Hiawatha Transmission Line Project
Draft
Environmental Impact Statement

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Prepared for the
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List of Acronyms and Abbreviations

AADT	annual average daily traffic
ac	acres
AC	alternating current
ACM	asbestos-containing materials
ACSR	aluminum conductor steel reinforced
AD	Anno Domini
ADT	average daily traffic
AES	Alternatives Evaluation Study
APE	Area of Potential Effect
APP	Avian Protection Plan
ASI	American Swedish Institute
ASR	Antenna Structure Registration
ATF	advisory task force
B.C.	Before Christ
BIL	basic impulse level
BMP	best management practices
CAA	Clean Air Act
CEDS	Comprehensive Economic Development Strategy
CFAS	Children, Family and Adult Services
CFR	Code of Federal Regulations
CM&StP	Chicago, Milwaukee and St. Paul Railroad
CO	carbon monoxide
CP	Canadian Pacific
CPED	Community Planning and Economic Development
CRFS	City Requested Special Facility Surcharge
CSAH	County State Aid Highway
dBA	A-weighted decibels
EDD	Economic Development District
EDR	Environmental Data Resources
EF	Experimental Forest
EIS	environmental impact statement
ELF-EMF	extremely low frequency electric and magnetic fields
EMF	electric and magnetic fields
EMF-RAPID	Electric and Magnetic Fields Research and Public Information Program
EMI	electromagnetic interference
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ER	environmental report

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ERM	Environmental Resources Management
ERP	OES Energy Regulatory Planning
ESA	Endangered Species Act
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHA	Federal Housing Authority
FHWA	Federal Highway Administration
FR	Federal Register
FSSS	U.S. Forest Service Sensitive Species
ft	feet
FTA	Federal Transit Authority
FY	fiscal year
GAP	Geographical Analysis Program
GHG	greenhouse gases
GHz	Gigahertz
GIS	gas insulated substation
GIS	Geographic Information Systems
GLO	General Land Office
GPS	Global Positioning System
HCHRA	Hennepin County Housing and Redevelopment Authority
HCRRA	Hennepin County Regional Rail Authority
HC-TSP	Hennepin County Transportation System Plan
HDD	horizontal directional drilling
HOBT	Heart of the Beast Puppet and Mask Theater
HPC	Historic Preservation Commission
HUD	Housing and Urban Development
HVTL	high voltage transmission line
IBPOA	Industrial Business Park Opportunity Areas
INHS	Illinois Natural History Survey
INNIRP	International Commission on Non Ionising Radiation Protection
kcmil	thousand circular mils
kHz	kilohertz
kV	kilovolt
LCC	local control cabinet
LE	Landscape Ecosystem
LEP	limited English proficiency
LGU	local government unit
LLC	limited liability company
LOS	level of service
LRT	light rail transit

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LTC	load tap changer
MA	Management Areas
MBBAP	Minnesota Breeding Bird Atlas Project
MBTA	Migratory Bird Treaty Act
MCBS	Minnesota County Biological Survey
MCC	Metro Conservation Corridors
MCVA	Minnesota Convention and Visitors Association
MCWD	Minnehaha Creek Watershed District
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MDOC	Minnesota Department of Commerce
MDNR	Minnesota Department of Natural Resources
µg	micrograms
mG	milliGauss
mi	miles
MIA	Minneapolis Institute of Arts
MMBF	million board feet
MnDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MNPRO	Minnesota Department of Employment and Economic Development
MOU	Memorandum of Understanding
MP	mile post
MPCA	Minnesota Pollution Control Agency
mph	miles per hour
MPRB	Minneapolis Park and Recreation Board
MPUC	Minnesota Public Utilities Commission
MSIWG	Minnesota State Interagency Working Group
µT	micro Teslas
MVA	mega voltampere
MW	megawatt
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NAC	Noise Area Classification
NADP	National Acid Deposition Program
NDEX	North Dakota Export
NERC	North American Electric Reliability Corp
NESC	National Electrical Safety Code
NEPA	National Environmental Policy Act
NHIS	Natural Heritage Information System
NHPA	National Historic Preservation Act

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NIEHS	National Institute of Environmental Health Sciences
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O_3	ozone
OAQPS	Office of Air Quality Planning and Standards
OHVs	off-highway vehicles
OSHA	Occupational Safety and Health Act
OAHP	Office of Archaeology and Historic Preservation
OES	Office of Energy Security
OSA	Office of the State Archaeologist
PACMs	presumed asbestos-containing materials
PAHs	polycyclic aromatic hydrocarbons
Pb	lead
PCP	pentachlorophenol
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
PPE	personal protective equipment
ppm	parts per million
PSCW	Public Service Commission of Wisconsin
PSD	Prevention of Significant Deterioration
PUC	Minnesota Public Utilities Commission
PVC	polyvinyl chloride
PWI	Public Waters Inventory
RF	radio frequency
ROC	Region of Comparison
ROD	Record of Decision
ROW	right-of-way
RSPD	Research and Strategic Planning Division
RSEA	Regionally Significant Ecological Areas
RTE	rare, threatened, and endangered
SHPO	State Historic Preservation Office
SIO	scenic integrity objective
SNA	Scientific and Natural Area
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SR	State Route

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SWPPP	Storm Water Pollution Prevention Plan
SWMA	State Wildlife Management Area
TCP	Traditional Cultural Property
TOD	Transit-Oriented Development
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USDOE	U.S. Department of Energy
USDOT	U.S. Department of Transportation
USEDA	U.S. Economic Development Administration
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
VMS	Visual Management System
VQOs	Visual Quality Objectives
WHO	World Health Organization
WIB	Workforce Investment Board
WMA	Wildlife Management Area
XLPE	cross-linked polyethylene

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Abstract

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The Public Utilities Commission (Commission) is considering the Project proposed by Xcel Energy for the Hiawatha Transmission Line.

The Project consists of two new 115 kV transmission lines and two new substations to be located in south Minneapolis, Hennepin County, Minnesota.

This Draft Environmental Impact Statement (EIS) was produced to satisfy the environmental review requirements for the Project.

Additional information on the Project is available in the Project application listed in the References section of this Draft EIS. Other material related to this docket is available online at:
http://energyfacilities.puc.state.mn.us/Docket.html?Id=19981

This Draft EIS was released on January 8, 2010. **Comments on the adequacy of the Draft EIS will be accepted until Wednesday, March 10, 2010**. Comments should be sent by email or U.S. mail to:

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Following the comment period, the Draft EIS will be revised to incorporate comments and a Final EIS will be issued.

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Summary

This Draft Environmental Impact Statement (EIS) Summary provides an overview of the proposed project and its alternatives evaluated, the regulatory framework under which the Draft EIS was prepared, and significant findings of the document.

I. Project Introduction

Xcel Energy (the Applicant) has proposed to construct two new distribution substations connected by two new 115 kilovolt (kV) transmission lines (referred to herein as the "Project" or "Hiawatha Line") in Minneapolis, Hennepin County, Minnesota. Due to the complexity of running transmission facilities through a largely developed urban area, several transmission line routes and substation locations have been identified as alternatives in the Draft EIS.

Proposed Project and Alternatives

The Project would require one new transmission line route to be connected to two new substations. One substation is to be located at the eastern end of the transmission line (referred to as the Hiawatha Substation) and the second substation is to be located at the western end of the transmission line (referred to as the Midtown Substation).

In accordance with the Minnesota Department of Commerce, Office of Energy Security's (OES) Scoping Decision on September 1, 2009, a total of five transmission line route alternatives, seven location alternatives for the Hiawatha Substation, and four location alternatives for the Midtown Substations are to be considered in the Draft EIS (DEIS). As a result of the initial evaluation process, several of these alternatives were found to be technically infeasible and therefore, were not carried forward for detailed analysis later in the DEIS. A detailed discussion on this determination is presented in Chapter 1.

The analysis contained within the Draft EIS was performed for the Project Area. The Project Area is defined as the requested route widths for the five route alternatives (Routes A, B, C, D and E2) and the six substation alternative sites (Hiawatha West, Hiawatha East, Midtown North, Midtown South, Mt-28N, and Mt-28S) which were carried forward for detailed analysis in the Draft EIS.

The transmission line routes and substation locations are shown in Figures 1-2 through 1-6.

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Route A

Route A is a 1.4-mile route that can be constructed overhead or underground. The transmission lines would connect at the Hiawatha West substation site and parallel the 29th Street/Hennepin County Regional Rail Authority ("HCRRA" or "Midtown Greenway") corridor for approximately 1.4 miles to the Midtown North substation site. If constructed overhead, the transmission line would be built with galvanized steel single pole, double circuit structures. The estimated transmission line cost for construction of the two transmission lines along this route using an overhead configuration is $3.0 million. The estimated transmission line cost for constructing the transmission lines using underground construction along this route is $15.6 million.

Route B

Route B is proposed as an overhead street route that would require construction of two single circuit lines because there is insufficient clearance for double circuit structures. Galvanized steel single circuit single pole structures would be used. One of the transmission lines would follow 26th Street between the Hiawatha West and Midtown North substation sites. The second line would follow East 28th Street. On both streets, the arms of the poles would be cantilevered over the roadway. The estimated route lengths of the two lines are 1.8 and 1.4 miles. The cost for construction of the transmission facilities along this route is estimated to be $5.0 million.

Route C

Route C is also proposed as an overhead street route that would require construction of two single circuit lines because there is insufficient clearance for double circuit structures. Galvanized steel single circuit single pole structures would be used. One of the transmission lines would follow East 28th Street between the Hiawatha West and Midtown North substation sites. The second line would parallel 31st Street. Both would use a cantilever pole configuration. The estimated route lengths of the two lines are 1.5 and 2.3 miles. The estimated cost for construction of the transmission facilities along this route is $5.8 million.

Route D

Route D is proposed as a 1.5-mile underground route along East 28th Street. This route is designed for a double circuit 115 kV transmission line between the Hiawatha West and Midtown North substation sites. The estimated transmission line costs for construction of the underground transmission facilities along this route is $16.4 million

Route E2

Route E2 is an overhead street route that would require construction of two 115 kV transmission lines on double circuit steel pole structures with a galvanized steel finish totaling approximately 3.2 miles. Route E2 begins at the Hiawatha Substation and crosses both Hiawatha Avenue and the Metro Transit Hiawatha Light Rail Line near the intersection of East 28th Street. The transmission line route then travels north along the west side of Hiawatha Avenue South towards I-94. At I-94, the route turns west and follows along the south side of I-94 toward I-35W. At I-35W, the route turns south and follows along the east side of I-35W until approximately West 26th Street. The transmission line route then turns west, crosses I-35W, turns south, and continues along the west side of I-35W until it reaches the Midtown Substation. The transmission line route then crosses I-35W once more to connect to the Midtown Substation located on the east side of I-35W.

Hiawatha Substation Alternatives

Engineering design of the Hiawatha Substation would be dependent upon the location selected; however, every Hiawatha substation alternative would require the following equipment:

- Four 115 kV transmission lines dead-end structures and related substation equipment and structures (an additional three dead-end structures would be required to connect two of the lines into the correct electrical position in the substation, and one for transformer termination);
- One 50 mega voltampere (MVA), 118-14.4 kV, Load Tap Changer (LTC) distribution transformer;
- One switchgear enclosure containing six 13.8 kV distribution feeders with associated equipment; and
- One electrical equipment enclosure containing all electrical controls, protective relaying and auxiliary equipment for the operation of the substation (Xcel Energy, 2009).

Hiawatha West Substation

The Hiawatha West Substation is the Applicant's preferred location for the Hiawatha Substation. The substation is located on the east side of Hiawatha Avenue (Minnesota State Highway 55) slightly south of the intersection of Hiawatha Avenue and East 28th Street. The site consists of a vacant lot currently owned by the Minnesota Department of Transportation (MnDOT). As such, no demolition or business relocation would be required prior to construction of the substation. The substation would be designed as a low-profile substation covering a footprint of 253 feet by 392 feet, or approximately 2.25 acres.

Hiawatha East Substation

The Hiawatha East location is the Applicant's proposed alternative location for the Hiawatha Substation. Hiawatha East is located on adjacent land to the northeast of Hiawatha West. Currently, the site is developed with an occupied warehouse that would need to be demolished and its tenants relocated. The substation would be designed as a low-profile substation covering a footprint of approximately 284 feet by 481 feet, or approximately 3.15 acres.

Underground Hiawatha West Substation

In addition to the two above listed Hiawatha Substation location alternatives, the ATF proposed that an underground design of the Hiawatha substation be considered. The Applicant evaluated the technical feasibility and cost of undergrounding a transmission substation located at the Hiawatha West Substation site.

The Hiawatha West Substation would consist of a cast-in-place, reinforced, concrete underground enclosure of approximately 38,000 square feet. The substation would consist of a three-story building (including the cable vaults) constructed completely underground (approximately 60 feet below grade) with a landscaped green space on the ground surface above the substation. The substation would include a 115-kV four-bay breaker-and-a-half Gas Insulated Substation (GIS), four 115-kV transmission lines, three 115-13.8-kV 30/40/50MVA transformers, and three lineups of 13.8-kV switchgear.

Midtown Substation Alternatives

Engineering design of the Midtown Substation would be dependent upon the location selected; however, every Midtown substation alternative would require the following equipment:

- Two 115 kV transmission lines, steel, box, structures and related substation equipment and structures;
- One 70 MVA, 118-14.4 kV, LTC distribution transformer; and
- One electrical equipment enclosure initially containing nine, 13.8 kV distribution feeders with associated equipment, all electrical controls, protective relaying, and auxiliary equipment for the operation of the substation (Xcel Energy, 2009).

Midtown North Substation

The Midtown North Substation is the Applicant's preferred location for the Midtown Substation. Midtown North would be located on the northwest corner of Oakland Avenue South and 29th Street. Currently, the site is occupied by the former Xcel Energy Oakland Substation, a condemned triplex, and a vacant lot. The substation would be designed as a high profile substation covering a footprint of approximately 145 feet by 228 feet, or approximately 0.75 acres.

Midtown South Substation

The Midtown South Substation is the Applicant's proposed alternative location for the Midtown Substation. Midtown South would be located on the southwest corner of Oakland Avenue South and 29th Street. The site is currently developed as a warehouse occupied Brown Campbell. The warehouse would need to be demolished and its tenant relocated prior to construction of the substation. The substation would be designed as a low profile substation covering a footprint of approximately 245 feet by 249 feet, or approximately 1.4 acres.

Mt-28N Substation

Substation Mt-28N, to be located at 2701 Wells Fargo Way, was proposed by the ATF. Mt-28N is located on a vacant property on the east side of I-35W, bordered to the south by East 28th Street. The Mt-28N Substation is located four blocks west of the Midtown North and South Substations, and would require expanded Route lengths for Routes A, B, C, and D. The site is a private green space owned by Wells Fargo. The site is large enough for either the low or high profile substation design.

Mt-28S Substation

Substation Mt-28S, to be located at 2840 4th Avenue South, was proposed by the ATF. Mt-28S is located on a vacant property on the east side of I-35W, bordered to the north by East 28th Street and to the south by East 29th Street. The Mt-28S Substation would be located four blocks west of the Midtown North and South Substations, and would require expanded route lengths for Routes A, B, C, and D. The site is currently being used as a shuttle parking lot for Children's Hospital. The site is large enough for either the low or high profile substation design.

II. Regulatory Framework

The Project is considered a High Voltage Transmission Line (HVTL) under Minnesota Statutes, chapter 216E (Minnesota Power Plant Siting Act) and requires a route permit from the Commission. The Hiawatha Transmission Project HVTL Route Permit Application was submitted by the Applicant to the Commission in April 2009, pursuant to the provisions of the Full Permitting Process as outlined in Minnesota Rules, parts 7850.1700 to 7850.2700.

In accordance with the Minnesota Power Plant Siting Act, a Public Information/Scoping Meeting, a Scoping Decision, development of an environmental review document and a Public Hearing must be completed by the state prior to a permit being issued.

The environmental review document (i.e., the EIS) is prepared by the OES. The EIS is a written document that describes the human and environmental impacts of a proposed project and selected alternative routes and methods to mitigate such impacts.

The public has the opportunity to comment on the scope of the EIS and the Draft EIS through public comment periods and at OES sponsored information meetings. A Draft EIS will be completed and made available prior to the public hearing.

III. Affected Environment, Impacts, and Mitigation

The Project is located in south Minneapolis, Minnesota in Hennepin County, and has potential to impact the neighborhoods of Central, Corcoran, Elliot Park, Longfellow, Loring Park, Phillips, Powderhorn Park, Seaward, Stevens Square-Loring Heights, Ventura Village, and Whittier. The area surrounding the transmission line alternatives varies in use from primarily residential to commercial, light and medium industrial, parks and major transportation corridors. The area surrounding the Hiawatha Substation sites is mainly commercial and industrial on both the eastern and western sides of Hiawatha Avenue. The area surrounding the Midtown Substation sites is light industry, single and multi-unit residential and commercial.

Chapter 5 of the DEIS includes a discussion of the various resources within the affected environment, the potential impacts to those resources, and mitigative measures that may be incorporated into the design, construction and operation of the Project to minimize the identified impacts.

The sub-sections describing the affected environment include a description of the specific resources as they relate to the proposed Project and each alternative considered. The resource categories include: properties in proximity to structures; land use, zoning, and planning; archaeological and historical; socioeconomic; environmental justice; safety and health; recreation and tourism; aesthetics; water resources; flora; fauna; rare and unique natural resources; air quality and climate; noise; Utility systems/infrastructure; and transportation and public services.

Potential direct and indirect impacts were identified and evaluated for each of the identified resource categories. The potential impacts of the Project and the Project alternatives are discussed in detail in Chapter 5.0 and summarized below.

A more detailed summary of the potential impacts and possible mitigations is presented in tables following this discussion.

Proximity to Structures

Information was gathered and examined to determine the number and type of existing properties located within specified distances of transmission line towers (i.e., poles) and within alternative substation locations.

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No homes would be displaced by any of the alternatives; however, limitations may be placed on existing and future uses of property. Potential impacts to properties that are located on possible substation locations include the demolition of existing structures for placement of Project structures and changes or limitations to the existing use.

Impacts to properties related to overhead transmission line towers can essentially be eliminated by developing one of the underground construction transmission line alternatives (Routes A or D). If an overhead route alternative is selected, the final transmission line design could be completed (i.e., micro-siting) with the objective of minimizing the number of structures within the "fall distance" of the tower to the extent practicable. In some cases, it may be possible to move towers away from homes.

Land Use, Zoning, and Planning

Zoning is used as a means of regulating permitted land uses in the State of Minnesota. Minnesota Statutes provide for this authority to promote the health, safety, morals, and general welfare. Minneapolis regulates zoning within the area covered by the analysis in this EIS.

Potential land use impacts from the Project include: incompatibility with local land use, zoning, and comprehensive planning; incompatibility with development; and loss of or restricted use to landowners.

While local approvals are not required for the construction and operation of the transmission line, knowledge of current zoning designations for each transmission line alternative and substation alternative is valuable since zoning can provide insights into the possible impacts of the Project on existing and future development plans.

The primary conflict between the Project and current land use is associated with the visual impact to the surrounding areas. The transmission line route alternatives would primarily be located along existing rights-of-way. The use of these pre-existing ROWs would limit the disruption to the existing urban fabric.

The majority of visual impacts related to overhead transmission lines can essentially be eliminated by developing one of the underground construction transmission line alternatives (Routes A or D). However, should an aboveground alternative be selected, measures such as landscaping with native vegetation or vegetation that is similar to existing plantings, as well as the use of custom designed structures specific to the area would minimize the visual impacts. In addition, any vegetation that would be removed could be restored after the construction of the facilities, to the extent allowed by vegetation restrictions. In some locations, existing distribution lines also could be placed underground to reduce the over head clutter.

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For the substations, low-profile designs and architecturally designed walls would reduce the visual impacts.

Archaeological and Historical Resources

Cultural resources include material remains of past human activities, both prehistoric and historic. Cultural resources management seeks to identify and protect all of these types of cultural resources with the goals of enhancing understanding of human behavior and protecting cultural practices.

Potential impacts to archaeological and/or historic resources includes: disruption or damage to existing archaeological resources not yet identified and impacts associated with views both from and to historic properties.

Placing underground alternatives within previously disturbed and/or public right-of-way is one way of minimizing the potential for adverse effects to archaeological resources. In the event that any archaeological sites, human remains, or associated artifacts are discovered during construction, activities would need to cease immediately. The State Historic Preservation Office and other relevant officials would be notified, and if necessary, interested federally recognized tribes.

Strategies for minimizing the visual impacts to or from historic features include: selection of an underground alternative for the transmission line; use of custom designed structures (i.e., towers); use of low-profile design and decorative walls for the substations; and landscaping disturbed areas.

Socioeconomics

Population, housing, employment, and income characteristics make up the socioeconomic fabric of the affected communities.

Potential impacts on socioeconomics include: an increase in local spending during construction activities; an increase to the local tax base from utility property; disruption to local businesses during construction activities; displacement (substation sites) of local businesses; perceived loss of property values; and the availability of federal assistance mortgage loan insured by the Federal Housing Administration.

Potential impacts on land-based economies, such as mining, fisheries, and agriculture are not anticipated. There is a potential impact to urban forestry as each transmission line alternative will involve the removal or trimming of a varying number of trees. The impact of the vegetation maintenance within the right-of-way of the transmission lines may include: increased energy cost to home owners whose residences benefited from the cooling effect of affected shade trees and perceived loss of property values due to loss of large trees.

Environmental Justice
In general, the transmission line route and substation alternatives are located in areas where the minority population exceeds 50 percent and the percentage of low income population generally exceeds the state level by 20 percentage points. As such, these populations would be impacted more often than other non-minority and non-low income property owners and residence.

The Project is not expected to result in a direct economic hardship to minority or low income populations. While no individual homes would be displaced by this Project, businesses may be relocated due to the construction of the substations. If any property owners are displaced they would be compensated for the property and could be assisted with relocation.

Safety and Health
Potential impacts concerning safety and health issues include: disruption of contaminated soils or building materials during construction; electric and magnetic fields; interference with implantable medical devices; stray voltage; security of equipment; and storm damage.

Depending upon its nature and extent, existing contamination (i.e., soil, groundwater, and building materials) can pose a health and safety hazard to construction workers and nearby public. In addition, soil disturbances required during construction, such as excavation and grading, could result in mobilization of existing soil contamination. Standard practices for the testing, handling, containment, transportation and disposal of hazardous materials do exist and would be employed if such material is encountered.

Electric and Magnetic Fields (EMFs) are invisible regions of force resulting from the presence of electricity. Naturally occurring EMFs are caused by the earth's weather and geomagnetic field. Man-made EMFs are caused from any electrical device and found wherever people use electricity. Estimates of the anticipated strength of the EMF generated from the transmission lines and modeled exposures to the public are within established acceptable guidelines for all transmission line alternatives.

Stray voltage is a condition that can occur at the electric service entrances to structures, that is, where distribution lines enter structures. More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel and immediately under

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the transmission line. Standard industrial designs, including line configuration, separation and enhanced grounding, can mitigate any potential for stray voltage to impact distribution lines.

Vandalism to towers and substations and theft for copper wire and scrap metal could create serious harm to the individual engaging in the activity, as well as compromise the safety of the affected high voltage equipment and endanger workers who operate or maintain the transmission lines and substations. All substation alternatives would be surrounded by a 12-foot wall and a chain-link gated fence. Should vandalism or theft affect the transmission lines, the protective devices (i.e., breakers and relays located where the line connects to the substation) would de-energize the line upon sensing a fault on the system.

Transmission poles and towers are designed and constructed to withstand the extreme wind and weather conditions normally experienced in their area of installation. Should severe weather drop a transmission line, the protective devices (i.e., breakers and relays

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located where the line connects to the substation) would de-energize the line upon sensing a fault on the system.

Recreation and Tourism
Minneapolis contains a number of recreation and tourism destinations that provide opportunities for active recreation, such as exercise, team sports, and child's play, and for passive recreation, such as picnicking, bird watching, fishing and general enjoyment of one's surroundings.

Potential impacts on recreational opportunities and tourism include: temporary restricted access to trails and pedestrian walk-ways, along with increased noise during construction activities; and changes to visual landscape.

No significant permanent impacts to recreational opportunities are expected; as stated previously, selection of an underground alternative for the transmission line would eliminate the visual impacts of the overhead transmission line alternatives.

Aesthetics
A large proportion of the Project Area is residential in character, complemented with supporting uses such as churches, schools and corner retail. The residential units are primarily one to two story single family houses and duplexes, but a number of two to three story multi family buildings also exist. Many of the route alternatives are within a few blocks of, and run parallel to, Lake Street, which is a commercial corridor that spans the full width of south Minneapolis.

The transmission lines and substations would be visible to many residents living in the area, as well as those traveling through the area; potential impacts include changes to the visual landscape.

To minimize the impact of overhead line construction the Applicant has proposed several measures, depending on the route selected. These include: relocation of distribution line underground to reduce overhead clutter, use of special structures with narrower bases, and placement of transmission structures to minimize direct impacts.

To minimize the visual impact of the substations, the Applicant has proposed low-profile designs and the construction of decorative, architecturally designed walls.

The selection of an underground alternative for the transmission line would eliminate the visual impacts of the overhead transmission line alternatives.

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Water Resources

There are no Public Water Inventory water bodies, National Wetland Inventory wetlands, or floodplains within the Project Area. Depending on site specific conditions, final design, and the construction methodologies, dewatering of the groundwater may be necessary. Potential impacts to water resources from construction activities include erosion and sedimentation of surface bodies from storm water runoff.

Commonly used best management practices can minimize the potential impacts of erosion and stormwater runoff during construction and dewater activities.

Flora

Potential impacts to flora from the transmission lines primarily result from disturbance required for the construction foot-print (i.e., tower foundations) and the requirement to restrict the height of vegetation within the right-of-way. Substation locations would require clearing of vegetation in preparation for construction. Potential impacts include: loss of individual trees; loss of habitat for wildlife species; loss of atmospheric carbon absorption, increased energy costs from reduced shade; perceived loss of property values; and loss of visual screening and aesthetics.

Due to urbanization and development of the Project Area, potential direct and indirect impacts from the Project to flora would be limited. Measures to minimize the impacts would include restoration of rights-of-way and temporary work spaces, including re-vegetation to return disturbed areas to their existing condition as far as practicable within the ROW vegetation protocol.

Selection of the underground alternative along 29th Street (Route A underground) would minimize disturbance to the vegetated slopes of the Midtown Greenway during construction and maintenance activities.

Fauna

The Project Area is a highly developed urban environment with patches of natural areas present in the city parks and the Midtown Greenway. Additionally, trees and shrubs planted along the boulevards and around houses provide wildlife species with habitat and food. Wildlife found in the Project Area and surrounding vicinity includes species adapted to living in areas disturbed by humans. Small mammals found in the urban environment include mice, voles, raccoons, squirrels, opossums, skunks, and bats. Both migratory and resident birds are found in the area.

There would be no direct or indirect impacts to aquatic wildlife from the transmission lines. Transmission lines would not cross aquatic areas and construction of transmission lines would not impact aquatic habitats.

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Potential impacts to wildlife include: loss of habitat; disturbance from construction, clearing, and maintenance activities; and changes in mortality rates due to such things as avian collisions or electrocution. Impacts can be minimized through commonly used construction best management practices and transmission structure design choices.

Rare and Unique Natural Resources

Five state-listed species or special communities have been identified within 1 mile of the Project Area: Blanding's turtle (*Emydoidea blandingii*), Peregrine falcon (*Falco peregrinus*), Eastern pipistrelle (*Pipistrellus subflavus*), Handsome sedge (*Carex formosa*), and Black sandshell (*Ligumia recta*). None of these species have been identified within the rights-of-way of any of the transmission line alternatives; however, the habitat of the Blanding's turtle may be intersected by Route C. No rare or unique species were identified at the sites proposed for development of substations, and the sites are not considered to be critical habitats for any of the species identified in the area.

Potential impacts to rare and unique natural resources are primarily associated with direct effects, including the taking (removal or loss) of an individuals or populations due to habitat destruction; and a change in an individual or population's habitat use due to noise, or disturbance from construction, clearing, and maintenance activities. Given the location of transmission lines and substations relative to identified species and habitat, the Project is not expected to significantly impact rare and unique natural resources.

Air Quality and Climate

Air quality is monitored in the Project Area at H.C. Anderson School, located at approximately 27th Street and 10th Avenue, by the Minnesota Pollution Control Agency as part of its statewide network of monitoring sites designed to determine compliance with national air quality standards. As reported in the MPCA Annual Air Monitoring Network Plan for the State of Minnesota (MPCA, 2009), the entire state of Minnesota, including the Twin Cities area, has been in compliance with national standards since 2002.

Potential impacts to air quality and climate include: temporary changes in air quality due to construction activities; and loss of carbon sequestrating vegetation. Commonly used best management practices can minimize potential for temporary impacts to air quality during construction. Vegetation losses can be minimized through route selection and re-vegetation of disturbed areas.

Noise

Noise is typically defined as "unwanted sound." It may be as mild as a general nuisance, such as a noise causing distraction or masking desired sounds, or severe enough to impede communication, affect behavior, and cause temporary or permanent hearing loss.

Noise generated by construction equipment is likely to constitute the greatest noise impact. Earth moving machinery including bulldozers, front end loaders, and other supporting equipment such as cranes and compressors can generate temporary noise.

Operational noise impacts can potentially occur along the transmission lines and at the substations, but the noise levels produced are not expected to exceed background levels in most cases. Transmission conductors and transformers at substations produce audible noise levels depending upon weather conditions and their design (e.g., conductor conditions and voltage levels). In foggy, damp, or rainy weather conditions, power lines can emit a subtle crackling sound due to the small amount of the electricity ionizing the moist air near the wires.

Sound absorbing panels, proposed by the Applicant, will reduce noise at the substations. Construction activities will comply with Minneapolis' noise ordinance noise and will be limited in duration.

Utility Systems

The Project would be located in a highly developed urban environment, one in which a variety of utility infrastructure already exist and that may be affected during construction or operation of the Project, including communications networks, water and wastewater systems, oil and natural gas pipelines, and transmission lines.

Potential impacts to existing utility systems include: interference with communication networks (microwave signals, cellular phones, radio, television, etc.); damage to or disruption in services from construction activities on gas and oil pipelines; and conflicts with existing distribution lines. These impacts can be mitigated by coordinating with the providers of these services during the detailed design and construction phases of the Project.

Transportation and Public Services

The Project Area lies within a fully developed portion of Minneapolis served by many modes of transportation and reliant on numerous transportation facilities. A north-south local street grid with roughly one-tenth mile spacing provides access to parcels, augmented by a system of higher functional streets at the county, state and federal level to provide mobility. Grade-separated light rail transit and pedestrian/bike-ways further enhance transportation options.

Potential impacts to existing transportation and public services include the disruption of roadways, pedestrian paths, and bicycle facilities during construction activities. These can be mitigated through well coordinated road closures and well planned detour routes.

Transmission lines and structure also can interfere with sightlines at alleys and intersections and interfere with pedestrian and wheelchair use of sidewalks, creating safety hazards. These can be mitigated through careful attention to transmission structure placement and eliminated through selection of an underground alternative.

It should be assumed that a listed impact for an affected environment applies to all transmission line route and substation location alternatives unless a specific alternative is identified.

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Table ES-1: Summary of Impacts

Resource	Direct and Indirect Impacts of Project and Proposed Alternatives
5.1 – Proximity to Structures	The following are the number of properties located within a 115' "fall distance" for each route alternative. The definition for "fall distance" is provided in HUD Handbook 4150.2, which states that "[f]or field analysis, the appraiser may use tower height as the fall distance." Note that "other" includes places of worship, daycares, schools, cemeteries, hospitals, and mixed use, etc.: • Route A (overhead): 17 residential structures; 21 commercial enterprises; 3 other. • Route A (underground): none – "fall distance" not relevant since route is underground. • Route B: 146 residential structures, 20 commercial enterprises, 11 other. • Route C: 204 residential structures; 23 commercial enterprises; 14 other. • Route D: none – "fall distance" not relevant since route is underground. • Route E2: 76 residential structures; 10 commercial enterprises; 4 other.
	The following existing properties would require demolition and relocation in order to accommodate the substations: • Hiawatha East: Warehouse Complex. • Hiawatha West: Vacant Lot. • Midtown North: Condemned Triplex, Former Xcel Energy Oakland Substation, and Vacant Lot. • Midtown South: Warehouse Complex. • Mt-28N: Green Space. • Mt-28S: Shuttle Parking Lot for Children's Hospital.
5.2 – Land Use, Zoning, and Planning	No land use or zoning categorizations would be impacted directly.
	There is a potential for communities to utilize the new power generated to support future development, either as new projects or as infill.
	Some overhead transmission line route alternatives require moving existing distribution lines underground. Some clutter may be removed resulting in a positive impact within the affected areas. However, in locations where the lines are not moved underground, the Project will contribute to the overall overhead clutter.
	Overhead transmission lines may create an industrial appearance in residential and commercial areas and are inconsistent with urban design directions suggested within many of the local land use plans.
	Visual intrusions created as a result of overhead transmission lines may discourage additional residential or higher density development.
	Overhead alternatives are not consistent with pedestrian friendly and pedestrian scale designs (i.e., pedestrian oriented development).
	Overhead transmission lines have the potential to negatively impact affected residential property values and their ability to acquire Federal Housing Authority (FHA) loans. This may negatively impact future residential development.
	The Project may eliminate existing green space, especially within the area of the Midtown Greenway, which is inconsistent with the goals of removing industrial properties from these areas and preserving existing green space.
	There would be a temporary (during construction) and permanent loss of use for landowners in affected areas where existing utilities are not presently located.
	There would be permanent loss of use in areas utilized that are outside of existing ROWs; however, this loss of space would be minimal due to the small footprint required by each transmission line.

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Resource	Direct and Indirect Impacts of Project and Proposed Alternatives
5.2 – Land Use, Zoning, and Planning (Continued)	During construction, there would be noise, dust, and additional traffic not typically associated with the existing land uses in residential, recreational, and commercial areas. In addition, there would be indirect effects from visual intrusions during construction and operation.
	Some substation sites may be improved as the Applicant would manage previously contaminated soils.
	Industrial uses would be added to areas rather than removed as directed in local area plans, especially if the Midtown locations are selected.
	Could discourage high density residential development.
	There is a potential that business developers may perceive the industrial uses as a deterrent to successful operations.
	Visual intrusions may be created with the addition of industrial properties.
	There would be a temporary (during construction) and permanent loss of use for landowners in affected areas where existing utilities are not presently located.
	Permanent loss of use would result from Hiawatha East Substation, as it would require the Crew business to be removed from its existing location, and the removal of existing buildings also would be required.
	Permanent loss of use from Midtown South Substation, as it would require the Brown Campbell Enterprises business be removed from its existing location, and the removal of existing buildings also would be required.
	Mt-28S Substation would require the removal of an existing parking area, which may impact the users of this lot. Shuttle services and parking would need to be relocated or accommodated in the design of this substation. This would affect the commuting patterns of the employees and visitors who utilize this service, creating additional demand on other parking areas used for businesses in this area.
5.3 – Archaeological and Historical Resources	Overhead transmission line route alternatives and above ground substation locations may negatively impact the integrity of the overall historic district.
	During construction, ground disturbing activities may cause damage to above ground features considered as contributing historic features in the district.
	Unidentified archaeological resources may be impacted by activities occurring below the ground surface.
	Overhead transmission line route alternatives and above ground substation locations may have a negative impact to known historic resources.
	Overhead transmission line route alternatives and above ground substation locations would introduce modern features within or near the historic district and would likely be considered an intrusive and adverse effect to the historic landscape.
	Overhead transmission line route alternatives and above ground substation locations may indirectly impact the visual aspect of historic architectural resources associated with the affected areas.
	Overhead transmission line route alternatives and above ground substation locations may have a negative impact to resources associated with residential development.

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<table>
<tr><th>Resource</th><th>Direct and Indirect Impacts of Project and Proposed Alternatives</th></tr>
<tr><td rowspan="12">5.4 – Socioeconomics</td><td>The total direct wages and salaries paid to local workers that may have the opportunity to work on the project would be negligible due to the small size of the crew to be used for construction.</td></tr>
<tr><td>Through the circulation and recirculation of dollars paid out by the Applicant as business expenditures and taxes, additional personal income would be generated for residents in the city of Minneapolis and Hennepin County.</td></tr>
<tr><td>During operation, increasing transmission capacity and reliability would be an economic benefit to the surrounding communities and businesses, as it could help to assure that income would not be lost as a result of potential brownouts or temporary losses of power from severe weather events.</td></tr>
<tr><td>An increase to the local tax base could occur, resulting in an incremental increase in revenue from utility property taxes.</td></tr>
<tr><td>Residents, local business owners, and customers in the Project Area primarily would be affected by temporary construction activities and permanent aesthetic changes.</td></tr>
<tr><td>At the Hiawatha East Substation, the buildings associated with the company currently existing there (i.e., Crew) would need to be removed and the current business would need to be relocated and both employee and client access may be impacted. If Crew was relocated to a location outside of the Project Area, there could be a loss in expenditures made in the Project Area from the workers, as well as a loss of revenues to the local tax base. The Crew business itself also could be impacted if its customers are based on its current location.</td></tr>
<tr><td>If the Midtown South Substation was selected, the two properties currently owned and occupied by the Brown Campbell Enterprises would need to be demolished and the businesses would need to be relocated. Similar to the Crew business, employees and customers would be affected. Employees who reach the work site by public transit may have to alter their commuting patterns and some employees may not be able to continue their employment with the Brown Campbell Enterprises. The customers also may have to adjust the type and amount of trips they take to reach the properties. This could result in the potential loss in expenditures contributed by workers at the business and revenues to the local tax base, as well as impact the business itself, especially if its customer base is dependent on the location.</td></tr>
<tr><td>If the Mt-28N Substation is selected, the green space, owned by the Wells Fargo Home Mortgage company and currently used by their employees, would no longer be available. The loss of green space may indirectly impact other businesses, which wish to purchase or rent property in the area. This type of land use provides a local amenity, as compared to the presence of a substation.</td></tr>
<tr><td>If the Mt-28S Substation is selected, the space which is currently used for shuttle parking for the Children's hospital would be lost. The loss of this parking lot may impact employees and residents who use this facility. Their commuting patterns would have to be adapted in order to locate parking in other facilities. This would be an indirect impact, as convenient access to the institutions and businesses nearby may be affected. In addition, if revenue is generated by the use of this lot, this could be a loss to the owners or operators of the parking lot.</td></tr>
<tr><td>Transmission lines would not directly impact the residential property values. However, the perceived value of a residential property in the Project Area may decrease in response to one of the following indirect effects:
• Concern or fear of possible health effects from electric or magnetic fields (EMF).
• The potential noise and visual unattractiveness of the transmission line.
• Potential interference with existing operations or foreclosure of present or future land uses.</td></tr>
<tr><td>Conversely, the perceived value of property could increase if:
• Cleanup and remediation activities take place at proposed sites with currently contaminated soil and groundwater, eliminating future clean up costs or environmental risks.
• Increased local electrical reliability enhances opportunities for development of commercial or industrial interests.</td></tr>
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Resource	Direct and Indirect Impacts of Project and Proposed Alternatives
5.5 – Environmental Justice	All alternatives are located in areas where the minority population exceeds 50 percent and the percentage of low income populations generally exceed the state level by 20 percentage points (i.e., Routes A, B, and D). These groups would be affected more often than other non-minority and non-low income property owners.
	The construction and operation of the Hiawatha East and Midtown South substations may impact local businesses that require demolition (i.e., Crew and Brown Campbell Enterprises).
	The relocation of businesses that require demolition may impact the employees' and customers' ability to travel to work or to conduct business.
	The relocation of businesses that require demolition may affect individuals employed at this location, as well as customers and the business operations. Customers for the business also may be impacted if their selection of these services was based on the location, ease of accessing the retail component of the business, or their decision to deal with a local business. In addition, this business may be reliant on the local clientele within the nearby neighborhoods. Moving the location may affect their existing client base.
	Residents in the Project Area primarily would be affected by temporary construction and permanent aesthetic changes, such as but not limited to a loss of scenic resources. Both the construction and operation of the transmission lines and substations are considered to result in a disproportionate adverse impact because the proposed locations are within areas that are predominately home to minority and low income populations.
	Temporary inconveniences related to access and mobility may occur along the streets and properties in which construction would take place.
	Temporary impacts from dust and noise would be present, along with visual intrusions as a result of construction activities and equipment.
	The overhead design option would interfere with the visual nature of the Midtown Greenway, an aesthetically pleasing multi-modal path used by residents through the city of Minneapolis by contributing to overhead clutter. The residents of these neighborhoods would have more frequent interactions with this setting than those living outside of the Phillips neighborhood, through which most of this route crosses.
	The Mt-28N Substation would require the removal of the green space located on the Wells Fargo campus, which would directly impact the users.
	There may be an increase in the amount of tax revenue available to Hennepin County and the city of Minneapolis.
	There may be an increased in indirect employment opportunities as public services in these neighborhoods improve.
	There may be a long-term positive impact by providing a more reliable electrical system.
	Some business developers may perceive the presence of the transmission lines and substations as a disadvantage. Therefore, the opportunities for new businesses to locate within the neighborhoods affected by this Project may be impacted.
	The presence of these substations in any of the four locations may affect potential businesses, which view the substations as a visual intrusion, from locating in the Phillips neighborhood.
	If a current business is located within the area, employees and customers may be impacted due to limitations on access.

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Resource	Direct and Indirect Impacts of Project and Proposed Alternatives
5.6 – Safety and Health	During construction, disturbance of the ground surface may expose existing soil and groundwater contamination (petroleum products and arsenic), creating a health and safety risk to construction workers and the nearby public.
	During construction, existing contamination in soils could be mobilized through soil disturbance, creating an impact around a larger area.
	When demolition is required, lead-based paint and asbestos-containing materials could be encountered and released during the demolition process.
	There is potential for releases/spills of oils, diesel fuels, or gasoline construction equipment.
	The maximum electric field strength for aboveground route alternatives ranges from approximately 0.56 kV/m for Routes A and E2 to approximately 1.12 kV/m for Routes B and C.
	The maximum electric field strength for the underground alternatives (Routes A and D) is approximately 4.6 kV/m.
	Underground transmission lines generally produce weaker EMFs than overhead transmission lines due to their ability to be shielded and weakened by the earth, however, they may allow a pedestrian to be closer to the source, thus slightly increasing the impact.
	The maximum peak magnetic field strength for the aboveground route alternatives range from approximately 26.16 mG for Routes B and C to approximately 38.44 mG for Routes A and E2.
	The maximum magnetic field strength for underground alternatives (Routes A and D) range from approximately 13.08 mG for the 3,000 kcmil conductor option to 19.67 mG for the 1250 kcmil conductor option.
	All route alternatives and substation locations have equal potential for Electromagnetic Interference (EMI) with implantable medical devices, although underground construction options have the strongest measured electric field strength when measured at centerline at 1 meter above ground.
	All overhead route alternatives and substation locations have equal potential to electrically charge objects, resulting in potential shocks.
	The anticipated construction schedule for underground structures would be significantly longer than the anticipated construction schedule for overhead transmission lines and aboveground substations, increasing the timeframe that construction activities have to cause potential safety and health impacts.
	All overhead route alternatives and aboveground substation locations have equal potential to be impacted by vandalism and theft. Access to transmission line and substation facilities would be significantly reduced for underground routes and substations.
	If 115 feet is used as the general “engineering (design) fall distance,” Route A has the fewest number of residences within this distance compared to other overhead route options.
	All underground alternatives would have zero risk from tower collapse associated with severe weather.
5.7 – Recreation and Tourism	For Routes A, B, and C, access to the Greenway would be limited in areas where construction is taking place, requiring the Greenway users to find alternate routes or alternate access points.
	For Routes A, B, and C, restrictions in the use of the Greenway could temporarily impact the visitors of the shops and restaurants located on Lake Street.
	Construction-related noise and dust would impact the quality of the recreational experience at parks and the Greenway, potentially causing people to avoid these areas.
	The presence of transmission line structures for Route A may have a negative effect on the overall experience, perception, and sentiment associated with using the Greenway.
	Periodic maintenance and repair of the lines of Route A, whether overhead or underground, would create aesthetic impacts through the presence of equipment and workers in the Greenway area.
	Residents may need to use alternate routes to reach parks and other points of interest due to temporary road closures and access restrictions.
	Nearby parks, not adjacent to a route or substation alternative, may experience increased use during construction as they would offer an alternative location for recreation during construction.
	For Route C, Construction occurring in the vicinity of the Powderhorn Park during the May Day Parade (May) and the Powderhorn Art Fest (August) events may limit the number of attendants due to inconvenience of road closures, access restrictions, and other construction impacts.

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Resource	Direct and Indirect Impacts of Project and Proposed Alternatives
5.8 – Aesthetics	During construction, the overhead transmission line route alternatives and above ground substation locations may create negative visual impacts for the residents with a view to the transmission routes and those who travel by these locations due to the presence of construction equipment, excavation of foundations, staging areas, and structure and line installation.
	Trimming existing over story trees under the overhead transmission lines can severely impact the form and aesthetic character of these trees if not trimmed properly (i.e., lowering of the crown height).
	Galvanized metal used on overhead transmission lines could be perceived as an incongruent material in relation to the materials typically used in the adjacent residential, commercial, institutional or office uses (e.g., wood, brick, and architectural concrete).
	During construction of the underground transmission line, visual impacts would be experienced due to the presence of construction equipment, excavation and construction of the duct banks.
	Vegetation replacement above the duct banks needed for the underground transmission lines would need to be limited to shallow rooted species in order to avoid the possibility of deep rooted species invading the duct bank. The loss of over story trees within the Greenway for Route A, or along Minneapolis residential streets for Route D, would not be consistent with the vegetated character typical of Minneapolis residential streets.
	The overhead transmission structures and lines for Route A that pass to the north of Pioneers and Soldiers Cemetery would not be consistent with the pastoral quality of the cemetery and may be visible as people view the cemetery from Lake Street and Cedar Avenue.
	The mass and material of the overhead transmission structures, along with the proximity of the structures to the sidewalk, would not be consistent with streetscape elements that pedestrians typically encounter.
	The scale, material, and industrial character of the transmission structures would not be consistent with the building materials typically found in the residential housing along the Greenway or with other outdoor elements found in residential front or side yards.
	People looking out towards the streets or Greenway from the third floor or higher of the buildings located along the overhead routes may have the transmission lines pass through their field of vision.
	Diners dining outdoors and facing onto the Greenway at the Midtown Exchange would view the transmission lines associate with the overhead Route A alternative that are crossing overhead in this area, as well as the transmission structures that extend east and west down the Greenway.
	By relocating existing distribution lines to the new transmission structures for Route B, the height of existing distribution lines would be lowered and the number of buildings that have distribution lines passing through the field of vision for building residents would be reduced.
	The galvanized transmission structures would not be complementary to the architectural style and materials of the nearby churches for Routes B and C.
	The galvanized transmission structures for Route B would not be consistent with the medical campus setting materials and character.
	The galvanized transmission structures for Route B would not be complementary to the historic nature, architectural style and materials of the American Swedish Institute or the adjacent mansions and early century multi family buildings.
	The architectural highlight of the Martin Sabo bridge's vertical tower and cables, located on the west side of Hiawatha Avenue, would not be compatible with the transmission towers and transmission lines for Route E2.
	The placement of transmission structures along I-94 for Route E2 may interrupt residents' view of the downtown skyline, particularly those located on upper floors of apartment buildings.
	The substation wall footprint of Hiawatha East would be larger than the existing light industrial buildings in the area.
	The transmission equipment visible above the architectural wall of the Hiawatha East Substation would have a more industrial character than the adjacent light industrial buildings.
	The substation setback of Hiawatha East would be approximately 85 feet closer to the roadway than the current building, creating a disruption of the uniform setback that currently exists along the street.

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Resource	Direct and Indirect Impacts of Project and Proposed Alternatives
5.8 – Aesthetics (Continued)	The north substation wall of Hiawatha East would be approximately 65 feet closer to the north property line than the existing building, resulting in reduced visual access between the substation and the building located immediately north of the substation.
	The wall setback of the substation Midtown North from Portland Avenue is not as deep as the housing units located further north on the block. This may create a disruption of the uniform setback that currently exists along the street.
	Replacing the private green space on the Wells Fargo campus with the Mt-28N Substation would not be compatible with the adjacent building materials and corporate campus setting.
5.9 – Water Resources	During construction, disturbed soils from the construction area would be exposed to storm water from precipitation events and runoff. Soils could enter the city of Minneapolis storm water sewer system, resulting in sediment build-up in water bodies receiving storm water discharge (e.g., Mississippi River).
	Any chemicals or vehicle fuels released during construction could enter the storm sewer.
	During construction of an overhead or underground transmission line, shallow groundwater may be encountered, resulting in the need for trench dewatering. Depending on the scale of dewatering activities required, it would be possible that shallow groundwater levels could be directly affected (locally and short-term) from trench dewatering. This would not be expected to affect groundwater levels in municipal water supply wells.
	The potential exists to encounter contaminated groundwater during construction activities. The disruption of contaminated groundwater during construction would have the potential to disrupt existing shallow groundwater flows, potentially resulting in an increased dispersion of contaminated groundwater in the Project Area.
5.10 – Flora	The preferred alignment for Route C would require the removal of three mature American elm trees, which are designated as high value.
	The preferred alignment for Route E2 has the potential to significantly affect eight trees designated as high value: two American elm trees, two cottonwood trees, two silver maple trees, one hackberry tree, and one catalpa tree.
	Route A's underground option would likely disturb the most non-woody vegetation.
	• 8 trees would be removed for the Route B preferred alignment; • 19 trees would be removed for the Route C preferred alignment; • 43 trees would be removed for the Route D preferred alignment; and • 12 trees would be removed for the Route E2 preferred alignment
	Five trees would be significantly affected at the Hiawatha West Substation location. One tree would be significantly affected at each of the Midtown Substation location alternatives.
	New trees planted on Arbor Day 2008 and 2009 by neighborhood groups would be lost at the Hiawatha East Substation location.
	The Mt-28N Substation location is developed as a heavily landscaped private green space, so the potential impacts to existing trees would be much greater than those anticipated for all other substation alternatives (170 total trees: 137 deciduous and 33 coniferous).
	17 total trees (all deciduous trees) would be lost at the Mt-28S Substation location.
5.11 – Fauna	Construction noise and increased activity levels would temporarily limit the use by wildlife of the habitat along the routes.
	Removal of trees for construction would result in displacement of wildlife nesting or burrowing.
	Direct mortality may occur to eggs or any young immobile birds if the nest is abandoned by the parents before the young ones mature.
	Construction of additional overhead structures slightly increases the possibility of avian collisions.
	Constructing aboveground substations may reduce the habitat availability for small mammals and birds.
	Abandoned buildings are frequently used by small rodents while vacant fields provide habitat for burrowing mammals. The removal of these features in order to construct the substations could result in displacement of such wildlife. Construction noise and increased activity in the vicinity of the substation would limit the use of the area by birds and other wildlife.

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Resource	Direct and Indirect Impacts of Project and Proposed Alternatives
5.12 – Rare and Unique Natural Water Resources/Critical Habitat	The habitat of the Blanding's turtle may be intersected by Route C.
	Peregrine falcon and Eastern pipistrelle and other bats are highly mobile species that may forage for food within the Study Area. Overhead transmission lines for Route A, B, C, and E2 would pose a potential collision hazard for the two species.
5.13 – Air Quality and Climate	There will be a loss of carbon sequestration potential from vegetation that is removed to install the facilities.
	Construction activity will result in air emissions from heavy equipment.
	Excavation, earth moving activities, and wind erosion from dirt piles may cause minor, relatively localized, and temporary re-entrainment of dust particulates and possibly other pollutants into the atmosphere.
	Negligible direct effects on air quality from operation of the aboveground transmission lines would include the potential for localized formation of ozone due to transmission line corona.
	Under both above- and belowground options, operation of vehicles and construction machinery along the route would result in minor amounts of air emissions into the atmosphere. These impacts would be slightly greater for underground options as a greater amount of earth moving activities would be required.
	Based on the current configuration of Route E2, the geographic extent of air quality impacts is likely to be the largest of all the overhead route alternatives, though likely less than any of the underground alternative options.
	Development of Hiawatha East would require relocation of the current occupant and subsequent demolition of the existing building.
	In association with Midtown North and Midtown South, some demolition of existing structures would be necessary, causing dust to be re-entrained into the air upon demolition.
	The Midtown North and Midtown South buildings to be demolished may contain lead-based paint or asbestos containing materials (ACMs) because they could have been constructed prior to the mid-1980s.
5.14 – Noise	Direct effects on ambient sound levels would primarily originate from the construction equipment operating during the construction phase of the project. If the underground option is chosen, a greater temporary noise impact would be experienced because of the higher level and duration of construction activity.
	When in operation, sound levels from the overhead 115 kV transmission lines may be most audible during times of damp or foggy weather as electricity near the power lines ionize the moist air around the wires. However, even during these circumstances it would not be expected to exceed background noise levels and would be significantly below the NAC 1 noise standards.
	When in operation, transmission line conductors and transformers at all substations could produce audible noise slightly above background levels depending upon weather conditions and their design.
5.15 – Utility Systems	Electromagnetic "noise" from transmission line conductors can cause interference with the reception of radio and television signals depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem.
	When a HVTL is located adjacent to an oil or natural gas pipeline's ROW, the pipeline may be subjected to electrical interference from overhead power lines in close proximity. This would only have the potential to occur during the construction phase of the Project.
	The potential exists for damage to occur to underground pipelines during excavation and grading activity for the underground design options associated with Route A and Route D, as well as in locations where other excavation activities would occur.
	Where the lines associated with Routes B and C are to be placed, the existing overhead distribution line structure would be removed, and the distribution line would be supported by the new transmission line structure (Xcel Energy, 2009).

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Resource	Direct and Indirect Impacts of Project and Proposed Alternatives
5.16 – Transportation and Public Services	Due to the width of the transmission structures at the base (36 to 58 inches depending on type), placement at driveway, alley or street intersections could obscure sight-lines and cause safety concerns.
	Construction activities could disrupt traffic flow and affect both connectivity and mobility of the roadway system, with full closure of commuter streets, commerce streets, activity area streets, and community connectors during construction having the greatest detrimental effect on overall traffic flow.
	Ongoing maintenance activities may affect traffic flow and operations for limited periods of time when maintenance is required.
	Project transmission line structures in the above grade alignments may require alignment shifts or width reductions in sidewalks or trails. ADA accessibility would need to continue to be assessed as plans are further developed.
	Proximity of construction activities to pedestrian and bicycle facilities may also cause significant disruption during construction.
	Placement of the transmission poles on the south side of 29th Street would prohibit future realignment and reconstruction of 29th Street (and associated sidewalks) which would be inconsistent with the Midtown Greenway plan.
	The Route A underground option may limit future construction of access points to the Midtown Greenway if construction of those access points requires excavation where duct banks would be located.
	Where Route E2 crosses Interstate 35W (I-35W) at two locations – between 29th and 28th Streets and again at approximately 26th Street, these crossings would need to maintain minimum required vertical clearances as required by the Federal Highways Administration (FHWA). In addition, pole placement would need to avoid the highway “clear zone” – an area outside of the freeway travel lanes kept free from structures to minimize damage or injury occurring from car crashes.
	Route E2 transmission structures would need to meet minimum setbacks from roadway and signage bridges in the corridor, as well as other lighting, signage, and communications structures.
	The crossing of the interstate corridor will require a permit from FHWA, triggering federal requirements for environmental review under the National Environmental Protection Act (NEPA).
	Routes B and C, which represent above grade facilities located on bus routes, could include transmission pole locations that may adversely affect bus stop locations either by obscuring visibility or reducing sidewalk width.
	Route A, whether above or underground, has the potential to negatively affect plans for future rail transit within the Midtown Greenway Corridor.
	The requested route width for Route A, if approved, could accommodate an alignment within the Midtown Greenway trench. Placement of the transmission line within the Greenway trench could conflict with future plans for the expansion of the LRT within the trench.
	Any transmission structures in the Midtown Greenway could either impair available right of way width to the degree that a double-track system may not be viable, impairing efficient operation of a transit system, or preclude construction of a rail transit system altogether.
	Construction activities could disrupt some Emergency Services access during the construction period. • Routes B, C, and D cross Bloomington Avenue within one-block of the fire station located at 2700 Bloomington Avenue South. Route A crosses Bloomington Avenue several blocks south. • Routes B, C, and D lie along (26th and 28th Streets) or cross (Chicago Avenue) primary access routes to both Abbott Northwestern and Minneapolis Children’s Hospitals. • Route A crosses Chicago Avenue several blocks to the south of the hospital facilities.
	Construction of the Hiawatha West or Hiawatha East Substation would temporarily disrupt use of the Midtown Greenway trail.
	Sidewalks adjacent to the proposed substations would be temporarily disrupted during construction.
	Construction of Midtown North may create physical constraints in a planned Midtown Greenway pedestrian promenade (Portland Avenue to Cedar Avenue).
	Construction of the Midtown South Substation would prohibit the future reestablishment of 29th Street due to space constraints. The 12-foot Midtown South Substation walls would exceed the recommended height limitation of the Midtown Greenway plan (i.e., fencing to be no higher than 3.5 feet).

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Mitigation of Impacts

The HVTL route permit may require certain mitigation measures to prevent or minimize both short-term and long-term impacts on resources from construction and operation of the Project. Potential mitigation measures for each resource area are discussed in detail in each affected environment section within Chapter 5.0 and summarized in Table ES-2 below.

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ES-2: Summary of Potential Mitigation Measures

Resource	Mitigation Measures
5.1 – Proximity to Structures	Construct the transmission lines underground.
	Develop substations on currently vacant parcels.
	Impacts to various properties can be minimized by developing the overhead transmission line route that has the fewest potential number of impacts to that type of property.
	If an overhead route alternative is selected, the final transmission line design could be completed with the objective of minimizing the number of structures within the "fall distance" of the tower to the extent practicable.
5.2 – Land Use, Zoning, and Planning	Use existing easements for the ROW.
	Restore (e.g., re-vegetate) cleared ROW to its original land use, to the extent practical.
	Construct the transmission lines underground.
	Select substation locations that require the minimum amount of land use change (i.e., demolition and/or relocation of existing buildings and current uses).
	Substations could be constructed with an architecturally designed wall on three to four sides of the substation to complement the surrounding structures and to mitigate other potential impacts such as noise.
5.3 – Archaeological and Historical Resources	Place underground lines within previously disturbed and/or public ROW.
	Use landscaping or other screening devices appropriate to the industrial and residential setting of the substation to avoid or to mitigate potential adverse impact from visual intrusion to surrounding historic properties.
	Construct the substations underground in a previously disturbed area.
5.4 – Socioeconomics	Locate the Project along existing roadway and utility ROW to reduce perceived impact on property values.
5.5 – Environmental Justice	Assist in relocation of businesses displaced for substation construction.
	If an underground transmission line route alternative is chosen, distribute the incremental cost of undergrounding the transmission line among a larger base of ratepayers (e.g., state of Minnesota or seven county metropolitan area) to reduce the potential economic hardship on ratepayers in the Project Area.
5.6 – Safety and Health	Monitor and screen suspected soil and groundwater for contamination, especially in areas of known potential soil or groundwater contamination.
	Provide PPE to construction workers in the event that contamination is identified.
	Have field instruments readily available to quickly screen soils in the field for arsenic contamination and appoint individuals with correct training for sampling, data review, and regulatory coordination, should an encounter with contaminated soils occur.
	Properly identify, handle, and dispose of contaminated soils and groundwater to protect workers and the public, and to prevent further contamination.
	Use dust suppression measures during soil disturbing activities in areas of potential soil contamination.
	Conduct a lead-based paint survey and an asbestos survey on any buildings constructed prior to the mid-1980's to determine the presence of these materials. Should these materials be found, follow proper protection and handling measures.
	Implement Best Management Practices as developed for the Storm Water Pollution Prevention Plan to reduce the likelihood of a spill, including inspections of construction equipment, preparation of spill kits, providing operator training, and using appropriate erosion prevention and sediment control practices.
	Construct the transmission lines aboveground to reduce the potential to encounter contaminated soils or groundwater.

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Resource	Mitigation Measures
5.6 – Safety and Health (Continued)	Construct the transmission line underground to further reduce levels of EMF and to avoid impacts to structures from severe weather.
	Ground metal objects near the transmission lines to reduce the risk of induced currents and shock hazards.
	Equip transmission lines with breakers and relays to de-energize the line in the event of an accident or severe weather damage to the structures.
	Place fences and warning signs around substations to prevent and discourage unauthorized access to electrical equipment.
5.7 – Recreation and Tourism	Impacts to recreation and tourism could be mitigated primarily by mitigating the aesthetics impacts (see aesthetics section below).
	If Route C is selected, construction could be avoided or minimized during the May Day Parade and the Art Festival to avoid impacts to recreation.
5.8 – Aesthetics	For Route A's overhead option, the Applicant would relocate the existing distribution lines along the 29th Street/HCRRA corridor and place them underground.
	For Route B or C, the special structures with narrower than normal bases could be used along the full length of the routes, to the extent possible, to bring the scale of the transmission structures closer to typical vertical poles currently found along these routes.
	The substations will be constructed with architecturally designed perimeter walls and the surrounding area will be landscaped.
	Locate the aboveground transmission structures in a manner to minimize direct impacts (e.g. avoid placing transmission structures directly in front of a building).
	For Route A, locate transmission structures away from planned community gathering spaces along the Greenway.
	To reduce aesthetic impact of trimming over story trees, cultivars could be planted or trimming techniques that lower the tree crown could be implemented.
	If exterior substation walls contain lighting for security, down shielding lights could be used to minimize the potential for light pollution and industrial appearance of the substation after dark.
	Construct the transmission lines and/or substations underground.
5.9 – Water Resources	Implement Best Management Practices contained within the Soil Erosion and Sediment Control Plan and Storm Water Pollution Prevention Plan, which may include: installation of sediment and erosion control measures prior to construction; restoration of the ROW; avoiding the use of fertilizer, pesticide, or herbicide in ROW; fueling vehicles on paved surfaces; and implementation of specific procedures that minimize and control inadvertent fluid returns during horizontal directional drilling operations.
	Conduct trench or pit dewatering as necessary.
5.10 – Flora	Only remove trees located in the ROW for the transmission line, or those that would impact the safe operation of the facility.
	Work with affected landowners to replace removed trees with other, more suitable trees.
	If Route A's underground option is chosen, minimize disturbance to the vegetated slope of the Midtown Greenway during construction and maintenance activities.

Resource	Mitigation Measures
5.11 – Fauna	Work with the resource agencies to identify any areas that may require marking transmission line shield wires and/or using alternate structures to reduce avian collisions. This may include the MnDNR, USFWS and/or the U.S. Army Corps of Engineers.
	Design plans include constructing the transmission structures with adequate spacing to avoid raptor electrocution.
	Attempt to avoid areas known as major flyways or migratory resting spots.
5.12 – Rare and Unique Natural Water Resources/Critical Habitat	See mitigation for Fauna section above.
	If Route C selected, survey for Blanding's turtle.
5.13 – Air Quality and Climate	Ensure that all vehicles are well maintained in compliance with Federal and State air quality regulations.
	Water spray dirt piles and dust-laden roadways during construction of the Project to minimize or avoid fugitive dust.
	Operate construction vehicle traffic at reduced speeds to minimize dust particle displacement on unpaved roads.
	Limit idle times and shut down construction equipment when not in use.
	Restore the natural landscape as soon as practicable upon cessation of construction activities to minimize the disturbed areas from which dust could arise.
5.14 – Noise	Conduct construction operations during the times specified in the City of Minneapolis noise ordinance.
	Surround substations with decorative walls and sound absorbing panels where necessary to help mitigate noise from the substation transformers and ensure compliance with State and City noise regulations.
5.15 – Utility Systems	If radio or television interference occurs because of transmission line, consult with affected landowner(s) to restore reception to pre-Project quality.
	Maintain proper horizontal and vertical separation between transmission line conductors and equipment (cranes and shovels) used during any pipeline construction and maintenance to prevent shock hazard.
	For Route A's overhead option, place existing overhead distribution lines underground to mitigate impacts to Greenway corridor.
	Schedule any planned service disruptions to electric service that are necessary during construction activities with the affected owners of the existing transmission line in accordance with reliability standards so that alternative arrangements for electrical service could be made in advance of the potential disruption.
	Have utility repair crews present or on-call during construction activities to respond to unplanned incidents that may result in interruption to electric service.
5.16 – Transportation and Public Services	Construct the transmission lines underground to mitigate impacts resulting from the potential of overhead transmission line structures creating obscure sight-lines and safety concerns for vehicular traffic.
	Construct the transmission line aboveground to mitigate impacts to roadways and traffic resulting from the duration of construction.
	Construct the transmission line underground to mitigate impacts to pedestrians and bicycle facilities.

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Resource	Mitigation Measures
5.16 – Transportation and Public Services (Continued)	Coordinate final overhead transmission structure placement with Minneapolis Public Works staff to avoid sightline concerns at driveway, alley or local street intersections, and to ensure ADA requirements for sidewalk widths are maintained.
	Coordinate construction activities with Minneapolis Fire Department and ambulance service providers to ensure construction activities do no disrupt provision of emergency services from nearby fire stations or hospitals.
	Closely monitor disruptions to traffic flow, connectivity and mobility of the roadway systems due to construction activities so that impacts are minimized through well-coordinated road closures and well-planned detour routes.
	Coordinate with Metro Transit to avoid or minimize disruption to LRT operations, during construction.
	Coordinate with Metro Transit to avoid or minimize impacts to bus stop facilities resulting from overhead pole locations either obscuring visibility or reducing sidewalk width.
	For Route E2, coordinate with FHWA and MnDOT to determine feasibility of locating transmission structures within the I-35W and I-94 ROW. If transmission poles are placed within this ROW, pole structures may need to be designed with crash protection to minimize property damage and injury risks associated with car crashes.
	If the HVTL is to be located underground within the Greenway/HCCRA, and an expanded route width is requested by the Applicant, the location of the line could be placed beneath the existing bike path to avoid conflicts with future plans for the expansion of the LRT within the trench.

1. Introduction

Xcel Energy (the Applicant) has proposed to construct two new distribution substations connected by two new 115 kilovolt (kV) transmission lines (referred to herein as the "Project" or "Hiawatha Line") in Minneapolis, Hennepin County, Minnesota. The Project would be located in a heavily developed urban area known as the Midtown District, located south of downtown Minneapolis.

The construction of high voltage transmission lines in the state of Minnesota requires a route permit from the Minnesota Pubic Utilities Commission (the Commission).[1] The route permitting process is governed by Minnesota Rules, parts 7850.1000 to 7850.6500. Additional description of regulatory requirements is presented in Chapter 2, Regulatory Framework. The Applicant submitted a route permit application for the Project to the Commission on April 24, 2009. The permit application was considered complete on May 21, 2009, which marked the start of the one-year process to select the transmission line route and substation locations.

As part of the permitting process for a high voltage transmission line, the Minnesota Department of Commerce Office of Energy Security (OES) is required to prepare an environmental review document, in this case, an Environmental Impact Statement (EIS).

Due to the controversial nature of the Project, on May 26, 2009, the Commission authorized the OES to establish and charge, as appropriate, an advisory task force (ATF) to assist OES staff in identifying impacts and issues to be evaluated in the EIS and identifying alternative transmission line routes and substation locations to be considered in the EIS. The ATF was comprised of 16 members from the following organizations:

1. Local Units of Government
    a. Hennepin County
    b. City of Minneapolis
2. Political Subdivision
    a. Hennepin County Regional Railroad Authority
    b. Midtown Greenway Coalition
    c. Minneapolis Ward 9
    d. Minneapolis Ward 8
    e. Minneapolis Ward 6
    f. Minneapolis Ward 2

[1] The route permitting process is governed by Minnesota Rules 7850.1000 – 7850.6500. Additional descriptions of regulatory requirements are presented in Chapter 2, Regulatory Framework.

3. Non-governmental Organizations
    a. Central Area Neighborhood Development Organization
    b. Corcoran Neighborhood Organization
    c. East Phillips Improvement Coalition
    d. Midtown Phillips Neighborhood Association
    e. Longfellow Community Council
    f. Seward Neighborhood Group
    g. Powderhorn Park Neighborhood Association
    h. Phillips West Neighborhood Association

On June 18, 2009, the OES Energy Facility Permitting staff (EFP) held a public information/scoping meeting with the purpose of providing information, answering questions, and allowing the public an opportunity to suggest alternatives and impacts that should be considered during preparation of the EIS. Major areas of concern expressed during the meeting included: compatibility with existing and future land use plans; health and safety issues; environmental justice; cost of mitigation (undergrounding) and who pays, and questions about the stated need and means of satisfying that need (OES Memorandum on Scoping Decision, 2009).

The ATF met three times: Wednesday, June 24, 2009; Wednesday, July 25, 2009; and Wednesday, August 5, 2009. All meetings were open to the public. The purpose of the meetings was to discuss potential alternative routes and substation locations, and impacts and possible mitigations of the proposed and alternative routes/substation locations. The ATF issued a report on August 29, 2009, that summarized the above discussions, identified seven additional alternative substation locations and one additional alternative transmission line route for consideration in the EIS, and identified the major areas of concern related to the Project (Management Analysis & Development, 2009). The ATF's major areas of concern included: compatibility of the Project with the Midtown Greenway Land Use and Development Plan, potential health and safety impacts, environmental justice issues, responsibility for the cost of undergrounding the transmission line as a mitigation measure, and alternative system configurations or means of satisfying the stated need of the Project (OES Memorandum on Scoping Decision, 2009).

On September 1, 2009, the OES issued the Scoping Decision for the EIS, which is included in Appendix A. The ATF's seven alternative substation locations and one alternative transmission line route, in addition to the four alternative substation locations and four alternative transmission line routes identified in the Applicant's route permit application, were included in the EIS scope. The following issues were determined to be outside the scope of the EIS:

- *Any route or substation alternatives not specifically identified in the scoping decision;*
- *The issue of need, including size, type, and timing; questions of alternative system configuration, or questions of voltage (Minn. Stat. 216E.02, subd. 2);*
- *The no-build option regarding the high voltage transmission line;*
- *The impacts of specific energy sources, such as carbon outputs from coal generated facilities;*
- *Policy issues surrounding whether utilities, ratepayers or local-government should be liable for the cost to underground conductors; and*
- *The manner in which land owners are paid for transmission rights-of-way (ROW) easements* (OES, 2009).

This Draft EIS is in accordance with the OES's Scoping Decision and has been prepared to identify, to the extent feasible, the potential for significant environmental impact from the Project. This Draft EIS contains information on the potential human and environmental impacts of the Project and addresses recommended methods to mitigate such impacts for all of the routes and substation locations considered.

1.1. Project Description

The Project involves constructing two new 115 kV transmission lines and two new distribution substations in south Minneapolis, Minnesota. Due to the complexity of running transmission facilities through a largely developed urban area, several transmission line routes and substation locations have been identified as alternatives in this Draft EIS.

The analysis contained within the Draft EIS was performed for the Project Area. The Project Area is defined as the requested route widths for the five route alternatives (Routes A, B, C, D and E2) and the six substation alternatives (Hiawatha West, Hiawatha East, Midtown North, Midtown South, Mt-28N, and Mt-28S) carried forward for detailed analysis in the Draft EIS.

The Project Area and location of alternative routes and substation locations are shown in Figure 1-1. In accordance with the OES's Scoping Decision, a total of five transmission line route alternatives, seven location alternatives for the Hiawatha Substation, and four location alternatives for the Midtown Substations are to be considered and evaluated in this Draft EIS. An overview of all transmission facility alternatives is included in the appropriate subsections under Section 1.4, Transmission Line Route Description, and Section 1.5, Substation Description.

1.2. Purpose of the Transmission Line

The Project is necessary to serve the increasing electrical demands of the Applicant's customers in the Project Area and would help tie the distribution system in south Minneapolis to the overall electrical system. The Project would increase the capacity of the electrical distribution delivery system and improve the reliability of the power supply to residences and businesses in south Minneapolis (Xcel Energy, 2009).

1.2.1. Connected Actions

Connected actions are defined in Minnesota Rules, part 4410.0200, subpart 9b, which states that "[t]wo projects are 'connected actions' if a responsible governmental unit determines they are related in any of the following ways: (A) one project would directly induce the other; (B) one project is a prerequisite for the other and the prerequisite project is not justified by itself; or (C) neither project is justified by itself."

Minnesota Rules, part 4410.4400, subpart 1, states "[m]ultiple projects and multiple stages of a single project that are connected actions or phased actions must be considered in total when comparing the project or projects" in determining whether an EIS is necessary. In addition, Minnesota Rules, part 4410.1700, subpart 9, states, "[c]onnected actions and phased actions shall be considered a single project for the purposes of the determination of need for an EIS."

There are no connected actions associated with the Project. The proposed Hiawatha Line Project is a stand-alone project and is neither brought about by another project nor interdependent with another project.

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1.3. Project Location

The Project is located in south Minneapolis, Hennepin County, Minnesota. The location of the Project is shown on Figure 1-1. A list of neighborhoods located within the Project Area is provided in Table 1-1.

Table 1-1: Project Location

Neighborhood	Township (N)	Range (W)	Sections	Associated Route Alternative
Cedar Riverside	29	24	25, 26	E2
Central	28	24	2, 3	C
Corcoran	28	24	1	C
Elliot Park	29	24	26	E2
Longfellow	29	24	36	A, B, C, D, E2
Loring Park	29	24	27	E2
Phillips	29	24	35, 36	A, B, C, D, E2
Powderhorn Park	28	24	2	C
Seward	29	24	36	E2
Stevens Square – Loring Heights	29	24	27	E2
Whittier	29	24	34	E2

Source: Xcel Energy, 2009

1.4. Transmission Line Route Description

The Applicant has identified four separate alternative transmission line routes (Routes A, B, C, and D) and five design options for consideration by the Commission. Of the transmission line design options, three are overhead (Routes A, B, and C) and two are underground (Routes A and D). Furthermore, the ATF has identified one additional alternative transmission line route (Route E), which consists of an overhead design. The original Route E, as developed by the ATF, is referred to herein as Route E1. Due to limitations in the technical feasibility of Route E1, the Applicant developed an alternative Route E, referred to herein as Route E2. Route A's overhead design is the Applicant's preferred route. The proposed routes are shown in Figures 1-2 through 1-6. Detailed route maps are provided in Appendix B.

An overview of each of the five route alternatives and corresponding design options is provided below.

1.4.1. Route A (Applicant's Preferred Route)

Route A, the Applicant's preferred route, is a 1.4-mile route that could be constructed overhead or underground. The preferred alignment of the transmission line would start on the east end at the Hiawatha Substation (Hiawatha West Location) and finish on the west end at the Midtown Substation (Midtown North Location). The transmission line route would first cross both Hiawatha Avenue and the Metro Transit Hiawatha Light Rail Line near the intersection of East 28th Street and continue west along the south side of East 28th Street. The transmission line route would then cross 29th Street/ Hennepin County Regional Rail Authority (HCRRA or Midtown Greenway), turn south, and continue along the north side of the Midtown Greenway. The transmission line route would cross 29th Street/HCRRA Corridor between Cedar Avenue South and 18th Avenue South, and proceed west along the south side of the Midtown Greenway and north side of East 29th Street. The transmission line route would again cross the Midtown Greenway diagonally between 10th Avenue South and Elliot Avenue South and continue west along the north side of the Midtown Greenway to between Oakland Avenue South and Portland Avenue South (Xcel Energy, 2009). Route A extends approximately 80 feet north from 29th Street into the Midtown Greenway Trench east of 10th Avenue S and extends approximately 88 feet south from the sidewalk into the Midtown Greenway Trench west of 10th Avenue S.

The overhead route would consist of two 115 kV transmission lines on double circuit steel pole structures with a galvanized steel finish. Overhead distribution lines that currently exist along the route would be placed underground to mitigate impacts to the Midtown Greenway (Xcel Energy, 2009).

The underground route would consist of two 115 kV transmission lines within two adjacent underground duct banks in a single trench. Under the Applicant's preferred alignment, the underground duct banks would be located under sidewalks and boulevards to the extent possible in order to minimize encroachment into the street. Manholes would be periodically placed along the route to allow for pulling the conductors through the concrete duct system (Xcel Energy, 2009). The proposed route and width boundaries for underground Route A are the same as aboveground Route A.

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1.4.2. Route B

Route B is an overhead street route that would require construction of two separate single circuit 115 kV transmission lines totaling approximately 3.2 miles. There is insufficient clearance along Route B for a single set of double circuit structures. The route would be located primarily where existing overhead distribution lines parallel the streets. Where the transmission line structures would be located near an existing distribution line structure, the distribution line structure would be removed and the distribution line would be supported by the new transmission line structure (Xcel Energy, 2009).

Route B's first transmission line segment would be approximately 1.8 miles long. The Applicant's preferred alignment would begin at the Hiawatha Substation and proceed north along the east side of Hiawatha Avenue. The line would be double circuited with the existing Elliot Park-Southtown 115 kV line for several spans. The transmission line would cross Hiawatha Avenue near the intersection of East 26th Street and continue west along the south side of East 26th Street. The transmission line would then proceed south along the west side of Oakland Avenue South and end on the west end at the Midtown Substation (Xcel Energy, 2009).

Route B's second transmission line segment would be approximately 1.5 miles long. The Applicant's preferred alignment would begin at the Hiawatha Substation and cross Hiawatha Avenue and the Metro Transit Hiawatha Light Rail Line near the intersection of East 28th Street. The transmission line would continue west along the north side of East 28th Street to 10th Avenue South, diagonally cross East 28th Street between 10th Avenue South and Elliot Avenue South, and continue west along the south side of East 28th Street. The transmission line would continue south along the west side of Columbus Avenue South and then west along the north side of 29th Street/HCRRA Corridor, ending on the west end at the Midtown Substation (Xcel Energy, 2009).

1.4.3. Route C

Route C is an overhead street route that would require construction of two separate single circuit 115 kV transmission lines totaling approximately 3.8 miles. There is insufficient clearance along Route C for a single set of double circuit structures. The route is located primarily where existing overhead distribution lines parallel the streets. Where the transmission line structures would be located near an existing distribution line structure, the distribution line structure would be removed and the distribution line would be supported by the new transmission line structure. Route C would also require special construction arrangements to accommodate for the narrow to non-existing boulevard along 31st Street. These special construction arrangements would include narrower than normal based structures along the boulevard, with approximately eight larger based structures at corners or street crossings (Xcel Energy, 2009).

Route C's first transmission line segment would be approximately 1.5 miles long. The Applicant's preferred alignment would begin on the east side of the Hiawatha Substation, cross Hiawatha Avenue and the Metro Transit Hiawatha Light Rail Line near the intersection of East 28th Street, and continue west along the north side of East 28th Street to 10th Avenue South. The transmission line would diagonally cross East 28th Street between 10th Avenue South and Elliot Avenue South and continue west along the south side of East 28th Street. The transmission line would continue south along the west side of Columbus Avenue South and then west along the north side of the Midtown Greenway, ending on the west end of the Midtown Substation (Xcel Energy, 2009).

Route C's second transmission line segment would be approximately 2.3 miles long. The Applicant's preferred alignment would begin at the Hiawatha Substation, head south, and travel along the east side of Hiawatha Avenue. The line would be double circuited with the existing Elliot Park-Southtown 115 kV line for several spans. The transmission line would cross both Hiawatha Avenue and the Metro Transit Hiawatha Light Rail Line near the intersection with East 31st Street and then proceed west along the north side of East 31st Street. The transmission line would cross East 31st Street at the intersection of Chicago Avenue South and continue west along the south side of East 31st Street. The transmission line would then go north along the east side of Portland Avenue South and finish on the west end of the Midtown Substation (Xcel Energy, 2009).

1.4.4. Route D

Route D is a 1.5 mile underground route that would parallel East 28th Street. The Applicant's preferred alignment for Route D would be a single underground trench used to run double circuited 115 kV transmission lines between the Hiawatha and Midtown Substations. Manholes would be periodically placed along the route to allow for pulling the conductors through the concrete duct system. The transmission line route's preferred alignment would begin on the east end at the Hiawatha Substation and cross both Hiawatha Avenue and the Metro Transit Hiawatha Light Rail Line near the intersection of East 28th Street. The transmission line route would proceed west within East 28th Street, then turn south under Oakland Avenue South, ending on the west end at the Midtown Substation (Xcel Energy, 2009).

1.4.5. Route E

Route E1 is an overhead route originally proposed by the ATF. The pathway suggested by the ATF for Route E1 would begin at the Hiawatha Substation, follow 28th Street East west to Highway 55, and follow Highway 55 north-northwest towards Interstate 94 (I-94). Route E1 would then follow the I-94 corridor to Interstate 35W (I-35W) and turn south to follow I-35W to roughly 28th Street East and end at the Midtown Substation (Management Analysis & Development, 2009).

Route E1 would present significant permitting and design challenges as the transmission line structures would be constructed within the interstate ROW. This ROW is owned and maintained by the Minnesota Department of Transportation (MnDOT); therefore, the Applicant would need to obtain a Utility Permit from MnDOT. However, constructing a transmission line directly on the interstate ROW is generally prohibited due to potential interference with public safety and convenience. Under Minnesota Rules, part 8810.3300, subpart 4 and the MnDOT Accommodation Policy, transmission lines can be located within the interstate ROW only in cases of extreme hardship and demonstration that locating the transmission line on the interstate would not affect traffic safety, design, construction, or operation (MnDOT, 1990). Additional information on the compatibility of Route E1 with MnDOT's Accommodation Policy is located in Section 8.0, Rejected Alternative Routes and Substations. Based on the limitations of the technical feasibility of Route E1, it was determined that this was not a viable route alternative. As such, Route E1 was not carried forward for analysis in the Draft EIS.

A substitute route for Route E1, referred to as Route E2, was developed by the Applicant. Route E2 generally mimics the ATF's proposed route alternative, but minimizes the use of interstate easements by instead following secondary roadways along a similar pathway.

The proposed route alignment for Route E2 begins at the Hiawatha Substation and crosses both Hiawatha Avenue and the Metro Transit Hiawatha Light Rail Line near the intersection of East 28th Street. The transmission line route then travels north along the west side of Hiawatha Avenue South towards I-94. At I-94, the route turns west and follows along the south side of I-94 toward I-35W. At I-35W, the route turns south and follows along the east side of I-35W until approximately West 26th Street. The transmission line route then turns west, crosses I-35W, turns south, and continues along the west side of I-35W until it reaches the Midtown Substation. The transmission line route then crosses I-35W once more to connect to the Midtown Substation located on the east side of I-35W.

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Both the ATF's and Applicant's proposed Route E (E1 and E2, respectively) are shown in Figure 1-6.

1.5. Substation Description

The Project would require the construction of two new substations, one to be located at the eastern end of the transmission line (referred to as the Hiawatha Substation) and one to be located at the western terminus of the transmission line (referred to as the Midtown Substation). The Applicant has proposed two locations for the Hiawatha Substation (Hiawatha West and Hiawatha East) and two locations for the Midtown Substation (Midtown North and Midtown South). In addition, the ATF has identified five alternative locations for the Hiawatha Substation (referred to as G-1, G-2, G-3, G-4, and G-5) and two alternative locations for the Midtown Substation (referred to as Mt-28N and Mt-28S). The Applicant's preferred substation locations are Hiawatha West and Midtown North. The locations of all substations are shown in Figure 1-1. An overview of each of the 11 substation locations is presented below.

Depending on the location, the substations would either have a low or high profile design. The difference between the two designs is analogous to the difference between a single-story and a split-level/two-story house (Management Analysis & Development, 2009). The high profile design is taller, which allows the substation to occupy a smaller footprint of land. However, a high profile design is more visible from a greater distance; therefore, if there is enough space available, the low profile design option is generally preferred. Additional description of the engineering design for the substations is located in Section 3.3.1, Engineering Design.

The minimum footprint of land needed for a substation greatly varies from site to site and depends on a number of factors, such as electrical clearances, maintenance/safety/access space requirements, site characteristics (e.g., the shape of the site, elevation changes, underground utilities, etc.), setbacks from roads or other requirements, and electrical transmission and distribution line ROW corridors (Xcel Energy, 2009). Therefore, no minimum footprint requirement for a high or low profile design can be provided. However, footprint areas have been determined for each of the Applicant's alternative substation locations as described below.

In addition, the ATF proposed that an underground design of the Hiawatha substation be considered by the Applicant. The Applicant evaluated the technical feasibility and cost of undergrounding a transmission substation located at the Hiawatha West Substation site. An overview of the underground substation alternative is provided in Section 1.5.3 and additional detail is provided in Section 3.0, Engineering and Operation Design.

1.5.1. Hiawatha Substations

As identified in the Applicant's route permit application, the Hiawatha Substation would generally include the following facilities:

- A prefabricated concrete wall approximately 12 feet high with a non-tag friendly design appropriate to the area along three sides of the substation to limit graffiti;
- Landscaping around the three concrete-walled sides of the substation;
- A chain-linked fence, gate and driveway along the remaining side of the substation;
- Four 115 kV transmission lines dead-end structures and related substation equipment and structures (an additional three dead-end structures would be required to connect two of the lines into the correct electrical position in the substation, and one for transformer termination);
- One 50 mega voltampere (MVA), 118-14.4 kV, Load Tap Changer (LTC) distribution transformer;
- One switchgear enclosure containing six 13.8 kV distribution feeders with associated equipment; and
- One electrical equipment enclosure containing all electrical controls, protective relaying and auxiliary equipment for the operation of the substation (Xcel Energy, 2009).

The equipment identified above would be required regardless of the location selected for the Hiawatha Substation. There are seven potential locations for the Hiawatha Substation, two identified by the Applicant and five identified by the ATF.

1.5.1.1. Hiawatha West (Applicant's Preferred Location)

Hiawatha West is located on the east side of Hiawatha Avenue (Minnesota State Highway 55) slightly south of the intersection of Hiawatha Avenue and East 28th Street. The site consists of a vacant lot currently owned by the MnDOT. As such, no demolition or business relocation would be required prior to construction of the substation. The substation would be designed as a low-profile substation covering a footprint of 253 feet by 392 feet, or approximately 2.25 acres (Xcel Energy, 2009). The Hiawatha West location is the Applicant's preferred location for the Hiawatha Substation. Additional description of the proposed layout for the Hiawatha West Substation is located in Section 3.3.1.1 and Figure 3-8.

1.5.1.2. Hiawatha East

Hiawatha East is located on adjacent land to the northeast of Hiawatha West. Currently, the site is developed with an occupied warehouse that would need to be demolished and its tenants relocated. The substation would be designed as a low-profile substation covering a footprint of approximately 284 feet by 481 feet, or approximately 3.15 acres (Xcel Energy, 2009). The Hiawatha East location is the Applicant's proposed alternative location for the Hiawatha Substation. Additional description of the proposed layout for the Hiawatha East Substation is located in Section 3.3.1.1 and Figure 3-9.

1.5.1.3. ATF Proposed Substation G-1

Substation G-1, located at 2600 Minnehaha Avenue, was proposed by the ATF. G-1 is located on vacant property on the southwest corner of the intersection of Minnehaha Avenue and East 26th Street. The site is approximately one-half block north of the Hiawatha East Substation location.

The site was originally considered by the Applicant, but the space is not large enough to accommodate a low or high profile substation design. As discussed in Section 8.0, Rejected Alternative Routes and Substations, the property is not considered to be a technically viable alternative for the Hiawatha Substation and is therefore not incorporated into the analysis of this Draft EIS.

1.5.1.4. ATF Proposed Substation G-2

Substation G-2 was proposed by the ATF. G-2 is located on west side of 21st Avenue South, south of a building on East 28th Street. The site is approximately one block west of the proposed Hiawatha West Substation location. The site comprises of the following properties: 2800 21st Avenue South, 2843 20th Avenue South, 2845 20th Avenue South, and 2859 20th Avenue South. The site is currently used as a parking lot (Xcel Energy, Information Request, No. IR 25, 2009).

The site was originally considered by the Applicant, but the space is not large enough to accommodate a low or high profile substation design. As discussed in Section 8.0, Rejected Alternative Routes and Substations, the property is not considered to be a technically viable alternative for the Hiawatha Substation and is therefore not incorporated into the analysis of this Draft EIS.

1.5.1.5. ATF Proposed Substation G-3

Substation G-3 was proposed by the ATF. G-3 is located on a triangular shaped vacant property, located on the east side of Highway 55/Hiawatha Avenue and north of Lake Street. The site is adjacent to the south of the Hiawatha West Substation location. The site, occupied by the SOO Line Railroad, currently has railroad tracks present.

According to the Applicant, the site is not large enough to accommodate a low or high profile substation design. As discussed in Section 8.0, Rejected Alternative Routes and Substations, the property is not considered to be a technically viable alternative for the Hiawatha Substation and is therefore not incorporated into the analysis of this Draft EIS.

1.5.1.6. ATF Proposed Substation G-4

Substation G-4 was proposed by the ATF. G-4 is located on a triangular shaped vacant property on the east side of Highway 55/Hiawatha Avenue. The G-4 Substation location extends from just north of the intersection of East 31st Street and Hiawatha Avenue to the intersection of East 32nd Street and Hiawatha Avenue. The site is approximately two blocks south of the Hiawatha West Substation location. A portion of the site is currently owned by Xcel Energy and was formerly developed with a substation. The other portion of the site is owned by the Minnesota Department of Transportation (MnDOT) and appears to be vacant and used for overflow light rail parking (Xcel Energy IR 25, 2009).

The site was originally considered by the Applicant, but the space is not large enough to accommodate a low or high profile substation design. As discussed in Section 8.0, Rejected Alternative Routes and Substations, the property is not considered to be a technically viable alternative for the Hiawatha Substation and is therefore not incorporated into the analysis of this Draft EIS.

1.5.1.7. ATF Proposed Substation G-5

Substation G-5 was proposed by the ATF. G-5 is located on a triangular shaped vacant property located on the east side of Hiawatha Avenue, north of East 26th Street. More precisely, the site is located between 2001 24th Street East, 2500 Minnehaha Avenue, and Hiawatha Avenue. The site is located approximately one and one half blocks north of the Hiawatha East and West Substation locations. The property is currently vacant and owned by MnDOT and Met Council (Xcel Energy, Technical Feasibility of ATF Substations, 2009).

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According to the Applicant, the site is not large enough to accommodate a low or high profile substation design. As discussed in Section 8.0, Rejected Alternative Routes and Substations, the property is not considered to be a technically viable alternative for the Hiawatha Substation and is therefore not incorporated into the analysis of this Draft EIS.

1.5.2. Midtown Substations

As identified in the Applicant's route permit application, the Midtown Substation would generally include the following facilities:

- A prefabricated concrete wall with a non-tag friendly design appropriate to the area along three to four sides of the substation to limit graffiti;
- Landscaping around the concrete-walled sides of the substation, as practical;
- A chain-linked gate and driveway along the remaining side of the substation;
- Two 115 kV transmission lines, steel, box, structures and related substation equipment and structures;
- One 70 MVA, 118-14.4 kV, LTC distribution transformer;
- One electrical equipment enclosure containing 13.8 kV distribution switchgear with associated equipment or outdoor high profile steel box structures for the distribution transformer breaker position and feeders; and
- One electrical equipment enclosure initially containing nine, 13.8 kV distribution feeders with associated equipment, all electrical controls, protective relaying, and auxiliary equipment for the operation of the substation (Xcel Energy, 2009).

The equipment identified above would be required regardless of the location selected for the Midtown Substation. There are four potential locations for the Midtown Substation, two identified by the Applicant and two identified by the ATF.

1.5.2.1. Midtown North Substation (Applicant's Preferred Location)

Midtown North would be located on the northwest corner of Oakland Avenue South and 29th Street. Currently, the site is occupied by the former Xcel Energy Oakland Substation, a condemned triplex, and a vacant lot. The substation would be designed as a high profile substation covering a footprint of approximately 145 feet by 228 feet, or approximately 0.75 acres (Xcel Energy, Information Requests, 2009). The Midtown North Substation location is the Applicant's preferred location for the Midtown Substation. Additional description of the proposed layout for the Midtown North Substation is located in Section 3.3.1.2 and Figure 3-10.

1.5.2.2. Midtown South Substation

Midtown South would be located on the southwest corner of Oakland Avenue South and 29th Street. The site is currently developed as a warehouse occupied Brown Campbell. The warehouse would need to be demolished and its tenant relocated prior to construction of the substation. The substation would be designed as a low profile substation covering a footprint of approximately 245 feet by 249 feet, or approximately 1.4 acres (Xcel Energy, 2009). The Midtown South location is the Applicant's proposed alternate location for the Midtown Substation. Additional description of the proposed layout for the Midtown South Substation is located in Section 3.3.1.2 and Figure 3-11.

1.5.2.3. ATF Proposed Substation Mt-28N

Substation Mt-28N, to be located at 2701 Wells Fargo Way, was proposed by the ATF. Mt-28N is located on undeveloped property on the east side of I-35W, bordered to the south by East 28th Street. The Mt-28N Substation is located four blocks west of the Midtown North and South Substations, and would require expanded Route lengths for Routes A, B, C, and D.

The site is currently a private green space owned by Wells Fargo. The green space is seeded with grass and landscaped with shrubs and trees. Benches placed throughout the green space are used by Wells Fargo employees for passive recreation (e.g., lunch breaks). There are paved walking trails within the green space. The green space is surrounded by multi-story office buildings occupied by Wells Fargo. The southern border of the green space, which is adjacent to East 28th Street, is fenced. Access to the green space is available from Honeywell Plaza, a private street located to the east of the green space. The entire green space is over 5 acres in size, although the proposed location for the Mt-28N Substation would only encompass the southern portion of the green space.

The site is large enough for either the low or high profile substation design. However, the site was rejected by the Applicant for the following reasons:

- The site is currently a private green space and the Applicant believed that the owner and the public would be opposed to developing an electrical substation on the green space.
- Potential freeway road salt and road carbon contamination issues: The west end of the property would potentially have issues regarding highway road salt and road carbon contamination from I-35W; potentially resulting in equipment corrosion and electrical equipment flashover. In addition, maintenance costs

would increase and a more expensive wall/salt barrier system would need to be installed.

- Future freeway expansion issues: Due to the close proximity to I-35W, the west end of the property may be desired in the future to be used for freeway expansions.
- More land would need to be purchased in comparison to the Midtown North substation alternative.
- More expensive transmission line costs: Transmission line length would be required to increase by 0.4 miles, resulting in higher costs and a greater number of business and homes impacted.
- More expensive distribution line costs: Distribution line length would be required to increase, resulting in higher costs and additional ROWs and exist requirements (Xcel Energy, Technical Feasibility of ATF Substations, 2009).

This alternative was carried forward for analysis in the Draft EIS.

1.5.2.4. ATF Proposed Substation Mt-28S

Substation Mt-28S, to be located at 2840 4th Avenue South, was proposed by the ATF. Mt-28S is located on a vacant property on the east side of I-35W, bordered to the north by East 28th Street and to the south by East 29th Street. The Mt-28S Substation would be located four blocks west of the Midtown North and South Substations, and would require expanded route lengths for Routes A, B, C, and D. The site is currently being used as a shuttle parking lot for Children's Hospital.

The site is large enough for either the low or high profile substation design. However, the site was rejected by the Applicant for the following reasons:

- Potential freeway road salt and road carbon contamination issues: The site is located in close proximity to I-35W; potentially resulting in equipment corrosion and electrical equipment flashover. In addition, maintenance costs would increase and a more expensive wall/salt barrier system would need to be installed.
- Future freeway expansion issues: Due to the close proximity to I-35W, the property may be desired in the future to be used for freeway expansions.
- More land would need to be purchased in comparison to the Midtown North substation alternative.
- More expensive transmission line costs: Transmission line length would be required to increase by 0.6 miles, resulting in higher costs and a greater number of business and homes impacted.

- More expensive distribution line costs: Distribution line length would be required to increase, resulting in higher costs and additional ROWs and exist requirements (Xcel Energy, Information Request, No. IR 25, 2009).

This alternative was carried forward for analysis in the Draft EIS.

1.5.3. Underground Hiawatha Substation

The Hiawatha West Substation location was used for evaluation of the option to underground the Hiawatha Substation. The underground Hiawatha West Substation would consist of a three-story building (including the cable vaults) constructed completely underground (approximately 60 feet below grade) with a landscaped green space on the ground surface above the substation. The substation would include a 115-kV four-bay breaker-and-a-half Gas Insulated Substation (GIS), four 115-kV transmission lines, three 115-13.8-kV 30/40/50MVA transformers, and three lineups of 13.8-kV switchgear.

The substation would consist of a cast-in-place, reinforced, concrete underground enclosure of approximately 38,000 square feet. The enclosure would include separate equipment areas or rooms as follows:

- One area for the 115-kV Gas Insulated Substation (GIS), associated local control cabinets (LCCs), and station auxiliary power transformers;
- One room (vault) for each of the 115-13.8-kV transformers;
- One room for each of the 13.8-kV switchgear lineups;
- One control room for the protective relaying and control panels, communication panels, ac and dc panels and automatic transfer equipment;
- One battery room;
- Two mechanical equipment rooms/areas (one shall contain a CO_2 tank);
- One substation office and fire response area to contain the miscellaneous fir protection/detection panels;
- One 115-kV cable vault to contain the cable racking clamping and support of the 115-kV XLPE cables; and
- One 13.8-kV (15-kV nominal) cable vault to contain the cable racking clamping and support of the 15-kV distribution feeder cables.

The Hiawatha Substation underground design report is included in Appendix D.

1.6. Route Width

The Power Plant Siting Act, Minnesota Statutes Chapter 216E, directs the Commission to locate transmission lines in a manner that "minimize(s) adverse human and environmental impact while ensuring continuing electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion" (Minn. Stat. § 216E.02, subd. 1). The Act further authorizes the Commission to meet its routing responsibility by designating a "route" for a new transmission line when it issues a Route Permit. *Id*. A route may have "a variable width of up to 1.25 miles," within which the ROW for the facilities can be located (Minnesota Statute, section 216E.01, subdivision 8) (Xcel Energy, 2009).

For this Project, the Applicant has requested varying route widths for each of the proposed routes. The final ROW could be sited anywhere within the permitted route. The requested route width for Route A is 125 feet to accommodate placement of the double circuit structures overhead or in underground duct banks. A double circuited overhead Route E2 would also require a route width of 125 feet. If Route B or C is selected, an 80-foot route width is requested for the single circuit structures. For Route D, an 80-foot route width is requested to accommodate double circuit underground duct banks on either side of the street. Route D is only viable when an underground design is used (Xcel Energy, 2009).

1.7. Rights-of-Way Requirements

ROW requirements vary for overhead and underground design construction. The requirements are based upon National Electrical Safety Code (NESC) clearances from the electrical conductor (i.e., the transmission line) for trees, buildings, or other objects, and takes into consideration the lateral movement of overhead transmission lines due to wind. The clearance also allows for occupation safety requirements regarding tree maintenance. ROW requirements for underground transmission line designs allow for construction and maintenance of the concrete duct and splice vaults that the underground transmission lines are installed within. In addition, the clearance limits the planting of vegetation that can potentially interfere with installation. Activities and other installations that do not interfere with the transmission line structure, such as sidewalks or roads, are permissible within the ROW (Xcel Energy, Information Request, 2009).

For the Project, if the proposed facilities are constructed on an overhead double or single circuit 115 kV transmission line structure, a 50-foot wide ROW would be required. All underground design alternatives would require a 30-foot wide ROW (Xcel Energy, 2009).

All route alternatives, for both overhead and underground construction designs, are located primarily within public street ROW or the HCRRA corridor. Whenever a transmission line is adjacent to a street, the line would share the existing road ROW; therefore, an easement of lesser width would be required from affected landowners, depending on road configuration and structure requirements. It is anticipated that easement acquisition from private landowners would be limited, ensuring adequate clearances for safe operation of the facilities (Xcel Energy, 2009). Underground line ROW evaluation and acquisition would proceed in a manner similar to that of overhead lines, as discussed in Section 4.3, Property/Right-of-Way Acquisition.

If a HVTL Route Permit is granted to the Applicant for the preferred or an alternative route, the actual alignment of the conductor may be placed anywhere that would be technically feasible within the requested route width, unless a special condition of the permit specifies otherwise. The Applicant has proposed a "preferred alignment" for each route alternative with corresponding ROWs ranging from 30 to 50 feet to allow the flexibility to accommodate route specific features that may need to be avoided.

The Draft EIS evaluates the impacts of the entire width of the preferred and alternative routes; while emphasis is placed on the Applicant's preferred alignment and corresponding ROW for each route alternative.

1.8. Project Costs

The estimated total cost for the Project, depending on route and substation designs (overhead/aboveground or underground), is between $28.4 million and $113.5 million. The cost of the Project includes materials, construction, ROW acquisition and project management. The estimated cost for each of the Applicant's proposed transmission line route alternatives and substation locations is shown in Table 1-2.

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Table 1-2: Project Costs

Route	Transmission Line Cost	Aboveground Hiawatha Substation Cost	Underground Hiawatha Substation Cost	Aboveground Midtown Substation Cost	Total Cost
Route A - Overhead	$3,000,000	$14,270,000		$11,120,000	$28,390,000
			$86,000,000	$11,120,000	$100,120,000
Route A - Underground	$15,600,000	$14,270,000		$11,120,000	$40,990,000
			$86,000,000	$11,120,000	$112,720,000
Route B	$5,000,000	$14,270,000		$11,120,000	$30,390,000
			$86,000,000	$11,120,000	$102,120,000
Route C	$5,750,000	$14,270,000		$11,120,000	$31,140,000
			$86,000,000	$11,120,000	$102,870,000
Route D	$16,400,000	$14,270,000		$11,120,000	$41,790,000
			$86,000,000	$11,120,000	$113,520,000
Route E2	$4,630,000	$14,270,000		$11,120,000	$30,020,000
			$86,000,000	$11,120,000	$101,750,000

Source: Xcel Energy, 2009; Sargent & Lundy, 2009.

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As shown in the Table 1-2, the costs of placing transmission lines underground are significantly higher than the standard construction practice of placing the facilities overhead. This is due to the engineering requirements, construction of trenches, and potential dewatering or other pre-installation measures. The incremental cost of undergrounding can be five times the cost of overhead construction, or more, depending upon the specific conditions encountered (Xcel Energy, 2009). Due to the cost and complexity of constructing and maintaining underground transmission lines, it is not the preferred construction method of the Applicant. The Applicant maintains approximately 7,300 miles of high voltage transmission lines in the five-state upper-Midwest region, of which only 12 miles are constructed underground (Xcel Energy, 2009).

As indicated in Table 1-2, the incremental increased cost of the underground transmission line alternatives when compared to the Applicant's preferred overhead transmission line route alternative, Route A, range from \$12.6 million to \$13.4 million. The impacts of this incremental increase will vary depending upon how the costs are allocated among rate payers.

In August of 2009, the Commission requested the Applicant provide an estimate of the monthly surcharges associated with allocating the incremental costs of undergrounding the transmission line to a variety of customer bases including the city of Minneapolis, Hennepin County, the Applicant's entire Minnesota service territory, and an additional subset of customers considered appropriate by the Applicant. The Applicant analyzed payment options for the incremental costs associated with undergrounding by using the City Requested Special Facility Surcharge (CRFS) rates, also known as the facilities surcharge rider, as a model. Timeframes of payment included three and five years. The Applicant chose to model surcharges for the seven-county metropolitan area as the fourth customer base considered appropriate by the Applicant. These calculations are provided in the tables below.

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Table 1-3: Customers within City of Minneapolis

City of Minneapolis				
3 Year Recovery				
Underground Incremental Cost Difference	**Route A**			**$12,600,000**
Carrying Charges, Interest on Capitalized $				**$1,577,411**
Total				**$14,177,411**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	160,186	$2.05	36	$11,821,727
Residential Low Income	3,269	$1.00	36	$117,684
Small Commercial & Industrial ND	11,096	$2.05	36	$818,885
Small Commercial & Industrial	4,701	$6.15	36	$1,040,801
Large Commercial and Industrial	1,055	$8.20	36	$311,436
Street Lighting	602	$2.05	36	$44,428
Small Municipal Pumping ND	7	$2.05	36	$517
Small Municipal Pumping	5	$6.15	36	$1,107
Large Municipal Pumping	0	$8.20	36	$0
Total	**180,921**			**$14,156,584**
Underground Incremental Cost Difference	**Route D**			**$13,400,000**
Carrying Charges, Interest on Capitalized $				**$1,678,557**
Total				**$15,078,557**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	160,186	$2.18	36	$12,571,397
Residential Low Income	3,269	$1.00	36	$117,684
Small Commercial & Industrial ND	11,096	$2.18	36	$870,814
Small Commercial & Industrial	4,701	$6.54	36	$1,106,803
Large Commercial and Industrial	1,055	$8.72	36	$331,186
Street Lighting	602	$2.18	36	$47,245
Small Municipal Pumping ND	7	$2.18	36	$549
Small Municipal Pumping	5	$6.54	36	$1,177
Large Municipal Pumping	0	$8.72	36	$0
Total	**180,921**			**$15,046,856**
5 Year Recovery				
Underground Incremental Cost Difference	**Route A**			**$12,600,000**
Carrying Charges, Interest on Capitalized $				**$2,542,657**
Total				**$15,142,657**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	163,327	$1.29	60	$12,641,510
Residential Low Income	3,333	$1.00	60	$199,980
Small Commercial & Industrial ND	11,313	$1.29	60	$875,626
Small Commercial & Industrial	4,793	$3.87	60	$1,112,935
Large Commercial and Industrial	1,076	$5.16	60	$333,130
Street Lighting	614	$1.29	60	$47,524

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Small Municipal Pumping ND	7	$1.29	60	$542
Small Municipal Pumping	5	$3.87	60	$1,161
Large Municipal Pumping	0	$5.16	60	$0
Total	**184,468**			**$15,212,407**
Underground Incremental Cost Difference		**Route D**		**$13,400,000**
Carrying Charges, Interest on Capitalized $				**$2,710,858**
Total				**$16,110,858**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	163,327	$1.37	60	$13,425,479
Residential Low Income	3,333	$1.00	60	$199,980
Small Commercial & Industrial ND	11,313	$1.37	60	$929,929
Small Commercial & Industrial	4,793	$4.11	60	$1,181,954
Large Commercial and Industrial	1,076	$5.48	60	$353,789
Street Lighting	614	$1.37	60	$50,471
Small Municipal Pumping ND	7	$1.37	60	$575
Small Municipal Pumping	5	$4.11	60	$1,233
Large Municipal Pumping	0	$5.48	60	$0
Total	**184,468**			**$16,143,410**

Source: Xcel Energy Information Request, 2009

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Table 1-4: Customers within Hennepin County

Hennepin County				
3 Year Recovery				
Underground Incremental Cost Difference	**Route A**			**$12,600,000**
Carrying Charges, Interest on Capitalized $				**$1,564,029**
Total				**$14,164,029**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	459,056	$0.71	36	$11,733,471
Residential Low Income	9,368	$0.71	36	$239,446
Small Commercial & Industrial ND	30,623	$0.71	36	$782,724
Small Commercial & Industrial	14,609	$2.13	36	$1,120,218
Large Commercial and Industrial	3,352	$2.84	36	$342,708
Street Lighting	1,443	$0.71	36	$36,883
Small Municipal Pumping ND	356	$0.71	36	$9,099
Small Municipal Pumping	133	$2.13	36	$10,198
Large Municipal Pumping	28	$2.84	36	$2,863
Total	**518,968**			**$14,277,612**
Underground Incremental Cost Difference	**Route D**			**$13,400,000**
Carrying Charges, Interest on Capitalized $				**$1,674,524**
Total				**$15,074,524**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	459,056	$0.75	36	$12,394,512
Residential Low Income	9,368	$0.75	36	$252,936
Small Commercial & Industrial ND	30,623	$0.75	36	$826,821
Small Commercial & Industrial	14,609	$2.25	36	$1,183,329
Large Commercial and Industrial	3,352	$3.00	36	$362,016
Street Lighting	1,443	$0.75	36	$38,961
Small Municipal Pumping ND	356	$0.75	36	$9,612
Small Municipal Pumping	133	$2.25	36	$10,773
Large Municipal Pumping	28	$3.00	36	$3,024
Total	**518,968**			**$15,081,984**
5 Year Recovery				
Underground Incremental Cost Difference	**Route A**			**$12,600,000**
Carrying Charges, Interest on Capitalized $				**$2,577,682**
Total				**$15,177,682**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	468,057	$0.44	60	$12,356,705
Residential Low Income	9,552	$0.44	60	$252,173
Small Commercial & Industrial ND	31,224	$0.44	60	$824,314
Small Commercial & Industrial	14,896	$1.32	60	$1,179,763
Large Commercial and Industrial	3,418	$1.76	60	$360,941
Street Lighting	1,471	$0.44	60	$38,834

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Small Municipal Pumping ND	363	$0.44	60	$9,583
Small Municipal Pumping	135	$1.32	60	$10,692
Large Municipal Pumping	29	$1.76	60	$3,062
Total	**529,145**			**$15,036,067**
Underground Incremental Cost Difference	**Route D**			**$13,400,000**
Carrying Charges, Interest on Capitalized $				**$2,727,175**
Total				**$16,127,175**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	468,057	$0.47	60	$13,199,207
Residential Low Income	9,552	$0.47	60	$269,366
Small Commercial & Industrial ND	31,224	$0.47	60	$880,517
Small Commercial & Industrial	14,896	$1.41	60	$1,260,202
Large Commercial and Industrial	3,418	$1.88	60	$385,550
Street Lighting	1,471	$0.47	60	$41,482
Small Municipal Pumping ND	363	$0.47	60	$10,237
Small Municipal Pumping	135	$1.41	60	$11,421
Large Municipal Pumping	29	$1.88	60	$3,271
Total	**529,145**			**$16,061,254**

Source: Xcel Energy Information Request, 2009

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Table 1-5: Customers within State of Minnesota

State of Minnesota				
3 Year Recovery				
Underground Incremental Cost Difference Route A				**$12,600,000**
Carrying Charges, Interest on Capitalized $				**$1,598,468**
Total				**$14,198,468**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	1,084,520	$0.29	36	$11,322,389
Residential Low Income	22,133	$0.29	36	$231,069
Small Commercial & Industrial ND	86,275	$0.29	36	$900,711
Small Commercial & Industrial	34,834	$0.87	36	$1,091,001
Large Commercial and Industrial	8,708	$1.16	36	$363,646
Street Lighting	3,466	$0.29	36	$36,185
Small Municipal Pumping ND	1,019	$0.29	36	$10,638
Small Municipal Pumping	467	$0.87	36	$14,626
Large Municipal Pumping	117	$1.16	36	$4,886
Total	**1,241,539**			**$13,975,151**
Underground Incremental Cost Difference Route D				**$13,400,000**
Carrying Charges, Interest on Capitalized $				**$1,691,080**
Total				**$15,091,080**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	1,084,520	$0.31	36	$12,103,243
Residential Low Income	22,133	$0.31	36	$247,004
Small Commercial & Industrial ND	86,275	$0.31	36	$962,829
Small Commercial & Industrial	34,834	$0.93	36	$1,166,242
Large Commercial and Industrial	8,708	$1.24	36	$388,725
Street Lighting	3,466	$0.31	36	$38,681
Small Municipal Pumping ND	1,019	$0.31	36	$11,372
Small Municipal Pumping	467	$0.93	36	$15,635
Large Municipal Pumping	117	$1.24	36	$5,223
Total	**1,241,539**			**$14,938,955**
5 Year Recovery				
Underground Incremental Cost Difference Route A				**$12,600,000**
Carrying Charges, Interest on Capitalized $				**$2,476,660**
Total				**$15,076,660**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	1,105,785	$0.19	60	$12,185,751
Residential Low Income	22,567	$0.19	60	$248,688
Small Commercial & Industrial ND	87,967	$0.19	60	$969,396
Small Commercial & Industrial	35,517	$0.57	60	$1,174,192
Large Commercial and Industrial	8,879	$0.76	60	$391,386
Street Lighting	3,534	$0.19	60	$38,945

Small Municipal Pumping ND	1,039	$0.19	60	$11,450
Small Municipal Pumping	476	$0.57	60	$15,737
Large Municipal Pumping	119	$0.76	60	$5,246
Total	**1,265,883**			**$15,040,790**
Underground Incremental Cost Difference	**Route D**			**$13,400,000**
Carrying Charges, Interest on Capitalized $				**$2,665,524**
Total				**$16,065,524**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	1,105,785	$0.20	60	$13,048,263
Residential Low Income	22,567	$0.20	60	$270,804
Small Commercial & Industrial ND	87,967	$0.20	60	$1,055,604
Small Commercial & Industrial	35,517	$0.60	60	$1,278,612
Large Commercial and Industrial	8,879	$0.80	60	$426,192
Street Lighting	3,534	$0.20	60	$42,408
Small Municipal Pumping ND	1,039	$0.20	60	$12,468
Small Municipal Pumping	476	$0.60	60	$17,136
Large Municipal Pumping	119	$0.80	60	$5,712
Total	**1,265,883**			**$16,157,199**

Source: Xcel Energy Information Request, 2009

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Table 1-6: Customers within Seven County Metro

Seven County Metro				
3 Year Recovery				
Underground Incremental Cost Difference	**Route A**			**$12,600,000**
Carrying Charges, Interest on Capitalized $				**$1,568,108**
Total				**$14,168,108**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	877,495	$0.37	36	$11,688,233
Residential Low Income	17,908	$0.37	36	$238,535
Small Commercial & Industrial ND	61,964	$0.37	36	$825,360
Small Commercial & Industrial	27,253	$1.11	36	$1,089,030
Large Commercial and Industrial	6,393	$1.48	36	$340,619
Street Lighting	2,660	$0.37	36	$35,431
Small Municipal Pumping ND	665	$0.37	36	$8,858
Small Municipal Pumping	269	$1.11	36	$10,749
Large Municipal Pumping	67	$1.48	36	$3,570
Total	**994,674**			**$14,240,385**
Underground Incremental Cost Difference	**Route D**			**$13,400,000**
Carrying Charges, Interest on Capitalized $				**$1,682,819**
Total				**$15,082,819**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	877,495	$0.39	36	$12,320,030
Residential Low Income	17,908	$0.39	36	$251,428
Small Commercial & Industrial ND	61,964	$0.39	36	$869,975
Small Commercial & Industrial	27,253	$1.17	36	$1,147,896
Large Commercial and Industrial	6,393	$1.56	36	$359,031
Street Lighting	2,660	$0.39	36	$37,346
Small Municipal Pumping ND	665	$0.39	36	$9,337
Small Municipal Pumping	269	$1.17	36	$11,330
Large Municipal Pumping	67	$1.56	36	$3,763
Total	**994,674**			**$15,010,136**
5 Year Recovery				
Underground Incremental Cost Difference	**Route A**			**$12,600,000**
Carrying Charges, Interest on Capitalized $				**$2,576,323**
Total				**$15,176,323**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	894,701	$0.23	60	$12,346,874
Residential Low Income	18,259	$0.23	60	$251,974
Small Commercial & Industrial ND	63,179	$0.23	60	$871,870
Small Commercial & Industrial	27,787	$0.69	60	$1,150,382
Large Commercial and Industrial	6,518	$0.92	60	$359,794
Street Lighting	2,712	$0.23	60	$37,426

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Small Municipal Pumping ND	678	$0.23	60	$9,356
Small Municipal Pumping	274	$0.69	60	$11,344
Large Municipal Pumping	69	$0.92	60	$3,809
Total	**1,014,177**			**$15,042,828**
Underground Incremental Cost Difference	**Route D**			**$13,400,000**
Carrying Charges, Interest on Capitalized $				**$2,670,661**
Total				**$16,070,661**
Customer Class	**Customers**	**Surcharge**	**Months**	**Recovery**
Residential	894,701	$0.25	60	$13,420,515
Residential Low Income	18,259	$0.25	60	$273,885
Small Commercial & Industrial ND	63,179	$0.25	60	$947,685
Small Commercial & Industrial	27,787	$0.75	60	$1,250,415
Large Commercial and Industrial	6,518	$1.00	60	$391,080
Street Lighting	2,712	$0.25	60	$40,680
Small Municipal Pumping ND	678	$0.25	60	$10,170
Small Municipal Pumping	274	$0.75	60	$12,330
Large Municipal Pumping	69	$1.00	60	$4,140
Total	**1,014,177**			**$16,350,900**

Source: Xcel Energy Information Request, 2009

The CRFS mechanism was used to provide a consistent comparison using common inputs and assumptions among the four customer populations. It is important to note that the CRFS mechanism only applies to special facilities requested by a city. If costs are decided to be allocated to other municipalities, other mechanisms may be more applicable and would be subject to Commission consideration and approval.

1.9. Sources of Information

Much of the information contained within this document was provided by the Applicant or the Applicant's representatives in the form of the Application to the Minnesota Public Utilities Commission for a Route Permit and Information Requests including written formal correspondence between the Applicant and OES.

Information on the ATF route and substation locations was provided by the ATF in the form of the Hiawatha 115 kV Transmission Line Advisory Task Force Report, dated August 28, 2009.

Additional sources of information, including all communication with federal, state, and local agencies, are noted in Section 13, References.

2. Regulatory Framework

This section summarizes the principle state regulations affecting the permitting process and the required environmental documentation for the Project. The Project would be subject to additional federal, state, and local regulations and permit conditions identified in Chapter 8.0, Required Permits and Approvals.

The Project is considered a High Voltage Transmission Line under Minnesota Statutes, chapter 216E (Minnesota Power Plant Siting Act) and requires a route permit from the Commission. When the Commission issues a route permit, zoning, building and land use regulations are preempted per Minnesota Statutes, section 216E.10, subdivision 1.

As part of this permitting process, the Minnesota Department of Commerce, Office of Energy Security (OES) prepares an Environmental Impact Statement (EIS). The EIS contains information on the human and environmental impacts of the Project and select alternatives and addresses mitigating measures for anticipated impacts.

2.1. Power Plant Siting Act - Minnesota Rule 7850

Minnesota Statutes, section 216E.03, subdivision 2, provides that no person may construct a high voltage transmission line (HVTL) without a route permit from the Commission. An HVTL is defined as a transmission line of 100 kV or more and greater than 1,500 feet in length in Minnesota Statutes, section 216E.01, subdivision 4. The two 115 kV transmission lines proposed for the Hiawatha Transmission Project are HVTLs and therefore a route permit is required prior to construction.

Because the Project is considered an HVTL, it is subject to the Minnesota Power Plant Siting Act (Minnesota Statutes, chapter 216E). Figure 2-1 illustrates the process to be undertaken by the state prior to a permit being issued for construction of the Project. This process includes a Public Information/Scoping Meeting, a Scoping Decision, development of an environmental review document, and a Public Hearing.

Minnesota Rules, chapter 7850 implements and regulates the Power Plant Siting Act. The intent of the Act and Chapter 7850 is to ensure that HVTLs are routed in an orderly manner compatible with environmental preservation and the efficient use of resources. In accordance with this policy, the Commission must choose locations that minimize adverse human and environmental impacts, while ensuring continuing electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion. The Commission is also required to provide for broad spectrum citizen participation in conjunction with these rules.

An example of a previously issued HVTL Route Permit is presented in Appendix E.

2.1.1. Route Permit Application

The Hiawatha Transmission Project HVTL Route Permit Application was submitted in April 2009 pursuant to the provisions of the Full Permitting Process outlined in Minnesota Rules, parts 7850.1700 to 7850.2700.

In accordance with Minnesota Rules, part 7850.1900, subpart 2, an application for a route permit for a HVTL must contain the following information:

- A statement of proposed ownership of the facility at the time of filing the application and after commercial operation;
- The precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated;
- At least two proposed routes for the proposed HVTL and identification of the applicant's preferred route and the reasons for the preference;
- A description of the proposed HVTL and all associated facilities including the size and type of HVTL;
- Environmental information (see subsection below);
- Identification of land uses and environmental conditions along the proposed routes;
- The names of each owner whose property is within any of the proposed routes for the HVTL;
- U.S. Geological Survey (USGS) topographical maps or other maps acceptable to the state authority showing the entire length of the HVTL on all proposed routes;
- Identification of existing utility and public rights-of-way (ROWs) along or parallel to the proposed routes that have the potential to share the ROW with the proposed line;
- The engineering and operational design concepts for the proposed HVTL, including information on the electric and magnetic fields of the transmission line;
- The cost analysis of each route, including the costs of constructing, operating, and maintaining the HVTL that are dependent on design and route;
- A description of possible design options to accommodate expansion of the HVTL in the future;
- The procedures and practices proposed for the acquisition and restoration of the ROW, construction, and maintenance of the HVTL;
- A listing and brief description of Federal, state, and local permits that may be required for the proposed HVTL; and
- A copy of the Certificate of Need or the certified HVTL list containing the proposed HVTL or documentation that an application for a Certificate of Need has been submitted or is not required.

2.1.2. Environmental Information

The route permit application also must include the following environmental information for each proposed site or route to aid in the preparation of an EIS (Minnesota Rules, part 7850.1900, subpart 3):

- Environmental setting for each site or route;
- Effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services;
- Effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;
- Effects of the facility on archaeological and historic resources;
- Effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna;
- Effects of the facility on rare and unique natural resources;
- Identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route; and
- Measures that might be implemented to mitigate the potential human and environmental impacts and the estimated costs of such mitigative measures.

2.1.3. Factors to be Considered

In determining whether to issue a permit for a HVTL, the Commission must consider the following factors (Minnesota Rules, part 7850.4100):

- Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services;
- Effects on public health and safety;
- Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;
- Effects on archaeological and historic resources;
- Effects on the natural environment, including air and water quality resources and flora and fauna;
- Effects on rare and unique natural resources;
- Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity;
- Use or paralleling of existing ROWs, survey lines, natural division lines, and agricultural field boundaries;

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- Use of existing transportation, pipeline, and electrical transmission systems or ROWs;
- Electrical system reliability;
- Costs of constructing, operating, and maintaining the facility that are dependent on design and route;
- Adverse human and natural environmental effects which cannot be avoided; and
- Irreversible and irretrievable commitments of resources.

2.1.4. Environmental Review

Applications for high voltage transmission line route permits are subject to environmental review, which is conducted by the OES staff under Minn. R. 7850.1700. The staff provides notice and conducts public information and scoping meetings to solicit public comments on the scope of the EIS.

The Director of the OES determines the scope of the EIS. The Commissioner shall not consider whether or not the project is needed (Minnesota Statutes, section 216E.03, subdivision 5), nor shall the issues of size, type and timing, system configuration, and voltage be included in the scope of environmental review (Minnesota Statutes, section 216E.02, subdivision 2).

An EIS is a written document that describes the human and environmental impacts of a proposed project (and selected alternative routes) and methods to mitigate such impacts. The public has the opportunity to comment on the scope of the EIS and the draft EIS through public comment periods and at OES sponsored information meetings. The draft EIS must be completed and made available prior to the public hearing.

2.1.5. Public Hearing

Applications for high voltage transmission line route permits under the full permitting process require a public contested-case hearing upon completion of the draft EIS pursuant to Minnesota Rules part 7850.2600. The hearing must be conducted by an administrative law judge from the Office of Administrative Hearings pursuant to the contested case procedures of Minnesota Statute, chapter 14. A portion of the hearing must be held in a county where the proposed project would be located.

2.2. Certificate of Need for Large Energy Facilities

Minnesota Statute, section 216B.243, subdivision 2 states that no large energy facility shall be sited or constructed in Minnesota without the issuance of a Certificate of Need by the Commission. A large energy facility is defined to include transmission lines between 100 kV and 200 kV if they are more than 10 miles long (Minnesota Statutes, section 216B.2421, subdivision 2(2) and (3)).

The 115 kV transmission lines proposed for the Hiawatha Project are less than 10 miles in length. Therefore, a Certificate of Need is not required for the proposed project.

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3. Engineering and Operation Design

The Project would be designed and constructed to meet the requirements of the National Electric Safety Code (NESC), North American Electric Reliability Corporation (NERC), and all applicable local and state design codes. The specific engineering design of the transmission line and substations would depend on the specific substation locations and route selected and location of the structures within the rights of way (ROW). This section provides an overview of the proposed engineering design of the transmission line and substations, as well as a discussion of maintenance considerations during operation of the Project. Overhead and underground transmission line designs and aboveground and underground substation designs are discussed independently, due to the differences required in engineering design.

3.1. Overhead Transmission Line

Routes A, B, C, and E2 would be constructed as overhead transmission line routes. Routes A and E2 would consist of a double-circuit structure with two transmission lines. Routes B and C would require two independent single-circuit transmission lines, due to the available width for a ROW. This section discusses engineering design and maintenance considerations for the overhead transmission lines.

3.1.1. Engineering Design

The double-circuit structures associated with Routes A and E2 would be constructed as single galvanized steel poles with davit arms. The structures would be bolted to concrete pier foundations. The proposed conductor would be 795,000 circular mils (795 kcmil) 26/7 Aluminum Conductor Steel Reinforced (ACSR) per phase (Xcel Energy, 2009)[2]. The height of the structures would vary based on the exact location of the structures within the ROW and whether additional height is required to avoid impacts to resources. The average height of a tangent double-circuit structure would be 75 feet, and the maximum height 110 feet. The average span distance between structures would be 500 feet (Xcel Energy, 2009). A diagram and photograph of a double-circuit tangent structure are shown in Figure 3-1.

Structures located at roadways, pedestrian paths, and future rail corridor crossings have not yet been designed due to the uncertainty of the selected route. At most crossings, the transmission line structures would be similar to the double-circuit dead-end structure shown in Figure 3-2, with an additional set of arms to support the crossing. The average height of a double-circuit dead-end structure would be 80 feet,

[2] A circular mil is a unit of area used by the NESC. One mil is equal to one thousandth of an inch. One circular mil is the area of a circle with a diameter of one mil.

and the maximum height 115 feet. The average span distance between structures at crossings would be 500 feet, although the span distance would vary based on crossing distances (Xcel Energy, 2009).

The single-circuit structures associated with the two independent lines that would be run along Routes B and C would be single galvanized steel poles with one side of davit arms and distribution underbuilt fixtures. The proposed conductor would be 795,000 circular mils (795 kcmil) 26/7 Aluminum Conductor Steel Reinforced (ACSR) per phase (Xcel Energy, 2009). The height of the structures would vary based on the exact location of the structures within the ROW and whether additional height is required to avoid impacts to resources. The average height of a tangent single-circuit structure would be 75 feet. The average span distance between structures would be 500 feet. A diagram and photograph of a single-circuit tangent structure are shown in Figure 3-3.

It is expected that the majority of pole structures would be placed on existing paved surfaces. Structure foundations would be finished below-grade to allow for the sidewalk and street curb to be finished up to the surface of the structure base, allowing for more useable surface area on sidewalks. A diagram of the below-grade foundation is shown in Figure 3-4.

Structures located at crossings would be similar to the single-circuit dead-end structure shown in Figure 3-5, with an additional set of arms to support the crossing. The average height of a single-circuit dead-end structure would be between 100 and 110 feet. The average span distance between structures would be 500 feet at the crossing, although the span distance would vary based on crossing distances (Xcel Energy, 2009).

Table 3-1 summarizes the engineering design specifications for Project conductors and overhead transmission line structures.

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Table 3-1: Overhead Transmission Line Engineering Design Summary

Component	Route	Line Voltage	Structure Type	Pole Type	Conductor	Foundation	Average Span Length	Average Height
Double-circuit tangent	A & E2	115 kV	Typical	Galvanized steel	795 kcmil 26/7 ACSR	Drilled pier	500 feet	75 feet
Double-circuit dead-end	A & E2	115 kV	Crossing	Galvanized steel	795 kcmil 26/7 ACSR	Driller pier/ driven pile	500 feet	80 feet
Single-circuit tangent	B & C	115 kV	Typical	Galvanized steel	795 kcmil 26/7 ACSR	Driller pier/ direct imbed	500 feet	75 feet
Single-circuit dead-end	B & C	115 kV	Crossing	Galvanized steel	795 kcmil 26/7 ACSR	Drilled pier	500 feet	100-110 feet

3.1.2. Maintenance

Although the estimated service life of the Project for accounting purposes is 40 years, in practicality the Project would not have a specified service end point. The overhead transmission lines would be designed to operate indefinitely with minimal routine maintenance requirements. The transmission line structures would be constructed to withstand severe weather. Repair of the lines may be required in the event of damage from natural disasters in the Project Area (e.g., tornados). If a fault is sensed on the transmission system, the transmission line would automatically be taken out of service with use of protective relaying equipment. Scheduled maintenance on the transmission line would be infrequent and the average annual availability of the transmission infrastructure is estimated by the Applicant to be over 99% (Xcel Energy, 2009).

Semi-annual inspections of the overhead transmission line would be conducted from the ground by representatives of the Applicant. Annual operating and maintenance costs for the transmission line are estimated to be $300 to $500 per mile (Xcel Energy, 2009).

3.2. Underground Transmission Line

Route D would be constructed as an underground transmission line. There is also an alternative that involves placing the line underground along Route A. Both routes would consist of a double-circuited 115 kV transmission line. This section discusses engineering design and maintenance considerations for the underground transmission lines.

3.2.1. Engineering Design

Underground transmission lines would be placed in a concrete duct system. The underground line would require two identical concrete duct banks containing four 6-inch PVC conduits for transmission circuits and two 2-inch PVC conduits for ground continuity and communication needs. The duct banks could either be installed adjacent to each other in the same trench or in two separate trenches. The trench design is dependant on physical limitations of the route selected, including existing subsurface features and available ROW. Manholes placed along the route would be used to pull conductors through the duct system.

The diameter of underground cables is determined by the size of the conductor that carries the load current, the cable's electrostatic shield system, and the insulation thickness (Xcel Energy, 2009). Typically, underground transmission line conductors are twice the size of conductors on overhead transmission lines, due to the limited heat dissipation from cable insulation and below grade encasement (Xcel Energy, 2009). The conductor would be high voltage extruded dielectric cable, 3000 kcmil Copper cross-linked polyethylene type or similar.

Underground cable vaults with manhole access would be required approximately every 1,500 feet and at any changes in the direction of the route. Vaults will allow for installation of the cable and access for inspection and repair. A typical vault with manhole access would be approximately 24 to 25 feet in length by 14 feet wide by 7 to 10 feet in height (Xcel Energy, 2009).

Figure 3-6 shows a typical underground duct section. Figure 3-7 shows the dimension of a typical underground cable vault.

3.2.2. Maintenance

No routine maintenance or operation costs are anticipated for underground transmission lines (Xcel Energy, 2009). Visual inspections of underground transmission lines are not possible and will not be conducted. Unlike overhead transmission lines that are susceptible to a number of sources of outages (e.g., weather, birds, vehicle impacts), underground transmission lines are susceptible to only two outage causes: cable fault due to overloading of the system and failure of the cable or splices. If a fault is sensed on the transmission system, the underground transmission line will need to be accessed.

The time and cost to repair an underground transmission line would be greater than those anticipated for an overhead transmission line. While overhead transmission lines fail, on average, once every 17.8 years, underground transmission lines fail once every 50.5 years (Xcel Energy, IR Request, 2009). In addition, the average time to resolve a failure on an overhead transmission line is nine hours. The average time to resolve a failure on an underground transmission line is three weeks (Xcel Energy, IR Request, 2009).

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3.3. Aboveground Substation

The Project includes an aboveground substation design for all alternative substation locations. As part of the scoping process, an alternative to place one or more of the substations underground was also identified and evaluated. Undergrounding considerations are discussed in Section 3.4. Engineering design and maintenance information for overhead substation construction is presented in this section.

3.3.1. Engineering Design

Engineering design of the alternative substations would be dependent on the location selected. A description of the Applicant's proposed two Hiawatha Substation alternatives, Hiawatha West and Hiawatha East, and the two Midtown Station alternatives, Midtown North and Midtown South, is provided below.

3.3.1.1. Hiawatha Substation

The Applicant's preferred Hiawatha West Substation and alternative Hiawatha East Substation would each have a similar low profile design. The proposed design layouts for Hiawatha West and Hiawatha East are displayed in Figures 3-8 and 3-9, respectively. The dimensions of the Hiawatha West Substation would be approximately 253 feet by 392 feet, for a total of 2.25 acres (Xcel Energy, 2009). The dimensions of the Hiawatha East Substation would be approximately 284 feet by 481 feet, for a total of 3.14 acres (Xcel Energy, IR Request, 2009). An approximately 12-foot high architecturally designed wall would border the substation on three sides; the fourth side would be gated with a chain-link fence to allow for maintenance access. The fenced and gated side would be located on the eastern side of the Hiawatha West Substation and the southern side of the Hiawatha East Substation. The substation would consist of one 50 MVA, 118-14.4 LTC distribution transformer, one 20-foot by 40-foot electric equipment enclosure to house electric controls, four switches for connection to future circuit breaker positions, and four dead-end transmission line structures connecting the substation to the transmission line (Xcel Energy, 2009).

Table 3-2 lists the structures, given with approximate heights, which would be located at the Hiawatha Substation.

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Table 3-2: Heights of Structures at the Hiawatha Substation

Type of Structure/Equipment	Height (feet)*
Lightning pole with protection spike	100
115 kV low profile	57 – 67
115 kV high buswork	22
115 kV low buswork	14
115 kV switch mounded on transmission line termination structure	42
115 kV circuit switch	22
115 – 13.8 kV power transformer	18
115 kV circuit breaker	14
Switchgear enclosure with cable spreading room	16
Electrical equipment enclosure	15

Source: Xcel Energy, 2009.

Notes: *With the exception of enclosure heights, all heights measured from "top-of-concrete" are defined as one foot above finished grade. Enclosure heights are measured from top of grade. All dimensions, provided by the Applicant, are preliminary and subject to change depending on final engineering design.

3.3.1.2. Midtown Substation

The Midtown North Substation, preferred by the Applicant, would have a high profile design. The substation would be approximately 176 feet by 248 feet, encompassing approximately one acre (Xcel Energy, 2009). The substation would be walled on four sides with an architecturally pleasing design and gate access from two sides. The substation would consist of one 70 MVA, 118-14.4 kV, LTC distribution transformer; one electric enclosure containing 13.8 kV distribution switchgear; and two 115 kV transmission line steel box dead-end structures (Xcel Energy, 2009). The proposed design layout for the Midtown North Substation is shown on Figure 3-10.

The dimensions of the alternative Midtown South Substation would be approximately 245 feet by 249 feet, encompassing approximately 1.4 acres (Xcel Energy, 2009). The design would be similar to the Midtown North Substation, with architecturally pleasing designed walls on four sides and gate access on two sides. The substation would consist of the same electric transformer and equipment as noted for the Midtown North Substation. If the Midtown South Substation were to be selected, route modifications would be required to tie Routes A, B, or C into the substation; more significant route modification would be required to tie in Route D. The Applicant has not yet developed specific route modification plans and the final engineering design will be contingent on the route and substation locations selected. The proposed design layout for the Midtown South Substation is shown on Figure 3-11.

Both the Mt-28S and Mt-28N Substation alternatives, suggested by the ATF, are large enough to accommodate either the design for the Midtown North or Midtown South Substations. Both substation locations were considered not viable by the Applicant because high winds blowing from the west could deposit road salt on substation equipment, increasing the risk of equipment corrosion and electrical equipment flashovers (Xcel Energy, Technical Feasibility of ATF Substations, 2009). If the Mt-28S or Mt-28N locations were to be selected, a wind study may be required prior to construction. Mitigation options for wind-related concerns would include use of a more extensive barrier wall or different equipment (e.g., equipment with higher basic impulse level [BIL], resistance graded, hydrophobic coatings, or polymers)[Xcel Energy, Technical Feasibility of ATF Substations, 2009]. Due to the increased distance of the Mt-28S and Mt-28N Substations from the transmission line route alternatives (approximately 0.06 and 0.4 miles, respectively), additional transmission line would be required. The costs for the additional transmission line distance would be approximately $810,000 for Mt-28S and $550,000 for Mt-28N (Xcel Energy, Information Request, 2009; Xcel Energy, Technical Feasibility of ATF Substations, 2009).

Table 3-3 lists the structures, given with approximate heights, which would be located at the Midtown Substation.

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Table 3-3: Heights of Structures at the Midtown Substation

Type of Structure/Equipment	Height (feet)*
Midtown North Substation	
115 kV steel box structure with protection strike	56-66
115 kV switch mounted on steel box structure	36
115 kV circuit switcher	23
115-13.8 kV power transformer	18
115 kV circuit breaker	14
Indoor feeder enclosure with cable spreading room	30
Midtown South Substation	
115 kV low profile with protection spike	57-67
13.8 kV steel box structure with protection spike	28-58
115 kV switch mounted on steel structure	42
115 kV circuit switcher	23
115-13.8 kV power transformer	18
115 kV circuit breaker	14
Electrical equipment enclosure	15

Source: Xcel Energy, 2009.

Notes: *With the exception of enclosure heights, all heights measured from "top-of-concrete" are defined as one foot above finished grade. Enclosure heights are measured from top of grade. All dimensions, provided by the Applicant, are preliminary and subject to change depending on final engineering design.

3.3.1.3. General Engineering Design

The Applicant has stated that substations are typically not equipped with exterior lighting. However, security lighting could be provided if necessary. Options for exterior lighting include motion sensing lights or soft wall backlighting. Internal emergency lights would be installed inside the perimeter fence. The lights would typically consist of 400 watt bulbs that are kept off unless manually turned on during an emergency or night work required during an outage (Xcel Energy, Security of Substation Facilities, 2009).

Regardless of the substation location selected, each substation would be surrounded by an approximately seven foot high perimeter fence with one foot of barb wire mounted above the fence at a 45 degree angle to limit access. All drive and walk gates would be padlocked. Warning signs would be placed on the outside of the substations approximately five feet above grade. Two signs would be placed on each drive gate, one internal and one external sign. One sign would be placed on the outside of each walk gate. Signs would be placed within 15 feet of all perimeter corners and at least one sign would be located every 30 to 45 feet (Xcel Energy, Security of Substation Facilities, 2009).

Substation warning signs would measure approximately 12 inches by 14 inches. The signs would be intended to warn the public of the danger of entering the substations and discourage access. Signs would be black and orange on a white background. The following description of the warning signs was provided by the Applicant:

> *Orange on black exclamation mark within a black triangle; black on orange "WARNING"; black on white falling human body with electrical wire near extended arm with a white on black electrical shock symbol on the human's chest; black on white "Keep Out!"; black on white "Hazardous voltage inside."; and black on white "Will shock, burn, or cause death."* (Xcel Energy, Security of Substation Facilities, 2009).

In addition to warning signs, a substation identification sign would be placed on all entrances to the substations. The signs would measure approximately 14 inches by 23 inches and include the Xcel Energy logo, the owner of the substation (Xcel Energy), and the name and address of the substation.

3.3.2. Maintenance

The Project substations would require routine maintenance to ensure they are operating efficiently and within the NESC and NERC requirements. Routine service would be performed on the substation transformers, circuit breakers, batteries, protective relays, and other equipment on an annual or semi-annual basis. Areas surrounding substation equipment must be kept clear of vegetation and proper drainage for the area must be maintained, both of which would require regular upkeep by the Applicant.

The Applicant would monitor the substations remotely through a control center, which is manned 24 hours a day, 365 days a year. Maintenance personnel would be available 24 hours a day to respond to an emergency.

As required under the Applicant's internal substation design standards, a minimum width of 15 feet would be maintained between the perimeter fence and any electrical parts to prevent an individual outside the fence from interfering with electrical equipment. Under NESC Rule 110A2, a 13 foot minimum clearance is required for 115 kV equipment. The 15-foot pathway would also be used for maintenance access.

3.4. Underground Substation

At the request of the ATF, the Applicant commissioned a study to determine the technical feasibility and cost of undergrounding the Hiawatha Substation. This section describes engineering and maintenance considerations for an underground substation design.

3.4.1. Engineering Design

The underground Hiawatha West Substation would be located in a three-story building (including the cable vaults) constructed completely underground (approximately 60 feet below grade) with a landscaped green space on the ground surface above the substation. The substation would consist of a cast-in-place, reinforced, concrete underground enclosure of approximately 38,000 square feet. The design would consist of a 115-kV four-bay breaker-and-a-half Gas Insulated Substation (GIS), four 115-kV transmission lines, three 115-13.8-kV 30/40/50 MVA transformers, and three lineups of 13.8-kV switchgear, each lineup consisting of 13 cubicles of switchgear (Sargent & Lundy, 2009).

3.4.2. Maintenance

The underground substation would require similar routine maintenance as the aboveground substations, as outlined in Section 3.3.2. The Applicant would also monitor the underground substation remotely through a control center, which is manned 24 hours a day, 365 days a year. Maintenance personnel would be available 24 hours a day to respond to an emergency.

3.5. Design Options to Accommodate Future Expansion

The locations of the Applicant's proposed Hiawatha West and Hiawatha East Substations were selected in part to provide for the opportunity for future expansion of the substations to accommodate future growth in the area. The expansion of either the Hiawatha West or Hiawatha East Substations could occur on the Zimmer-Davis property, located at 2700 Minnehaha Avenue (Xcel Energy, 2009). The Zimmer-Davis property would allow for a substation expansion of 565 feet by 250 feet, for a total of approximately 3.24 acres (Xcel Energy, IR Request, 2009). The Hiawatha Substation would allow for an additional transmission line tie-in and additional transformer and feeder lines. Expansion of the substation could accommodate a future 115 kV or 345 kV transmission line. The Applicant does not currently have plans to expand the Hiawatha Substation or develop another High Voltage Transmission Line in the Project Area (Xcel Energy, 2009). However, expansion may be necessary in the future to address continued development of the area and associated load growth.

The locations of the Midtown North and Midtown South Substations do not allow for potential future substation expansion. However, the Midtown Substation would be able to tie-in an additional 115 kV line and additional transformer and feeder lines (Xcel Energy, 2009).

4. Construction

Prior to construction of the Project, the Applicant would conduct pre-construction soil and land-based surveys, develop location-specific engineering designs, and acquire right-of-way (ROW) easement rights. This chapter includes a discussion of these pre-construction considerations and activities, as well as a description of the anticipated techniques for construction of transmission lines and substations. The chapter also discusses post-construction restoration activities and damage compensation.

4.1. Transmission Line and Structures

This section addresses construction of overhead and underground transmission lines. Construction of the Project would begin following the decision of the Commission and the issuance of required permits and approvals from federal, state, and local agencies. Prior to construction, all easement rights and ROW must be acquired and soil conditions established to finalize the construction design.

Regardless of the route or technique selected, similar construction equipment would be required. Equipment that would be used for construction includes: tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, and various trailers (Xcel Energy, 2009).

Construction of the Project would require lay down and staging areas, which may be located outside the Project ROW. These areas would be used for the temporary storage of construction materials and equipment. The exact location of lay down and staging areas would be determined once the route is selected. These areas would be temporarily leased from local landowners through rental agreements and would not require permanent ROW or easement acquisition.

4.1.1. Overhead Transmission Line

Overhead transmission line structures would be designed for installation at existing grade, such that construction areas would not be graded or leveled unless the slope of the topography is greater than 10 percent (Xcel Energy, 2009). For areas with a slope greater than 10 percent, fill material would be used to grade the area and create working pads. With the land owner's permission, fill material and working pads would remain at the site for use during future maintenance. If requested by private land owners, imported fill material can be removed following construction and the area graded back to its original condition to the extent possible (Xcel Energy, 2009).

Due to space considerations, the Applicant anticipates that overhead transmission line poles may be erected aerially, meaning that cranes will be used to vertically raise and lower the entire pole structure into place (Xcel Energy, 2009). Steel poles used for overhead transmission line construction would be transported to the ROW on tractor-trailers.

In areas where the transmission line route runs adjacent to an existing roadway, access to the transmission line structures and ROW would be provided from the roadway. Temporary road closures may be required in these situations. In most cases, road closures for construction of the transmission line adjacent to the roadway can be limited to one lane to minimize the disruption to traffic. Road closures may also be required for construction of the transmission line above the roadway at road crossings. During construction of the transmission line over road crossings, the entire road may be temporarily closed and traffic rerouted. Similarly, crossings over the Midtown Greenway may temporarily restrict full use of the Greenway.

Prior to installation of overhead transmission line poles, the structures would be moved from the staging area to the desired installation location. The structures would be stored within the ROW immediately prior to construction so that insulators and other hardware can be attached while the pole is on the ground. The pole would then be lifted, placed, and secured on the foundation (Xcel Energy, 2009).

Tangent and angle structures associated with single circuit overhead lines (Routes B and C) would be installed through the process of direct embedding. The process consists of digging a hole for each structure, placement of a corrugated metal culvert for soil support into the hole, partially filling the hole with crushed rock, setting the pole on top of the crushed rock base, and backfilling the area around the pole with crushed rock or soil.

Tangent and angle structures associated with double circuit overhead lines (Routes A and E2) would be installed on concrete drilled pier foundations. Any dead-end structures or structures that are considered medium or heavy angle would be supported by drilled pier foundations. Drilled pier foundations would be constructed by drilling and excavating of the ground surface in preparation for concrete foundations. Drilled pier foundations would range from 5 to 7 feet in diameter and 20 or more feet deep.

4.1.2. Underground Transmission Line

Two alternatives involve underground rather than aboveground transmission lines: Route D and the underground option for Route A. In general, construction of underground transmission lines takes longer than construction of overhead transmission lines. Significant background research and engineering and design considerations are required before construction of underground transmission lines. Prior to construction of underground transmission lines, the Applicant would conduct soil sampling and testing to determine the thermal conductivity of the earth and ability to trench and bore in the ROW (Xcel Energy, 2009).

There are several technologies available for the construction of underground transmission lines, including surface-cut open trenching, horizontal boring, and horizontal directional drilling (HDD). The Applicant has stated that trenching is the preferred method because it is the most easily controlled and cost effective (Xcel Energy, 2009). Open cut trenching is the most commonly used construction technique to install underground duct systems and has been used by the industry since the early 1900s. Depending on the natural features of the Project Area, it may be necessary to shore up the trench for worker safety, dewater the trench due to the presence of shallow groundwater, and backfill the trench with selective fill material to improve heat transfer. A representative photograph of a single circuit 115 kV underground trench is shown in Figure 4-1.

Horizontal boring and directional drilling are often used when the natural landscape makes open trenching difficult. Horizontal boring and directional drilling are used when construction is required to cross ravines, railroad lines, major roadways, and rivers. Although horizontal boring and directional drilling are not expected to be the primary construction techniques, they may be used during construction of the Project depending on the route selected and natural features present. The Applicant has identified the Hiawatha Avenue roadway crossing and Metro Transit Hiawatha Light Rail Line crossing as potential locations where HDD would be required.

HDD was developed in the 1970s as a method to avoid open cut trenching. In the past 30 years, HDD has been used for the installation of transmission lines, cables, and oil, natural gas, and water pipelines. By directionally drilling beneath existing features, HDD would reduce the potential for interference with transportation services during construction.

Construction of underground transmission lines would require installation of a duct system. The majority of underground facilities would consist of two identical concrete duct banks containing four 6-inch polyvinyl chloride (PVC) conduits for transmission circuits and two 2-inch PVC conduits for ground continuity and communication needs. The duct banks could either be installed adjacent to each other within the same trench or in two separate trenches. An extra duct bank would be constructed with extra cable to act as a backup in the event that a fault occurs along the transmission line. The duct system minimizes the length of trench open at any one time, as cables are pulled into the ducts after trench backfilling is completed. To assist in pulling cable through the duct system, manholes would be installed along the duct system.

The Applicant estimates that construction of the initial duct banks would occur at a rate of approximately 200 feet per day (Xcel Energy, 2009). During construction, a safety barrier would enclosure the work area to prevent unauthorized access to the area.

4.2. Substations

This section discusses construction considerations for aboveground and underground substations, including demolition of existing buildings required prior to construction of the substations.

4.2.1. Aboveground Substations

Each of the eleven substation alternatives could potentially be constructed as an aboveground substation. As described in Section 1.5, many of the alternative substation locations are currently developed with vacant or occupied buildings. Businesses located at selected substation locations would need to be relocated prior to construction and any existing facilities demolished. Vacant lots would need to be cleared and graded prior to construction.

Special procedures may be necessary for contaminated soils encountered during substation construction, including worker protection during soils excavation and handling and proper off-site disposal, depending on the concentration of parameters detected.

A description of the engineering design for the Applicant's proposed substations is included in Section 3.3.1. The layout and size of substations, as presented in Section 3.3.1, was developed with consideration of electrical clearances. Similar construction equipment would be used during substation construction as was described for transmission line construction in Section 4.1.

4.2.2. Underground Substations

The Applicant commissioned a study to evaluate the technical feasibility and cost of undergrounding the Hiawatha Substation. The Hiawatha West Substation location was used for the analysis.

If the substation were to be placed underground, construction would require the excavation of soils up to 60 feet below ground surface. Under this scenario, shallow groundwater may be encountered, resulting in the need for pit dewatering. Dewatering refers to the removal of groundwater in order to lower the local groundwater table and allow for subsurface construction. Typically, pit dewatering could occur through use of dewatering pumps place directly within an excavated pit or well. Displaced water from dewatering activities would need to be discharged off-site in accordance with a National Pollutant Discharge Elimination Standard (NPDES) permit.

Depending on the scale of dewatering activities required, it is possible that shallow groundwater levels could be directly affected from pit dewatering. Dewatering is not expected to affect groundwater levels in production wells withdrawing groundwater from deep aquifers for the municipal water supply.

Backfill for the substation could be obtained and re-used from the excavation site. The underground substation would be covered with eight to 12 inches of topsoil (Sargent & Lundy, 2009).

Special procedures may be necessary for contaminated soils encountered during substation construction, including worker protection during soils excavation and handling and proper off-site disposal, depending on the concentration of parameters detected.

4.3. Property/Right-of-Way Acquisition

The width of ROW required for construction of the Project is dependant on the design and location selected. Construction of an overhead transmission line along Routes A, B, C, or E2 would require a 50-foot-wide ROW. Construction of an underground transmission line along Routes A or D would require a 30-foot-wide ROW. In most locations, the transmission line structures would be placed along the centerline of the ROW, with equal widths extending out from either side of the centerline. Exceptions to ROW widths may be required to avoid impacts to existing resources.

In cases where the transmission line structures can be placed adjacent to an existing roadway, the Project would share the existing road ROW. Depending on the route selected, and therefore the width of existing roadway ROW, road configurations, and structure requirements, easements may be needed from adjacent residential and commercial landowners (Xcel Energy, 2009).

The acquisition of utility easement on private land consists of a multi-step process that involves contacting the land owner, conducting a land survey, preparation of legal documentation, and negotiating and purchase of the easement.

Owners of private land located within the desired ROW easement would be contacted by a ROW agent acting on behalf of the Applicant to discuss the land use needs specific to their parcel and any site-specific concerns of the land owner. Contact with private land owners would occur following the issuance of the Route Permit. The ROW agent would request permission to access the property to conduct a land survey and soil borings. The purpose of the survey is to identify natural features, man-made features, and elevations needed for detailed engineering design of the transmission line (Xcel Energy, 2009).

The ROW agent conducts negotiations with the land owner to acquire easement rights to build, operate, and maintain the transmission line and associated structures. The ROW agent would offer compensation for the easement. The specific location of structures associated with the transmission line would be staked during easement negotiations.

The monetary offer made for the easement would compensate the land owner for any diminution in value of the fair market value of the property due to the encumbrance of the easement (Xcel Energy, 2009). The land owner would be allowed a set amount of time to consider the offer and present the ROW agent with additional information needed to determine the easement's value. If the land owner does not agree with the easement value offered by the ROW agent, the land owner and/or the Applicant may have an appraisal made. The cost of the appraisal, up to $500, would be reimbursed by the Applicant as long as the appraisal is performed in accordance with standard and accepted appraisal practices, as stipulated in Minnesota Statutes, section 117.189.

The Applicant anticipates that land owner concerns would be addressed and an agreement reached regarding the purchase of land rights. Legal documentation for the acquisition of easement rights would be prepared by the ROW agent. If an agreement cannot be reached regarding the acquisition of easement rights, the Applicant can exercise the right of eminent domain, also referred to as the condemnation process, under Minnesota Statutes, chapter 117.

Under the condemnation process, the Applicant files a Petition in the district court where the property is located. The Petition would be served to all owners of the property. If granted by the courts, a three-person condemnation commission would be established to evaluate compensation for the easement. The three-person committee would be comprised of third-party individuals familiar with real estate issues, who would view the property in question. The commission would conduct a valuation hearing, at which the property owners would be allowed to testify regarding the fair market value or the easement. Following the hearing, the commission would make an award as to the value of the property, which would be filed with the court. Each party is given a 40-day window to appeal to the district court for a jury trial.

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After ROW is acquired, the ROW agent would contact all land owners to discuss the construction schedule. If personal property must be moved temporarily for the construction of the Project (e.g., property fences), the ROW agent would discuss this with the land owner.

For the acquisition of utility easement on public land, the Applicant would work with applicable local and state agencies to obtain the required approvals and permits.

4.4. Cleanup and Restoration

Potential impacts from construction of the Project are discussed in detail in Chapter 5.0. Through best management practices and mitigation measures, also discussed in Chapter 5.0, impacts from construction can be minimized or avoided. Construction of the transmission line would require temporary disruption of the ground surface within the ROW. The disturbed areas would be restored to their original condition to the extent possible following construction activities.

Disturbance of vegetation along overhead ROW would be limited to pole locations and surrounding lay down areas. However, the installation of an underground transmission line would require the clearing of all existing vegetation along the ROW. Following construction, cleared areas above underground transmission line facilities would be revegetated with shallow rooted species.

The HVTL route permit would require the Applicant to restore ROWs following construction. This may include the replacement of personal property removed or damaged during construction, re-grading areas where fill material was used, and assisting in the reestablishment of vegetation.

4.5. Damage Compensation

Following construction of the Project, the ROW agent would contact private land owners to inquire whether any damage occurred to the property during construction and what repairs may be needed. The Applicant would be responsible for restoring all areas to their original condition to the maximum extent possible. An outside contractor may be hired by the Applicant to assist in restoration and repairs. If non-repairable damage occurs to a property, the Applicant would reimburse the landowner for such damages.

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5. Affected Environment, Impacts, and Mitigation

This chapter describes the environmental setting as it relates to the proposed Project and each alternative considered. The Project Area is defined as the route width for each transmission line alternative and each alternative substation location.

The sub-sections describing affected environment describe the resource/environmental setting in the Project Area. The sub-sections describing direct and indirect impacts describe the potential effects of the project on the resource/environmental setting within the proposed rights-of-way. The sub-sections describing mitigation strategies include a discussion Applicant-proposed mitigation from the application and additional mitigation measures when warranted. Mitigation measures are not discussed for identified potential direct and indirect effects that are either not anticipated to occur under construction or operation of the Project or are anticipated to result in a positive effect.

5.1. Proximity to Structures

This section identifies and provides a description of properties that have the potential to be impacted from the Project due to their co-location with or proximity to overhead and aboveground transmission structures. Properties located within a specified distance of the overhead transmission line towers or aboveground substations can be impacted in various ways. Various types of potential impact that are related to structure proximity are addressed in other sections in Chapter 5 of this Draft EIS, such as aesthetics, noise, socioeconomics, and safety and health. This section evaluates the potential impact of the various alternatives relative to each other by examining the number of structures in proximity to the various routes for each alternative within a specified fall distance as discussed below.

The underground transmission line routes (Routes A and D) and the underground substation alternative were not evaluated in the analysis for proximity to structures as the primary concern is related to overhead transmission line towers and aboveground structures.

Information was gathered and examined to determine the number and types of existing properties located within various distances of transmission structures and the potential affects on these structures from the proposed Project.

5.1.1. Affected Environment

The affected environment is identified as those properties located within specified distances of transmission line poles and/or properties situated on substation locations. Only transmission line structures (i.e., transmission line poles and substations) are included in this discussion. Information on potential impacts from transmission lines themselves or from the entire transmission line system is discussed where appropriate in the applicable subject sections of this Draft EIS.

Table 5.1-1 shows the assortment of properties located within 75 and 115 foot distances of the proposed transmission line pole structures (referred to as "transmission line towers"). Distances are equivalent to the proposed height range of transmission line towers (i.e., 75 to 115 feet). This metric was chosen to evaluate the effect of properties being located within the "fall distance" of a transmission line tower (assumed to be equivalent to tower height). The term "fall distance" is not a term defined or utilized by the utility industry, by the Applicant, or by federal statute or federal regulation (Xcel Energy, FHA, 2009). The definition for this term is provided in HUD Handbook 4150.2, which states that "[f]or field analysis, the appraiser may use tower height as the fall distance" (Xcel Energy, FHA, 2009).

These distances were based on the Applicant's preferred tower placement locations for the preferred transmission line alignments. However, alignments could be located anywhere within the selected route width. The numbers of structures shown are best estimates based on information available at the time of the evaluation. Actual numbers would be based on the final alignment of the transmission line within the ROW and the final design locations of transmission line pole structures.

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Table 5.1-1: Properties in Proximity to Overhead Transmission Structures

Transmission Line Route	Distance (ft)[1]	Residential Structures	Places of Worship	Daycare Centers	Schools	Cemeteries	Hospitals	Commercial Enterprises[4]	Mixed-Use[5]	Mixed-Use (Other)[6,7,8]	Total Structures
Route A[2,3]	75	7	0	0	0	1	0	9	0	0	17
	115	17	1	0	0	1	0	21	1	0	41
Route B	75	70	3	0	0	0	0	14	4	1	92
	115	146	4	1	0	0	0	20	5	1	177
Route C	75	101	6	0	0	0	1	10	2	1	121
	115	204	7	1	0	0	1	23	4	1	241
Route D[3]	75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	115	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Route E2	75	54	0	2	0	0	0	10	1	0	67
	115	76	0	3	0	0	0	10	1	0	90

1 Distance is measured as a radius around each transmission line tower. Transmission line tower locations are best estimates based upon information currently available. The exact structure placement may vary based upon detailed site surveys once a final route has been selected.
2 Route A details properties within the distance of the proposed overhead route centerline.
3 Routes A (underground option) and D were not analyzed because they are only proposed using underground construction.
4 Includes commercial, industrial use descriptions, and medical facilities not classified as hospitals.
5 Mixed-Use is described as residential and commercial use.
6 Mixed-Use (Other) is described as two or more land uses within the same parcel, as specified.
7 Hospital-Daycare mixed use, listed as number of sites followed by the number of buildings on-site that could be affected.
8 School-Daycare mixed use, listed as number of sites followed by the number of buildings on-site that could be affected.

Source: Asah, Personal email communication regarding proximity to structures, 2009.

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Table 5.1-2 shows existing properties situated on substation locations. The identified structures on these properties would require demolition and relocation in order to accommodate the associated substation.

Table 5.1-2: Properties Located on Substation Sites

Substation Locations	Associated Properties
Midtown North	Condemned Triplex, Former Xcel Energy Oakland Substation, and Vacant Lot
Midtown South	Warehouse Complex
MT-28 N	Green Space
MT-28 S	Shuttle Parking Lot for Children's Hospital
Hiawatha East	Warehouse Complex
Hiawatha West	Vacant Lot

Source: Xcel Energy, 2009

5.1.2. Direct/Indirect Effects

Potential direct effects to properties that are located in proximity to transmission line towers or situated on substation locations include:

- Required demolition of existing structures for placement of Project structures; and
- Changes or limitation to existing land use.

Potential indirect effects on these properties include impacts to:

- Health and safety;
- Aesthetics;
- Noise; and
- Socioeconomics (property values and FHA home loans).

The various types of potential indirect impacts that are related to structure proximity are addressed in other sections in Chapter 5 of this Draft EIS.

5.1.2.1. Transmission Line Towers

The extent of potential impacts from transmission line towers to structures and the type of properties impacted depends upon the transmission line route. Routes that are longer in distance generally have the potential to impact more properties, and routes that run primarily through residential areas have the potential to impact more residential structures. The degree of potential impacts to various properties of each route is further discussed below.

As shown in Table 5.1-1, the Route A overhead option has the potential to impact the least number of residences (seven to 17) out of all of the overhead route alternatives. This route has the potential to impact only one or no places of worship, cemeteries, mixed-use properties, daycare centers, schools, or hospitals. Potential commercial enterprise impacts are similar to Routes B and C.

Route B has the potential to impact the second greatest number of residential properties (70 to 146) and places of worship (three to four) and the greatest number of all mixed-use properties (five to six). Route B has no potential impacts to schools, cemeteries, and hospitals and the potential to impact up to one daycare center. Commercial enterprises impacts are similar to Routes A and C.

Route C has the potential to impact the greatest number of residential structures (101 to 204) and places of worship (six to seven). This is most likely due to the fact that this route is one of the longest transmission line route alternatives and primarily runs through residential areas. Route C has the potential to impact one daycare center, one hospital, no schools or cemeteries, and up to five mixed-use properties. Commercial enterprises impacts are similar to Routes A and B.

Route E2 has the potential to impact 54 to 76 residential structures and the greatest number of daycare centers, although the number remains low at two to three. Route E2 could impact only one mixed-use property and no places of worship, schools, cemeteries, or hospitals. This route has generally fewer potential impacts to commercial enterprises than the other overhead routes.

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5.1.2.2. Substation Locations

Depending upon location, construction of the substations would potentially require the removal of existing structures and resettlement of building occupants[3]. For the Midtown Substation development, all alternatives would require some modifications to the current land use of the property. If the Midtown North location is selected, a condemned triplex would need to be demolished. If the Midtown South location is selected, a warehouse complex owned by Brown Campbell would need to be demolished and the occupied use relocated. Neither of the ATF's substation locations requires demolition; however, Mt-28N would require the removal of an existing green space and Mt-28S would require the removal of an existing shuttle parking lot used by Children's Hospital.

For the Hiawatha Substation development, Hiawatha West is currently a vacant property and would not require demolition or resettlement. If the Hiawatha East site is selected, a warehouse complex owned by Crew would need to be demolished and the occupied use relocated.

There are no significant differences between the potential impacts for construction of aboveground substations or underground substations, as demolition of existing properties would be required for both construction methods.

5.1.3. Mitigation

Impacts to properties related to overhead transmission line towers can essentially be eliminated by developing one of the underground construction transmission line alternatives (Routes A or D). Impacts to various properties can be minimized by developing the overhead transmission line route that has the fewest potential number of impacts to that type of property. For example, impacts to residential structures can be minimized by developing Route A. In some cases, it may be possible to micro-site specific tower locations to move them away from residential structures, to the extent practicable. If an overhead route alternative is selected, the final transmission line design could be completed with the objective of minimizing the number of structures within the "fall distance" of the tower to the extent practicable.

In terms of land use change requirements for various substation location alternatives, impacts can be avoided by developing the substation location alternatives that are currently unoccupied and vacant. For substation locations that would require land

[3] Properties situated near substation locations have the potential to be impacted in other ways, as described in other Chapter 5 sections of this Draft EIS.

change, the Applicant has stated that they would work with the landowners subject to displacement and provide just compensation for the property and all required relocation benefits. All substation sites are located in areas zoned light industrial; therefore, the removal of the condemned and abandoned triplex associated with the Midtown Substation would not impact the city's housing plan for the area (Xcel Energy, 2009).

5.2. Land Use, Zoning, and Planning

This section provides a description of the land use patterns and pertinent zoning regulations associated with the Project. Information from the Minnesota Department of Natural Resources (MnDNR) Geographical Analysis Program (GAP) and the city of Minneapolis Planning Department was used to determine existing conditions and potential effects on those conditions.

The Land Use, Zoning, and Planning Study Area used for this analysis includes the following neighborhoods (see Figure 5.4-1, Neighborhood Map):

Table 5.2-1: Land Use, Zoning, and Planning Study Area Location

Neighborhood	Township (N)	Range (W)	Sections
Cedar Riverside Neighborhood	29	24	25, 26
Central Neighborhood	28	24	2, 3
Corcoran Neighborhood	28	24	1
Elliot Park Neighborhood	29	24	26
Longfellow Neighborhood	29	24	36
Loring Park Neighborhood	29	24	27
Phillips Neighborhood	29	24	35, 36
Powderhorn Park Neighborhood	28	24	2
Seward Neighborhood	29	24	36
Stevens Square-Loring Heights Neighborhood	29	24	27
Whittier Neighborhood	29	24	34

Source: Xcel Energy, 2009a.

The 11 neighborhoods are located in south Minneapolis, Hennepin County, Minnesota. The following discussion provides a brief description of each of the neighborhoods that comprise the Land Use, Zoning, and Planning Study Area. A note is made for each neighborhood that is included within the city of Minneapolis empowerment zones. These neighborhoods are targets for sustainable communities that allow for economic growth, affordable housing, education, and community services (City of Minneapolis, Minneapolis Empowerment Zone, 2008).

The **Cedar Riverside** is triangular in shape and is bounded by the Mississippi River, Interstate 94, and Interstate 35W (I-35W) (City of Minneapolis CPED, 2009d). This neighborhood provides the northeastern border for the Route E2 transmission line route alternative.

The **Central neighborhood** is a primarily residential area bordered by Lake Street on the north and 38th Street on the south. I-35 W serves as its western border, and Chicago Avenue is its eastern border. Similar to other neighborhoods in the city, Central neighborhood is primarily residential with more than 60 percent of the land for single-family residences (City of Minneapolis CPED, 2009d). The Central neighborhood is located to the southwest of the Land Use, Zoning, and Planning Study Area. The alignment of Route C extends into the northern half of this neighborhood.

Elliot Park is bounded by the following streets: Fifth Avenue South, Fifth Street South, Highway 55, 18th Street East, and Fourth Avenue South. This neighborhood is home to the Hennepin County Medical Center and North Central University (City of Minneapolis CPED, 2009d). This neighborhood is included within the city of Minneapolis empowerment zones. Elliott Park is located to the north of Route E2.

The **Corcoran neighborhood** is located between Lake Street East and 36th Street East and between Cedar Avenue South and Hiawatha Avenue (City of Minneapolis CPED, 2009d). This neighborhood is located to the southeast of the Land Use, Zoning, and Planning Study Area. The alignment of Route C extends into the northern half of this neighborhood.

Other primarily residential areas include the Loring Park, Phillips, Powderhorn Park, and Stevens Square-Loring Heights neighborhoods. The **Loring Park neighborhood** is located in the southwest portion of downtown Minneapolis. It is bound by West Lyndale North, Lyndale South, and Hennepin Avenues on the west; Interstate 94 on the south; and Highway 65 on the east (City of Minneapolis CPED, 2009d). This neighborhood is located to the northwest of the Land Use, Zoning, and Planning Study Area. It borders the Route E2 transmission line alternative.

The **Phillips neighborhood** comprises the largest portion of the overall Land Use, Zoning, and Planning Study Area. This neighborhood is located south of downtown Minneapolis and extends from Interstate 94 on the north to Lake Street East on the south and from Interstate 35 on the west to Hiawatha Avenue on the east. The eastern border of the neighborhood continues along Hiawatha Avenue to Cedar Avenue South and then along the Soo Line Railroad (City of Minneapolis CPED, 2009d). This neighborhood is part of the empowerment zones within the city. It incorporates the area intersected by Routes A, B, C, D, and E2. Many of the substation alternatives also are located within this neighborhood.

South of the Phillips neighborhood, the **Powderhorn Park neighborhood** is bound on the north by Lake Street, on the east by Cedar Avenue South, on the south by 38th Street East, and on the west by Chicago Avenue. It is mainly a residential neighborhood (City of Minneapolis CPED, 2009d). This neighborhood includes portions of Route C.

The **Stevens Square-Loring Heights neighborhood** is located south of Minneapolis' downtown. This neighborhood has the highest population density within the city of Minneapolis (City of Minneapolis CPED, 2009d). This neighborhood borders the Route E2 transmission line alternative.

While the aforementioned neighborhoods primarily consist of residential properties, other neighborhoods within the city exhibit a mixed use characteristic. The **Longfellow neighborhood** extends west to Hiawatha Avenue and east to 38th Avenue, while the northern and southern boundaries are 27th Street and 34th Street, respectively. This neighborhood is served by a light-rail transit corridor that runs alongside Hiawatha Avenue, which includes an industrial area. Likewise, the **Seward neighborhood** incorporates both residential and industrial areas. Approximately 20 percent of its land use is industrial (City of Minneapolis CPED, 2009d). Both of these neighborhoods are part of the city empowerment zones. These two neighborhoods are the locations for many of the eastern substation alternatives.

The **Whittier neighborhood** also exhibits mixed use characteristics, but does not contain as much industrial land as the Longfellow and Seward neighborhoods. Almost 40 percent of this neighborhood's total acreage is used for multifamily housing, and almost 90 percent of those housing units are renter-occupied. Approximately 60 percent of the land includes a wide variety of uses including commercial properties, schools, and entertainment facilities (City of Minneapolis CPED, 2009d). This neighborhood is also part of the City of Minneapolis empowerment zones. It borders the Route E2 transmission line alternative.

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5.2.1. Affected Environment

The Project involves routing transmission facilities through an urban area in south Minneapolis, Minnesota. The Applicant has stated that they followed the State of Minnesota's policy of "non-proliferation" of infrastructure corridors, which establishes a preference for locating new transmission line facilities along existing rights-of way (ROWs), including transmission line ROWs and transportation ROWs (Xcel Energy, 2009).

The discussion of the affected environment includes an analysis of local zoning and land use; land cover; and federal, state, county, and local planning. The analysis primarily provides an overview of existing conditions within the Land Use, Zoning, and Planning Study Area (i.e., the 11 neighborhoods in South Minneapolis).

5.2.1.1. Zoning/Use

Zoning is used as a means of regulating permitted land uses in the State of Minnesota. Minnesota Statutes provide for this authority to promote the health, safety, morals, and general welfare of a community within the State. The city of Minneapolis regulates zoning within the Land Use, Zoning, and Planning Study Area.

The Hiawatha Line would be considered a high voltage transmission line (HVTL). A HVTL is defined as a transmission line of 100 kV or more and greater than 1,500 feet in length. For this reason, this Project is subject to the provisions of the Power Plant Siting Act.

Under the Power Plant Siting Act, Minnesota Statutes, section 216E.10, the Route Permit issued for 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 preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local, and special purpose government" (Minnesota Statutes, section 216E.10).

While not directly applicable, local zoning ordinances regarding utility locations are limited. Chapter 99.850 of the municipal code provides for underground electrical transmission lines. The following describes the provisions of this ordinance:

> *The city council finds that it is in the public interest and necessary in order to promote and preserve the general welfare, assure the orderly development of the city and provide for the safety and convenience of its inhabitants, that all existing overhead distribution systems and transmission lines of electrical and*

> *communication utilities be eliminated as soon as possible and that distribution lines and systems used in the supplying of electric, communication or similar associated services be placed, constructed and installed underground* (City of Minneapolis, 1991).

An ordinance in Chapter 13 of the municipal code regulates utility encroachment on public park lands. This ordinance requires the acquisition of a permit prior to locating a utility. Other references to utilities include ROW provisions. For instance, Chapter 429.40 establishes a voluntary utility coordination committee. This committee would assist the city in providing decisions as to the use of ROW and allowing for construction within them (City of Minneapolis, 1991).

While local approvals are not required for the construction and operation of the transmission line, current zoning designations are presented for each transmission line alternative and substation alternative, since they can provide insights into the possible impacts of the Project on future development plans. As described by the city of Minneapolis Community Planning and Economic Development Department (CPED), the current zoning designations for each transmission line route and substation alternative are presented in Table 5.2-2.

Table 5.2-2: Zoning Designations within the ROW

Route Alternative/ Substation Site	Route Portion	Zoning Code	Zoning District
Route A	Not applicable	I1	Light Industrial
		R6	Multiple-family (high density)
		OR3	Institutional Office Residence
		C2	Neighborhood Corridor Commercial
		R2B	Two-family (low density)
		OR2	High Density Office Residence
		I3	General Industrial
		I2	Medium Industrial
Route B	26th Street	I1	Light Industrial
		R2B	Two-family (low density)
		R4	Multiple-family (medium density)
		OR2	High Density Office Residence
		C1	Neighborhood Commercial
		C4	General Commercial
		I2	Medium Industrial
	28th Street	I1	Light Industrial
		R6	Multiple-family (high density)

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Route Alternative/ Substation Site	Route Portion	Zoning Code	Zoning District
		C2	Neighborhood Corridor Commercial
		OR3	Institutional Office Residence
		R2B	Two-family (low density)
		C1	Neighborhood Commercial
		I2	Medium Industrial
Route C	28th Street (see Route B)	-	-
	31st Street	C1	Neighborhood Commercial
		I2	Medium Industrial
		I1	Light Industrial
		R4	Multiple-family (medium density)
		C2	Neighborhood Corridor Commercial
		OR1	Neighborhood Office Residence
		R2B	Two-family (low density)
		C1	Neighborhood Commercial
		R5	Multiple-family (high density)
		OR2	High Density Office Residence
		C3A	Community Activity Center
Route D	Not applicable	I1	Light Industrial
		R6	Multiple-family (high density)
		C2	Neighborhood Corridor Commercial
		OR3	Institutional Office Residence
		R2B	Two-family (low density)
		C1	Neighborhood Commercial
		I2	Medium Industrial
Route E2	I-35 West (28th Street to 27th Street)	I2	Medium Industrial
	I-35 West (27th Street to Franklin Avenue)	R6	Multiple-family (high density)
	I-35 West (Franklin Avenue to approximately 17th Street)	C1	Neighborhood Commercial
	I-35 West (5th Avenue to Columbus Avenue)	R6	Multiple-family (high density)
	I-35 West (Columbus Avenue to Elliot Avenue)	OR2	High Density Office Residence
	I-35 West (Elliot Avenue to Hiawatha Avenue)	R6/R2B	Multiple-family (high density)/ Two-family (low density)
	I-35 West (Hiawatha Avenue/Ogema Place to 24th Street)	R6	Multiple-family (high density)

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Route Alternative/ Substation Site	Route Portion	Zoning Code	Zoning District
	I-35 West (24th Street to Stately Street)	R4	Multiple-family (medium density)
	I-35 West (Stately Street to 26th Street)	R1-R2B	Single Family (low density)/Two-family (low density)
	I-35 West (26th Street to 28th Street)	I2	Medium Industrial
Hiawatha Substation (East and West)	Not applicable	I1	Light Industrial
Midtown Substation (North and South)	Not applicable	I1	Light Industrial
Mt-28N Substation	Not applicable	I1	Light Industrial
Mt-28S Substation	Not applicable	I1	Light Industrial

Source: Xcel Energy, 2009 (Appendix B-Zoning).

Land use within the city of Minneapolis is predominantly residential. In 2005, 19,566 acres of land were classified as residential; this accounts for approximately 53.3 percent of the total acreage (36,726 acres). Single family homes comprised 14,789 acres of all residential land, while multi-family homes accounted for 4,777 acres. Table 5.2-3 provides additional details regarding the overall land use within the city of Minneapolis.

Table 5.2-3: Land Use within the city of Minneapolis, 1990-2005

Land Use (in acres)	1990	1997	2000	2005
Residential Total	**19,676**	**19,341**	**19,316**	**19,566**
Single Family	16,039	14,769	14,808	14,789
Multi-Family	3,637	4,572	4,508	4,777
Commercial Total	**1,909**	**2,345**	**2,384**	**2,376**
Retail	n/a	n/a	2,179	2,089
Office	n/a	n/a	148	219
Mixed Use Commercial	n/a	n/a	58	68
Industrial Total	**5,460**	**4,646**	**4,599**	**4,009**
Industrial and Utilities	4,917	4,019	3,442	3,322
Extractive	n/a	13	0	0
Mixed use industrial	n/a	n/a	61	85

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Land Use (in acres)	1990	1997	2000	2005
Airports	543	542	491	36
Railways	n/a	n/a	605	566
Institutional and Recreational Total	**5,986**	**6,464**	**6,541**	**6,559**
Institutional	2,575	2,803	2,788	2,776
Parks and Recreational	3,411	3,661	3,753	3,783
Parks	n/a	n/a	3,227	3,256
Golf Courses	n/a	n/a	527	527
Major 4-Lane Highways	**1,298**	**1,327**	**1,418**	**1,402**
Non-urbanized Land Total	**769**	**946**	**836**	**627**
Wetlands	30	16	13	10
Areas with 18% or greater slope	n/a	n/a	3	1
Undeveloped and Agricultural	739	930	821	616
Undeveloped	n/a	n/a	821	616
Agricultural	n/a	n/a	0	0
Open Water Bodies	**2,271**	**2,220**	**2,195**	**2,186**
Total	**37,369**	**37,289**	**37,292**	**36,726**

Notes: n/a= not available
Source: Met Council, 2007.

Land use within the individual neighborhoods is depicted in Figure 5.2-1 (City of Minneapolis, City Assessor, 2006).

As shown in Figure 5.2-2, the neighborhoods contain a variety of uses ranging from residential to light industrial. Similar to the city of Minneapolis as a whole, residential uses are the predominant land use within many of the neighborhoods. However, each transmission line route alternative would intersect a variety of land use types, including but not limited to residential, industrial, and recreational.

Table 5.2-4 provides the various land use types within each route ROW and the percentage of each that would intersect the route ROW.[4]

[4] The percentage of each route that would intersect a particular land use was calculated using a Geographic Information Systems (GIS) program. The ROW was assumed to be 50 feet for overhead routes and 30 feet for underground routes. The percentage represents the amount of overlap between the

Table 5.2-4: Land Use Designations within the ROW

Route	Land Use	Acreage	Percentage[1]
Route A (Overhead)	Single Family Detached	0.05	0.6%
	Single Family Attached	0.13	1.5%
	Multi-Family	0.24	2.9%
	Retail and Other Commercial	0.19	2.3%
	Mixed Use Residential	0.31	3.8%
	Mixed Use Commercial and Other	0.36	4.3%
	Industrial and Utility	0.70	8.5%
	Park, Recreational, or Preserve	5.75	69.8%
	Major Highway	0.26	3.2%
	Undeveloped	0.25	3.1%
	Total	**8.23**	**100.0%**
Route A (Underground)	Single Family Attached	0.00	0.1%
	Multi-Family	0.13	2.3%
	Retail and Other Commercial	0.25	4.3%
	Mixed Use Residential	0.06	1.1%
	Mixed Use Commercial and Other	0.21	3.6%
	Industrial and Utility	0.48	8.1%
	Park, Recreational, or Preserve	4.44	75.1%
	Major Highway	0.16	2.6%
	Undeveloped	0.17	2.9%
	Total	**5.92**	**100.0%**
Route B (Overhead)	Single Family Detached	3.52	18.0%
	Single Family Attached	3.26	16.6%
	Multi-Family	2.56	13.0%
	Retail and Other Commercial	1.11	5.7%
	Mixed Use Residential	0.38	2.0%
	Industrial and Utility	2.47	12.6%
	Institutional	1.84	9.4%
	Park, Recreational, or Preserve	1.52	7.8%
	Major Highway	1.88	9.6%
	Undeveloped	1.05	5.3%
	Total	**19.58**	**100.0%**
Route C (Overhead)	Single Family Detached	4.32	19.3%
	Single Family Attached	3.75	16.8%
	Multi-Family	2.21	9.9%
	Retail and Other Commercial	1.68	7.5%

alignment and the land use assuming the appropriate amount of ROW as compared to the overall acreage of the route alignment. Percentages were not calculated for the substations, as many of these alternatives are located within only one type of land use.

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Route	Land Use	Acreage	Percentage[1]
	Mixed Use Residential	0.38	1.7%
	Industrial and Utility	1.72	7.7%
	Institutional	3.32	14.9%
	Park, Recreational, or Preserve	0.94	4.2%
	Major Highway	2.78	12.4%
	Undeveloped	1.26	5.6%
	Total	**22.36**	**100.0%**
Route D (Underground)	Single Family Detached	1.06	20.2%
	Single Family Attached	0.99	18.7%
	Multi-Family	0.47	9.0%
	Retail and Other Commercial	0.69	13.1%
	Mixed Use Residential	0.11	2.1%
	Industrial and Utility	0.91	17.2%
	Institutional	0.33	6.4%
	Park, Recreational, or Preserve	0.16	3.0%
	Major Highway	0.14	2.7%
	Undeveloped	0.41	7.7%
	Total	**5.26**	**100.0%**
E2 (Overhead)	Single Family Detached	1.39	7.5%
	Single Family Attached	1.98	10.7%
	Multi-Family	7.62	41.3%
	Retail and Other Commercial	0.62	3.4%
	Office	0.22	1.2%
	Industrial and Utility	1.30	7.1%
	Institutional	0.28	1.5%
	Park, Recreational, or Preserve	1.03	5.6%
	Major Highway	2.66	14.4%
	Undeveloped	1.35	7.3%
	Total	**18.46**	**100.0%**

Notes: 1. Some variability in the percentage may be present due to rounding.
Source: Xcel Energy, 2009 (ROW width).

As shown in Table 5.2-4, within both the overhead and underground options for Route A, the largest percentage of land would be used for parks, recreation, and preserve. This is due to the presence of the Midtown Greenway. Route A primarily would follow this multi-modal path system along East 29th Street. The overhead option ROW for the Applicant's preferred alignment would include approximately 8.23 acres of the Greenway, while the underground option ROW would include approximately 5.92 acres. The ROW of Route A under both design options would intersect the fewest acres of land zoned for single family detached homes and multi-family homes as compared to all other route alternatives.

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Within Route B, single family detached homes would comprise the highest percentage of the route's total acreage. As previously indicated, Route B primarily would follow East 26th Street for a majority of its alignment. The total acreage of ROW for the Applicant's preferred alignment would be approximately 19.58 acres. While the three highest percentages of total acreage would be for residential purposes, approximately 12.6 percent of the route's total acreage would be comprised of industrial and utility uses. Unlike the Route A design options, this route alternative would contain land used for institutional purposes.

Route C would occupy a variety of land uses, with the most acreage being used for single family detached homes. In addition, this route ROW for the Applicant's preferred alignment would incorporate the highest total acreage (22.36 acres) and the highest percentage of institutional uses (14.9 percent).

Within the Applicant's preferred alignment for Route D, the highest percentage of the total acreage would be used for single family detached homes, followed by single family attached homes. These two uses would be the highest among all of the route alternatives for the respective uses. Furthermore, Route D would contain the highest percentage of undeveloped land as compared to the other route alternatives. This route ROW, however, would incorporate the least amount of total acreage (5.26 acres).

The Applicant's preferred alignment for Route E2 would contain the highest percentage of multi-family residential land uses (41.3 percent) as compared to the other route alternatives. This land use represents the highest percentage of the overall acreage (18.46 acres) within this route ROW. The second highest percentage would be for a major highway, as a portion of Route E2 would follow I-35 W.

5.2.1.2. Land Cover

The Geographic Analysis Program (GAP) was used to classify the primary land cover types within the Land Use, Zoning, and Planning Study Area. The GAP maps land cover types from satellite imagery; land-based surveys are used to supplement data as needed.
Based on the data obtained from this source, Table 5.2-5 provides a description of the current land cover that is present within the Land Use, Zoning, and Planning Study Area.

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Table 5.2-5: Land Cover within the Land Use, Zoning, and Planning Study Area

Route Alternative/ Substation Site	Route Portion	Land Cover
Route A	Between Portland Avenue and 19th Street, Along 29th Street	Developed (High, Medium, and Low Intensity)
	Between 21st Street and Minnehaha, Along 28th Street	Developed (High and Medium Intensity)
Route B	Between 29th Street and 26th Street, Along Oakland Avenue	Developed (High and Medium Intensity)
	Between Oakland Avenue and Minnehaha, Along 26th Street	Developed (High, Medium, and Low Intensity)
	Along I-35 W	Developed (High Intensity)
Route C	Along 28th Street	Developed (High, Medium, and Low Intensity)
	Between Columbus Avenue and 19th Avenue, Along 31st Street	Developed (High, Medium, and Low Intensity)
	Between 19th Avenue and 21st Avenue, Along 31st Street	Developed (High, Medium, and Low Intensity and Open Space)
Route D	Between Oakland Avenue and Minnehaha, Along 28th Street	Developed (High, Medium, and Low Intensity)
Route E2	Not applicable	Developed (High, Medium, and Low Intensity)
Hiawatha Substation (East and West)	Not applicable	Developed (High, Medium, and Low Intensity and Open Space)
Midtown Substation (North and South)	Not applicable	Developed (High and Medium Intensity)
Mt-28N Substation	Not applicable	Developed (High, Medium, and Low Intensity and Open Space)
Mt-28S Substation	Not applicable	Developed (High and Medium Intensity)

Source: USGS, n.d.

As indicated in Table 5.2-5, the land cover within the Land Use, Zoning, and Planning Study Area is developed. The intensity ranges from open space to high intensity development. The Land Use, Zoning, and Planning Study Area does not contain areas of deciduous forest or open water. Areas located along the Mississippi River, however, do contain this type of land cover.

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5.2.1.3. Federal, State, and Local Government Planning

Within the State of Minnesota, land use planning occurs at multiple levels of government, including state, regional, county, and municipal jurisdictions. The goals and objectives stated in plans written by these agencies provide indications of community values and attitudes relevant to new development and the use of the land. The plans provide guidance for important land use decisions that have the ability to affect more than one jurisdiction, such as electrical transmission.

This section provides a brief description of federal energy policy and involvement in transmission facility siting, a discussion of the regional framework for land use, a summary of state and county level comprehensive plans, and an overview of municipal and small area studies and plans.

Federal

Federal involvement for this Project is limited; the transmission lines and facilities do not cross state lines or require federal permitting. Federal legislation typically would affect transmission line siting if one of the following conditions were met:

- A finding that the line addresses a "National Interest Transmission Corridor" as identified by the United States Department of Energy;
- The state jurisdiction considering the line has taken more than 12 months to consider the completed application;
- The state through which the line passes lacks jurisdiction to permit the line;
- The state jurisdiction considering the line lacks the authority to consider regional benefits from the project; or
- The applicant requests that Federal Energy Regulatory Commission (FERC) act (Brown and Sedano, 2004) (Public Law 109-58, 2005).

As previously indicated, the Applicant has submitted this Project under the Full Permitting Process for the State of Minnesota.

Regional

The city of Minneapolis is part of the Metropolitan Planning Council (Met Council), which is the regional planning agency serving the Twin Cities metropolitan area. The Land Use, Zoning, and Planning Study Area is located within District 7. In particular, the Community Development Division is responsible for the regional growth strategy, for planning and technical assistance to local communities, and for parks and open space. This agency provides essential services to the region including the following:

- Operates the region's largest bus system;
- Collects and treats wastewater;
- Engages communities and the public in planning for future growth;
- Provides forecasts of the region's population and household growth;
- Provides affordable housing opportunities for low- and moderate-income individuals and families;
- Provides planning, acquisitions and funding for a regional system of parks and trails; and
- Provides a framework for decisions and implementation for regional systems including aviation, transportation, parks and open space, water quality and water management (Met Council, 2009b).

This agency also develops the comprehensive development guide for the metropolitan area.

In addition to the comprehensive development guide, the Met Council establishes the goals for regional growth within the 2030 Regional Development Framework. These goals include the following:

- Work collaboratively with regional partners;
- Maximize effectiveness and value of regional services, infrastructure investments, and incentives;
- Enhance transportation choices and improve the ability of all residents to travel safely and efficiently; and
- Preserve vital natural areas and resources for future generations (Met Council, 2006).

Based on this framework, the Met Council anticipates that approximately 91 to 95 percent of new growth is to be located in urban areas. The city of Minneapolis is considered one of several developed areas within Hennepin County. One of its primary challenges is to accommodate future growth at appropriate densities and to conserve natural resources at the same time (Met Council, 2006).

In addition to the overall framework for the region, the Met Council also develops several policy guidelines to help improve transportation, water resources management, and parks and recreation. While few references are made to the overall Land Use, Zoning, and Planning Study Area, the transportation plan includes a short description of its overall land use policy as it pertains to the development of transportation infrastructure. In this document, the Midtown Greenway is referenced as one of a few off-street multi-modal facilities. These types of facilities generally are encouraged throughout the city of Minneapolis (Met Council, 2009a).

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State

In 1925, the Minnesota Supreme Court endorsed the use of comprehensive planning and zoning as legitimate tools for promoting the general welfare of the public. Some of the key laws that formed the foundation for comprehensive planning and growth management in Minnesota are as follows (Minnesota Planning and Minnesota Environmental Quality Board, 2002):

- ***1939 – Township planning and zoning*** (Minnesota Statutes, sections 366.10 to 366.18). Authorized townships to plan and regulate land use to, among other things, prevent excessive concentration or wasteful scattering of population.
- ***1959 – County planning enabling act*** (Minnesota Statutes, sections 394.21 to 394.37). Authorized counties to adopt planning tools and land use controls.
- ***1965 – Municipal planning enabling act*** (Minnesota Statutes, sections 462.351 to 462.365). Authorized cities to adopt planning tools and land use controls.
- ***1969 – Regional development act*** (Minnesota Statutes, sections 462.381 to 462.397). Authorized creation of regional development commissions in 12 areas of the state outside of the Twin Cities metropolitan area.
- ***1976 – Metropolitan land use planning*** (Minnesota Statutes, sections 473.851 to 473.871). Mandates the creation of coordinated plans, programs and controls by all local governments in the seven-county Twin Cities region for planned, orderly and staged development that is consistent with metropolitan system plans prepared by the Metropolitan Council. School districts must prepare capital improvement programs for review by the Metropolitan Council.
- ***1982 – Township authority*** expanded with revisions to the Municipal Planning Act (Minnesota Statutes, sections 462.351 to 462.365).

The local governments in the state of Minnesota have the authority and responsibility to plan for a multitude of issues that are important for the health and well-being of communities and the state as a whole. These responsibilities include:

- To plan and regulate land use and subdivision (counties, cities and towns).
- To create planning commissions or agencies, to prepare and adopt comprehensive plans for future development and to establish procedures for plan implementation (counties, cities and towns). These include, but are not limited to, the adoption of official controls to further the purpose and objectives of the comprehensive plan, including zoning, subdivision regulations and official maps.
- To undertake joint-planning studies with municipalities located within their boundaries (counties).
- To extend, under certain conditions, zoning and subdivision regulations within a two-mile area beyond their corporate limits (cities).

- To establish jurisdiction over planning in areas outside municipal corporate boundaries (counties).
- To be consistent with or at last as restrictive as county zoning ordinances (townships).

County Comprehensive Plans

A county's main responsibility is to protect the general health, safety and welfare of citizens and residents. In order to meet this objective, a county comprehensive plan consists of policies, statements, goals and interrelated plans for public and private land and water use, transportation and community facilities. A plan may also include recommendations for ordinances and maps to guide future development.

Minnesota law states that a comprehensive plan, when adopted by ordinance, "must be the basis for official controls." Official controls may include zoning and subdivision regulations and official maps. A comprehensive plan may also suggest timing and sequencing of the official controls to ensure development is planned, orderly, and consistent with the comprehensive plan.

In most cases, a county will ask its planning commission and staff to prepare and recommend a comprehensive plan to the county board. Alternatively, a county may use other planning advisory bodies to create a joint powers board with membership from the county, cities and townships to prepare a comprehensive plan.

Municipal Comprehensive Plans

A city or township (municipality) may perform comprehensive planning activities to direct improvements and future development. It may prepare, adopt and amend a comprehensive municipal plan and implement the plan by ordinance and other official actions in alignment with Minnesota Statutes, sections 462.351 to 462.365. These actions may include collecting and analyzing data, preparing maps, charts, tables and other illustrations and displays, and conducting necessary studies. A municipality may also publicize its purposes, suggestions and findings on planning matters, distribute reports and them and advise the public.

Minnesota law requires the municipal planning agency to consider the plans of the county, neighboring cities and townships when planning. In fact, Minnesota Statutes, section 462.3585, supports the creation of a joint planning board with membership from the city, county and adjacent townships. The purpose of this board is to jointly prepare a plan for the area immediately outside the city but no more than two miles from the city boundary. In addition to planning responsibilities, the board may adopt and enforce official controls if participating local governments allow.

A prominent distinction between city and township planning and implementation is that official controls for townships must be consistent with, and at least as restrictive as, the county's controls.

County Comprehensive Plans and Development Directives

With the exception of Hennepin County (and Ramsey County), all Minnesota counties have the authority to prepare comprehensive plans and adopt official controls, including zoning and subdivision regulations, and maps. These plans are intended to protect the general health, safety, and welfare of their populations (Minnesota Statutes, section 473.862 (2007)).

While comprehensive land use plans are not established within Hennepin County, land use decisions at the county level are based indirectly on various other county plans, as follows:

- **Hennepin County Environmental Quality Report (2007)** – This report examines the quality of the Hennepin County environment including an analysis of air, land, and water, and the current trends experienced by the County in each of these areas. It also describes the efforts being taken by the Hennepin County government to protect the environment.

  According to this report, 47 percent of Hennepin County's land is considered urban, which represents a ten percent increase over 20 years ago. Natural resource inventories have been completed for approximately 61 percent of Hennepin County, and over 66,000 acres of critical natural corridors have been identified. Only 36 percent of these corridors are currently protected from future development. Consequently, one of the primary goals of this report is determine how to balance urban growth with natural resource protection (Hennepin County Environmental Services, 2007).

  This plan does not directly provide direction for the Land Use, Zoning, and Planning Study Area. However, current development plans within the 11 neighborhoods considers the overall county vision of balancing green space and urban development.

- **Vision 2012: A Five Year Strategy, Hennepin County Housing and Redevelopment Authority (2008)** - The purpose of this plan is to review the Hennepin County Housing and Redevelopment Authority (HCHRA) program history. It provides the history of this program in relation to its current community context, as well as presents a five year strategic direction for the HCHRA.

This plan does not directly provide direction for the Land Use, Zoning, and Planning Study Area. However, this plan encourages the use of public engagement in the development of strategies for advancing housing and community development, especially in partnership with community organizations.

- **Hennepin County Comprehensive Economic Development Strategy (CEDS) (2009)** – The CEDS is the result of local planning processes designed to guide the economic development efforts of the Workforce Investment Board. The plan is used to help create jobs, to foster more stable and diversified economies, and to improve living conditions. The CEDS is produced every other year by the Hennepin County Workforce Investment Board (WIB). This plan is required to qualify for US Economic Development Administration (EDA) assistance under its public works, economic adjustment, and most planning programs, and is a prerequisite for designation by EDA as an economic development district (EDD).

  This plan addresses the Lake Street Corridor within Minneapolis, which is included in the overall Land Use, Zoning, and Planning Study Area. This area was identified as the most populous area within the context of the CEDS.

  Recommendations are provided for the Minnehaha-Hiawatha Community Works Project. The purpose of the this project is to maximize the potential benefits from the Hiawatha LRT line by leveraging county investments in infrastructure for job creation and economic development, improvement of natural systems of the area, improvement of transportation (including bike and pedestrian access), and enhancement of the area's tax base. This project is adjacent to the Lake Street economic target area (Hennepin County Workforce Investment Board, 2009).

- **Hennepin County Assessment Analysis Report (2007)** - According to this report, land should be set aside to provide the population with activity space in which to be active. This report provides the results of surveys that were given to residents around the county. Residents were asked what barriers were present that limited their mobility and activities. One of the primary issues was the presence of off-street biking and walking trails, which are the most likely improvements to make respondents more likely to bike or walk in their neighborhoods (Active Living, 2007). Therefore, this plan draws attention to the need for ensuring that communities have ample space set aside for active, recreational uses.

The Midtown Greenway is present within the Land Use, Zoning, and Planning Study Area. This facility provides off-street bicycle and walking areas. This particular facility would be part of or adjacent to the location of Route A.

In addition to these plans, the County also has developed a transportation systems plan. This plan, entitled *2030 Hennepin County Transportation Systems Plan (HC-TSP)*, provides a vision of the long-term transportation services for the county. It includes a framework of polices, guidelines, technical analyses, and recommendations. The following is included in the transportation plan:

> *Since the early 1980's, the Hennepin County Regional Rail[road] Authority (HCRRA) has purchased and preserved a number of abandoned rail corridors. Although purchased for future [light rail transit] LRT service, the HCRRA allowed the development of trails as an interim use. Since this time, there has been a commitment to maintain pedestrian and bicycle accommodations even with the eventual addition of LRT. To allow for the addition of LRT in the future, the planning, design and construction of major trail facilities such as bridges and tunnels within the LRT corridors have been completed in such a way to preserve these structures and allow bicycle accommodations to continue after the eventual addition of LRT* (Hennepin County, 2000).

This statement represents the overall need to preserve greenway space for non-motorized transportation corridors. One of the areas addressed by this statement includes the Midtown Greenway, which is located along Route A.

City Comprehensive Plans

The *Minneapolis Plan for Sustainable Growth* (Minneapolis Plan) serves as the comprehensive plan for the city of Minneapolis. It guides the future growth and development of the city as a whole by providing the framework and context for shaping the development of regional infrastructure in coordination with area cities and local communities. This plan was adopted by the Met Council on July 22, 2009 and by the Minneapolis City Council on October 2, 2009. Implementation of the comprehensive plan is through the city's zoning code and other policy documents and adopted plans.

The Minneapolis Plan provides policy guidance for land use decisions, which include the location, intensity, and mix of uses, as well as managing interactions between them. This plan outlines 16 general land use policies including the following:

- Establish land use regulations to achieve the highest possible development standards, enhance the environment, protect public health, support a vital mix of land uses, and promote flexible approaches to carry out the comprehensive plan;

- Ensure development plans incorporate appropriate transportation access and facilities, particularly for bicycle, pedestrian, and transit;
- Support development along Commercial Corridors that enhances the street's character, fosters pedestrian movement, expands the range of goods and services available, and improves the ability to accommodate automobile traffic;
- Support high density development near transit stations in ways that encourage transit use and contribute to interesting and vibrant places;
- Maintain Industrial Employment Districts to provide appropriate locations for industrial land uses; and
- Support development of Growth Centers as locations for concentrations of jobs, housing, and supportive services (City of Minneapolis CPED, 2009a).

Typically, a comprehensive plan will provide a description of the existing and future land use designations and locations within a city. The future land use map within the Minneapolis Plan serves as the official policy map. According to this map, areas within the Land Use, Zoning, and Planning Study Area are designated as "Urban Neighborhood," "Parks and Open Space," "Commercial," "Industrial," "Mixed Use," and "Public/Institutional" (City of Minneapolis CPED, 2009a).

The Land Use, Zoning, and Planning Study Area also includes an area that is classified as a "Growth Center." A Growth Center is defined as a "busy, interesting and attractive place(s) characterized by a concentration of business and employment activity and a wide range of complementary activities taking place throughout the day into the evening. These activities include residential, office, retail, entertainment and recreational uses. The concentration of employment-generating development in Growth Centers brings a critical mass of private and public sector firms, services, complementary retail and entertainment uses as well as a daily stream of employees to and from each site" (City of Minneapolis CPED, 2009a).

The Growth Center within the Land Use, Zoning, and Planning Study Area is located just south of downtown and is home to several large institutional campuses, including Wells Fargo Home Mortgage, Abbott Northwestern Hospital, and the Children's Hospital. Although these facilities are not contiguous, together they form a large concentration of employment and a cluster of supporting uses. In addition, the surrounding area includes a mix of residential densities, typical of neighborhoods close to the Downtown core (City of Minneapolis CPED, 2009a).

The Minneapolis Plan also identifies several "Industrial Employment Districts." These districts are areas within the city that are classified as prime industrial space. They are well-served by rail and the interstate system and offer opportunities for business growth with minimal impacts to residential neighborhoods. Portions of the Land Use,

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Zoning, and Planning Study Area along Hiawatha Avenue, between 25th Street East and Lake Street, are designated as Industrial Employment Districts (City of Minneapolis CPED, 2009a).

The Minneapolis Plan also outlines plans contained in the Minneapolis Park and Recreation Board's Comprehensive Plan (MPRB Plan) to support the current park system and to create future parks and open spaces within the city. One of the goals of the MPRB Plan is to develop and implement park plans to acquire parkland and build amenities in current and projected growth areas of the city, including the Hiawatha light-rail corridor, located between approximately 35th Street East and Godfrey Parkway, south of the Land Use, Zoning, and Planning Study Area (City of Minneapolis CPED, 2009a).

The Minneapolis Plan also addresses preservation of historic resources within the city, including the Midtown Greenway. The Plan notes that the Greenway has "experienced a rebirth as a bike and pedestrian corridor and is now on the National Register of Historic Places" (City of Minneapolis CPED, 2009a).

Furthermore, the Minneapolis Plan provides a discussion of promoting transit-oriented development in station areas along the regional light-rail or bus rapid transit and along the local Primary Transit Network corridors. The light rail station at Lake Street along the Hiawatha corridor is designated in the plan as an opportunity to complement the light rail activity "with a mix of housing and commercial activity. Higher density new development and rehabilitation of existing buildings will reinforce the station as a focal point for the neighborhood" (City of Minneapolis CPED, 2009a).

In addition to the Minneapolis Plan, other land-use and development plans have been approved by the Minneapolis City Council. These approved plans address specific aspects of the overall development within the city and relate either to a specific issue or concern, such as commercial, residential, or industrial development, or to a particular geography within the city (i.e., Small Area Plans).

Commercial/Residential Development

While no specific individual commercial or residential plans have been adopted by the city of Minneapolis, several Small Area Plans and strategies specifically address the commercial and residential development within the city. These plans and strategies include the Downtown 2010 Plan, the Great Streets Neighborhood Business District Program, and the Corridor Housing Strategy.

The *Downtown Minneapolis 2010 Plan* provides a discussion of the policies and actions that are intended to guide economic policy and development within the downtown area. The planning horizon for the Downtown Minneapolis 2010 Plan was for 15 years. It was intended to show what the downtown would look like in the year 2010. The primary intent of the plan was to assist the city in becoming an urban center attentive to economic vitality, culture, and improved quality of life. It addresses three specific questions, including what the city should look like in 2010, how it should grow, and how the people should get to the Downtown and move about within the city (City of Minneapolis Planning Department and Minneapolis Downtown Council, 2006).

The focus of this plan centers on the Downtown core, the Riverfront, the Downtown East area, Elliot Park neighborhood, and Loring Park neighborhood. These areas are located to the north of the Land Use, Zoning, and Planning Study Area, and the Elliot Park and Loring Park neighborhoods border Route E2.

Unlike the downtown plan, the Great Streets Neighborhood Business District Program addresses two areas contained within the Land Use, Zoning, and Planning Study Area. These include the Lake Street Corridor and the Hiawatha/Lake Street Light Rail Transit (LRT) Station area. While not an official plan, this program addresses the commercial corridor needs. It outlines ways to prioritize investment in commercial areas with a majority of low and moderate income residents, similar to the Phillips neighborhood (see Section 5.4, Socioeconomics and Section 5.5, Environmental Justice for additional details) (City of Minneapolis CPED, 2007a).

Similar to the Great Streets strategy, the city also has developed a corridor housing strategy. This strategy accounts for the projected population growth, neighborhood resistance to density and affordability, corridor disinvestment, and transit developments. Five corridors have been selected as part of this program. One of these corridors is the Lake Street Corridor, which is located within the Land Use, Zoning, and Planning Study Area. Guidelines for development within this corridor include the use of buildings with scales complimentary to their use, the application of transit oriented development principles, the promotion of pedestrian accessibility, and the accommodation of economic activity (City of Minneapolis CPED, n.d.).

Industrial Development

While the city of Minneapolis has passed relatively few plans specific to commercial and residential development, the city has adopted the Industrial Land Use Study and Employment Policy Plan (Industrial Plan), which was completed in June 2006 and was approved by the Minneapolis City Council on November 3, 2006. The Industrial Plan was to be incorporated into the land use policy and maps of the Minneapolis Plan. Its purpose is to provide the city with a clear policy direction for industrial land uses and industrial sector employment. This plan recognizes the value of industrial jobs and their ability to help generate economic growth (City of Minneapolis CPED, 2006a).

The Industrial Plan evaluates the long-term viability of existing industrial uses and proposes a range of industrial uses to retain for the future. In particular, it identifies where existing and new industrial uses should be located and what components, either existing or new, these uses will require. This plan also provides a comprehensive examination of current and future industrial sector employment within the city of Minneapolis in relation to national and regional trends. This plan evaluates the scale of job loss, types of industries present, market demands for residential/industrial properties, and incomes of homebuyers (City of Minneapolis CPED, 2006a).

The Industrial Plan provides several recommendations to the Minneapolis City Council. The recommendations adopted by the City Council included the following:

1. Revising the Minneapolis Plan to clarify that Industrial Business Park Opportunity Areas (IBPOA) are prioritized for industrial use; and
2. Clearly defining the boundaries of the IBPOA as "Employment Districts" in the Minneapolis Plan (City of Minneapolis CPED, 2006a).

The Industrial Plan states that setting geographic boundaries to the IBPOAs will clarify that industrial is the priority land use and uses, such as residential uses, that impede industrial businesses should not be permitted. However, in adopting this plan, the City Council specifically did not follow a recommendation within the plan to prohibit residential uses within the Employment Districts (City of Minneapolis CPED, 2006a).

The Employment Districts established by the City Council are used as a zoning framework. The Minneapolis Department of Community Planning and the Economic Development- Planning Division's recommendations do not reveal any financial support for the establishment or maintenance of these types of districts (City of Minneapolis CPED, 2006a).

Two employment districts are located within the Land Use, Zoning, and Planning Study Area. The larger of the two areas is located west and east of Hiawatha Avenue and is bordered by Evergreen Drive to the northeast, 26th Street to the northwest, 19th Avenue South on the west, and 29th Street to the southwest. The second district is located along Hiawatha Avenue near 33rd Street. A portion of the Land Use, Zoning, and Planning Study Area is included in this district.

Small Area and Corridor Plans

As previously indicated, local planning within the city of Minneapolis provides for specific plans that address particular geographic locations. These plans incorporate greater detail for individual neighborhoods and areas than what is addressed in the Minneapolis Plan. This discussion provides a summary of some of the available small area plans. It includes the following plans:

- Midtown Minneapolis Land Use and Development Plan;
- Midtown Greenway Land Use and Development Plan;
- Midtown Greenway Rezoning Study;
- Greenway Expansion;
- Phillips West Master Land Use Plan;
- Seward Longfellow Area Land Use and Predevelopment Study;
- Hiawatha/Lake Station Area Master Plan; and
- Corcoran Midtown Revival Plan.

Midtown Minneapolis Land Use and Development Plan

The *Midtown Minneapolis Land Use and Development Plan* (Midtown Plan) was approved by the Minneapolis City Council on December 23, 2005. The plan incorporates the area bordered by Blaisdell and 11th Avenues and the Midtown Greenway and 31st Street (City of Minneapolis CPED, 2005).

The Midtown Plan calls for a transit-oriented, mixed use, urbanized district within the Land Use, Zoning, and Planning Study Area defined by the plan. Transit-oriented/mixed use typically is defined to include permitted activities mixed within the same building or within separate buildings on the same site or on nearby sites. For example, residential uses can be placed over ground-floor retail or other commercial uses (City of Minneapolis CPED, 2005).

Other than the Midtown Greenway, which is located along Route A, the areas covered by the transmission line alternatives and proposed substation alternatives locations were not specifically addressed within the Midtown Plan, which primarily focuses upon the Lake Street corridor.

The Midtown Plan provides a listing of specific elements that were identified as future development needs in this area including the following:

- Office, retail, and residential land uses should be located predominately along Lake Street, the primary commercial corridor, and along the Greenway;

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- Development of high intensity uses should be developed at the nodes, both along Lake Street and the Greenway;
- A rhythm of development intensity where the highest intensity development should occur at major intersection nodes (Nicollet Avenue/Lake Street and Chicago Avenue/Lake Street) and lower intensity development will occur between the nodes;
- High traffic generators being located in close proximity to the I-35W Interchange with Lake Street should be used to help reduce the volume of automobile traffic traveling long distances on Lake Street;
- Job opportunities for local residents should be offered where on-the-job training is provided by large employers already in the area;
- Alternative transportation modes should have easy access and should be facilitated through the provision of ample sidewalks, transit facilities/services, and bicycle facilities services;
- Sidewalks that are sufficiently wide to permit convenient pedestrian circulation and that encourage gathering and commercial activity should be included in the urban design guidelines for the area;
- Transit facilities that are integrated into the design of gathering locations to make use of transit services convenient and accessible should be included within the area;
- Bicycle paths to/from the Greenway, bicycle racks located near entrances to buildings, and bike storage lockers located near major transit stops should be provided;
- On-street parking should be available in order to serve local businesses; and
- Housing should be mixed in terms of affordability levels and types. New housing should be located in areas that would reinforce existing housing and stabilize the residential character of the Park/Portland District along 31st Street, in order to support a mix of high intensity uses in the I-35W and Chicago - Midtown Exchange District and to provide housing along the Greenway (City of Minneapolis CPED, 2005).

Midtown Greenway Land Use and Development Plan

The *Midtown Greenway Land Use and Development Plan* (Greenway Plan) was approved by the Minneapolis City Council on February 23, 2007. This plan provides guidance for the properties within one block of the Greenway, from the western border of the city, and Hiawatha Avenue on the east and evaluates the long-term viability of existing land uses along the corridor. The Midtown Greenway is listed in the Minneapolis Plan. It serves as a bicycle and pedestrian connection between the Chain of Lakes to the West and the Mississippi River and trails to the east, as well as a link between 10 city neighborhoods (City of Minneapolis CPED, 2007b).

As described within this plan, 10 principles provide direction for future land use along the Greenway corridor and that are consistent with the comprehensive plan for the entire city, the Minneapolis Plan. These principles are as follows:

1. Promote a safe, vibrant, and active environment with calmed streets and widened sidewalks. Focus investments toward developing an enlivened, pedestrian-friendly public realm;
2. Encourage redevelopment projects to be transit-supportive by integrating bicycle and pedestrian amenities, as well as accessible and visually appealing transit stops into projects;
3. Promote opportunities for additional public green space, dedicated parks, trail connections, and public art along the Greenway edge, especially near transit stops and higher-intensity developments;
4. Support compact development and promote mixed use in existing commercial areas in order to create a more lively and diverse urban environment;
5. Focus the most intensive development near future transit stops and existing commercial nodes, while at the same time encourage the provision of open space and active storm water management in new developments;
6. Promote development that reinforces appropriate architectural scale and relates to adjacent land uses. Employ development strategies that minimize Greenway shadowing;
7. Use new development, the pedestrian environment, and open space to promote an integrated relationship between the Greenway floor and the Greenway edge/rim, fostering a sense of place and community;
8. Develop a premier public edge along both sides of the Greenway, including a more pedestrian and bicycle-friendly 29th Street and public promenades;
9. Promote Greenway safety and comfort through environmental design features, such as doors located on the street or Greenway, as appropriate; windows facing public space; and the relocation of service doors away from the public realm; and
10. Promote compatibility of industrial uses with residential areas and the Greenway through landscaping and enhanced urban design (City of Minneapolis CPED, 2007b).

Recommendations specific to land use include concentrating new commercial development at existing nodes along commercial corridors to complement the vibrant commercial activities already located along Lake Street, Lagoon Avenue, and Hennepin Avenue. The Greenway Plan provides for the most intensive residential development to occur at the north-south commercial corridors, where high quality bus service currently is available and proposed transit stations would be placed in the future. With regard to industrial uses, a recommendation of this plan is to provide support for ongoing industrial uses near Hiawatha Avenue (City of Minneapolis CPED, 2007b).

The Greenway Plan provides a future vision of the Greenway that would be used to support light rail, bus rapid transit, or streetcar transportation. One of the primary recommendations of the Greenway Plan is to provide a linear public "promenade" or walkway wherever possible between private development and the Greenway. The promenade would consist of an eight foot sidewalk within a 12-foot public realm, which would allow for both pedestrians and slow-moving bicyclists (City of Minneapolis CPED, 2007b).

New transit stations also are recommended for placement on the Greenway corridor. The stations would be located at the Greenway level. Additional access points (ramps, stairs, and at-grade) to the Greenway would be included. The current Greenway has 19 individual access points for pedestrians and bicyclists.

The Greenway Plan addresses the re-establishment of 29th Street as a continuous ROW at several key blocks. Specifically, the plan provides for a 56-foot ROW that includes a sidewalk and planted boulevard along the north side of 29th Street. This would provide a walkway for pedestrians to overlook the Greenway (City of Minneapolis CPED, 2007b).

The proposed pedestrian lookout area appears to include a section of the Greenway along which Route A would be located.

Midtown Greenway Rezoning Study

The *Midtown Greenway Rezoning Study* is an analysis of the existing zoning in the area surrounding the Midtown Greenway. A rezoning study in the city of Minneapolis primarily conducted for an analysis of the existing zoning in an area no less than 40 acres. Once complete, the intent of this study is to provide a recommendation to change the zoning of select parcels in order to match the city of Minneapolis adopted future land use plans. This study has not yet been adopted by the City Council (City of Minneapolis CPED, 2009e).

The primary initiatives for this re-evaluation of the zoning are to ensure that the Midtown Greenway continues to draw a market interest in multi-family housing development, that industrial uses are not located within or along the Greenway, and that commercial development should be focused on major corridors that intersect the Greenway or Lake Street. The area for this evaluation consisted of 3,210 parcels. Of this total, 1,766 parcels had policy guidance adopted in small areas plans that was not consistent with the current zoning districts. The majority of proposed changes suggest increasing the density of housing in certain areas of the city (City of Minneapolis CPED, 2009e).

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The primary recommendations from this study include the following:

- Pedestrian Oriented Overlay Districts – Two overlay districts are recommended for expansion. The first overlay district would be located at Hennepin Avenue and Lake Street and also at Lake Street and Lyndale Avenue South. The boundaries would be expanded to match the activity centers described in the Minneapolis Plan. A second overlay district is recommended for the intersections of Lake Street and Chicago Avenue and Lake Street and Bloomington Avenue (City of Minneapolis CPED, 2009e). These areas are located in the southern half of the Land Use, Zoning, and Planning Study Area for this evaluation; and
- Industrial Living Overlay – This overlay is recommended for industrial parcels east of Minnehaha Avenue (City of Minneapolis CPED, 2009e). Several of the Project substation alternatives would be located within this area.

A Midtown Greenway Overlay also was evaluated, but this was determined not to be necessary to accomplish the desired effects. The preliminary recommendations stated above resulted in the creation of an amendment to the ordinances entitled, "Amending Title 20, Chapter 521 of the Minneapolis Code of Ordinances relating to Zoning Code: Zoning Districts and Maps Generally" (City of Minneapolis CPED, 2009e).

Phillips West Master Land Use Plan

The *Phillips West Master Land Use Plan* (Phillips West Plan) was adopted by the Minneapolis City Council on July 17, 2009 as an amendment to the 2008 *Minneapolis Plan for Sustainable Growth*. This plan is the first land use plan drafted for the Phillips West neighborhood. It shares some of the same area as the *Midtown Minneapolis Land Use and Development Plan* and the *Midtown Greenway Land Use and Development Plan* (City of Minneapolis CPED, 2009c).

The Phillips West neighborhood boundaries are Interstate 35W on the west, East 22^{nd} Street to the north, Chicago Avenue on the east, and East Lake Street to the south. Main north-south through streets within the neighborhood include Park Avenue, Portland Ave, and Chicago Ave. Main east-west streets are East Lake Street, East 28^{th} Street, and East 26^{th} Street (City of Minneapolis CPED, 2009c).

This plan is based upon six urban design principles, which are described, as follows:

1. Create stability and continued interest in investment in the area;
2. Find opportunity to introduce sustainability, including enhancing existing and creating more public green space and natural resource management;
3. Preserve and restore single/multi-family detached residences whenever possible and strengthen the residential nature of the neighborhood;

4. Maintain diversity of people, land uses and building types while encouraging future growth of jobs and population;
5. Plan for alternative transportation and increased use of the Midtown Exchange transportation hub; and
6. Seek Public/Private initiatives for funding of betterment programs (City of Minneapolis CPED, 2009c).

To implement these six design principles, the Phillips West Plan provides a discussion of four land use concepts, referred to as Concepts A-D.

- Concept A relates to each of the six design principles. It recommends the stabilization and continued investment in single-family detached housing in order to strengthen the residential nature of Portland Avenue and adjacent streets, 5th Avenue and Oakland Avenue. This concept provides for the infill of vacant lots with new single/multi-family detached housing that complements the scale and style of the neighboring structures (City of Minneapolis CPED, 2009c).

- Concept B relates to enhancing and realizing the full potential of the Greenway. This concept relates to all six design principals. This concept suggests phasing out industrial uses along the Greenway and replacing them with medium and high density housing while maintaining low-density single family housing in the remaining Phillips West area (City of Minneapolis CPED, 2009c).

- Concept C relates to principles one through four and six for Park Avenue, which is currently home to many cultural institutions, such as the American Swedish Institute, the Phillips Eye Institute, St. Mary's University, Messiah Lutheran, Abbott Northwester, and the American Indian Services buildings. This concept recommends that any future development or redevelopment along Park Avenue maintain the established setbacks and building typology. It includes designs for traffic calming and the provision of bicycle lanes (City of Minneapolis CPED, 2009c).

- Concept D relates to principle one and four through six and provides that Lake Street should continue to be promoted as the primary commercial corridor for this neighborhood. Under this concept, the bulk of the buildings should be put to their highest and best use, and vacant lots and 1-2 story buildings should be redeveloped into 4-5 story buildings with parking behind or below the buildings. At key locations, such as Lake Street and Chicago Avenue, 5-9 story buildings should be developed, as well. These design concepts are supported by the need to phase out industrial uses along the Greenway and the revitalization of Lake Street (City of Minneapolis CPED, 2009c).

Similar to other county and city plans, the Phillips West Plan discusses the need for the development of additional green space within the neighborhood. In particular, a recommendation is made to create a public open space along the Greenway at 5th Avenue, which currently is a privately owned parcel, and to explore other opportunities to create small parks and community gardens throughout the Phillips West area. Incentives are recommended as a means to encourage this type of development. The removal of the I-35W sound barrier wall and the replacement of it with a trees and shrubs to create a natural shelter belt also are suggested (City of Minneapolis CPED, 2009c).

The Land Use, Zoning, and Planning Study Area for the proposed transmission line routes and substations alternatives includes the Phillips West neighborhood. The selection of a preferred concept would be included within the areas through which the proposed facilities would be located.

Seward Longfellow Greenway Area Land Use and Predevelopment Study

The *Seward and Longfellow Greenway Area Land Use and Pre-Development Study* (Seward Study) was approved by the City of Minneapolis City Council on February 9, 2007. The study area for this plan (Seward Study Area) is bounded by Hiawatha Avenue on the west, the Mississippi River on the east, 25th Street on the north, and Lake Street on the south (City of Minneapolis CPED, 2004).

Within the Seward Study Area, land use consists of a range of residential uses, which are predominant in areas located more than one block north or south of the Greenway. In general, industrial uses occupy parcels abutting the Greenway. The study demonstrates that existing zoning often results in areas of non-conforming uses (City of Minneapolis CPED, 2004).

The purpose of the study was to identify land use patterns, market potential, and impacts of transit infrastructure and also to explore likely development opportunities for specific sites. This was accomplished through intensive study and community input. Several principles were identified within the Seward Study and were recognized as important guides for future development and land use; they include the following:

- Take advantage of the amenity of the Greenway and the area's proximity to light rail transit (LRT);
- Balance the desire for a residentially focused neighborhood with strategies for retaining industry that offers greater "job density," higher pay scales, and has low impact on neighborhood livability;
- Discourage industrial uses that are heavily dependent on trucks adjacent to residential areas;

- Provide "on-site" mitigation of the undesirable effects of development on neighborhood livability; and
- Recognize that higher density in both residential and industrial development will be necessary to offset the costs of redevelopment (City of Minneapolis CPED, 2004).

Guiding principles suggested for infrastructure focus primarily on pedestrian and bicycle facilities.

The land use plan developed in the Seward Study envisions a balanced approach for residential and industrial uses along the Greenway that is coordinated with previously developed plans. As such, this study recommends the retention of existing uses for the vast majority of parcels. At the same time, the Seward Study proposes that the existing industrial parcels at the east end of the Seward Study Area should be changed to multi-family residential. These areas include those parcels occupied by Gopher Roofing, Empire Glass, and the Shasta Building. The plan envisions that the Shasta building itself would remain, but that the balance of the site would be developed as multi-family residences (City of Minneapolis CPED, 2004).

The Seward Study also recommends that other industrial sites, including those containing Hauenstein and Burmeister, Hiawatha Metalcraft, Mack Engineering and Metro Produce, remain as industrial sites. The plan recognizes that these areas may be redeveloped in the future since the long-term market pressure in the Seward Study Area will be toward residential use (City of Minneapolis CPED, 2004).

The Seward Study also suggests that an "island of residential" use, along 29th Avenue both north and south of the Greenway, be redeveloped for higher-density (3-4 story) residential use. In this location, homes are located within several blocks of industrially zoned land next to major industrial users (i.e., an example of a non-conforming zoning use) (City of Minneapolis CPED, 2004).

Economic development of the area also is addressed within the Seward Study. The Seward Study provides recommendations intended to promote higher paying jobs and businesses with greater job densities within the area. For example, in the Seward South Industrial Park, which occupies a portion of the Seward Study Area west of 27th Avenue, the goal is to intensify industrial development (City of Minneapolis CPED, 2004).

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Opportunities to increase density include the following:

- Reducing setbacks from the street and between buildings in favor of useable, aggregated common space;
- Creating shared parking, truck maneuvering and loading docks;
- Within multi-story buildings, providing mixed use space, such as production on the ground floor and office space on the above-ground floors;
- Converting storage facilities back to industrial uses within the Seward and industrial areas along the Hiawatha corridor; and
- Discouraging distribution and other businesses that create heavy truck traffic or other negative impacts on adjoining residential areas (City of Minneapolis CPED, 2004).

As previously indicated in the context of other regional, county, and municipal plans, another component of the Seward Study is to enhance the area's "urban forest" (see Section 5.4, Socioeconomics for additional information on urban forestry). The addition of green space would help provide a link between the Greenway and other parts of Seward and Longfellow neighborhoods. For instance, an extension of the Greenway to create a pedestrian bicycle path along the east side of Hiawatha as a link to the Lake Street light-rail station is a high priority for this plan. Additional enhanced pedestrian and bicycle links to Lake Street along north/south streets and the integration of parks also are recommended (City of Minneapolis CPED, 2004).

Two sites were evaluated as opportunity sites. These included the Gopher Roofing, Empire Glass, and the Shasta Building and the area north and south of the Greenway at 29th Avenue (the ''island of residential"). These sites were used as case studies using the principles suggested throughout the plan to improve the overall quality of life within the Seward and Longfellow neighborhoods (City of Minneapolis CPED, 2004).

Only a portion of the Land Use, Zoning, and Planning Study Area is within the area examined by the Seward Study. Specifically, the Hiawatha Substation alternatives, located on the east side of Hiawatha Avenue, are within the area studied in the Seward Study. The Seward Study calls for the area encompassing these two sites to retain their existing light industrial zoning designations. The Seward Study also calls for additional trees to be planted in the area of the proposed substation sites as part of an "industrial park reforestation" effort. Traffic calming measures also are suggested in the long-term for 26th Street.

Hiawatha/Lake Station Area Master Plan

The *Hiawatha/Lake Station Area Master Plan* is the first of a series of land use plans developed for transit-oriented development centered on the 11-mile Hiawatha Light Rail Transit (LRT) corridor. This particular study incorporates four residential neighborhoods including Phillips, Corcoran, Longfellow, and Seward, all of which are included in the Land Use, Zoning, and Planning Study Area (City of Minneapolis CPED, 2001).

The existing LRT station includes 500 acres of residential, commercial, civic/institutional, and open space. Approximately 20% of the total land area was identified as having redevelopment potential, with the majority of the candidate sites located along Lake Street or adjacent to the Hiawatha transportation corridor (City of Minneapolis CPED, 2001).

The purpose of the plan is to guide changes that build upon neighborhood strengths and capitalize on opportunities. These opportunities include the following:

- Future mixes of new businesses, housing, and neighborhood amenities;
- Improvements to the pedestrian environment;
- Enhancement of parks and green space; and
- Improving the accessibility and fit of the station with the neighborhood (City of Minneapolis CPED, 2001).

Recommendations within this plan include the reconstruction and expansion of the existing Public Works yard, new light industrial and office commercial uses north of 28th Street in the Phillips neighborhood, and environmental remediation of vacant industrial lands adjacent to Hiawatha Avenue. Industrial uses within the Seward neighborhood also are addressed to provide for landscaped surface parking and storage areas (City of Minneapolis CPED, 2001).

Corcoran Midtown Revival Plan

The Corcoran Midtown Revival Plan provides a vision for the Corcoran neighborhood in the vicinity of the Lake Street/Midtown Light Rail Transit (LRT) Station. It stems from and builds upon the Hiawatha/Lake Station Area Master Plan. The plan is a master plan based on community ideas and previously conducted planning studies (City of Minneapolis CPED, 2002).

The Corcoran Midtown Revival Plan includes the area between Hiawatha Avenue and Cedar Avenue. This plan focuses on Lake Street as a mixed-use corridor. The area borders the Pioneer and Soldiers Memorial Cemetery, which is identified as public green space within the plan (City of Minneapolis CPED, 2002).

The primary themes for this plan comprise an overall vision for the revival of the Corcoran neighborhood. These themes include the following:

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- Pedestrian orientation;
- Transit-oriented development;
- Sustainability;
- Inviting and safe;
- Appropriate development models for this neighborhood; and
- Neighborhood arts center (City of Minneapolis CPED, 2002).

One of the focuses of the master plan is transit-oriented development (TOD), which is centered on the LRT stations. This type of development encourages higher densities and infill. The plan provides that buildings should not exceed six stories in height. TOD primarily focuses on an area within 0.5 mile from a transit station or multi-modal transit hub (City of Minneapolis CPED, 2002).

Other Small Area Plans

The following plans are located within the vicinity of the Land Use, Zoning, and Planning Study Area, but do not directly affect activities associated with the construction and operation of the transmission line route alternatives and substation alternatives:

- The Cedar Riverside Small Area Plan: Building Connections – This plan is a policy document intended to guide land use and development in the Cedar Riverside neighborhood for the next 20 years. The plan examines the current conditions of the area, develops a future vision of what the neighborhood is to become, as well as formulates goals, objectives, and policies to implement the neighborhood vision (City of Minneapolis CPED, 2008b). The Cedar Riverside neighborhood is located to the north of the Land Use, Zoning, and Planning Study Area and borders Route E2.

- Uptown Small Area Plan – This plan proposes a land use and development plan for the area of Lake Street between Lake Calhoun on the west and Calhoun Avenue on the east. It also outlines plans for a narrow strip of area located along Hennepin Avenue between Franklin Avenue to the north and 36th Street West to the south (City of Minneapolis CPED, 2008c). This plan addresses an area to the west of the Land Use, Zoning, and Planning Study Area.

- Lyn-Lakes Small Area Plan – This plan provides recommendations to strengthen the business core, to include design considerations in the case that rail service is implemented within the Midtown Greenway, to encourage further historic preservation efforts and incremental additions of green space, and to provide guidance on building scale and design (City of Minneapolis CPED, 2009b).

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This plan focuses on the area of Lyndale Avenue between 26th Street and 31st Street and Lake Street between Bryant Avenue South and Blaisdell Avenue South. This plan does not apply to land within the Land Use, Zoning, and Planning Study Area, which has I-35W as its western boundary (City of Minneapolis CPED, 2009b).

- The 38th Street and Chicago Avenue Small/Corridor Framework Plan – The purpose of this plan is to support the ongoing improvement and revitalization of the area of 38th Street and Chicago Avenue. Both of these roadways are identified as community corridors. The plan identifies six focus areas, including three nodes identified by the Minneapolis Plan as "Neighborhood Commercial Nodes" (i.e., Chicago Avenue and 38th Street, Sabathani / 4th Avenue and 38th Street, and Bloomington Avenue and 38th Street). These focus areas extend along Chicago Avenue to the Midtown Greenway and Lake Street and along 38th Street between Nicollet Avenue and Bloomington Avenue. Four neighborhoods are involved including Central, Powderhorn Park, Bancroft, and Bryant neighborhoods (City of Minneapolis CPED, 2008a).

  With regard to land use, at the northern end of the area evaluated for this plan (i.e., near 31st Street), also referred to as the Gateway Focus Area, land use primarily consists of low density housing with pockets of commercial areas. The intent is to propose medium and high density housing with mixed use areas, along with improvements in non-motorized transportation connections, such as to the Midtown Greenway (City of Minneapolis CPED, 2008a). This focus area is included within the Land Use, Zoning, and Planning Study Area.

  As indicated by the proposed change in land use, the goals were to identify opportunity sites, which include vacant and underutilized parcels, for development; to identify parcels where the current use conflicted with the long-term vision; to increase the number of people living within the Land Use, Zoning, and Planning Study Area; to recommend locations for higher density development; to protect and encourage pedestrian orientation; and to encourage construction of mixed-use, commercial and residential development. As such, the final recommendations within this plan include locating new higher density development adjacent to transit corridors and changing existing land uses to make the higher density possible (City of Minneapolis CPED, 2008a).

- The 38th Street Station Area Master Plan – The 38th Street Station is located at 38th Street East and 30th Avenue South in the Standish neighborhood, which is south of the Corcoran neighborhood and south of the Land Use, Zoning, and Planning Study Area.

38th Street is considered a community corridor, which is intended to have intermittent concentrations of small-scale commercial uses. As part of the evaluation for the 38th Street Station, concerns about the quality of the pedestrian realm were addressed in the land use component of the plan. Specifically, parcel depth and orientation, sidewalk width, building setback and orientation, land use, and ease of crossing Hiawatha Avenue were evaluated. The dominant land use within the area is for grain mills and storage elevators east of Hiawatha and north and south of 38th Street (City of Minneapolis CPED, 2006b).

Other South Minneapolis plans have been approved by the City Council. These plans include the 46th Street and Hiawatha Station Area Master Plan, the Hi-Lake Shopping Center Development Guidelines, and the Nokomis East Station Area Plan. Several Southwest Minneapolis plans, which incorporate the Whittier neighborhood, were adopted by the City Council. These include the plans entitled, *The Lyndale Avenue: A Vision* and *The Nicollet Avenue: The Revitalization of Minneapolis' Main Street*.

5.2.2. Direct/Indirect Effects

Potential land use impacts from the Project include the following:

- Incompatibility with local land use, zoning, and comprehensive planning;
- Incompatibility with planned development; and
- Loss of use to landowners.

Direct and indirect effects of the Project are addressed for the transmission line route alternatives and substation alternatives.

5.2.2.1. Transmission Line Route Alternatives

This section identifies the potential indirect and direct impacts to land use specific to the transmission line route alternatives.

Local Land Use, Zoning, and Comprehensive/Land Use Plans

Due to the small amount of land required for each overhead and underground line, the transmission line route alternatives would not directly impact local land use and zoning categorizations; these current designations would not be altered by the construction and operation. The transmission line route alternatives would not limit the type of development, zoning designation, or land use that could occur. In addition, these lines typically would be located within existing ROWs that are already designated or used for utility placement.

However, positive and negative indirect impacts would result from the construction and operation of the transmission line route alternatives. For this analysis, the discussion of the indirect impacts associated with land use is provided in the context of consistency and compatibility with local comprehensive and land use plans.

With regard to local comprehensive and land use plans, the following provides a summary of the goals recommended within the various plans for the city of Minneapolis and its individual neighborhoods:

- Encourage the development of non-motorized transportation facilities;
- Encourage mixed use development, including residential, commercial, and some light industrial uses;
- Where possible, allow for high density and transit-oriented development;
- Encourage the growth of Industrial Employment Districts and Growth Centers, which involves the creation of jobs among other improvements; and
- Allow for urban design techniques that eliminates incompatible residential and industrial uses.

Based on the local plans, the Project transmission line route alternatives would be consistent with some of the goals set forth by the various communities. For example, one goal is to encourage the expansion of industrial employment districts and growth centers. This in part can be accomplished through the construction of new infrastructure to improve the overall well-being of the residents and visitors. While the proposed infrastructure associated with the transmission lines would not change the current or future land use patterns recommended in the individual plans for the city and the small areas, this Project would supply additional capacity that would better support existing users and could be used for future residences and businesses.

As described earlier, the city of Minneapolis has established empowerment zones, similar to the Industrial Employment Districts and Growth Centers. Several of the neighborhoods within the Land Use, Zoning, and Planning Study Area are included in these zones. The Project is consistent with the goals of improving the economic development of these areas indirectly by increasing the overall capacity for electricity and indirectly improving this utility service for local businesses.

With regard to the utilization of urban design techniques to eliminate the appearance of incompatible uses, some of the transmission line route alternatives would assist in eliminating overhead clutter associated with existing lines. For example, Route A and Route D have underground designs that would allow for additional power capacity without creating an industrial appearance, especially with regard to the Midtown Greenway. The remaining overhead route alternatives, however, would not accomplish this same objective. The lines associated with overhead Route A, Route B, Route C, and

Route E2 would be incompatible with the urban design direction suggested within many of the local land use plans due to their industrial appearance.

While positive benefits are associated with the creation of additional power capacity and the elimination of some overhead lines, a number of negative indirect impacts would also result from the development of the transmission line route alternatives.

The presence of the transmission line route alternatives would not be consistent with pedestrian friendly and pedestrian scale designs (i.e., pedestrian oriented development). The transmission line routes, when built as overhead designs, would interfere with creating visual sight lines consistent with pedestrian oriented development, which is both physically and visually accessible to people who are walking or bicycling. While the transmission lines routes would not limit or prevent this type of development, the poles and lines associated with the overhead routes would detract from the overall scale of these types of developments.

In some cases, people may perceive that the infrastructure associated with the lines would inhibit access to multi-modal paths and the overall enjoyment of the experience. During construction, some access may be limited, but the access would be restored once the construction activities were complete. In addition, the Applicant would not locate overhead poles within an existing multi-modal path that would interfere directly with a person's ability to travel. Additional recreational impacts are discussed in Section 5.7, Recreation; visual impacts are discussed in Section 5.8, Aesthetics; and impacts to multi-modal transportation facilities are discussed in Section 5.16, Transportation and Public Services.

The transmission line routes would not limit or prevent additional residential development or higher density development, especially along the Midtown Greenway, as suggested by the goals of the various plans. However, the transmission line route alternatives, when built as overhead lines, would create visual intrusions that may discourage this type of development. The overhead lines have the potential to create visual clutter that typically is not preferred in residential areas, as well as creating an industrial feel. Mitigation for this type of visual impact would be to locate the transmission line routes underground (see Section 5.8, Aesthetics).

Residential development also may be impacted indirectly due to a potential reduction in residential property values and ease in acquiring Federal Housing Authority (FHA) loans. For example, residential property values may be lowered due to the presence of the poles due to visual perceptions and concerns over safety. In addition, the FHA provides mortgage insurance to lenders with protection against losses as a result of homeowner defaults on mortgage loans. The mortgage loans must meet certain requirements established by the FHA to qualify for insurance (HUD, 2009). One of these requirements concerns the structural collapse of transmission towers, also known as the fall zone. Further discussion of these two potential impacts is located in Section 5.4.2.2, Property Values.

Several of the city and small area plans recommend the removal of industrial uses along the Midtown Greenway and the development of this area as a community resource. While the transmission line route alternatives would not prevent the removal of industrial uses or inhibit the development of the Midtown Greenway, the transmission lines and poles themselves sometimes are understood as an industrial use. The city of Minneapolis has demonstrated a desire to locate utility lines underground to eliminate overhead clutter and to remove the perception of industrial uses within specific areas, such as the Midtown Greenway. Routes A and D allow for this opportunity with the underground designs. However, the remaining alternatives would be constructed as overhead lines. As such, industrial uses would be added to areas like the Midtown Greenway, rather than removed.

As included in the discussion of consistency and compatibility with local comprehensive plans, the primary indirect impact is associated with visual impacts or intrusions. Visual impacts would be present both during construction and operation.

These types of impacts would be experienced during construction due to the presence of construction equipment, which is not typically seen in areas used for recreation and enjoyment of the outdoors or residential areas. The presence of utility lines would not be consistent with the conception of green space and park lands as an escape from urban environments.
This visual effect is a primary concern for the Midtown Greenway, which currently is used as a multi-modal transportation route. The existing route currently contains light poles, fences, railroad tracks, and signage. Overhead routes would contribute to a more urban feel to the Greenway and to additional overhead clutter rather than creating surroundings considered to be an escape from the urban environment. The underground route alternatives would be more consistent with maintaining the overall feel of this area. Perceptions and visual amenities are further discussed in Section 5.8, Aesthetics.

Other indirect impacts associated with construction would include dust and noise. These effects typically are not associated with residential and commercial areas. However, these effects would be short-term and would last only until construction activities were completed. Maintenance activities associated with the operation of the transmission lines would not create significant impacts to the overall land use within the Land Use, Zoning, and Planning Study Area.

As suggested by existing municipal ordinances, underground utilities are the preference for the city of Minneapolis.

Planned Development

The transmission line route alternatives would not directly affect the overall planned development for the 11 neighborhoods included within the Land Use, Zoning, and Planning Study Area. For the most part, the transmission line routes would be located within existing ROWs. These areas typically are reserved for utilities and other construction related activities. The introduction of transmission lines either overhead or underground would not alter the future zoning categorization and the overall future land use. However, as previously discussed, indirect impacts are associated with the transmission lines, including but not limited to visual impacts, concerns for loan availability, and overall desirability.

In general, the parcels on which the lines would be located could be redeveloped in accordance with the goals and objectives outlined by the city comprehensive plan and small area/corridor plans without interference from the transmission lines. With regard to the scale, type, and density of proposed development indicated within the city and small area plans, negative impacts to the planned development would be associated more often with the overhead transmission line route alternatives than with the underground route alternatives.

As many of the comprehensive and small area plans concern future development, the impacts on planned development are the same as those evaluated for consistency and compatibility with local plans. As such, both negative and positive indirect impacts would be anticipated. For example, negative impacts associated with planned development include visual intrusions, the addition of industrial uses, noise, and dust.

Planned development might be impacted in a positive manner to the extent that communities may be able to utilize the power generated by the new facilities, thus indirectly supporting additional development, either as new projects or as infill.

Revitalization and redevelopment efforts within the city of Minneapolis have been documented along and around Lake Street and Hiawatha Avenue. In particular, the Abbott Northwestern Hospital, Anderson Open Elementary School, Midtown Medical, a hotel, condominiums, commercial and industrial buildings, and a shopping center are located in this area. An Applicant study demonstrated the need for addition energy capacity in response to an increasing number of feeder circuit overloads and service interruptions in this area. A deficit of 55 megawatts is present in south Minneapolis (Xcel Energy, 2009). This Project addresses the need for additional sources of energy in this area of the city.

Loss of Use

Landowners may experience both a temporary and permanent loss of use in areas where existing utilities are not currently located. The temporary loss of use for landowners would occur during construction. During this time, machinery would be present to allow for the placement of the poles and wires. The construction activities also would involve movement of equipment and people. Indirect effects may include visual intrusions, noise, dust, and additional traffic not typically associated with the existing land uses in residential, recreational, and commercial areas.

The Applicant would require a final ROW width of 50 feet for overhead routes and 30 feet for underground routes. Individual landowners would be compensated for any land taken (Xcel Energy, 2009).

5.2.2.2. Substation Alternatives

This section identifies the potential indirect and direct impacts to land use specific to the substation alternatives.

Local Land Use, Zoning, and Comprehensive/Land Use Plans

As a result of the construction and operation, the Applicant's proposed substation alternatives, including the Hiawatha East and West substations and the Midtown North and South substations, would not directly impact local land use and zoning categorizations, because these designations would not be altered.

In some locations, these sites would be improved, as the Applicant would manage previously contaminated soils. For instance, the standard policies and procedures of the Applicant would be used to address the contaminated soils associated with the vacant lot and residential home in the area of the Midtown North substation location. These policies and legal obligations require crews to continually monitor for possible soil contamination during construction, as well as provide additional safety measures (Xcel Energy, 2009).

Despite the improvements for some of the properties, negative impacts also would result from the construction and operation of the substations. For example, the Midtown locations, including Midtown North, Midtown South, Mt-28N, and Mt-28S, are within close proximity to the Midtown Greenway. Local land use plans suggest that these areas should contain mixed uses consistent with pedestrian friendly designs and transit oriented development. In these land use plans, recommendations are made to remove industrial uses to allow for the development of higher density residential properties.

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The Midtown Substation alternatives, however, would be inconsistent with the goals of these plans. One of the four locations, the Mt-28N substation, currently is used as a green space by Wells Fargo (2701 Wells Fargo Way). While the space is large enough to accommodate the Midtown North or Midtown South designs, the loss of green space would not be consistent with the goals of many of the small area plans and would create a visual intrusion. In addition, as this location is just north of the Midtown Greenway, a potential connection between the two green areas would be lost with the intrusion of an industrial facility. The elimination of the green space and the addition of industrial uses would be inconsistent with the goals of removing industrial properties from these areas within the city of Minneapolis and preserving green space. The presence of these substations also could discourage high density residential development.

The Hiawatha Substation and Midtown Substations could be constructed underground. These alternatives would not alter the existing land use, although prolonged temporary impacts may be experienced during construction due to noise, dust, and visual intrusions during a longer and more extensive construction period. Following construction, the ground surface above an underground substation would be a landscaped green space.

In general, indirect impacts to the overall land use may result from the construction and operation of the substation alternatives. These indirect impacts primarily include visual impacts. During construction, visual impacts would be experienced due to the presence of equipment, staging areas, and temporary lay down areas. These impacts would be felt temporarily by residents in locations with a view to the substation locations and for those who travel by these locations. This effect primarily would be felt in the short-term and for current users.

Other indirect impacts associated with construction would include dust and noise. These effects typically are not associated with residential and commercial areas, although would be common to some industrial activities. These effects would be short-term and would last until construction is completed. Maintenance activities associated with the operation of the substations would not create significant impacts to the overall land use within the Land Use, Zoning, and Planning Study Area.

Once in operation, the presence of the substations would create a visual impact in areas used for residential and commercial purposes. When in operation, transmission line conductors and transformers present at the substations may produce audible noise above background levels depending upon weather conditions and their design. As previously indicated, industrial facilities are not common within these types of settings and could deter additional residential and commercial development. Underground construction of the substation would eliminate the visual impact. The Applicant plans to surround both substations with decorative walls to help mitigate noise from the substation transformers. In addition, the Applicant plans to install sound absorbing panels at the Midtown North Substation to ensure compliance with state and city noise regulations (Xcel Energy, 2009).

Planned Development

Some of the substation alternatives would not directly affect the overall planned development for the neighborhoods included within the Land Use, Zoning, and Planning Study Area. However, positive and negative indirect impacts would result.

Many of the small area plans recommended the maintenance of industrial areas with the intent of generating higher wage paying jobs. For instance, within the Seward Study, one of the goals was to "balance the desire for a residentially focused neighborhood with strategies for retaining industry that offers greater 'job density,' higher pay scales, and has low impact on neighborhood livability" (City of Minneapolis CPED, 2004). Since this area would not be changed from its current use, it would not negatively impact the neighborhood.

In addition, the Hiawatha Substation alternatives are located in an area defined by the Minneapolis Plan as an industrial employment district. These areas are located along Hiawatha Avenue between 25th Street East and Lake Street (City of Minneapolis CPED, 2009a). The Hiawatha West Substation also would be designed to accommodate a bike path, an extension of 28th Street, underground utility corridors, and a rail spur (Xcel Energy, 2009).

As previously indicated, planned development may be impacted indirectly in a positive manner to the extent that communities may be able to utilize the power generated by the new facilities, thus indirectly supporting additional development, either as new projects or as infill.

However, the substations located north and south of the Midtown Greenway would not be consistent with the goals of several small area plans and thus, planned development. The areas surrounding the Midtown Greenway are intended to be used for residential and mixed uses rather than industrial uses. While current zoning allows for industrial uses in these areas, the goals of the plans suggest a desired zoning change in the future. As previously indicated, the proposed locations for the Midtown North, Midtown South, and Mt-28S substations would be inconsistent with these plans, as they would add industrial uses to the area rather than eliminate them. Furthermore, the Mt-28N Substation would be located in an area currently used as a green space (Xcel Energy, 2009b and c).

In addition, planned development may be impacted if potential business developers perceive the industrial uses as a deterrent to successful operations. The substations are an industrial use that often is associated with an undesirable land use. As such, potential businesses may prefer to locate in other areas of the city, where these facilities are not present. A further discussion of potential market value is provided in Section 5.4, Socioeconomics.

Loss of Use

Landowners and users may experience both temporary and permanent losses of use in the locations of the substation alternatives.

A temporary loss of use would be associated with access routes near the selected substation location. During construction, equipment would be present, and additional workers would be on-site. Users of adjacent properties may need to adjust their travel routes to accommodate the movement of equipment. The impacts associated with the presence of these activities would be limited to the construction period.

A permanent loss of use would result if the Hiawatha East Substation location were constructed. This alternative would require that the Crew business be removed from its existing location, and the removal of existing buildings also would be required. However, this site would be improved as possible soil contamination would be remediated. The loss of use would not impact the overall land use or zoning designation and would not interfere with the city housing plans (Xcel Energy, 2009).

A similar effect would be associated with the Midtown South Substation location. This property would require the removal of existing buildings and the relocation of the Brown Campbell Enterprises. Similar to the Hiawatha East Substation, site soil remediation would be necessary (Xcel Energy, 2009).

As previously indicated, the Mt-28N Substation location would require the removal of a green space (Xcel Energy, 2009c). No buildings would be demolished at this location.

In addition, parking space would be lost at the Mt-28S Substation. The loss at the Mt-28S Substation location would impact users of the shuttle for the institutions surrounding the lot. The services would need to be relocated or accommodated in the design of the substation. This could affect the commuting patterns of the employees and visitors who utilize this service. Additional demand may be placed on other parking areas used for businesses in this area (Xcel Energy, 2009c).

5.2.3. Mitigation

The mitigation measures primarily would be intended to address the indirect effects associated with visual impacts to the surroundings areas. Section 5.8, Aesthetics provides more detailed mitigation measures to address visual impacts.

The transmission line alternative routes primarily would be located along existing ROWs. The use of these pre-existing ROWs would limit the disruption to the existing urban fabric. In sensitive locations, such as the Midtown Greenway, additional mitigation measures would be needed. These measures could include landscaping with native vegetation or vegetation that is similar to existing plantings, as well as the use of custom designed structures specific to the area. In addition, any vegetation that would be removed could be restored after the construction of the facilities, to the extent allowed by vegetation restrictions. In some locations, existing distribution lines also could be placed underground (Xcel Energy, 2009).

The Applicant has stated that the substations would be designed to include architecturally designed walls. The Hiawatha Substations would include low-profile designs with walls on three sides. The Midtown Substations, including Mt-28N and Mt-28S, if selected, would be designed to incorporate walls and landscaping. Chain link fences would be used for controlling access and safety. These additions would be consistent with the overall industrial area. Additional mitigation to improve the appearance of the substations is presented in Section 5.8, Aesthetics.

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5.3. Archaeological and Historical Resources

Cultural resources include material remains of past human activities, both prehistoric and historic. Cultural resources management seeks to identify and protect all of these types of cultural resources with the goals of enhancing understanding of human behavior and protecting cultural practices.

For cultural resources qualifying as historic properties, protection is afforded under the National Historic Preservation Act (NHPA) of 1966. The NHPA defines a historic property as follows:

> *…any Pre-European contact or historic district, site, building, structure, or object included in, or eligible for listing on the National Register, including artifacts, records, and material remains related to such a property or resource* (46 CFR 800, as amended 2006, Title III, Section 301, #5).

The term "historic property" is used in the sense defined here throughout this section and evaluation.

A cultural resource must meet the criteria for National Register of Historic Places (NRHP) eligibility for protection under the NHPA. The four criteria are as follows:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association, and:
>
> A. That are associated with events that have made a significant contribution to the broad patterns of our history;
> B. That are associated with the lives of persons significant in our past;
> C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> D. That yielded, or may be likely to yield, information important in prehistory or history (National Park Service, 1983, 1997, and 2002).

If a cultural resource can be demonstrated to meet the criteria for listing on the NRHP, it qualifies as an historic property, and impacts to that historic property must be avoided or mitigated appropriately.

Historic properties are protected from both direct and indirect effects. Direct effects physically alter the historic property in some way. Indirect effects diminish some significant aspect of the historic property, but do not physically alter it.

The Area of Potential Effect (APE) is the area within which the proposed undertaking has the potential to either directly or indirectly impact historic properties that may be present. If a direct or indirect effect on an historic property is identified, consulting parties must agree on whether the effect is adverse. If an effect is adverse, either avoidance of the effect or mitigation for the effect is required under NHPA.

Historic properties can include archaeological sites. Archaeological sites are defined as the location in which evidence of a past activity is preserved, sometimes below the ground surface. Within the state of Minnesota, an archaeological site can consist of a single artifact or feature. Archaeological sites can be considered eligible for the NRHP based on any of the four criteria.

Historic properties also can include elements of the built environment. Individual structures or collections of buildings, such as, but not limited to houses, commercial properties, and government buildings, can be considered historic properties. These structures typically are over 50 years in age. Built structures can be considered eligible for the NRHP based upon any of the four criteria.

Another type of cultural resource that, if present, also warrants consideration as an historic property is a traditional cultural property. A traditional cultural property must consist of a tangible property such as a district, site, building, structure, or object, and must meet the criteria listed above to be considered a historic property per the NHPA. For natural resources to qualify for protection under the NHPA, they would have to constitute a definable traditional cultural property, that is, a specific site or district associated with traditional events, activities, or observances, of a significance warranting inclusion on the NRHP (Parker and King, 1998).

In addition to the NRHP criteria, the city of Minneapolis has local historic landmark designation procedures through its Historic Preservation Commission (HPC). The following criteria are utilized by the HPC in determining the significance of a property:

1. The property is associated with significant events or with periods that exemplify broad patterns of cultural, political, economic or social history.

2. The property is associated with the lives of significant persons or groups.

3. The property contains or is associated with distinctive elements of city identity.

4. The property embodies the distinctive characteristics of an architectural or engineering type or style, or method of construction.

5. The property exemplifies a landscape design or development pattern distinguished by innovation, rarity, uniqueness or quality of design or detail.

6. The property exemplifies works of master builders, engineers, designers, artists, craftsmen or architects.

7. The property has yielded, or may be likely to yield, information important in prehistory or history (Local Register Designation Criteria (Chapter 599, Article V, 599.2210)).

Based on these criteria, the city of Minneapolis may designate individual buildings or entire districts (HPC, 2009).

The city of Minneapolis also maintains the "800 List." This list includes historic properties and areas that have been locally designated by the HPC for their historical significance as part of their heritage preservation protection program. The list has some overlap with the NRHP program (Stark and Vermeer, 2009).

This section identifies cultural resources within the various transmission line route alternatives and substation alternatives as per the criteria of the NRHP and the HPC. It provides a discussion of the affected environment and cultural resources identified through records obtained from the State Historic Preservation Office (SHPO) and the HPC. Records from the General Land Office (GLO) survey maps and historic fire insurance maps also were consulted for the cultural resources assessment (Stark and Vermeer, 2009). Direct and indirect effects of the Project alternatives on the identified cultural resources and techniques for mitigating these effects are included, as well.

5.3.1. Affected Environment

The affected environment is defined by the area evaluated in the cultural resources assessment conducted in 2009 by Stark Preservation LLC, and may include both prehistoric and historic archaeological resources and historic architectural resources. The area used for this evaluation of archaeological and historical structures (Cultural Resources Study Area) includes the immediate area of, and 0.1 mile away from the boundary of, the collective transmission line route alternatives, which extends north to East 25th Street, east to Minnehaha Avenue, south to East 32nd Street, and west to 5th Avenue South (see Figure 5.3-1).

The purpose of the cultural resources assessment was to identify known cultural resource properties and the potential for previously unidentified cultural resource properties that may be significant and potentially eligible for the NRHP. No field survey or evaluation of NRHP eligibility was conducted (Stark and Vermeer, 2009). This evaluation draws upon the conclusions and recommendations provided in this assessment.

Since the cultural resource assessment was conducted prior to the submittal of the Route Permit Application and ATF Report, Route E2 and Substations Mt-28N and Mt-28S were not evaluated. Where available, information is provided for these alternatives.

5.3.1.1. History of the Cultural Resources Study Area

The following discussion provides a brief history of the development of the Cultural Resources Study Area within the city of Minneapolis. It is not intended to be all inclusive, but to provide a general sense of the types of resources that may be present within the Cultural Resources Study Area.

The Cultural Resources Study Area once was a part of the broad prairie that extended south from the Mississippi River and the St. Anthony Falls. Prehistory in the state of Minnesota extends from the Paleo-Indian through contact with Europeans.

The earliest inhabitants of Minnesota (about 6000 B.C.) were from the Paleo-Indian or Big Game cultures. These peoples are known primarily through their finely made distinctive projectile points. These artifacts often are found in the southern and central regions of the state of Minnesota (Minnesota State University Mankato, n.d.).

The Archaic Period, 6000 to 1000 B.C., represents a technological cultural departure from the earlier period, but generally precedes the use of pottery. Within the state of Minnesota, Archaic cultures can be described as semi-nomadic hunter-gatherers. This period was followed by the Woodland, and Minnesota was on the western edge of this cultural area. Artifacts defined as Woodland began to appear in Minnesota about 1000 B.C. and continued in the northern part of the state until about 1700 AD (Minnesota State University Mankato, n.d.).

By this time, European settlers had entered the state as traders. From the 1680's forward, the area to include Minneapolis was "on paper" under the European rule of the countries of France, England, and Spain until finally becoming a part of the United States of America in 1784 (Hennepin County Library, n.d.).

The city of Minneapolis was authorized by the Minnesota Territorial Legislature in 1856 as a town. Two years later, the town of Minneapolis government was organized; and in 1866, under a legislative act, the city of Minneapolis was incorporated (Hennepin County Library, n.d.). Euro-American settlement was undertaken by farmers who lived near the city of Minneapolis (Stark and Vermeer, 2009).

Most of the Cultural Resources Study Area was annexed by the city in 1833, with portions north of 29th Street between 21st and 28th Avenues being annexed slightly earlier. At this time, railroads influenced the overall character and development of this area. In 1880, the Chicago, Milwaukee, and St. Paul Railroad (CM&StP) connected its short line from St. Paul, on a bridge across the river at 26th Street East which ran to Hiawatha Avenue, in order to head north into the downtown. This area became an attractive location for industry (Stark and Vermeer, 2009).

Transportation for the individuals within the city primarily consisted of passenger street cars, which also influenced the development of the Cultural Resources Study Area. Most lines ran north-south, with the first reaching Lake Street in 1883. At this time, higher-end residential development occurred in several south Minneapolis areas, including Park Avenue (Stark and Vermeer, 2009).

Commercial districts at the turn of the twentieth century tended to develop around the street car lines. By the 1920's, the Cultural Resources Study Area was fully established as residential and commercial neighborhoods. During this time, the automobile became a common element of individual households. This allowed for suburban expansion and development, ultimately affecting the Cultural Resources Study Area's growth (Stark and Vermeer, 2009).

By mid-century, the Cultural Resources Study Area was undergoing a series of changes in part due to renewal efforts. Interstate 35-W divided the neighborhoods when it was constructed in 1959. By 1970, the closure of industrial facilities resulted in significant job losses within the Cultural Resources Study Area (Stark and Vermeer, 2009).

At present, the neighborhoods are undergoing another revival with the development of new housing and the arrival of new employers. This development is in part due to the Hiawatha Light Rail Transit (LRT) system, adaptive re-use of historic properties, and new commercial properties (Stark and Vermeer, 2009).

5.3.1.2. Archaeological Resources

Background research showed that one previously recorded archaeological survey was conducted within the Cultural Resources Study Area. However, this survey was conducted along Lake Street and only evaluated areas disturbed by the original construction of the Lake Street, its associated curbs, and its sidewalks (Stark and Vermeer, 2009).

Information for the prehistoric and historic archaeological resources contained within the alignment of Route E2 and the Mt-28N and Mt-28S Substation alternatives was not evaluated by Stark and Vermeer (2009). Due to the lack of information regarding these alternatives, conclusions about the archaeological potential cannot be made.

Prehistoric Archaeological Resources

No known prehistoric archaeological sites are located within the Cultural Resources Study Area. A majority of the Cultural Resources Study Area is considered to have low potential for containing intact prehistoric archaeological resources. This is due to the lack of any topographically prominent features and its considerable distance from water sources or wetlands. In addition, most of the Cultural Resources Study Area has substantial urban development, which would have destroyed intact cultural remains of the prehistoric period (Stark and Vermeer, 2009).

Historic Archaeological Resources

The literature search indicated that there are no historic archaeological resources within the Cultural Resources Study Area. However, locations within the Cultural Resources Study Area with the greatest potential for historic archaeological sites are those undisturbed areas associated with present residential occupations, historically present industrial occupations, and historically present infrastructural operations (Stark and Vermeer, 2009). Resources associated with South Minneapolis most likely would date between 1850 and the end of the nineteenth century. During this time, regular trash collection likely was not available to all residents and business owners, and privies would have been used throughout much of the city. These types of resources would leave a dense archaeological signature underground (Stark and Vermeer, 2009).

Occupations associated with historic archaeological resources can be characterized as commercial, industrial, infrastructural, institutional, recreational/social, and residential (Stark and Vermeer, 2009).

5.3.1.3. Historic Architectural Resources

Background research identified several historic architectural surveys that had been conducted within the Cultural Resources Study Area, including the following:

- Minneapolis Survey: Powderhorn Park, Central, Whittier, and Phillips Neighborhood – This survey includes portions of the Cultural Resources Study Area west of Hiawatha Avenue. It evaluated over 8,005 properties and included many of these within a photographic survey. The largest number of properties was described as "having possible significance and retaining integrity."

- Midtown Greenway Survey – The area analyzed for this survey was defined as the area that included the first property to the north and south of the Midtown Greenway right-of-way (ROW), as well as any other property that was tied to the rail line historically or was dependent on it for business. Two individual properties were determined eligible for the NRHP and are included within the Cultural Resources Study Area.

- Lake Street Repaving and Streetscape Survey – This survey extended from Dupont Avenue to the Mississippi River, which includes portions of the Cultural Resources Study Area. This survey evaluated 199 properties; and six of these properties were listed in, or were previously determined eligible for, the NRHP. An additional 10 properties were recommended as eligible for the NRHP following a Phase II investigation. Three properties from this survey that are considered eligible for the NRHP are included within the Cultural Resources Study Area for this Project (730-740 E. Lake Street, 119 E. Lake Street, and 1201 E. Lake Street).

- Abbott Northwestern Expansion Study – This survey included the documentation of 15 properties on Chicago Avenue South, between 27th Street and 28th Street and on 27th Street.

- Minnehaha-Hiawatha Corridor Study – The area evaluated for this survey was between Minnehaha and Hiawatha Avenues, from 28th Street on the north to Minnehaha Parkway on the south. This portion overlaps with the Cultural Resources Study Area. The results of this survey showed that a grouping of houses on the 3100 block of Minnehaha Avenue may possess historic significance (Stark and Vermeer, 2009).

In addition to the previously conducted surveys, data was collected from state and local repositories for the Cultural Resources Study Area. For instance, data from the SHPO inventory database showed that 210 individually inventoried properties are located within the Cultural Resources Study Area. Of these structures, four properties are individually listed in the NRHP, including the following resources:

- Sears, Roebuck and Company Building, HE-MPC-3517;
- Minneapolis Pioneers and Soldiers Memorial Cemetery (Layman's Cemetery), HE-MPC-4123;
- Swan J. Turnblad House, HE-MPC-4218; and
- Bardwell-Ferrant House, HE-MPC-4232.

In addition to these resources, the Chicago, Milwaukee, and St. Paul Railroad Grade Separation Historic District (Midtown Greenway) is partially located within the Cultural Resources Study Area. This district includes 48 contributing and non-contributing buildings and structures (Stark and Vermeer, 2009).

Within the Cultural Resources Study Area, seven properties are determined eligible for listing on the NHRP, and they include the following:

- Stewart-Cepro Grain Elevator, HE-MPC-0625 (Demolished);
- Goodlund Rowhouse, HE-MPC-13782;
- South Side Destructor, HE-MPC-3504;
- Northern States Power Hiawatha Substation, HE-MPC-4107;
- Avalon Theater, HE-MPC-4116;
- Zinsmaster Baking Company, HE-MPC-4220; and
- W.J. Jennison House, HE-MPC-4234.

A total of 134 properties were found not eligible for listing in the NRHP through Section 106-reviewed survey projects (Stark and Vermeer, 2009).

In addition to these properties, the city's "800 List" incorporates 24 properties that are located within the Cultural Resources Study Area, including the following:

- 2812-14 11th Avenue South, Brick Queen Anne House;
- 2641 13th Avenue South, Eastlake/Queen Anne House;
- 2631 14th Avenue South, Eastlake/Queen Anne House;
- 3019 17th Avenue South, Faith Lutheran Church;
- 3027-3043 17th Avenue South, Brick Worker's Cottages;
- 2536 18th Avenue South, Craftsman Cottage;
- 2647 Bloomington Avenue, Oliver Presbyterian Church;
- 3056 Bloomington Avenue, Commercial Building (wire brick);
- 2546 Cedar Avenue, Queen Anne Dwelling;
- 3024 Cedar Avenue, Brick & Stone Queen Anne Dwelling;
- 3107 Cedar Avenue, Clapboard Farmhouse;

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- 3045 Chicago Avenue, Mount Olive Lutheran Church;
- 2843-2929 Elliot Avenue, Sears, Roebuck & Co. (now NRHP listed);
- 3112 Elliot Avenue, Eastlake/Queen Anne Dwelling;
- 1626-30 E. Lake Street, Gustavus Adolphus Hall (now demolished);
- 1700 E. Lake Street, Phillips 66 Gas Station;
- 1701-07 E. Lake Street, Glass-front Commercial Block;
- 3044 Longfellow Avenue, Church of the Nazarene;
- 3010 Minnehaha Avenue, Former Fire Station #21;
- 2520 Park Avenue, Georgian Revival Dwelling;
- 2722 Park Avenue, Brick Colonial Revival Dwelling;
- 2523 Portland Avenue, Ebenezer Tower;
- 2546 Portland Avenue , Chateauesque Dwelling; and
- 2709-11 Portland, Colonial Revival Duplex.

Based upon available information for Route E2, properties listed on the NRHP that were not documented within the Cultural Resources Study Area include the following:

- Colonial Revival House, HE-MPC-0323;
- Harry F. Legg House, HE-MPC-0469;
- First Church of Christ Scientist, HE-MPC-0581;
- Franklin Branch Library, HE-MPC-4099;
- Elisha and Lizzie Morse, Jr. House, HE-MPC-4871;
- St. Stevens Church, HE-MPC-4880; and
- Bridge No. 92348, HE-MPC-7320 (Xcel Energy, Information Requests, 2009).

An additional 35 properties were listed as potentially eligible for listing in the NRHP and were in areas intersected by Route E2 (Xcel Energy, Information Requests, 2009). No determinations of eligibility were identified for these properties.

Information for those properties on the "800 List" for Route E2 was obtained by the Applicant. Information specific to Route E1, the original alignment for Route E proposed by the ATF, is included in the information presented for Route E2. The following properties could be potentially impacted by Route E2:

- 728-740, 16th Street East, Linne Flats;
- 2850 20th Avenue South, South Side Destructor;
- 1801-1823 Elliot Avenue South, 909 E 18th Street East, Brick Apartment building;
- 2546 Portland Avenue South, W.J. Jennison House;
- 1826 15th Avenue South, F.W. Fink Double House;
- 2424 18th Avenue South, Holy Rosary Catholic Church;
- 1809 Park Avenue South, W.D. Lawrence House;
- 326-336 18th Street East, Clinton Flats;

- 335-349 18th Street East, 1800-1804 4th Avenue South, Rowhouses;
- 500-510 24th Street East, Commercial Buildings;
- 1512-1604 10th Avenue South, Block of Queen Anne/Colonial Houses;
- 1901-1903 Portland Avenue South, St. Paul's Lutheran Church;
- 1912-1914 15th Avenue South, Frame House;
- 2123 5th Avenue South, Silas L. Heywood House;
- 2419-2433 5th Avenue South, Apartment Building/High Rise;
- 1800-1806 4th Avenue South, Apartment Building;
- 1112-1122 19th Street East, Frame Houses;
- 1508 10th Avenue South, Apartment Building;
- 2020 Portland Avenue South, Apartment Building; and
- 1617 Elliot Avenue, August Ekman House.

Table 5.3-1 identifies the total number of cultural resources potentially impacted by the proposed route and substations.

Table 5.3-1: Cultural Resources Potentially Impacted by the Proposed Routes and Substation Sites

Route/Substation	NRHP Listed	NRHP Eligible	800 List
Route A	8	4	3
Route B	9	5	11
Route C	7	5	10
Route D	0	0	0
Route E2	8	37	20
Hiawatha Substation Sites	0	0	0
Midtown Substation Sites	3	1	0
Mt-28N and Mt-28S Substation Sites	2	3	1

Source: Stark and Vermeer, 2009 as cited in Xcel Energy, 2009; Xcel Energy, Information Request #15, 2009; and Xcel Energy, Cultural Resources Potentially Impacted by Substation Location, 2009.

In addition to individual property listings, the city of Minneapolis also has addressed historic preservation in its comprehensive planning efforts. For example, the *Minneapolis Plan for Sustainable Growth* provides guidance on the treatment of historic resources throughout the city. Several policies are dedicated to the preservation of these resources, including protecting historic structures from modifications that are not sensitive to their historic significance and protecting archaeological sites through identification, documentation, and interpretation (City of Minneapolis CPED, 2009b).

Cultural landscapes also are recognized within this plan. They are encouraged through the maintenance of street trees and other natural elements. The preservation of historic materials, such as street materials, lighting, and other resources also is recommended (City of Minneapolis CPED, 2009b).

Based on a review of the available literature, including the city plans, Stark and Vermeer (2009) developed five important considerations for assessing the potential for historic associations within the Cultural Resources Study Area. The first includes a residential theme. A number of residences relevant to the wealthy and middle class citizens can be found along Park Avenue, in Powderhorn Park, and in the Phillips neighborhood. These residences include high-style mansions and workers cottages and may be significant resources based on their associations with the individuals who resided in the homes (Stark and Vermeer, 2009).

The second theme includes Swedish and Norwegian immigrant communities. Examples of houses, churches, social institutions, and districts can be found throughout the Cultural Resources Study Area. These structures may be associated with the immigrant culture (Stark and Vermeer, 2009).

Third, the Cultural Resources Study Area contains numerous remnants of industries important to the development of Minneapolis, including the Minneapolis Moline plant, the Honeywell facility, and the rail yards.

Fourth, important historic and cultural institutions are present within the Cultural Resources Study Area. These facilities may have historical significance based on the persons associated with the buildings and on events that took place within the locations.

Last, the Cultural Resources Study Area was shaped by transportation systems. The convergence of rail lines is present near Hiawatha and E. 28th Street, street cars once used Lake Street, and the Chicago, Milwaukee, St. Paul & Pacific (CM&StP) Benton Cutoff. These rail lines provided a grade separation through the Cultural Resources Study Area (Stark and Vermeer, 2009).

The characteristics of many of the NRHP-listed properties exhibit these themes. The following discussion provides a description of these properties and their significance.

5.3.1.4. Midtown Greenway Trench

The Midtown Greenway Trench is parallel to 29th Street between Humboldt Avenue and 20th Avenue. The Applicant's preferred alignment for Route A follows 29th Street between Portland Avenue South and Hiawatha Avenue. The preferred alignment

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would be located along the south boundary of the Midtown Greenway trench between the Hiawatha Substation and 10th Avenue S. At approximately 10th Avenue S, the preferred alignment would cross the Greenway and continue to follow the north boundary of the Greenway to the Midtown Substation. Route A extends approximately 80 feet north from 29th Street into the Midtown Greenway Trench east of 10th Avenue S and extends approximately 88 feet south from the sidewalk into the Midtown Greenway Trench west of 10th Avenue S.

The Midtown Greenway trench, bridges, retaining walls, and two adjacent properties are listed on the National Register of Historic Places as the Chicago, Milwaukee, and St. Paul Railroad Grade Separation in 2005 (City of Minneapolis CPED, 2009a). Today, this property is used for a multi-use trail. The Hennepin County Regional Railroad Authority purchased the railroad property in 1993, with the intent of developing bicycling and pedestrian trails for east-west movements across South Minneapolis. The Midtown Greenway is located in the former railroad trench for approximately half of its length. The trench was constructed between 1912 and 1916. It is approximately 22 feet deep and has a steeply sloped earthen wall on the north and south sides. Ramps from the street level allow access to bicycle and pedestrian trails in the greenway. Each north-south block over the 29th Street trench also features a bridge, which was built circa 1910 (Hennepin County, 2006).

The contributing features include the earthen trench, 28 bridges, one discontiguous retaining wall, and one building located at 2841 Dupont Avenue South (the Twin City Separator Company). Non-contributing features include nine bridges, a bicycle-pedestrian trail, and six additional buildings. Other non-contributing features include modern lighting, emergency telephone boxes, bicycle ramps, chain-link fences, and a retaining wall that divides the trail from the former rail line (HCRRA, 2008).

This property is managed by a set of cultural landscape guidelines created by the Hennepin County Regional Railroad Authority (HCRRA). The purpose of the guidelines was to prevent irreversible damage to the character defining features of the Midtown Greenway. They provide a framework for public projects, as well as other activities subject to the HCRRA, such as community landscape/garden projects and public arts projects. The guidelines only apply to those areas designated as contributing to the historic district that fall within the jurisdiction of the HCRRA (HCRRA, 2008).

The HCRRA guidelines address spatial elements; topography; vegetation; traffic circulation; water features; buildings; structures, furnishings, and objects; accessibility; health and safety; and environmental and energy considerations. While not all of the guidelines address elements relevant to this Project, some of the specific recommendations are significant for the construction and operation of the transmission line routes and the substations. For instance, the following recommendations are suggested:

- Graded slopes should be maintained to allow for access to the public facilities within the Greenway;
- The use of vegetation consisting of shrubs and perennials should be limited; vegetation should not block views of the bridge portals and landmarks;
- A standard palette of structures and furnishings should be used to support an integrated aesthetic environment; and
- Features that diminish the historic experience should be removed (HCRRA, 2008).

5.3.1.5. Pioneer and Soldiers Cemetery

This Pioneers and Soldiers Cemetery occupies 27 acres within the East Phillips neighborhood (HPC, 2007b). It is located near the eastern edge of the Project routes. The proposed alignment for Route A follows its north-northwestern border. It is situated between Lake Street and East 28th Street and between Cedar Avenue South and 21st Avenue South.

This cemetery (formerly known as Layman's) is the oldest existing cemetery in the city of Minneapolis. The original owners of the property were the Martin Layman Family. Since 1928, the city of Minneapolis has owned and maintained the cemetery (Friends of the Cemetery, 2009 and HPC, 2007a).

Within the cemetery, the first burial dates to 1853. Prominent individuals associated with the early beginnings of Minneapolis history were buried at this cemetery, including Charles Christmas, Edwin Hedderly, and Philander Prescott. In addition, approximately 200 military veterans are buried in the cemetery. These soldiers fought for wars ranging from the War of 1812 to World War I (Friends of the Cemetery, 2009).

Unlike other cemeteries of this time, this location is also the burial site for many of the city's early African American residents and figures associated within the Abolitionist Movement. Immigrants from around the world are buried at the cemetery, as well; although, these burials are predominantly of Scandinavian and Eastern European descent. Over half of the burials within the cemetery are children (Friends of the Cemetery, 2009).

The cemetery is listed on the National Register of Historic Places (NRHP). It received this distinction in June of 2002. The property is listed due to its distinctive architectural features, which include a caretaker's cottage (ca. 1871) and other decorative elements including a flag pole, fence, gate, and monuments dating to the 1920's and 1930's. In addition, this site is associated with many prominent figures important to the local history of Minneapolis (Friends of the Cemetery, 2009).

5.3.1.6. Midtown Exchange (Sears Roebuck)

The Sears, Roebuck & Company building, known as the Midtown Exchange, is located in the Midtown Phillips neighborhoods between Elliot Avenue South and 10th Avenue South, north of Lake Street. This building is located near the western terminus of the Applicant's preferred alignment for Route A. The preferred alignment for Route A would travel past the northern edge of the Midtown Exchange property.

The Midtown Exchange was built in 1927 by George Nimmons & Company. It was used as an industrial/commercial complex, similar to today's use as a mixed use building containing office, residential, and commercial space. This building was constructed in a Modern style, which showcases advancements of the twentieth century. Characteristics associated with this style include flat roofs, smooth walls, and geometric massing. The building was designated to the NRHP in 2005 and is recognized locally, as well (HPC, 2007c).

The Midtown Exchange represents an early phase in the development of Sears, Roebuck & Co., which became a major retailer in the country by the late twentieth century. The success of the Chicago-based company necessitated the spread of warehouses and retail stores throughout the upper-Midwest. This location was chosen due to its cost and availability for parking (HPC, 2007c).

The retail store closed in 1994. Rehabilitation efforts were undertaken between 2004-2006 to convert the old warehouse into the Allina Hospital and Clinics headquarters, private condos, and a Global Market (HPC, 2007c).

5.3.1.7. Other Historic Properties within the Cultural Resources Study Area

In addition to the properties discussed in Sections 5.3.1.3 through 5.3.1.5, eight other properties are noted for their national significance. Two of these properties are located within the Cultural Resources Study Area, including the Bardwell-Ferrant House and the Swan Turnblad House. The remaining properties are associated with the Applicant's preferred alignment for Route E2.

Bardwell-Ferrant House

The Bardwell-Ferrant House is representative of the national interest in exotic stylistic themes in the late nineteenth century. This structure is located at 2500 Portland Avenue South in the Phillips West neighborhood near the intersection of Portland Avenue and East 25th Street (HPC, 2007a). It is located to the north of proposed Route B.

The house was constructed in 1883 for Charles Bardwell. It originally was located at 1800 Park Avenue, but was moved to its present site in 1898 to make way for the construction of an apartment building (HPC, 2007a).

The original Queen Anne form of the dwelling was transformed in 1890 into a Moorish style through the addition of onion domed towers, ogee arch shapes, and deep-toned stained glass lights. Mr. Emil Ferrant employed a locally prominent architect, Carl F. Struck, to rebuild the structure using Moorish design themes (HPC, 2007a). This property was listed on the NRHP in 1984 and was recognized for local distinction in 1983.

Swan Turnblad House

The Swan Turnblad House is located in the Midtown Phillips Neighborhood. It was constructed circa 1903-1910 by Boehme and Cordella in the French Chateau style. The building is located at 2600 Park Avenue South near the intersection of Park Avenue and East 26th Street. It is located to the south of the Applicant's preferred alignment for Route B.

This house was built by Swan J. Turnblad, a Swedish-American immigrant, who acquired the *Svenska Amerikanska Posten*, a nationally circulated newspaper. The 33-room house, which cost nearly $1,500,000 to construct, took seven years to complete. It is a three-story mansion, built of Bedford limestone. The property includes a massive porte-cochere with a solarium above, a two-story carriage house, and a decorative stone and iron fence that surrounds the property. In 1929, the house was donated to the Swedish American Institute. Today, it houses an extensive collection of Swedish-American exhibits (HPC, 2007d). This property was listed on the NRHP in 1970 and is recognized as a locally significant building (HPC, 2007d).

Harry F. Legg House

The Harry F. Legg House is located at 1601 Park Avenue South. It is a private residence that was listed on the NRHP in 1976 and is recognized as a locally significant property (HPC, 2007e). The property is located to the north of the Cultural Resources Study Area in Elliott Park. It is situated to the south of the Applicant's preferred alignment for Route E2.

This property is an example of Queen Anne architecture and retains it original architectural integrity. The interior also maintains its integrity and exhibits some ornate woodwork that may have been ordered from factory catalogs that were prominent in the late 1800's (HPC, 2007e).

First Church of Christ Scientist

The First Christian Scientist Church was the first of its kind constructed in Minnesota. This property was listed on the NRHP in 1986 and is recognized as a locally significant building. It is located at 614-20 East 15th Street in Elliot Park (HPC, 2007f). This church is located to the north of the Cultural Resources Study Area and is within the neighborhood that borders the Applicant's preferred alignment for Route E2.

The architect, S.J. Bowler, designed this building to represent the Doric order, a simple form of Greek architecture. This building is one of two remaining buildings with this style of architecture in the city of Minneapolis. The front exterior of the church features a deep portico with two fluted columns reaching up to the low pitched, pedimented gable (HPC, 2007f).

Franklin Branch Library

This property is located at 1314 Franklin Avenue East in the Ventura Village neighborhood, which once was part of the Phillips neighborhood. This property was listed on the NRHP in 2000 and is locally significant (HPC, 2007g). It is located just south of the Applicant's preferred alignment for Route E2.

The Franklin Avenue branch of the Minneapolis Public Library system played an important role as a neighborhood and educational center at the turn of the twentieth century. For many years, it housed the largest collection of Scandinavian books, magazines, and newspapers in the city. This library was one of thirteen branches established from 1904 to 1936. The branch was designed by a prominent New York City architect, Edward L. Tilton, and was funded by the Carnegie Corporation (HPC, 2007g).

Elisha and Lizzie Morse, Jr. House

The Elisha Morse House is significant as the only known example of the Italian Villa style in Minneapolis. This property was listed on the NRHP in 1995 and is recognized as a locally significant building (HPC, 2007h). It is located to the west of the Cultural Resources Study Area in the Whittier neighborhood.

This property retains its original cupola and cut-plank siding treatment. This siding consists of flat and planed planks incised at regular intervals to convey the impression of cut stone. This siding technique was rarely used in Minnesota architecture and extant buildings employing this technique are relatively unique. In December of 1991, the house was moved from its original location on 4th Avenue to the corner of Pillsbury Avenue and 24th Street. The original site was considerably altered in 1966 after the construction of Interstate 35W (HPC, 2007h).

Church of St. Stephen

The Church of St. Stephen is a Catholic church located at 2201 Clinton Avenue South. The church was constructed between 1889 and 1891 and features Romanesque architecture designed by Frederick Corser. The building was constructed of sandstone, brick, concrete, and copper.

The church was attended by entrepreneurs and businessmen from the Washburn-Fair Oaks Mansion District in the early 1900s. The church is still active and attended by residents of the area. The property was added to the NRHP in 1991 (NRHP, 2009).

Bridge No. 92348

During a review of SHPO records on October 9, 2009, the Applicant identified Bridge No. 92348 as an NRHP-listed property located within the Cultural Resources Study Area. The property location was described as Fourth Avenue over the Chicago, Milwaukee, and St. Paul Railroad Grade Separation. However, this property was not identified in a review of historic places listed on the city of Minneapolis Heritage Preservation Commission database or the National Register of Historic Places online database.

5.3.2. Direct/Indirect Effects

The Project would have both direct and indirect effects on archaeological and historic resources. This discussion provides an overview of the general direct and indirect effects similar for all routes and substations. This is followed by a more detailed evaluation of the direct and indirect effects associated with each route and substation alternative.

Potential direct effects from the Project include:

- Disruption to the ground surface and existing structures during operation;
- Impacts to existing and potential archaeological resources not yet identified; and

- Loss of information gathering from historic sites if Project-related activities disturb the context of the archaeological resources.

Potential indirect effects from the Project include:

- Effects associated with views both from and to historic properties; and
- Alteration of the urban landscape.

The visual impacts associated with the routes and substations would be felt both temporarily and permanently. The temporary effects would be experienced by residents and visitors to the area during the construction of the transmission lines. Construction activities and workers not typically part of this urban environment would be seen both to and from the historic structures. The presence of workers and equipment would be temporarily included within these views, while activities associated with the Project construction and operation were occurring. Once in place, the transmission lines and substations permanently would alter the urban landscape. These structures eventually would become part of the urban fabric and would lose some of the immediate impact felt by residents and visitors when first built.

Generally, the construction of a facility would not cause an adverse visual effect, except where the visual setting or visual elements are character-defining features of eligibility of a historic property located within the area of potential effect (APE) (Stark and Vermeer, 2009).

5.3.2.1. Transmission Line Route Alternatives

This section identifies potential direct and indirect effects of the Project specific to the transmission line route alternatives.

Route A

Route A would consist of one double-circuited overhead line or an underground line. The cultural resources assessment identified eight historic properties listed on the NRHP, four historic properties that are eligible for the NRHP, and three historic properties listed on the HPC's 800 List that may be impacted by the preferred alignment of Route A (See Table 5.3-1).

If this route is built underground, it would remove the visual intrusions of overhead lines within this corridor; however, it could impact the integrity of the overall historic district. Minor elements, such as historic retaining walls and fences, may be located within or near the proposed route. These resources are considered to be contributing historic features to the district. During the construction of the transmission line, ground disturbing activities may cause damage to these above ground features.

Unidentified archaeological resources also may be impacted by activities occurring below the ground surface. If resources are found within this route, these resources typically would be associated with the historic period. Prehistoric resources most likely have been destroyed by previous road construction and utility installations. Due to these previous disturbances, potential resources found within this urban environment likely would not possess the necessary characteristics of integrity to be eligible for the NRHP.

If built as an overhead route, Route A would have the potential to impact known historic resources, as it parallels the CM&StP Railroad Grade Separation historic district, the NRHP-listed Midtown Exchange Building (HE-MPC-3517), the NRHP-listed Layman's Cemetery (HE-MPC-4123), the NRHP-eligible Zinsmaster Baking Company (HE-MPC-4220), and the NRHP-eligible Southside Destructor (HE-MPC-3504). In general, the neighborhoods intersected by the alignment of Route A are characterized by industrial and transportation associations. Therefore, the proposed large transmission towers near the CM&StP Railroad Grade Separation are not entirely out of character. However, the proposed route would introduce modern features within or near the historic district and would likely be considered an intrusive and adverse effect to the historic landscape. The introduction of these features would not be consistent with the recommendation of the HCCRA guidelines to remove incompatible features within the Midtown Greenway (HCRRA, 2008). Likewise, the transmission line could be considered an adverse effect on the Sears Building and the Zinsmaster Baking Company, depending on the location of the line and its associated structures.

Route B

As indicated in Table 5.3-1, the cultural resources assessment identified nine historic properties listed on the NRHP, five historic properties that are eligible for the NRHP, and 11 historic properties listed on the HPC's 800 list that may be impacted by the preferred alignment of this alternative (Xcel Energy, 2009). As currently planned, this route runs primarily within existing ROW.

During the construction of the overhead transmission line, ground disturbing activities may cause some damage to undocumented archaeological resources, if discovered. Similar to Route A, if resources are found within this route, these resources typically would be associated with the historic period. Prehistoric resources most likely have been destroyed by previous road construction and utility installations. As aforementioned, the likelihood of being eligible for listing on the NRHP is low due to the lack of integrity in previously disturbed contexts.

Route B may indirectly impact the visual aspect of historic architectural resources associated with Park Avenue, the Phillips neighborhood, Swedish and Norwegian immigrant communities, historic and cultural institutions, and industrial facilities. Within this route, numerous structures are present including the Minneapolis Moline plant, the Honeywell facility, the CM&StP rail yards, the CM&StP Benton Cutoff and grade separation, and streetcar lines. In addition, Lake Street is in the viewshed of this route. The Lake Street corridor served as an important commercial area in the city of Minneapolis. Many associated historic properties have been or may be determined eligible along this corridor (Xcel Energy, 2009).

Route C

The cultural resources assessment identified seven historic properties listed on the NRHP, five historic properties that are eligible for the NRHP, and 10 historic properties listed on the HPC's 800 list that may be impacted by the alignment of this alternative (Xcel Energy, 2009).

During the construction of the two single-circuit overhead transmission lines, ground disturbing activities may cause some damage to undocumented archaeological resources, if discovered. Similar to Routes A and B, if resources are found within this route, these resources typically would be associated with the historic period. Prehistoric resources most likely have been destroyed by previous road construction and utility installations within the existing ROW. The likelihood of being eligible for listing on the NRHP is low.

Route C potentially impacts the visual aspect of cultural resources associated with Park Avenue, the Powderhorn Park neighborhood, the Phillips neighborhood, Swedish and Norwegian immigrant communities, historic and cultural institutions and facilities, and industrial facilities, such as the Minneapolis Moline and Honeywell Facility. This route also would impact the CM&StP rail yards, the CM&StP Benton Cutoff and grade separation, the streetcar lines, and the Lake Street commercial corridor.

Similar to Routes A and B, this route also may impact resources associated with residential development. In particular, this route is located within proximity to the following resources:

- 17th Avenue South - Properties in the 3000 block have been recommended previously as important representations of brick workers housing;

- Powderhorn Lake and Park – Resources in these areas have been identified as having the potential for historic architectural resources;

- 10th and 11th Avenues - The 3100 block of each street has been noted as having the potential for historic architectural resources;

- Powderhorn Terrace, 12th Avenue South (north of Powderhorn Park), 14th Avenue South (east of the park) - Properties throughout these neighborhoods have the potential to be eligible for NRHP listing or local designation;

- East 31st Street - The 1700 block contains a series of four parged stone houses that are unique to the neighborhood and may be historically significant; and

- Minnehaha Avenue - A grouping of residences on the 3100 block may possess historic significance as examples of early twentieth century worker cottages built for employees of the nearby Minneapolis Steel and Machinery Company (Xcel Energy, 2009).

Route D

Underground transmission lines would have minimal or no effects to most historic architectural resources. As proposed, this underground alternative would be placed within ROW and likely would not cause adverse effects to historic architectural properties or landscapes (Xcel Energy, 2009).
While the underground route would remove the visual intrusions of overhead lines, unidentified archaeological resources may be impacted by activities occurring below the ground surface. If resources are found within this route, these resources typically would be associated with the historic period. Prehistoric resources most likely have been destroyed by previous road construction and utility installations. The lack of integrity would preclude these sites from being eligible for listing on the NRHP.

Route E2

As identified by the Applicant, eight NRHP listed properties and 37 properties that are potentially eligible for listing on the NRHP may be impacted by the alignment of this alternative (Xcel Energy Information Request, 2009). Information is not available for properties listed on the "800 List."

Since this route is intended as an overhead route, the impacts associated with Route E2 would be similar to those in Routes A, B, and C. During the construction of the overhead transmission line, ground disturbing activities may cause some damage to undocumented archaeological resources, if discovered.

Information on the archaeological resources in the area incorporated by Route E2 was not documented by the cultural resource assessment. However, based on the urban environment and similarities in location to the other routes, if resources are found within Route E2, these resources typically would be associated with the historic period. Prehistoric resources most likely have been destroyed by previous road construction and utility installations within the existing ROW. The likelihood of being eligible for listing on the NRHP is low.

Route E2 may indirectly impact the visual aspect of historic architectural resources associated with the Phillips, Whittier, Stevens Square-Loring Heights, Elliot Park, Cedar Riverside, Seward, and Longfellow neighborhoods.

5.3.2.2. Substation Alternatives

This section identifies potential direct and indirect effects of the Project specific to the substation alternatives.

Hiawatha Substation Sites

The proposed Hiawatha substation sites are to be located in an area that has been significantly redeveloped in recent years. The north portion was occupied previously by the CM&StP shops and has been disturbed heavily by the construction of Trunk Highway 55 and new industrial construction. The south portion was occupied by multiple railroad tracks (Stark and Vermeer, 2009).

Although rail spurs are present within this area, it does not appear within the alignment of the CM&StP's main line or its Short Line route, an unevaluated rail corridor with potential historic significance. Most of the rail facilities within this area, such as the CM&StP rail yards, have been removed (Xcel Energy, 2009).

As a result, these sites do not appear to contain historic properties or to be proximate to historically significant properties.

Midtown Substation Sites

For these sites, three historic properties listed on the NRHP and one historic property that is eligible for the NRHP were identified within the cultural resources assessment (Xcel Energy, 2009).

The Midtown North and Midtown South sites are adjacent to the CM&StP Railroad Grade Separation historic district on its north and south sides. A portion of the north site was the location of the former Oakland Substation, which was built in the 1950's.

Construction of another transformer yard, now called a substation, at the proposed site would not have significant direct impacts to historic resources (Xcel Energy, 2009).

The proposed Midtown North high-profile substation, with an average height of 45 feet, would result in visual effects to surrounding properties for both the north and south alternatives. Many of the immediately surrounding properties have not been evaluated for potential NRHP eligibility (Xcel Energy, 2009).

Midtown South would be constructed on the site of a former auto sales and service building and curling club. This property was determined not eligible for the NRHP as part of the Midtown Greenway investigation. The Midtown South substation is proposed as a low-profile substation and would have fewer visual impacts than the Midtown North substation (Xcel Energy, 2009).

The likelihood exists of other unevaluated historic resources to be present based on the contextual history of this alternative (Xcel Energy, 2009).

Mt-28N and Mt-28S Substations

The Mt-28N and Mt-28S are located at the western end of the transmission line routes alternatives in the Phillips neighborhood. If the Mt-28N or Mt-28S Substation locations are selected, a design similar to the Midtown North or Midtown South Substation would be constructed.

Two NRHP listed properties, Bridge No. 92348 and the Chicago, Milwaukee, and St. Paul Grade Separation Historic District are located within the study area for the Mt-28S and Mt-28N Substations. In addition, three NRHP eligible properties are located within the study area for the substations. One 800 List property is located within the study area for Mt-28N.

The Mt-28S Substation would be located on a vacant lot currently used for parking. The Mt-28N Substation would be located on a private green space owned by Fells Fargo. No building demolition is anticipated for construction of these substations. Construction of the substations would not be expected to have significant direct impacts to cultural resources.

5.3.3. Mitigation

This section identifies mitigation measures to reduce or eliminate potential direct and indirect effects of the Project.

5.3.3.1. Transmission Line Route Alternatives

Placing underground alternatives within previously disturbed and/or public ROW is one way of minimizing the potential for adverse effects to archaeological resources. The Cultural Resources Study Area is located at a considerable distance from any water sources or wetlands that typically are associated with high probability for archaeological resources. Instead, the routes are located in areas documented as previously disturbed by urban development. If placement within sensitive areas is necessary, further investigations may be required to determine the presence and significance of archaeological resources.

In the event that any archaeological sites, human remains, funerary items, or associated artifacts are discovered during removal and restoration of fill, activities would need to cease immediately. The SHPO and other relevant officials would be notified, and if necessary, interested federally recognized tribes. Additional mitigation efforts may be needed.

5.3.3.2. Substation Alternatives

Potential mitigation strategies for minimizing the visual impact of substations on historic properties would be:

- Use of decorative walls as a screening device; and
- Landscaping the area immediately surrounding the substation.

The Applicant has stated that the Hiawatha Substation could be constructed with a one-story decorative wall surrounding the substation on three to four sides. The walls could be architecturally-designed to complement the existing character of the Cultural Resources Study Area (Xcel Energy, 2009).

Underground substations would have minimal or no effects to most historic architectural resources. If one or more of the substations is constructed underground, placement of the substation in a previously disturbed area would minimize the potential for adverse effects to unknown archaeological resources.

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5.4. Socioeconomics

This section provides a discussion of the socioeconomic patterns within the city of Minneapolis and specifically the neighborhoods through which the transmission lines and substations would be built. Information from the United States Census Bureau (USCB), the Minnesota Department of Administration (MDA), and the city of Minneapolis was analyzed to determine the existing conditions within this area. Data for the state, county, and city was obtained from the USCB 2000 decennial census. At the more local level of the neighborhood unit, population estimates were obtained from the city of Minneapolis Department of Planning.

This discussion includes a description of the affected environment, direct and indirect effects, and mitigation.

5.4.1. Affected Environment

The affected environment consists of the Socioeconomic Study Area, which is comprised of the following neighborhoods within the city of Minneapolis, Hennepin County, Minnesota:

- Cedar Riverside Neighborhood;
- Central Neighborhood;
- Corcoran Neighborhood;
- Elliot Park Neighborhood;
- Longfellow Neighborhood;
- Loring Park Neighborhood;
- Phillips Neighborhood[5];
- Powderhorn Park Neighborhood;
- Seward Neighborhood;
- Stevens Square – Loring Heights Neighborhood; and
- Whittier Neighborhood.

Details regarding the population, housing, employment, and income characteristics of these communities are provided in the following subsections.

[5] The city of Minneapolis approved the creation of Ventura Village as a separate neighborhood from Phillips in 2002 (City of Minneapolis, 2005). However, they will be discussed together as the Phillips Neighborhood as they relate to the 1990 and 2000 Census data, unless otherwise indicated.

5.4.1.1. Socioeconomic Characteristics

This section identifies and discusses population characteristics, housing characteristics, employment characteristics, and income for the Socioeconomic Study Area.

Population Characteristics

Population characteristics, including total populations, gender, median ages, and average household sizes for the Socioeconomic Study Area, are shown in Table 5.4-1. The following discussion provides an overview of the State of Minnesota, Hennepin County, the city of Minneapolis, and the 11 neighborhoods within the Socioeconomic Study Area. The population by census tract within the transmission line route alternatives also is provided.

Demographic characteristics specific to minority and low income populations are contained in Section 5.5, Environmental Justice.

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Table 5.4-1: Population Characteristics, 1990 and 2000

Population Characteristics	State of Minnesota	Hennepin County	City of Minneapolis	Cedar Riverside Neighborhood	Central Neighborhood	Corcoran Neighborhood	Elliot Park Neighborhood	Longfellow Neighborhood	Loring Park Neighborhood	Phillips Neighborhood	Powderhorn Park Neighborhood	Seward Neighborhood	Stevens Square-Loring Heights Neighborhood	Whittier Neighborhood
1990														
Total Population	4,375,099	1,032,431	368,383	6,368	7,521	3,635	5,678	5,023	6,586	17,247	7,864	7,020	4,433	13,051
Sex														
Male	49.0%	48.4%	48.5%	52.1%	49.4%	47.6%	54.7%	48.1%	50.0%	48.5%	47.1%	47.5%	53.6%	52.6%
Female	51.0%	51.6%	51.5%	47.9%	50.6%	52.4%	45.3%	51.9%	50.0%	51.5%	52.9%	52.5%	46.4%	47.4%
Median Age (years)	n/a	n/a	n/a	24.1	24.2	31.5	34.1	35.6	38.3	29.3	31.8	30.8	31.1	28.6
Total Households	1,647,853	419,060	160,682	2,775	2,397	1,536	2,792	2,296	4,891	6,543	3,381	3,664	2,743	6,763
Average Household Size	2.58	2.41	2.19	1.72	3.10	2.36	1.42	2.16	1.33	2.43	2.32	1.92	1.43	1.82
2000														
Total Population	4,919,479	1,116,200	382,618	7,545	8,150	4,228	6,476	4,972	7,501	19,805	8,957	7,174	3,948	15,247
Sex														
Male	49.5%	49.2%	50.2%	51.2%	52.4%	50.1%	55.2%	48.5%	54.1%	52.4%	50.3%	49.7%	58.2%	56.0%
Female	50.5%	50.8%	49.8%	48.8%	47.6%	49.9%	44.8%	51.5%	45.9%	47.6%	49.7%	50.3%	41.8%	44.0%
Median Age (years)	35.4	34.9	31.2	23.6	24.5	30.2	29.8	35.8	36.3	26.9	28.9	32.5	29.3	28.2
Total Households	1,895,127	456,129	162,352	2,838	2,335	1,547	2,685	2,285	5,638	6,333	3,350	3,721	2,623	7,031
Average Household Size	2.52	2.39	2.25	2.03	3.48	2.71	1.55	2.17	1.31	2.86	2.66	1.92	1.46	2.06
Average Annual % Change in Population, from 1990-2000	1.24	0.81	0.39	1.85	0.84	1.63	1.41	-0.10	1.39	1.48	1.39	0.22	-1.0.9	1.68

Notes: n/a = not available
Source: Neighborhood Statistics - city of Minneapolis, Planning Department, Research and Strategic Planning Division (RSPD), 2001a-k; Minnesota, city of Minneapolis, and Hennepin County Statistics – USCB, 1990a-o and 2000a-l.

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Among the neighborhoods within the Socioeconomic Study Area, the population in 1990 ranged from a low of 3,635 in the Corcoran neighborhood to a high of 17,247 in the Phillips neighborhood. In 2000 the population ranged from a low of 3,948 in the Stevens Square-Loring Park neighborhood to a high of 19,805 in the Phillips neighborhood. As shown in Table 5.4-1, the Cedar Riverside neighborhood experienced the greatest percentage increase in population with 18.5 percent for the 10 year period or 1.85 percent annually from 1990 to 2000, and the Stevens Square-Loring Heights neighborhood experienced a decrease of 10.9 percent for the 10 year period or 1.09 percent annually (City of Minneapolis RSPD, 2001a-k).

Projections from the Metropolitan Council, the regional planning agency for the Twin Cities, suggest that the city of Minneapolis will have a total population of 402,000 in 2010, which represents a change of 5.1 percent; 423,000 in 2020, which represents a change of 8.2 percent from 2010 to 2020; and 435,000 in 2030, which represents a change of 2.8 percent from 2020 to 2030. According to the Metropolitan Council, regional forecasts are compared to national population forecasts and historic trends to provide a check on the demographically derived forecasts (Metro Council, 2009). An explanation for the general increase in population was not provided. Information at the neighborhood level was not available.

While 11 individual neighborhoods are included within the Socioeconomic Study Area, the transmission line route alternatives only incorporate portions of each neighborhood. Table 5.4-2 provides the census tracts contained within each route and the total number of people who live within them.

Table 5.4-2: Population within 500 Feet of the Transmission Line Routes

Route	Census Tract	Number of Persons within Tract
Route A	107500	2,019
	007302	2,332
	007900	1,604
	007802	2,050
	Total Population	**8,005**
Route B	107500	2,019
	007302	2,332
	007301	1,815
	107200	2,514
	107100	2,721
	007802	2,050
	007900	1,604
	Total	**15,055**

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Route	Census Tract	Number of Persons within Tract
	Population	
Route C	107500	2,019
	007302	2,332
	007900	1,604
	007802	2,050
	008400	2,760
	008500	4,501
	108600	3,087
	108700	3,550
	108800	3,813
	Total Population	**25,716**
Route D	107400	1,713
	107500	2,019
	007302	2,332
	007900	1,604
	007802	2,050
	Total Population	**9,718**
Route E2	107500	2,019
	007302	2,332
	007301	1,815
	106200	3,356
	106000	3,462
	104800	7,534
	005901	3,060
	005902	3,307
	105700	2,877
	107100	2,721
	106900	3,121
	007801	1,813
	007802	2,050
	Total Population	**39,467**

Source: Xcel Energy, 2009c and USCB, 2000m.

As shown in Table 5.4-2, the greatest numbers of people live in the area contained within Route E2 (39,467) and the least number of people live within the area contained by Route A (8,005). A more detailed analysis of the census tract data is provided in Section 5.5, Environmental Justice.

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Based on 2000 USCB data, the median age of residents within the Socioeconomic Study Area varied from a low of 23.6 in the Cedar Riverside neighborhood to a high of 36.3 in the Loring Park neighborhood. The median age in the State of Minnesota was 35.4; in Hennepin County, it was 34.9; and in the city of Minneapolis, the median age was 31.2 (City of Minneapolis RSPD, 2001a-k) (USCB, 2000a, e, and i) (Table 5.4-1). Other than the Longfellow and Loring Park neighborhoods, the median ages are less than that of the state and county. The Longfellow, Loring Park, and Seward neighborhoods had a median age higher than the city of Minneapolis.

Housing Characteristics

The total number of housing units, ownership levels, and housing occupancy/vacancy levels compiled from the USCB are presented in Table 5.4-3 (City of Minneapolis RSPD, 2001a-k; USCB, 2000a, e, and i).

As indicated in Table 5.4-1, in both 1990 and 2000, the Central neighborhood had the greatest average household size of 3.10 and 3.48 people, respectively. The Loring Park neighborhood had the smallest with an average of 1.33 people per household in 1990 and 1.31 people per household in 2000. During these same years, the State had an average of 2.58 (1990) and 2.52 (2000) people per household; the County had an average of 2.41 (1990) and 2.39 (2000); and the city had an average of 2.19 (1990) and 2.25 (2009) (City of Minneapolis RSPD, 2001a-k; USCB, 1990a and 2000a).

Projections from the Metropolitan Council suggest that the city of Minneapolis will have approximately 172,000 households in 2010, which represents an increase of 5.9 percent from 2000 to 2010; 181,000 households in 2020, which represents an increase of 5.2 percent from 2010 to 2020; and 187,000 in 2030, which represents an increase of 3.3 percent from 2020 to 2030 (Met Council, 2009). Projections for future levels of housing at the neighborhood level were not available.

In 2000, the city of Minneapolis had a total of 162,352 occupied housing units. This was an increase of approximately 1.0 percent from the total of 160,682 in 1990. Within the Socioeconomic Study Area, the total housing units varied from a low of 1,593 units in the Corcoran neighborhood to a high of 7,265 in the Whittier neighborhood (Table 5.4-3).

The percentage of total occupied units ranged from a low of 92.6 percent in the Central neighborhood to a high of 97.8 percent in the Seward neighborhood. However, owner occupancy among the total number of occupied units ranged from a low of 3.4 percent in the Elliot Park neighborhood to a high of 60.3 percent in the Corcoran neighborhood (City of Minneapolis RSP, 2001a-k; Table 5.4-3).

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The number of seasonal, recreational, or occasional units also was not available for the individual neighborhoods. However, within the city of Minneapolis, 780 units were unoccupied seasonal units (USCB, 2000e).

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Table 5.4-3: Housing Characteristics, 2000

2000	State of Minnesota	Hennepin County	City of Minneapolis	Cedar Riverside Neighborhood	Central Neighborhood	Corcoran Neighborhood	Elliot Park Neighborhood	Longfellow Neighborhood	Phillips Neighborhood	Loring Park Neighborhood	Powderhorn Park Neighborhood	Seward Neighborhood	Stevens Square-Loring Heights Neighborhood	Whittier Neighborhood
Total Housing Units	2,065,946	468,824	168,606	2,918	2,522	1,593	2,859	2,339	6,734	6,033	3,512	3,805	2,746	7,265
Total Occupied Units	1,895,127	456,129	162,352	2,838	2,335	1,547	2,685	2,285	6,333	5,638	3,350	3,721	2,623	7,031
Owner-Occupied	1,412,865	301,793	83,408	291	1,121	933	92	1,256	1,366	1,098	1,585	1,290	190	781
Renter-Occupied	482,262	154,336	78,944	2,547	1,214	614	2,593	1,029	4,967	4,540	1,765	2,431	2,433	6,250
Total Unoccupied Units	170,819	12,695	6,254	80	187	46	174	54	401	395	162	84	123	234
Year-Round Units	65,210	10,204	5,470	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Seasonal, recreational, or occasional use units	105,609	2,491	784	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Note: n/a = not available

Sources: Neighborhood Statistics - City of Minneapolis, Planning Department, Research and Strategic Planning Division (RSPD), 2001a-k;
Minnesota, city of Minneapolis, and Hennepin County Statistics – USCB, 2000a, e, and i.

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As previously indicated, each of the routes crosses portions of the 11 neighborhoods. The individual number of dwellings located within 500 feet of the Applicant's preferred alignment for the transmission line route alternatives is presented in Table 5.4-4.

Table 5.4-4: Estimated Number of Dwelling Units Near the Preferred Alignments of the Transmission Line Routes

	Total Estimated Dwelling Units				
Route	Within 0-25 feet	Within 26-50 feet	Within 51-100 feet	Within 101-200 feet	Within 201-500 feet
Route A					
Aboveground	245	262	439	575	968
Underground	219	263	333	606	975
Route B	335	356	1,084	1,352	2,114
Route C	206	190	540	787	1,702
Route D					
Center of Street	0	189	254	421	1,023
North Sidewalk	83	93	256	416	1,012
Route E2	730	723	1,032	1,404	2,203

Source: Xcel Energy, 2009b.

As shown in this table, Route E2 contains the greatest number of dwelling units located within 200 to 500 feet of the Applicant's preferred alignment, and Route A has the least. For all routes, except Route C and E2, the least amount of dwelling units is located between 0 and 25 feet of the Applicant's preferred alignment for the transmission line.

Employment Characteristics

Table 5.4-5 provides a summary of 2000 employment information for the population aged 16-years old and above. The table provides background information about the total civilian labor force, the number of employed civilians, the number of unemployed civilians, and the rate of unemployment.

As shown in the table, unemployment in 2000 varied by neighborhood:

- Cedar Riverside Neighborhood (17.0 percent);
- Central Neighborhood (8.8 percent);
- Corcoran Neighborhood (6.8 percent);
- Elliot Park Neighborhood (15.4 percent);
- Longfellow Neighborhood (6.1 percent);
- Loring Park Neighborhood (4.6 percent);
- Phillips Neighborhood (12.5 percent);
- Powderhorn Park Neighborhood (6.6 percent);
- Seward Neighborhood (3.3 percent);

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- Stevens Square-Loring Heights Neighborhood (6.1 percent); and
- Whittier Neighborhood (5.2 percent).

The Socioeconomic Study Area (i.e. the 11 neighborhoods) had a total of 4,265 unemployed residents in 2000. At that time, the state of Minnesota had an unemployment rate of 4.1 percent, Hennepin County had a rate of 3.8 percent, and the city of Minneapolis had a rate of 5.8 percent (USCB, 2000c, g, and k). Eight of the 11 neighborhoods had higher rates of unemployment in 2000 than the state, county, and city. Three of the neighborhoods had unemployment rates in 2000 less than the city (City of Minneapolis CPED, 2005).

Projections from the Metropolitan Council, suggest that the city of Minneapolis had an employment total of 308,127 in 2000. This differs from that information provided by the CPED. Based on this data, the Metropolitan Council estimated that the city of Minneapolis will have total employment of 317,000 in 2010, which represents an increase of 2.9 percent; 332,500 in 2020, which represents an increase of 4.9 percent from 2010 to 2020; and 346,500 in 2030, which represents an increase of 4.2 percent from 2020 to 2030. According to the Metropolitan Council, employment forecasts were calculated by projecting the region's share of national forecasted growth (from the Bureau of Economic Analysis; Met Council, 2009). Information at the neighborhood level was not available.

Table 5.4-6 provides information regarding 2000 employment by industry for those residing within the Socioeconomic Study Area, as well as for the state of Minnesota, Hennepin County, and the city of Minneapolis.

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Table 5.4-5: Total Employment, 2000

Labor Force	State of Minnesota		Hennepin County		City of Minneapolis		Cedar Riverside Neighborhood		Central Neighborhood		Corcoran Neighborhood		Elliot Park Neighborhood		Longfellow Neighborhood		Loring Park Neighborhood		Phillips Neighborhood		Powderhorn Park Neighborhood		Seward Neighborhood		Stevens Square-Loring Heights Neighborhood		Whittier Neighborhood	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Population 16 years old & older	3,781,756	100.0%	876,731	100.0%	306,378	100.0%	6,435	100.0%	5,470	100.0%	3,125	100.0%	5,835	100.0%	4,115	100.0%	7,290	100.0%	13,905	100.0%	6,560	100.0%	5,875	100.0%	3,710	100.0%	12,880	100.0%
Individuals in Labor Force	2,691,709	71.2%	641,557	73.2%	220,790	72.1%	4,210	65.4%	3,680	67.3%	2,220	71.0%	3,405	58.4%	3,125	75.9%	5,155	70.7%	7,680	55.2%	4,950	75.5%	4,265	72.6%	2,965	79.9%	10,065	78.1%
Civilian Labor Force	2,689,115	71.1%	641,139	73.1%	220,668	72.0%	4,210	65.4%	3,680	67.3%	2,220	71.0%	3,405	58.4%	3,125	75.9%	5,155	70.7%	7,680	55.2%	4,940	75.3%	4,265	72.6%	2,965	79.9%	10,065	78.1%
Employed	2,580,046	68.2%	616,729	70.3%	207,890	67.9%	3,495	54.3%	3,355	61.3%	2,070	66.2%	2,880	49.4%	2,935	71.3%	4,915	67.4%	6,720	48.3%	4,620	70.4%	4,120	70.1%	2,785	75.1%	9,545	74.1%
Unemployed	109,069	2.9%	24,410	2.8%	12,778	4.2%	715	11.1%	325	5.9%	150	4.8%	525	9.0%	190	4.6%	235	3.2%	960	6.9%	325	5.0%	140	2.4%	180	4.9%	520	4.0%
Percent of civilian labor force unemployed		4.1%		3.8%		5.8%		17.0%		8.8%		6.8%		15.4%		6.1%		4.6%	0	12.5%		6.6%		3.3%		6.1%		5.2%
Armed Forces	2594	0.1%	418	0.0%	122	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	0.1%	0	0.0%	0	0.0%	0	0.0%
Individuals not in Labor Force	1,090,047	28.8%	235,174	26.8%	85,588	27.9%	2,225	34.6%	1,785	32.6%	905	29.0%	2,430	41.6%	995	24.2%	2,135	29.3%	6,225	44.8%	1,610	24.5%	1,610	27.4%	745	20.1%	2,815	21.9%

Sources: City of Minneapolis CPED, 2005; USCB, 2000c, g, and k.

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Table 5.4-6: Employment by Industry, 2000

Industry Sector and Class of Workers	State of Minnesota		Hennepin County		City of Minneapolis	
	Number	Percent	Number	Percent	Number	Percent
Total, All Industries (i.e. Employed Civilian Population 16 Years and Older)	2,580,046	100.0%	616,729	100.0%	207,890	100.0%
Industry						
Agriculture, forestry, fishing and hunting, and mining	67,883	2.6%	1,448	0.2%	435	0.2%
Construction	153,267	5.9%	25,942	4.2%	6,844	3.3%
Manufacturing	419,271	16.3%	84,970	13.8%	22,439	10.8%
Wholesale trade	92,854	3.6%	25,961	4.2%	5,393	2.6%
Retail trade	307,714	11.9%	73,802	12.0%	22,076	10.6%
Transportation and warehousing, and utilities	131,683	5.1%	26,897	4.4%	9,758	4.7%
Information	65,460	2.5%	20,157	3.3%	7,402	3.6%
Financial, insurance, real estate, and rental and leasing	184,874	7.2%	63,657	10.3%	17,929	8.6%
Professional, scientific, management, administrative, and waste management services	227,064	8.8%	83,869	13.6%	28,446	13.7%
Educational, health, and social services	539,111	20.9%	118,249	19.2%	47,442	22.8%
Arts, entertainment, recreation, accommodation, and food services	186,001	7.2%	47,989	7.8%	22,867	11.0%
Other services (except Public Administration)	118,322	4.6%	28,676	4.6%	10,672	5.1%
Public Administration	86,542	3.4%	15,112	2.5%	6,187	3.0%
Total	2,580,046	100.0%	616,729	100.0%	207,890	100.0%

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Table 5.4-6: Employment by Industry, 2000 (continued)

Industry Sector and Class of Workers	Cedar Riverside Neighborhood		Central Neighborhood		Corcoran Neighborhood		Elliot Park Neighborhood		Longfellow Neighborhood		Loring Park Neighborhood		Phillips Neighborhood		Powderhorn Park Neighborhood		Seward Neighborhood		Stevens Square-Loring Heights Neighborhood		Whittier Neighborhood	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total, All Industries (i.e. Employed Civilian Population 16 Years and Older)	3,495	100.0%	3,355	100.0%	2,070	100.0%	2,880	100.0%	2,935	100.0%	4,915	100.0%	6,720	100.0%	4,620	100.0%	4,120	100.0%	2,785	100.0%	9,545	100.0%
Industry																						
Agriculture, forestry, fishing and hunting, and mining	25	0.7%	10	0.3%	0	0.0%	10	0.3%	0	0.0%	15	0.3%	20	0.3%	10	0.2%	0	0.0%	0	0.0%	25	0.3%
Construction	85	2.4%	160	4.8%	105	5.1%	40	1.4%	170	5.8%	70	1.4%	300	4.5%	245	5.3%	100	2.4%	55	2.0%	235	2.5%
Manufacturing	365	10.4%	475	14.2%	275	13.3%	225	7.8%	385	13.1%	485	9.9%	920	13.7%	600	13.0%	305	7.4%	250	9.0%	930	9.7%
Wholesale trade	40	1.1%	55	1.6%	40	1.9%	45	1.6%	30	1.0%	70	1.4%	250	3.7%	130	2.8%	50	1.2%	105	3.8%	180	1.9%
Retail trade	340	9.7%	395	11.8%	260	12.6%	330	11.5%	350	11.9%	530	10.8%	570	8.5%	355	7.7%	390	9.5%	320	11.5%	1,030	10.8%
Transportation and warehousing, and utilities	155	4.4%	115	3.4%	55	2.7%	110	3.8%	140	4.8%	155	3.2%	340	5.1%	225	4.9%	180	4.4%	145	5.2%	375	3.9%
Information	125	3.6%	75	2.2%	45	2.2%	110	3.8%	110	3.7%	260	5.3%	95	1.4%	95	2.1%	110	2.7%	100	3.6%	340	3.6%
Financial, insurance, real estate, and rental and leasing	220	6.3%	185	5.5%	155	7.5%	180	6.3%	175	6.0%	695	14.1%	425	6.3%	345	7.5%	315	7.6%	225	8.1%	585	6.1%
Professional, scientific, management, administrative, and waste management services	345	9.9%	440	13.1%	230	11.1%	305	10.6%	260	8.9%	815	16.6%	600	8.9%	585	12.7%	465	11.3%	365	13.1%	1,510	15.8%
Educational, health, and social services	1,205	34.5%	630	18.8%	445	21.5%	725	25.2%	760	25.9%	765	15.6%	1,375	20.5%	1,030	22.3%	1,330	32.3%	475	17.1%	2,050	21.5%
Arts, entertainment, recreation, accommodation, and food services	445	12.7%	500	14.9%	335	16.2%	570	19.8%	305	10.4%	685	13.9%	1,250	18.6%	565	12.2%	485	11.8%	490	17.6%	1,555	16.3%
Other services (except Public Administration)	95	2.7%	235	7.0%	65	3.1%	190	6.6%	200	6.8%	280	5.7%	455	6.8%	285	6.2%	225	5.5%	230	8.3%	595	6.2%
Public Administration	50	1.4%	75	2.2%	55	2.7%	35	1.2%	45	1.5%	95	1.9%	120	1.8%	165	3.6%	165	4.0%	30	1.1%	135	1.4%
Total	3,495	100.0%	3,350	99.9%	2,065	99.8%	2,875	99.8%	2,930	99.8%	4,920	100.1%	6,720	100.0%	4,635	100.3%	4,120	100.0%	2,790	100.2%	9,545	100.0%

Sources: City of Minneapolis, Community Planning and Economic Development Department, 2005; USCB, 2000c, g, and k.

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As in Table 5.4-6, the largest industry employment sector in most neighborhoods is education, health, and social sciences ranging from 15.6 percent to 34.5 percent. The top three employment industries in each of the neighborhoods in the Socioeconomic Study Area are:

- Cedar Riverside Neighborhood – Educational, health, and social services (34.5 percent); Arts, entertainment, recreation, accommodation, and food services (12.7 percent); and Manufacturing (10.4 percent);

- Central Neighborhood – Educational, health, and social services (18.8 percent); Arts, entertainment, recreation, accommodation, and food services (14.9 percent); and Manufacturing (14.2 percent);

- Corcoran Neighborhood - Educational, health, and social services (21.5 percent); Arts, entertainment, recreation, accommodation, and food services (16.2 percent); and Manufacturing (13.3 percent);

- Elliot Park Neighborhood: Educational, health, and social services (25.2 percent); Arts, entertainment, recreation, accommodation, and food services (19.8 percent); and Retail Trade (11.5 percent);

- Longfellow Neighborhood - Educational, health, and social services (25.9 percent); Manufacturing (13.1 percent); and Retail trade (11.9 percent);

- Loring Park Neighborhood - Professional, scientific, management, administrative, and waste management services (16.6 percent); Educational, health, and social services (15.6 percent); and Financial, insurance, real estate, and rental and leasing (14.1 percent);

- Phillips Neighborhood (including Ventura Village) - Educational, health, and social services (20.5 percent); Arts, entertainment, recreation, accommodation, and food services (18.6 percent); and Manufacturing (13.7 percent);

- Powderhorn Park Neighborhood - Educational, health, and social services (22.3 percent); Manufacturing (13.0 percent); and Professional, scientific, management, administrative, and waste management services (12.7 percent);

- Seward Neighborhood - Educational, health, and social services (32.3 percent); Arts, entertainment, recreation, accommodation, and food services (11.8 percent); and Professional, scientific, management, administrative, and waste management services (11.3 percent);

- Stevens Square Neighborhood - Arts, entertainment, recreation, accommodation, and food services (17.6 percent); Educational, health, and social services (17.1 percent); and Professional, scientific, management, administrative, and waste management services (13.1 percent); and

- Whittier Neighborhood - Educational, health, and social services (21.5 percent); Arts, entertainment, recreation, accommodation, and food services (16.3 percent); and Professional, scientific, management, administrative, and waste management services (15.8 percent) (City of Minneapolis CPED, 2005).

The top three employment sectors for the State included educational, health, and social services; manufacturing; and retail trade. Hennepin County's top three employment sectors included educational, health, and social services; manufacturing; and professional, scientific, management, administrative, and waste management services. The city of Minneapolis had the same top three industries as Hennepin County, although a lower percentage of manufacturing than professional services (USCB, 2000c, g, and k). As indicated by this data, the top industry in each of these geographic areas is education, health, and social services.

Table 5.4-7 provides data about the worker class, which consists of those employed by private industry, the government, self-employed, and unpaid family workers. The vast majority of workers (74.2 percent to 88.3 percent) were private wage and salaried workers, with many of the remaining workers employed by the government (7.4 percent to 20.4 percent).

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Table 5.4-7: Class of Worker, 2000

	State of Minnesota		Hennepin County		City of Minneapolis	
	Number	Percent	Number	Percent	Number	Percent
Class of worker						
Private Wage and Salary Worker	2,074,432	80.4%	517,714	83.9%	167,922	80.8%
Government Workers	318,932	12.4%	65,353	10.6%	28,815	13.9%
Self-employed Workers in Own Not Incorporated Businesses	178,586	6.9%	32,603	5.3%	10,730	5.2%
Unpaid Family Workers	8,096	0.3%	1,059	0.2%	423	0.2%
Total (employed civilian population, 16 years and older)[1]	2,580,046	100.0%	616,729	100.0%	207,890	100.1%

	Cedar Riverside Neighborhood		Central Neighborhood		Corcoran Neighborhood		Elliot Park Neighborhood		Longfellow Neighborhood		Loring Park Neighborhood		Phillips Neighborhood		Powderhorn Park Neighborhood		Seward Neighborhood		Stevens Square-Loring Heights Neighborhood		Whittier Neighborhood	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Class of worker																						
Private Wage and Salary Worker	2,725	78.0%	2,840	84.6%	1,640	79.3%	2,510	87.2%	2,280	77.8%	4,305	87.6%	5,690	84.5%	3,750	81.3%	3,060	74.2%	2,460	88.3%	8,190	85.8%
Government Workers	605	17.3%	330	9.8%	280	13.5%	270	9.4%	385	13.1%	505	10.3%	725	10.8%	570	12.4%	840	20.4%	205	7.4%	955	10.0%
Self-employed Workers in Own Not Incorporated Businesses	155	4.4%	160	4.8%	145	7.0%	100	3.5%	255	8.7%	110	2.2%	305	4.5%	285	6.2%	220	5.3%	120	4.3%	375	3.9%
Unpaid Family Workers	4	0.1%	25	0.7%	4	0.2%	0	0.0%	10	0.3%	0	0.0%	10	0.1%	10	0.2%	4	0.1%	0	0.0%	25	0.3%
Total (employed civilian population, 16 years and older)[1]	3,495	100.0%	3,355	100.0%	2,070	100.0%	2,880	100.0%	2,933	100.0%	4,915	100.1%	6,720	100.0%	4,620	100.0%	4,120	100.0%	2,785	100.0%	9,545	100.0%

Notes: 1. The numbers provided in these rows are a sum of the private wage and salary worker, government workers, self-employed workers, and unpaid family workers. These numbers may not agree with the total population presented in Table 5.4-6 due to this summation.

Sources: City of Minneapolis, Community Planning and Economic Development Department, 2005
USCB, 2000c, g, and k.

Income Characteristics

Table 5.4-8 includes 2000 income information for the Socioeconomic Study Area (i.e., the 11 neighborhoods). As shown in this table, the 2,000 per capita income ranged from a total of $10,200 in the Phillips neighborhood to $37,000 in the Loring Park neighborhood. Except for the Loring Park neighborhood, the per capita income in other ten neighborhoods was less than the city of Minneapolis per capita income of $22,685 and the Hennepin County per capita income of $28,789, (Hennepin County CFAS, 2002). As will be shown in Section 5.5, Environmental Justice, the Loring Park neighborhood had the third lowest percentage of the population below the poverty level among the neighborhoods included within the Socioeconomic Study Area.

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Table 5.4-8: Income Characteristics, 2000

Income Characteristics	State of Minnesota	Hennepin County	City of Minneapolis	Cedar Riverside Neighborhood	Central Neighborhood	Corcoran Neighborhood	Elliot Park Neighborhood	Longfellow Neighborhood	Loring Park Neighborhood	Phillips Neighborhood	Powderhorn Park Neighborhood	Seward Neighborhood	Stevens Square-Loring Heights Neighborhood	Whittier Neighborhood
Percent of Individuals Below the Poverty Level	7.9%	8.3%	16.9%	32.1%	29.6%	15.0%	28.7%	9.5%	16.5%	32.8%	21.4%	18.3%	20.8%	21.3%
Median Household Income	$47,111	$51,711	$37,974	$14,637	$32,656	$33,393	$18,013	$34,156	$28,078	$23,090[1]	$34,985	$30,209	$24,060	$28,328
Per Capita Income[2]	$23,198	$28,789	$22,685	$10,400	$11,400	$15,700	$12,600	$19,100	$37,000	$10,200[1]	$15,300	$19,200	$20,500	$16,600
Mean Household Income (Mean Earnings)	$59,189	$68,522	$52,245	$27,806	$39,161	$37,975	$22,286	$40,627	$51,313	$33,459[1]	$39,753	$40,841	$31,494	$35,062

Notes:
1. The statistics for the Phillips neighborhood do not include Ventura Village.
2. The per capita income for each neighborhood was rounded to the nearest $100.

Sources:
City of Minneapolis CPED, 2009
City of Minneapolis CPED, 2005
USCB, 2000c, g, and k.
Hennepin County CFAS, 2002

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5.4.1.2. Property Values

Property values are determined by a combination of property characteristics and local market trends. Property characteristics that affect overall value include size, age, condition, and any additional special features and amenities within a residential structure, such as fireplaces. Local market trends are determined from detailed analyses of property sales within a given area (City of Minneapolis Assessor's Office, 2009). For example, if individual property sales decrease in locations where transmission lines are present, other properties in the same area or comparable areas, even if they are not directly adjacent or in sight of the transmission lines, may be impacted.

One concern of residents living near existing or proposed overhead transmission lines is how proximity to the line could affect the value of their property. Research on this issue does not identify a clear cause and effect relationship between the two variables. Instead, the presence of a transmission line becomes one of several factors that interact to affect the value of a particular property. A power line may either increase or decrease an individual's perception of a property's worth. This perception is indicative of how much one is willing to pay for the property.

Effects of transmission lines on property values are difficult to quantify as there are many variables that influence the final value of the property, such as differences in type and size of power lines, distance to the power lines, and amenities offered by the property. Studies on the topic have not been able to isolate a leading variable that would be a predictor of the impact of transmission lines on property values. A summary of research and case studies for both residential and industrial properties is presented below.

Residential Properties

There is a wide body of both professional and academic literature on the subject of high voltage transmission lines and residential property values. For instance, the Public Service Commission of Wisconsin addressed the issue in their Final Environmental Impact Statement on the Arrowhead – Weston Electric Transmission Line Project. This analysis of the relationship between property values and transmission lines looked at approximately 30 papers, articles, and court cases covering the period from 1987 through 1999 (PSCW, 2000).

The Wisconsin analysis identified two types of property value impacts that property owners may experience, which included potential economic impacts associated with the amount paid by a utility for a right-of-way (ROW) easement and potential economic impacts regarding the future marketability of the property. The first type of property

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value typically refers to the "market price of the land with and without the encumbrance of the line" (PSCW, 2000). The second refers to sale price, the amount of time required to sell a property, and the debt amount carried over that time (PSCW, 2000).

The Final EIS provides six general observations from the studies evaluated by its authors, including the following:

- A potential reduction in sale price for single family homes may range from 0 to 14 percent;
- Adverse effects on the sale price of smaller properties could be greater than effects on the sale price of larger properties;
- Other amenities, such as proximity to schools or jobs, lot size, square footage of a house, and neighborhood characteristics, often have a much greater effect on sale price than the presence of a power line;
- Adverse effects created by the presence of a power line appear to diminish over time;
- Effects on the sale price of property most often are observed for property crossed by or immediately adjacent to a power line. However, effects also have been observed for properties that are located farther away from the line; and
- The value of agricultural property is likely to decrease if the power line poles are placed in an area that inhibits farm operations (PSCW, 2000).

In addition, a number of other academic studies resulted in the conclusion that a negative impact on value diminished with the distance from the power lines and became negligible at a distance of 200 meters (656.2 feet) (Colwell, 1990) (Hamilton and Schwann, 1995). Furthermore, some studies show that personal perceptions are dependent on the size of the support structures and the voltage carried. For example, larger transmission lines are perceived to have a greater impact on property value than lower support structures and lower voltage lines (Hamilton and Schwann, 1995). A professional study of property sales in New England region found no evidence of systematic effects of either proximity or visibility of 345 kV on residential property values. The study found a slight negative effect due to encumbrance of the transmission line easement on adjoining properties (Chalmers, 2009).

Neither a survey of the perceptions of power lines nor an evaluation of impacts on property values has been conducted for the Socioeconomic Study Area. However, a survey of people's perceptions regarding power lines was performed in the Minnesota towns of Brooklyn Park and Maple Grove, located approximately 12 miles northwest of Minneapolis. The survey did not evaluate how the distance of the properties from the power lines, the size of the support structures or the voltage carried affect the purchasing decisions; it only evaluated the presence of high voltage power lines. Out of

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67 respondents, 33 respondents (49 percent) accounted for the presence of power lines when purchasing a house. Twelve buyers out of the 33 (36 percent) lowered their offering price as a result of the presence of power lines by an average of 4 percent. The remaining buyers who initially considered the power lines (64 percent) indicated that the presence of transmission lines ultimately had no impact on their decisions to purchase the properties (Mitteness, 1998).

Based upon the conclusions from the cited studies, the presence of power lines alone is not always indicative of a reduction in residential property value. Other factors and considerations, such as property type and condition, existing amenities, distance to, and the size of transmission lines are also present when buyers evaluate property. These conclusions suggest that the impacts on property values from overhead transmission lines would vary throughout the Socioeconomic Study Area.

Industrial Properties

Studies on the effects of transmission lines and substations on industrial property values are limited as compared to the availability of research on residential property values. Dean Chapman (2005), conducted surveys and interviews with industrial property owners in the southwest United States to determine impacts on industrial property values. He concluded that the sale price generally was not affected by the presence of transmission lines. Other factors, such as building size, ease of access, or number of loading docks was considered more important than the presence of transmission lines. However, one of the major considerations for the determination of industrial property value is whether an industrial property can provide the best use needed for the owner; for example, can the property accommodate a single building of a certain size? If the best use of the property was affected directly by the presence of transmission lines, the property value could be affected as well (Chapman, 2005).

Chapman (2005) also evaluated visual and health impacts from transmission lines on industrial properties. Interviews with property managers of business parks showed that there was no difference in rent between units facing high voltage transmission lines and those where the lines were hidden from view. Chapman did not record comments from interviews that suggested a lower rent or price due to health concerns.

General conclusions from research on housing developments can be applicable to industrial properties, as well. According to the available professional and academic research, the location and pace of development typically is affected by the availability of basic utility services. The supply of developable land is, in part, a function of the cost of providing utility services. For example, if an industrial property must supply its own electricity or other utility services, such as water and sewer, a greater up front development cost may be incurred, rather than creating a connection to existing lines.

However, the cost associated with the development of industrial properties also is dependent on other factors, such as market demand and location (Peiser, 1983).

5.4.1.3. Land-Based Economies

Land-based economy is any economy that uses or depends on the land as a resource. The Socioeconomic Study Area is predominantly residential and light industrial in nature and as such offers limited opportunities for land-based economies such as large scale mining, forestry (i.e., timber harvesting), and commercial agriculture. These land-based economies generally require extensive land availability and hence they are found in rural or open areas. The Socioeconomic Study Area does contain small scale agricultural plots in the form of community gardens. These gardens provide opportunities for local subsistence-based food production. Woody vegetation within the Socioeconomic Study Area forms an urban forest that provides direct economic benefits to city residents.

This discussion provides a description of the existing mining, community gardens and urban forestry activities within the Socioeconomic Study Area. It also includes a description of the potential direct and indirect effects that the transmission line route alternatives and substation alternatives would have on these resources.

Mining

There are no large-scale mining operations in the Socioeconomic Study Area and there are no active or inactive aggregate mining (mining of sand, gravel, and clay) pits in the Socioeconomic Study Area. The Socioeconomic Study Area is located within secondary sand and gravel deposits in the Richfield Terrace land form. Secondary source classification means that:

- less than 20 percent of the material is retained on a number 4 sieve; and/or
- the deposit is less than 20 feet thick; and/or
- overlying sediment is more than 10 feet (U of M, 1999).

Agricultural/Community Gardens

Community gardens within the Socioeconomic Study Area are used for food production, neighborhood beautification, youth programming, and education. There are over 100 community gardens in the Minneapolis-St. Paul metro area. Community gardens located in the vicinity of proposed routes include the following fourteen gardens (Gardening Matters, 2009):

- Prairie Oaks Community Garden is located at 2600 Oakland Ave, along Route B;
- 12th and 13th Avenue Block Club Garden is located at 2727 12th Avenue S, located approximately half a block north of the 28th Street portion of Routes B and C. The garden is tended by students from nearby school;
- Shalom Garden located is at 2819-23 15th Avenue S, just south of the 28th Street portion of Routes B and C;
- Walker Church Community Garden is located at 3104 16th Avenue S, along 31st Street portion of Route C. The garden also is used for youth programming, education, and beautification;
- Kaleidoscope Garden is located at 2504 Columbus Avenue South and is used for youth programming and individual plots;
- Hope Community Youth and Community Gardens is located at 2115 Portland Avenue South and is used for beautification and food production;
- Peaceful Patch is located at 2444 11th Avenue South and is used for beautification and individual plots;
- Midtown Greenway Rainwater Garden Project is located at East Phillips – 28th Street and the Midtown Greenway and is used for beautification;
- Youth Farm and Market Project is located in the Powderhorn Neighborhood at 32nd Street and Portland Avenue, NE Corner and is used for youth programming;
- Columbus Community Garden is located at 3300 Columbus Avenue South and is used for food production and individual plots;
- Artstop Garden is located at 32nd Street and Chicago Avenue, SE Corner and is used for beautification;
- Powderhorn Park East Community Garden is located at 3217 15th Avenue and is used for horticultural therapy, beautification, and food production;
- Minnehaha Avenue Community Garden is located at 3128 Minnehaha Avenue and is used for education, food production, and individual plots; and
- Seward Youth Peace Garden is located at 2309 28th Avenue South and is used for youth programming, food production, and food donation.

In addition, Urban Ventures Community Garden, a youth education garden, is adjacent to the southeast corner of the proposed Mt-28S substation. The garden engages neighborhood youth in food production and plant growth aimed to beautify the community. Additional information on community gardens is provided in Section 5.5, Environmental Justice.

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Forestry (Urban)

The term "urban forest" can be broadly applied to any kind of woody vegetation growing around human settlement, or it can be limited to remnants of wild ecosystems within a city. For the purpose of this document, "urban forest" is used to describe a collection of large woody vegetation growing in residential areas, actively managed through tree planting, pruning, and removal in order to benefit the community and prevent infrastructure damage.

The Minneapolis Park and Recreation Board Forestry Division is responsible for the care and management of all city-owned trees found in parks and boulevards (MPRB, 2009). Boulevards are defined by the City of Minneapolis Public Tree Policy as …"that part of all streets and avenues lying between the sidewalk and the property line and between the sidewalk and the roadway, excluding the curb" (City of Minneapolis, 2001). In Minneapolis, urban forest covers over 26 percent of the landscape, with 979,000 trees present in the city. Overall tree density in Minneapolis is equivalent to approximately 26.2 trees per acre, while the tree density in the Socioeconomic Study Area is approximately 29 trees per acre (USDA, 2006).

Urban forests provide a number of economic benefits for the various communities within the city. Trees increase property values, reduce energy used for heating and cooling, reduce stormwater runoff, absorb emissions, and sequester carbon.

Both individual landowners and neighborhoods experience direct economic benefits from energy savings attributed to the presence of urban forests. During the summer season, large trees, especially ones growing by west and south-facing sides of houses and businesses, provide shade and thus reduce the amount of energy needed to cool buildings. In addition to direct shade, trees cool entire neighborhoods by releasing moisture into the air and shading hard surfaces, like parking lots and streets, which retain heat generated by the sun. During the autumn and winter, trees help to buffer individual buildings against wind and the associated cooling effect.

Various economic benefits derived from urban forest in Minneapolis have been quantified and calculated to equal the following:

- $216,000/year in energy cost reduction;
- $16,000/year in avoided carbon emissions; and
- $756 million in structural values (USDA, 2006).

A recent study performed in California showed that trees can reduce a homeowner's summertime electric bill by about $25 a year (Donovan, 2009). Summertime savings in

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Minnesota are most likely less due to lower temperatures and a shorter duration of the summer season. Key findings from the California study are highlighted below.

- Shade trees affect summertime electricity use; but the amount of the savings depends on the location of the trees;
- Trees planted within 40 feet of the south side or within 60 feet of the west side of a house will generate a similar amount of energy savings, because of the way shadows fall at different times of the day;
- Tree cover on the east side of a house has no effect on electricity use; and
- A tree planted on the west side of a house can reduce net carbon emissions from summertime electricity use by 30 percent over a 100-year period.

5.4.2. Direct/Indirect Effects

This section provides a discussion of the potential effects of the five alternative routes and substation locations on socioeconomic resources. Both direct and indirect effects would be felt by the populations located along any of the proposed routes. Where information is available, specific details are provided for individual routes and the substations.

Potential direct and indirect effects include impacts to the following:

- Socioeconomic characteristics;
- Property values; and
- Land-based economies.

This discussion is divided into a discussion of potential impacts from transmission line route alternatives and substation alternatives.

5.4.2.1. Socioeconomic Characteristics

This section described the potential direct and indirect of the transmission line route and substation alternatives on socioeconomic characteristics.

Transmission Line Route Alternatives

The transmission line route alternatives consist of Routes A, B, C, D, and E2. Each of these routes would affect varying portions of the 11 neighborhoods within the Socioeconomic Study Area.

The effects to residents and visitors to these neighborhoods include impacts to the overall local economy and individual residences and businesses. While property values also would be impacted by the construction and operation of the Project, these effects are discussed separately in Section 5.4.2.2.

Local Economy

Effects to socioeconomic resources would be felt during construction and operation of the Project. The impacts associated with construction typically would be felt in the short-term, while those impacts occurring during operation likely would impact the long-term resources of the local neighborhoods.
During construction of the transmission line, approximately four to six workers would be required by the Applicant. These crews are expected to spend approximately 15 weeks constructing the transmission line (Xcel Energy, 2009). To the extent that local workers are used for portions of the construction, the total direct wages and salaries paid to these workers could contribute to the total personal income of the city of Minneapolis and possibly to the individual neighborhoods located within the Socioeconomic Study Area. However, this contribution would be negligible due to the small size of the crew to be used for construction.

Construction expenditures made for equipment, energy, fuel, and other needed products and services may benefit businesses in the city of Minneapolis and the larger region, including Hennepin County and the state of Minnesota. However, similar to the contribution of additional personal income, this impact would be negligible due to the small amount of expenditures. In general, transmission infrastructure improvements are paid for by the Applicant and the entire customer base and users of the transmission system (Xcel Energy, 2009). Through the circulation and recirculation of dollars paid out by the Applicant as business expenditures and taxes, additional personal income would be generated for residents in the city of Minneapolis and Hennepin County.

During construction, revenue likely would increase for some local businesses, such as restaurants, gas stations, and grocery stores, due to increased spending from workers associated with construction of the Project. However, this contribution would be negligible due to the small size of the construction work force.

Once in operation, the Project is expected to meet the growing energy demand within the city of Minneapolis. The residents and users within the Socioeconomic Study Area would be served by the electricity transmitted along the proposed lines (Xcel Energy, 2009). Therefore, during operation, increasing transmission capacity and reliability would be an economic benefit to the surrounding communities and businesses.

Additional capacity not only would provide electricity for economic growth from new or enlarged industry and businesses, it also would help to assure that income would not be lost as a result of potential brownouts or temporary losses of power from severe weather events. The availability of reliable power also could have a positive effect on the quality of services provided to the public. Minimal costs and activity are associated with the operation and maintenance of the transmission lines. If overhead routes are selected, annual maintenance and operating costs have averaged approximately $300 to $500 per mile of transmission ROW (Xcel Energy, 2009).

Furthermore, an increase to the local tax base would occur, resulting in an incremental increase in revenue from utility property taxes. Consequently, the addition of power facilities could have a long-term and positive economic effect to the Socioeconomic Study Area, although most likely minimal.

According to policies of the city of Minneapolis, each parcel of commercial, industrial, and utility property qualifies for the "Preferred" class rate. Only the value equal to the first-tier (first $150,000 of market) value of contiguous parcels, except those contiguous parcels held by the same owner, qualifies for the reduced class rate (City of Minneapolis, Assessor's Office, 2009).

In addition, according to Minnesota legislation, property owned by a private utility is subject to property tax, unless specifically exempted. Utilities are valued and assessed under a dual property tax system. In this system, the Department of Revenue values the property that constitutes the utility's operating property using the unit value system. The unit value is then apportioned among the jurisdictions where the property is located. The second includes the non-operating property, such as offices, garages, warehouses, and land (Minnesota House of Representatives, 2006).

As discussed, this Project would not directly impact the local economy and is not expected to have negative economic impacts during construction. Likewise, the operation and maintenance of the transmission line would not negatively impact the socioeconomic resources related to industry in the city of Minneapolis and in particular, the 11 neighborhoods contained within the Socioeconomic Study Area. Positive impacts associated with both construction and operation likely would be minimal.

Individual Residences and Businesses

The Project would not cause the displacement of any individuals from their homes or businesses where property or easement acquisition is necessary. Federal, state, and local regulations dictate property acquisition requirements.

For portions of the Project that would be constructed on public land, the Applicant would obtain all necessary approvals to construct the facilities. Where private land rights need to be acquired, the ROW acquisition process would begin early and typically would require easement rights across parcels to accommodate the facilities. A ROW representative would personally work with each of the property owners or their representatives. Therefore, affected landowners would be compensated for their property at fair market value or in some cases, other arrangements would be made (Xcel Energy, 2009).

Residents and local business owners and customers in the Socioeconomic Study Area primarily would be affected by temporary construction activities and permanent aesthetic changes. Potential effects associated with aesthetics are discussed in further detail in Section 5.8, Aesthetics.

Substation Alternatives

The Applicant indicated that two new electrical substations would be constructed to serve the electrical needs of the area. For the potential location of the substations, the Applicant sought to identify properties that were vacant and undeveloped. Six locations were determined as the potential sites for the substations. The following discussion provides a summary of the direct and indirect effects associated with each of the locations during construction and operation.

The Hiawatha West site is an open area owned by the Minnesota Department of Transportation (MnDOT). A light industrial warehouse is located to the east of this proposed site. During construction, similar effects as associated with the transmission line would be felt with regard to the local economy and individual residences and businesses. In this manner, the Project would contribute, although quite minimal, to the local economy through the expenditures of individual construction workers and the Applicant as a whole for the costs of equipment, energy, fuel, and other needed products and services. As previously indicated, a negligible increase in revenue for some local businesses, such as restaurants, gas stations, and grocery stores, would result due to increased spending from workers associated with construction of the substations. This type of spending likely would result in minimal, indirect positive economic effects for the local neighborhoods in the short-term.

During operation, the substation would help address the growing energy demand within the city of Minneapolis. As aforementioned, the residents and users within the Socioeconomic Study Area would be served by the electricity transmitted by this Project.

The Hiawatha East site is located in area currently occupied by a light industrial business, known as Crew. The minimal, positive effects associated with the construction and operation at this site would be the same as those experienced at the other possible substation locations (i.e., an increase in available energy supply). However, if this site is selected, the buildings associated with the company would need to be removed and the current business would need to be relocated. If this were to occur, both employee and client access may be impacted. For instance, employees who reach the site by public transit may have to alter their commuting patterns. In this case, some employees may not be able to continue their employment with the company, if it is relocated in an inaccessible location to the individuals. The customers also may have to adjust their visiting patterns to the warehouse. In addition, if the business were to relocate outside of the Socioeconomic Study Area, a potential loss in expenditures of the workers would be lost, as well as revenues to the local tax base. The business itself also could be impacted if its customers are based on its current location.

Similar to the previous two locations, the positive impacts associated with the construction and operation of the Project would be experienced at the Midtown North site. This property is located in an area currently occupied by a former substation, condemned triplex, and vacant land. If this site is selected, the buildings associated with the triplex would need to be removed. Unlike the Hiawatha East site, this would not result in a loss of business and may result in a positive impact associated with the clearance of a condemned structure. Furthermore, the addition of a built structure on the vacant land could contribute additional revenue to the local communities through additional taxes from the utility.

Both positive and negative impacts associated with the Project as a whole would be experienced at the Midtown South location. As discussed, the positive impacts would be the same as for the other alternatives. However, this area includes two properties currently owned and occupied by the Brown Campbell Enterprises. If these properties were selected, the existing buildings would need to be demolished, and the businesses would need to be relocated. Similar to the Crew business, employees and customers would be affected. As previously indicated, employees who reach the work site by public transit may have to alter their commuting patterns. If this were to occur, some employees may not be able to continue their employment with the Brown Campbell Enterprises. The customers also may have to adjust the type and amount of trips they take to reach the properties. This could result in the potential loss in expenditures contributed by workers at the business and revenues to the local tax base, as well as impact the business itself, especially if its customer base is dependent on the location.

The Mt-28N Substation is located north of 28th Street between Honeywell Plaza and I-35W. Currently, this location has landscaped areas and outbuildings to the southwest. The positive impacts would be the same as for the other alternatives. This site, however, currently is being used as a green space, owned by the Wells Fargo Home Mortgage company. If the substation were located within this property, the green space would no longer be accessible to Wells Fargo employees. While this does not represent a direct impact to the overall economic conditions within this area, the loss of green space may indirectly impact other businesses, which wish to purchase or rent property in the area. This type of land use provides a local amenity, as compared to the presence of a substation (see Section 5.2, Land Use).

The western half of the Wells Fargo Home Mortgage parking lot is located at 2840 4th Avenue. This site also is referred to as the Mt-28S Substation. As discussed, the positive impacts would be the same as for the other alternatives. The space currently is used for shuttle parking for the Children's hospital. The loss of this parking lot may impact employees and residents who use this facility. Their commuting patterns would have to be adapted in order to locate parking in other facilities. This would be an indirect impact, as convenient access to the institutions and businesses nearby may be affected. In addition, if revenue is generated by the use of this lot, this could be a loss to the owners or operators of the parking lot.

5.4.2.2. Property Values

The following sections identify the potential direct and indirect impacts to residential and industrial properties.

Residential Properties

The following discussion evaluates the direct and indirect effects of transmission lines on residential property values.

Residential land use is the predominant land use category within each of the neighborhoods in the Socioeconomic Study Area (see Section 5.2). The average residential property values for the properties within or directly adjacent to each of the routes is presented in Table 5.4-9.

Table 5.4-9: Average Residential Assessed Property Values

Average Property Value	Route A	Route B[1]	Route C	Route D	Route E
Average Total Value	$294,784	$235,723	$227, 280	$214,893	N/A
Average Total Value (excluding outliers)	N/A	$168,785	N/A	N/A	N/A

Notes: N/A = not applicable (no apparent outliers)
1. Route B has several outliers in the property value data because there are two large apartment complexes along the route (2700 and 2615 Park Avenue), which when included skew the data to present a higher property value.
Source: Xcel Energy, 2009

As shown in Table 5.4-9, the highest property values are located within the vicinity of Route A, which also is near the Midtown Greenway. The lowest property values are located within the vicinity of Route D, which primarily is located along 28th Street in the Phillips neighborhood.

Transmission lines would not directly impact the residential property values. However, the perceived value of a residential property in the Socioeconomic Study Area may decrease in response to one of the following indirect effects:

- Concern or fear of possible health effects from electric or magnetic fields (EMF);
- The potential noise and visual unattractiveness of the transmission line; and
- Potential interference with existing operations or foreclosure of present or future land uses.

Conversely, the perceived value of property could increase if:

- Increased local electrical reliability enhances opportunities for development of commercial or industrial interests.

The following provides a discussion of health and safety, aesthetic, land use, and development impacts that may affect residential property values.

Health and Safety

Potential safety and health impacts, as related to the Project, are identified and discussed in Section 5.6, Safety and Health. Concerns over possible health effects (e.g., exposure to Electric and Magnetic Fields) from transmission lines may influence buyers. Therefore, properties in the vicinity of transmission lines could have a smaller pool of potential buyers as compared to an equivalent property located elsewhere.

Another safety concern associated with transmission lines includes transmission line tower collapse, as discussed in Section 5.6, Safety and Health and 5.1, Proximity to Structures. Although the issue on its own does not directly impact property values, it may affect the availability of federal assistance mortgage loan insured by the Federal Housing Administration (FHA).

The FHA provides mortgage insurance to lenders with protection against losses as a result of homeowner defaults on mortgage loans. The mortgage loans must meet certain requirements established by the FHA to qualify for insurance (HUD, 2009). One of these requirements concerns health and safety related to a structural collapse of transmission towers.

FHA guidelines, as specified in the Housing and Urban Development (HUD) Handbook, prohibit mortgage support for homes in the fall zone of high voltage transmission towers or support structures. In order to determine the presence of this safety concern, the handbook specifies a set of guidelines to determine the danger. In this instance, the tower height is used as the fall distance, and transmission lines with a capacity of 12-60 kV or above are considered high voltage transmission lines (HUD, 2009).

The height of tower structures to be used for the Project varies depending on the route selected for construction and operation. Overhead tower structures for Route A and E include double circuit tangent structures and double circuit dead-end structures. Tangent structures proposed for Routes A and E2 have an average height of 75 feet, with maximum height reaching 110 feet. Dead-end structures have an average height of 80 feet and a maximum height of 115 feet. The average span length for both types is approximately 500 feet (Xcel Energy, 2009).

The majority of structures for Routes B and C would be single circuit tangent or dead-end structures. The proposed single circuit tangent structures have an average height of 75 feet, while the dead-end structures have an average height between 100 and 110 feet. The average span length for both types is approximately 500 feet (Xcel Energy, 2009).

Route D is not subject to these concerns, as the transmission line route would be placed underground.

As part of the FHA appraisal, the appraiser must indicate the following:

> *…whether the dwelling or related property improvements is located within the easement serving a high-voltage transmission line. If the property is located within such an easement, the DE (Direct Endorsement) Underwriter must obtain a letter from the owner or operator of the tower indicating that the dwelling and its related property improvements are not located within the tower's (engineered) fall distance in order to waive this requirement* (HUD, 2009).

In the past, the Applicant has provided the structure height to both HUD and/or the FHA, when information is requested.

Information on proximity to the tower structures and whether or not properties would be located within the fall distance of a tower structure is provided in Section 5.1, Proximity to Structures. These distances were based on the Applicant's preferred tower placement locations for the preferred transmission line alignments. However, alignments could be located anywhere within the selected route width.

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As part of the overall Project construction and operation, the poles and towers to be installed by the Applicant would be designed to meet or exceed the requirements of the National Electrical Safety Code (NESC) (Xcel Energy, Information Request, 2009).

Aesthetics

As discussed in Section 5.8, Aesthetics, the view of high voltage transmission lines is considered by many people to have a negative impact on the overall quality and feel of a community. Aesthetics associated with the visual appeal of the neighborhoods are impacted due to presence of poles, wires, and substations, and also due to removal or trimming of trees present along transmission lines.

The presence of trees on a property adds direct value to the property, partially due to the look of the property. Although some properties will be directly impacted by tree removal, the Applicant proposes to replace the impacted trees with more suitable tree or shrub species. The impacts of tree removal on property values, therefore, would be temporary and would diminish once trees are replaced.

Negative impacts to the overall quality and feel of a property also may reduce the property value, although through indirect means. As discussed previously, aesthetic consideration is just one of the factors affecting the perceived value of property. As shown in the survey performed in Minnesota towns, potential buyers considered the presence of transmission lines when purchasing a property. The degree to which the perception of the landscape and the value of the property are affected by the presence of transmission lines is dependent on the individual. People viewing the transmission lines as incompatible with their expected viewshed may not be willing to purchase a property in the vicinity of transmission lines. Therefore, the pool of potential buyers could be smaller for a property with a view of a high voltage transmission lines.

Visibility of substations from a residential property also could be perceived by some people as an aesthetically unpleasant view. The Midtown Substation would be a high profile substation and, depending on the final site selected, the substation could be visible from existing residential properties. Depending on the individual perceptions of industrial structures, some may perceive the view as unpleasant, and thus, the pool of potential buyers could be smaller for a property with a view of a substation.

Land Use

The transmission lines and substations are compatible with current and future land use in the Socioeconomic Study Area, as discussed in detail in Section 5.2, Land Use, as they do not limit or prohibit the existing and future land use within the Socioeconomic Study Area. New development, including infrastructure, is recognized in various county, city, and small area land use plans. Existing ROW would be utilized to the greatest possible extent to minimize indirect land use impacts.

Some ROW may be obtained from private land owners for the construction and operation of the Project. The need to obtain ROW from private land owners has been identified by the Applicant as a requirement for Route C. A decrease of useable lot space due to transmission line easement could have a negative effect on the value of the property. As mentioned before, exact locations for the transmission lines and support towers would not be determined until a route is selected. Therefore, a specific determination of impacted properties cannot be made.

The substation alternatives would be constructed in areas already zoned for light industrial use, and residential zoning would not likely be impacted. Since the substation would not change the overall land use of the area, property values should not be impacted by foreclosure of current or future residential land uses.

Development Opportunities

As discussed in Section 5.2, Land Use, the Project is located in neighborhoods included in empowerment zones. The goal of these zones is to improve the economic development by increasing the overall capacity for electricity and indirectly improving services for local businesses. A reliable energy supply could promote further economic development in the area. Proximity of vital businesses, shops, and restaurants could have a positive impact on property values.

As indicated in the land use discussion, some indirect impacts are associated with development opportunities; they primarily focus on visual intrusions and the overall perception of the infrastructure presence. Planned and proposed development would not be limited or prevented as a result of this Project. However, individuals may choose to alter their development plans based on the visual intrusion and negative perception associated with the presence of transmission lines and substations.

Industrial Properties

The following discussion evaluates the direct and indirect effects of the Project on industrial property values in the Socioeconomic Study Area. There would be no direct effects to industrial property values.

The Socioeconomic Study Area contains areas zoned for medium and light industrial use, as discussed in greater detail in Section 5.2, Land Use. The proposed substations would be located on properties zoned for light industrial use. Parcel descriptions and

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their market value, as obtained from data gathered by Hennepin County Taxpayer Services, is presented in Table 5.4-10.

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Table 5.4-10: Parcel Descriptions for Proposed Substation Sites

Proposed Substation	Parcel Address	Parcel Description	Owner	Area (Acres)	Property Value (Market Total)	Value per Acre[2]
Midtown North	2840 Oakland Ave S	Hobart's 2nd Addition to Minneapolis, Block #002, Lots 2-5 including block 2	NSP	0.51	467,800	917,300
	2833 Portland Ave S	Hobart's 2nd Addition to Minneapolis, Block #002, Lot #009	MT Smith & EM Zeliner (property is in condemned status)	0.13	261,000	2,007,700
	2841 Portland Ave S	Hobart's 2nd Addition to Minneapolis, Block #002, Lots 6-8 of block 2	Campbell Ent Non-MI Properties LLC	0.38	185,000	486,800
Midtown South	2907 Portland Ave S	Auditor's Subdivision No. 215, Lot #18	Campbell Ent Non-MI Properties LLC	0.93	605,900	651,500
	2915 Portland Ave S	McIntyre's Res Subdivision, Block #001, Lots 1, 2, 5, 6, including adjacent vacant alley	Campbell Ent Non-MI Properties LLC	0.48	550,000	1,145,800
Mt-28 N[1]	2701 Wells Fargo Way	Honeywell Plaza, Block #001,Lot #001	Norwest Mortgage Inc	15.87	57,500,000	3,623,200
Mt-28 S	2840 4th Ave S	Honeywell Plaza 2nd Addition, Block #002, Lot #001	Norwest Mortgage Inc	6.37	6,900,000	1,083,200
Hiawatha East	2650 Minnehaha Ave	Minnehaha Industrial Park Sixth Addition, Block #001, Lot #001	320 LLC	4.19	2,900,000	692,100
Hiawatha West	N/D	N/D	MnDOT	N/D	N/D	N/D
Hiawatha Proposed Expansion	2700 Minnehaha Ave	Minnehaha Industrial Park, Block #003, Lot #005	Primary Holdings LLC	3.3	2,756,500	835,300

1. Parcel exceeds substation footprint
2. Values have been rounded to the nearest $100.00.
N/D – No Data
Source: Hennepin County Property Locator, 2009. http://gis.co.hennepin.mn.us/HCPropertyMap
* Metes & Bonds

As indicated in Table 5.4-10, parcels for substations range in size and in assessed property value. Although the parcel for Mt-28N is the largest and most expensive, it exceeds the footprint of the proposed substation.

The property value for the Hiawatha West Substation was not available. Comparable property values within areas zoned as light industrial within Minneapolis have an approximate price of over $800,000 per acre of land. This price is an estimate based on advertised properties for sale located in light industrial zoned areas, rather than a true assessed value for the specific parcels.

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Indirect effects on industrial property due to possible health and safety, aesthetic, land use, and development impacts are discussed below.

Health and Safety

Potential safety and health impacts, as related to the Project, are identified and discussed in Section 5.6, Safety and Health. Similar to residential properties, the concern of potential safety and health impacts from transmission lines and substations also would exist for potential buyers of industrial properties. Therefore, properties in the vicinity of transmission lines could have a smaller pool of potential buyers as compared to an equivalent property located elsewhere.

Potential health and safety impacts from current soil and groundwater contamination may be present at some of the proposed sites, as discussed in Section 5.6, Safety and Health. If managed properly, cleanup and remediation activities could have a positive effect on the value of the impacted sites, as the removal of contaminants would eliminate future clean up costs, assuming no new releases are incurred.

Aesthetic

Aesthetic impacts do not appear to be of high priority for industrial properties, as the presence of transmission lines and substations are expected in industrial areas. As indicated in the research performed by Chapman (2005), other factors appear to be of greater importance than the overall aesthetics. The transmission lines and substations are consistent uses within an industrial landscape. Therefore, indirect impacts to industrial property values within the viewshed of the transmission lines should be minimal.

Land Use

The transmission lines and substations are compatible with current and future industrial land use in the Socioeconomic Study Area, as discussed in detail in Section 5.2, Land Use. Existing ROW would be utilized to the greatest possible extent to minimize land use impacts.

The proposed sites for the Hiawatha Substation are located in areas characterized by light industry, transportation, and commercial rail development. The proposed sites for Midtown Substation are located in areas zoned for light industrial use and surrounded by residential properties. Since the overall land use of the area would not change, property values should not be impacted.

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Development Opportunities

A reliable source of electric power could be an incentive to promote future development in the industrial areas of the city. If the demand for industrial properties in the Socioeconomic Study Area increases, the value of the properties could increase, as well. However, other factors such as market forces or availability of suitable land would likely impact development in the area more than the reliability of the source of power (which might already be assumed to exist regardless of the presence of the Project).
Land-Based Economies

5.4.2.3 Land-Based Economies

The following sections describe potential direct and indirect impacts to mining, community gardens, and forestry.

Mining

Because there are no large-scale mining operations and there are no active or inactive aggregate mining (mining of sand, gravel, and clay) pits in the Socioeconomic Study Area, no mining impacts would occur from the Project.

Agricultural/Community Gardens

The Project will not directly or indirectly impact community garden resources on a permanent basis. Construction activities in the vicinity of the gardens would create temporary negative impacts for the gardeners due to increased noise and dust levels in the area.

Forestry (Urban)

The construction of overhead transmission lines would require the removal or further trimming of a number of the trees found along the transmission line route alternatives. The number and type of trees impacted would depend on alternative selected, as discussed in Section 5.10, Flora. The number of trees impacted would range from two trees for Route A to 43 trees for Route D. Removed trees would be replaced with more suitable trees or shrubs (Xcel Energy, 2009).

Removal of trees for construction purposes would not impact economic benefits provided to the community from urban forests since only a small percentage of the total tree population would be altered. Depending on the size and location of the removed trees, as well as presence of additional trees, individual homeowners could experience increases in energy expenditures if shade-providing trees are eliminated. Houses along Route D, east of 10th Avenue, are most likely to be affected since 34 trees would be removed from the south-exposed side of the street (Xcel Energy, Information Requests, No. IR 17, 2009). Actual impacts would vary and also would depend on other individual building characteristics, such as house construction and insulation. Management of trees along the routes would create temporary beneficial economic impacts for urban foresters. Local urban foresters could be hired for tree removal prior to construction activities and replacement of impacted trees once the construction is complete.

5.4.3. Mitigation

This section identifies mitigation methods for the socioeconomic impacts identified above relating to the Project alternatives.

5.4.3.1. Socioeconomic Characteristics

Construction of the project would result in short-term positive economic impacts. In general, increasing transmission capacity and reliability would be an economic benefit to the surrounding communities and businesses. The Project would not directly impact the local economy and is not expected to have negative economic impacts; therefore, no corresponding mitigation measures appear to be warranted for any of the route alternatives.

5.4.3.2. Property Values

Residents and local business owners and customers could potentially be affected by possible safety and health impacts related to the construction and operation of the transmission lines and substations, proximity to overhead structures and aboveground substations, and temporary construction activities and permanent aesthetic changes. Mitigation measures to address these impacts are discussed in Section 5.1, Proximity to Structures; 5.6, Safety and Health; and 5.8, Aesthetics.

Additionally, the Project could be located along existing roadway and utility ROWs to reduce the potential impact to property values.

5.4.3.3. Land-Based Economies

No potential impacts to mining or permanent impacts to community gardens are identified; therefore, no corresponding mitigation measures appear to be warranted for any of the route alternatives.

To reduce the potential impacts to urban forestry resulting from home owners who experience increases in energy expenditures from the elimination of shade-providing trees, the Project could construct a route alternative that requires the minimal amount of tree removal. In addition, if the Project is located along an existing roadway and utility ROW, the Project would affect areas that already were disturbed from similar uses, and thus have less impact on urban forestry than the creation of new ROW. Further mitigation methods to address impacts to urban forestry are discussed in Section 5.10, Flora.

5.5. Environmental Justice

The Project Area is located in an urban residential area of south Minneapolis, Minnesota. Environmental Justice was identified as a potential issue of concern during the scoping process for the Project. As such, Environmental Justice was included within the scope of the Draft Environmental Impact Statement (EIS) (OES, 2009). Environment Justice issues are evaluated within this Draft EIS using the federal construct established under Executive Order 12898.

Executive Order 12898, which requires Federal Actions to address potential environmental justice impacts to minority and low-income populations, was signed by President Clinton on February 11, 1994. In response to this order, the responsible official must consider an action's potential for demographic, geographic, economic, and human health risk factors when conducting and documenting a National Environmental Policy Act (NEPA) related analysis. Each Federal agency, whenever practicable and appropriate, should collect, maintain, and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding Federal facilities. The directives from this order are addressed in the analysis of the affected environment, the direct and indirect effects of the potential routes and substations, and the mitigation measures.

Potential positive effects for populations in the Project Area are discussed in detail in Section 5.4, Socioeconomics. Once in operation, the Project is expected to meet the growing energy demand within the city of Minneapolis. The residents and users within the Project Area would be served by the electricity transmitted along the proposed lines (Xcel Energy, 2009). Therefore, during operation, increasing transmission capacity and reliability would be an economic benefit to the surrounding communities and businesses.

Information for the state, county, and city was derived from the USCB data from the 2000 decennial census. Data for the individual neighborhoods was derived from the Hennepin County Children, Family and Adult Services (CFAS) (2002); the City of Minneapolis Planning Department, Research and Strategic Planning Division (RSPD) (2001); and the city of Minneapolis, Community Planning and Economic Development Department (CPED) (2005).

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For this analysis, a disproportionately high and adverse effect on minority and low income populations means an adverse effect, which "…1) is predominately borne by a minority population and/or a low income population, or 2) will be suffered by the minority population and/or low income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low income population" (USDOT, 1997).

In order to determine whether an individual neighborhood contained a disproportionately greater minority, low-income, or Limited English Proficiency (LEP) population, this analysis consists of a comparison of the combined and individual neighborhood data and census tracts to the state of Minnesota. One method of comparison is to determine whether one or both of the following two criteria is met:

1. The low-income or minority population of a census tract, neighborhood, or the Project Area exceeds 50 percent overall; and/or

2. The low-income or minority population percentage of the environmental impact area is significantly greater (typically at least 20 percentage points) than the low-income or minority population percentage in the geographic area chosen for comparative analysis (in this case the state).

The state was selected for comparison in order to provide a lower threshold thereby not underestimating the potential for impacts. As such, Hennepin County and the city of Minneapolis data is provided only as additional information within each of the tables presented in this analysis.

5.5.1. Affected Environment

This discussion provides a demographic overview and a description of the existing minority populations, poverty and low-income populations, and groups with LEP within the affected environment. A brief discussion also is provided to address subsistence uses.

For the purposes of this analysis, the affected environment includes the Environmental Justice Study Area, defined as the 11 neighborhoods in which the transmission line route alternatives and substation alternatives are located. Locations of the neighborhoods are shown on Figure 5.4-1. As previously indicated, this discussion draws upon information found in the 2000 Census and information obtained from Hennepin County and the city of Minneapolis, regarding individual neighborhoods.

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5.5.1.1. Demographic Overview

This analysis considers the degree to which there may be disproportionate adverse environmental and human health impacts to low-income and minority populations. It involves comparing the minority, low income, and LEP populations in the area affected by the Project to the state of Minnesota.

As previously indicated, the Environmental Justice Study Area contains the 11 neighborhoods within the city of Minneapolis that could be affected by the Project and were discussed in part within the Applicant's permit application. The Environmental Justice Study Area includes the Cedar Riverside, Central, Corcoran, Elliot Park, Longfellow, Loring Park, Phillips, Powderhorn Park, Seward, Stevens Square-Loring Heights, and Whittier neighborhoods.

Each of these neighborhoods is either crossed by the transmission line route alternatives or substation alternatives or is on the border of one of these neighborhoods. The comparison includes evaluating this Environmental Justice Study Area with the state of Minnesota; additional information is provided for Hennepin County and the city of Minneapolis, as well. Where available, additional details are provided for census tracts intersected by the transmission line route alternatives.

Table 5.5-1 provides information about the total population, the percentage of the population that identifies as a minority, the percentage of the population that identifies as Caucasian, the per capita income, and the percentage of the total population that is below the poverty level.

Table 5.5-1: Population and Economic Characteristics

Location	Population	Minority Population	Caucasian Population	Per Capita Income	Percentage of Population Below Poverty Level
State of Minnesota	4,919,479	10.6%	89.4%	$23,198	7.9%
Hennepin County	1,116,200	19.5%	80.5%	$28,789	8.3%
City of Minneapolis	382,618	34.9%	65.1%	$22,685	16.9%
Cedar Riverside Neighborhood	7,545	57.9%	42.1%	$10,400	32.1%
Central Neighborhood	8,150	74.3%	25.7%	$11,400	29.6%
Corcoran Neighborhood	4,228	47.1%	52.9%	$15,700	15. 0%
Elliot Park Neighborhood	6,476	48.1%	51.9%	$12,600	28.7%

Location	Population	Minority Population	Caucasian Population	Per Capita Income	Percentage of Population Below Poverty Level
Longfellow Neighborhood	4,972	28.7%	71.3%	$19,100	9.5%
Loring Park Neighborhood	7,501	19.0%	81.0%	$37,000	16.5%
Phillips Neighborhood	19,805	68.4%	31.6%	$10,200	32.8%
Powderhorn Park Neighborhood	8,957	50.1%	49.9%	$15,300	21.4%
Seward Neighborhood	7,174	34.9%	65.1%	$19,200	18.3%
Stevens Square-Loring Heights Neighborhood	3,948	33.9%	66.1%	$20,500	20.8%
Whittier Neighborhood	15,247	46.5%	53.5%	$16,600	21.3%

Sources: City of Minneapolis CPED, 2005 and Xcel Energy, 2009.

As shown in Table 5.5-1, the total population for the Environmental Justice Study Area is 94,003 people. The Environmental Justice Study Area comprises 24.6 percent of the total population of the city of Minneapolis, 8.4 percent of the total population of Hennepin County, and 1.9 percent of the total population of the state of Minnesota.

5.5.1.2. Minority Populations

Table 5.5-2 provides a summary of the total population and minority population within the Environmental Justice Study Area, as compared to the state of Minnesota, Hennepin County, and the city of Minneapolis.

Table 5.5-2: Minority Populations within the Environmental Justice Study Area, City, County, and State, 2000

	Total Population	Total Caucasian Population	Percent of Population	Total Minority Population	Percent of Population
Minnesota	4,919,479	4,400,282	89.4%	519,197	10.6%
Hennepin County	1,116,200	898,921	80.5%	217,279	19.5%
City of Minneapolis	382,618	249,186	65.1%	133,432	34.9%
Environmental Justice Study Area	94,003	46,657	49.6%	47,346	50.4%

Sources: City of Minneapolis RSPD, 2001a-k and USCB, 2000 a, e, and i.

As indicated, 50.4 percent of the Environmental Justice Study Area residents were members of a racial minority in 2000. Minorities constituted a larger percentage of the population (50.4 percent) within the Environmental Justice Study Area as compared to the other geographic areas, while the Caucasian population was the largest group within the state (89.4 percent), the county (80.5 percent), and the city (65.1 percent). As indicated in Table 5.5-2, the percentage of the minority population within the Environmental Justice Study Area exceeded 50 percent and exceeds the state percentage by over 20 percentage points.

Table 5.5-3 provides a more detailed breakdown of the minority and non-minority populations within the Environmental Justice Study Area and the larger geographic areas.

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Table 5.5-3: Racial Characteristics of the State, County, City, and Neighborhoods, 2000

Minority Populations	State of Minnesota		Hennepin County		City of Minneapolis	
	Number	Percent	Number	Percent	Number	Percent
Total Population	4,919,479	100.0%	1,116,200	100.0%	382,618	100.0%
One Race	4,836,737	98.3%	1,087,159	97.4%	365,924	95.6%
Caucasian	4,400,282	89.4%	898,921	80.5%	249,186	65.1%
African-American	171,731	3.5%	99,943	9.0%	68,818	18.0%
Native American & Alaska Native	54,967	1.1%	11,163	1.0%	8,378	2.2%
Asian, Native Hawaiian & Other Pacific Islander	143,947	2.9%	54,086	4.8%	23,744	6.2%
Other	65,810	1.3%	23,046	2.1%	15,798	4.1%
Two or More Races	82,742	1.7%	29,041	2.6%	16,694	4.4%
Hispanic or Latino Ethnic Origin	143,382	2.9%	45,439	4.1%	29,175	7.6%

Minority Populations	Cedar Riverside Neighborhood		Central Neighborhood		Corcoran Neighborhood		Elliot Park Neighborhood		Longfellow Neighborhood		Loring Park Neighborhood		Phillips Neighborhood		Powderhorn Park Neighborhood		Seward Neighborhood		Stevens Square-Loring Heights Neighborhood		Whittier Neighborhood	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total Population	7,545	100.0%	8,150	100.0%	4,228	100.0%	6,476	100.0%	4,972	100.0%	7,501	100.0%	19,805	100.0%	8,957	100.0%	7,174	100.0%	3,948	100.0%	15,247	100.0%
One Race	7,145	94.7%	7,499	92.0%	3,932	93.0%	6,008	92.8%	4,735	95.2%	7,305	97.4%	18,012	90.9%	8,419	94.0%	6,688	93.2%	3,700	93.7%	14,364	94.2%
Caucasian	3,174	42.1%	2,096	25.7%	2,235	52.9%	3,361	51.9%	3,545	71.3%	6,076	81.0%	6,258	31.6%	4,467	49.9%	4,673	65.1%	2,611	66.1%	8,161	53.5%
African-American	2,428	32.2%	3,306	40.6%	672	15.9%	2,037	31.5%	528	10.6%	727	9.7%	5,825	29.4%	1,987	22.2%	1,441	20.1%	687	17.4%	3,044	20.0%
Native American & Alaska Native	67	0.9%	199	2.4%	195	4.6%	182	2.8%	200	4.0%	61	0.8%	2,352	11.9%	477	5.3%	153	2.1%	73	1.8%	328	2.2%
Asian, Native Hawaiian & Other Pacific Islander	1,190	15.8%	746	9.2%	191	4.5%	215	3.3%	168	3.4%	284	3.8%	1,216	6.1%	454	5.1%	305	4.3%	116	2.9%	841	5.5%
Other	286	3.8%	1,152	14.1%	639	15.1%	213	3.3%	294	5.9%	157	2.1%	2,361	11.9%	1,034	11.5%	116	1.6%	213	5.4%	1,990	13.1%
Two or More Races	400	5.3%	651	8.0%	296	7.0%	468	7.2%	237	4.8%	196	2.6%	1,793	9.1%	538	6.0%	486	6.8%	248	6.3%	883	5.8%
Hispanic or Latino Ethnic Origin	426	5.6%	1,899	23.3%	897	21.2%	500	7.7%	483	9.7%	380	5.1%	4,385	22.1%	1,971	22.0%	213	3.0%	456	11.6%	3,299	21.6%

Sources: City of Minneapolis RSPD, 2001a-k and USCB, 2000a, e, and i.

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As shown in Table 5.5-3, the following neighborhoods have a minority population that exceeds 50 percent: Cedar Riverside, Central, Phillips, and Powderhorn Park. In addition, all of the neighborhoods exceed the state percentage by 20 percentage points except the Longfellow and Loring Park neighborhoods.

In addition, as indicated in Table 5.5.-3, African Americans comprise the largest percentage of the minority population in all of the geographic areas, including the Environmental Justice Study Area (24.1 percent). The second largest minority group within the Environmental Justice Study Area includes those persons who identified themselves as being "other." Individuals of an "other" race included 9.0 percent of the total population within the Environmental Justice Study Area. Within each of the larger geographic areas, however, this population comprised less than 5.0 percent of the total population.

In the 2000 USCB, "Hispanic" is an ethnic classification rather than a racial one. The terminology used for this analysis is the same as that defined by the USCB. Therefore, individuals, identifying themselves as "of Hispanic origin," accounted for approximately 15.9 percent of the total population in the Environmental Justice Study Area and less than 10.0 percent of the population in the state, county, and city.

5.5.1.3. Poverty and Low-Income Concentrations

The number of individuals within the Environmental Justice Study Area who are below the poverty level is shown in Table 5.5-4.[6]

[6] For references to the Phillips neighborhood in Section 5.5.1.3, figures for the median household income and the per capita income do not account for Ventura Village. The total numbers of individuals living below the poverty line were added together and were based on information provided in the city of Minneapolis CPED (2005) data.

Table 5.5-4: Number of Individuals Living Below the Poverty Level within the Environmental Justice Study Area

	Number of Individuals	Total Population	Percent of Total Neighborhood Population Below the Poverty Level
Cedar Riverside Neighborhood	2,420	7,545	32.1%
Central Neighborhood	2,415	8,150	29.6%
Corcoran Neighborhood	635	4,228	15.0%
Elliot Park Neighborhood	1,860	6,476	28.7%
Longfellow Neighborhood	470	4,972	9.5%
Loring Park Neighborhood	1,240	7,501	16.5%
Phillips Neighborhood	6,495	19,805	32.8%
Powderhorn Park Neighborhood	1,915	8,957	21.4%
Seward Neighborhood	1,310	7,174	18.3%
Stevens Square-Loring Heights Neighborhood	820	3,948	20.8%
Whittier Neighborhood	3,245	15,247	21.3%
Total	22,825	94,003	24.3%

Source: City of Minneapolis CPED, 2005

Based upon the 2000 census data, approximately 24.3 percent of the Environmental Justice Study Area was comprised of low income individuals. In comparison, 7.9 percent of the state of Minnesota's population was below the poverty level, 8.3 percent of Hennepin County's, and 16.9 percent of the city of Minneapolis' (USCB, 2000c, g, and k) (Table 5.5-4).

As shown in Table 5.5-5, the percentage of the population living below the poverty level within the Environmental Justice Study Area as a whole neither exceeds 50 percent nor is greater than 20 percentage points above the state percentage. Moreover, none of the individual neighborhoods exceed 50 percent. However, four neighborhoods exceed the state percentage by 20 percentage points.

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Table 5.5-5: Number and Percent of Individuals Living Below the Poverty Level in the Environmental Justice Study Area, State, County, and City

Characteristic	Environmental Justice Study Area	State of Minnesota	Hennepin County	City of Minneapolis
Number of Persons Below Poverty Level	22,825	380,476	90,384	62,092
Percent of Persons Below Poverty Level	24.3%	7.9%	8.3%	16.9%

Notes: Phillips data and Ventura Village were added together for the number of individuals living below the poverty level.
Sources: City of Minneapolis CPED, 2005; and USCB, 2000c, g, and k.

In addition to the poverty level, the median household income and per capita income provide a measure of the economic position of a community. As shown in Table 5.5-6, the median household and per capita income for the state of Minnesota was greater than each of the neighborhoods.

Table 5.5-6: Median Household and Per Capita Income in the Environmental Justice Study Area, State, County, and City

Characteristic	Environmental Justice Study Area	State of Minnesota	Hennepin County	City of Minneapolis
Median Household Income	$14,367 - $34,985	$47,111	$51,711	$37,974
Per Capita Income	$10,200-$37,000	$23,198	$28,789	$22,685

Sources: City of Minneapolis CPED, 2005; Hennepin County CFAS, 2002; and USCB, 2000c, g, and k.

As shown in Table 5.5-6, the median household income for Hennepin County was the highest, while the Environmental Justice Study Area had the lowest. The same was true for the per capita income levels, excluding the Loring Park Neighborhood ($37,000).

5.5.1.4. Limited English Proficiency

Limited English Proficiency (LEP) populations also were identified using data from the 2000 Census. For the portion of the population that was five years old and older, persons who spoke English “not well” or “not at all” were considered to have LEP.

Table 5.5-7 shows the LEP characteristics of the state, county, and city. Information was not available at the overall neighborhood level.

Table 5.5-7: Limited English Proficiency in the Environmental Justice Study Area, State, County, and City

Characteristic	Environmental Justice Study Area	State of Minnesota	Hennepin County	City of Minneapolis
Total Population 5 years and above	n/a	4,591,491	1,043,809	357,867
Individuals who speak English less than "very well"	n/a	167,511	64,156	37,693
Percentage of Individuals who speak English less than "very well"	n/a	3.6%	6.1%	10.5%

Notes: n/a = not available
Sources: USCB, 2000b, f, and j.

As shown in this table, the percentage of individuals who speak English less than "very well" within the city of Minneapolis was greater than that for the state of Minnesota and Hennepin County.

5.5.1.5. Subsistence

As part of the Environmental Justice analysis, according to Executive Order 12898, Federal agencies, whenever practicable and appropriate, should collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence, in order to assist in identifying the need for ensuring protection of populations with differential patterns of subsistence consumption of fish, wildlife, and plants, vegetation, and berries.

Subsistence activities may include hunting, fishing, gathering, and gardening. This section provides a brief description of relevant regulations and activities conducted within the city of Minneapolis. Data was not available at the neighborhood level for all of these activities.

Hunting

Hunting does not occur within the city of Minneapolis because the discharge of firearms within the city boundaries is prohibited for the general public. The proper use of firearms is documented in the Minneapolis Code of Ordinances, Chapter 393. Weapons and in Chapter 267. Amusements (City of Minneapolis, 1990). Neither of these chapters allows the use of weapons in public areas or private areas outside these regulations.

Fishing

Fishing within the city of Minneapolis is regulated by the following provision in Chapter 2 of the Minneapolis Code of Ordinances:

> *PB2-22. Fishing. No person shall fish in any city lake other than those authorized to be open for fishing by the park and recreation board and approved by the state department of natural resources.* (Code 1960, As Amend., § 1010.330; City of Minneapolis, 1990).

In addition, no fishing activities occur within the Environmental Justice Study Area due to the lack of available waterways.

The closest lake to the Environmental Justice Study Area is located in Powderhorn Park. This lake is part of the municipal park and is approximately 0.2 miles south of East 31st Street. The Minneapolis Park and Recreation Board does not recognize this municipal lake for fishing resources (MPRB, n.d.).

Aquatic resources are discussed in Section 5.11, Fauna. This discussion identifies aquatic resources within the vicinity of the Environmental Justice Study Area, approximately within a 1 mile buffer. No direct or indirect effects to the aquatic resources are anticipated due to the construction and operation of the transmission line and substations that would deter fishing activities.

Gathering

Gathering also is regulated by the municipal code. According to Chapter 2 of the city ordinances, no one is allowed to:

> *"…pick or cut any wild or cultivated flower, or cut, break or in any way injure or deface any tree, shrub, or plant within the limits of any park or parkway; nor carry within or out of any park or parkway any wild flower, tree, shrub, plant or any newly plucked branch or portion thereof, or any soil or material of any kind"* (Code 1960, As Amend., § 1010.030; City of Minneapolis, 1990).

As shown by this regulation, gathering is not allowed on public lands. Activities occurring on private lands, however, are difficult to consider within this evaluation due to the lack of existing information on this type of activity. Based on available information, no known gathering activities used for subsistence occur within the Environmental Justice Study Area.

Gardening
Individual and community gardens are located within the Environmental Justice Study Area. These resources may be used by individuals and families to supplement individual diets. Community gardens are located in the following locations; the purpose of each garden is listed, as well:

- Prairie Oaks Community Garden – 2600 Oakland Avenue, Food Production;
- Kaleidoscope Garden – 2504 Columbus Avenue South, Youth Programming and Individual Plots;
- Hope Community Youth and Community Gardens – 2115 Portland Avenue South- Beautification and Food Production;
- Peaceful Patch – 2444 11th Avenue South, Beautification and Individual Plots;
- 12th and 13th Avenue Block Club Garden, Food Production, Youth Programming, and Individual Plots;
- Shalom Garden – 2819-23 15th Avenue South, Food Production and Individual Plots;
- Midtown Greenway Rainwater Garden Project – East Phillips – 28th Street and the Midtown Greenway, Beautification;
- Youth Farm and Market Project – Powderhorn Neighborhood – 32nd Street and Portland Avenue, NE Corner, Youth Programming;
- Columbus Community Garden – 3300 Columbus Avenue South, Food Production and Individual Plots;
- Artstop Garden – 32nd Street and Chicago Avenue, SE Corner, Beautification;
- Powderhorn Park East Community Garden – 3217 15th Avenue, Horticultural Therapy, Beautification, and Food Production;
- Walker Church Community Garden – 3104 16th Avenue South, Your Programming, Horticultural Therapy, Beautification, Education, Food Production, and Individual Plots;
- Minnehana Avenue Community Garden – 3128 Minnehaha Avenue, Education, Food Production, and Individual Plots; and
- Seward Youth Peace Garden – 2309 28th Avenue South, Youth Programming, Food Production, and Food Donation (Gardening Matters, 2009).

Community gardens are a permitted use in all zoning districts (subject to the specific development standards) apart from the B4-Downtown Business District and the I3-General Industrial district (City of Minneapolis DHFS, 2009). Additional information regarding gardening habits and activities was not readily available.

5.5.2. Direct/Indirect Effects

This section provides a description of the potential effects of Routes A, B, C, D, E2, and the substation alternatives. The individual routes are discussed as they pertain to minority concentrations and poverty and low income concentrations. Data was not available for the LEP population at the neighborhood level; however, information is provided for the individual census tracts that intersect with each individual route alignment.

These discussions are followed by a comparison of the alternatives. The comparison of the alternatives provides a discussion of temporary and permanent impacts on minority, low income, and LEP populations within the Environmental Justice Study Area.

Potential effects to environmental justice include the following:

- Displacement of homes and businesses;
- Loss of scenic resources;
- Loss of economic resources;
- Impacts to food resources used by those on subsistence diets; and
- Impacts to health.

In general, these effects are similar for all transmission line route alternatives and substation alternatives, unless otherwise noted.
Once in operation, the Project is expected to meet the growing energy demand within the city of Minneapolis. The residents and users within the Environmental Justice Study Area would be served by the electricity transmitted along the proposed lines (Xcel Energy, 2009). Therefore, during operation, increasing transmission capacity and reliability would be an economic benefit to the surrounding communities and businesses. Additional capacity not only would provide electricity for economic growth from new or enlarged industry and businesses, it also would help to assure that income would not be lost as a result of potential brownouts or temporary losses of power from severe weather events. The availability of reliable power also could have a positive effect on the quality of services provided to the public. This potential positive effect on the community is discussed in Section 5.4, Socioeconomics.

5.5.2.1. Transmission Line Route Alternatives

Each of the transmission line route alternatives passes through at minimum two neighborhoods. These neighborhoods are comprised of a number of census tracts, ranging from four to 15 individual census tracts. Table 5.5-8 provides the total population within a route alternative based on the individual census tracts. Table 5.4-2,

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Population within 500 Feet of the Transmission Line Routes, provides the total population within each individual census tract.

The census tract information is incorporated into this discussion to provide additional detail regarding the individual transmission line route alternatives. Census tracts are defined as small statistical subdivisions of a county.

Table 5.5-8: Population by Route

Route	Total Number of Persons within Route
Route A	8,005
Route B	15,055
Route C	25,716
Route D	25,716
Route E2	39,467

Sources: USCB, 2000m and p.

Route A

Route A begins on the west end at the proposed Midtown Substation (Midtown North location) and ends on the east end of the Hiawatha Substation (Hiawatha West location). It primarily travels along 29th Street within the Phillips neighborhood. It crosses into the Longfellow neighborhood on the western end once crossing Hiawatha Avenue.

The discussion that follows includes a description of the minority concentrations and low-income groups contained within these two neighborhoods, as well as the four census tracts through which the alternative crosses. LEP populations are discussed per census tract data.

Minority Concentrations

Table 5.5-9 shows the percentage of minority persons in each neighborhood through which Route A passes. Of the two neighborhoods that intersect with the alignment of Route A, one has a minority population that exceeds 50 percent, and it also exceeds the state level by 20 percentage points.

Table 5.5-9: Route A - Minority Persons by Neighborhood

Geographic Location	Percent Minority	Greater than 50%	Greater than State (10.6%)	Greater than County (19.5%)	Greater than City (34.9%)
Minnesota	10.6%	No	Not applicable	No	No

Geographic Location	Percent Minority	Greater than 50%	Greater than State (10.6%)	Greater than County (19.5%)	Greater than City (34.9%)
Hennepin County	19.5%	No	Yes	Not applicable	No
City of Minneapolis	34.9%	No	Yes	Yes	Not applicable
Longfellow Neighborhood	28.7%	No	Yes	Yes	No
Phillips Neighborhood	68.4%	Yes	Yes	Yes	Yes

Source: Xcel Energy, 2009.

Table 5.5-10 shows the percentage of minority persons in each census tract through which Route A passes. Of the four census tracts that intersect with the alignment of Route A, one has a minority population that is less than 50 percent, while the three remaining census tracts exceed this percentage. In addition, all of the census tracts have minority populations that are greater than the state. Only census tract 107500 has a minority population that does not exceed the state level by over 20 percentage points.

Table 5.5-10: Route A - Minority Persons by Census Tract

Route	Census Tract	Population	Minority Population	Percentage of Population	Greater than 50%	Greater than State (10.6%)	Greater than County (19.5%)	Greater than City (34.9%)
Route A	107500	2,019	367	18.2%	No	Yes	No	No
	7302	2,332	1,616	69.3%	Yes	Yes	Yes	Yes
	7900	1,604	1,092	68.1%	Yes	Yes	Yes	Yes
	7802	2,050	1,279	62.4%	Yes	Yes	Yes	Yes
	Total Population	**8,005**	**4,354**	**54.4%**	Yes	Yes	Yes	Yes

Source: USCB, 2000m.

Poverty and Low-Income Concentrations

Table 5.5-11 shows the percentage of the population below the poverty level for each of the neighborhoods within Route A, as well as the state, county, and city percentages. Of the two neighborhoods that would be intersected by Route A, neither has more than 50 percent of its population living below the poverty level (Table 5.5-11). Both neighborhoods have greater percentages of their population living below the poverty level than the state. Only the Phillips neighborhood has poverty levels exceeding the state levels by greater than 20 percentage points.

Table 5.5-11: Route A - Poverty Level by Neighborhood

Geographic Location	Percentage of Population Below Poverty Level	Greater than 50%	Greater than State (7.9%)	Greater than County (8.3%)	Greater than City (16.9%)
Minnesota	7.9%	No	Not applicable	No	No
Hennepin County	8.3%	No	Yes	Not applicable	No
City of Minneapolis	16.9%	No	Yes	Yes	Not applicable
Phillips Neighborhood	32.8%	No	Yes	Yes	Yes
Longfellow Neighborhood	9.5%	No	Yes	Yes	No

Source: Xcel Energy, 2009.

Of the four census tracts that would be intersected by Route A, none of the tracts has 50 percent or more of its population living below the poverty level (Table 5.5-12). All of the census tracts have greater percentages of their population living below the poverty level than in the state. However, census tracts 7900 and 7802 exceed the state level by over 20 percentage points.

Table 5.5-12: Route A - Poverty Level by Census Tract

Route	Census Tract	Population for Whom Poverty Status is Determined	Income in 1999 Below Poverty Level	Percentage of Population Below Poverty Level	Greater than 50%	Greater than State (7.9%)	Greater than County (8.3%)	Greater than City (16.9%)
Route A	107500	2,020	223	11.0%	No	Yes	Yes	No
	7302	2,394	643	26.9%	No	Yes	Yes	Yes
	7900	1,513	436	28.8%	No	Yes	Yes	Yes
	7802	2,044	625	30.6%	No	Yes	Yes	Yes
	Total Population	7,971	1,927	24.2%	No	Yes	Yes	Yes

Source: USCB, 2000n.

LEP Populations

As shown in Table 5.5-13, the four census tracts that would be intersected by Route A each has a greater percentage of their populations who speak English less than "very well," which is greater than the state percentage. None of the census tracts exceed 50 percent. However, three of the four census tracts have percentages of their population that speak English less than "very well" that exceed the state level by over 20 percentage points.

Table 5.5-13 Route A – English Proficiency by Census Tract

Route	Census Tract	Total Population 5 years and above	Individuals who speak English less than "very well"	Percentage of Individuals who speak English less than "very well"	Greater than 50%	Greater than State (3.6%)	Greater than County (6.1%)	Greater than City (10.5%)
Route A	107500	1,885	76	4.0%	No	Yes	No	No
	7302	2,156	587	27.2%	No	Yes	Yes	Yes
	7900	1,456	463	31.8%	No	Yes	Yes	Yes
	7802	1,863	572	30.7%	No	Yes	Yes	Yes
	Total Population	7,360	1,698	23.1%	No	Yes	Yes	Yes

Source: USCB, 2000o.

Route B

The transmission line for Route B would be placed between the Hiawatha West and the Midtown North substations. It primarily travels along 26th and 28th Streets within the Phillips neighborhood. It crosses into the Longfellow neighborhood on the western end once crossing Hiawatha Avenue.

As such, the same conclusions regarding the minority and low income populations would be reached as those neighborhoods found for Route A (see Tables 5.5-9 and 5.5-11). Additional detail regarding Route B is provided for the individual census tracts that the route intersects.

Minority Concentrations

Table 5.5-14 provides the number of individuals who identify as minorities and a comparison to the percentage of the state of Minnesota, Hennepin County, and the city of Minneapolis. Of the seven census tracts that intersect with the alignment of Route B, one has a minority population that is less than 50 percent, while the six remaining census tracts exceed this percentage. In addition, all of the census tracts have minority populations that are greater than the state. Six census tracts also have minority populations that are over 20 percentage points greater than the state percentage.

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Table 5.5-14: Route B - Minority Persons by Census Tract

Route	Census Tract	Number of Persons within Tract	Minority Population	Percent	Greater than 50%	Greater than State (10.6%)	Greater than County (19.5%)	Greater than City (34.9%)
Route B	107500	2,019	367	18.2%	No	Yes	No	No
	7302	2,332	1,616	69.3%	Yes	Yes	Yes	Yes
	7301	1,815	1,556	85.7%	Yes	Yes	Yes	Yes
	107200	2,514	1,736	69.1%	Yes	Yes	Yes	Yes
	107100	2,721	1,602	58.9%	Yes	Yes	Yes	Yes
	7802	2,050	1,279	62.4%	Yes	Yes	Yes	Yes
	7900	1,604	1,092	68.1%	Yes	Yes	Yes	Yes
	Total Population	**15,055**	**9,248**	**61.4%**	Yes	Yes	Yes	Yes

Source: USCB, 2000m.

Poverty and Low-Income Concentrations

As shown in Table 5.5-15, of the seven census tracts that would be intersected by Route B, none has more than 50 percent of its population living below the poverty level. All of the census tracts have greater percentages of their populations living below the poverty level than in the state. Four census tracts exceed the state level by over 20 percentage points.

Table 5.5-15: Route B – Poverty Level by Census Tract

Route	Census Tract	Population for Whom Poverty Status is Determined	Income in 1999 Below Poverty Level	Percent	Greater than 50%	Greater than State (7.9%)	Greater than County (8.3%)	Greater than City (16.9%)
Route B	107500	2,020	223	11.0%	No	Yes	Yes	No
	7302	2,394	643	26.9%	No	Yes	Yes	Yes
	7301	1,721	731	42.5%	No	Yes	Yes	Yes
	107200	2,340	639	27.3%	No	Yes	Yes	Yes
	107100	2,270	897	39.5%	No	Yes	Yes	Yes
	7802	2,044	625	30.6%	No	Yes	Yes	Yes
	7900	1,513	436	28.8%	No	Yes	Yes	Yes
	Total Population	14,302	4,194	29.3%	No	Yes	Yes	Yes

Source: USCB, 2000n.

LEP Populations

Table 5.5-16 provides information regarding the level of English proficiency for the census tracts intersected by the alignment of Route B. None of the census tracts exceed 50 percent. All of the census tracts, however, exceed the percentage of the state of Minnesota. Four of the census tracts exceed this percentage by over 20 percentage points.

Table 5.5-16: Route B - English Proficiency by Census Tract

Route	Census Tract	Total Population 5 years and above	Individuals who speak English less than "very well"	Percentage of Individuals who speak English less than "very well"	Greater than 50%	Greater than State (3.6%)	Greater than County (6.1%)	Greater than City (10.5%)
Route B	107500	1,885	76	4.0%	No	Yes	No	No
	7302	2,156	587	27.2%	No	Yes	Yes	Yes
	7301	1,513	280	18.5%	No	Yes	Yes	Yes
	107200	2,209	481	21.8%	No	Yes	Yes	Yes
	107100	2,363	560	23.7%	No	Yes	Yes	Yes
	7802	1,863	572	30.7%	No	Yes	Yes	Yes
	7900	1,456	463	31.8%	No	Yes	Yes	Yes
	Total Population	13,445	3,019	22.5%	No	Yes	Yes	Yes

Source: USCB, 2000o.

Route C

Route C includes two single circuit transmission line routes from the proposed Hiawatha and Midtown substations. The first line segment would be located along 28th Street in the Phillips and Longfellow neighborhoods, and the second line segment would be located along 31st Street in the Central, Powderhorn Park, and Corcoran neighborhoods.

The discussion that follows includes a description of the minority concentrations and low-income groups contained within these five neighborhoods and the nine census tracts through which the alternative route crosses. The LEP populations within each of the census tracts are compared to the larger geographic regions.

Minority Concentrations

Table 5.5-17 shows the percentage of minority persons in each neighborhood through which Route C passes. Of the five neighborhoods that intersect with the alignment of Route C, three neighborhoods have minority populations that exceed 50 percent, and four that exceed the state level by 20 percentage points.

Table 5.5-17: Route C - Minority Persons by Neighborhood

Geographic Location	Percent Minority	Greater than 50%	Greater than State (10.6%)	Greater than County (19.5%)	Greater than City (34.9%)
Minnesota	10.6%	No	Not applicable	No	No
Hennepin County	19.5%	No	Yes	Not applicable	No
City of Minneapolis	34.9%	No	Yes	Yes	Not applicable
Central Neighborhood	74.3%	Yes	Yes	Yes	Yes
Corcoran Neighborhood	47.1%	No	Yes	Yes	Yes
Longfellow Neighborhood	28.7%	No	Yes	Yes	No
Phillips Neighborhood	68.4%	Yes	Yes	Yes	Yes
Powderhorn Park Neighborhood	50.1%	Yes	Yes	Yes	Yes

Source: Xcel Energy, 2009.

Table 5.5-18 shows the percentage of minority persons in each census tract through which Route C passes. Of the nine census tracts that intersect with the alignment of Route C, six census tracts have minority populations that exceed 50 percent. These same six census tracts, plus two additional tracts, also exceed the state level by 20 percentage points.

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Table 5.5-18: Route C - Minority Persons by Census Tract

Route	Census Tract	Number of Persons within Tract	Minority Population	Percent	Greater than 50%	Greater than State (10.6%)	Greater than County (19.5%)	Greater than City (34.9%)
Route C	107500	2,019	367	18.2%	No	Yes	No	No
	7302	2,332	1,616	69.3%	Yes	Yes	Yes	Yes
	7900	1,604	1,092	68.1%	Yes	Yes	Yes	Yes
	7802	2,050	1,279	62.4%	Yes	Yes	Yes	Yes
	8400	2,760	1,829	66.3%	Yes	Yes	Yes	Yes
	8500	4,501	2,455	54.5%	Yes	Yes	Yes	Yes
	108600	3,087	1,702	55.1%	Yes	Yes	Yes	Yes
	108700	3,550	1,309	36.9%	No	Yes	Yes	Yes
	108800	3,813	1,314	34.5%	No	Yes	Yes	No
	Total Population	**25,716**	**12,963**	**50.4%**	Yes	Yes	Yes	Yes

Source: USCB, 2000m.

Poverty and Low-Income Concentrations

The percentage of the population below the poverty level is shown in Table 5.5-19. This table provides information for the state, county, and city, as well as the individual neighborhoods, which are intersected by the alignment of Route C. As shown in this table, none of the five neighborhoods have 50 percent or more of their populations living below the poverty level (Table 5.5-19). All of the neighborhoods have greater percentages of their populations living below the poverty level than for the state. Two of the census tracts exceed the state level by over 20 percentage points.

Table 5.5-19: Route C - Poverty Level by Neighborhood

Geographic Location	Percentage of Population Below Poverty Level	Greater than 50%	Greater than State (7.9%)	Greater than County (8.3%)	Greater than City (16.9%)
Minnesota	7.9%	No	Not applicable	No	No
Hennepin County	8.3%	No	Yes	Not applicable	No
City of Minneapolis	16.9%	No	Yes	Yes	Not applicable
Central Neighborhood	29.6%	No	Yes	Yes	Yes
Corcoran Neighborhood	15.0%	No	Yes	Yes	No
Longfellow Neighborhood	9.5%	No	Yes	Yes	No
Phillips Neighborhood	32.8%	No	Yes	Yes	Yes
Powderhorn Park Neighborhood	21.4%	No	Yes	Yes	Yes

Source: Xcel Energy, 2009.

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In addition to the neighborhood level information, the percentage of the population living below the poverty level is provided by census tract in Table 5.5-20. None of the nine census tracts has a percentage of the population living below the poverty level that is greater than 50 percent (Table 5.5-20). All of the census tracts have greater percentages of their population living below the poverty level than the state. Two of the census tracts have percentages that exceed the state percentage by over 20 points.

Table 5.5-20: Route C - Poverty Level by Census Tract

Route	Census Tract	Population for Whom Poverty Status is Determined	Income in 1999 Below Poverty Level	Percent	Greater than 50%	Greater than State (7.9%)	Greater than County (8.3%)	Greater than City (16.9%)
Route C	107500	2,020	223	11.0%	No	Yes	Yes	No
	7302	2,394	643	26.9%	No	Yes	Yes	Yes
	7900	1,513	436	28.8%	No	Yes	Yes	Yes
	7802	2,044	625	30.6%	No	Yes	Yes	Yes
	8400	2,762	748	27.1%	No	Yes	Yes	Yes
	8500	4,416	1,169	26.5%	No	Yes	Yes	Yes
	108600	3,073	487	15.8%	No	Yes	Yes	No
	108700	3,360	498	14.8%	No	Yes	Yes	No
	108800	3,810	483	12.7%	No	Yes	Yes	No
	Total Population	25,392	5,312	20.9%	No	Yes	Yes	Yes

Source: USCB, 2000n.

LEP Populations

As indicated in Table 5.5-21, nine census tracts are intersected by the alignment for Route C. None of the census tracts have a percentage that exceeds 50 percent. All of the census tracts within Route C's alignment have LEP population percentages that exceed that of the state. Four of the census tracts have LEP population percentages that exceed the state level by over 20 percentage points.

Table 5.5-21: Route C - English Proficiency by Census Tract

Route	Census Tract	Total Population 5 years and above	Individuals who speak English less than "very well"	Percentage of Individuals who speak English less than "very well"	Greater than 50%	Greater than State (3.6%)	Greater than County (6.1%)	Greater than City (10.5%)
Route C	107500	1,885	76	4.0%	No	Yes	No	No
	7302	2,156	587	27.2%	No	Yes	Yes	Yes
	7900	1,456	463	31.8%	No	Yes	Yes	Yes
	7802	1,863	572	30.7%	No	Yes	Yes	Yes
	8400	2,550	519	20.4%	No	Yes	Yes	Yes
	8500	4,075	988	24.2%	No	Yes	Yes	Yes
	108600	2,843	638	22.4%	No	Yes	Yes	Yes
	108700	3,314	545	16.4%	No	Yes	Yes	Yes
	108800	3,632	413	11.4%	No	Yes	Yes	Yes
	Total Population	23,774	4,801	20.2%	No	Yes	Yes	Yes

Source: USCB, 2000o.

Route D

Route D would be constructed as an underground route between the Hiawatha West and Midtown North substations. This route primarily is located along 28th Street, with a portion on Oakland Avenue; this route is located within the Phillips and Longfellow neighborhoods. As previously indicated, these are the same neighborhoods as discussed with regard to Route A (see Tables 5.5-9 and 5.5-11).

While Route D crosses the same neighborhoods as Route A, one additional census tract is crossed by this route: tract 107400. Table 5.5-22 provides the number of individuals who identify themselves as minorities within each of the census tracts and a comparison to the percentage of the state of Minnesota, Hennepin County, and the city of Minneapolis.

Minority Concentrations

Table 5.5-22 provides the percentage of minority populations within each census tract that intersects with the alignment of Route D. All of the census tracts exceed the state percentage of minority persons. Of the five census tracts that intersect with the alignment of Route D, three census tracts also have minority population percentages that exceed 50 percent. In addition, four census tracts have a minority population percentage that exceeds the state level by 20 percentage points.

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Table 5.5-22: Route D – Minority Persons by Census Tract

Route	Census Tract	Number of Persons within Tract	Minority Population	Percent	Greater than 50%	Greater than State (10.6%)	Greater than County (19.5%)	Greater than City (34.9%)
Route D	107400	1,713	625	36.5%	No	Yes	Yes	Yes
	107500	2,019	367	18.2%	No	Yes	No	No
	7302	2,332	1,616	69.3%	Yes	Yes	Yes	Yes
	7900	1,604	1,092	68.1%	Yes	Yes	Yes	Yes
	7802	2,050	1,279	62.4%	Yes	Yes	Yes	Yes
	Total Population	**9,718**	**4,979**	**51.2%**	Yes	Yes	Yes	Yes

Source: USCB, 2000m.

Poverty and Low-Income Concentrations

As indicated in Table 5.5-23, none of the five census tracts has a percentage of the population living below the poverty level that exceeds 50 percent. All of the neighborhoods have greater percentages of their population living below the poverty level than the state. Census tracts 7802 and 7900 also exceed the state level by over 20 percentage points.

Table 5.5-23: Route D - Poverty Level by Census Tract

Route	Census Tract	Population for Whom Poverty Status is Determined	Income in 1999 Below Poverty Level	Percent	Greater than 50%	Greater than State (7.9%)	Greater than County (8.3%)	Greater than City (16.9%)
Route D	107400	1,723	190	11.0%	No	Yes	Yes	No
	107500	2,020	223	11.0%	No	Yes	Yes	No
	7302	2,394	643	26.9%	No	Yes	Yes	Yes
	7900	1,513	436	28.8%	No	Yes	Yes	Yes
	7802	2,044	625	30.6%	No	Yes	Yes	Yes
	Total Population	9,694	2,117	21.8%	No	Yes	Yes	Yes

Source: USCB, 2000n.

LEP Populations

Route D intersects with five census tracts. None of the census tracts contain a LEP population that is greater than 50 percent (Table 5.5-24). Three of the census tracts have a LEP population percentage that exceeds the state level by 20 percentage points.

Table 5.5-24: Route D - English Proficiency by Census Tract

Route	Census Tract	Total Population 5 years and above	Individuals who speak English less than "very well"	Percentage of Individuals who speak English less than "very well"	Greater than 50%	Greater than State (3.6%)	Greater than County (6.1%)	Greater than City (10.5%)
Route D	107400	1,652	152	9.2%	No	Yes	Yes	No
	107500	1,885	76	4.0%	No	Yes	No	No
	7302	2,156	587	27.2%	No	Yes	Yes	Yes
	7900	1,456	463	31.8%	No	Yes	Yes	Yes
	7802	1,863	572	30.7%	No	Yes	Yes	Yes
	Total Population	9,012	1,850	20.5%	No	Yes	Yes	Yes

Source: USCB, 2000o.

Route E2

Route E2 would travel east of I-35W from just south of West 28th Street. It then crosses I-35W at West 26th Street. It follows this roadway and then turns east on East 18th Street. This roadway is followed until turning south onto Ogema Place. The route follows this roadway on the western side of Hiawatha Avenue until just north of West 28th Street.

The discussion that follows includes a description of the minority concentrations and low-income groups contained within these seven neighborhoods and the 13 census tracts through which the alternative route crosses. The LEP populations within each of the census tracts are compared to the larger geographic regions.

Minority Concentrations

Table 5.5-25 shows the percentage of minority persons in each neighborhood through which Route E2 passes. Two neighborhoods have minority populations that exceed 50 percent within the alignment of Route E2. Both of these neighborhoods, Cedar Riverside and Phillips, also exceed the state level by 20 percentage points. Four other neighborhoods also exceed the state level by over 20 percentage points.

Table 5.5-25: Route E2- Minority Persons by Neighborhood

Geographic Location	Percent Minority	Greater than 50%	Greater than State (10.6%)	Greater than County (19.5%)	Greater than City (34.9%)
Minnesota	10.6%	No	Not applicable	No	No
Hennepin County	19.5%	No	Yes	Not applicable	No
City of Minneapolis	34.9%	No	Yes	Yes	Not applicable
Cedar Riverside Neighborhood	57.9%	Yes	Yes	Yes	Yes
Elliot Park Neighborhood	48.1%	No	Yes	Yes	Yes
Longfellow Neighborhood	28.7%	No	Yes	Yes	No
Phillips Neighborhood	68.4%	Yes	Yes	Yes	Yes
Seward Neighborhood	34.9%	No	Yes	Yes	No
Stevens Square-Loring Heights Neighborhood	33.9%	No	Yes	Yes	No
Whittier Neighborhood	46.5%	No	Yes	Yes	Yes

Sources: City of Minneapolis CPED, 2005 and Xcel Energy, 2009.

The percentage of minority persons in each census tract through which Route E2 passes is provided in Table 5.5-26. Nine census tracts have minority populations that exceed 50 percent. Twelve of the census tracts exceed the state level by 20 percentage points.

Table 5.5-26: Route E2 - Minority Persons by Census Tract

Route	Census Tract	Number of Persons within Tract	Minority Population	Percent	Greater than 50%	Greater than State (10.6%)	Greater than County (19.5%)	Greater than City (34.9%)
Route E2	107500	2,019	367	18.2%	No	Yes	No	No
	7302	2,332	1,616	69.3%	Yes	Yes	Yes	Yes
	7301	1,815	1,556	85.7%	Yes	Yes	Yes	Yes
	106200	3,356	1,565	46.6%	No	Yes	Yes	Yes
	106000	3,462	2,356	68.1%	Yes	Yes	Yes	Yes
	104800	7,534	4,370	58.0%	Yes	Yes	Yes	Yes
	5901	3,060	1,621	53.0%	Yes	Yes	Yes	Yes
	5902	3,307	2,310	69.9%	Yes	Yes	Yes	Yes
	105700	2,877	1,086	37.7%	No	Yes	Yes	Yes
	107100	2,721	1,602	58.9%	Yes	Yes	Yes	Yes
	106900	3,121	1,223	39.2%	No	Yes	Yes	Yes
	7801	1,813	1,149	63.4%	Yes	Yes	Yes	Yes
	7802	2,050	1,279	62.4%	Yes	Yes	Yes	Yes
	Total Population	**39,467**	**22,100**	**56.0%**	Yes	Yes	Yes	Yes

Sources: City of Minneapolis CPED, 2005 and USCB, 2000m and p.

Poverty and Low-Income Concentrations

None of the seven neighborhoods has more than 50 percent of the population living below the poverty level. All of the neighborhoods have greater percentages of their populations living below the poverty level than for the state. Three of the neighborhoods have populations living below the poverty level that exceed the state level by over 20 percentage points.

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Table 5.5-27: Route E2- Poverty Level by Neighborhood

Geographic Location	Percentage of Population Below Poverty Level	Greater than 50%	Greater than State (7.9%)	Greater than County (8.3%)	Greater than City (16.9%)
Minnesota	7.9%	No	Not applicable	No	No
Hennepin County	8.3%	No	Yes	Not applicable	No
City of Minneapolis	16.9%	No	Yes	Yes	Not applicable
Cedar Riverside Neighborhood	32.1%	No	Yes	Yes	Yes
Elliot Park Neighborhood	28.7%	No	Yes	Yes	Yes
Longfellow Neighborhood	9.5%	No	Yes	Yes	No
Phillips Neighborhood	32.8%	No	Yes	Yes	Yes
Seward Neighborhood	18.3%	No	Yes	Yes	Yes
Stevens Square-Loring Heights Neighborhood	20.8%	No	Yes	Yes	Yes
Whittier Neighborhood	21.3%	No	Yes	Yes	Yes

Sources: City of Minneapolis CPED, 2005 and Xcel Energy, 2009.

As shown in Table 5.5-28, none of the 13 census tracts have more than 50 percent of their populations living below the poverty level. All of the census tracts have greater percentages of their population living below the poverty level than for the state. Eight of the census tracts have percentages of their populations living below the poverty level that exceed the state level by over 20 percentage points.

Table 5.5-28: Route E2 - Poverty Level by Census Tract

Route	Census Tract	Population for Whom Poverty Status is Determined	Income in 1999 Below Poverty Level	Percent	Greater than 50%	Greater than State (7.9%)	Greater than County (8.3%)	Greater than City (16.9%)
Route E2	107500	2,020	223	11.0%	No	Yes	Yes	No
	7302	2,394	643	26.9%	No	Yes	Yes	Yes
	7301	1,721	731	42.5%	No	Yes	Yes	Yes
	106200	3,356	782	23.3%	No	Yes	Yes	Yes
	106000	3,440	1,170	34.0%	No	Yes	Yes	Yes
	104800	5,764	2,419	42.0%	No	Yes	Yes	Yes
	5901	2,850	1,033	36.2%	No	Yes	Yes	Yes
	5902	3,218	1,353	42.0%	No	Yes	Yes	Yes
	105700	2,842	699	24.6%	No	Yes	Yes	Yes
	107100	2,270	897	39.5%	No	Yes	Yes	Yes
	106900	2,662	582	21.9%	No	Yes	Yes	Yes
	7801	1,717	531	30.9%	No	Yes	Yes	Yes
	7802	2,044	625	30.6%	No	Yes	Yes	Yes
	Total Population	**36,298**	**11,688**	**32.2%**	Yes	Yes	Yes	Yes

Sources: USCB, 2000n and r.

LEP Populations

Table 5.5-29 provides information for individuals who speak English less than "very well" within the census tracts intersected by Route E2. Of these tracts, none have a population of individuals who speak English less than "very well" that exceeds 50 percent. All of the census tracts within this route's alignment have LEP population percentages that exceed that of the state. Six of the census tracts have LEP population percentages that exceed the state level by over 20 percentage points.

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Table 5.5-29: Route E2 - English Proficiency by Census Tract

Route	Census Tract	Total Population 5 years and above	Individuals who speak English less than "very well"	Percentage of Individuals who speak English less than "very well"	Greater than 50%	Greater than State (3.6%)	Greater than County (6.1%)	Greater than City (10.5%)
Route E2	107500	1,885	76	4.0%	No	Yes	No	No
	7302	2,156	587	27.2%	No	Yes	Yes	Yes
	7301	1,513	280	18.5%	No	Yes	Yes	Yes
	106200	3,203	656	20.5%	No	Yes	Yes	Yes
	106000	3,199	861	26.9%	No	Yes	Yes	Yes
	104800	7,096	2,430	34.2%	No	Yes	Yes	Yes
	5901	2,863	459	16.0%	No	Yes	Yes	Yes
	5902	3,048	1,152	37.8%	No	Yes	Yes	Yes
	105700	2,779	550	19.8%	No	Yes	Yes	Yes
	107100	2,363	560	23.7%	No	Yes	Yes	Yes
	106900	3,038	683	22.5%	No	Yes	Yes	Yes
	7801	1,621	367	22.6%	No	Yes	Yes	Yes
	7802	1,863	572	30.7%	No	Yes	Yes	Yes
	Total Population	**36,627**	**9,233**	**25.2%**	No	Yes	Yes	Yes

Sources: USCB, 2000o and q.

5.5.2.2. Substation Alternatives

All proposed substation are located within the Phillips (those located on the western end of the transmission line) or Longfellow (those located on the eastern end of the transmission line) neighborhoods.

Tables 5.5-9 and 5.5-11 provide an overview of the Phillips and Longfellow neighborhoods. As previously indicated, the Phillips neighborhood contains a greater percentage of minority populations than the state. In addition, this neighborhood has a minority population that exceeds 50 percent and that is over 20 percentage points greater than the state level. While the percentage of its population living below the poverty level does not exceed 50 percent, it does exceed the state level by over 20 percentage points.

The Longfellow neighborhood contains a greater percentage of minority populations than the state. The same is true for its population living below the poverty level. However, neither the percentage of minority populations nor the percentage of people living below the poverty level exceeds 50 percent. Furthermore, these percentages do not exceed the state level by over 20 percentage points.

Data at the neighborhood level is not provided for LEP populations.

5.5.2.3. Comparison of Alternatives

Table 5.5-30 summarizes and compares the overall percentages of minority and low income populations affected by each of the route and substation alternatives. As shown by this table, all of the transmission line route alternatives and substation alternatives have the potential to impact minority and low income populations.

Routes A, B, and D have the potential to affect slightly more individuals that are minority populations or that are living below the poverty level than Routes C and E2. The Midtown Mt-28N and Mt-28S Substation alternatives would affect a greater percentage of the minority populations and low income populations than the Hiawatha Substation alternatives. As previously indicated, information was not available on the neighborhood level for LEP population data.

Table 5.5-30: Summary of Affected Environmental Justice Communities

Route/Substations	Minority Population (%)[1]	Low-Income Population (%)[1]	LEP Population (%)[2]
A	60.4%	28.1%	23.1%
B	60.4%	28.1%	22.5%
C	59.7%	25.9%	20.2%
D	60.4%	28.1%	20.5%
E2	51.2%	25.5%	25.2%
Hiawatha East Substation	28.7%	9.5%	n/a
Hiawatha West Substation	28.7%	9.5%	n/a
Midtown North Substation	68.4%	32.8%	n/a
Midtown South Substation	68.4%	32.8%	n/a
Substation Mt-28N	68.4%	32.8%	n/a
Substation Mt-28S	68.4%	32.8%	n/a

Notes: 1. Based on neighborhood populations.
2. Based on census tracts.
Sources: City of Minneapolis RSPD, 2001a-k.

Displacement of Homes and Businesses

The Applicants have followed the state of Minnesota's policy of non-proliferation of infrastructure corridors, which established a strong preference for locating new transmission line facilities along existing public rights-of-way (ROWs), including transmission line and transportation ROWs (Xcel Energy, 2009). Federal, state, and local regulations dictate property acquisition requirements and require that affected landowners be compensated for their property at fair market value or another amenable arrangement.

For the construction of the transmission line facilities, the Project would not cause the displacement of any individuals from their homes or businesses where property or easement acquisition is necessary. The transmission line routes primarily would be located within existing ROW.

However, since all of the transmission line route alternatives are located in areas where the minority population exceeds 50 percent and the percentage of low income populations generally exceed the state level by 20 percentage points (i.e., Routes A, B, and D), these groups would be affected more often than other non-minority and non-low income property owners. While the process for all affected property owners would involve the same procedure, undue burdens may be placed on minority and low income populations, as the properties that they own may be utilized more often than the properties owned by other populations (Xcel Energy, 2009).

The construction and operation of the substations also may impact local businesses. For the Hiawatha East Substation, the Crew business would need to be relocated, and the removal of buildings would be required. This business operates as a carpet cleaning and home services company. It is family owned and has locations throughout the Midwest (Crew2, 2007).

The relocation of this business may affect individuals employed at this location, as well as customers and the business operations. If individuals, for instance, rely on public transit for access to the company, they may not be able to continue to work for the company, if the new location does not allow for the same services and hours of employment. Information, however, was not available to determine if these employees are minority or low-income individuals. Customers for the business also may be impacted if their selection of these services was based on the location, ease of accessing the retail component of the business, or their decision to deal with a local business. In addition, this business may be reliant on the local clientele within the nearby neighborhoods. Moving the location may affect their existing client base.

The Midtown North Substation also would require the removal of buildings, including a condemned triplex. This removal, however, would not affect existing residences or businesses since it is unoccupied. The presence of this structure, however, is within the Phillips neighborhood, which has a minority population of 68.4 percent and a low income population of 32.8 percent. This places a use typically deemed as undesirable within this community. The presence of the substation may affect potential businesses, which view this as an intrusion, from locating in the Phillips neighborhood.

The Midtown South Substation would require that existing buildings be demolished and the business of Brown Campbell Enterprises to be relocated. This business provides the shipment and fabrication of specialty steel and fiberglass products. This

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business has eight local service centers, two sales offices, and a headquarters building (Brown Campbell Enterprises, 2009).

The Midtown South Substation would create the same types of impacts associated with the Hiawatha East Substation and the Midtown North Substation. Employees and customers may be reliant on the location of the Brown Campbell Enterprises. Moving this company may impact the employees' and customers' ability to travel to work or to conduct business.

Aesthetics and Quality of Life

Residents in the Environmental Justice Study Area primarily would be affected by temporary construction and permanent aesthetic changes, such as but not limited to a loss of scenic resources. Both the construction and operation of the transmission lines and substations are considered to result in a disproportionate adverse impact because the proposed locations are within areas that are predominately home to minority and low income populations.

Inconveniences related to access and mobility may occur along the streets and properties in which construction would take place; these effects would be temporary and would last only as long as construction. In addition, dust and noise would be present, along with visual intrusions as a result of construction activities and equipment.

These effects are not typically associated with residential and recreational uses. While all users of these areas would be affected in the same manner, the area primarily is home to minority and low income populations as shown within this evaluation. Therefore, members of these population groups are more susceptible to these impacts.

More permanent impacts also are associated with the operation of the transmission lines and substations. For example, Route A is located along the Midtown Greenway, an aesthetically pleasing multi-modal path, used by residents through the city of Minneapolis. The overhead design option would interfere with the visual nature of this path by contributing to overhead clutter. The residents of these neighborhoods would have more frequent interactions with this setting than those living outside of the Phillips neighborhood, through which most of this route crosses.

In addition, the proposed Mt-28N Substation is to be located within an area currently used as a private green space on the Wells Fargo campus within the Phillips neighborhood. The substation would require the removal of the green space, which would directly impact the users.

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Additional discussion of the aesthetic impacts is provided in Section 5.2, Land Use and Section 5.8, Aesthetics.

Economic and Employment Effects

Depending on how the costs of a specific mitigation are allocated, the proposed activities are not expected to result in an economic hardship, such as an increase in taxes, which is disproportionate to minority or low income populations. If approved, the Project may increase the amount of tax revenue available to Hennepin County and the city of Minneapolis. The Project also could provide increased indirect employment opportunities as public services in these neighborhoods improve.

If the transmission line is placed underground, the impacts of the incremental increase in Project cost will vary depending upon how the costs are allocated among ratepayers.

In August of 2009, the Commission requested the Applicant provide an estimate of the monthly surcharges associated with allocating the incremental costs of undergrounding the transmission line to a variety of customer bases including the city of Minneapolis, Hennepin County, the Applicant's entire Minnesota service territory, and an additional subset of customers considered appropriate by the Applicant. Estimated monthly surcharges associated with allocating the incremental costs of undergrounding the transmission line to the customer base is discussed in Section 1.8, Introduction.

The Project would have a long-term positive impact by providing a more reliable electrical system. Residents not only within the Environmental Justice Study Area, but also within the city of Minneapolis would benefit from the increased voltage support and transmission reliability provided by the proposed the transmission line.

While improvements to the overall capacity may assist in attracting new businesses to the area, some business developers may perceive the presence of the transmission lines and substations as a disadvantage. Therefore, the opportunities for new businesses to locate within the neighborhoods affected by this Project may be impacted.

For example, four Midtown locations are provided as alternatives for the substations. These include the Midtown North and Midtown South Substations, which are located near the Midtown Greenway. These properties contain existing structures, while the Midtown South Substation also is the location of the Brown Campbell Enterprises. The Mt-28N Substation is located north of 28th Street between Honeywell Plaza and I-35W. Currently, this location has landscaped areas and outbuildings to the southwest. The Mt-28S Substation would be located in the western half of the Wells Fargo Home Mortgage parking lot, located at 2840 4th Avenue. The space currently is used for shuttle parking for the Children's hospital.

The proposed locations of these substations are within the Phillips neighborhood, which has a minority population of 68.4 percent and a low income population of 32.8 percent. The construction and operation of these substations allows for a use typically deemed as undesirable. The presence of these substations in any of the four locations may affect potential businesses, which view the substations as a visual intrusion, from locating in the Phillips neighborhood. In addition, as previously indicated, if a current business is located within the area, employees and customers may be impacted due to limitations on access.

Subsistence

The transmission line route alternatives and substation alternatives would not impact food resources used by those conducting subsistence hunting, fishing, and gathering activities. As previously indicated, hunting is not permissible within the city of Minneapolis. Fishing also is allowed only in certain areas recognized for this purpose; these resources are not located within the Environmental Justice Study Area. Furthermore, gathering activities are not allowed on public property.

Private and community gardens should not be impacted since these gardens are not located within existing ROW or on the properties proposed for the substation alternatives.

Health

Provided that no spills or leaks occur from construction equipment and that contaminated soil and/or groundwater is not encountered or mobilized during construction, none of the alternatives are expected to produce adverse health and safety impacts to the local population, and in particular, minority and low income populations.

Potential safety and health impacts, as related to the Project, are identified and discussed in Section 5.6, Safety and Health.

5.5.3. Mitigation

The following discussion summarizes the mitigation measures that could be implemented to reduce the potential effects from construction equipment and activities and the operation of the transmission lines and substations.

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5.5.3.1. Displacement of Homes and Businesses

While no individual homes would be displaced by this Project, businesses may be relocated due to the construction of the substations. The Applicant has stated that they plan to work with landowners subject to displacement and provide just compensation for the property and all required relocation benefits (Xcel Energy, 2009).

5.5.3.2. Aesthetics

The Applicants could work with landowners to identify aesthetic concerns and would attempt to minimize visual impacts related to the Project. In addition, the Applicant could re-locate the existing distribution lines along the 29th Street corridor and place them underground if the Route A overhead design were selected. If either Routes B or C were to be selected, the Applicant could remove select distribution structures along the selected route and support the distribution lines on the proposed transmission structures (Xcel Energy, 2009).

In order to mitigate the visual impacts of the substation alternatives, the Applicant has stated that they would construct a one-story decorative wall surrounding the Hiawatha Substation on three sides and a one-story decorative wall surrounding the Midtown Substation. The walls would be architecturally designed to complement the existing character of the Environmental Justice Study Area (Xcel Energy, 2009). Additional measures to mitigate potential aesthetic impacts are discussed in Section 5.8, Aesthetics.

5.5.3.3. Economic and Employment

The Project is not expected to result in a direct economic hardship to minority or low income populations. However, the incremental costs of undergrounding the transmission line may be passed on to the Applicant's ratepayers. The Applicant has developed potential surcharge estimates for four different groups of ratepayers: customers in the city of Minneapolis; customers in Hennepin County; customers within the seven county Minneapolis-St. Paul metropolitan area; and customers in the state of Minnesota. Distributing the incremental cost of undergrounding the transmission line among a larger base of ratepayers (e.g., state of Minnesota or seven county metropolitan area) would reduce the potential economic hardship on ratepayers in the Environmental Justice Study Area.

Additional indirect impacts may result due to the loss of amenities and the presence of visual intrusions. Potential mitigation measures may include the placement of the transmission lines underground and the screening of substations. Additional measures to mitigate potential aesthetic impacts are discussed in Section 5.8, Aesthetics.

5.5.3.4. Subsistence

The Project is not expected to impact subsistence activities within or surrounding the Environmental Justice Study Area; therefore no mitigation measures appear to be warranted for any of the route alternatives.

5.5.3.5. Health

In order to mitigate impacts related to safety and health, the Project would be designed in compliance with local and state standards with regard to construction activities and would include protective devices. Additional measures to mitigate potential health and safety impacts are discussed in Section 5.6, Safety and Health.

5.6. Safety and Health

This section identifies and describes a variety of potential safety and health impacts from construction and operation of the Project. The discussion of the affected environment includes background information for each potential impact identified. Direct and indirect safety and health impacts from the Project alternatives and potential mitigation methods are also addressed.

5.6.1. Affected Environment

Eight sources of potential safety and health impacts from the proposed Project and alternatives were identified, including:

- Environmental Contamination;
- Electric and Magnetic Fields (EMFs);
- Implantable Medical Devices;
- Stray Voltage;
- Induced Currents and Shock Hazards;
- Construction Activities and Equipment;
- Security; and
- Severe Weather.

5.6.1.1. Environmental Contamination

Because of current and past developed land use in the Project Area, as discussed in Section 5.2, Land Use, the potential exists for encountering contaminated sites during construction of the Project. Depending upon its nature and extent, existing contamination can pose a health and safety hazard to construction workers. In addition, soil disturbances required during construction, such as excavation and grading, could result in mobilization of existing soil contamination.

As part of the application process, the Applicant commissioned an environmental database search from Environmental Data Resources, Inc. (Xcel Energy, 2009). Environmental database searches are often relied upon by agencies and others to identify known or potential sources of contamination in a specified area. For this impact analysis, the EDR database information was reviewed and filtered to remove database listings that are not necessarily associated with environmental contamination, such as permitted air and water releases. The following databases, presented in Table 5.6-1, were used in the impact analysis of potential or known contaminated sites within the Project Area.

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Table 5.6-1: EDR Databases with Potentially Known or Suspected Contaminated Sites

Database Name	Abbreviation	State (MN) or Federal (US) Database
Generators Associated with Enforcement Logs	MN Enforcement	MN
Petroleum Brownfields Program Sites	BROWNFIELDS	MN
Voluntary Investigation and Cleanup Program	MN VIC	MN
Institutional Controls	INST CONTROL	MN
Site Remediation Section Database	SRS	MN
Department of Agriculture Spills	MN AGSPILLS	MN
Permanent List of Priorities	MN PLP	MN
Superfund Site Information Listing	SHWS	MN
Leaking Underground Storage Tanks	LUST	MN
Leaking Aboveground Storage Tanks	LAST	MN
Spills Database	MN Spills	MN
List of Sites	MN LS	MN
Proposed National Priority List Sites	Proposed NPL	US
PCB Activity Database System	PADS	US
A Listing of Brownfields Sites	US BROWNFIELDS	US
Comprehensive Environmental Response, Compensation, and Liability Information System	CERCLIS	US
CERCLIS No Further Remedial Action Planned	CERC-NFRAP	US
Emergency Response Notification System	ERNS	US
National Priority List	NPL	US
Toxic Chemical Release Inventory System	TRIS	US

Source: Asah, RaeLynn. 2009. Xcel Energy. Personal email communication. November 12.

The databases were then analyzed for sites within 200 feet of the Project Area. Table 5.6-2 lists the number of known or suspected contaminated sites within 200 feet of each route alternative. The same analysis was performed for Route E2 by the Applicant once the route was determined to be included as a route alternative.

Table 5.6-2: Known or Suspected Contaminated Sites

Structure Type	Route A	Route B	Route C	Route D	Route E2
Total Route Length (miles)	1.4	3.3	3.8	1.5	3.04
Number of Potentially Contaminated Sites (within 200 feet of route)	15	34	26	21	21

Source: Xcel Energy, 2009 and Xcel Energy, Information Request, 2009.

The majority of the known or suspected contaminated sites listed in the table above are associated with petroleum releases. One of the larger and more extensively investigated contaminated properties in the Project Area is the South Minneapolis Residential Soil Contamination Site, which is listed in the EDR report for arsenic contamination. This site is centered on Hiawatha Avenue and East 28th Street, and was formerly occupied by an arsenic-based pesticide manufacturer. The site is listed on the National Priority List (NPL). The NPL is a federal list that identifies sites of known or threatened contamination that warrant either further investigation or clean-up activities. The Minnesota Department of Agriculture (MDA) and U.S. Environmental Protection Agency (USEPA) assessed the contamination at the former plant site and in nearby neighborhoods under the federal Superfund program. Between 2004 and 2008, cleanup was conducted at hundreds of residential properties with arsenic contamination associated with the former plant (Xcel Energy, 2009). The arsenic contamination affected an approximately one-quarter square mile area, which encompasses portions of all Project route alternatives. According to a fact sheet issued by the USEPA in August of 2009, the site is currently in the final phase of cleanup, which is expected to take approximately two and a half years (USEPA: *EPA to Begin Final Cleanup of Neighborhood Site*, 2009).

In addition, several alternative substation locations would require the demolition of existing properties, including the Midtown North, Midtown South, and Hiawatha East Substation alternatives. Depending upon the date of construction of the existing properties, the potential exists to encounter asbestos-containing materials or lead-based paint during demolition.

Lead-based paint was banned from use in residential housing by the federal government in 1978. Asbestos was banned in most building materials with the potential to be friable in 1978, as well, but the Occupational Safety and Health Administration (OSHA) deems spray applied surfacing materials, thermal system insulation materials, and vinyl flooring materials as "presumed asbestos-containing materials" (PACMs) if they are present in pre-1981 buildings (Title 29 of the Code of Federal Regulations, Parts 1910.1001 and 1926.1101).

Heavy equipment is typically used to construct transmission lines and substations. This equipment can include, but is not limited to, tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks and various trailers (Xcel Energy, 2009). This type of heavy construction equipment often requires the use of oils, diesel fuels, and gasoline for fueling and maintenance purposes. Soil or groundwater contamination could result from an accidental spill or release of these hazardous materials due to improper handling and/or storage of hazardous materials during construction activity, or during transmission line and substation operations and maintenance.

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5.6.1.2. Electric and Magnetic Fields (EMF)

Electric and Magnetic Fields (EMFs) are invisible regions of force resulting from the presence of electricity. Naturally occurring EMFs are caused by the earth's weather and geomagnetic field. Man-made EMFs are caused from any electrical device and found wherever people use electricity. EMFs are characterized and distinguished by their frequencies, which is measured by the rate at which the fields change direction each second. A table displaying the wide spectrum of EMFs is shown in Figure 5.6-1: Electromagnetic Spectrum.

As indicated in Figure 5.6-1, all power lines within the United States have a frequency equivalent to 60 cycles per second, defined as 60 Hertz (Hz). EMFs at this frequency level and within the range of 3 - 3,000 Hz are considered to be Extremely Low Frequency (ELF) EMFs (ELF-EMFs).

The term "EMF" usually, and for the purpose of this Project, refers to separate electric and magnetic fields at ELF. However, the term can sometimes refer to "electromagnetic fields" and be used in a much broader sense to encompass both low and high frequency fields. It is important to differentiate between the two, as electric and magnetic fields in the ELF range are not coupled or interrelated in the same way that they are at higher frequencies (NIEHS, 2002). ELF-EMFs also exhibit non-ionizing radiation and non-thermal characteristics, as opposed to high frequency fields (e.g., gamma rays and x-rays) that can exhibit ionizing radiation, capable of breaking through molecular bonds, and/or thermal characteristics.

Electric Field

Electric fields are created by the electric charge (i.e., voltage) on a conductor (e.g., a transmission line). Electric fields are solely dependent upon the voltage of a conductor, not the actual flow of electricity (i.e., current). Electric field strength is measured in kilovolts per meter (kV/m). The strength of an electric field decreases rapidly as the distance from the source increases. Electric fields are easily shielded or weakened by most objects and material, such as trees, buildings, and even human skin.

Although there is no federal regulation, the Minnesota Public Utilities Commission has imposed a permit condition of 8 kV/m for the maximum electric field for previously permitted high voltage transmission lines (HVTLs) (measured at centerline and at 1 meter above ground). Five other states, including California, Florida, Montana, New Jersey, and New York, have comparable standards.

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Magnetic Fields

Magnetic fields are created by and are solely dependent upon the electrical current in a conductor. Magnetic field strength is measured in milliGauss (mG). Similar to electric fields, the strength of a magnetic field decreases rapidly as the distance from the source increases. However, unlike electric fields, magnetic fields are not easily shielded or weakened by objects or materials.

There are no federal or Minnesota State regulations for the permitted strength of a magnetic field on a transmission line; however, both Florida and New York have standards ranging from 150 to 250 mG.

Health Studies

A common concern related to EMFs is the potential of adverse health affects exposure to EMFs may have on children, elderly, and pregnant women. The suggestion that these demographics are more susceptible to adverse health effects from EMF exposure is consistent with a large body of information showing that these demographics are more vulnerable than average adults to other exposures, such as to chemicals, diseases, and ionizing radiation.

Numerous panels of experts have convened to review research data relevant to whether or not EMFs are associated with adverse health effects. These studies have been conducted by the National Institute of Environmental Health Sciences (NIEHS), the USEPA, the World Health Organization (WHO), and the Minnesota State Interagency Working Group (MSIWG) on EMF Issues.

In 1992, the U.S. Congress authorized the Electric and Magnetic Fields Research and Public Information Dissemination Program (EMF-RAPID Program) in the Energy Policy Act. The Congress instructed NIEHS, National Institutes of Health, and the U.S. Department of Energy (DOE) to direct and manage a program of research and analysis aimed at providing scientific evidence to clarify the potential for health risks from exposure to ELF-EMFs (NIEHS, 1999). The EMF-Rapid Program provided the following conclusions to Congress on May 4, 1999:

- *The scientific evidence suggesting that ELF-EMF exposures pose any health risk is weak.*
- *Epidemiological studies have serious limitations in their ability to demonstrate a cause and effect relationship whereas laboratory studies, by design, can clearly show that cause and effect are possible. Virtually all of the laboratory evidence in animals and humans and most of the mechanistic work done in cells fail to support a causal relationship between exposure to ELF-EMF at environmental levels and changes in biological function or disease status. The lack of consistent positive findings in animal or*

mechanistic studies weakens the belief that this association is actually due to ELF-EMFs, but it cannot completely discount the epidemiological findings.

- *The NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or non-cancer health outcomes provide sufficient evidence of a risk to currently warrant concern* (NIEHS, 1999).

Currently, the USEPA states the following viewpoint of the associated health effects of EMFs on its website (USEPA: *Electric and Magnetic Fields (EMF) Radiation from Power Lines*, 2009):

> *Much of the research about power lines and potential health effects is inconclusive. Despite more than two decades of research to determine whether elevated EMF exposure, principally due to magnetic fields, is related to an increased risk of childhood leukemia, there is still no definitive answer. The general scientific consensus is that, thus far, the evidence available is weak and is not sufficient to establish a definitive cause-effect relationship* (USEPA: *Electric and Magnetic Fields (EMF) Radiation from Power Lines*, 2009).

Currently, the WHO states the following viewpoint of the associate health effects of EMFs on its website (WHO, 2009):

> *Extensive research has been conducted into possible health effects of exposure to many parts of the frequency spectrum. All reviews conducted so far have indicated that exposures below the limits recommended in the INNIRP (1998) EMF guidelines, covering the full frequency range from 0-300 GHz, do not produce any known adverse health effect. However, there are gaps in knowledge still needing to be filled before better health risk assessments can be made* (WHO, 2009).

In September of 2002, the MSIWG on EMF Issues, published "A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options," referred to as the "White Paper." The MSIWG was formed to examine the potential health impacts of EMFs and to provide useful, science-based information to policy makers in Minnesota. Work Group members included representatives from the Department of Commerce, the Department of Health, the Pollution Control Agency, the Public Utilities Commission, and the Environmental Quality Board (MSIWG, 2002). The White Paper concluded the following findings:

- *Some epidemiological results do show a weak but consistent association between childhood leukemia and increasing exposure to EMF (see the conclusion of IARC and NIEHS). However, epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists, and the association must be supported by data from laboratory studies. Existing laboratory studies have not substantiated this relationship (see NTP, 1999; Takebe et al., 2001), nor have scientists been able to understand the biological mechanism of how EMF could cause adverse effects. In addition, epidemiological studies of various other diseases, in both children and adults, have failed to show any consistent pattern of harm from EMF.*
- *The Minnesota Department of Health concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk from EMF cannot be dismissed. Construction of new generation and transmission facilities to meet increasing electrical needs in the State is likely to increase exposure to EMF and public concern regarding potential adverse health effects.*
- *Based upon its review, the Work Group believes the most appropriate public health policy is to take a prudent avoidance approach to regulating EMF. Based upon this approach, policy recommendations of the Work Group include:*
    - *Apply low-cost EMF mitigation options in electric infrastructure construction projects;*
    - *Encourage conservation;*
    - *Encourage distributed generation;*
    - *Continue to monitor EMF research;*
    - *Encourage utilities to work with customers on household EMF issues; and*
    - *Provide public education on EMF issues* (MSIWG, 2002).

As noted above, research has not been able to establish a cause and effect relationship between exposure to EMFs and adverse health effects. However, a general consensus has been formed to continue research on the health effects of EMFs.

Continued Research

It is important to note that although expert panels and agencies, such as the ones discussed above, have not yet identified any viable cause and effect relationships between exposure to EMFs and adverse health effects, hypotheses have existed and continue to be researched. Some health studies in discussion include, but are not limited to, the Melatonin and Henshaw Effect hypotheses formed by Professor Denis Henshaw.

The Melatonin hypothesis associates exposure to elevated magnetic fields to a decrease in the natural production of melatonin in the human body, a known natural anti-cancer agent produced by the pineal gland. The Henshaw Effect hypothesis postulates that transmission lines increase the amount of air pollution the human body retains when it is inhaled, thus creating a greater likelihood of developing cancer and/or other adverse health effects. This study examines high voltages, carried by transmission line cables, which have the ability to break up the air and separate electrons from individual air molecules (known as ionization). Ionization results in the creation of electrically charged particles, referred to as "corona ions." The hypothesis states that the corona ions may be carried away from the immediate surrounding area by wind. The corona ions are considered to have a sticking ability to cling on to surfaces, similar to a dust particle, and are considered to stick to common air pollutants, such as vehicle exhaust pollution (air pollution associated with the Project is further discussed in Section 5.13, Air Quality and Climate). The theory further postulates that due to the stickiness of the corona ions, the particles also have a greater chance of becoming trapped in the human lung upon inhalation. The theory postulates that corona ions created by high voltages carried by transmission lines stick to air pollution particles and have a greater likelihood of sticking to the inside of the human lung upon inhalation, thus creating a greater chance of developing adverse health effects including cancer.

5.6.1.3. Implantable Medical Devices

Research has established that electric fields can potentially interfere with implantable medical devices, such as cardiac pacemakers and implantable cardioverter defibrillators (ICDs). This interference, referred to as Electromagnetic Interference (EMI), can cause inappropriate triggering of a device or inhibit the device from responding appropriately (PSCW, 2009). Medtronic and Guidant, manufacturers of various implantable medical devices, have indicated that electric fields below 6 kV/m are unlikely to cause interactions affecting operation of most of their devices.

5.6.1.4. Stray Voltage

Stray voltage is a condition that can occur at the electric service entrances to structures from distribution lines, not transmission lines. More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings.

Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel and immediately under the transmission line (Xcel Energy, 2009).

Stray voltage safety concerns have been primarily raised on dairy farms because it may impact operations and milk production. In rural areas, livestock can receive electrical shocks from milking equipment. Problems with stray voltage are usually related to the distribution and service lines directly serving a farm or the wiring on a farm. In addition, stray voltage may result from a damaged, corroded, or poorly connected wiring or damaged insulation. It also can develop on incoming metallic pipes, such as utility lines, through induction from transmission lines, if the transmission lines are in parallel with the utility lines over some distance (PSCW, 2009).

5.6.1.5. Induced Currents and Shock Hazards

Overhead power line fields can induce voltage and currents on conductive objects, such as metal roofs or buildings, fences, and vehicles. According to the Applicant, underground transmission lines can not create this same effect. As a protective measure on overhead transmission lines, conductive items are designed below the line, in an attempt to limit the short circuit current.

5.6.1.6. Construction Activities and Equipment

Construction workers are subject to typical construction related incidents including slips, trips, falls, wounds, and traumatic injuries. Additional safety issues relevant to this Project may result from electrocution and/or the construction of tall structures.

5.6.1.7. Security

Towers and substations have the potential to be vandalized and/or theft targets for copper wire and other scrap metals to be stolen.

5.6.1.8. Severe Weather

Severe weather, including high winds, ice and snow storms, and tornados, could create possible safety hazards in what is considered the "engineering (designed) fall distance" of an overhead transmission line. Snow and ice accumulation and high winds can increase a structure's weight, making it more susceptible to failure or collapse. The term "fall distance" is not a term defined or utilized by the utility industry, by the Applicant, or by federal statute or federal regulation (Xcel Energy, FHA, 2009). The only definition for this term is provided in HUD Handbook 4150.2, which states that "[f]or field analysis, the appraiser may use tower height as the fall distance" (Xcel Energy, FHA, 2009).

5.6.2. Direct/Indirect Effects

This section identifies potential direct and indirect safety and health impacts resulting from the above identified sources related to the Project alternatives. Potential direct and indirect impacts include safety and health concerns related to:

- Environmental Contamination;
- Electric and Magnetic Fields (EMFs);
- Implantable Medical Devices;
- Stray Voltage;
- Induced Currents and Shock Hazards;
- Construction Activities and Equipment;
- Security; and
- Severe Weather.

5.6.2.1. Environmental Contamination

During construction of the Project, the potential to encounter existing soil and groundwater contamination would be a potential safety and health concern. Exposing existing contaminated soils could create a health and safety risk to construction workers and the nearby public. Furthermore, existing contamination could be mobilized due to soil disturbances associated with construction activities and pose a further health and safety risk to the public and the environment.

The majority of the known or potentially contaminated sites are associated with petroleum releases. Petroleum contaminated soils or groundwater can present a vapor hazard, depending on the type of petroleum involved. For example, gasoline has a relatively high proportion of volatile compounds and motor oil has a low amount of volatile compounds. Furthermore, the volatile components decrease with time, thus reducing the vapor hazard. High contaminant concentrations, particularly the presence of free-phase product, increase the risk of vapor hazards. Vapor can migrate along conduits such as sewers and the more permeable backfill or utility trenches. Petroleum vapors can create a health hazard to workers and also, if they accumulate at high enough concentrations, can pose an explosion risk. Petroleum contamination is typically identifiable in the field by staining and/or odor (Xcel Energy, 2009).

Arsenic contaminated soils in the Project Area are also identified as a possibly-encountered contaminant due to past land uses. Arsenic is toxic and can cause various health effects, depending on the concentration and the length of exposure. According to the USEPA, acute inhalation exposure of workers to high levels of arsenic dusts or fumes has resulted in gastrointestinal effects (nausea, diarrhea, abdominal pain), while acute exposure of workers to inorganic arsenic has also resulted in central and peripheral nervous system disorders (USEPA: *Arsenic Compounds*, 2009). Arsenic is typically not identifiable in the field visually or by odor.

The potential to encounter lead-based paint and asbestos-containing materials during demolition of existing properties constructed before 1978 and 1981, respectively, exists for the Midtown North, Midtown South, and Hiawatha East Substation alternatives. If not managed properly during demolition, lead-based paint dust and airborne friable asbestos fibers can be inhaled and pose serious health and safety risks. Lead is toxic and can cause a variety of health problems including damage to the brain, kidney, and central nervous system (USEPA, Lead in Paint, Dust, and Soil, 2009). Asbestos can cause serious lung diseases including asbestosis, lung cancer, and mesothelioma (USEPA, Asbestos, 2009).

Due to the type of heavy construction equipment involved, the potential exists for releases or spills of oils, diesel fuels, or gasoline. A release or spill of these chemicals would have the potential to harm construction workers, as described above, or contaminate local soil and/or groundwater.

Project Alternatives

Environmental contamination could be encountered during construction of all route and substations alternatives. However, the risk associated with encountering contaminated soils by constructing an underground route alternative or undergrounding one or more of the substations is much greater than construction of an overhead route alternative or substation. For all underground route alternatives, the entire route distance would be exposed (with the exception of those areas planned to be crossed by horizontal directional drilling). In comparison, for all overhead route alternatives, subsurface work would be confined to the transmission structure locations. Minimizing the soil area exposed during construction would minimize the potential to encounter or mobilize a pre-existing contaminant.

All route and substation alternatives have equal risk potential associated with an accidental release or spill of hazardous chemicals from heavy construction equipment.

5.6.2.2. Electric and Magnetic Fields

A viable cause and effect relationship between the exposure to EMFs and adverse health effects has not been established. However, a general consensus has been formed to continue research on the effects of EMFs and to provide information on EMFs to the public.

A table of typical EMF levels for power transmission lines is provided in Figure 5.6-2: Typical EMF Levels for Power Transmission Lines. As displayed in the figure, the strength of EMFs greatly decreases as distance from the source increases. In the case of electrical cables, the EMFs are strongest immediately surrounding the transmission lines. As indicated in the figure, a typical 115 kV transmission line exerts an electric field of approximately 1.0 kV/m and a mean magnetic field of approximately 29.7 mG directly underneath the line.

The actual strengths of the EMFs associated with the Project are explored separately below.

Electric Field

Estimates of the anticipated strength of the electric field associated with the Project routes are shown in Table 5.6-3.

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Table 5.6-3: Calculated Electric Fields (kV/m) for Proposed 115 kV Transmission Line Designs (1 meter or 3.28 feet Above Ground)

Routes	Structure Type	Nominal Voltage (kV)	Minnesota Standard (kV/m)	Distance to Purposed Centerline of Transmission Line Structure								
				-200'	-100'	-50'	-25'	0'	25'	50'	100'	200'
A	Davit Arm 115 kV/115 kV Steel Pole Double Circuit	121	8	0.01	0.02	0.15	1.00	0.56	1.00	0.15	0.02	0.01
B & C	Horizontal Post 115 kV Single Circuit	121	8	0.02	0.05	0.05	0.13	1.12	1.09	0.09	0.08	0.03
A & D	Transmission Duct Bank 115 kV/115kV Underground Double Circuit	121	8	0.00	0.01	0.04	0.13	4.60	0.19	0.06	0.01	0.00
E	Davit Arm 115 kV/115 kV Steel Pole Double Circuit	121	8	0.01	0.02	0.15	1.00	0.56	1.00	0.15	0.02	0.01

Source: Xcel Energy, 2009

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The maximum electric field strength for the aboveground route alternatives, measured at the centerline of the structure and at 1 meter above ground, ranges from approximately 0.56 kV/m for Routes A and E2 to approximately 1.12 kV/m for Routes B and C. The maximum electric field strength for the underground alternatives (Routes A and D) is approximately 4.6 kV/m, measured directly above the center of the transmission line at one meter above the surface of the ground (Xcel Energy, 2009).

Underground transmission lines generally produce weaker EMFs than overhead transmission lines. This is due to the electric fields ability to be shielded or weakened by most materials, including the earth. However, the distance between an overhead power line and a human is typically greater than the distance between an underground power line and a human. Therefore, although the underground line alternatives would be expected to exhibit a much weaker electric field due to its ability to be shielded and weakened by the earth, the distance from the source must also be evaluated.

The electric fields associated with all of the routes are significantly less than the maximum limit of 8 kV/m, which would be a permit condition imposed by the Commission.

Magnetic Field

Estimates of the anticipated strength of the magnetic field associated with the Project routes are shown below. There are two conductor options (1250 kcmil and 3000 kcmil) for underground construction. Magnetic fields have been calculated for both potential conductors; however, field conditions would ultimately determine which conductor size is used should an underground construction option be chosen (Xcel Energy, 2009).

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Table 5.6-4: Calculated Magnetic Flux Density (milligauss) for Proposed 115 kV Transmission Line Designs (1 meter or 3.28 feet Above Ground)

Routes	Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline of Transmission Line Structure										
				-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'
A	Davit Arm 115 kV/115 kV Steel Pole Double Circuit	Peak	230	0.22	1.49	3.13	7.88	23.03	38.44	22.77	7.73	3.05	1.44	0.21
		Average	138	0.13	0.90	1.79	4.73	13.82	23.06	13.66	4.64	1.72	0.87	0.13
B & C	Horizontal Post 115 kV Single Circuit	Peak	230	0.67	2.24	3.50	6.07	12.11	26.16	26.25	12.18	6.10	3.51	0.86
		Average	138	0.42	1.41	2.20	3.82	7.63	16.49	16.54	7.68	3.84	2.21	0.54
A & D (3000 kcmil)	Transmission Duct Bank 115 kV/115kV Underground Double Circuit	Peak	230	0.00	0.01	0.03	0.11	0.84	13.08	0.85	0.11	0.03	0.01	0.00
		Average	138	0.00	0.01	0.02	0.07	0.51	7.85	0.51	0.07	0.02	0.01	0.00
A & D (1250 kcmil)	Transmission Duct Bank 115 kV/115kV Underground Double Circuit	Peak	230	0.00	0.01	0.02	0.05	0.37	19.67	0.37	0.05	0.01	0.01	0.00
		Average	138	0.00	0.00	0.01	0.03	0.22	11.80	0.22	0.03	0.01	0.00	0.00
E2	Davit Arm 115 kV/115 kV Steel Pole Double Circuit	Peak	230	0.22	1.49	3.13	7.88	23.03	38.44	22.77	7.73	3.05	1.44	0.21
		Average	138	0.13	0.90	1.79	4.73	13.82	23.06	13.66	4.64	1.72	0.87	0.13

Source: Xcel, 2009

The maximum peak magnetic field strength for the aboveground route alternatives, measured at the centerline of the structure and at 1 meter above ground, ranges from approximately 26.16 mG for Routes B and C to approximately 38.44 mG for Routes A and E2. The maximum strength for the underground alternatives (Routes A and D) ranges from approximately 13.08 mG for the 3,000 kcmil conductor option to 19.67 mG for the 1250 kcmil conductor option, measured directly above the center of the transmission line at one meter above the surface of the ground (Xcel Energy, 2009).

According to the USEPA, all calculated Project magnetic fields strengths are significantly weaker than the typical strength associated with many household appliances. Some common sources associated with higher magnetic field strengths are displayed in the table below.

Table 5.6-5: Magnetic Field Measurements of Household Appliances

Distance from the Source	6 inches	12 inches
Hair Dryer		
Average (mG)	300	1
Peak (mG)	700	70
Microwave Oven		
Average (mG)	200	40
Peak (mG)	300	200
Vacuum Cleaner		
Average (mG)	300	60
Peak (mG)	700	200

Source: USEPA, 1992

Project Alternatives

In general, the underground construction route alternatives (Routes A and D) would decrease the risk associated with EMF exposure concerns since EMF strength has been measured to be weaker than aboveground transmission lines. The exception to this generalization is the electric field strength measured at the center point and 1 meter above ground, in which underground Routes A and E2 have electric field strengths that are greater than the aboveground route alternatives. However, with an increase in distance from the centerline when measuring the electric field strength (first measured at 25 feet from centerline), the underground construction alternatives have a significantly weaker overall EMF strength.

Research has not identified a viable cause and effect relationship between EMFs and adverse health effects, and EMFs associated with the Project are less than the electric field standard imposed by the state and typical magnetic fields associated with many household objects. As such, all route alternatives and substation locations are not expected to have a direct or indirect affect on health and safety.

5.6.2.3. Implantable Medical Devices

EMFs may cause EMI with implantable medical devices. This interference disrupts the cardiac device's ability to sense normal electrical activity in the heart. Although most modern cardiac devices are less susceptible to effects from EMFs due to engineering design, older designs can still be affected. In the event that a cardiac device is impacted, the effect is typically a temporary asynchronous pacing (i.e., fixed rate pacing) and the device would return to its normal operation when the person moves away from the source of EMFs (PSCW, 2009).

Project Alternatives

All route alternatives and substation locations have equal potential for EMI with implantable medical devices, although underground construction options have the strongest measured electric field strength: 4.6 kV/m within 1 meter of the transmission line. This measurement, although below the common manufacturer guideline of 6 kV/m, is over four times higher than all other route alternatives.

5.6.2.4. Stray Voltage

Stray voltage safety concerns are primarily associated with distribution lines. Stray voltage is often not noticeable to humans, but may be felt by an animal (PSCW, 2009). Stray voltage is not identified as a safety concern associated with the Project; however, since transmission lines can induce stray voltage on distribution circuits that are parallel and immediately under a transmission line, the Applicant would take appropriate measures when the transmission lines proposed are parallel to or cross distribution lines. These appropriate measures are site specific and may include, but are not limited to:

- *Cancellation: Arranging transmission line phase conductors in a configuration to minimize EMF levels, bonding distribution neutral and transmission shield wires together, and employing an under built transmission shield wire bonded to distribution neutral rather than a normal overhead shield wire.*
- *Separation: Increase the distance between transmission and distribution facilities by placing across the road and/or burying the distribution facilities, or providing greater vertical distance between the transmission line phase conductor and an under built distribution line.*

- *Enhanced Grounding: Employing bare buried counterpoises connected to the distribution neutral and/or transmission shield wire* (Asah, Personal Communication, Additional Stray Voltage Information, 2009).

Project Alternatives

No health and safety effects from stray voltage are expected from the Project.

5.6.2.5. Induced Currents and Shock Hazards

People or animals can receive a shock by touching an electrically charged metal object located near an overhead transmission line. The shock is similar to that received by touching a television after walking across a carpet (PSCW, 2009). These small electrical shocks cause no physiological harm; however, they may present a nuisance. The magnitude and strength of a charge are directly related to the mass of the ungrounded metal object and its orientation to the overhead transmission line (PSCW, 2009).

Induced current can be prevented or corrected by grounding all metal objects near the transmission line.

Project Alternatives

All overhead route alternatives and substation locations have equal potential to electrically charge objects, resulting in potential shocks. According to the Applicant, underground transmission lines do not pose this same risk; therefore, there is no expected health and safety effect regarding induced currents or shock hazards for underground route and substation alternatives.

5.6.2.6. Construction Activities and Equipment

Safety would be an important concern for construction activities associated with all Project alternatives. Potential safety concerns include minor and major work-related injuries associated with any type of a construction project. Additional safety concerns include construction accidents, such as a structure or conductor falling to the ground or coming into contact with energized equipment.

Project Alternatives

All route alternatives and substation locations have equal potential to be impacted by construction activities and equipment, although the anticipated construction schedule for underground transmission line and substations would be significantly longer than the anticipated construction schedule for overhead transmission lines and aboveground substations.

5.6.2.7. Security

Vandalism to towers and substations and theft for copper wire and scrap metal could create serious harm to the individual engaging in the activity, as well as compromise the safety of the affected high voltage equipment. Workers who operate or maintain the transmission lines and substations could be seriously injured upon interacting with the affected high voltage equipment.

Project Alternatives

All route overhead route alternatives and aboveground substation locations have equal potential to be impacted by vandalism and theft. Access to transmission line and substation facilities would be significantly reduced for underground routes and substations.

5.6.2.8. Severe Weather

Severe weather could create possible safety hazards in what is considered the "engineering (design) fall distance" of overhead transmission line structures. This distance can be assumed to be equivalent to the height of the transmission line tower. Tower heights on overhead transmission lines vary by route as shown in the table below:

Table 5.6-6: Transmission Tower Heights for Overhead Route Alternatives

Route Alternatives	Project Component	Average Height
Routes A & E	Tangent Double Circuit Structure Design	75 feet
	Dead-End Double Circuit Structure Design	80 feet
Routes B & C	Tangent Single Circuit Structure Design	75 feet
	Dead-End Single Circuit Structure Design	100 - 110 feet

Source: Xcel Energy, 2009

The number of residences and other properties that would be potentially affected from a tower failure or collapse varies by each overhead route alternatives. A table displaying the number of residential structures and other properties located within these distances is shown in Table 5.1-1 in Section 5.1, Proximity to Structures.

Project Alternatives

If 115 feet is used as the general "engineering (design) fall distance," Route A has the fewest number of residences within this distance compared to other overhead construction options. Calculations of affected residences also include buildings adjacent to the substations. Route A has 17 residential buildings within this fall distance. In contrast, Route B has 146 and Route C has 204 residential buildings (Xcel Energy, 2009). All underground route alternatives would have no risk from tower collapse associated with severe weather.

5.6.3. Mitigation

This section identifies mitigation methods for the safety and health impacts identified above relating to the Project alternatives.

5.6.3.1. Environmental Contamination

Contaminated soils and groundwater would need to be properly identified, handled, and disposed of to protect workers and the public, and to prevent further environmental contamination. The Applicant has existing standard policies and procedures for properly identifying and managing contaminated soils. These policies and legal obligations require crews to continually monitor for possible soil contamination during construction; procedures for segregating and disposing of contaminated soils, where necessary; and procedures for protecting worker health and safety in areas with a high probability for encountering contamination.

Although petroleum contaminated soils are generally detectable by visual observations, arsenic contaminated soils are not as easily identifiable. The Applicant has agreed to have field instruments readily available to quickly screen soils in the field for arsenic contamination. In addition, the Applicant could also appoint individuals with correct training for sampling, data review, and regulatory coordination should an encounter with contaminated soils occur.

If a high probability of encountering contaminated soils is identified, the Applicant is prepared to provide construction workers with appropriate Personal Protection Equipment (PPE), such as dermal protection and, if potential concentrations are high enough, respiratory protection. Dust suppression measures would also be utilized during soil disturbing activities in areas of potential soil contamination (Xcel Energy, 2009).

Where necessary, the plans and procedures noted above would be supplemented to address other issues, such as the vacant lot and residential home in the area of the Midtown North substation location. According to the Minneapolis List of Boarded/Condemned Properties, the residential home was registered as vacant on August 12, 2008, and was classified as condemned on September 10, 2008 (Xcel Energy, 2009). Supplemental mitigation measures could include soil sampling in planned construction areas that have a high likelihood of contamination. Soil sampling would provide the Applicant with a better understanding of the contamination, associated concentration levels, and assist in identifying appropriate mitigation measures necessary for further construction activities in the affected area. If cleanup and remediation activities are deemed necessary, all state-specific standards developed and enforced by the Minnesota Pollution Control Agency (MPCA) would be followed.

Building constructed prior to the mid-1980s may contain lead-based paint or asbestos containing materials (ACMs). As such, lead-based paint or ACMs may be encountered during demolition of buildings located on the Midtown North, Midtown South, or Hiawatha East Substation locations. Prior to demolition, a lead-based paint survey and an asbestos survey would be required to determine the presence of these materials. Contractors performing asbestos removal must be licensed by the Minnesota Department of Health (MDH). Five days prior to the start of demolition, the contractor is required to submit notification to the MDH and MPCA. Under state regulations, no visible emissions of dust are allowed during the removal, transportation, and disposal of asbestos. The contractor would be required to use control technology (e.g., plastic sheeting) to reduce emissions from demolition. Asbestos waste must be placed in double 6-mil plastic bags, labeled as asbestos, and shipped to an approved landfill.

With regards to the potential for spills or leaks from the equipment during construction activities, several mitigation strategies are available to the Applicant. The following mitigation measures would be included as Best Management Practices (BMPs) in the Applicant's Storm Water Pollution Prevention Plan (SWPPP). A SWPPP is required for all route alternatives under the state general permit for storm water associated with construction related activities.

- Conduct frequent inspections of construction equipment to ensure hydraulic systems and oil pans are in good condition and free of significant leaks;
- Require portable spill containment kits for each piece of construction equipment that has the potential to discharge a significant amount of oil to the environment;
- Ensure appropriately trained equipment operators are present at the nozzle at all times when refueling is in progress; and

- Prohibit the refueling of equipment in wetlands.

Due to general storm water construction permit conditions, the SWPPP would require applicable erosion prevention and sediment control BMPs. These mitigation strategies would minimize the potential for mobilization of pre-existing contaminants. In the event of a spill or mobilization of an existing contaminant, the source would be identified and contained immediately upon discovery.

5.6.3.2. Electric and Magnetic Fields

No conclusive health or safety concerns have been identified with EMF exposure; therefore, no mitigation measures appear to be warranted for any of the route alternatives.

5.6.3.3. Implantable Medical Devices

Although EMI caused by transmission lines can disrupt the function of an implantable medical device, this disruption can be avoided and corrected by the person moving away from the electrical source. Individuals using implantable medical devices should consult with their doctor and device manufacture regarding recommended precautions or avoidance.

The electric fields associated with all route alternatives are below common manufacturer guidelines of 6 kV/m. No mitigation measures appear to be warranted for any of the route alternatives.

5.6.3.4. Stray Voltage

No health or safety concerns have been identified for stray voltage; therefore, no mitigation measures appear to be warranted for any of the route alternatives.

5.6.3.5. Induced Currents and Shock Hazards

Induced current can be prevented or corrected by grounding all metal objects near the overhead transmission line (PSCW, 2009). The Applicant should ensure that all metal objects located near the overhead transmission line, including metal buildings or roofs, vehicles, and fences, are effectively grounded.

If an electrical charge builds in a vehicle, the vehicle can be grounded by attaching a grounding strap to the vehicle long enough to touch the earth. Such buildup is a rare event because generally vehicles are effectively grounded through tires. Modern tires provide an electrical path to ground because carbon black, a good conductor of electricity, is added when they are produced. Vehicles would not normally build up a charge unless they have unusually old tires or are parked on dry rock, plastic, or other surfaces that insulate them from the ground (Xcel Energy, 2009).

Passenger vehicles and trucks may be safely used under or near overhead power lines. The Applicant has agreed to design all overhead power lines to meet or exceed minimum clearance requirements over roads and driveways as specified by the National Electrical Safety Code (NESC). Recommended clearances within the NESC are designed to accommodate a relative vehicle height of 14 feet (Xcel Energy, 2009).

5.6.3.6. Construction Activities and Equipment

To mitigate worker-related safety impacts, the Applicant's construction crews and/or contract crews must comply with local, state, NESC, and the Applicant's standards regarding the installation of facilities and standard construction practices. The Applicant must also follow all Occupational Health and Safety Administration (OSHA) standards related to the construction of the transmission line and substations.

To mitigate any potential construction accidents, the Project would be designed in compliance with local, state, NESC and the Applicant's company standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials and right-of-way widths. Company-established and industry safety procedures would be followed during and after installation of the transmission lines. This would include clear signage during all construction activities (Xcel Energy, 2009).

To safeguard the public from an accident, such as a structure or conductor falling to the ground, the proposed transmission lines would be equipped with protective devices. The protective devices are breakers and relays located where the line connects to the substation and would de-energize the line should the accident occur. In addition, the substation facilities would be fenced and access would be limited to authorized personnel. Proper signage would be posted warning the public of the risk of coming into contact with the energized equipment (Xcel Energy, 2009).

5.6.3.7. Security

All substation alternatives would be surrounded by a 12-foot wall and a chain-link gated fence. The chain-link gate would be used to provide access to the substation only to authorized construction and maintenance workers. In addition, proper signage would be posted warning the public of the risk associated with coming into contact with energized equipment. Security measures proposed by the Applicant are presented in greater detail in Section 3.3.1.3, General Engineering Designs. Should vandalism or theft affect the transmission lines, the protective devices (i.e., breakers and relays located where the line connects to the substation) would de-energize the line upon sensing a fault on the system.

5.6.3.8. Severe Weather

If an underground construction alternative is chosen, all safety impacts related to severe weather as discussed would essentially be mitigated. If an overhead construction alternative is chosen, the following mitigation methods would apply.

The Applicant has designed all transmission poles and towers to withstand the extreme wind and weather conditions normally experienced in their area of installation. Transmission infrastructure has very few mechanical elements and is built to withstand weather extremes that are not normally encountered. Pole and towers installed by the Applicant are designed to meet or exceed the requirements of the NESC. The NESC does not have a tornado loading design criterion (Xcel Energy, 2009).

In the past five years, there have been no steel pole failures on the Applicant's system in Minnesota due to tornados or other storm conditions. Two of the 10,350 steel structures on the overall Applicant's system have failed due to a tornado; these structures were located in the Public Service Company of Colorado's service territory (Xcel Energy, 2009).

The ability of structures to withstand tornadic conditions is illustrated in Figure 5.6-3: Aerial Photograph of Tornado Damage to Transmission Lines in Hugo, Minnesota, which displays the aftermath of the May 2008 tornado in Hugo, Minnesota. In the photograph, the Applicant's wood pole structures and conductors are still intact after the F3 tornado with win speeds of up to 150-200 miles per hour went through the area (Xcel Energy, 2009).

Should a failure or collapse of the transmission infrastructure occur, the proposed transmission lines are equipped with protective devices that would automatically take the line out of service. The protective devices are breakers and relays located where the line connects to the substation and would de-energize the line upon sensing a fault on the system.

5.7. Recreation and Tourism

This section describes potential affects on recreational and tourism resources within 0.5 miles of all proposed alternative routes and substations. A distance of 0.5 miles from alternative routes and substations was chosen for analysis as a reasonable distance beyond which recreational facilities would not likely be affected by the Project.

5.7.1. Affected Environment

The city of Minneapolis contains a number of recreation and tourism destinations that provide opportunities for active recreation, such as exercise, team sports, and child's play, and for passive recreation, such as picnicking, bird watching, fishing, walking and general enjoyment of one's surroundings.

Facilities for active recreation include city parks and trails. The Minneapolis Park and Recreation Board maintains a number of properties within 0.5 miles of the proposed alternative routes and substations that provide residents with access to playgrounds, sports activities, picnic areas, and social and educational events. There are also bicycle and pedestrian trails used for recreation and commuting located within 0.5 miles of the alternative routes and substations. The main bike trail located in the vicinity of routes and substations is the Midtown Greenway.

A number of attractions located within 0.5 miles of the alternative routes and substations provide residents and visitors with opportunities for passive recreation. Attractions include the Midtown Global Market, Lake Street shops and restaurants, the Sheraton Minneapolis Midtown Hotel, In the Heart of the Beast Puppet and Mask Theatre, the Minneapolis Institute of Arts, and the American Swedish Institute.

5.7.1.1. Parks

Parks within the city are owned and managed by the Minneapolis Park and Recreation Board. Park hours, as established by city ordinance, are from 6:00 a.m. to 12:00 midnight. Figure 5.7-1 shows the locations of the parks in relation to the proposed routes and substations, while Table 5.7-1 indicates distance of each recreational facility to the proposed routes.

The following parks are located within 0.5 miles of the proposed routes and substations (MPRB, 2009):

- 2529 13th Ave South property includes Waite House, a playground, and a garden. The House is run by Pillsbury United Communities and offers human services and community building activities such as after school and summer programs, adult education, and employment services (Pillsbury United Communities, 2009). The East 26th Street portion of Route B passes approximately half a block south of the Waite House. The East 28th Street segment of Routes B and C, as well as Route D, pass approximately 0.3 miles south of Waite House.

- Cedar Avenue Field is located at the intersection of East 25th Street and Cedar Avenue South. The 1.89 acre park includes a playground, two basketball half-courts, an open play field, and a picnic area. The East 26th Street portion of Route B is located approximately half a block south (less than 0.1 mile) from the field. Route E2 is located approximately 0.2 miles east of the field. The East 28th Street segment of Routes B and C, as well as Route D, pass approximately 0.3 miles south of the park. Route A is located approximately 0.4 miles south of the park. Hiawatha East and Hiawatha West substations are located approximately 0.4 miles southeast of the park.

- Clinton Field is located at the corner of East 25th Street and Clinton Ave South. Clinton Field Park offers an open play field, two half-sized courts for basketball, a volleyball court, a playground, and benches. Route E2 passes approximately 0.1 miles east of the park. The 26th Street segment of Route B is located approximately 0.25 miles southeast from the park. The East 28th Street segment of Routes B and C, as well as Route D, pass approximately 0.5 miles southeast of the park. Substation Mt-28N is located approximately 0.3 south of the park and Substation Mt-28S is located approximately 0.4 miles south. The Midtown North and South Substations are located approximately 0.5 miles southeast of the park.

- Corcoran Park is located at the corner of East 33rd Street and 20th Avenue South. It is one of the smallest parks in the city, providing a playground area, a wading pool, a softball field, and a volleyball court. The Corcoran Festival and Cinco de Mayo festivities are held annually in Corcoran Park. Corcoran Park is located approximately 0.25 miles south of the East 31st Street segment of Route C.

- Dorilus Morrison Park is located at the southwest corner of E 24th Street and 3rd Avenue South. The park is home to the Minneapolis Institute of Arts. Route E2 passes approximately 0.2 miles east of the park, while the East 26th Street segment of Route B passes approximately 0.4 miles southeast from the park.

Substation Mt-28N is located approximately 0.3 south of the park and Substation Mt-28S is located approximately 0.4 miles south.

- East Phillips Park is located south of downtown Minneapolis, at the west corner of Hiawatha Avenue and Cedar Avenue South. The amenities at the 6.5 acre park include a playground, a wading pool, a basketball court, baseball fields, picnic areas, and a craft room. The park is bordered by Hiawatha Avenue, which is the proposed location of Route E2. Route E2 would be located along the eastern boundary of the park. The East 26th Street segment of Route B passes approximately 0.25 miles south of East Phillips Park. The East 28th Street segment of Routes B and C, as well as Route D, pass approximately 0.5 miles south of the park.

- Peavey Park is located at the intersection of Park Ave and East Franklin Avenue. The park comprises 7 acres of land and includes a playground, wading pool, three half-court basketball areas, tennis court, volleyball/badminton court, baseball diamonds and open fields for soccer or football. The East 26th Street segment of Route B passes approximately 0.4 miles south of the southern boundary of Peavey Park. Route E2 passes approximately 0.25 miles west of the park.

- Powderhorn Park extends from Powderhorn Terrace to East 35th Street, between 10th and 15th Avenue South. It is the largest park located within 0.5 miles of the alternative routes and substations, comprising 68 acres of land and 12 acres of water. The park's amenities include a bandstand; a playground; basketball, volleyball and tennis courts; baseball and football fields; a wading pool; an ice rink; and a fishing dock. Powderhorn Park is host to several important events each year, including the annual 4th of July Celebration, May Day Festival, and the Powderhorn Arts Festival. Powderhorn Park is located approximately 0.1 miles south of the East 31st Street portion of Route C, 0.3 miles south of Route A, and 0.4 miles south from the East 28th Street segment of Routes B and C, and 0.4 miles south from Route D.

- Stewart Field is located along East 26th Street, between 10th and 12th Avenues. The amenities at the park include baseball fields, basketball courts and a recreation center. The East 26th Street segment of Route B is adjacent to the northern boundary of the park. Route D and the East 28th Street segment of Routes B and C are located approximately 1 block (0.1 miles) south from the park. Route A is located approximately 0.2 miles south of the park while Route E2 is located approximately 0.5 miles west. The Midtown North and South

Substations are located approximately 0.4 miles southwest of the park and the Mt-28N Substation is located approximately 0.5 miles southwest from the park.

- Washburn Fair Oaks is located at the northwest intersection of East 24th Street and 3rd Avenue South. The park is located directly across from the Minneapolis Institute of the Arts and provides green space in a neighborhood of historic houses. Route E2 passes approximately 0.2 miles east of the park, while the East 26th Street segment of Route B passes approximately 0.4 miles southeast from the park. Substation Mt-28N is located approximately 0.45 miles south of the park and Substation Mt-28S is located approximately 0.5 miles south.

In addition, the following parks are located within 0.5 miles of Route E2. These parks are located over 0.5 miles away from the other alternative substations and routes.

- Currie Park is a small park located at the corner of South 5th Street and 15th Avenue South. Amenities at the park include a basketball court, softball field, a playground, a wading pool, and a picnic area. Route E2 passes approximately 0.3 miles south of the park.

- Elliott Park is located at the corner of East 14th Street and Elliott Avenue South. The park provides baseball and softball fields, a basketball court, and two tennis courts. Route E2 passes approximately 0.2 miles south of the park.

- Murphy Square is located east of downtown, at the corner of South 7 ½ Street and 22nd Avenue South. The 3 acre park is the oldest park in Minneapolis and it contains a picnic area. Route E2 passes approximately 0.5 miles west of the park.

- Franklin Steele Park is located at the corner of East 17th Street and Portland Avenue South. Amenities include a basketball court, two playgrounds, a wading pool and a splash park, a picnic shelter, and picnic tables. Route E2 passes approximately 0.1 miles south of the park.

- Stevens Square Park is located at the corner of East 19th Street and 2nd Avenue South. The park occupies one block and provides a playground, basketball and tennis courts, a formal seating area, and performance/staging space for neighborhood festivals. Neighborhood organizations use the park to provide social, art, music, and cultural activities for the residents. Route E2 passes approximately 0.25 miles east of the park.

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The Midtown Greenway and Lake Street Corridor are also located within 0.5 miles of the alternative routes and substations and are discussed below. Table 5.7-1 provides a summary of the recreational facilities located within 0.5 miles of the alternative routes and substations.

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Table 5.7-1 Proximity of Recreational Facilities to Proposed Routes and Substations

Name	Location	Routes (miles)							Substations (miles)					
		Route A	Route B (26th Street)	Route B (28th Street)	Route C (28th Street)	Route C (31st Street)	Route D	Route E2	Hiawatha East	Hiawatha West	Midtown North	Midtown South	Mt-28N	Mt-28S
2529 13th Ave South Property / Waite House	2529 13th Ave	-	0.1	0.3	0.3	-	0.3	-	-	-	-	-	-	-
American Swedish Institute	E 26th Street and Park Ave S	0.4	Adjacent	0.4	0.4	-	0.25	-	-	-	0.3	0.3	0.3	0.4
Cedar Avenue Field	E 25th Street and Cedar Ave S	0.4	< 0.1	0.3	0.3	-	0.3	0.2	0.4	0.4	-	-	-	-
Clinton Field	E. 25th Street and Clinton Ave S	-	0.25	0.5	0.5	-	0.5	0.1	-	-	0.5	0.5	0.3	0.4
Corcoran Park	E 33rd Street and 20th Ave S	-	-	-	-	0.25	-	-	-	-	-	-	-	-
Currie Park	S 5th Street and 15th Ave S	-	-	-	-	-	-	0.3	-	-	-	-	-	-
Dorilus Morrison Park	E 24th Street and 3rd Ave S	-	0.4	-	-	-	-	0.2	-	-	-	-	0.3	0.4
East Phillips Park	Hiawatha Ave and Cedar Ave S	-	0.25	0.5	0.5	-	0.5	Adjacent	-	-	-	-	-	-
Elliott Park	E 14th Street and Elliott Ave S	-	-	-	-	-	-	0.2	-	-	-	-	-	-
Franklin Steele Park	E 17th Street and Portland Ave S	-	-	-	-	-	-	0.1	-	-	-	-	-	-
Lake Street Corridor	Lake Street	0.1	0.5	0.25	0.25	0.1	0.25	-	-	-	0.1	0.1	0.2	0.1
Minneapolis Institute of Arts	E 24th Street and 3rd Ave S	-	0.4		-	-	-	0.2	-	-	-	-	0.3	0.4
Midtown Greenway	E 29th Street	Adjacent / Co-located	0.4/Crosses bridge	0.1/Segment co-located	0.1/Segment co-located	0.25	0.1/Segment co-located	Crosses a segment	Adjacent	Adjacent	Adjacent	Adjacent	0.1	Adjacent
Murphy Square	S 7 ½ Street and 22nd Ave S	-	-	-	-	-	-	0.5	-	-	-	-	-	-
Peavey Park	E. Franklin Ave and Park Ave S	-	0.4	-	-	-	-	0.25	-	-	-	-	-	-
Pioneers and Soldiers Cemetery	Lake Street and Cedar Avenue	Adjacent	0.3	0.1	0.1		0.1	0.2	0.25	0.25	-	-	-	-
Powderhorn Park	Powderhorn Terrace and 14th Ave S	0.3	-	0.4	0.4	0.1	0.4	-	-	-	-	-	-	-
Stevens Square Park	E 19th Street and 2nd Ave S	-	-	-	-	-	-	0.25	-	-	-	-	-	-
Stewart Field	E 26th Street and 10th Ave S	0.2	Adjacent	0.1	0.1	0.5	0.1	0.5	-	-	0.4	0.45	0.5	-
Washburn Fair Oaks	E 24th Street and 3rd Ave S	-	0.4		-	-	-	0.2	-	-	-	-	0.45	0.5
Total number of recreational facilities		7	14		11		10	15	3	3	5	5	8	7

Notes: For each Route, distances over 0.5 miles are indicated by a dash (-) and were not included for analysis.

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5.7.1.2. Trails

Paved bike paths, bike lanes on city streets, and the Midtown Greenway, a dedicated commuter bike trail, provide a network of bicycle routes heavily utilized for recreation and commuting. More than 40 miles of street bicycle lanes and 83 miles of off-street bicycle paths are located in the city of Minneapolis, as further discussed in Section 5.16, Transportation. Use of the trails varies seasonally and depends on weather conditions; however, there was a general 15 percent increase in the number of bicyclist using the trails from 2007 to 2008 (City of Minneapolis, Department of Public Works, 2009). The following main bike lanes and trails are present within 0.5 miles of the alternative routes and substations:

- Portland Avenue – southbound street bike lane, provides connection between downtown Minneapolis and the Greenway. Estimated daily traffic, based on counts performed September 2008, was over 600 bicyclists (City of Minneapolis, Cycling in Minneapolis, 2009). The bike lane runs along a segment of the East 31st Street segment of Route C, and approximately 0.1 miles west of a segment of East 26th Street segment of Route B. Additionally, the bike lane crosses Route E2.

- Park Avenue – northbound street bike lane, provides connection between the Greenway and downtown Minneapolis. Estimated daily traffic, based on counts performed September 2008, was over 600 bicyclists (City of Minneapolis, Cycling in Minneapolis, 2009). The bike lane crosses Routes A, B, D, and E2, as well as the 28th Street segment of Route C.

- 11th Avenue – two-way street, bike lane starts at the intersection of 24th Street East and provides a connection to downtown. Estimated daily bicycle usage is not known. The bike lane crosses Route E2.

- The Midtown Greenway - a 5.7-mile dedicated commuter bike trail and the proposed site for Route A. Estimated daily traffic, based on counts performed September 2008, was over 2,700 bicyclists (City of Minneapolis, Cycling in Minneapolis, 2009). A portion of Routes A, B, C, and D are located within the Greenway corridor.

Midtown Greenway

The Midtown Greenway is a 5.7-mile bicycle and pedestrian trail used both for recreation and commuting. Photographs of the Midtown Greenway are included in Figures 5.8-3 and 5.8-5. The Greenway is a joint venture of Hennepin County, the Hennepin County Regional Railroad Authority (HCRRA), the state of Minnesota, the city of Minneapolis, the federal government and the community. The trail is owned by HCRRA and maintained by the city.

The Greenway runs in the east-west direction along 29th Street, approximately one block north of Lake Street, and provides a vehicle-free connection between the Chain of Lakes on the west end and the Mississippi River on the east end. On its west end, the Greenway connects to the Southwest LRT Trail and the Kenilworth Trail. Kenilworth Trail provides access to downtown Minneapolis via connection with the Cedar Lake Trail while the Southwest LRT Trail connects to the suburbs of St. Louis Park, Hopkins, and beyond. On its east end, the Greenway connects with the West River Parkway. Further extension of the east part of the Greenway trail is planned in the future. The trail would eventually cross over the Mississippi River into the Prospect Park neighborhood of Minneapolis. (City of Minneapolis, Department of Public Works, 2009; City of Minneapolis, Cycling in Minneapolis, 2009).

Since 2007, data has been collected on bicycle use of the greenway at three locations with automatic counters. Bicycle use of the greenway varies seasonally and is dependent on the weather; however, there was a generally increasing trend in the use of the greenway between 2007 and 2008. For the period between March and December 2008, bicycle use on the Greenway increased by 31 percent from 2007. The highest average daily count was at the Hennepin Avenue station, which had an average of 4,107 bicyclists per day in July of 2008. This represented a 36 percent increase in overall numbers from July 2007. The lowest average daily count for 2008 was at the West River Parkway, with only 49 bicyclists per day in the month of December (City of Minneapolis, Department of Public Works, 2009).

Data for 2009 from two counting stations (the Hennepin station has malfunctioned) shows that overall use of the Greenway decreased in January 2009 by 40 percent when compared with 2008, but rose by 40 percent in March. Late afternoon is the busiest time for bicycle traffic (City of Minneapolis, Department of Public Works, 2009).

There are a number of community gardens in the Midtown Greenway. The Urban Ventures Community Garden is west of the at-grade crossing of 5th Avenue, approximately 0.1 miles from the proposed Midtown Substation. Two other gardens in the Greenway are over a mile away from proposed construction sites (City of Minneapolis, Cycling in Minneapolis, 2009). Community gardens beautify the Greenway and add to the pleasure derived from spending time in a nature-based setting. They also provide recreational gardening opportunities for community members. A Parade of Community Gardens, held in August, encourages people to visit community gardens in Minneapolis.

There are 35 access points to the Greenway. The following 10 access points are located along the proposed Route A:

- Park Avenue;
- Columbus Avenue (Stairway);
- Chicago Avenue (Stairway);
- 13th Avenue;
- Bloomington Avenue (Stairway);
- 18th Avenue;
- 28th Street;
- 20th Avenue (At-Grade Crossing);
- 21st Avenue (At-Grade Crossing); and
- Hiawatha Avenue (At-Grade Crossing).

In addition, an access point at Minnehaha Avenue is located by the proposed Hiawatha Substation. A section of the Greenway trail between Hiawatha Avenue and Minnehaha Avenue passes along the proposed Hiawatha East and Hiawatha West substations (City of Minneapolis, Department of Public Works, 2009).

5.7.1.3. Lake Street Corridor

A section of the Lake Street Corridor is located approximately one block south of Route A and one block north of the 31st Street East segment of Route C. The Lake Street Corridor is a vibrant community of shops, restaurants, theaters, and markets. The commercial area is walkable and accessible by car, light rail, bus, and the Midtown Greenway. Access points from the Greenway to the main Lake Street points of interest include Chicago Avenue, 13th Street, and Bloomington Avenue (Lake Street Council, 2009). Some of the main recreational and tourist attractions include In the Heart of the

Beast Puppet and Mask Theatre, the Midtown Global Market, and the Midtown Sheraton Hotel.

In the Heart of the Beast Puppet and Mask Theatre, located in the Avalon Theater at 1500 East Lake Street, organizes weekend performances and workshops, as well as the annual May Day Parade. The parade travels down Bloomington Avenue to Powderhorn Park for the May Day ceremony. Approximately 2,000 people participate in the parade, with many more lining the streets as an audience. The ceremony at the park draws crowds of up to 50,000 people. The 36th Annual May Day Parade and Festival is scheduled to take place on May 2, 2010 (HOBT, 2009).

Midtown Global Market is located on Lake Street in the Midtown Exchange building. The internationally-themed public market is home to over 50 locally-owned businesses and features groceries, restaurants, and arts and crafts from around the world (Lake Street Council, 2009).

The Midtown Sheraton Hotel is a 136-room hotel located at the corner of Chicago and Lake Street. The hotel caters to both business and vacation visitors as it provides convenient access to downtown and the greenway (Sheraton, 2009).

The Lake Street area is often a host to large community events, such as parades and festivals. These events draw thousands of residents from across the city to the Lake Street area. Main events are listed in Table 5.7-2.

Table 5.7-2 Annual Events in Lake Street Corridor

Event	Location	Upcoming Date	Attendance
May Day Parade	From Lake and Bloomington, along Bloomington Ave to Powderhorn Park	May 2, 2010	50,000
Mexican Independence Day	Lake Street and 4th Ave South	September 2010	20,000
Barbette's Bastille Day Block Party	Irving Ave South and Lagoon Ave	July 2010	N/D
Uptown Art Fair	Lake Street and Hennepin	August 6-8, 2010	375,000
Powderhorn Art Fair	Powderhorn Park	August 7-8, 2010	N/D
Loring Park Art Festival*	Loring Park	August 8-9, 2010	N/D

*Loring Park Art Festival, although not located in the Lake Street area, is part of the Uptown, Powderhorn, and Loring Art Fest taking place in August. Residents take advantage of free transportation provided between all three festivals.
N/D indicates that attendance has not been determined.

Source: Minneapolis Convention and Visitors Association (MCVA), 2009.

5.7.1.4. Other Recreational Opportunities

The city provides a number of cultural, historical, and architectural resources located within 0.5 miles of the alternative routes and substation, further discussed in Section 5.3, Archeological and Historical Resources. These resources create unique neighborhoods that provide opportunities for walking or driving for pleasure and enjoyment of elements of the built environment. Opportunities for recreation exist in visiting places such as the Pioneers and Soldiers Cemetery (located at Lake Street and Cedar Avenue) or residential houses along Park Avenue. The Pioneers and Soldiers Cemetery is adjacent to Route A and within 0.1 miles of Routes B, C, and D. Additionally, the Hiawatha East and West substations are approximately 0.1 miles northeast of the cemetery. Park Avenue crosses Route A and is also within 0.1 miles of Route C. These points of interests possess historical and cultural values and are important community landmarks. The overall experience is defined by passive uses, perceptions, and sentiments associated with the experience of visiting the neighborhoods in which the Project would be located.

Cultural institutions include the Minneapolis Institute of Arts and the American Swedish Institute. The Minneapolis Institute of Arts is located at the intersection of 3rd Avenue South and East 24th Street. It offers free admission and is open Tuesday through Sunday. Annual attendance from June 2007 through June 2008 was approximately 500,000 visitors (MIA, 2008). Route E2 passes approximately 0.2 miles east of the Minneapolis Institute of Arts while the East 26th Street segment of Route B passes approximately 0.4 miles southeast. Substation Mt-28N is located approximately 0.3 miles south of the Minneapolis Institute of Arts while Substation Mt-28S is located approximately 0.4 miles south.

The American Swedish Institute is housed in the Turnblad Mansion, located at the intersection of Park Ave South and East 26th Street. The Institute's Turnblad Mansion is on the National Register of Historic Places. The American Swedish Institute is open Tuesday through Sunday (ASI, 2009). The American Swedish Institute is adjacent to the 26th Street segment of Route B, within 0.25 miles of Route D, and within 0.4 miles of Route A, the 28th Street segment of Route B, and Route C. It is also located within 0.5 miles of the four Midtown substation alternatives.

5.7.2. Direct/Indirect Effects

This section provides a discussion of the potential direct and indirect impacts from the Project on recreation and tourism. The discussion is divided between transmission line route alternatives and substation alternatives.
Potential direct and indirect effects on recreation and tourism include the following:

- Restricted access;
- Increased noise levels; and
- Aesthetic impact.

Direct effects involve altering or physically changing recreation resources, conflicting with recreation area goals, or affecting accessibility to remote or sensitive areas. Direct effects could affect both active and passive recreational activities and could occur during construction or operation.

Indirect effects include visual impacts to the scenic quality and natural appearance of the landscape, as viewed from the recreational use area by a recreational user. Section 5.8, Aesthetics, describes the potential for visual impacts in more detail. Indirect effects can also include negative impacts to noise and air quality that would affect the recreational experience.

5.7.2.1. Transmission Line Route Alternatives

Transmission line route alternatives are located in the vicinity of a number of recreational resources. Resources affected and potential impacts depend on the route chosen, but in general the impacts for all the routes would include restricted access, increased noise levels, and aesthetic impacts.

Route A

Route A runs along or co-terminus with the Greenway for approximately 1.4 miles. The Applicant's preferred alignment for Route A would be located along the south boundary of the Midtown Greenway trench between the Hiawatha Substation and 10th Avenue South. At approximately 10th Avenue South, the preferred alignment would cross the Greenway and continue to follow the north boundary of the Greenway to the Midtown Substation. Route A extends approximately 80 feet north from 29th Street into the Midtown Greenway Trench east of 10th Avenue South and extends approximately

88 feet south from the sidewalk into the Midtown Greenway Trench west of 10th Avenue South.

In addition, the Route is adjacent to the Pioneers and Soldiers Cemetery and is within 0.5 miles of the American Swedish Institute, Cedar Avenue Field, Lake Street Corridor, Powderhorn Park, and Stewart Field. Both direct and indirect impacts to recreational use of the Greenway would occur during the construction of either the overhead or the underground transmission line. Use of other recreational facilities within 0.5 miles of the route would only be indirectly affected.

Access to the Greenway would be limited in areas where construction is taking place, requiring the Greenway users to find alternate routes or alternate access points. For both the overhead and underground design, construction activities along the bike path could result in temporary closure of a section of the Greenway or temporary narrowing of the bike path in order to safely accommodate construction. Construction activities on top of the trench would not impact the bike path, although they could impact the access to the bike path. Restricted access would impact individuals using the Greenway for active recreation such as biking and also those using the Greenway as a place to connect with nature through gardening or walking along the community gardens. Since the Greenway provides access to the Lake Street district, restrictions in the use of the Greenway would also impact the visitors of the shops and restaurants located on Lake Street. However, any restrictions to the use of the Greenway would only be temporary in nature and would last only for the duration of the construction activities.

Construction-related noise and dust would impact the quality of the recreational experience, potentially causing people to avoid the areas directly adjacent to construction, such as the Greenway and the Pioneers and Soldiers Cemetery. Other facilities within 0.5 miles of the route might also experience increased noise levels, thus affecting the quality of the recreational experience.

Operation of either the aboveground or the underground options for transmission lines along Route A would not directly interfere with the future recreational use of the Greenway. However, indirect impacts would occur.

The overhead lines would pose an aesthetic impact to recreation in the Greenway, further discussed in Section 5.8, Aesthetics. The transmission lines would cross over the Greenway twice and the steel pole structures located along the Greenway, whether on top of the trench or along the bike path, would be visible to the Greenway users. In addition, minor aesthetic impacts would result from removal of five deciduous trees along the Greenway. The presence of transmission line structures may have a negative effect on the overall experience, perception and sentiment associated with using the Greenway. Periodic maintenance and repair of the lines, both overhead and underground, would create additional aesthetic impacts through the presence of equipment and workers in the Greenway area. Similar to the construction impacts, maintenance and repair of the line co-terminus with the bike path would be more noticeable and could result in temporary closures or blocking off of parts of the bike path to allow maintenance to take place.

Route B

A total of 14 recreational facilities lie within 0.5 miles of the two segments of Route B. The 26th Street segment of Route B passes adjacent to the American Swedish Institute, the northern boundary of Stewart Field, and approximately half a block south of both the Cedar Avenue Field and Waite House. In addition, the segment of the Route is located within 0.5 miles of the Midtown Greenway, Clinton Field, Dorilus Morrison Park, East Phillips Park, Lake Street Corridor, the Minneapolis Institute of Arts, Peavey Park, Pioneers and Soldiers Cemetery, and Washburn Fair Oaks Park. It also crosses the Midtown Greenway at the suspension bridge over Hiawatha Avenue. The 28th Street segment of Route B passes approximately 0.1 miles south of Stewart Field, and approximately 0.1 miles north of both the Midtown Greenway and the Pioneers and Soldiers Cemetery. The segment also runs approximately 0.1 miles along the Midtown Greenway, at the top of the trench, and crosses the Greenway by the Hiawatha East and West substations. In addition, the 28th Street segment of the route is also within 0.5 miles of the Waite House, the American Swedish Institute, Cedar Avenue Field, Clinton Field, East Phillips Park, Lake Street Corridor, and Powderhorn Park.

There would be no direct impact to recreational facilities from construction or operation of the transmission lines. Temporary indirect impacts to recreation would occur during construction due to noise, access restrictions, and aesthetic changes. Recreation facilities adjacent to or in close proximity to the route, such as Stewart Field, the American Swedish Institute, Pioneers and Soldiers Cemetery, and the Waite House, would experience greater impacts than facilities located further away.

Residents may need to use alternate routes to reach parks and other points of interest due to temporary road closures and access restrictions. Furthermore, Midtown Greenway users may experience limited access to the Greenway since the Route runs along a 0.1-mile portion of the Greenway. The route also crosses the Greenway by the Hiawatha Substation. However, inconvenience resulting from access restrictions should be minor as the residential nature of the area offers many nearby detour points.

Stewart Field and the American Swedish Institute would experience increased construction noise levels as the portion of the transmission line passes immediately adjacent to those facilities. Cedar Avenue Field and Waite House are located approximately 0.1 miles away from the transmission line and would experience attenuated construction noise levels. Construction-related noise would impact the quality of the recreational experience, potentially causing people to limit the time spent in a park until the construction in that area is completed. Other facilities within 0.5 miles of the route might also experience increased noise levels, thus affecting the quality of the recreational experience. Nearby parks, such as East Phillips Park or Peavey Field, may experience increased use as they are located further north from the proposed transmission line and would offer an alternative location during construction.

Aesthetic impacts would occur due to construction activities. Once completed, transmission lines would be visible from the Midtown Greenway, Stewart Field, and potentially from Cedar Field. Further discussion of aesthetic impacts is provided in Section 5.8, Aesthetics.

Route C

A total of 11 recreational facilities lie within 0.5 miles of Route C. The 28th Street segment of Route C passes approximately 0.1 miles south of Stewart Field and approximately 0.1 miles north of both the Midtown Greenway and the Pioneers and Soldiers Cemetery. The segment also runs approximately 0.1 miles along the Midtown Greenway, at the top of the trench, and crosses the Greenway by the Hiawatha East and West Substations. In addition, the segment is located within 0.5 miles of the Waite House, the American Swedish Institute, Cedar Avenue Field, Clinton Field, East Phillips Park, Lake Street Corridor, and Powderhorn Park. The 31st Street segment of Route C passes approximately 0.1 miles north of Powderhorn Park and 0.1 miles south of Lake Street Corridor. It crosses the Greenway by the Hiawatha Substation. The segment is also located within 0.5 miles of Corcoran Park and Stewart Field.

Temporary impacts to recreation would occur during construction due to noise, access restrictions, and aesthetic changes. Recreation facilities adjacent to or in close proximity to the route, such as the Midtown Greenway, Stewart Field, Pioneers and Soldiers

Cemetery, Powderhorn Park and the Lake Street Corridor would experience greater impacts than facilities located farther away.

Residents may need to use alternate routes to reach parks and other points of interest due to temporary road closures and access restrictions. Furthermore, Midtown Greenway users may experience limited access to the Greenway since the Route runs along a 0.1-mile portion of the Greenway. The route also crosses the Greenway by the Hiawatha East and West Substations. Inconvenience resulting from access restrictions may occur but should be minor as the residential nature of the area offers many nearby detour points.

Temporary impacts would also result from construction noise. Increased noise levels would impact the quality of the recreational experience, potentially limiting the use of the Greenway, the parks and the Lake Street Corridor temporarily. Stewart Field is located approximately 1 block away from the transmission line and would experience attenuated noise levels due to the buildings separating the park from the construction activities. Nearby parks, such as East Phillips Park or Peavey Field, may experience increased use as they are located further north from the proposed transmission line and would offer an alternative location for recreational activities. Powderhorn Park is located half a block away from the route; however, the large size of Powderhorn Park would make it possible for visitors to move away from noisy areas and still remain in the park.

Powderhorn Park is a location of two large community events: the May Day Parade (occurring in May) and the Powderhorn Art Fest (occurring in August). Construction occurring in the vicinity of the park during these events may limit the number of attendants due to inconvenience of road closures, access restrictions, limited parking, and aesthetic impacts.

Aesthetic impacts would occur due to construction activities. Upon completion, the overhead structures would be visible from the nearby parks. Further discussion of aesthetic impacts is included in Section 5.8, Aesthetics.

Route D

Ten recreational facilities lie within 0.5 miles of Route D. Route D passes along East 28th Street, approximately 0.1 miles south of Stewart Field and approximately 0.1 miles north of both the Midtown Greenway and the Pioneers and Soldiers Cemetery. The segment also runs approximately 0.1 miles along the Midtown Greenway, at the top of

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the trench, and crosses the Greenway by the Hiawatha East and West Substations. In addition, the segment is located within 0.5 miles of the Waite House, the American Swedish Institute, Cedar Avenue Field, Clinton Field, East Phillips Park, Lake Street Corridor, and Powderhorn Park.

Temporary impacts to recreation would occur during construction due to noise, access restrictions, and aesthetic changes. Recreation facilities adjacent to or in close proximity to the route, such as the Midtown Greenway, Stewart Field, and the Pioneers and Soldiers Cemetery, would experience greater impacts than facilities located further away.

Impacts on recreation would be temporary in nature and would last only for the duration of construction activities. During construction, residents may need to use alternate routes to reach parks and other points of interest due to temporary road closures and access restrictions. Inconvenience may result from access restrictions but should be minor as the residential nature of the area offers many nearby detour points.

Increased noise levels could impact the quality of recreational experience, potentially limiting the use of the Greenway, Stewart Field, and the Pioneers and Soldiers Cemetery. As mentioned previously, nearby parks, such as East Phillips Park or Peavey Field, may experience increased use as they are located further north from the proposed transmission line and would offer an alternative location for recreational activities.

Aesthetic impacts would occur from the construction activities such as trench digging and tree removal. Since the line would be located underground, there would be no aesthetic impacts associated with presence of new structures. However, 43 trees would need to be removed during the construction of the line. The impacts of tree removal would be permanent for those specific trees, but off-set by replacement of the removed trees with species compatible with tree height requirements.

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Route E2

Route E2 runs adjacent to the major traffic arteries of Hiawatha Avenue, Interstate 94 (I-94), and Interstate 35W (I-35W). Route E2 passes along the eastern boundary of East Phillips Park and also within 0.1 miles of Clinton Field and Franklin Steele Park. The line crosses the Greenway by the Hiawatha East and West Substations. Additionally, the line is located within 0.5 miles of Cedar Avenue Field, Currie Park, Dorilus Morrison Park, Elliott Park, the Minneapolis Institute of Arts, Murphy Square, Peavey Park, Pioneers and Soldiers Cemetery, Stevens Square, Stewart Field, and Washburn Fair Oaks Park.

Impacts on recreation from Route E2 would be similar in scope to previously described impacts for other routes. Temporary impacts would result from access restrictions, construction noise, and aesthetic impacts. Recreation facilities adjacent to or in close proximity to the route, such as East Philips Park, Clinton Field, and Franklin Steele Park, would experience greater impacts than facilities located further away.

During construction, residents may need to use alternate routes to reach parks and other points of interest due to temporary road closures and access restrictions. Inconvenience resulting from access restrictions should be minor as the residential nature of the area offers many nearby detour points.

Increased noise levels could impact the quality of recreational experience in the parks located in close proximity to the transmission line. Since the route passes along the boundary of East Phillips Park, the use of the park may become limited during construction activities. Clinton Field and Franklin Steel Park, although located within 0.1 miles of the route, may be affected to a lesser extent as the parks are located by major traffic arteries and already experience increased noise levels.

Aesthetic impacts would occur due to construction activities.

The power line structures would be visible from the parks in the vicinity of Route E2. Further discussion of aesthetic impacts is included in Section 5.8, Aesthetics.

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5.7.2.2. Substation Alternatives

Substation alternatives would not directly impact recreational resources within the Project; however, several of the substation alternatives are located next to the Midtown Greenway or are located within 0.5 miles of other recreational facilities. Since the impacts from substations would be similar for a given area, the discussion is broken down into Hiawatha substations and Midtown substations. In general, impacts would include restricted access, increased noise levels, and aesthetic impacts.

Hiawatha Substations

The proposed locations for Hiawatha East, Hiawatha West, and the planned expansion area are adjacent to the Midtown Greenway between Hiawatha Avenue and Minnehaha Avenue. The substations are also within 0.5 miles of Cedar Avenue Field, the Pioneers and Soldiers Cemetery, and Stewart Field.

There would be no significant direct impact to the Greenway or to the other recreational facilities from construction or operation of the substations. Temporary impacts would occur during construction from increased construction noise and access restrictions. During construction, residents may need to use alternate routes to reach parks and other points of interest due to temporary road closures and access restrictions.

Construction activities and stockpiling of excavated materials could pose aesthetic impacts to the Greenway users passing by the substations. Once the substation is completed, the aesthetic impacts would be minimal as the area is industrial in nature.

During operation, increased noise levels could impact the quality of recreational experience in the recreational facilities located in close proximity to the substations. When in operation, transmission line conductors and transformers present at the substation may produce audible noise slightly above background levels depending upon weather conditions and their design. The Applicant plans to surround both substations with decorative walls to help mitigate noise from the substation transformers.

Midtown Substations

The proposed locations for Midtown North and Midtown South Substations are adjacent to the Midtown Greenway between Portland Avenue South and Oakland Avenue South. The Mt-28S substation is adjacent to the Greenway between Clinton Ave and I-35W. The Mt-28N substation is not adjacent to the Greenway. Additionally, the substations are within 0.5 miles of Waite House, Clinton Field, Dorilus Morrison Park, Lake Street Corridor, the Minneapolis Institute of Arts, Stewart Field, and Washburn Fair Oaks Park.

There would be no significant direct impact to the Greenway or to the other recreational facilities from construction or operation of the substations. Temporary impacts would occur during construction from increased construction noise and access restrictions. During construction, residents may need to use alternate routes to reach parks and other points of interest due to temporary road closures and access restrictions.

Although there is no direct access to the Greenway from either Portland or Oakland Avenues, users en route to an access point could be required to take a detour because of construction activities and temporary road closures resulting from construction of Midtown North, Midtown South, or Mt-28S substations. The Mt-28N substation is not adjacent to the Greenway and therefore access restrictions to the Greenway would be minimized.

The proposed of Midtown North, Midtown South, or Mt-28S Substations would most likely be visible from the Greenway. The Mt-28N Substation would not be visible to the Greenway users. Construction activities and stockpiling of excavated materials could pose aesthetic impacts to the Greenway users passing by the substations. Once the substation is completed, the aesthetic impacts would be minimal as the area is industrial in nature.

During operation, increased noise levels could impact the quality of recreational experience in the recreational facilities located in close proximity to the substations. When in operation, transmission line conductors and transformers present at the substation may produce audible noise slightly above background levels depending upon weather conditions and their design. The Applicant plans to surround both substations with decorative walls to help mitigate noise from the substation transformers. The Applicant has stated that they would surround both substations with decorative walls on three to four sides to help mitigate noise from the substation transformers. In addition, the Applicant has stated that they would install sound absorbing panels at the Midtown North Substation to ensure compliance with state and city noise regulations (Xcel Energy, 2009).

5.7.3. Mitigation

Mitigation of temporary impacts during construction from dust and noise are addressed in Sections 5.13, Air Quality, and 5.14, Noise. No significant permanent impacts to recreation are expected, although the following would reduce or minimize the potential minimal effects anticipated.

5.7.3.1. Restricted Access

There would be no significant direct impact to the Greenway or to the other recreational facilities from construction or operation of the routes or substations. Temporary access restrictions would occur during construction. Residents may need to use alternate routes to reach parks and other points of interest due to temporary road closures and access restrictions.

If Route C is selected, construction could be avoided or minimized during the May Day Parade and the Art Festival to avoid impacts to recreation.

The Applicant recognizes that there is interest in adding an access point to the Greenway at the proposed Midtown North site. The Applicant's proposed design for Midtown North accommodates a walkway installation along the south side of the wall.

5.7.3.2. Increased Noise Levels

The Applicant has stated that they would surround both substations with decorative walls on three to four sides to help mitigate noise from the substation transformers. In addition, the Applicant has stated that they would install sound absorbing panels at the Midtown North Substation to ensure compliance with state and city noise regulations (Xcel Energy, 2009).

5.7.3.3. Aesthetic Impact

The Applicant has stated that the overhead structures would be constructed out of galvanized steel. This construction material could minimize the aesthetic impact on recreation by blending in with the recent modernization of the area. The Applicant has stated that if the Route A overhead design is selected, overhead distribution lines that currently exist along the route could be placed underground to mitigate aesthetic impacts to the Midtown Greenway.

To further mitigate aesthetic impact, the Applicant has proposed that the aboveground substations be surrounded on three to four sides with an architecturally designed wall. Alternatively, substations could be undergrounded to eliminate impacts from visual intrusion. Mitigation of aesthetics impacts is further discussed in Section 5.8, Aesthetics.

5.8. Aesthetics

This section provides information about the existing visual landscape in the Project Area and describes identified scenic areas and sensitive visual receptors. The focus of this analysis is placed upon visual experiences, which are the ways in which people view the landscape. The active use of these resources is largely discussed within Section 5.7, Recreation and Tourism.

5.8.1. Affected Environment

A large proportion of the Project Area is residential in character, complemented with supporting uses such as churches, schools and corner retail. The residential units are primarily one to two story single family houses and duplexes, but a number of two to three story multi family buildings also exist. At select locations around the neighborhood, primarily adjacent to Route E2, there are some taller multi family buildings in the range of 12 to 15 stories. Many of the route alternatives are within a couple blocks of, and run parallel to, Lake Street, which is a commercial corridor that spans the full width of south Minneapolis. Lake Street has recently been reconstructed through the Project Area. The reconstruction project included streetscape enhancements such as ornamental street lights, street furniture, improved sidewalks, transit shelters, parking lot screening and street trees. Project Area streets are typically lined with street trees. There are a few select segments along the proposed routes without street trees, primarily due to the lack of adequate boulevard space.

Two smaller areas within the overall Project Area vary from this residential character, as shown in Figure 5.2-1. The first is the medical campus area of Children's Hospital and Abbott Northwestern Hospital generally bounded by 25th Street on the North, 10th Avenue on the east, the Midtown Greenway on the south and Chicago Avenue on the

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west, with some medical campus related structures extending west on select blocks to Columbus Avenue. This area is characterized by large commercial and institutional buildings and parking ramps in the range of three to 10 stories. The streets are primarily lined with street trees with a few select locations without street trees due to the lack of adequate boulevard space. The second area is the Wells Fargo campus generally bounded by Interstate 35W on the west, 26th Street on the north, 5th Avenue on the east and the Midtown Greenway on the south. This area is characterized by large institutional buildings and parking ramps in the range of three to six stories.

Another area of note within the Project Area is the Midtown Greenway, which once was a grade-separated (depressed) railroad corridor that is being transitioned into a Greenway corridor for non-motorized transportation. Currently a bike path exists along the north side of the corridor with space reserved on the south side for future light rail transit. With its origins as a railroad corridor, the Greenway is primarily lined with a mixture of one to two story light industrial buildings and residential units, with one exception being the Midtown Exchange building, which at its tallest is 16 stories (approximately 210 feet) in height. With the transition from industrial to transportation uses, newer buildings adjacent to the Greenway are transitioning to three to four story multi family residential buildings. The Hennepin County Regional Rail Authority (HCRRA) has developed Cultural Landscape Management and Treatment Guidelines that call for preserving the historical character and integrity of the Greenway, which include buildings and structures. The north and south slopes down to the Greenway are primarily vegetated with trees and shrubs, with the exception of the area between 11th Avenue and Chicago Avenue, and to a lesser degree between Chicago Avenue and the Midtown Substation.

The character of the area in the vicinity of Route E2, Midtown Substations, and western terminus of alternative routes is heavily influenced by the transportation corridors of Interstate 35W (I-35W) and Interstate 94 (I-94). Noise walls exist between I-35W and the adjacent residential neighborhoods immediately east and west of I-35W. A concrete retaining wall (approximately 20-foot height) provides a grade separation between I-94 and the adjacent residential neighborhood immediately north and south of I-94. Most buildings facing north onto I-94 have uninterrupted views of the Minneapolis downtown skyline.

The character of the far eastern edge of the Project Area is influenced by the transportation function of Hiawatha Avenue (Highway 55), along with the Hiawatha light rail transit line and an existing railroad that parallels Hiawatha Avenue. There are three bridges of note in this area, the Martin Olav Sabo Bridge where the Midtown Greenway trail crosses Hiawatha Avenue, the Hiawatha Avenue Bridge over Lake Street and the Hiawatha LRT bridge over Lake Street and Hiawatha Avenue, as shown in Figure 5.8-1. These bridges at times screen street level views to adjacent parcels while also providing views for those using them down to adjacent parcels. The area is primarily light industrial and commercial in character, with the exception of a residential area west of Hiawatha between I-94 and 26th Street that is predominantly screened from Hiawatha Avenue by noise walls. Industrial and commercial buildings are typically one story, architectural precast concrete buildings, with the exception of a few two to four story buildings west of Hiawatha Avenue and a five story multi family building east of the Hiawatha West Substation site. The community recently organized a tree planting event along the east side of Hiawatha Avenue adjacent to the Midtown Greenway as it parallels Hiawatha Avenue. The tree planting area encompasses a portion of the Hiawatha West Substation location and an undeveloped area to the east of the Hiawatha East Substation location.

The majority of the proposed routes contain existing overhead electrical distribution lines. These lines are typically mounted on wooden structures that are approximately 30 to 40 feet tall and have a 12-inch diameter pole. A representative existing distribution pole is shown in Figure 5.8-2. At times these structures also host additional utility wires and double as street light posts.

A 115 kV line supported by single circuit tangent structures currently parallels the east side of Hiawatha Avenue. The structures are similar to the proposed single circuit tangent structures proposed for the project and are depicted in Figure 3-3. These painted metal structures are approximately 80 feet tall and have a 4-foot diameter at their base. The davit arms extend approximately 7 feet from the pole. The Hiawatha Avenue corridor historically has had an industrial character with rail lines, grain elevators and industrial buildings along Hiawatha Avenue. The existing transmission line is not incongruous with the existing character of the corridor.

5.8.2. Direct/Indirect Effects

This section provides a discussion of the potential aesthetic impacts from the Project. The Project likely would be visible to many residents living in the Project Area, as well as those traveling on roadways through the area. Potential direct and indirect effects include changes to the visual landscape.

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5.8.2.1. Transmission Facility Overview

This section identifies potential direct and indirect effects of the Project, specific to the aboveground and underground construction options, and route and substation alternatives.

Overhead Transmission

During construction, visual impacts would be experienced due to the presence of construction equipment, excavation of foundations, staging areas, and structure and line installation. These impacts would be felt by residents in locations with a view to the transmission routes and those who travel by these locations.

The proposed structures for the 115 kV lines from the Midtown Substation to the Hiawatha Substation would be galvanized metal with davit arms with either single or double circuit tangent structures, depending upon which route is chosen, as shown in Figure 3-1 and Figure 3-3. The single circuit tangent structures would be similar to the existing single circuit tangent structures located on the east side of Hiawatha Avenue. Both the double circuit and single circuit tangent structures would be between 75 and 80 feet in height, although some would reach 100 to 115 feet in height where the line crosses transportation corridors. Using a typical transmission structure height of 75 feet, the bottom transmission line is approximately 42 feet above the ground. If the structure also needs to support distribution lines on underbuild arms as shown in Figure 3-3, and assuming a clearance of 11 feet between the transmission line and the distribution line, the distribution lines would be approximately 31 feet above the ground. The poles would have an average span of approximately 500 feet between the structures, although some smaller spans have been proposed based upon existing features in the Project Area. Structures can be placed to minimize direct aesthetic impacts (e.g., avoid placement of poles directly in front of buildings). The Applicant plans to minimize direct impacts where practical.

Existing trees would be allowed to remain under the overhead transmission lines but would be trimmed to a height of 15 feet per Applicant maintenance requirements. The mature height of over story trees typically found in Minneapolis, such as maples, ash, oaks, honey locust and hackberry, on average range from 30 to 50+ feet. A 15-foot height is equivalent to the mature height of smaller cultivars of Crabapple trees. Trimming existing over story trees under the transmission lines can severely impact the form and aesthetic character of these trees, if not trimmed properly (i.e., lowering of the crown height).

Public ROW vertical elements in the Project Area such as overhead utility distribution poles, traffic signals and street lights typically take the form of either wood poles or painted metal posts with a typical height of 30 feet. The use of galvanized metal for the transmission structures may reduce the visual impact when viewed at a distance. Galvanized metal has traditionally been used for industrial applications and may be perceived as an incongruent material in relation to the materials typically used in the adjacent residential, commercial, institutional or office uses, such as wood, brick, and architectural concrete.

Underground Transmission

During construction of the underground transmission line, visual impacts would be experienced due to the presence of construction equipment, excavation and construction of the duct banks. The transmission lines would be placed in two duct banks adjacent to each other in the same trench at a depth of 4 feet 10 inches to the bottom of the duct bank. The excavated trench width would be at a minimum of 9 feet 8 inches wide at the bottom of the trench. The width at the top of the trench would depend on the excavation approach used. Figure 3-6 depicts representative duct bank placement and associated trench excavation. The underground transmission duct banks would be located under sidewalks and boulevards to the extent possible in order to minimize encroachment into the street. This would require the removal of trees and other vegetation in the boulevard that lie within the excavation trench boundaries. Vegetation replacement above the duct banks would be limited by the Applicant to shallow rooted species to avoid the possibility of deep rooted species invading the duct bank.

Transmission Line Route Alternatives

The section identifies potential impacts specific to the transmission line route alternatives.

Route A Overhead Route

The majority of the Applicant's preferred alignment for an overhead construction of Route A would be located at street level along 29th Street, to the south and mostly outside of the Midtown Greenway. The preferred alignment would cross the Midtown Greenway near the Midtown Exchange building and travel on the north side of the Greenway to the Midtown Substation.

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The overhead structures for Route A are galvanized, double circuit structures with davit arms, as shown in Figure 3-1, which would be bolted to concrete pier foundations. The concrete caisson foundations would extend approximately 6 inches above the ground line. At several locations the lines would cross existing and future light rail, auto and pedestrian paths. There would be custom designed structures for the current and future light rail corridors based on the field requirements at each location. These structures would look something like the dead end structures depicted in Figure 3-2, with an additional arm to support crossings without an additional structure.

The preferred alignment for Route A would parallel the south side of 28th Street from Hiawatha Avenue to the start of the Midtown Greenway and would pass by light industrial buildings, as shown in Figure 1-2 and Figure 5.8-6. The industrial nature of the transmission structures would not be incongruent to the character of this area. Further west, the transmission structures and lines between 28th Street and Cedar Avenue pass to the north of Pioneers and Soldiers Cemetery. While the transmission structures and lines would likely be partially obscured by foreground trees, they are not consistent with the pastoral quality of the cemetery and may be visible as people view the cemetery from Lake Street and Cedar Avenue.

The preferred alignment along 29th Street between 18th Avenue and 11th Avenue would be located immediately on top of the Midtown Greenway's southern slope. Between 10th Avenue and 11th Avenue, the preferred alignment would be located below street level in the Greenway, as shown in Figure 5.8-5. While the use of the Greenway is transitioning to transportation and residential uses, the Greenway still conveys a historic industrial character. This, along with the Greenway's approximate width of 100 feet, may not be incongruent with the scale and material of the transmission structures.

The Greenway is separated from residential and industrial properties by 29th Street, which borders the Greenway to the south. The preferred alignment of Route A at the southern boundary of the Greenway and northern sidewalk of 29th Street would provide approximately 50 feet of separation between the transmission line facilities and single family houses, multi family buildings, and industrial buildings. The mass and material of the transmission structures, along with the proximity of the structures to the sidewalk, would not be consistent with streetscape elements that pedestrians typically encounter. The transmission structure scale and the galvanized metal would not be consistent with building materials typically found in residential housing. While the materials of the transmission structures would be consistent with the materials used in the industrial buildings located along 29th Street, the scale of the structures would not be consistent with the smaller scale of most of these industrial structures.

Between 10th Avenue and Chicago Avenue, the preferred alignment would cross from the top of the south slope to the top of the northern slope of the Greenway. In this segment, the transmission structures would pass the Midtown Exchange. While the transmission structures are in scale of this building, the galvanized metal and industrial character of the structures would not consistent with the Art Deco style of the Exchange building south of the Greenway, but is not inconsistent with the industrial building located immediately north of the Greenway.

The preferred alignment located on the north side of the Greenway between Chicago Avenue and the Midtown Substation would not be separated from the adjacent parcels by a street. Small area plans call for the future construction of a pedestrian promenade trail along top of the north slope of the Greenway for this transmission line segment. The mass and materials of the transmission structures, along with the proximity of the structures to the trail, would not be consistent with promenade elements that pedestrians typically encounter. The scale, material and industrial character of the transmission structures would not be consistent with the building materials typically found in the residential housing along the Greenway or with other outdoor elements found in residential front or side yards. While the materials of the transmission structures would be consistent with the materials used in the industrial buildings located along the Greenway, its scale would not be consistent with the smaller scale of most of these industrial structures. Along this segment of Route A, the route width would allow for alignment of the transmission line and placement of associated right-of-way (ROW) along the south slope or bottom of the Greenway.

Distribution lines currently exist along the south side of 29th Street between 18th Avenue and 11th Avenue and between Chicago Avenue and Midtown Substation on the north side of the Greenway. The Applicant has proposed to relocate these existing distribution lines and place them underground with the construction of the new transmission structures and lines if overhead Route A is selected, as shown in Figure 5.8-4.

The existing distribution lines referenced are at heights ranging from approximately 30-40 feet. By relocating the distribution lines to the transmission structures, and assuming an 11-foot clearance between the lowest transmission line and the distribution line, the distribution lines will be approximately 31 above the ground. This may result in some of the distribution lines that are currently at a height of 40 feet being lowered to approximately 30 feet, which may increase the number of buildings that have distribution lines passing through the field of vision for building residents than currently exists today. If redevelopment along the Greenway incorporates taller buildings, there is an increased chance that the transmission lines would pass through the field of vision of residents in the upper stories of these buildings.

Building heights along Route A typically fall in the range of one to two stories, with the exception of the six buildings that exceed two stories. The lowest height of the transmission line and underbuild arm facilities with co-located distribution lines would be approximately 42 feet and 31 feet above the ground, respectively. Transmission lines and underbuild arm facilities with distribution lines would be higher in locations with a minimum height restriction (e.g., above roadways, rail transit, and bridges). People looking out towards the street or Greenway from the third floor or higher of the following buildings may have the transmission lines in their field of vision.

- A multi family building (three stories) at the intersection of Cedar Avenue and 29th Street;
- A multi family building (four stories) on 29th Street between 10th Avenue and 11th Avenue;
- A multi family building (three stories) at the intersection of 29th Street and Bloomington Avenue;
- The central tower of Midtown Exchange building, which is 16 stories (approximately 210 feet) in height. The remainder of the Midtown Exchange building ranges in height between four and 10 stories;
- The Sheridan Hotel (four stories) east of Chicago Avenue and south of the Greenway; and
- A multi family building (three stories) south of the Greenway and west of Park Avenue.

Given the depressed, linear nature of the Greenway, the transmission structures would be most visible to people traveling within the Greenway or crossing over the Greenway bridges as part of extended views up and down the corridor, created by the repetition of the transmission structures along the corridor. Outdoor dining facing onto the Greenway exists at the Midtown Exchange. Diners would view the transmission lines that are crossing overhead in this area, as well as the transmission structures that extend east and west down the Greenway.

Existing trees would be allowed to remain under the overhead transmission lines but would be trimmed to a height of 15 feet per Applicant maintenance requirements. Trimming existing over story trees under the transmission lines would severely impact the form and aesthetic character of these trees if not trimmed property (i.e., lowering the crown height). This will primarily occur along Route A between 28th Street and 11th Avenue as shown in Figure 5.8-3 and to a lesser degree between Chicago Avenue and the Midtown Substation.

Route A Underground Route

Construction of an underground transmission line along Route A, as shown in Figure 1-2, would require the removal of trees and other vegetation that currently lies within the excavation trench boundaries. Two segments of Route A in particular would likely experience vegetation removal:

- The Greenway corridor between 28th Street and 18th Avenue; and
- The north slope of the Greenway between Elliot Avenue and the Midtown Substation.

Vegetation replacement above the duct banks would be limited by the Applicant to shallow rooted species to avoid the possibility of deep rooted species invading the duct bank. If the root depths of most over story trees exceed the Applicant's shallow depth requirement, the loss of over story trees within the Greenway would not be consistent with the vegetated character desired by the community for this corridor, as stated in adopted small area plans and as evidenced by community Greenway planting events that have occurred.

The Applicant has stated that there would be no aboveground facilities associated with underground transmission lines.

Route B

The majority of the proposed structures are galvanized metal, single circuit with davit arm, supplemented with distribution underbuild arms as needed as shown in Figure 3-3. The davit arms and transmission lines would be cantilevered over the street. At several locations the line would cross existing and future light rail, auto and pedestrian

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paths requiring custom designs for these structures based on specific site conditions. Even with the customization, the transmission structures would be similar to those shown in Figure 3-3. Structure foundations would be below grade such that the sidewalk/street curb can be finished up to the surface of the structure as shown in Figure 3-4.

Route B, as shown in Figure 1-3, is located primarily where existing overhead distribution lines parallel the streets. Where the proposed transmission line structures would be located near an existing distribution line structure, the distribution line structure would be removed and the distribution line would be supported by the new transmission line structure, thus consolidating some utilitarian elements in the street environment. These existing distribution lines are at heights ranging from approximately 30 to 40 feet. By relocating the distribution lines to the transmission structures, and assuming an 11-foot clearance between the lowest transmission line and the distribution line, the distribution lines will be approximately 31 above the ground. This may result in some of the distribution lines that are currently at a height of 40 feet being lowered to approximately 30 feet, which may increase the number of buildings that have distribution lines passing through the field of vision for building residents than currently exists today.

The preferred alignment would be placed in the street boulevard, between the street curb and pedestrian sidewalk. For large segments of Route B, the street ROW outside of the roadway is comprised of six-foot pedestrian sidewalks separated from the roadway by 4-foot turf grass boulevards. While the ROW does extend beyond the pedestrian sidewalk, numerous fences and private landscaping occur in this area. The diameter of transmission structures at ground level typically range from 2.5 to 3.5 feet. Within a typical four-foot boulevard, 6 inches is taken up by the top of curb. If the transmission structure width is 3.5 feet in diameter, it would extend continuously from the back of curb to the edge of sidewalk. If a narrower transmission structure is used, the structure would need to be set at the back of curb to facilitate the mowing of the one-foot wide strip of turf between the structure and the sidewalk.

For the eastern portion of Route B, from Hiawatha Avenue to approximately Longfellow Avenue, the transmission structures and lines would pass by predominantly light industrial buildings interspersed with some houses on 26th and 28th Streets as shown in Figure 5.8-6. The industrial nature of the transmission structures would not be incongruent to the character of this area.

Houses in south Minneapolis typically face onto north-south Avenues. A higher than average number of houses face onto 28th Street and 26th Street in the Project Area. Photo simulations of 26th and 28th Streets before and after the Project, if the Project is located along Route B, are shown in Figures 5.8-11 and 5.8-12, respectively. Many of the houses have shallow front or side yard setbacks, bringing the houses close to the street. For 26th and 28th Streets between Longfellow Avenue and 10th Avenue and for portions of Oakland Avenue, the predominance of existing two story houses with shallow front and side yards, combined with street trees, street lights, fences and sidewalks create a street spatial volume that is pedestrian-scaled and residential in character. The mass and materials of the transmission structures, along with the proximity of the structures to the sidewalk, would not be consistent with streetscape elements that pedestrians typically encounter. The transmission structure scale, galvanized metal and industrial character would not be consistent with the residential character of the street or with building materials found in the adjacent residential housing.

Along 26th Street, from 10th Avenue to 12th Avenue, the preferred alignment would pass the northern edge of a neighborhood park. The mass and industrial character of the transmission pole on the north edge of the park, is not consistent with the pastoral and vegetated character of this park. The transmission line would also come within approximately 10 feet of a church at the intersection of 28th Street and 15th Avenue. The galvanized transmission structures would not be complementary to the architectural style and materials of the church.

The preferred alignment would pass through a medical campus area along both 26th and 28th Streets from 10th Avenue to Chicago Avenue. These medical campuses are starting to extend westward to Columbus Avenue. Buildings in this area are comprised of institutional and office uses, along with structured parking garages, located in highly manicured landscapes. These buildings are much larger in scale than the adjacent residential houses, range in height from three to 10 stories, and are constructed from materials such as brick, glass and architectural concrete. While the scale of the transmission structures would not be incongruent with the scale of these buildings, the use of galvanized metal for the transmission structures would not be consistent with the campus setting materials and character.

West of the medical campus the character of the route transitions to an area that is comprised of a mixture of large, historic mansions, large and small multi family buildings, duplexes and single family houses, along with some industrial buildings closer to the Greenway. The mansions are constructed from high quality materials with

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well-preserved architectural detailing and are set in spacious, manicured yards. These mansions are important identity elements for the neighborhood. The transmission structures and lines would come in close proximity (approximately 10 feet) to the west-facing facade of one of these neighborhood mansions, the American Swedish Institute. While this side of the building is not the primary entrance of the building, it does have high quality architectural detailing. The transmission line would also pass by the north side of the American Swedish Institute and would be approximately 40 feet away from the building and 10 feet away from the Institute's ornamental fencing. The galvanized transmission structures would not be complementary to the historic nature, architectural style and materials of the American Swedish Institute or the adjacent mansions and early century multi family buildings.

A segment of Route B would be located on the north side of the Greenway between Chicago Avenue and the Midtown Substation. Along this segment of Route B, the route width would allow the placement of the transmission structures along the north slopes and along the bottom of the Greenway. The scale, material and industrial character of the transmission structures would not be consistent with the building materials found in the residential housing along this segment of the Greenway. While the materials of the transmission structures would be consistent with the materials used in the industrial buildings located along the Greenway, its size would not be consistent with the smaller scale of most the adjacent industrial structures in this segment. Small area plans call for the future construction of a pedestrian promenade trail along top of the north slope of the Greenway for this transmission line segment. The mass and materials of the transmission structures, along with the proximity of the structures to the trail, would not be consistent with promenade elements that pedestrians typically encounter.

The preferred alignment would be most visible to people traveling along Route B streets as part of extended views up and down the streets, created by the repetition of the transmission structures along the street. Existing trees would be allowed to remain under the overhead transmission lines but would be trimmed to a height of 15 feet per Applicant maintenance requirements. Trimming existing overstory trees under the transmission lines would severely impact the form and aesthetic character of these trees. The following route segments would be impacted by tree trimming:

- 28th Street between Longfellow Avenue and 10th Avenue and between Chicago Avenue and Columbus Avenue;
- Coumbus Avenue between 28th Street and the Greenway;

- Midtown Greenway between Columbus and Oakland Avenue;
- Oakland Avenue between the Greenway and 26th Street; and
- 26th Street between Oakland Avenue and Longfellow Avenue.

Building heights along Route B typically fall in the range of one to two stories, with the exception of the following buildings along Route B that exceed two stories. Given that the lowest transmission line and underbuild arm distribution line would be approximately 42 feet and 31 feet above the ground, respectively, people looking out towards the street or Greenway from the third floor or higher of the following buildings may have the transmission lines pass through their field of vision:

- Abbott Northwestern Hospital (approximately 10 stories);
- An office building at 2800 Chicago Avenue (four stories);
- A multi family building (nine to 17 stories) at the intersection of Oakland Avenue and 27th Street;
- A multi family building (six stories) at the intersection of Columbus Avenue and 26th Street;
- A multi family building (four stories) at the intersection of Cedar Avenue and 28th Street; or
- Five medical office buildings (ranging from three to seven stories) along 26th Street between Chicago Avenue and 10th Avenue.

Route B along Hiawatha Avenue between 26th Street and the Hiawatha substation would pass through a light industrial area where an existing 115kV transmission line parallels the east side of the roadway. Construction of another transmission line along this corridor is compatible with the current industrial character of this area.

Route C

The majority of the proposed structures are galvanized metal, single circuit with davit arm, supplemented with distribution underbuild arms as needed, as shown in Figure 3-3. The davit arms and transmission lines would be cantilevered over the street. At several locations the line would cross existing and future light rail, auto and pedestrian paths requiring custom designs for these structures based on specific site conditions. Even with the customization, the transmission structures would be similar to those shown in Figure 3-3. Structure foundations would be below grade such that the sidewalk/street curb can be finished up to the surface of the structure as shown in Figure 3-3.

Route C, as shown Figure 1-4, is located primarily where existing overhead distribution lines parallel the streets. Where the proposed transmission line structures would be located near an existing distribution line structure, the distribution line structure would be removed and the distribution line would be supported by the new transmission line structure. These existing distribution lines are at heights ranging from approximately 30-40 feet. By relocating the distribution lines to the transmission structures, and assuming an 11-foot clearance between the lowest transmission line and the distribution line, the distribution lines will be approximately 31 above the ground. This may result in some of the distribution lines that are currently at a height of 40 feet being lowered to approximately 30 feet, which may increase the number of buildings that have distribution lines passing through the field of vision for building residents than currently exists today.

The preferred alignment along 28th Street, Portland Avenue, and Columbus Avenue would be placed in the street boulevard, between the street curb and pedestrian sidewalk. For 31st Street, the transmission structures would be placed in or behind the sidewalk. Photo simulations of 28th Street and 31st Street before and after the Project, if the transmission line is located along Route C, are shown in Figures 5.8-12 and 5.8-13, respectively. For large segments of 28th Street, the street ROW outside of the roadway is comprised of 6-foot pedestrian sidewalks separated from the roadway by 4-foot turf grass boulevards. While the ROW does extend beyond the pedestrian sidewalk, numerous fences and private landscaping occur in this area. The diameter of transmission structures at ground level typically range from 2.5 to 3.5 feet. Within a typical four foot boulevard, 6 inches is taken up by the top of curb. If the transmission structure width is 3.5 feet in diameter, it would extend continuously from the back of curb to the edge of sidewalk. If a narrower transmission structure is used, the structure would need to be set at the back of curb to facilitate the mowing of the one-foot wide strip of turf between the structure and the sidewalk. Portland Avenue and Columbus Avenue have boulevard widths that typically range from 4.5 to 10 feet. There is generally adequate space to place a transmission structure in these boulevards. For 31st Street, the street ROW outside of the roadway is comprised of a 7.5-foot sidewalk located at the back of the curb. While the ROW does extend 2.5 feet beyond the pedestrian sidewalk, numerous fences and private landscaping occur in this area.

Route C would require special construction arrangements to accommodate for the narrow to nonexistent boulevard along 31st Street. Special structures with narrower than normal bases would be ordered for the route.

On 31st Street from Hiawatha Avenue to 19th Avenue, the transmission structures and lines would predominantly pass by large surface parking lots, institutional buildings such as the YWCA and South High School, along with the high school athletic fields and several single family and multi family housing. The mass of these institutional buildings, along with open nature of the parking lots and athletic fields, may be compatible with the height and mass of the transmission structures, but would not be compatible with the galvanized metal material and industrial character of the structures.

Houses in south Minneapolis typically face onto Avenues. A higher number of houses than average face onto 28th Street and 31st Street in the Project Area. Many of the houses have shallow front or side yard setbacks, bringing the buildings close to the street. While the houses along Portland Avenue are set further back from the street, all of the houses face onto Portland Avenue. For Portland Avenue, 28th Street between Longfellow Avenue and 10th Avenue, and 31st Street between 19th Avenue and Portland Avenue, the predominance of existing two story houses, combined with street trees, street lights, fences and sidewalks create a street spatial volume that is pedestrian-scaled and residential in character. The mass and materials of the transmission structures, along with the proximity of the structures to the sidewalk, would not be consistent with streetscape elements that pedestrians typically encounter. The transmission structure scale, galvanized metal and industrial character would not be consistent with the residential character of the street or with building materials found in the adjacent residential housing.

The preferred alignment would come within approximately 10-20 feet of churches located at the intersections of 28th Street and 15th Avenue; Chicago and 31st Street; Columbus and 31st Street; and Park Avenue and 31st Street. The galvanized transmission structures would not be complementary to the architectural style and materials of these churches.

A segment of Route C would be located on the north side of the Greenway between Chicago Avenue and the Midtown Substation. Along this segment of Route C, the route width would allow the placement of the transmission structures along the north slopes and along the bottom of the Greenway. The scale, material and industrial character of the transmission structures would not be consistent with the building materials found in the residential housing along this segment of the Greenway. While the materials of the transmission structures would be consistent with the materials used in the industrial buildings located along the Greenway, its size would not be consistent with the smaller scale of most the adjacent industrial structures in this segment. Small area plans call for the future construction of a pedestrian promenade trail along top of the north slope of the Greenway for this transmission line segment. The mass and materials of the transmission structures, along with the proximity of the structures to the trail, would not be consistent with promenade elements that pedestrians typically encounter.

The transmission structures would be most visible to people traveling along Route C streets as part of extended views up and down the streets, created by the repetition of the transmission structures along the street. Existing trees would be allowed to remain under the overhead transmission lines but would be trimmed to a height of 15 feet per Applicant maintenance requirements. Trimming existing overstory trees under the transmission lines would severely impact the form and aesthetic character of these trees. The following route segments will be impacted by tree trimming:

- Portland Avenue between 31st Street and Midtown Greenway;
- The Midtown Greenway between Portland Avenue and Columbus Avenue;
- Columbus Avenue between the Greenway and 28th Street; and
- 28th Street between Columbus Avenue and Chicago Avenue and between 10th Avenue and Longfellow Avenue.

Along 31st Street, intermittent trees located on private parcels have branches that extend out into the street. These branches would also require trimming, which will impact the form of these trees

Building heights along Route C typically fall in the range of one to two stories, with the exception of the following buildings along Route C that exceed two stories. Given that the lowest transmission line and underbuild arm with distribution line would be approximately 42 feet and 31 feet above the ground, respectively, people looking out towards the street or Greenway from the third floor or higher of the following buildings may have the transmission lines pass through their field of vision:

- Abbott Northwestern Hospital (approximately 10 stories);
- An office building at 2800 Chicago Avenue;
- A multi family building (three stories) at the intersection of 19th Avenue and 31st Street;
- A multi family building (three stories) at the intersection of 22nd Avenue and 31st Street; or
- A multi family building (four stories) at the intersection of Cedar Avenue and 28th Street.

The transmission structures and lines would predominantly pass by light industrial buildings, interspersed with some houses, on 28th Street from Hiawatha Avenue to approximately Longfellow Avenue as shown in Figure 5.8-6. Along Hiawatha Avenue between 28th Street and 31st Street, the transmission lines would pass through a light industrial area and would pass behind several retail buildings where an existing 115kV transmission line parallels the east side of the roadway. Construction of another transmission line along these segments of Route C would be compatible with the current industrial character of these areas.

Route D

The underground transmission duct banks for Route D, as shown in Figure 1-5, would be located under sidewalks and boulevards to the extent possible in order to minimize encroachment into the street. This would require the removal of trees and other vegetation in the boulevard that lie within the excavation trench boundaries, resulting in the loss of all street trees along the north side of 28th Street and the west side of Oakland Avenue along Route D. Vegetation replacement above the duct banks would be limited by the Applicant to shallow rooted species to avoid the possibility of deep rooted species invading the duct bank. If the root depths of most over story trees exceed the Applicants' shallow depth requirement, the loss of over story trees within the Greenway would not be consistent with the vegetated character typical of Minneapolis residential streets.

Route E2

Should the transmission lines for Route E2, as shown in Figure 1-6, be located on the Interstate and Highway side of the noise barrier walls, the scale, mass and industrial character of the transmission structure would not be incongruent to the vehicle oriented character of these corridors.

Should the transmission structures along Route E2 be placed on the residential side of the noise barrier walls, the lines would parallel residential streets predominately lined with single family house styles. Segments of the route that vary from single family house styles include three-story apartment buildings along I-94, 12-15 story apartment buildings along the northern portion of Hiawatha Avenue, a neighborhood park abutting Hiawatha Avenue between 22nd and 24th Streets, and light industrial buildings south of 26th Street. Route segments that are predominantly comprised of residential structures combined with street trees, street lights, fences and sidewalks create a street spatial volume that is pedestrian-scaled and a residential character. The mass and materials of the transmission structures, along with the proximity of the structures to the sidewalk, would not be consistent with streetscape elements that pedestrians typically encounter. The transmission structure scale, galvanized metal and industrial character would not be consistent with the residential character of the street or with building materials found in the adjacent residential housing. Route E2 along Hiawatha Avenue between 26th Street and the Hiawatha substation would pass by the Martin Sabo cable-stay bridge. The architectural highlight of the bridge's vertical tower and cables, located on the west side of Hiawatha Avenue, would not be compatible with the transmission towers and transmission lines.

Residential streets along Route E2 are located primarily where existing overhead distribution lines parallel the streets. The placement of transmission structures along I-94 may interrupt residents' view of the downtown skyline, particularly those located on upper floors of apartment buildings.

5.8.2.2. Substation Alternatives

The Hiawatha Substation would be located in an area characterized by light industry, a major transportation corridor (Hiawatha Avenue, Hiawatha LRT, and the Midtown Greenway) and commercial retail development. The Midtown Substation would be located in an area that is predominantly light industrial and residential in character. The substation would be located directly adjacent to the Midtown Greenway, an amenity and east-west transportation corridor spanning south Minneapolis.

During construction, visual impacts would be experienced due to demolition of any existing site facilities, the presence of construction equipment, excavation of foundations, the use of staging areas, and wall, structure and line installation. These impacts would be temporarily felt by residents in locations with a view to the substations and those who travel by these locations.

Hiawatha West

The Hiawatha West Substation, the Applicant's preferred location, would be a low-profile substation, with an average height of approximately 20 feet. In portions of the substation, transmission equipment of an industrial character and approximate height of 40 feet would extend above the architectural walls. Photo simulations of the Midtown West Substation from the viewpoint of the Sabo Bridge are shown in Figures 5.8-7 and 5.8-8. The substation would be surrounded on three sides (north, west and south) with a 22-foot prefabricated concrete, architecturally designed wall with a graffiti resistant design appropriate to the area. Two potential wall designs, consisting of an architecturally designed wall with brick accents and a pre-cast concrete wall, are shown in Figures 5.8-14 and 5.8-15, respectively. The east side would be comprised of a 7-foot tall galvanized metal chain-link fence with an additional vertical foot of barbed wire at a 45 degree angle. Substation galvanized metal chain link gates would be 20 feet wide and 7 feet tall with an additional vertical foot of barbed wire at a 45 degree angle. The substation wall would have a footprint dimension of 253 feet x 392 feet, or 2.25 acres, with the larger dimension being the north-south direction along Hiawatha Avenue.

The substation would be visible to vehicle drivers, LRT passengers, bicyclists and pedestrians along Hiawatha Avenue and to bicyclists and pedestrians traveling on the Midtown Greenway. Photo simulations of the Midtown West Substation from the intersection of E 28th Street and Hiawatha Avenue are shown in Figures 5.8-14 and 5.8-15. The photo simulations show the options for an architecturally designed wall with brick or pre-cast concrete wall, each of which was designed by the Applicant to be compatible with surrounding industrial land use. The substation would terminate the view of eastbound traffic on 28th Street. The aesthetic character of this wall segment and any associated landscaping would have heightened importance at this location. The substation would be visible from a five story multi family building located east of the substation, from the service entrances of the adjacent light industrial and retail buildings and from the light industrial buildings located west of Hiawatha Avenue.

Photo simulations of the Midtown West Substation from Minnehaha Avenue, located to the east of the substation location, are shown in Figures 5.8-16 and 5.8-17.

The substation wall footprint and architectural treatment would be comparable to the existing light industrial and retail buildings in the area. The transmission equipment visible above the architectural wall would have a more industrial character than the adjacent light industrial buildings. Currently, the back service areas of these buildings face onto Hiawatha Avenue. The substation would be located closer to Hiawatha than the adjacent light industrial and retail buildings and would screen the service side of the Zimmer-Davis building from Hiawatha Avenue.

Hiawatha East

The Hiawatha East Substation, an alternative to Hiawatha West, would be a low-profile substation, with an average height of approximately 20 feet. In portions of the substation, transmission equipment of an industrial character and approximate height of 40 feet would extend above the architectural walls. The substation would be surrounded on three sides (north, west and east) with a 22-foot prefabricated concrete, architecturally designed wall with a graffiti resistant design appropriate to the area as shown in Figure 3-9. The south side would be comprised of a 7-foot tall galvanized metal chain-link fence with an additional vertical foot of barbed wire at a 45 degree angle. A galvanized metal chain link gate that is 20 feet wide and 7 feet tall with an additional vertical foot of barbed wire at a 45 degree angle would be located along the southern end of the east facing wall at a location matching the existing southern driveway into the site. The substation wall would have a footprint dimension of 284 feet x 481 feet, or 3.16 acres, with the smaller dimension being the north-south direction along Minnehaha Avenue.

The substation would be visible to vehicle drivers, bicyclists and pedestrians along Hiawatha Avenue and Minnehaha Avenue, LRT passengers, and to bicyclists and pedestrians traveling on the Midtown Greenway, which would be located approximately 15–20 feet away from the substation's south side chain link fence. The substation would also be visible from the light industrial buildings located immediately north and south of the site, from light industrial buildings located on the east side of Minnehaha Avenue, from a 5-story multi family building located south of the substation, from the service entrances of the adjacent retail buildings and from the Green Institute and a light industrial building located west of Hiawatha Avenue.

The substation wall footprint would be larger than the existing light industrial buildings in the area. The substation would be located closer to Hiawatha than the adjacent light industrial building, but not as close as the retail building further south. The area immediately west of the substation recently received landscape plantings that may help to screen the substation from Hiawatha Avenue when they mature. The architectural treatment of the substation walls would be comparable to the existing light industrial buildings. The transmission equipment visible above the architectural wall would have a more industrial character than the adjacent light industrial buildings.

The wall setback from Minnehaha Avenue is not as deep as the light industrial buildings located immediately north and south of the substation. The substation setback would be approximately 85 feet closer to the roadway than the current building. This is would create a disruption of the uniform setback that currently exists along the street. In addition, the north substation wall would be approximately 65 feet closer to the north property line than the existing building, resulting in reduced visual access between the substation and the building located immediately north of the substation.

Midtown North

The proposed substation at the Midtown North location would be a high profile design with an average height of approximately 45 feet, which allows the substation to occupy a smaller footprint of 160 feet x 268 feet, or 0.98 acre, with the larger dimension being in the east-west direction along the Midtown Greenway as shown in Figure 3-10. (Given the site location, the substation would be landscaped on the south, east and west sides as practical and walled on four sides with an architecturally pleasing design. The substation wall would have a 12-foot height and be prefabricated concrete with a graffiti resistant design appropriate to the area. A galvanized metal chain link gate that is 20 feet wide and 7 feet tall with an additional vertical foot of barbed wire at a 45 degree angle would be located on the east and west facing walls at driveway access points. The block where the substation is located does not have an alley. Therefore, the proposed driveway entrances to the substation off of Portland Avenue and Oakland Avenue would be consistent with other parcels driveways along the block. Interest has been expressed by the community to add an access point to the Greenway at the proposed Midtown North substation site. In response to this interest, the substation wall and layout has been designed to accommodate a walkway installation along the south side of the wall.

Photo simulations of the Midtown North Substation from the adjacent Brown-Campbell property, Midtown Greenway, Oakland Avenue, and Portland Avenue are shown in Figures 5.8-18 through 5.8-21. The average height of the substation wall would extend approximately 12 feet above ground surface. The average height of substation structures would be 45 feet above ground surface. The majority of structures would be oriented on the southeast corner of the substation location and would be visible from the Brown-Campbell property, Midtown Greenway, and Oakland Avenue. Due to the orientation of the substation facilities, equipment would not be visible from the street level along Portland Avenue. For the Applicant's preferred alignment, two transmission line pole structures would be located immediately outside and to the south of the Midtown North Substation within the slope or trench of the Midtown Greenway. These structures, located outside the substation wall, would be up to 115 feet in height based on the route selected.

To a certain extent, the substation would not pose a significant change in visual character along Oakland Avenue as it would be replacing an existing substation located along Oakland Avenue. The new substation would be screened by a twelve foot wall, where the existing substation does not have any screening. Construction of the substation would require the removal of an abandoned and condemned triplex at 2833 Portland Avenue that has a single family scale. It would also fill in a currently vacant parcel consisting of turf grass and several trees encircled by a chain link fence, which would eliminate some visual green space from the block frontage.

The north and south walls of the substation would span the full width of the block between Portland Avenue and Oakland Avenue. The east and west facing substation walls have a much longer massing than the residential units located immediately north of the substation. The wall facing east is approximately twice the width of the multi family building located opposite the substation on the west side of Portland Avenue, yet the wall lengths are of similar size as the adjacent industrial buildings located opposite the substation on the east side of Oakland Avenue and across the Greenway.

The wall setback from Portland Avenue is not as deep as the housing units located further north on the block. This is would create a disruption of the uniform setback that currently exists along the street. The wall setback from Oakland Avenue is consistent with the setback of the housing along the block. The south substation wall would be closer to the Greenway than other adjacent buildings on the north side of the Greenway by approximately 25 feet.

The industrial building east of Oakland does not have any windows facing the substation. The substation walls and chain link gates would be viewed from a multi family building located across Portland Avenue. The choice of architectural wall treatments and color, along with the choice of material for the chain link fence would impact the substation's visual character. There would be space available on the east and west sides of the substation to plant a vegetated buffer. No space would be available for a vegetated buffer on the north side of the substation, which would face onto a residential side yard.

Part of the slope near the Midtown Greenway would be needed for the site and would require a new retaining wall. The retaining wall would require the removal of existing vegetation on the Greenway slope adjacent to the substation.

Should the existing vegetation along the south slope of the Greenway be maintained, views of the substation walls would likely be screened from street level pedestrians on the south side of the Greenway.

Midtown South

The proposed substation at the Midtown South location would be a high profile design with an average height of approximately 45 feet and a dimension of 245 feet x 249 feet, or 1.4 acres, with the larger dimension being in the east-west direction along the Greenway as shown in Figure 3-11. Given the site location, the substation would have 10 feet of landscaping on the east and west sides and would be walled on four sides with a 12-foot prefabricated concrete, architecturally designed wall with a graffiti resistant design appropriate to the area. Galvanized metal chain link gates that would be 20-feet wide and 7-feet tall with an additional vertical foot of barbed wire at a 45 degree angle would be located on the east and west facing walls at driveway access points. The residential portion of the block where the substation is located is serviced by an alley. While the proposed driveway entrances to the substation off of Portland Avenue and Oakland Avenue would be inconsistent with the remainder of the block, the overall substation design would reduce the number of driveway entrance from the current condition.

The footprint of the proposed substation is comparable to the existing building on the site. The proposed substation would change the visual character along Portland Avenue and Oakland Avenue, as the substation walls would replace an articulated space comprised of an existing a two story building and several one story industrial buildings with a uniform 12-foot high wall. The existing two story building faces onto Portland Avenue and is complementary in scale and form to the adjacent residential units. The existing structure facing onto Oakland Avenue has an industrial character with outdoor storage. The new substation walls would provide more screening of industrial uses than current site conditions.

The wall setback from Portland Avenue is consistent with the housing units located further south on the block. The wall setback from Oakland Avenue is consistent with the setback of the house immediately south of the site. Houses farther south on the block transition to deeper setbacks. The setback of the north facing substation wall is consistent with the setback of buildings east of the proposed substation. The east facing wall would terminate eastbound views along 29th Street, as 29th Street ends at Portland Avenue. The aesthetic character of this wall segment and any associated landscaping would have heightened importance at this location.

The multi family building east of Oakland is oriented towards the Greenway. A few windows on the west side of the building would face the substation. A large portion of the multi family parcel along Oakland Avenue is comprised of surface parking. The substation walls and chain link gates would be viewed from single family houses located across Portland Avenue. The south wall would face onto two residential side yards. There would be approximately 20–30 feet between the substation wall and these houses. This would be approximately 20 feet more space than what currently exists. The choice of architectural wall treatments and color, along with the choice of material for the chain link fence would impact the substation's visual character. There would be space available on the east and west sides of the substation to plant a vegetated buffer.

Midtown Mt-28N and Mt-28S

Both of these substation locations are located immediately east of I-35W and would be screened from I-35W by mature trees and shrubs as shown in Figure 1-1. Mt-28N is the site of a well maintained, highly manicured, private green space on the Wells Fargo campus. The green space is lined with 4–6 story office buildings and parking structures constructed from brick, glass and architectural concrete. Replacing the green space with a substation would not be compatible with the adjacent building materials and corporate campus setting. Mt-28S is the site of a surface parking lot immediately north of the Greenway. A substation on this site would be partially screened from the Greenway by mature trees and shrubs on the north slope of the Greenway. Parking structures constructed from brick and architectural concrete would be located north and east of the substation. While the materials and industrial character of the substation would not be compatible with the adjacent corporate campus parking structures, the relative isolation of the site would not make the substation incongruent with this location.

Underground Substations

Underground construction of the substation would eliminate visual intrusion and eliminate the majority of potential impacts to aesthetics. Figures 5.8-9 and 5.8-10 are simulations of an underground Hiawatha West substation, provided by the Applicant. As shown in the simulations, the area above the substation would be vegetated with shrubs and trees.

5.8.3. Mitigation

The section identifies mitigation measures to reduce or eliminate potential direct and indirect effects discussed above.

To mitigate visual impacts of the proposed transmission lines if the Route A overhead design is selected, the Applicant proposes to relocate the existing distribution lines along the 29th Street/HCRRA corridor and place them underground. If either Route B or C is selected, use of the special structures with narrower than normal bases along the full length of the routes, to the extent possible, could be considered to bring the scale of the transmission structures closer to typical vertical poles currently found along these routes.

The Applicant proposed to place the transmission structures in a manner to minimize direct impacts (e.g. avoid placing transmission structures directly in front of a building). For Route A, an additional mitigation measure that could be considered is locating transmission structures away from planned community gathering spaces along the Greenway, such as future transit station areas.

To reduce the aesthetic impact of trimming over story trees, the Applicant could plant cultivars or use techniques to lower the tree crown. Permanent removal of existing trees could be off-set by replacement with trees or shrubs the meet height requirements.

To mitigate visual impacts of the Hiawatha and Midtown Substations, the Applicant proposes to construct a 22-foot decorative wall surrounding the Hiawatha Substation on three sides and a 12-foot decorative wall surrounding the Midtown Substation. The walls would be architecturally designed to complement the existing character of the Project Area. Landscaping is also being proposed along select sides of the Midtown Substations.

To further mitigate the impact of the Hiawatha Substations, a 22-foot decorative wall on the east side of the substation with access gates and landscaping treatment could be considered. Fully enclosing the substation with a wall would screen views into the substation for users of the Midtown Greenway. Landscaping treatment would break up the massing of the walls and blend the site with the area immediately north that has just received landscape enhancements. A further mitigation measure would be to change the material of the fences and gates to have more of an architectural character while still achieving needed access and security.

To further mitigate the impact of the Midtown Substation, some landscaping on all sides of the walls, especially for walls facing residential properties, could be considered. While the space between the walls and the property lines vary, there appears to be adequate space to implement some landscaping. To further mitigate the impact of the Midtown Substations, articulating the architectural walls could be considered to bring the wall massing closer in scale to the adjacent residential buildings. Changing the material of the gates to have more of an architectural character, while still achieving needed access and security, could also be considered.

To minimize the potential for light pollution and industrial appearance of the substation after dark, down shielding lights could be used on the exterior walls of the substations. Although the Applicant does not typically provide lighting along exterior walls, the option to light the substations was identified as a potential mitigation measure to increase safety in the area.

5.9. Water Resources

This section identifies water resources located within the Project Area. Water resources are defined herein as surface water bodies, groundwater, wetlands, and floodplains. This section identifies the potential direct and indirect impacts of the Project on water resources in the Project Area and potential mitigation measures.

5.9.1. Affected Environment

The Project Area is situated in an urban area in southern Minneapolis, Hennepin County, Minnesota. The area is heavily developed with residential, commercial, and industrial properties. As such, water resources located within the Project Area are limited.

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Information on the location of surface waters and wetlands was obtained from Public Waters Inventory (PWI) maps maintained by the Minnesota Department of Natural Resources (MnDNR). Public waters are defined as all water basins and watercourses that meet the criteria set forth in Minnesota Statutes, section 103G.005, subdivision 15 and identified on PWI maps authorized by Minnesota Statutes, section 103G.201 (MnDNR, 2009). Under Minnesota Statutes, Section 103G.005, subdivision 15, public waters are defined as the following:

1) water basins assigned a shoreland management classification by the commissioner under sections 103F.201 to 103F.221;
(2) waters of the state that have been finally determined to be public waters or navigable waters by a court of competent jurisdiction;
(3) meandered lakes, excluding lakes that have been legally drained;
(4) water basins previously designated by the commissioner for management for a specific purpose such as trout lakes and game lakes pursuant to applicable laws;
(5) water basins designated as scientific and natural areas under section 84.033;
(6) water basins located within and totally surrounded by publicly owned lands;
(7) water basins where the state of Minnesota or the federal government holds title to any of the beds or shores, unless the owner declares that the water is not necessary for the purposes of the public ownership;
(8) water basins where there is a publicly owned and controlled access that is intended to provide for public access to the water basin;
(9) natural and altered watercourses with a total drainage area greater than two square miles;
(10) natural and altered watercourses designated by the commissioner as trout streams; and
(11) public waters wetlands, unless the statute expressly states otherwise.

Public waters wetlands include Type 3, 4, and 5 wetlands (as defined by the U.S. Fish and Wildlife Service) that are either larger than 10 acres in size in unincorporated areas or larger than 2.5 acres in size in incorporated areas (MnDNR, 2009). Information on the location of wetlands within the Project Area was obtained through a review of National Wetland Inventory (NWI) maps maintained by the U.S. Fish and Wildlife Service (USFWS).

Groundwater information was obtained through a review of the regional-scale multi-aquifer groundwater flow model of the Twin Cities metropolitan area developed by the Minnesota Pollution Control Agency (MPCA) between 1996 and 2001. The discussion was supplemented with information contained within published reports for various active groundwater investigation and remediation projects within the Project Area.

Information on the location of floodplains within the Project Area was obtained through a review of floodplain data maintained by the Federal Emergency Management Agency (FEMA).

5.9.1.1. Surface Waters

There are no PWI surface water bodies located within the requested route widths for the five alternative transmission line routes or six alternative substation locations. The nearest water body to the Project Area is Powderhorn Lake, located at approximately East 33rd Street between 11th Street South and 14th Street South. The lake is approximately 1,000 feet south from the nearest transmission line alternative, Route C. The lake is located over 4,000 feet from the nearest substation alternative, Mt-28S.

The Project Area is located within the Minnehaha Creek Watershed District (MCWD). Minnehaha Creek is located approximately two miles south of the Project Area.

The Mississippi River is located within one mile of the eastern terminus of the transmission line routes and the two substation alternatives in the eastern portion of the Project Area. All five alternative routes and two Hiawatha Substation alternatives would be a similar distance from the Mississippi River, with the nearest proximity to the River occurring at the northeast point of Route E2. At its closest point, Route E2 would be approximately 4,000 feet from the Mississippi River.

5.9.1.2. Groundwater

Between 1996 and 2001, the MPCA developed a coarse regional-scale multi-aquifer groundwater flow model of the Twin Cities metropolitan area, which included the Project Area. The Project Area is located within a region identified in the model as the Northwest Province. The Northwest Province, which includes the city of Minneapolis and greater Hennepin County, is underlain by three primary aquifers: Glacial Drift Aquifer, St. Peter Sandstone Aquifer, and Prairie du Chien-Jordan Aquifer. The aquifers are situated at 600, 570, and 360 feet above mean sea level, respectively. In addition, the entire metropolitan area is underlain by the Franconia-Ironton-Galesville Aquifer and Mt. Simon-Hinckly Aquifer (Seaberg and Hansen, 2000). The Mississippi River valley serves as a discharge zone for the aquifers. There is a net loss of groundwater in the region due to the extraction of groundwater from pumping wells.

The Project Area is located within the Anoka Sand Plain Ecological Subsection, defined by the MnDNR's Ecological Classification System. Soils in the Subsection are typically well-drained sands and gravels that have been overlain by fill material for urban development. The Project Area ranges in elevation between approximately 850 to 870 feet above mean sea level (Xcel Energy, 2009).

In the vicinity of the Project Area, regional direction of groundwater flow was approximated as southeast within the Prairie du Chien-Jordan and Fanconia-Ironton-Galesville aquifer, and west within the Mt. Simon-Hinckley aquifer (Metropolitan Council, 2009).

Numerous contaminated properties are located within the vicinity of the Project Area, some of which have been associated with local groundwater contamination and maintain active groundwater investigation and remediation systems. The potential impact to these properties is discussed in further detail in Section 5.6, Safety and Health.

Partial information regarding depth to groundwater and groundwater flow specific to the Project Area was developed during groundwater monitoring at the CMC Heartland Superfund Site, located in the eastern portion of the Project Area adjacent to the north of ATF proposed alternative substation G-2. During previous subsurface investigations at the CMC site, fill and coarse-grained terrace deposits were encountered from the ground surface to depths ranging between 18 and 30 feet below surface. The deposits were underlain by 25 to 30 feet of glacial till. Shallow groundwater flow within terrace and glacial till deposits was determined to be west-southwest at 34 to 81 feet per year (CH2M Hill, 2007).

5.9.1.3. Wetlands

No PWI or NWI designated wetlands are located within the requested route widths for the five alternative transmission line routes or six substation locations (USFWS, 2009). The nearest NWI wetland is located one block south of Route C. The wetland area is located within Powderhorn Park, bordered by East 31st Street to the north, East 35nd Street to the south, 14th Avenue South to the east, and 10th Avenue South to the west.

5.9.1.4. Floodplains

The Project Area is not located within the 100-year or 500-year floodplains (FEMA, 2009).

5.9.2. Direct/Indirect Effects

This section identifies potential direct and indirect effects of the Project on water resources present within the Project Area. Potential direct effects on water resources include impacts to the following:

- Quality of water resources;
- Amount of water and resulting depths of water resource; and
- Functionality of water resources.

Potential indirect effects on water resources include impacts to the following:

- Erosion and sediment controls;
- Wildlife habitat;
- Human health;
- Recreational activities; and
- Prevention of flooding in urban communities.

The discussion of effects is divided into those effects that may result through construction or operation of the transmission line and those that may result through construction or operation of associated substations.

5.9.2.1. Transmission Line Route Alternatives

There are no surface water bodies, wetlands, or floodplains located within the Project Area; as such, no direct impacts to these resources would be anticipated.

During construction of overhead or underground transmission line structures, disturbed soils from the construction area would be exposed to storm water from precipitation events and runoff. Soils could enter the city of Minneapolis storm water sewer system, resulting in sediment build-up in water bodies receiving storm water discharge (e.g., Mississippi River). In addition, any chemicals or vehicle fuels released during construction could enter the storm sewer with soils and runoff. As such, construction of the transmission line could indirectly affect water resources. Any potential impacts would be expected to be temporary, as construction areas and rights-of-way (ROWs) would be restored following construction activities.

Overhead transmission line structures would typically be installed with drilled pier foundations placed 20 feet or more below ground surface, depending on soil conditions (Xcel Energy, 2009). Placement of the transmission line underground would require horizontal or vertical installation of duct banks within a below-ground trench, as described in Section 4.1. Depending on the design chosen, the base of the trench would range from 6 to 12 feet below ground surface (Xcel Energy, 2009). As described in Section 5.9.1.2, shallow groundwater in the Project Area was encountered during previous subsurface investigations at the CMC site in terrace and glacial deposits located from the ground surface to depths of 18 to 60 feet below surface. During construction of an overhead or underground transmission line, shallow groundwater may be encountered, resulting in the need for trench dewatering. Depending on the scale of dewatering activities required, it would be possible that shallow groundwater levels could be directly affected from trench dewatering. However, any potential impacts would be expected to be localized and short-term. Dewatering would not be expected to affect groundwater levels in production wells withdrawing groundwater from deep aquifers for the municipal water supply.

The potential exists to encounter contaminated groundwater during construction activities. This represents a potential impact to health and safety for construction workers and others exposed to the construction area. The potential impacts from exposure to groundwater and resulting vapor intrusion issues are discussed in Section 5.6, Safety and Health. In addition to health and safety impacts, disruption of contaminated groundwater during construction would have the potential to disrupt existing shallow groundwater flows, potentially resulting in an increased dispersion of contaminated groundwater in the Project Area.

The Project would not be expected to result in violations of groundwater quality standards, unless a significant fuel or chemical spill associated with construction equipment were to occur.

There are no significant differences in the nature or extent of direct and indirect impacts from the construction and operation of the transmission line along the route alternatives.

5.9.2.2. Substation Alternatives

There are no surface water bodies, wetlands, or floodplains located within the Project Area; as such, no direct impacts to these resources are anticipated.

During construction of substations, disturbed soils from the construction areas would be exposed to storm water from precipitation events and runoff. Soils could enter the city of Minneapolis storm water sewer system, resulting in sediment build-up in water bodies receiving storm water discharge (e.g., Mississippi River). In addition, any chemicals or vehicle fuels released during construction could enter the storm sewer with soils and runoff. As such, construction of the substations could indirectly affect water resources. Any potential impacts would be expected to be temporary during the construction period.

If the substation is placed underground, construction would require the excavation of soils up to 60 feet below ground surface. Under this scenario, shallow groundwater may be encountered, resulting in the need for pit dewatering. Depending on the scale of dewatering activities required, it would be possible that shallow groundwater levels could be directly affected from pit dewatering. Dewatering would not be expected to affect groundwater levels in production wells withdrawing groundwater from deep aquifers for the municipal water supply.

Similar to the potential effects discussed above for construction of the transmission line, the potential exists to encounter contaminated groundwater during construction of the substations. Placement of the substations belowground would have the possibility to affect shallow groundwater flow and migration of existing groundwater plumes in the Project Area.

The Project would not be expected to result in violations of groundwater quality standards, unless a significant fuel or chemical spill associated with construction equipment or substation operations were to occur.

There are no significant differences in the nature or extent of direct and indirect impacts from the construction and operation of the substations in the alternative locations identified by the Applicant and the Advisory Task Force (ATF).

5.9.3. Mitigation

Due to the heavy development of the Project Area, potential direct and indirect impacts to water resources are limited.

5.9.3.1. Surface Water

A variety of mitigation measures could be implemented to reduce the potential indirect impacts to surface water from construction runoff and direct impacts to groundwater through undergrounding of the substations and installation of the transmission line. Mitigation measures could be included as conditions in permits required for the construction and operation of the Project.

Under the High Voltage Transmission Line (HVTL) permit issued by the Commission, the Applicant could be required to develop a Soil Erosion and Sediment Control Plan. An Erosion Control Permit, which would also require an Erosion Control Plan, would be required from the city of Minneapolis because the Project would disturb greater than 5,000 square feet of soil (Xcel Energy, 2009). The Project would also require coverage under the state of Minnesota's General Permit for Storm Water Discharges Associated with Construction Activities. Under the storm water permit, the Applicant would be required to develop and implement a Storm Water Pollution Prevention Plan (SWPPP), which would include Best Management Practices (BMPs) for sediment and erosion control during construction to protect topsoil and surface water resources. Typical BMPs contained within the SWPPP and Erosion Control Plan may include:

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- Install sediment and erosion control (including erosion control blankets with embedded seeds, silt fences, matting, and hay bales) prior to construction;
- Spread topsoil and seed during restoration in a timely manner;
- Avoid use of fertilizer, pesticide, or herbicide to clear vegetation in ROW;
- Fuel construction vehicles on paved surfaces, away from storm water drains, and use appropriate spill prevention and containment procedures; and
- Implement procedures to minimize and control inadvertent fluid returns during horizontal directional drilling (HDD) operations, if they are used.

5.9.3.2. Groundwater

During construction of the transmission line, and if substations are undergrounded, trench or pit dewatering may be necessary. If dewatering would involve the withdrawal of greater than 10,000 gallons of water per day or one million gallons of water per year, the Project would require a Water Appropriations Permit from the MnDNR Division of Waters. Prior to construction, groundwater monitoring wells could be installed and sampled to identify the presence of contaminated groundwater. If contamination were to be detected, the MPCA and MnDNR would be notified and relied upon for groundwater treatment/disposal guidance.

5.9.3.3. Wetlands

There would be no anticipated impacts to wetlands in the Project Area. As such, it does not appear that mitigation measures are warranted for this resource.

5.9.3.4. Floodplains

There would be no anticipated impacts to floodplains in the Project Area. As such, it does not appear that mitigation measures are warranted for this resource.

5.10. Flora

This section identifies flora resources located within the Project Area. Flora is defined as all plant life occurring in the Project Area. This section also describes threatened and endangered species as identified by the State of Minnesota Department of Natural Resources (MnDNR). The MnDNR Natural Heritage Database was consulted to identify any rare or unique resources within 1 mile of route alternatives A, B, C, D, and E2.

5.10.1. Affected Environment

Threatened and endangered species in Minnesota are protected from death, harm, and harassment under the Federal Endangered Species Act (ESA), as amended (16 U.S.C. §§ 1531 – 1544) and the Minnesota Endangered Species Statute (Minnesota Statutes, section 84.0895). The Federal Endangered Species Act defines the regulations pertaining to plant and animal species federally-designated as threatened or endangered to ensure that any project or action would not jeopardize the continued existence of any listed species or adversely modify designated critical habitats.

There are no federally-listed threatened or endangered species occurring in the Project Area. The Handsome Sedge (*Carex formosa*) is a state listed endangered species. It is the only threatened or endangered plant species identified within one mile of the route and substation alternatives. The Handsome Sedge is found in forests, forest edges, and at the edges of swamps. It can also occur in disturbed habitats such as road edges (Natureserve, 2009). Known occurrences of Handsome Sedge have been documented along the Mississippi River, approximately 1 mile east and southeast from the Project.

Prior to development, flora in eastern Hennepin County and the Project Area consisted primarily of Oak Woodland and Brushland with areas of Upland Prairie (Marschner, 1930). However, the Project would be located in a highly developed urban environment with few patches of natural areas present in the city parks and the Midtown Greenway. Additionally, there are lawns, landscape trees and shrubs planted along the boulevards and around houses and businesses.

Route A would be located along the Midtown Greenway. Under the Applicant's preferred alignment, the majority of the route would be located along the existing street right-of-way (ROW) and not within the Greenway itself. The exception to this is along the corridor adjacent to the Pioneers and Soldiers Cemetery, where the preferred alignment would be located within the Greenway trail. The preferred alignments for Routes B, C, D, and E2 would be located along urbanized city streets and primarily located within public ROWs. Impacts to urban trees would occur based upon the route alternative that is selected and final alignment within the route. Locations of the substations would be on properties with urban, non-native flora landscapes. Impacts of proposed substations on flora are discussed below in Section 5.10.2.2.

Since 1987, the MnDNR has been implementing the Minnesota County Biological Survey (MCBS). The MCBS is a systematic survey of rare biological features with a goal to identify significant natural areas and to collect and interpret data on the distribution and ecology of rare plants, rare animals and natural communities. The information obtained from the MCBS is fed into the National Heritage Information System (NHIS), which tracks important information about the biology and distribution of rare features. Other than the presence of the Handsome Sedge noted above, there are no other flora species noted in the NHIS (Xcel Energy, 2009). Through the Metro Conservation Corridor (MCC) project, the MnDNR identifies key natural lands and sets a strategy for accelerating and enhancing habitat protection by targeting funds toward high-priority focus areas and coordinating the efforts of conservation organization's projects protecting valuable habitat identified in the metro area (MnDNR, Metro Conservation Corridors, 2009). There are no conservation corridors within the Project Area. The closest MCC habitats include:

- The habitat along the Mississippi River, located approximately 2 miles east of the Project;

- Lake Hiawatha and Lake Nokomis and the surrounding habitat, located approximately 2 miles south of the Project; and

- Lake of the Isles and Lake Calhoun and the surrounding habitat, located approximately 2.5 miles west of the Project (MnDNR, Metro Conservation Corridors, 2009).

In 2003, MnDNR conducted landscape-scale assessments of the metropolitan area to identify Regionally Significant Ecological Areas (RSEA). Areas classified as RSEA include places with intact native plant or native animal habitat that are still found in the region and that continue to provide important ecological functions. There are no RSEAs within the Project Area (MDNR, RSEA, 2009). The closest RSEA is located approximately 8 miles south of the Project, along the Minnesota River.

5.10.2. Direct and Indirect Effects

This section discusses both the direct and indirect effects of the Project on flora found within the Project Area. Direct effects to flora would potentially include the following:

- Loss of an individual or population due to disturbance from construction or related ROW clearing; and
- Loss of an individual or population due to disturbance from maintenance activities.

In general, the loss of trees can lead to the following indirect effects:

- Loss of habitat for wildlife species;
- Loss of atmospheric carbon absorption;
- Reduced ability of absorption of other pollutants including particulates, SO_2, and NOx;
- Increased energy costs from reduced shade;
- Decrease life expectancy of paved surfaces;
- Decreased property values;
- Loss of noise abatement capacity;
- Loss of wind control capacity; and
- Loss of visual screening and aesthetics (Coder, 1996).

5.10.2.1. Transmission Line Route Alternatives

Impacts to flora from transmission lines would be similar for all the proposed routes. Most trees beneath the preferred alignments have already been trimmed down because of existing overhead distribution lines, with the exception of Routes C and E2. The preferred alignment for Route C would require the removal of three mature American elm trees (Xcel Energy, 2009). The preferred alignment for Route E2 has the potential to significantly affect eight trees designated as high value based on their size and height, including two American elm trees, two cottonwood trees, two silver maple trees, one hackberry tree, and one catalpa tree (Xcel Energy, Route E Tree Data, 2009).

Compared to the other routes, the Route A underground option would likely disturb the most non-woody vegetation. Placement of the route outside the Greenway would minimize disturbance to flora. Vegetation surveys have not been performed along the Greenway; however, the vegetation covering the flat part of the Greenway likely consists of turf grass species. The vegetation covering the slopes of the Greenway consists of trees, shrubs, grasses and annual, biennial and perennial herbaceous plants. Ornamental landscapes are present along Route A. For the purposes of the application, trees were defined by species (*i.e.*, shrub species such as Eastern hemlock were not included) and a height greater than 10 feet. It is estimated that five trees will be removed for the Route A overhead preferred alignment and two trees removed for the Route A underground preferred alignment.

Routes B through E2 would be along urbanized city streets and would be primarily located within public ROWs. Impacts to non-woody flora would be minimal as the non-woody flora on routes within urban areas are primarily lawn grasses. Impacts to urban trees would occur based upon the transmission alternative that is selected. It was estimated that eight trees would be removed for the Route B preferred alignment; 19 trees would be removed for the Route C preferred alignment; 43 trees would be removed for the Route D preferred alignment; and 12 trees would be removed for the Route E2 preferred alignment.

5.10.2.2. Substation Alternatives

The Hiawatha East and West Substation alternatives would be on properties with urban, non-native flora landscapes. It is anticipated that five trees, as defined by the Applicant in the route permit application, would be significantly affected at the Hiawatha West location and no trees would be affected at the Hiawatha East location, with the exception of new trees planted at the Hiawatha Substation locations on Arbor Day 2008 and 2009 by neighborhood groups.

Locations of the Midtown Substation alternatives would be on properties with urban, non-native flora landscapes. It is anticipated that one tree would be significantly affected at each of the Midtown Substation location alternatives.

The Mt-28N and Mt-28S Substation alternatives would also be on properties with urban, non-native flora landscapes. However, the Mt-28N location is developed as a heavily landscaped private green space. As such, potential impacts to existing trees at Mt-28N would be much greater than those anticipated for Mt-28S or the other substation alternatives. Because Mt-28N and Mt-28S are located on private property, the areas were not accessible for a tree survey. However, based on tree survey data from the city of Minneapolis, the Applicant estimated that 170 total trees (137 deciduous and 33 coniferous) would be significantly affected at the Mt-28N Substation location and 17 total trees (all deciduous trees) would be significantly affected at the Mt-28S Substation location (Xcel Energy, Route E Tree Data, 2009).

Undergrounding of the substations would result in similar effects to flora as aboveground substation construction. However, it is expected that flora would return to the substation area following construction and restoration activities.

5.10.3. Mitigation

Due to urbanization and development of the Project Area, potential direct and indirect impacts from the Project to flora would be limited. In most cases, mitigation measures would be included as conditions in permits required for the construction and operation of the Project. These measures include required restoration of ROWs, lay down areas, access roads, and temporary work spaces, including re-vegetation to return disturbed areas to their existing condition.

To minimize impacts to trees in the Project Area, the Applicant could limit tree removal to those trees located in the ROW for the transmission line, or those that would affect the safe operation of the transmission facilities. Trees outside the ROW that would need to be removed include trees that are unstable and could potentially fall into the transmission facilities. The Applicant has stated a commitment to work with affected landowners to replace removed trees with other, more suitable trees and shrubs, regardless of what route is selected (Xcel Energy, 2009).

If the Route A is constructed underground, additional mitigation could include minimizing disturbance to the vegetated slopes of the Midtown Greenway during construction and maintenance activities.

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5.11. *Fauna*

This section summarizes the habitat conditions and common wildlife species present in the Project Area and extending out approximately 1 mile from the proposed alternative routes and substations. The search for special wildlife areas, such as State Wildlife Management Areas, was expanded beyond the Project Area in order to locate the closest designated protected area and provide a better understanding of the wildlife habitat.

5.11.1. Affected Environment

The Project would be located in highly developed urban environment with patches of natural areas present in the city parks and the Midtown Greenway. Additionally, trees and shrubs planted along the boulevards and around houses provide wildlife species with habitat and food. Wildlife found in the Project Area and surrounding vicinity includes species adapted to life among anthropogenic disturbances. Small mammals found in the urban environment include mice, voles, raccoons, squirrels, opossums, skunks, and bats. Both migratory and resident birds are found in the area. Although exact numbers of bird species are not known, it is expected that approximately 115 species utilize the urban habitat (MBBAP, 2009). Aquatic environments are present in Powderhorn Lake, located in Powderhorn Park, and in the Mississippi River. Powderhorn Lake is stocked with crappies, sunfish, and adult catfish. The Mississippi River contains crappies, stripers, and small mouth bass (MPRB, 2009).

Wildlife habitat along each of the routes is similar in the general conditions and types of wildlife that commonly occur. Route A would be located along the Midtown Greenway. Although the Greenway habitat is rather narrow, it is connected on the east end to the Soldiers and Pioneers Cemetery, which provides a large patch of contiguous green space. Routes B, C, and D would be located in a residential environment, with various shrub and tree species providing limited wildlife habitat. Route E2 would follow major roads and highways and therefore does not provide much habitat.

5.11.1.1. State Wildlife Management Areas/Scientific Natural Areas

There are no State Wildlife Management Areas (SWMA) or Scientific Natural Areas within 1 mile of the route and substation alternatives. Robina Lake WMA and Schendel WMA, two SWMAs located in Hennepin County, are located approximately 30 miles west of the Project Area.

Minnesota Department of Natural Resources (MnDNR) protects valuable habitat in the metro area by implementation of Metro Conservation Corridors (MCC) (MnDNR, Metro Conservation Corridors, 2009). There are no MCC habitats located within 1 mile of the route and substation alternatives. The closest MCC habitats include:

- The habitat along the Mississippi River, located approximately 2 miles east of the Project;
- Lake Hiawatha and Lake Nokomis and the surrounding habitat, located approximately 2 miles south of the Project; and
- Lake of the Isles and Lake Calhoun and the surrounding habitat, located approximately 2.5 miles west of the Project (MnDNR, Metro Conservation Corridors, 2009).

In 2003, the MnDNR conducted a landscape-scale assessment of the metropolitan area to identify Regionally Significant Ecological Areas (RSEA). Areas classified as RSEA include places with intact native plant or native animal habitat that are still found in the region and that continue to provide important ecological functions. There are no RSEAs located within 1 mile of the route and substation alternatives (MnDNR, RSEA, 2009). The closest RSEA is located approximately 8 miles south of the Project, along the Minnesota River.

5.11.1.2. National Wildlife Refuge/Waterfowl Production Areas

There are no National Wildlife Refuge or Waterfowl Production Areas located within 1 mile of the route and substation alternatives. The closest wildlife refuge is the Minnesota Valley National Wildlife Refuge, a series of refuges strung along the valley of the Minnesota River. The Refuge is located approximately 8 miles south of the Project and is jointly managed by USFWS and MnDNR. The Refuge includes riverine wetlands, ferns, seeps, floodplain forests, oak savannas, forests and native prairie habitats. More than 250 species of birds, including nesting bald eagles and peregrine falcons, use the refuge at some time during the year (USFWS, 2009).

5.11.2. Direct/Indirect Effects

This section discusses both the direct and indirect effects of the Project on the wildlife found within 1 mile of the route and substation alternatives.

Potential direct effects to wildlife include the following:

- Loss of an individual or population due to habitat destruction;
- A change in an individual or population's habitat use due to noise; and
- Disturbance from construction, clearing, and maintenance activity.

Potential indirect effects to wildlife include the following:

- Increased competition for resources or habitat due to displacement of individuals from the affected area into the territory of other animals;
- Changes in mortality;
- Reduced breeding; and
- Recruitment in the future population.

5.11.2.1. Transmission Line Route Alternatives

Impacts to terrestrial wildlife from transmission lines would be similar for all the proposed routes. Wildlife impacts would be limited in scope as the species have adjusted to anthropogenic activity and disturbance. Construction noise and increased activity levels would temporarily limit the use of the habitat along the routes. In addition, removal of trees, as necessary for construction, would result in displacement of wildlife nesting or burrowing in the tree. Displacement of any species would be short-term as availability of similar trees would allow the displaced wildlife to relocate. Direct mortality may occur to eggs or any young immobile birds if the nest is abandoned by the parents before the young ones mature.

Collision with tall structures is one of the causes of bird mortality. Migratory birds utilize the Mississippi River basin as one of the major migratory flyways in the US, with approximately 40 to 60 percent of migratory waterfowl passing over the Mississippi flyway (USFWS, 2009). The Project Area is not directly adjacent to the Mississippi River or to Wildlife Refuge Areas known to be major stopover points for migrating waterfowl. However, as birds utilize wide areas for migratory routes, it would be reasonable to expect migratory birds to pass through the Project Area. For the proposed routes, installation of additional above-ground utility poles in the already urban environment would slightly increase the possibility of avian collisions. Avian collisions are more likely for waterfowl if the transmission lines are in the vicinity of wetlands or open water. The nearest open water area is the Powderhorn Lake, located approximately 0.2 miles south of the 31st Street segment of Route C.

Transmission lines pose a potential electrocution hazard to large birds such as raptors. Electrocution occurs when birds with large wingspan come in contact with two conductors or a conductor and a grounding device. The transmission line design proposed by the Applicant would provide adequate spacing to eliminate the risk of raptor electrocution (Xcel Energy, 2009). The overhead support structures contain 11 feet of space between the lines. The largest raptor native to the US, the California condor, has a wingspan of 9 feet (CRC, 2009).
Undergrounding the transmission lines (Routes A and D) would eliminate the potential for avian collisions and electrocution.

There would be no direct or indirect impacts to aquatic wildlife from the transmission lines. Transmission lines would not cross aquatic areas and construction of transmission lines would not impact aquatic habitats.

5.11.2.2. Substation Alternatives

Impacts to wildlife from substation construction would be similar for all the proposed sites. Construction of aboveground substations would reduce the availability of habitat for small mammals and birds. Abandoned buildings are frequently used by small rodents while vacant fields provide habitat for burrowing mammals. Underground construction of the substations would eliminate the potential reduction in habitat, as wildlife could return to the developed area after construction and restoration.

In addition, construction noise and increased activity in the vicinity of the substation would limit the use of the area by birds and other wildlife. Displacement of any species would be short-term as availability of similar habitat would allow the wildlife to relocate.

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5.11.3. Mitigation

This section identifies potential mitigation measures to reduce or eliminate the potential direct and indirect effects identified above.

The Applicant has been working with various state and federal agencies over the past 20 years to address avian issues as quickly and efficiently as possible. In 2002, the Applicant entered into a voluntary memorandum of understanding (MOU) with the USFWS to work together to address avian issues throughout its service territories. This includes the development of Avian Protection Plans (APP) for each state the Applicant serves: Minnesota, South Dakota and North Dakota. Work is currently underway on the Xcel Energy APP.

Mitigation measures to reduce avian collision and electrocution hazards could be included in the design of the overhead transmission lines. The Applicant's current design plans include the provision of adequate spacing to avoid raptor electrocution. As previously mentioned, the wingspan of a largest US native raptor, the California condor, may reach up to 9 feet, while the spacing between elements leading to electrocution is 11 feet.

5.12. Rare and Unique Natural Resources/Critical Habitat

This section describes threatened and endangered species and critical habitats needed for their survival, as identified by the U.S. Fish and Wildlife Service (USFWS) and the State of Minnesota. The Minnesota Department of Natural Resources (MnDNR) Natural Heritage Database was consulted to identify any rare or unique resources located within 1 mile of Routes A through E2 and the substation alternatives.

5.12.1. Affected Environment

Threatened and endangered species in Minnesota are protected from death, harm, and harassment under the Federal Endangered Species Act (ESA), as amended (16 U.S.C. §§ 1531 – 1544) and the Minnesota Endangered Species Statute (*Minnesota Statutes*, section 84.0895). The Federal Endangered Species Act defines the regulations pertaining to plant and animal species federally-designated as threatened or endangered to ensure that any project or action would not jeopardize the continued existence of any listed species or adversely modify designated critical habitats.

There are no federally-listed threatened or endangered species occurring within 1 mile of the route and substation alternatives. There are no federally–listed critical habitats found within 1 mile of the route and substation alternatives.

Minnesota's Endangered Species Statute requires the MnDNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting list of Endangered, Threatened, and Special Concern Species is codified as *Minnesota Rules*, chapter 6134. The Endangered Species Statute also authorizes the MnDNR to adopt rules that regulate treatment of species designated as endangered and threatened. These regulations are codified as *Minnesota Rules*, parts 6212.1800 to 6212.2300 and impose a variety of restrictions, a permit program, and several exemptions pertaining to the taking of species designated as endangered or threatened. The results of field studies and detailed project plans determine whether a takings permit is required.

Five state-listed species or special communities have been identified within 1 mile of the Project, as shown on Figure 5.12-1. The species include Blanding's turtle (*Emydoidea blandingii*), Peregrine falcon (*Falco peregrinus*), Eastern pipistrelle (*Pipistrellus subflavus*), Handsome sedge (*Carex formosa*), and Black sandshell (*Ligumia recta*). Table 5.12-1 lists the species and their approximate location within 1 mile of the route and substation alternatives.

Table 5.12-1 State-listed Species within 1-mile of the Project

Common name	Scientific name	Number of Occurrences	Federal status	State status	Location
Handsome sedge	*Carex formosa*	1	None	E	Along the Mississippi River, approximately 1 mile southeast from the E. 31st Street segment of Route C.
Blanding's turtle	*Emydoidea blandingii*	1	None	T	Powderhorn Lake Park, located approximately one block south from the E. 31st Street segment of Route C.
Peregrine falcon	*Falco peregrinus*	4	None	T	Along the Mississippi River, approximately 1 mile northeast from the Hiawatha substation; downtown Minneapolis approximately 1 mile north of Route E2 segment located along I94
Black sandshell	*Ligumia recta*	2	None	SC	Found in the Mississippi River, approximately 1 mile north of the Hiawatha substations
Eastern pipistrelle	*Pipistrellus subflavus*	1	None	SC	Among the bats concentrated by the Mississippi River, approximately 1 mile north of the Hiawatha substations

5.12.1.1. Birds

This section identifies state listed threatened and endangered birds within 1 mile of the route and substation alternatives.

Peregrine falcon (*Falco peregrinus*)

The Peregrine falcon is a state listed threatened species. It is the only threatened or endangered bird identified within 1 mile of the route and substation alternatives. Historically, Peregrine falcons in Minnesota nested primarily on cliff edges along rivers and lakes. In response to increased development pressure, this species has adapted to urban settings by nesting on buildings or bridges and foraging in non-forested, open areas. The Peregrine falcon's hunting range could extend up to 15 miles (MnDNR, 2009c). The Peregrine falcon mainly hunts other birds such as pigeons, blackbirds, and waterfowl, and it feeds less often on mammals, reptiles, and insects (Peregrine Fund, n.d.). Known occurrences of Peregrine falcon have been documented along the Mississippi River, approximately 1 mile northeast from the proposed location of Hiawatha East and West Substations, and in downtown Minneapolis, approximately 1 mile north of Route E2.

5.12.1.2. Plants

This section identifies state listed threatened and endangered plants within 1 mile of the route and substation alternatives.

Handsome sedge (*Carex formosa*)

The Handsome sedge is a state listed endangered species. It is the only threatened or endangered plant species identified within 1 mile of the route and substation alternatives. The Handsome sedge is found in forests, forest edges, and at the edges of swamps. It can also occur in disturbed habitats such as road edges (Natureserve, 2009). Known occurrence of Handsome sedge have been documented along the Mississippi River, approximately 1 mile southeast from the E. 31st Street segment of Route C.

5.12.1.3. Other Rare and Unique Species

Other rare and unique species located with 1 mile of the route and substation alternatives include a reptile (Blanding's turtle), bats (Eastern pipistrelle and a bat colony), and mussels (Black sandshell).

Blanding's turtle (*Emydoidea blandingii*)

Blanding's turtle is a state listed threatened species. It prefers habitats with calm, shallow water and rich aquatic vegetation, and it utilizes both wetland and upland habitats throughout its life. In Minnesota, the species has been found in a variety of wetland and riverine habitats throughout the state, including shrub wetlands, open marshes, and meandering streams and rivers (MnDNR, 2009a). An occurrence of Blanding's turtle was reported in 1986 in Powderhorn Park, located approximately one block south from the E 31st Street segment of Route C.

Eastern pipistrelle (*Pipistrellus subflavus*)

The Eastern pipistrelle is listed as a special concern species by the State of Minnesota. It is the smallest bat species found in Minnesota and can be found foraging in open woods near edges of water. In the wintertime, it hibernates in caves, mines, and tunnels, preferring areas with higher temperature and humidity. In the summertime the Eastern pipistrelle often roosts singly in trees, rock crevices, caves, and buildings. The Eastern pipistrelle is highly sensitive to disturbance during winter hibernation (MnDNR, 2009b). The Eastern pipistrelle was found among the bats concentrated by the Mississippi River, approximately 1 mile north of the Hiawatha Substation.

Black sandshell (*Ligumia recta*)

The Black sandshell is listed as a special concern species by the State of Minnesota. It is found in rivers, lakes, and large streams, usually in riffles or raceways with good current. It inhabits sandy mud, firm sand, or gravel (INHS, 2009a). A colony of Black sandshell mussels has been documented in the Mississippi River, approximately 1 mile north of the Hiawatha Substation.

5.12.2. Direct/Indirect Effects

This section evaluates the potential impacts of the Project on rare and unique resources that are known to occur within 1 mile of the Project route and substation alternatives. Impacts to these species would be considered significant if the Project would result in:

- Direct effects to Federal or State-listed species including the taking (removal or loss) of an individual or population due to habitat destruction; a change in an individual or population's habitat use due to noise; or visual disturbance from construction, clearing, and maintenance activity.
- Indirect effects to Federal or State-listed species, such as increased competition for resources or habitat due to displacement of individuals from the affected area into the territory of other animals; or other indirect effects which cause mortality or reduced breeding and recruitment in the future population.
- Direct or indirect effects on habitat types that affect population size and long-term viability for Federal or State-listed species. Direct effects include vegetation removal by clearing, burial, or other destructive activity. Indirect effects include changes within larger ecological units (e.g., the Northern Minnesota Drift and Plains Ecoregion), but not necessarily within 1 mile of the Project, that could occur at a later point in time such as a change in long-term vegetation composition or dominance; habitat conversion; habitat fragmentation; invasion by non-native species; or disruption of natural disturbance regimes (e.g., the annual natural hydrological cycle).

5.12.2.1. Transmission Line Route Alternatives

Construction of transmission lines is not expected to significantly impact the habitat of rare species found within 1 mile of the proposed route alternatives. However, the habitat of Blanding's turtle may be intersected by Route C. Peregrine falcon and Eastern pipistrelle are highly mobile species that may forage for food within 1 mile of the Project. Overhead transmission lines for Route A, B, C, and E2 would pose a potential collision hazard for the two species. Black sandshell and Handsome sedge are restricted in their habitat range and their habitats would not be impacted by the proposed routes.

One occurrence of Blanding's turtle has been noted south of the 31st Street segment of Route C, in Powderhorn Lake Park. The wetlands around the lake appear to be the only patches of suitable habitat for Blanding's turtle. In addition, houses and roads form substantial barriers to turtle locomotion. It can reasonably be expected that the possible Blanding's turtle's habitat would be limited to the Powderhorn Park, south of the 31st Street. If Route C is selected, surveys for Blanding's turtle should be performed.

For the above-ground routes A, B, C, and E2, potential impacts from collisions with transmission poles may occur to the Peregrine falcon, Eastern pipistrelle and other bats concentrated along the Mississippi River. For the proposed routes, installation of additional above-ground utility poles in the already urban environment would slightly increase the possibility of avian collisions.

Transmission lines pose a potential electrocution hazard to large birds such as raptors. Electrocution occurs when birds with large wingspan come in contact with two conductors or a conductor and a grounding device. Peregrine falcon's wingspan may reach up to 3.5 feet in length (Peregrine Fund, n.d.), while the spacing between conductors for the proposed overhead structures is 11 feet (Xcel Energy, 2009). Therefore, the transmission line design implemented by Xcel would provide adequate spacing to eliminate the risk of raptor electrocution (Xcel Energy, 2009).

Black sandshell and Handsome sedge have been documented in or along the Mississippi River, approximately 1 mile northeast from the Hiawatha East and West Substations. The proposed routes do not cross habitats of these rare species and will not result in habitat destructions or alterations.

5.12.2.2. Substation Alternatives

There were no rare or unique species identified at the sites proposed for development of substations, and the sites are not considered to be critical habitats for any of the species identified in the area. However, currently vacant lands associated with the substation alternatives could serve as part of the hunting habitat of Peregrine falcons. Since the Peregrine falcon's hunting range can extend up to 15 miles and the species mainly hunts smaller birds, conversion of one of the vacant parcels to developed infrastructure should not have a direct negative effect on falcon's ability to find prey.

5.12.2.3. Federal Species

There are no federally-listed species found within 1 mile of the Project route and substation alternatives. There are no critical habitats within 1 mile of the Project route and substation alternatives.

5.12.2.4. State Species

There are nine state-listed species found within 1 mile of the Project route and substation alternatives. No direct impacts or habitat changes are expected to occur to the listed species as a result of construction activities. Potential impacts due to collisions with structural installations exist for Peregrine falcon and Eastern pipistrelle, as discussed previously in 5.12.2.1.

5.12.3. Mitigation

This section identifies potential mitigation measures to reduce or eliminate the potential direct and indirect effects identified above.

Potential collision and electrocution hazards exist for Peregrine falcons. The Applicant has been working with various state and federal agencies over the past 20 years to address avian issues as quickly and efficiently as possible. In 2002, the Applicant entered into a voluntary memorandum of understanding (MOU) with the USFWS to work together to address avian issues throughout its service territories. This includes the development of Avian Protection Plans (APP) for each state the Company serves: Minnesota, South Dakota and North Dakota. Work is currently underway on the Xcel Energy APP. Mitigation measures to reduce avian collision and electrocution hazards could be included in the design of the overhead transmission lines. The Applicant's current design plans include the provision of adequate spacing to avoid raptor electrocution. As previously noted, the Peregrine falcon's wingspan may reach up to 3.5 feet, while the spacing between elements leading to electrocution is 11 feet.

5.13. Air Quality and Climate

This section provides an overview of the current air quality status and monitoring within and near the Project Area. The potential air quality impacts due to construction and operation of the Project are analyzed along with potential mitigation measures. This section also addresses potential climate impacts as a result of the Project construction and operation.

5.13.1. Affected Environment

The affected environment for air quality and climate for the Project Area is less variable across specific locations than other resources because ambient air, unlike land or water, is not constrained by any land-based boundaries. Thus, any discussion related to air quality or climate impacts is generally applicable to all of the alternative routes and substations and the surrounding vicinity, with the exception of the specific local scale impacts where construction is to occur. The affected region for the air quality and climate analysis is focused primarily on the area covering southeastern Hennepin county and south Minneapolis. The air quality discussion is based upon the air quality and attainment designations of the area, as determined by Minnesota Pollution Control Agency (MPCA) air quality monitoring data.

5.13.1.1. Air Quality

Pursuant to the requirements of the 1990 Clean Air Act (CAA), the United States Environmental Protection Agency (USEPA) was tasked with setting National Ambient Air Quality Standards (NAAQS) as defined in Title 40, *Code of Federal Regulations*, Part 50 (40 CFR 50) for pollutants that are considered harmful to public health and the environment. The USEPA's Office of Air Quality Planning and Standards (OAQPS) subsequently sets the standards for six principal pollutants, which are called "criteria pollutants"(see Table 5.13.1). These pollutants are sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM_{10}/$PM_{2.5}$), ozone (O_3), carbon monoxide (CO), and lead (Pb). The original CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. These standards are mathematically defined using both parts per million (ppm) by volume and micrograms per cubic meter of air ($\mu g/m^3$).

Table 5.13.1: National Ambient Air Quality Standards

Averaging		NAAQS	
Emission Type	**Period**	**Primary μ/m^3 (ppm)**	**Secondary μ/m^3 (ppm)**
Carbon Monoxide (CO)	8-hour [a]	10,000 (9)	10,000
	1-hour [a]	40,000 (35)	40,000
Sulfur Dioxide (SO_2)	Annual	80 (0.03)	--
	24-hour [a]	365 (0.14)	--
	3-hour [a]	--	1,300 (0.5)
	1-hour [a,e]	1,300 (0.5)	
Nitrogen Dioxide (NO_2)	Annual	100 (0.05)	100
Ozone (O_3)	8-hour [b]	(0.075)	(0.075)
PM_{10}	Annual [e]	50	50
	24-hour [a]	150	150
$PM_{2.5}$[d]	Annual [d]	15	15
	24-hour [c]	35 65 [e]	35 65 [e]
Lead (Pb) [f]	Rolling 3-Month Average	0.15	--

Source: USEPA, National Primary and Secondary Ambient Air Quality Standards (40 CFR 50).

a. Not to exceed more than once per year, per monitor location, averaged over a three year period.

b. As of May 27, 2008, the 8-hour ozone standard is met if the 3-year average of the fourth highest 8-hour ozone concentration at each monitor is not greater than 0.075 ppm.

c. In September 2006 EPA revised the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$, but the previous standard is currently applicable until EPA completes the attainment designation and implementation process. During any 12 consecutive months, 98 percent of the values shall not exceed 35 $\mu g/m^3$ under the new standard, and 65 $\mu g/m^3$ under the currently applicable standard. Minnesota has retained the 65 $\mu g/m^3$ standard.

d. Spatial average standard, applied by EPA over a neighborhood scale.

e. Standard is only a Minnesota standard.

f. The final rule for new lead standard was signed on October 15, 2008

The MPCA operates a network of 45 air quality monitoring sites throughout the state, with 26 of the monitors operating in the Twin Cities Metropolitan Area. The agency also supports operation of additional sites at three tribal sites, six $PM_{2.5}$ speciation sites, and 10 National Acid Deposition Program (NADP) sites. The air quality data collected from these monitors are analyzed to determine compliance with the NAAQS locally, regionally, and statewide. The nearest ambient air quality monitor to the Project Area is located at H.C. Anderson School, located at approximately 27th Street and 10th Avenue. The monitor records metals, volatile organic compounds, and continuously measures and speciates $PM_{2.5}$. Two additional monitoring sites located within 5 miles of the route and substation alternatives (Vandalia Street, Wenonah School) also measure particulate

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concentrations in the ambient air. SO_2 and CO are measured at the Arts Center site approximately 7 miles to the northwest of the proposed route and substation alternatives. NO_2 levels are measured at the Rosemount Site, located approximately 16 miles southeast of the proposed route and substation alternatives. Ozone is measured at a monitoring site in nearby Shakopee, approximately 16 miles southwest of the proposed route and substation alternatives. As reported in the MPCA Annual Air Monitoring Network Plan for the State of Minnesota (MPCA, 2009), the entire state of Minnesota, including the Twin Cities area, has been in compliance with the NAAQS for all criteria pollutants since 2002.

In addition to impacts during the construction phase of the Project, the primary air quality concerns related to transmission lines are emissions of ozone and nitrogen oxide near the conductor due to the development of a corona during Project operation. Corona consists of the breakdown or ionization of air within a few centimeters or less of the conductors. It usually occurs when the electric field intensity, or surface gradient, on the conductor exceeds the breakdown strength of air. Usually some imperfection, such as a scratch on the conductor or a water droplet, is necessary to cause corona (Xcel Energy, 2009).

Ozone is a highly reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Ozone forms naturally in the lower atmosphere from lightning discharges, and forms efficiently in the presence of sunlight from chemical reactions between nitrogen oxides and hydrocarbons, which are ozone precursors. The production rate of ozone is typically directly proportional to temperature and sunlight, and inversely proportional to humidity. Humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone (Xcel Energy, 2009).

The USEPA has regulations regarding the permissible concentrations of ozone and oxides of nitrogen (62 Federal Register 38856) in the atmosphere. As shown in Table 5.13.1, the national standard is 0.075 parts per million (ppm) over a rolling 8-hour averaging period (40 CFR 50). This standard is based upon the measured fourth greatest 8-hour daily maximum average for ozone at each monitor in one year, averaged over a 3-year period.

5.13.1.2. Climate

Climate change refers to an emerging consensus within the scientific community that indicates that global climate, particularly changes in temperatures, are affected by human activities. As described in a USDA Forest Service report, it is widely acknowledged that climate variability significantly influences the health of plant, insect, and animal ecosystems. Anthropogenic activities such as burning of fossil fuels and the coincidental land surface changes due to deforestation, reforestation, and urbanization, directly or indirectly add quantities of greenhouse gases (GHGs) into the atmosphere, particularly carbon dioxide (USDA, 2007).

According to the MPCA Report to the Minnesota Legislature, "Air Quality in Minnesota: Emerging Trends" (2009), emissions of CO_2 in Minnesota increased by 50 percent from 1970 to 2006. This increase was largely due to an increased reliance on the combustion of coal to generate electricity to handle increased load demand. As a result, the Minnesota legislature and the Governor signed the Next Generation Energy Act (2007) which initiated efforts to increase renewable energy use in the state, increase energy conservation, and decrease GHG emissions, especially CO_2. The Act also set specific GHG emissions reductions percentages from a 2005 baseline date for the years 2015, 2025, and 2050.

5.13.1.3. Construction

Air emissions can result from operation of earth moving vehicles during construction activities. These vehicle emissions can include particulates, hydrocarbons, sulfur oxides, nitrogen oxides, and carbon monoxide. In addition, air quality impacts could occur from wind blown dust (i.e., particulates) re-entrainment into the ambient air as a consequence of earth moving activity and travel on roads.

5.13.2. Direct/Indirect Effects

This section discusses the potential direct and indirect impacts to air quality and climate for alternative Routes A through E2. Potential direct and indirect impacts from the Project include the following:

- Changes in air quality; and
- Contribution to climate change (including loss of carbon sequestration).

Studies of monitored concentrations of ozone due to transmission line corona show no significant incremental ozone concentrations at ground level, and minimal (0.001 to 0.008 ppm) concentrations at an elevation nearer to the transmission line. Typically, the greater level of ozone concentration would only be detected during heavy corona in foul weather, often a time with low background ozone levels. Additional testing showed that production of nitrogen oxides due to corona would be approximately one-fourth of the production of ozone due to corona. Relative to the NAAQS, increased concentrations of ozone due to corona would likely be on the order of one–hundredth to one-tenth of the standard near the elevated transmission line, and would be insignificant temporally and spatially.

The most direct impact on climate from this Project may be any loss of carbon sequestration potential from vegetation that is removed to install substations and transmission lines. The maximum number of trees expected to be removed for any of the proposed substation alternatives would be a potential maximum of five trees, as defined by the Applicant, from the Hiawatha West Substation. Additional newly planted trees at the Hiawatha West Substation, including those planted during community plantings on Arbor Day 2008 and 2009, may also be removed. For any of the route alternatives, tree removal would be expected to predominantly occur along the right-of-way (ROW), with a lower amount of removal required in areas where safe operation would be impeded by the existence of trees. The total number of trees expected to be removed ranges from two trees for the Route A underground route alternative to 43 trees from the Route D underground route. This removal is minimal and is expected to be offset by the Applicant's replacement of removed vegetation with new vegetation to also address aesthetic and flora concerns.

For each of the proposed route alternatives, both above and below ground options, construction activity will result in air emissions from heavy equipment during construction. In addition, excavation, earth moving activities, and wind erosion from dirt piles may cause re-entrainment of dust particulates and possibly other pollutants into the atmosphere. However, reductions in air quality resulting from these impacts, will generally be minor, relatively localized, and temporary in nature. No significant long-term air quality related impacts are expected under the Project.

5.13.2.1. Transmission Line Route Alternatives

This section identifies potential direct and indirect impacts of the Project specific to the route alternatives.

Route A

Route A extends westward from the Hiawatha substation to the Midtown substation along 29th street. It could potentially be constructed aboveground or underground. Direct effects on air quality from operation of the aboveground transmission lines would be the potential for localized formation of ozone due to transmission line corona; however, as discussed above these impacts would be negligible. Under both above- and belowground options, operation of vehicles and construction machinery along the route would result in minor amounts of air emissions into the atmosphere. Indirectly, earth disturbance from ROW clearing and the temporary stockpiling of excavated earth may result in some dust becoming re-suspended in the air and transported some distance under certain meteorological conditions. While undergrounding the transmissions lines would avoid even the negligible impacts from corona associated with aboveground lines, construction vehicle air emissions and dust particulate generation would be somewhat greater for the underground option considering the greater amount of earth moving activities required. These localized impacts, however, would be temporary, intermittent and generally contained within the immediate vicinity of the route.

Route B

Route B would require two separate single circuited 115 kV lines, which would follow East 28th Street and East 26th Street for a total of 3.2 miles. There is no underground option for Route B. Direct effects on air quality from operation of the transmission lines would be the potential for a negligible amount of localized formation of ozone due to transmission line corona. During the construction phase, operation of vehicles and construction machinery along the route would emit air emissions into the atmosphere. Indirectly, disturbed areas and temporary dirt stockpiles occurring during construction may result in dust generation with particles becoming re-suspended in the air and transported some distance under certain meteorological conditions. The geographic extent of air quality impacts for Route B would be proportionately greater than that for the aboveground Route A alternative given the additional 1.8 miles of route length. However, air impacts would remain negligible.

Route C

As with Route B, Route C would require two separate single circuited 115 kV lines, which would follow East 28th Street and East 31st Street for a total of 3.8 miles. There is no underground option for Route C. Direct effects on air quality from operation of the transmission lines would be the potential for a negligible amount of localized formation of ozone due to transmission line corona. During the construction phase, operation of vehicles and construction machinery along the route would result in minor amounts of vehicle emissions and dust generation as with other alternatives. The geographic extent of air quality impacts with Route C would be proportionately greater than that for the aboveground Route A alternative or Route B since the combined length of Route C would be 3.8 miles over the two distinct segments; these impacts, however, would remain minor and temporary in nature.

Route D

Route D is 1.5 miles in length and proposed exclusively as an east-west underground route along 28th Street between the Midtown and Hiawatha Substations. Since this route would be underground, air quality effects due to corona would not be expected. During the construction phase, however, operation of a greater number of vehicles and construction machinery for drilling, trenching, and excavation to place the lines underground would results in a higher magnitude of air emissions into the atmosphere than would occur with an aboveground option. Indirectly, temporary dirt stockpiles may be subject to wind erosion and dust particles may be transported downwind some distance to a similarly greater degree. However, as with other alternatives, these impacts would remain minor and temporary in nature.

Route E2

Route E2 is over 3.0 miles in length and would be the northernmost route amongst the alternatives. There is no underground option for Route E. Direct effects on air quality from operation of the transmission lines would be the potential for localized formation of ozone due to transmission line corona. During the construction phase, operation of vehicles and construction machinery along the route and at substations may emit air emissions into the atmosphere. Indirectly, earth disturbance from ROW clearing and pole placement would likely result in some dust generation and transport some distance depending on the prevailing meteorological conditions. Based on the current configuration of the route, the geographic extent of air quality impacts is likely to be one of the largest of all the overhead route alternatives, though likely less than any of the underground alternative options. Similar to the other alternatives, impacts along this route would remain minor and temporary in nature.

5.13.2.2. Substation Alternatives

This section identifies potential direct and indirect impacts of the Project specific to the substation alternatives.

Hiawatha Substation

The Applicant's two proposed Hiawatha Substations would be located in an area just east of Hiawatha Avenue and 28th Street that is zoned as light industrial to commercial. During the construction phase at the substation sites, operation of vehicles and construction machinery would emit air emissions into the atmosphere. Under some meteorological conditions, dirt and other small debris created temporarily from the construction activities have the potential to become suspended in the air and transported downwind. The Hiawatha West Substation location would be constructed on vacant land and would not require demolition of existing structures. The Hiawatha East Substation location is currently occupied by a commercial business. Development of this substation alternative would require relocation of the current occupant and subsequent demolition of the existing building; thus greater construction impacts would be expected relative to the proposed Hiawatha West Substation. However, for both alternatives, these impacts would intermittent, temporary, and mild in nature. Once construction is complete, there are no expected air quality impacts from operation of the substation.

Midtown Substation

The Applicant's proposed Midtown North and Midtown South Substations are both located at the intersection of 29th Street and Oakland Avenue South. In association with these substations, some demolition of existing structures would be necessary. For the Midtown North substation, a condemned triplex would need to be demolished. For the Midtown South substation, a business would be required to relocate and a larger square footage of buildings removed relative to the Midtown North substation. Such demolition and construction activity may temporarily cause dust to be re-entrained into the air upon demolition. The Advisory Task Force (ATF) alternative substations, Mt-28S and Mt-28N are proposed on undeveloped property. As such, no demolition would be required for construction of these alternative substations. During the construction phase of the new building structures at the substations, operation of vehicles and construction machinery at the construction site would emit air emissions into the atmosphere. Indirectly, dirt and other small debris created temporarily from the construction activities have the potential to become re-suspended in the air and transported downwind depending on the prevailing meteorological conditions.

Building constructed prior to the mid-1980s may contain lead-based paint or asbestos containing materials (ACMs). Prior to demolition, an asbestos survey would be required to determine the presence of ACMs. Contractors performing asbestos removal must be licensed by the Minnesota Department of Health (MDH). Five days prior to the start of demolition, the contractor is required to submit notification to the MDH and MPCA. Under state regulations, no visible emissions of dust are allowed during the removal, transportation, and disposal of asbestos. The contractor would be required to use control technology (e.g., plastic sheeting) to reduce emissions from demolition. Asbestos waste must be placed in double 6-mil plastic bags, labeled as asbestos, and shipped to an approved landfill.

Due to the size of the structures requiring demolition for the Midtown South Substation alternative, it is expected that this site would result in relatively greater air impacts of the two proposed Midtown substation sites. Because no demolition would be required at Mt-28S or Mt-28N, construction of either of these substations would result in relatively less air impacts than construction of the Applicant's Midtown North or Midtown South Substations. However, for all alternatives, these impacts would intermittent, temporary, and mild in nature. Once construction is complete, there are no expected air quality impacts from operation of the substation.

5.13.3. Mitigation

The magnitude of emissions during construction is highly dependent on the prevailing weather conditions and type of construction activity. However, most activities during the construction phase of the project are expected to be of short duration and intermittent in nature. As such, no significant impacts are anticipated.

Recommended measures to minimize impacts from vehicles used during construction include verifying and ensuring that all vehicles are well maintained in compliance with Federal and State air quality regulations. Any equipment and vehicles that exhibit excessive emissions of exhaust due to poor engine adjustments, or other inefficient operating conditions, could be removed from operation until repairs or adjustments are made. Limiting idle times and performing shutdowns of equipment when not in use could also be practiced.

Temporary impacts from fugitive dust could be minimized or avoided by engaging in procedures to control dust during construction of the Project. During the construction phase, construction and traffic activities could be monitored for dust generation. To minimize dust particle displacement on unpaved roads, vehicle traffic could be operated at reduced speeds. Water spraying of dirt piles and dust-laden roadways could limit dust re-suspension. Restoring the natural landscape as soon as practicable upon cessation of construction activities could aid in minimizing the extent of disturbed areas in the Project Area.

Upon cessation of construction activities and transition to operating mode, air quality impacts from actual operation of the substations and transmission lines are expected to be nominal. It does not appear as though any mitigation measures are warranted during operation of the Project.

5.14. Noise

This section provides background information used to develop a noise assessment for the Project, including a summary of the basic principles of noise, a brief overview of the evolution of noise regulation in the United States, and the applicable State of Minnesota and city of Minneapolis noise standards and ordinances. Based on this information, the potential direct and indirect impacts from noise produced during the construction and operation of the Project route alternatives and substation designs are discussed. Finally, a description of planned noise mitigation activities relating to the Project is presented.

5.14.1. Affected Environment

Noise is typically defined as “unwanted sound.” It may be as mild as a general nuisance, such as a noise causing distraction or masking desired sounds, or severe enough to impede communication, affect behavior, and cause temporary or permanent hearing loss. Prior to the 1960s, noise was not officially recognized or regulated in the United States. In the National Environmental Policy Act in 1969 and the Noise Control Act in the early 1970s, the issue of noise abatement was addressed at the federal level. Today, many state, county, and local municipalities have also adopted noise ordinances to minimize noise issues at the local level.

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Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of 3 dBA is barely perceptible to average human hearing. However, a 5 dBA change (either an increase or a decrease) in noise levels is clearly noticeable. A 10 dBA change in noise levels is perceived as a doubling (if it is an increase in noise levels) or halving (if it is a decrease) of noise loudness (Harris, 1979).

Noise levels change depending upon the distance from a point or stationary source (e.g., factory operation). In general, for every doubling of the distance from the stationary source of noise, the sound level decreases by 6 decibels. Thus, a source of noise measured at 80 decibels from a distance of 50 feet would produce a sound level of 74 decibels from 100 feet away. For line sources (e.g., transmission lines), the sound level decreases by 3 decibels for every doubling of distance from the source of the sound (FTA, 2006). Table 5.14-1 provides the typical decibel levels for some common noise sources that are experienced by people during everyday living.

Table 5.14-1: Common Noise Sources and Levels

Sound Pressure Level (dBA)	Typical Sources
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet
80	Garbage disposal
70	City street corner
60	Conversational speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night

Source: Environmental Impact Analysis Handbook, ed. by Rau and Wooten, 1980

The Minnesota noise regulations are administered by the Minnesota Pollution Control Agency (MPCA) under Minnesota Rule 7030.0050. This Rule lists various activity categories by their Noise Area Classification (NAC). Both proposed substation locations qualify under NAC 3, while some potential affected residences fall within NAC 1. Table 5.14-2 identifies the established noise standards for daytime (7:00 a.m. – 10:00 p.m.) and nighttime (10:00 p.m. – 7:00 a.m.) for each classification. The standards are expressed as a range of dBA (decibel – A weighted) within a one hour period; L_{50} is the noise level that is allowed to be exceeded 50 percent of the time within an hour, while L_{10} is the level that can be exceeded 10 percent of the time within an hour.

Table 5.14-2: MPCA Noise Standards (dBA – Decibel, A-weighted)

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

Source: A Guide to Noise Control, MPCA, 2008

The city of Minneapolis noise ordinances are located in the Code of Ordinances Title 15, Chapter 389. These ordinances incorporate by reference the MPCA noise standards and contain additional city-specific rules. Specifically, activities that generate sounds that are greater than 10 dBA above normal daytime levels or 5 dBA above normal nighttime levels, as measured within a dwelling, are prohibited.

The city also has noise level limits for light and heavy duty vehicles (City of Minneapolis Ordinance Article II) when in operation or traveling on roads.
Typical of urbanized city environments such as Minneapolis, it is expected that existing background noise levels in the residential areas in the vicinity of the alternative routes and substations would be in the range of 45-55 dBA. Along the busier city streets and highways, sound levels are likely to be in the 55-75 dBA range.

5.14.1.1. Construction

The city of Minneapolis addresses noise from construction and demolition equipment in its noise ordinance. Accordingly, the city prohibits the operation of noise-generating construction or demolition equipment between 6:00 p.m. and 7:00 a.m. on weekdays. On weekends or holidays, no operation is permitted except under specific permits approved by the director of inspections or the city council. At no time may equipment be allowed to operate that generates sound that exceeds 90 dBA measured at a 50-foot distance from the source of the sound.

5.14.1.2. Operation

Operational noise impacts can potentially occur along the transmission lines and at the substations. Transmission conductors and transformers at substations produce audible noise levels depending upon weather conditions and their design (e.g., conductor conditions and voltage levels). In foggy, damp, or rainy weather conditions, power lines can emit a subtle crackling sound due to the small amount of the electricity ionizing the moist air near the wires. During heavy rain, the audible noise of any transmission line is greatest because the conductor is wet; however, general background or ambient noise levels accompanying rainy weather are usually greater than the noise from the transmission line. During light rain, dense fog, snow, and other times when there is moisture in the air, transmission lines can produce audible noise levels (50-60 dBA range) similar to household background levels. During dry weather, audible noise from transmission lines produce nearly imperceptible sound levels (40-50 dBA), sporadic crackling sounds.

5.14.2. Direct/Indirect Effects

This section identifies and discusses potential direct and indirect noise impacts for each of the Project transmission line route alternatives and substation alternatives. Potential direct and indirect effects include changes in audible noise in the Project Area and surrounding vicinity during construction and operation of the transmission lines and substations.

Noise generated by construction equipment is likely to constitute the greatest noise impact. Earth moving machinery including bulldozers, front end loaders, and other supporting equipment such as cranes and compressors can generate temporary noise. Table 5.14-3 provides noise range levels (within 50 feet of the source) experienced for the typical construction equipment expected to be utilized during the construction phase of the Project.

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Table 5.14-3: Typical Noise Ranges from Construction Equipment (dBA) at 50 ft

		Equipment Type	Noise Range
Equipment Powered by Internal Combustion Engines	Earth Moving	Compactors (Rollers)	73-75
		Front Loaders	72-84
		Backhoes	72-93
		Tractors	76-96
		Scrapers/Graders	80-93
		Pavers	87-89
		Trucks	83-94
	Materials Handling	Concrete Mixers	75-88
		Concrete Pumps	81-83
		Cranes (Movable)	76-87
		Cranes (Derrick)	86-89
	Stationary	Pumps	69-71
		Generators	71-82
		Compressors	74-87
Impact Equipment		Pneumatic Wrenches	83-89
		Jack Hammers and Rock Drills	81-98
		Pile Drivers (Peaks)	95-106
Other		Vibrator	69-81
		Saws	72-82

Source: US Environmental Protection Agency. 1971. *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*. US Environmental Protection Agency Office of Noise Abatement and Control, Washington, D.C.

5.14.2.1. Transmission Line Route Alternatives

The audible noise levels of a transmission line depend significantly upon the line's geometry and operating voltage. The audible noise of a 230 kV line during fair weather is expected to be very low and seldom noticeable, even when standing directly under the line, and would not exceed applicable noise standards (Xcel Energy, 2009).

Route A

Route A is a 1.4 mile route that could be constructed as an overhead or underground transmission line. Along the Applicant's preferred alignment, the number of residences that would be located within 100 feet of the overhead and underground routes are 946 and 815, respectively. As with all alternatives, direct effects on ambient sound levels would primarily originate from the construction equipment operating during the

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construction phase of the Project. If the underground option is chosen, a greater temporary noise impact would be experienced because of the higher level and duration of construction activity.

When in operation, sound levels from the overhead 115 kV transmission lines may be most audible during times of damp or foggy weather as electricity near the power lines ionize the moist air around the wires but would be expected to be minor. If constructed as an underground route, there are not expected to be any operational noise impacts; the sole source of noise-related impacts would occur from construction equipment operating during the construction phase of the Project.

Route B

Route B would be constructed as two separate single circuit 115 kV transmission line installed along two separate roadways. There is no underground option for Route B. Along the Applicant's preferred alignment, the number of residences that would be located within 100 feet of the transmission lines is 1,775. Direct effects on ambient sound levels would again primarily result from construction equipment during the construction phase of the Project, while noise impacts from the transmission line operation would be minor. The geographic extent of noise impacts and magnitude of impacted residences expected during construction would be greater than with Route A since the combined length of transmission line segments would be 3.2 miles and would affect more residents. However, the overall noise impact from the aboveground Route B construction would be less than that of the underground Route A option, given the less overall construction activity involved.

Route C

Route C would be constructed as two separate single circuit 115 kV transmission line installed along two separate roadways. There is no underground option for Route C. Along the Applicant's preferred alignment, the number of residences that would be located within 100 feet of the transmission lines is 936. Direct effects on sound levels would primarily result from construction equipment with minor noise impacts during operation. The geographic extent of potential noise impacts (and therefore the number of affected residents) is greater with Route C than with Routes A or D since the length of transmission line corridor extends a combined 3.8 mile distance; however, the overall noise impact from the aboveground Route C construction would be less than that of the underground Route A option.

Route D

Route D is a 1.5 mile underground route. Under the Applicant's preferred alignment, the number of residences that would be located within 100 feet of the transmission line is 443 and the number of residences that would be located between 100 and 200 feet is 416. As an underground route, there are no anticipated operational noise impacts; the sole source of noise-related impacts would occur from construction equipment operating during the construction phase of the Project. This alternative would have a greater noise impact during construction than the aboveground alternatives, and it would have a similar impact to the underground Route A option.

Route E2

Route E2 is slightly over 3.0 miles in length and the northernmost route alternative. There is no underground option for Route E2. Along the Applicant's preferred alignment, the number of residences that would be located within 100 feet of the transmission lines is 2,485. As with other alternatives, direct effects on ambient sound levels would primarily result from construction equipment during the construction phase of the project with minor impacts during operation. Based on the length of the route, the geographic extent of noise impacts would be greater than Routes A or D, less than Routes B or C, but lower than the underground options.

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5.14.2.2. Substation Alternatives

This section identifies potential direct and indirect effects specific to the substation alternatives.

Hiawatha Substation Sites

The Hiawatha Substations would be located in an area zoned as light industrial to commercial east of Hiawatha Avenue and 28th Street. Noise impacts similar to the transmission line construction are expected to occur in association with construction of either of the substations; however, the Hiawatha East Substation would require demolition of an existing building. When in operation, transmission line conductors and transformers present at the substation may produce audible noise above background levels depending upon weather conditions and their design.

Midtown Substation Sites

The Midtown North and Midtown South Substations would be located at the intersection of 29th Street and Oakland Avenue South. Some noise would be generated in association with demolition of existing structures prior to construction of the substations. Noise impacts are also expected to occur during construction of the substation(s). When in operation, transmission line conductors and transformers present at the substation may produce audible noise slightly above background levels depending upon weather conditions and their design.

ATF Alternative Substations Mt-28N and Mt-28S

Substations Mt-28N and Mt-28S were proposed by the ATF as alternatives to the Midtown Substation locations. Both substations are located approximately 0.25 miles west of the Midtown North and South Substations. Noise impacts also expected to occur during construction of the substation(s). When in operation, transmission line conductors and transformers present at the substation may produce audible noise slightly above background levels depending upon weather conditions and their design.

5.14.3. Mitigation

This section describes potential mitigation measures to reduce the potential effect of the Project on audible noise.

5.14.3.1. Construction Noise

The primary source of noise from the Project is expected to occur during the construction phase of the Project as earth moving and supporting installation efforts ensue. These activities would be temporary in nature, and to minimize the impact of construction-related noise, the city of Minneapolis noise ordinances would apply. These ordinances limit the magnitude of noise as well as the hours for construction activities to only weekday and daytime hours between 7:00 a.m. and 6:00 p.m. The applicant would be required to adhere to all city ordinances.

5.14.3.2. Transmission Line Operation Noise

Along the transmission line routes, the noise generated from overhead transmission lines associated with any of the route alternatives are not expected to exceed background noise levels. The Applicant has designed the Project to operate significantly below the NAC 1 noise standards listed in Table 5.14-2. Therefore, it does not appear that additional mitigation measures are warranted.

5.14.3.3. Substation Operation Noise

The nearest residence to the planned Hiawatha Substation is over 200 feet away. The nearest dwelling to the Midtown Substation is approximately 20 feet away. Both areas are zoned as light industrial and qualify as Minnesota Noise Area Classification 1 (NAC 1). The Applicant plans to surround both substations with decorative walls to help mitigate noise from the substation transformers. In addition, the Applicant plans to install sound absorbing panels at the Midtown North Substation to ensure compliance with State and City noise regulations (Xcel Energy, 2009). The Applicant has stated that the Midtown Substation design would be replicated at either the Mt-28N or Mt-28S Substation locations if either of those locations is selected.

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5.15. Utility Systems

This section identifies utility systems in the Project Area, including communications networks, oil and natural gas pipelines, and transmission lines. Potential effects of the Project on existing utility systems are discussed, as well as potential mitigation measures to reduce disruption or interference in utility services from Project construction and operation.

5.15.1. Affected Environment

This section identifies existing utility systems in the Project Area that may be affected during construction or operation of the Project. Communications networks in the Project Area were identified through a search of current antenna licenses with the Federal Communications Commission (FCC). Existing transmission lines in the Project Area, many of which are owned by the Applicant, were identified by the Applicant in the application for a route permit, as well from information provided by Hennepin County. Existing oil and gas pipelines were identified by the Applicant and confirmed through a review of pipeline maps obtained from pipeline owners and operators, as needed.

Communications network technologies present within the Project Area are divided into the following general categories: omnidirectional, unidirectional, and landlines. Omnidirectional is defined as those antennae that transmit or receive signals in any direction at the same time. Telecommunications signals for radio, television, and cellular phones are typically omnidirectional. Unidirectional is defined as those antennae that transmit or receive signals in a single direction. Microwave signals are unidirectional. Omnidirectional antenna towers and unidirectional microwave antenna towers that are located within the Project Area for the Project alternatives and substations are discussed below. Landlines that provide telephone service are located within the Project Area. Landlines are installed on existing transmission line and distribution line structures.

5.15.1.1. Omnidirectional Signals, Unidirectional Signals, Landlines, and, Existing Communication Tower Locations

Based on review of the FCC databases, no AM broadcasting towers, FM broadcasting towers, TV stations, ASR towers, or broadcast microwave pathways were found to be located directly within the Project Area.

The Hiawatha East Substation has an AM tower (KMNV) located approximately 1.6 miles to east of the substation location, and one FM translator tower (K283BG (FX)) and one new application approximately 1.3 miles to the north. There are multiple FM stations towers (FM stations, FM auxiliary stations, and FM translators), 13 TV station permits/licenses, and seven ASR towers located between approximately 0.60 and 0.75 miles to the north of Route E2.

5.15.1.2. Existing Transmission Lines, Fiber Optic Lines, and Pipelines

There is one existing 115 kV transmission line route located within the Project Area. The existing transmission line route is located along Hiawatha Avenue and would be located near the proposed Hiawatha substations.

Route A follows an existing utility corridor, including portions located within and near the Midtown Greenway. According to the Hennepin County construction plan and profile for 29th Street, Midtown Greenway Phase II (2002), overhead power lines owned by Xcel Energy are located along 29th Street. Additional utilities include overhead telephone lines owned by Qwest and overhead television lines owned by Time Warner. Worldcom has a fiber optic cable buried in this location, as does Williams Communication. The Williams line, however, is buried within a conduit. Buried gas lines owned by Reliant Energy are present, as well.

Routes B and C would be located primarily where existing overhead distribution lines parallel the streets; however, where the proposed transmission line structures would be located near an existing distribution line structure, the distribution line structure would be removed and the distribution line would be supported by the new transmission line structure.

Route E2 primarily follows an existing interstate corridor. Information on the specific utility systems present along Route E2 was not readily available.

5.15.2. Direct/Indirect Effects

This section identifies potential direct and indirect effects of the Project on existing utility systems. Potential effects include interference with the following:

- Communication networks;
- Oil and gas pipelines; and
- Existing transmission lines.

No AM, FM, TV, ASR or microwave pathways were found to be located within the Project Area. Thus, potential effects on these resources should be minimal. If effect were to occur, impacts would be similar in natural among all transmission line route alternatives and substation alternatives.

5.15.2.1. Communications Networks

Corona from transmission line conductors can generate electromagnetic "noise" at the same frequencies that radio and television signals are transmitted. This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem. If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations presently providing good reception can be obtained by appropriate modification of (or addition to) the receiving antenna system. Moreover, AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the right-of-way (ROW) to either side. FM radio receivers usually do not pick up interference from transmission lines because corona-generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 Megahertz), also the excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

A two-way mobile radio located immediately adjacent to and behind a large metallic structure (such as a steel tower) may experience interference because of signal-blocking effects. Movement of either mobile unit so that the metallic structure is not immediately between the two units should restore communications. This would generally require a movement of less than 50 feet by the mobile unit adjacent to a metallic tower.

Television interference is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Loose and/or damaged hardware may also cause television interference. If television or radio interference is caused by or from the operation of the proposed facilities in those areas where good reception is presently obtained, the Applicant will inspect and repair any loose or damaged hardware in the transmission line, or take other necessary action to restore reception to the present level, including the appropriate modification of receiving antenna systems if deemed necessary (Xcel Energy, 2009).

Unidirectional signals emitted and received from microwave antennae are dependent upon a line-of-sight between antenna receivers. If transmission line structures are located between two microwave signal antennae, interference could occur to the unidirectional signals. Typically, existing microwave towers are taller than the proposed pole structures. In addition, transmission lines can be constructed to avoid line-of-sight interference with existing towers. However, as indicated above, there are no current or proposed pathways that were identified in the FCC database that would be affected by any of the proposed transmission line routes or substations.

Modern telephone lines and communication circuits are typically well shielded to prevent potential interference from transmission lines. When landlines parallel transmission lines for long distances, inductive coupling (i.e., coupling between the energized source and electrical equipment) can occur. The induced voltage of the landline can be avoided by increasing the distance between parallel transmission lines and landlines, and electrical shielding of the line.

5.15.2.2. Existing Oil and Natural Gas Pipelines

When a high voltage transmission line (HVTL) is located adjacent to a pipeline's ROW, the pipeline may be subjected to electrical interference from overhead power lines in close proximity by (1) capacitance, (2) conductance, and (3) induction (Bonds, 1999). Voltage induced on a pipeline poses a greater shock hazard rather than a corrosion concern (Bonds, 1999).

Capacitive effects, or electrostatic effects, typically are a concern during pipeline construction when long sections of the pipeline are above ground. Voltage from overhead power lines can be induced by a capacitance effect (electrostatic voltage) (Bonds, 1999). This type of effect occurs in the immediate vicinity of the overhead power lines when the pipe is laid on a foundation that is well insulated from the

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ground. The pipeline picks up a voltage relative to the soil, which is proportional to the voltage in the transmission line (Shwehdi and Johar, 2003).

In a regular situation, this would not normally be induced on a buried pipeline since the capacitance between the pipeline and earth is negligible. However, during installation, a voltage can be produced by the influence of a strong electrical field on an insulated pipe when located above and insulated from the ground. According to Bonds (1999), the electric field tends to move electrons from the earth to the pipe and also from the pipe to the overhead power line. Therefore, in some cases, the voltage can be above maximum safe voltage limitations for a pipe. Under other normal situations, contacting the pipe only would result in a slight electrical shock, and the pipe voltage would be reduced immediately to zero (Bonds, 1999).

Electrical conductance can be caused by direct contact or ground fault conditions. Direct contact likely would be an accidental occurrence. This would happen if an energized conductor and metallic pipe connected. The pipe then would rise to the potential of the conductor until the lines were de-energized (Bonds, 1999).

Conductance also can be caused by ground fault conditions. In an electrical transmission system, the full potential of the circuit is present across the insulators separating the energized conductors and the tower. If lightning strikes between the tower structure and an overhead cloud, the potential of the tower could be raised to an extremely high voltage, which might result in the potential across an insulator to be in excess of its rating (Bonds, 1999).

In addition to capacitive and conductance, voltage induction may occur. Inductive effects may occur when there is extended and close parallel routing with HVTLs. The voltage is due to any phase imbalance in the lines. The likelihood of interference increases with rising operating currents in the overhead lines, with increasing quality of the coating on the pipeline, and with the length of line parallel to and close to the HVTLs (Shwehdi and Johar, 2003).

With this type of effect, current flow in an alternating current conductor creates an electromagnetic field of force, which always lies at right angles to the current that produces it. The items related to the pipeline that affect the magnitude of induced voltage are the length of electrically continuous pipeline parallel to the electrical transmission system, the resistance of the pipeline coating, and the longitudinal resistance of the pipeline (Bonds, 1999).

The potential exists for damage to occur to underground pipelines during excavation and grading activity for the underground design options associated with Route A and Route D, as well as in locations where other excavation activities would occur.

5.15.2.3. Existing Electric Transmission Lines

As previously indicated, the Applicant intends to follow the State's policy of non-proliferation of infrastructure corridors, which establishes a preference for locating new transmission line facilities along existing public ROWs, including transmission line and transportation ROWs.

If overhead Route A were selected, overhead distribution lines that exist along the route could be placed underground to mitigate impacts to the Midtown Greenway corridor. In addition, both Project lines would be constructed on double circuit steel pole structures (Xcel Energy, 2009). Route E2 would also be double circuited. Double-circuiting would require less ROW, but would increase the potential for reliability issues because a single incident has the potential to disrupt service on both lines.

Routes B and C would be located primarily where existing overhead distribution lines parallel the streets. Where the lines associated with this route would be placed, the distribution line structure would be removed, and the distribution line would be supported by the new transmission line structure (Xcel Energy, 2009).

5.15.3. Mitigation

No large-scale negative effects of the Project alternatives are expected on utility systems. However, localized effects on utility systems are possible. This section identifies potential mitigation measures to reduce or eliminate localized effects on utility systems.

5.15.3.1. Interference

If radio or television interference occurs because of the transmission line, the Applicant has stated a commitment to work with the affected landowner(s) to restore reception to pre-Project quality.

To prevent contact shock hazards, proper horizontal and vertical separation between the transmission line's conductors and equipment used during pipeline construction and maintenance (such as cranes and shovels) could be maintained.

5.15.3.2. Disruption in Service

Any planned service disruptions to electric service that are necessary during construction activities could be scheduled with the affected owners of the existing transmission line in accordance with reliability standards. Advanced scheduling of these disruptions would allow for alternative arrangements for electrical service to be made when possible and allow for customers to be notified in advance.

Utility repair crews could be present or on-call during construction activities to respond to any unplanned incidents that may result in an interruption to electric service.

5.16. Transportation and Public Services

This section provides a description of surface and air transportation facilities and emergency service facilities in proximity to the Project route and substation alternatives, and discusses potential impacts to those facilities from the proposed Project, as well as potential mitigation measures.

5.16.1. Affected Environment

The Project Area lies within a fully developed portion of Minneapolis served by many modes of transportation and reliant on numerous transportation facilities. A north-south local street grid with roughly one-tenth mile spacing provides access to parcels, augmented by a system of higher functional streets at the county, state and federal level to provide mobility. Grade-separated light rail transit and pedestrian/bike-ways further enhance transportation options. Within Minneapolis, avenues typically run north-south, while streets run east-west.

5.16.1.1. Roadways

All modes of transportation (pedestrians, bicyclists, transit, automobiles and trucks) utilize the existing street system. The city of Minneapolis 2030 transportation plan, *Access Minneapolis*, discusses the function of roadways in relationship to the surrounding land uses that they serve. *Access Minneapolis* further emphasizes the multi-modal aspect of roadways describing its intent as follows:

> *It is the intent of Access Minneapolis to foster the practice of providing complete streets that support and encourage walking, bicycling and transit use while promoting safe operations for all users. Components of a complete street include street and sidewalk lighting, pedestrian and bicycle safety improvements, public transit facilities, street trees and landscaping, street furniture, stormwater management, traffic management, on-street parking, traffic lanes, and streets and sidewalks that have a scale and character compatible with the physical context of the surrounding community.*

In accordance with this intent, Access Minneapolis describes the functions of streets within the Project Area using the follow categories:

Commuter Street: High capacity; carries thru-traffic; serves longer trips and provides limited access to land uses; provides regional truck routes; typically includes trees and landscaping.

Commuter Streets in the vicinity of the route and substation alternatives include Interstate 94 (I-94) to the north of Route E2, Interstate 35W (I-35W) to the west of Mt-28N and Mt-28S, and Hiawatha Avenue near the Hiawatha Substations and eastern terminus of the route alternatives.

Commerce Street: Medium capacity; supports retail, service commercial and higher intensity residential land uses on a corridor basis; local truck routes; access limited to local streets with spacing guidance; typically includes trees and landscaping.

Commerce Streets in the vicinity of the route and substation alternatives include Franklin Avenue and Lake Street. These east-west streets are the focal commercial corridors and key traffic routes in the vicinity of the Project Area.

Franklin Avenue is also designed as County State Aid Highway (CSAH) 5 by Hennepin, with the designation of an A Minor Arterial-Reliever, reflecting its function as a reliever to I-94. Lake Street (CSAH 3) and Hiawatha Avenue (CSAH 152) are both designated A Minor Arterial-Augmentor as they provide for longer local trips within the City of Minneapolis.

Activity Area Street: Medium capacity; provides access to abutting properties in activity centers, growth centers, transit station areas and neighborhood commercial nodes; local truck deliveries; typically includes trees and landscaping.

East-west Activity Area Streets in the vicinity of the route and substation alternatives include 24th Street between Portland and Chicago and 28th Street between I-35W and 10th Avenue, serving the numerous clinics and hospitals in the area.

North-south Activity Area Streets connect the Commerce Streets of Franklin and Lake with downtown Minneapolis to the north. These streets include Portland Avenue north of Lake Street, Park Avenue north of Lake Street and Chicago Avenue north of Lake Street. Portland (CSAH 35) and Park (CSAH 33) Avenues are also designated as A Minor Arterials by Hennepin County.

Community Connector: Medium capacity; connects neighborhoods and/or districts together; serves as the main street of a neighborhood commercial node; provides local truck access; typically includes trees and landscaping.

Community Connector streets in the vicinity of the route and substation alternatives include Portland, Park and Chicago Avenues south of Lake Street as well as Cedar Avenue, connecting downtown on the north with neighborhoods south of Lake Street. 26th Street also serves as a Community Connector through the medical activity center, traversing the Project Area between I-35W and Cedar Avenue. Parallel to, and south of Lake Street, 31st Street serves as a Community Connector, providing an alternative route to Lake Street.

Neighborhood Connector: Low capacity and lower speed; connects neighborhoods with each other; typically includes trees and landscaping.

Bloomington Avenue serves as a north-south Neighborhood Connector, while 26th Street and 28th Street serve as east-west Neighborhood Connectors east of the medical activity center.

Industrial Connector: Low capacity and lower speed; connects districts with neighborhoods and serves abutting property in single use industrial/ employment) districts; typically includes trees and landscaping.

Few Industrial Connectors can be found within the vicinity of the route and substation alternatives. They include 28th Street east of Cedar Avenue and 20th Avenue between 28th Street and Lake Street.

Local Street: Low capacity; serves abutting property in residential neighborhoods or single use (industrial/employment) districts; typically includes trees and landscaping.

All remaining roadways within the vicinity of the route and substation alternatives are categorized as Local Streets.

5.16.1.2. Pedestrian and Bicycle Facilities

With the exception of the Commuter Streets (principal arterials) discussed above, a comprehensive system of sidewalks is provided on all roadways within the city of Minneapolis. Bicyclists are allowed on the roadways as well. *Access Minneapolis* supports quality roadway/sidewalk facilities to promote the use of the roadway system by pedestrians and bicyclists as well as cars.
In addition, separate pedestrian/bicycles facilities in the vicinity of the route and substation alternatives consist of:

- Hiawatha trail facilities: A trail is provided along the west side of Hiawatha Avenue from Franklin Avenue to 46th Street/Minnehaha Creek. An additional trail is provided along the east side of Hiawatha Avenue from downtown Minneapolis to the Midtown Greenway Trail. A pedestrian bridge over Hiawatha Avenue connects these trails at 24th Street.
- The Midtown Greenway Trail traverses the city of Minneapolis from the western city limits to West River Road at the Mississippi. The Midtown Greenway Trail crosses over Hiawatha Avenue at the Martin Olav Sabo bridge and at grade at 28th Street.
- Bike lanes are designated on Portland Avenue and Park Avenue.

Proposed improvements on the 2008 Draft Bikeway Master Plan include:

- Extending the existing trail along the east side of Hiawatha Avenue that currently terminates at the Midtown Greenway Trail further south to 46th Street.
- Signed bike routes along Chicago Avenue from 24th Street to 31st Street and along 20th Avenue from the Greenway to 40th Street.

- Experimental bikeways along 31st Street from Lake Calhoun to 20th Avenue and along Bloomington Avenue from 24th Street to Diamond Lake Road.
- Bike lanes along Minnehaha Avenue from 20th Avenue to Minnehaha Falls Park.

Existing bikeways in the vicinity of the route and substation alternatives are shown in Figure 5.16-1.

Pedestrian and bicycle facilities are also supported by a number of small areas plans:

Corcoran Midtown Revival Master Plan
This plan calls for the creation of a pedestrian and bicycle oriented route along 21st Avenue and 32nd Street in the Corcoran neighborhood and along Minnehaha Avenue in the Longfellow community. The loop would connect to the Midtown Greenway at 21st Avenue and Minnehaha Avenue. The loop would facilitate non-motorized transportation without excluding vehicles.

Midtown Minneapolis Land Use and Development Plan
The plan calls for adequately sized sidewalks to accommodate anticipated increased pedestrian activity. The plan discusses Midtown Greenway as an amenity, non-motorized transportation corridor.

The Midtown Greenway Rezoning Study/City of Minneapolis Zoning Maps
A large portion of the Project route and substation alternatives in the vicinity of the Lake Street and Hiawatha Avenue falls within a pedestrian-oriented overlay district. The district is roughly bounded by Cedar Avenue on the west, 28th Street on the north, Minnehaha Avenue/26th Avenue/28th Avenue on the east and 31st Street/32nd Street on the south.

Hiawatha/Lake Station Area Master Plan
This plan calls for improved pedestrian connections to the Hiawatha/Lake LRT station for all four quadrants of the Hiawatha Avenue/Lake Street intersection. It also calls for improved pedestrian connection between station area neighborhoods and local shopping and employment destinations.

Access Minneapolis summarizes recommended and acceptable through walk zones (sidewalk) widths for various combinations of roadway and land use types. Walk zone widths are shown in Table 5.16-1.

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Table 5.16-1: Walk Zone Widths by Roadway and Land Use Types

Land Use	Street Type	Sidewalk Width (Recommended)	Sidewalk Width (Acceptable)
Commercial or Mixed Use	Activity Center with High Pedestrian Priority	8-feet	6-feet
Commercial or Mixed Use	Non-local Streets	6-feet	5-feet
Residential	Non-local Streets	6-feet	5-feet
Residential	Local Streets	6-feet	5-feet

Utility poles are recommended to be placed in the planting/furnishing zone (boulevards). Placement of utility poles is acceptable in frontage zones and on private property when there are constrained conditions.

It is the city's desire to remove all obstacles from the through walk zone. A minimum through walk zone width of 4-feet must be maintained when moving around vertical obstructions in the sidewalk.

5.16.1.3. Bus Transit Routes

Bus transit routes are located along many of the Commerce, Activity Area, Community Connector, and Neighborhood Connector Streets in the vicinity of the route and substation alternatives. Bus routes and stop locations are evaluated on a regular basis and adjusted to meet ridership demands. Bus stop facilities along these routes range from a weather protected bus shelter, to a sidewalk bench, to simply bus stop signage along the sidewalk. Adequate sidewalks are needed at bus stop locations to provide access and queuing spaces. Bus stop locations require a minimum of 70-80 feet of curb area with adequate visibility to ensure the safety of bus passengers.

5.16.1.4. Railways

One active freight rail line, Canadian Pacific (CP), approaches the area from the east just south of 27th Street, then turning to the south just to the east of Hiawatha Avenue. There are no other freight railways within the vicinity of the route and substation alternatives.

The 12-mile Hiawatha Light Rail Transit System runs parallel to Hiawatha Avenue at the eastern edge of the Project Area linking downtown Minneapolis, the Minneapolis/St. Paul International Airport and the Mall of America in Bloomington. Hiawatha LRT stations are located at Franklin Avenue and at Lake Street. The

Hiawatha LRT line lies east of Hiawatha Avenue north of 28th Avenue diagonally crossing over Hiawatha at 28th Street, and proceeding south to the west of Hiawatha Avenue along the west edge of Hiawatha Avenue. The Lake Street station sits above Lake Street itself on a bridge.

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The Midtown Greenway Corridor has been identified by the Hennepin County Regional Rail Authority as a potential LRT/Streetcar route and was purchased by the County for that purpose. The Minneapolis Streetcar Feasibility Study identified the Midtown Corridor streetcar alignment as primarily serving the extension of the SW LRT and Hiawatha LRT lines into south Minneapolis and a connection between the two lines. The alignment would operate in the 29th Street abandoned railroad trench next to the existing Midtown Greenway multi-use trail. A total of seven stations are recommended along the Midtown Corridor, including the two LRT stations:

- West Lake Station (along future Southwest Corridor LRT line);
- Hennepin Avenue S (Uptown Transit Center);
- Lyndale Avenue S;
- Nicollet Avenue S;
- Chicago Avenue S;
- Bloomington Avenue S; and
- Lake Street Station (along Hiawatha LRT line).

The report discusses both single track and double track designs, acknowledging the operational benefits of a double-track operation, but also addressing the physical constraints of accommodating both a streetcar and trail facilities under the corridor's many bridges. Connections to the Hiawatha LRT corridor would also require the construction of a structure to connect the streetcar station to the elevated LRT station overhead. A maintenance and operations facility would also be needed. Options discussed in the study include construction of a new streetcar facility in the industrial area east of Hiawatha Avenue (near 28th Street) or shared use with an LRT facility. Construction of a new facility near 28th Street and Hiawatha was considered inappropriate given the future plans for residential and commercial use in the area, so co-location with an LRT facility is recommended.

While the preferred alignment for Route A overhead and underground is to run above the Midtown Greenway/HCCRA, the requested route width for Route A, if approved, could accommodate an alignment within the Midtown Greenway/HCCRA. Placement of the transmission line within the HCCRA could conflict with future plans for the expansion of the LRT within the HCCRA.

5.16.1.5. Airports

Minneapolis- St. Paul International Airport, the region's largest air travel facility, is located approximately 5 miles southeast of the Project route and substation alternatives in the city of Bloomington, Minnesota. The airport's three runways are oriented toward the northwest and the southwest. The runway trajectories do not pass over the route and substation alternatives.

5.16.1.6. Emergency Services

The Project would be located within the Minneapolis Police Department's Third Precinct. Precinct headquarters are located at 3000 Minnehaha Avenue South. The 3rd Precinct has two community safety centers. Both serve to foster police-community relations by joining police and local prosecutors with residents, local businesses and others to fight crime and improve neighborhoods in the precinct. The Franklin Avenue Safety Center is located at 1201 East Franklin, while the second, the Midtown Community Safety Center at 2949 Chicago Avenue South, is located close to Lake Street.

One of Minneapolis' 17 fire stations is located within the vicinity of the Project route and substation alternatives at 2700 Bloomington Avenue South.

A number of hospitals and medical clinics are located within or just north of the route and substation alternatives. Abbott Northwestern Hospital, 800 E 28th Street, occupies an approximately 4-block area between 26 and 28th Streets and 8th and 10th Avenues South. Minneapolis Children's Hospital lies immediately to the north of Abbott Northwest between 26th and 25th Avenues. Many medical clinics are located within the immediate area of these hospital facilities.

Northeast of the route and substation alternatives, Hennepin County Medical Center – a Level 1 Trauma Center – is located 701 Park Avenue in downtown Minneapolis.

5.16.2. Direct/Indirect Effects

This section identifies potential direct and indirect effects of the Project on traffic and transportation facilities. Specifically, the section discusses the following potential impacts:

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- Traffic on roadways;
- Safe distances from roadways ;
- Disruption to pedestrian and bicycle facilities;
- Rerouting or delays for bus transit;
- Compatibility with railways;
- Compatibility with nearby airports; and
- Traffic and rerouting of emergency services.

5.16.2.1. Transmission Line Route Alternatives

This section identifies indirect and direct effects to transportation facilities specific to the Project route alternatives.

Roadways

With all proposed transmission line route alternatives, proposed pole locations are not proposed within the curb line of roadways and therefore would not restrict vehicle lanes. The proposed height of transmission line wires are above minimum bridge height requirements and therefore should not impair the movement of taller vehicles through the street grid. Due to the width of the transmission poles at the base (between 36 to 58 inches depending on the structure type), placement of poles at driveway, alley or street intersections could obscure sight-lines and cause safety concerns.

Construction activities, however, could disrupt traffic flow and affect both connectivity and mobility of the roadway systems. Full closure of Commuter Streets, Commerce Street, Activity Area Streets and Community Connectors during construction would have the greatest detrimental effect on overall traffic flow. Full or partial closure of other streets during construction may not have significant impacts to traffic operations if closures are well coordinated and detour routes are planned.

Ongoing maintenance activities may also affect traffic flow and operations for limited periods of time when maintenance is required.

Potential impacts from all route alternatives would be similar in nature. Route C, the longest overhead route in length, and underground Routes A and D would be expected to have a longer construction schedule. As such, the duration of impacts to traffic flow would be greater along these routes.

Pedestrian and Bicycle Facilities

Pedestrian and bicycle facilities have the potential for greatest impact as transmission poles in the above grade alignments may require alignment shifts or width reductions in sidewalks or trails. Proximity of construction activities to pedestrian and bicycle facilities may also cause significant disruption during construction. Assessment of impacts below reflect pole locations identified in the Applicant's permit application; however, pole locations would not be finally determined until the next phase of the project.

Route A - Aboveground

Narrow boulevards, approximately 6 feet in width, on 28th Avenue between Hiawatha Avenue and the Midtown Greenway may not provide sufficient area for transmission pole bases and may encroach into the sidewalk requiring either a shift in the sidewalk alignment and/or sidewalk narrowing. Plans available at this time do not clarify potential impacts in these areas.

Construction activities may further disrupt sidewalk facilities as pole foundation structures are constructed.

The Midtown Greenway pedestrian promenade between Portland and Cedar Avenue may be disrupted by two to three proposed transmission pole locations on the north side of the Greenway between Elliot and Oakland. Further design development would be needed to fully determine potential impacts to this planned facility. Placement of the transmission poles on the south side of 29th Street would prohibit future realignment and reconstruction of 29th Street (and associated sidewalks) in a manner consistent with the Midtown Greenway plan.

Route A – Underground

While long term effects resulting from transmission pole structures are largely avoided with below grade options, pedestrian and bicycle facilities may be disrupted by construction activities:

- East of Hiawatha: Excavation for duct bank and underground cable vault (vault size is 14-feet wide, 24-feet long, and 7.5-feet high) would temporarily disrupt the Midtown Greenway Trail (or require that the trail be temporarily realigned).

- 28th Avenue between Hiawatha Avenue and the Midtown Greenway: Excavation for duct bank and underground cable vault would temporarily disrupt the sidewalk on south side of 28th Street and Greenway Trail immediately south of 28th Street. Duct bank excavation may also temporarily disrupt an existing trail along the west side of Hiawatha immediately south of 28th Avenue (depends on extent of horizontal directional drilling under Hiawatha Avenue).

- Midtown Greenway between Cedar Avenue and 18th Avenue: Excavation for duct bank would temporarily disrupt the Greenway trail.

- Duct bank excavation would temporarily disrupt north-south pedestrian crossings of 29th Street between 18th Avenue and 10th Avenue.

- Northeast quadrant of 10th Avenue and 29th Street: If the duct bank is at street grade (as opposed to down in the trench of the Greenway), excavation of duct bank and underground cable vaults would temporarily disrupt pedestrian access to the east side of 10th Avenue bridge over the Greenway.

- North bank of Midtown Greenway between Park Avenue and Oakland Avenue: the duct bank is shown going under the existing ramp between Greenway and Park Avenue. This ramp utilizes extensive retaining walls. Careful evaluation of as-built drawings would be needed to avoid impacts to ramp foundations.

- Duct bank excavation would temporarily disrupt north-south pedestrian crossings along Chicago Avenue, Columbus Avenue, Park Avenue and Oakland Avenue. It would also temporarily disrupt north-south bicycle traffic along the Park Avenue on-street bike lanes.

The Route A underground option may also limit future construction of access points to the Midtown Greenway if construction of those access points requires excavation where duct banks would be located.

Route B

28th Street from Hiawatha Avenue to Columbus Avenue has narrow boulevards (varying from 0 – 4 feet in width). Pole widths may encroach into the sidewalk, which are typically 6 feet wide. This applies to both the north and south sides of the street.

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Oakland Avenue from the Midtown Greenway to 26th Street has a boulevard width that ranges from 4 – 6.5 feet (typically 5.5 feet). At select locations the boulevard space is paved along this segment. Pole widths may encroach into the sidewalks, which are typically 6 feet wide. This applies to both the east and west sides of the street.

26th Street from Oakland Avenue to Hiawatha Avenue has a 4-foot boulevard width. At select locations the 4-foot boulevard area is paved along this segment. Pole widths may encroach into the sidewalks, which are typically 6 feet wide. This applies to both the north and south sides of the street.

Pole installation would temporarily disrupt the adjacent sidewalks along the full length of Route B.

Route C

East of Hiawatha: Excavation for one of the transmission poles would temporarily disrupt the Midtown Greenway Trail (or require that the trail be temporarily be realigned).

31st Street between Hiawatha Avenue and Portland Avenue has a 7.5-foot wide sidewalk located at the back of curb along both the north and south sides of the street. Poles would encroach into the sidewalk. ADA accessibility would need to continue to be assessed as plans are further developed.

Portland Avenue from 31st Street to the Midtown North Substation has boulevard widths that range from 7 to 10 feet. Transmission poles placed in these boulevards would not encroach on the adjacent sidewalk.

Installation of a transmission pole on the north slope of the Midtown Greenway, immediately east of Oakland Avenue, may temporarily disrupt the sidewalk along Oakland Avenue and/or bicycle ramp between Oakland Avenue and Park Avenue.

28th Street from Hiawatha Avenue to Columbus Avenue has narrow boulevards (which vary from 0 – 4 feet in width). Pole widths may encroach into the sidewalks, which are typically 6 feet wide. This applies to both the north and south sides of the street.

Pole installation would temporarily disrupt the adjacent sidewalks along the full length of Route C.

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Route D

East of Hiawatha: Excavation for the duct bank would temporarily disrupt the Midtown Greenway Trail (or require that the trail be temporarily be realigned).
Duct bank excavation may temporarily disrupt an existing trail along the west side of Hiawatha immediately north of 28th Avenue (depending on the extent of horizontal directional drilling under Hiawatha Avenue).

28th Street from Hiawatha Avenue to Oakland Avenue: Excavation for duct bank and underground cable vaults would temporarily disrupt the sidewalk on the side of the street where the duct bank is located. It would also temporarily disrupt north-south pedestrian crossings of 28th Street for cross streets where the excavation is occurring.

The excavation of the duct bank would temporarily disrupt the north-south on-street bike lanes that exist on Park Avenue.

Oakland Avenue from 28th Street and the Midtown North Substation: Excavation for duct bank and underground cable vaults would temporarily disrupt the sidewalk on the side of the street where the duct bank is located. It would also temporarily disrupt east-west pedestrian crossings of Oakland Avenue at 28th Street.

Route E2

Route E2 crosses I-35W at two locations – between 29th and 28th Streets and again at approximately 26th Street. These crossings would need to maintain minimum required vertical clearances as required by the Federal Highways Administration (FHWA). In addition, pole placement would need to avoid the highway "clear zone" – an area outside of the freeway travel lanes kept free from structures to minimize damage or injury occurring from car crashes. The clear zone requirements vary by roadway conditions and would require coordination with FHWA and the Minnesota Department of Transportation to fully determine requirements in these specific areas of the I-35W corridor.
Further, transmission structures would need to meet minimum setbacks from roadway and signage bridges in the corridor, as well as other lighting, signage, and communications structures.

The crossing of the interstate corridor will require a permit from FHWA, triggering federal requirements for environmental review under the National Environmental Protection Act (NEPA).

Transmission structure locations are not yet identified for Route E2 as it parallels both I-35W and I-94. If the structures are placed within I-35W and I-94 right of way (ROW), similar requirements as discussed above for a freeway crossing would apply.

If the transmission structures are placed on the non-freeway side of the I-35W noise walls, impacts to local streets may result. Between 28th and 26th Streets, 3rd Avenue South and Clinton Avenue South lie immediately adjacent to the noise wall, leaving insufficient room for placement of transmission structures. On the opposite side of these roadways, the sidewalk sits immediately adjacent to the curb, requiring either re-alignment of the sidewalk, or placement of transmission structures in residential yards.

North of the I-35W crossing at 26th Street, a similar situation exists where Route E2 approaches 5th Avenue just south of 25th Street. Throughout this segment of the route to 18th Street, 5th Avenue has minimal (0-2 feet) boulevards on the west side of the roadway adjacent to noise walls, and narrow (2-4 feet) boulevards on the east side of the roadway, coupled with a sidewalk and a shallow residential yard. Placement of transmission structures within the 5th Avenue ROW would result in impacts to either the roadway or sidewalk width.

These narrow conditions continue along 18th Street to Chicago Avenue. A retaining wall on the north side of 18th Streets separates the street from the I-94 ramp below, with a minimal (0-2 feet) curb between the roadway edge and the parapet wall. On the south edge of 18th Street, a narrow (2-4 foot) boulevard separates the street from the sidewalk, with a shallow setback to building faces. East of Chicago Avenue, boulevards both north and south of 18th Street increase in size which may more easily accommodate transmission structures.

As the route turns south along Highway 55, conditions open up with wider areas available between the highway, its ramps and bridges, and adjacent local streets and sidewalks. Specific impacts within this area are difficult to evaluate without transmission structure locations; however, the corridor appears to afford enough flexibility in this segment to avoid impacts to transportation facilities.

As with previous routes, construction activities along this route would have the potential to impede access and traffic flow during construction.

Transit

Routes B and C, which represent above grade facilities located on bus routes, could include transmission pole locations that may adversely affect bus stop locations either by obscuring visibility or reducing sidewalk width.

Railways

None of the proposed routes would affect current freight rail operations in the vicinity of the Project route alternatives.

All proposed routes encounter the path of the Hiawatha LRT transit line. Provided that sufficient clearances with LRT facilities are provided, no significant impacts to the Hiawatha LRT facility are anticipated. Extensive coordination would be needed with Metro Transit to avoid or minimize disruption to LRT operations during project construction.

Route A, whether above or underground, has the potential to negatively affect plans for future rail transit within the Midtown Greenway Corridor. The physical constraints for placing both rail transit and maintaining existing bicycle and pedestrian facilities within the Greenway are recognized as significant challenges in both the Midtown Greenway Plan and the Streetcar Feasibility Study. Placement of any transmission facilities, whether below or above grade, within this corridor would only further challenge future transit planning.

While the preferred alignment for Route A overhead and underground is to run above the Midtown Greenway/HCCRA, the requested route width for Route A, if approved, could accommodate an alignment within the Midtown Greenway/HCCRA. Placement of the transmission line within the HCCRA could conflict with future plans for the expansion of the LRT within the HCCRA.

Engineering plans have not been developed for a rail transit facility within the Greenway, preventing specific evaluation of potential impacts to a future rail transit facility in this corridor. However, given the limited width available, any transmission structures could either impair available ROW width to the degree that a double-track system may not be viable, impairing efficient operation of a transit system, or preclude construction of a rail transit system altogether.

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Airports

Due to the distance between the proposed routes and the Minneapolis-St. Paul airport, no impacts to air travel are anticipated with any of the alternatives.

Emergency Services

Due to location of proposed transmission structures outside of the roadway travel lanes, no long term impacts to emergency service provision is anticipated.

Construction activities could disrupt access during the construction period. Routes B, C, and D cross Bloomington Avenue within one-block of the fire station located at 2700 Bloomington Avenue South. Route A crosses Bloomington Avenue several blocks to the south.

Similarly Routes B, C, and D lie along (26th and 28th Streets) or cross (Chicago Avenue) primary access routes to both Abbott Northwestern and Minneapolis Children's Hospitals. Route A crosses Chicago Avenue several blocks to the south of the hospital facilities.

5.16.2.2. Substation Alternatives

This section identifies indirect and direct effects to transportation facilities specific to the Project substation alternatives. Potential impacts identified below would be similar if an aboveground or underground substation design is selected.

Roadways

None of the proposed substation locations would disrupt roadway facilities.

Pedestrian and Bicycle Facilities

The following potential impacts could occur to pedestrian and bicycle facilities:

Hiawatha West Substation

Construction of the substation would temporarily disrupt use of the Midtown Greenway trail. Construction of the Hiawatha West Substation would involve creation of a new bike path to be located adjacent to the west of the Substation, to the east of

Hiawatha Avenue and an existing rail spur used by Metropolitan Council for the delivery of light rolling cars. The bike path would connect to the existing Midtown Greenway bike path and be similar in size and design to the existing path, with a bituminous surface.

Hiawatha East Substation

Given the close proximity of the existing Midtown Greenway trail to the proposed southern wall, it is likely that the construction of the southern wall would temporarily disrupt the Greenway trail.

Midtown North Substation

Sidewalks along Portland Avenue and Oakland Avenue would be temporarily disrupted during the construction of the substation access drives. Possible impacts may extend through the demolition of the existing structures and construction of the new substation and walls.

Construction of the Midtown North Substation may create physical constraints in a planned Midtown Greenway pedestrian promenade (Portland Avenue to Cedar Avenue) between the substation walls and the transmission poles. A promenade trail using a reduced trail width or little to no clearances on either side of the trail may be possible although not desirable.

Midtown South Substation

Sidewalks along Portland Avenue and Oakland Avenue would be temporarily disrupted during the construction of the substation access drives. Possible impacts may extend through the demolition of the existing buildings and construction of the new substation and walls.

Construction of the Midtown South Substation would prohibit the future reestablishment of 29th Street due to space constraints. There may be room to put an 8 foot promenade through, with 4 feet of clearance to the substation walls. The Midtown Greenway plan calls for fencing no higher than 3.5 feet between the promenade and the adjacent private parcel for pedestrian safety. The 12-foot substation walls would exceed the recommended height limitation.

Mt-28N and Mt-28S Substations

Pedestrian or trail impacts are not anticipated for Substation locations Mt-28S and Mt-28N based on available information.

Bus Transit

None of the proposed substation locations would disrupt existing bus transit facilities.

Railways

None of the proposed substation locations would disrupt freight rail or Hiawatha LRT facilities or operations.

Airports

The proposed substation locations would not affect airport facilities.

Emergency Services

The proposed substation locations would not affect emergency service provision.

5.16.3. Mitigation

Potential direct and indirect impacts to transportation facilities could be minimized through mitigation measures. Mitigation measures, specific to the alternative routes and substations, are presented below.

5.16.3.1. Route A – Aboveground

- Final transmission pole placement decisions could be coordinated with Minneapolis Public Works staff to avoid any sightline concerns at driveway, alley or local street intersections.

- Final transmission pole placement decisions could also be coordinated with the City of Minneapolis to ensure ADA requirements for sidewalk widths are maintained.

- Construction activities could be coordinated with the Minneapolis Fire Department and ambulance service providers to ensure that construction activities do not disrupt provision of emergency services from the fire station at 2700 Bloomington Avenue South, or access to Abbott Northwestern Hospital, Minneapolis Children's Hospital or the Hennepin County Medical Center.

- If the transmission line structures were to be placed within the Greenway trench, it could be done in such a way that avoids impacts to future rail transit in the future.

- Disruptions to traffic flow, connectivity and mobility of the roadway system due to construction activities could be closely monitored. Disruptions may not have significant impacts to traffic operations if road closures are well coordinated and detour routes are planned.

- Extensive coordination with Metro Transit could be conducted in order to avoid or minimize disruption to LRT operations during project construction.

5.16.3.2. Route A – Underground

- Careful evaluation of as-built drawings for the ramp between the Greenway and Park Avenue could be conducted to avoid impacts from duct bank construction to ramp foundations.

- If the transmission line structures were to be placed within the Greenway trench, it could be done in such a way that avoids impacts to future rail transit in the future.

- Construction activities could be coordinated with the Minneapolis Fire Department and ambulance service providers to ensure that construction activities do not disrupt provision of emergency services from the fire station at 2700 Bloomington Avenue South, or access to Abbott Northwestern Hospital, Minneapolis Children's Hospital or the Hennepin County Medical Center.

- If the route width were to be expanded north within the Greenway trench, the route expansion could allow for an alignment to be placed within the trench so as to not interfere with future development of LRT within the trench.

- Disruptions to traffic flow, connectivity and mobility of the roadway system due to construction activities could be closely monitored. Disruptions may not have significant impacts to traffic operations if road closures are well coordinated and detour routes are planned.

- Extensive coordination with Metro Transit could be conducted in order to avoid or minimize disruption to LRT operations during project construction.

5.16.3.3. Route B

- Design plans could be coordinated with Metro Transit to avoid or minimize impacts to bus stop facilities resulting from pole locations either obscuring visibility or reducing sidewalk width.

- Construction activities could be coordinated with the Minneapolis Fire Department and ambulance service providers to ensure that construction activities do not disrupt provision of emergency services from the fire station at 2700 Bloomington Avenue South, or access to Abbott Northwestern Hospital, Minneapolis Children's Hospital or the Hennepin County Medical Center.

- Disruptions to traffic flow, connectivity and mobility of the roadway system due to construction activities could be closely monitored. Disruptions may not have significant impacts to traffic operations if road closures are well coordinated and detour routes are planned.

- Extensive coordination with Metro Transit could be conducted in order to avoid or minimize disruption to LRT operations during project construction.

5.16.3.4. Route C

- Design plans could be coordinated with Metro Transit to avoid or minimize impacts to bus stop facilities resulting from pole locations either obscuring visibility or reducing sidewalk width.

- Construction activities could be coordinated with the Minneapolis Fire Department and ambulance service providers to ensure that construction activities do not disrupt provision of emergency services from the fire station at

2700 Bloomington Avenue South, or access to Abbott Northwestern Hospital, Minneapolis Children's Hospital or the Hennepin County Medical Center.

- Disruptions to traffic flow, connectivity and mobility of the roadway system due to construction activities could be closely monitored. Disruptions may not have significant impacts to traffic operations if road closures are well coordinated and detour routes are planned.

- Extensive coordination with Metro Transit could be conducted in order to avoid or minimize disruption to LRT operations during project construction.

5.16.3.5. Route D

- Construction activities could be coordinated with the Minneapolis Fire Department and ambulance service providers to ensure that construction activities do not disrupt provision of emergency services from the fire station at 2700 Bloomington Avenue South, or access to Abbott Northwestern Hospital, Minneapolis Children's Hospital or the Hennepin County Medical Center

- Disruptions to traffic flow, connectivity and mobility of the roadway system due to construction activities could be closely monitored. Disruptions may not have significant impacts to traffic operations if road closures are well coordinated and detour routes are planned.

- Extensive coordination with Metro Transit could be conducted in order to avoid or minimize disruption to LRT operations during project construction.

5.16.3.6. Route E2

- Coordination would be needed with FHWA and MnDOT to determine feasibility of locating transmission structures within the I-35W and I-94 ROW. If transmission poles are placed within this ROW, pole structures could be designed with crash protection to minimize property damage and injury risks associated with car crashes.

- Potential impacts to local roadways or sidewalks along 3rd Avenue South, Clinton Avenue, 5th Avenue South and 18th Street may not be mitigatable without relocation or realignment of these roadways, which could result in further significant impacts.

- Construction activities could be coordinated with the Minneapolis Fire Department and ambulance service providers to ensure that construction activities do not disrupt provision of emergency services from the fire station at 2700 Bloomington Avenue South, or access to Abbott Northwestern Hospital, Minneapolis Children's Hospital or the Hennepin County Medical Center.

- Disruptions to traffic flow, connectivity and mobility of the roadway system due to construction activities could be closely monitored. Disruptions may not have significant impacts to traffic operations if road closures are well coordinated and detour routes are planned.

- Extensive coordination with Metro Transit could be conducted in order to avoid or minimize disruption to LRT operations during project construction.

5.16.3.7. Substation Locations

Potential impacts to transportation facilities from substation construction and operation would be minimal and temporary in the nature; as such, no mitigation measures appear to be warranted.

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6. Alternative Routes and Substation Locations Evaluated in EIS

This chapter summarizes the comparative impacts of Routes A, B, C, D, and E2, as well as the Hiawatha and Midtown Substation alternatives in terms of the direct and indirect effects identified in Chapter 5.0. This chapter also summarizes potential mitigation for these impacts and the potential irreversible and irretrievable commitment of resources under the Project. Finally, the chapter discusses the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity.

6.1. Comparative Impacts of Alternatives

This section discusses the comparative direct and indirect impacts of the five transmission line route alternatives and the five substation locations.

6.1.1. Transmission Line Alternatives

Five route alternatives were analyzed in the Draft Environmental Impact Statement (EIS): Route A (the Applicants' preferred route), Route B, Route C, Route D, and Route E2. Routes A and E2 would be constructed as double circuit overhead lines. Route A could also be constructed underground. Routes B and C would be constructed as two single circuit overhead transmission lines. Route D would only be constructed underground.

In general, potential impacts do not vary significantly between the four overhead route alternatives, except that Routes B and C would be longer than Routes A and E2 and therefore result in longer construction times and a greater total area potentially affected by construction and operation of the Project.

Likewise, potential impacts do not generally vary significantly between the two underground route alternatives, with the main difference being construction and vegetation impacts to the 29th Street/Greenway corridor versus 28th Street. However, there is significant variation between the potential impacts from overhead transmission lines and underground transmission lines. Generally, underground transmission lines eliminate most impacts to the visual landscape, with the exception of visual impacts resulting from tree removal. However, underground transmission lines require a longer construction period, have more invasive subsurface construction procedures, and are significantly more expensive.

A comparison of potential impacts of the transmission line route alternatives is shown in Table 6-1.

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Table 6-1: Comparative Impacts of Alternatives for the Applicant's Preferred Alignments of Transmission Line Routes

Resource and Impacts	Route A (Overhead)	Route A (Underground)	Route B (Overhead)	Route C (Overhead)	Route D (Underground)	Route E2 (Overhead)
Overall Route Length	**1.4**	**1.4**	**3.3**	**3.8**	**1.5**	**3.0**
Proximity to Structures						
Number of residential structures within 115 feet of overhead transmission line pole structures[7]	17	NA Zero impact.[8]	146	204	NA Zero impact.[2]	76
Number of commercial enterprises within 115 feet of overhead transmission line pole structures[1]	21	NA Zero impact.[2]	20	23	NA Zero impact.[2]	10
Number of other properties (i.e., places of worship, daycares, schools, cemeteries, hospitals, and mixed use) within 115 feet of overhead transmission line pole structures[1]	3	NA Zero impact.[2]	11	14	NA Zero impact.[2]	4
Land Use, Planning, and Zoning						
Potential loss of land use along easements	Similar effect	Similar effect	Similar effect	Similar effect	Similar effect	Similar effect
Compatibility with land use plans to support additional development by increasing electrical reliability	Similar benefit	Similar benefit	Similar benefit	Similar benefit	Similar benefit	Similar benefit
Archaeological and Historical Resources						
Permanent alteration of urban landscape	Similar effect among overhead transmission line construction alternatives	None; no visual intrusion	Similar effect among overhead transmission line construction alternatives	Similar effect among overhead transmission line construction alternatives	None; no visual intrusion	Minor effect; existing industrial infrastructure along route

[7] 115 feet is equivalent to the maximum height of an overhead transmission line pole structures, also referred to as the "fall distance." The term "fall distance" is not a term defined or utilized by the utility industry, by the Applicant, or by federal statute or federal regulation (Xcel Energy, FHA, 2009). The definition for this term is provided in HUD Handbook 4150.2, which states that "[f]or field analysis, the appraiser may use tower height as the fall distance" (Xcel Energy, FHA, 2009).

[8] Underground transmission line route alternatives have no associated "fall distance" of aboveground transmission line pole structures; therefore there is zero impact in proximity to structures.

Resource and Impacts	Route A (Overhead)	Route A (Underground)	Route B (Overhead)	Route C (Overhead)	Route D (Underground)	Route E2 (Overhead)
Number of NRHP listed properties (view to/from historic properties potentially affected by visual intrusion)	8	0	9	7	0	8
Number of NRHP eligible properties (view to/from historic properties potentially affected by visual intrusion)	4	NA Zero impact.	5	5	NA Zero impact.	37
Number of 800 list properties (view to/from historic properties potentially affected by visual intrusion)	3	NA Zero impact.	11	10	NA Zero impact.	Unknown
Potential impacts from ground disturbance	Significantly less effect than underground lines, as soil disturbances would be limited to transmission line pole construction as opposed to the entire transmission line route alignment. Similar effect among all overhead line alternatives.	Greater ground disturbance than overhead lines. Potential impacts to unidentified archaeological resources or to integrity of known resources (e.g., historic retaining walls).	Significantly less effect than underground lines, as soil disturbances would be limited to transmission line pole construction as opposed to the entire transmission line route alignment. Similar effect among all overhead route alignment alternatives.	Significantly less effect than underground lines, as soil disturbances would be limited to transmission line pole construction as opposed to the entire transmission line route alignment. Similar effect among all overhead route alignment alternatives.	Greater ground disturbance than overhead lines. Potential impacts to unidentified archaeological resources or to integrity of known resources (e.g., historic retaining walls).	Significantly less effect than underground lines, as soil disturbances would be limited to transmission line pole construction as opposed to the entire transmission line route alignment. Similar effect among all overhead route alignment alternatives.
Socioeconomics						
Potential economic benefit to the surrounding communities and businesses from an increase in transmission capacity and reliability	Similar benefit	Similar benefit	Similar benefit	Similar benefit	Similar benefit	Similar benefit
Decrease in the perceived value of residential properties along routes	Similar effect among overhead transmission line construction alternatives	NA Zero impact.	Similar effect among overhead transmission line construction alternatives	Similar effect among overhead transmission line construction alternatives	NA Zero impact.	Similar effect among overhead transmission line construction alternatives
Environmental Justice						

Resource and Impacts	Route A (Overhead)	Route A (Underground)	Route B (Overhead)	Route C (Overhead)	Route D (Underground)	Route E2 (Overhead)
No anticipated long-term or permanent effects specific to minority or low income populations within the Environmental Justice Study Area are anticipated.						
Safety and Health						
Number of known or suspected contaminated sites potentially affected along route	15	15	34	26	21	Unknown
Recreation and Tourism						
Potential negative effect on the overall experience, perception, and sentiment associated with recreational areas due to visual intrusion	Visible from Midtown Greenway.	NA Zero impact.	Visible from Stewart Field and Cedar Field.	Visible from northern portion of Powderhorn Park.	NA Zero impact.	Visible from East Phillips Park. Existing industrial features in area minimize effect from additional visual intrusion.
Aesthetics						
Visual Intrusion	1.4 miles Visible from multi-story residential and commercial buildings.	No visual intrusion, impacts from transmission lines themselves; however there will be impacts from tree removal.	3.2 miles Visible from multi-story residential and commercial buildings.	3.8 miles Visible from multi-story residential and commercial buildings.	No visual intrusion, impacts from transmission lines themselves; however there will be impacts from tree removal. Route D removes the most tress.	3.0 miles Visible from multi-story residential and commercial buildings.
Water Resources						
No anticipated long-term or permanent effects on natural resources within the Project Area are anticipated.						
Flora						
Number of existing trees that would be removed along each route during construction	5	2	8	19	43	Unknown
Route-specific flora impacts	Similar effect among overhead transmission line construction	Would disturb mostly non-woody vegetation.	Similar effect among overhead transmission line construction	Would require removal of three mature American elm trees.	Similar effect among overhead transmission line construction	Similar effect among overhead transmission line construction

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Resource and Impacts	Route A (Overhead)	Route A (Underground)	Route B (Overhead)	Route C (Overhead)	Route D (Underground)	Route E2 (Overhead)
	alternatives		alternatives		alternatives	alternatives
Fauna						
No anticipated long-term or permanent effects specific to fauna within the Project Area are anticipated.						
Rare and Unique Natural Resources/Critical Habitat						
No anticipated long-term or permanent effects specific to rare and unique natural resources or critical habitat within 1 mile of the route and substation alternatives are anticipated.						
Air Quality and Climate						
Potential for localized formation of ozone from aboveground transmission line corona (impact expected to be negligible)	Similar effect among overhead transmission line construction alternatives	NA Zero impact.	Similar effect among overhead transmission line construction alternatives	Similar effect among overhead transmission line construction alternatives	NA Zero impact.	Similar effect among overhead transmission line construction alternatives
Vehicle emissions and dust particulate generated during construction (all impacts considered minor and temporary)	Lowest potential impact of all alternatives; shortest anticipated construction schedule.	Greater negative effect than overhead transmission line route due to longer construction schedule.	Second highest potential impact of overhead route alternatives due to longer length and corresponding construction schedule.	Highest potential impact of overhead route alternatives due to longer length and corresponding construction schedule.	Greater negative effect than overhead transmission line route due to longer construction schedule.	Second lowest potential impact of all alternatives; second shortest anticipated construction schedule.
Noise						
Direct effect on ambient sound during construction	Shortest duration of construction.	Greatest effect on ambient sound. A greater temporary noise impact would be experienced because of the higher level of construction activity.	Second longest duration of construction.	Longest duration of construction.	Greatest effect on ambient sound. A greater temporary noise impact would be experienced because of the higher level of construction activity.	Second shortest duration of construction.
Sound levels from operation of transmission line (minor levels of	Similar effect among overhead	NA	Similar effect among overhead	Similar effect among overhead	NA	Similar effect among overhead

Resource and Impacts	Route A (Overhead)	Route A (Underground)	Route B (Overhead)	Route C (Overhead)	Route D (Underground)	Route E2 (Overhead)
audible noise during times of damp or foggy weather as electricity near the power lines ionize the moist air around the wires)	transmission line construction alternatives	Zero impact.	transmission line construction alternatives	transmission line construction alternatives	Zero impact.	transmission line construction alternatives
Utility Systems						
No anticipated long-term or permanent effects specific to utility systems within the Project Area are anticipated.						
Traffic and Transportation						
Potential for overhead transmission line structures located at driveways, alleys, or street intersections to obscure sight-lines and cause safety concerns for vehicular traffic.	Similar effect among overhead transmission line construction alternatives	NA Zero impact.	Similar effect among overhead transmission line construction alternatives	Similar effect among overhead transmission line construction alternatives	NA Zero impact.	Similar effect among overhead transmission line construction alternatives
Construction activities and ongoing maintenance could disrupt traffic flow and affect connectivity and mobility of the roadway system.	Similar effect among overhead transmission lines.	Greatest effect when compared to overhead transmission lines as construction duration would be significantly greater.	Similar effect among overhead transmission lines.	Similar effect among overhead transmission lines.	Greatest effect when compared to overhead transmission lines as construction duration would be significantly greater.	Similar effect among overhead transmission lines.
Pedestrian and Bicycle Facilities	Similar effect among overhead transmission line construction alternatives	NA Zero impact.	Similar effect among overhead transmission line construction alternatives	Similar effect among overhead transmission line construction alternatives	NA Zero impact.	Similar effect among overhead transmission line construction alternatives

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6.1.2. Substation Alternatives

Similar to the comparison of impacts for transmission line routes, potential impacts between the six substation locations do not vary significantly. However, if one or more of the substations are constructed underground, as the ATF requested consideration of, the differences in construction, engineering design, and operation between the two design types would result in a significant variation in potential impacts.

Most of the potential direct and indirect impacts from aboveground substations can be minimized through undergrounding of the substations. Potential impacts unique to aboveground substation designs including the following: loss of land use and incompatibility with community land use plans, potential loss of vegetation, and permanent visual intrusion.

However, several potential direct and indirect impacts from underground substations are the same as those potential impacts from aboveground substations: improvement in electric reliability for the area, loss of land use and possible displacement of tenants, and temporary impacts from construction (e.g., road closures, noise, and fugitive air emissions).

The substation alternatives vary in the extent of affected land uses based on whether demolition of existing structures and relocation of existing tenants would be required. Table 6-2 lists the current land use of the substation alternatives.

Table 6-2: Current Use of Alternative Substation Locations

Substation	Current Buildings and/or Land Use
Hiawatha West	Vacant Lot
Hiawatha East	Occupied Warehouse
Midtown North	Condemned Triplex, Vacant Lot, and Former Xcel Energy Oakland Substation
Midtown South	Occupied Warehouse
Mt-28N	Green Space
Mt-28S	Shuttle Parking Lot for Children's Hospital

Underground substations present the potential for impacts not typically experienced from aboveground substations, including disruption of contaminated soil and groundwater, dewatering activities required during construction, and an overall more extensive construction schedule that would prolong temporary impacts to traffic and transportation, air quality, and noise levels. In addition, the significantly higher cost of undergrounding a substation would pose additional impacts to those parties responsible for payment of the increased incremental cost.

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6.2. Mitigation of Impacts

The high voltage transmission line (HVTL) route permit may require certain mitigation measures to prevent or minimize both short-term and long-term impacts on resources from construction and operation of the Project. Potential mitigation measures for each resource area are discussed in detail in Chapter 5.0 and summarized in Table 6-3.

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Table 6-3: Summary of Potential Mitigation Measures

Resource	Mitigation Measures
5.1 – Proximity to Structures	Construct the transmission lines underground.
	Develop substations on currently vacant parcels.
	Impacts to various properties can be minimized by developing the overhead transmission line route that has the fewest potential number of impacts to that type of property.
	If an overhead route alternative is selected, the final transmission line design could be completed with the objective of minimizing the number of structures within the "fall distance" of the tower to the extent practicable.
5.2 – Land Use, Zoning, and Planning	Use existing easements for the ROW.
	Restore (e.g., re-vegetate) cleared ROW to its original land use, to the extent practical.
	Construct the transmission lines underground.
	Select substation locations that require the minimum amount of land use change (i.e., demolition and/or relocation of existing buildings and current uses).
	Substations could be constructed with an architecturally designed wall on three to four sides of the substation to complement the surrounding structures and to mitigate other potential impacts such as noise.
5.3 – Archaeological and Historical Resources	Place underground lines within previously disturbed and/or public ROW.
	Use landscaping or other screening devices appropriate to the industrial and residential setting of the substation to avoid or to mitigate potential adverse impact from visual intrusion to surrounding historic properties.
	Construct the substations underground in a previously disturbed area.
5.4 – Socioeconomics	Locate the Project along existing roadway and utility ROW to reduce perceived impact on property values.
5.5 – Environmental Justice	Assist in relocation of businesses displaced for substation construction.
	If an underground transmission line route alternative is chosen, distribute the incremental cost of undergrounding the transmission line among a larger base of ratepayers (e.g., state of Minnesota or seven county metropolitan area) to reduce the potential economic hardship on ratepayers in the Project Area.
5.6 – Safety and Health	Monitor and screen suspected soil and groundwater for contamination, especially in areas of known potential soil or groundwater contamination.
	Provide PPE to construction workers in the event that contamination is identified.
	Have field instruments readily available to quickly screen soils in the field for arsenic contamination and appoint individuals with correct training for sampling, data review, and regulatory coordination, should an encounter with contaminated soils occur.
	Properly identify, handle, and dispose of contaminated soils and groundwater to protect workers and the public, and to prevent further contamination.
	Use dust suppression measures during soil disturbing activities in areas of potential soil contamination.
	Conduct a lead-based paint survey and an asbestos survey on any buildings constructed prior to the mid-1980's to determine the presence of these materials. Should these materials be found, follow proper protection and handling measures.

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Resource	Mitigation Measures
5.6 – Safety and Health (Continued)	Implement Best Management Practices as developed for the Storm Water Pollution Prevention Plan to reduce the likelihood of a spill, including inspections of construction equipment, preparation of spill kits, providing operator training, and using appropriate erosion prevention and sediment control practices.
	Construct the transmission lines aboveground to reduce the potential to encounter contaminated soils or groundwater.
	Construct the transmission line underground to further reduce levels of EMF and to avoid impacts to structures from severe weather.
	Ground metal objects near the transmission lines to reduce the risk of induced currents and shock hazards.
	Equip transmission lines with breakers and relays to de-energize the line in the event of an accident or severe weather damage to the structures.
	Place fences and warning signs around substations to prevent and discourage unauthorized access to electrical equipment.
5.7 – Recreation and Tourism	Impacts to recreation and tourism could be mitigated primarily by mitigating the aesthetics impacts (see aesthetics section below).
	If Route C is selected, construction could be avoided or minimized during the May Day Parade and the Art Festival to avoid impacts to recreation.
5.8 – Aesthetics	For Route A's overhead option, the Applicant would relocate the existing distribution lines along the 29th Street/HCRRA corridor and place them underground.
	For Route B or C, the special structures with narrower than normal bases could be used along the full length of the routes, to the extent possible, to bring the scale of the transmission structures closer to typical vertical poles currently found along these routes.
	The substations will be constructed with architecturally designed perimeter walls and the surrounding area will be landscaped.
	Locate the aboveground transmission structures in a manner to minimize direct impacts (e.g. avoid placing transmission structures directly in front of a building).
	For Route A, locate transmission structures away from planned community gathering spaces along the Greenway.
	To reduce aesthetic impact of trimming over story trees, cultivars could be planted or trimming techniques that lower the tree crown could be implemented.
	If exterior substation walls contain lighting for security, down shielding lights could be used to minimize the potential for light pollution and industrial appearance of the substation after dark.
	Construct the transmission lines and/or substations underground.
5.9 – Water Resources	Implement Best Management Practices contained within the Soil Erosion and Sediment Control Plan and Storm Water Pollution Prevention Plan, which may include: installation of sediment and erosion control measures prior to construction; restoration of the ROW; avoiding the use of fertilizer, pesticide, or herbicide in ROW; fueling vehicles on paved surfaces; and implementation of specific procedures that minimize and control inadvertent fluid returns during horizontal directional drilling operations.
	Conduct trench or pit dewatering as necessary.
5.10 – Flora	Only remove trees located in the ROW for the transmission line, or those that would impact the safe operation of the facility.
	Work with affected landowners to replace removed trees with other, more suitable trees.
	If Route A's underground option is chosen, minimize disturbance to the vegetated slope of the Midtown Greenway during construction and maintenance activities.

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Resource	Mitigation Measures
5.11 – Fauna	Work with the resource agencies to identify any areas that may require marking transmission line shield wires and/or using alternate structures to reduce avian collisions. This may include the MnDNR, USFWS and/or the U.S. Army Corps of Engineers.
	Design plans include constructing the transmission structures with adequate spacing to avoid raptor electrocution.
	Attempt to avoid areas known as major flyways or migratory resting spots.
5.12 – Rare and Unique Natural Water Resources/Critical Habitat	See mitigation for Fauna section above.
	If Route C selected, survey for Blanding's turtle.
5.13 – Air Quality and Climate	Ensure that all vehicles are well maintained in compliance with Federal and State air quality regulations.
	Water spray dirt piles and dust-laden roadways during construction of the Project to minimize or avoid fugitive dust.
	Operate construction vehicle traffic at reduced speeds to minimize dust particle displacement on unpaved roads.
	Limit idle times and shut down construction equipment when not in use.
	Restore the natural landscape as soon as practicable upon cessation of construction activities to minimize the disturbed areas from which dust could arise.
5.14 – Noise	Conduct construction operations during the times specified in the City of Minneapolis noise ordinance.
	Surround substations with decorative walls and sound absorbing panels where necessary to help mitigate noise from the substation transformers and ensure compliance with State and City noise regulations.
5.15 – Utility Systems	If radio or television interference occurs because of transmission line, consult with affected landowner(s) to restore reception to pre-Project quality.
	Maintain proper horizontal and vertical separation between transmission line conductors and equipment (cranes and shovels) used during any pipeline construction and maintenance to prevent shock hazard.
	For Route A's overhead option, place existing overhead distribution lines underground to mitigate impacts to Greenway corridor.
	Schedule any planned service disruptions to electric service that are necessary during construction activities with the affected owners of the existing transmission line in accordance with reliability standards so that alternative arrangements for electrical service could be made in advance of the potential disruption.
	Have utility repair crews present or on-call during construction activities to respond to unplanned incidents that may result in interruption to electric service.
5.16 – Transportation and Public Services	Construct the transmission lines underground to mitigate impacts resulting from the potential of overhead transmission line structures creating obscure sight-lines and safety concerns for vehicular traffic.
	Construct the transmission line aboveground to mitigate impacts to roadways and traffic resulting from the duration of construction.
	Construct the transmission line underground to mitigate impacts to pedestrians and bicycle facilities.

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Resource	Mitigation Measures
5.16 – Transportation and Public Services (Continued)	Coordinate final overhead transmission structure placement with Minneapolis Public Works staff to avoid sightline concerns at driveway, alley or local street intersections, and to ensure ADA requirements for sidewalk widths are maintained.
	Coordinate construction activities with Minneapolis Fire Department and ambulance service providers to ensure construction activities do no disrupt provision of emergency services from nearby fire stations or hospitals.
	Closely monitor disruptions to traffic flow, connectivity and mobility of the roadway systems due to construction activities so that impacts are minimized through well-coordinated road closures and well-planned detour routes.
	Coordinate with Metro Transit to avoid or minimize disruption to LRT operations, during construction.
	Coordinate with Metro Transit to avoid or minimize impacts to bus stop facilities resulting from overhead pole locations either obscuring visibility or reducing sidewalk width.
	For Route E2, coordinate with FHWA and MnDOT to determine feasibility of locating transmission structures within the I-35W and I-94 ROW. If transmission poles are placed within this ROW, pole structures may need to be designed with crash protection to minimize property damage and injury risks associated with car crashes.
	If the HVTL is to be located underground within the Greenway/HCCRA, and an expanded route width is requested by the Applicant, the location of the line could be placed beneath the existing bike path to avoid conflicts with future plans for the expansion of the LRT within the trench.

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6.3. Irreversible and Irretrievable Commitment of Resources

Irreversible commitment of resources refers to the loss of future options for resource development or management, especially of nonrenewable resources such as cultural resources. Irretrievable commitment of resources refers to the lost production or use value of renewable natural resources.

The construction of the Project would require the irretrievable commitment of non-recyclable building materials and fuel consumed by construction equipment.

6.4. Relationship between Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity

Construction of the Project would have short-term impacts on environmental resources, primarily associated with installation of poles and conductors, clearing of the right-of-way (ROW), and use of construction lay-down areas. Temporary impacts from construction activities are discussed in Chapter 5.0. The HVTL permit would require the Applicant to restore the ROW, temporary work spaces, access roads, abandoned ROW, and other private lands affected by construction of the Project. During the restoration process, the Applicants could be required by the HVTL route permit to work with private landowners, local wildlife management programs, and other applicable agencies and groups, to ensure that the ROW restoration would return the land to its original function to the extent possible.

The short-term use of environmental resources would result in improved ability to meet the electrical demands of the Applicant's customers in south Minneapolis, improved reliability with reduced outages, and better connection of the current distribution system to the overall electrical system. The Project would remain operational for over 40 years. Within that time, environmental resources would generally return to their long-term productivity, although some permanent impacts, such as changes to the visual landscape, would occur with their degree depending on the route selected.

7. Rejected Alternative Routes and Substations

One alternative route and seven alternative substations were proposed by the Advisory Task Force (ATF). The alternative route, originally referred to by the ATF as Route E and now referred to as Route E1 for purposes of this Draft Environmental Impact Statement (EIS), was determined not to be viable due to its proximity to major interstates. An alternative Route E, referred to as Route E2, was developed by the Applicant for analysis in the Draft EIS. Five substation locations were proposed by the ATF as alternatives to the Applicant's two proposed locations for the Hiawatha Substation. These five Hiawatha alternatives were determined not to be viable due to size limitations, as discussed below. Two Midtown Substation alternatives were also proposed by the ATF, and these alternatives were carried forward for further analysis in the Draft EIS. This section describes the limitation of the five ATF Hiawatha Substation alternatives and ATF proposed Route E1 that resulted in the rejection of these alternatives as viable options and elimination of the alternatives from analysis in the Draft EIS.

7.1. Alternative Routes Rejected

One alternative route was proposed by the ATF, which was originally referred to as Route E. Due to the proximity of Route E to major interstates, the Route was determined not be a viable route alternative. An alternative to Route E, referred to as Route E2, was developed by the Applicant. The original Route E alignment, as developed by the ATF, is referred to as Route E1 and described in detail below.

7.1.1. Route E1

Route E1 is an overhead route over 3 miles in length. The pathway suggested by the ATF for Route E1 would begin at the Hiawatha Substation, follow 28th Street East west to Highway 55, and follow Highway 55 north-northwest towards Interstate 94 (I-94). Route E1 would then follow the I-94 corridor to Interstate 35W (I-35W) and turn south to follow I-35W to roughly 28th Street East and end at the Midtown Substation (Management Analysis & Development, 2009).

Route E1 would present significant permitting challenges. The interstate right-of-way (ROW) is owned and maintained by the Minnesota Department of Transportation (MnDOT). The Applicant would be required to obtain a Utility Permit from MnDOT prior to construction of the Project. However, locating transmission lines directly on the interstate ROW is generally prohibited due to potential interference with public safety and convenience. Under Minnesota Rules, part 8810.3300, subpart 4 and the MnDOT Accommodation Policy, transmission lines can be located within the interstate ROW only in cases of extreme hardship and demonstration that locating the transmission line on the interstate will not affect traffic safety, design, construction, or operation (MnDOT, 1990). Under the MnDOT Accommodation Policy, the following conditions would need to apply prior to MnDOT granting a Utility Permit for construction of the transmission line within the interstate ROW:

1. The accommodation will not adversely affect the safety, design, construction, traffic operations, maintenance, or stability of the freeway;
2. Alternate locations are not available or are cost prohibitive from the standpoint of providing efficient utility services;
3. The accommodation will not interfere with or impair the present use or future expansion of the freeway;
4. The location of the utility facility outside of the right-of-way would result in the loss of productive agricultural land or loss of productivity of agricultural land (in this case, the utility owner must provide information on the direct and indirect environmental and economic effects for evaluation and consideration by the Commissioner of Transportation); and
5. Access for constructing and servicing the utility facility will not adversely affect safety and traffic operations or damage any highway facility.

Route E1, as proposed by the ATF, would be located within the I-94 and I-35W interstate ROWs. Portions of the proposed route would be located in the median of I-94, overlap with driving lanes of I-35W, and be placed within the emergency shoulder of the interstate. As such, it is likely that MnDOT would find Route E1 to present hazards to motorists and to restrict and interfere with MnDOT's operation of the interstates.

As an alternative to Route E1, Route E2 was developed for analysis in the Draft EIS. Route E2 minimizes the use of interstate easements and instead follows secondary roadways along a similar pathway. Route E2 is described in Section 1.0, Introduction.

7.2. Alternative Substations Rejected

Five alternative Hiawatha Substation locations, suggested by the ATF and referred to as G-1 through G-5, were evaluated for technical feasibility. These alternative substation locations are shown on Figure 1-1. Due to the size of the available property at G-1 through G-5, each location was determined to be too small for a low profile or high profile substation design, and therefore not a technically viable option. More descriptive information on alternative Substations G-1 through G-5 is presented below.

7.2.1. Substation G-1

Substation G-1 is located at 2600 Minnehaha Avenue. G-1 is located on vacant property on the southwest corner of the intersection of Minnehaha Avenue and East 26th Street. The site is approximately one-half block north of the Hiawatha East Substation location.

The site was originally considered by the Applicant, but the space is not large enough to accommodate a low or high profile substation design. Due to the lack of space, detailed design or engineering of the site was not conducted, and this alternative was removed from further consideration.

7.2.2. Substation G-2

Substation G-2 is located on west side of 21st Avenue South, south of a building on East 28th Street. The site is approximately one block west of the proposed Hiawatha West Substation location. The site is comprised of the following properties: 2800 21st Avenue South, 2843 20th Avenue South, 2845 20th Avenue South, and 2859 20th Avenue South. The site is currently used as a parking lot (Xcel Energy, Information Request, No. IR 25, 2009).

The site was originally considered by the Applicant, but the space is not large enough to accommodate a low or high profile substation design. In order to use the site for the Hiawatha Substation, properties to the north and/or west would need to be purchased in order to make it a viable alternative for configuration of a low or high profile design (Xcel Energy, Information Request, No. IR 25, 2009). Due to the lack of space, detailed design or engineering of the site was not performed, and this alternative was removed from further consideration.

7.2.3. Substation G-3

Substation G-3 is located on a triangular shaped property, located on the east side of Highway 55/Hiawatha Avenue and north of Lake Street. The site is adjacent to and south of the Hiawatha West Substation location. The site, occupied by the SOO Line Railroad, is developed with railroad tracks.

The site is not large enough to accommodate a low or high profile substation design. In order to use the site for the Hiawatha Substation, the present railroad tracks would need to be eliminated entirely and all of the space between 2510 Lake Street East and Hiawatha Avenue would need to be available to allow for a high profile substation design (Xcel Energy, Technical Feasibility of ATF Substations, 2009). Due to the lack of space, t detailed design or engineering of the site was not performed, and this alternative was removed from further consideration.

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7.2.4. Substation G-4

Substation G-4 is located on a triangular shaped vacant property on the east side of Highway 55/Hiawatha Avenue. The G-4 Substation location extends from just north of the intersection of East 31st Street and Hiawatha Avenue to the intersection of East 32nd Street and Hiawatha Avenue. The site is approximately two blocks south of the Hiawatha West Substation location. A portion of the site is currently owned by Xcel Energy and was formerly developed with a substation. The other portion of the site is owned by the Minnesota Department of Transportation (MnDOT) and appears to be vacant and used for overflow light rail parking (Xcel Energy IR 25, 2009).

The site was originally considered by the Applicant, but the space is not large enough to accommodate a low or high profile substation design (Xcel Energy IR 25, 2009). Due to the lack of space, detailed design or engineering of the site was not conducted, and this alternative was removed from further consideration.

7.2.5. Substation G-5

Substation G-5 is located on a triangular shaped vacant property located on the east side of Hiawatha Avenue, north of East 26th Street. The site is located between 2001 24th Street East, 2500 Minnehaha Avenue, and Hiawatha Avenue. The site is located approximately one and one half blocks north of the Hiawatha East and West Substation locations. The property is owned by MnDOT and Met Council (Xcel Energy, Technical Feasibility of ATF Substations, 2009).

The site is currently not large enough to accommodate a low or high profile substation design. In order to use the site for the Hiawatha Substation, the adjacent occupied property to the east would need to be purchased (Xcel Energy, Technical Feasibility of ATF Substations, 2009). Due to the lack of space, the detailed design or engineering of the site was not performed, and this alternative was removed from further consideration.

8. Required Permits and Approvals

Construction of the Project will require a High Voltage Transmission Line (HVTL) permit from the Commission (Minnesota Statutes, section 216E.03, subdivision 2). Additional potentially required permits and approvals are listed in Table 8-1 below. The table also includes applicable executive orders and regulations that may guide regulating agencies in the permit or approval processes.

Table 8-1: Potentially Required Permits and Approvals

Regulation/Policy	Citation	Description – As Relevant to Project
Federal Regulations and Permits		
Archaeological Resources Protection Act of 1979	16 U.S.C. § 470aa-mm	The Act requires a permit for the excavation or removal of archaeological resources from publicly held or Native American lands. Permitted excavations must further archaeological knowledge and the resources removed are to remain the property of the United States. Tribal consent must be issued if the resource is found on land owned by a Native American tribe.
Clean Air Act	42 U.S.C. § 7401 et seq.	The Act establishes NAAQS for certain pervasive pollutants. The Act establishes limitations on SO_2 and NO_x emissions and sets permitting requirements. Authority for implementation of the permitting program is delegated to the MPCA.
Clean Water Act, as amended in 1972	33 U.S.C. 1251 et seq.	The Act contains standards to address the causes of pollution and poor water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction. Section 402 authorizes the issuance of National Pollutant Discharge Elimination System (NPDES) permits. Requires sources to obtain permits to discharge effluents and stormwaters to surface waters. The NPDES permit would be issued by the state of Minnesota.
Determination of No Hazard to Air Navigation	14 CFR 77.19	The FAA must confirm that construction of the Project does not constitute a hazard to air navigation.
Emergency Planning and Community Right-to-Know Act of 1986	42 U.S.C. 11001 et seq.	The Act requires that the Applicant maintain an inventory of specific chemicals used or stored on-site and annually report quantities present or used over applicable threshold.
Endangered Species Act of 1973	16 U.S.C. 1531 et seq.	The Act requires any federal agency authorizing, funding, or carrying out any action to ensure that the action is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species.
Highly Erodible Land & Wetland Conservation	7 CFR 12	The regulation sets forth the terms and conditions under which a person who produces an agricultural

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		commodity on highly erodible land or designates such land for conservation use, plants an agricultural commodity on a converted wetland, or converts a wetland shall be determined to be ineligible for certain benefits provided by the USDA and agencies and instrumentalities of USDA.
Migratory Bird Treaty Act	16 U.S.C. 703 et seq.	The Act protects birds that have common migration patterns between the United States and Canada.
National Environmental Policy Act of 1969	42 U.S.C. 4321-4347	The Act requires agencies of the federal government to study the possible environmental impacts of major federal actions significantly affecting the quality of the human environment.
National Historic Preservation Act of 1966	16 U.S.C. 470 et seq.	Under Section 106 of the Act, prior to the approval of the expenditure of any federal funds on the Project or prior to the issuance of any license, the federal agency must take into account the effect of the Project on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The federal agency shall afford the Advisory Council on Historic Preservation established under Title II of the Act a reasonable opportunity to comment with regard to such undertaking.
Noise Control Act of 1972	42 U.S.C. 4901-4918	The Act directs federal agencies to carry out noise control programs in their jurisdictions “to the fullest extent within their authority” and in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health and welfare.
Occupational Safety and Health Act of 1970	29 U.S.C. 651 et seq.	The Act established regulations for the protection of worker health and safety. The Applicant would be subject to OSHA general industry standards and OSHA construction standards.
Pollution Prevention Act of 1990	42 U.S.C. 13101 et seq.	The Act establishes a national policy for waste management and pollution control.
Resource Conservation & Recovery Act	42 U.S.C. 6901 et seq.	The Act regulates the treatment, storage, and disposal of hazardous wastes. The Applicant would be required to manage hazardous wastes generated during construction or operation of the Project in accordance with RCRA.
Safe Drinking Water Act	42 U.S.C. 300	The Act authorizes the USEPA to regulate public drinking water supplies by establishing drinking water standards, delegating authority for enforcement of drinking water standards to the states, and protecting aquifers from hazards such as injection of wastes and other materials into wells. The Act is enforced in the state by the Minnesota Department of Health, who manages applicable permits and registrations.
Executive Orders		
E.O. 12898, Environmental Justice	E.O. 12898	The executive order directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.
E.O. 13112, Invasive Species	E.O. 13112	The executive order directs federal agencies to

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		prevent the introduction or to monitor and control invasive non-native species and provide for restoration of native species.
E.O. 13186, Responsibilities of Federal Agencies to Protect Migratory Birds	E.O. 13186	The executive order directs federal agencies to avoid or minimize the negative impacts of their actions on migratory birds, and to take active steps to protect birds and their habitats.
State Regulations and Permits		
Aboveground Storage Tank Registration	Minn. R. 7151	The rule requires that aboveground storage tanks larger than 110 gallons of oil or petroleum products must be registered with the state.
Access Permit	Minn. R. 8810	The rule requires the Applicant to obtain an access permit from MnDOT when access is needed from established MnDOT ROWs.
Cultural Resources Review	36 CFR 800	The federal regulation requires state review under the National Historic Preservation Act.
Drainage Permit	Minn. R. 8810.3200-8810.3600	The rule requires a permit for the repair of utility or rebuilding of structures already in place (e.g., manholes, catch basins).
Easement Across State-Owned Land Managed by the Minnesota Department of Natural Resources	Minn. Stat. 84.63 and 84.631	The statute requires that MnDNR issue an easement to cross state-owned lands for the purposes of construction.
Electrical Inspection	Minn. R. 3800	The rule requires the Project to conform to all applicable electrical codes, enforced by the state.
Environmental Laboratory Certification	Minn. R. 4740.2010	The rule states that if sampling is required under state or federal permits (e.g., NPDES), environmental laboratory certification will be required.
Hazardous Waste Generator License	Minn. R. 7045.0225	The rule requires that if the Project generates greater than 10 gallons of hazardous waste in a calendar year, the Applicant must obtain a license.
License to Cross Public Lands and Waters	Minn. R. 6135	The rule requires a license if utility services are to cross public waters or lands administered by the MnDNR.
Minnesota Endangered Species Law	Minn. R. 6134 and Minn. Stat. 84.0895	The statute requires MnDNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting list of Endangered, Threatened, and Special Concern Species is codified as Minn. R. ch. 6134.
Minnesota Field Archaeology Act of 1963	Minn. Stat. 138.31-138.42	The statute establishes the office of the State Archaeologist; requires licenses to engage in archaeology on nonfederal public land; establishes ownership, custody and use of objects and data recovered during survey; and requires state agencies to submit development plans to the State Archaeologist, the Minnesota Historical Society and the Minnesota Indian Affairs Council for review when there are known or suspected archaeological sites in the area.
Minnesota Historic Sites Act	Minn. Stat. 138.661-138.669	The statute establishes the State Historic Sites Network and the State Register of Historic Places, and requires that state agencies consult with the Minnesota Historical Society before undertaking or

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		licensing projects that may affect properties on the Network or on the State or National Registers of Historic Places.
NPDES General Construction Stormwater Permit	40 CFR 122; Minn. R. 7001	The federal regulation authorizes the state environmental agency to regulate NPDES general stormwater permits. Coverage under the state general permit is required for construction projects disturbing greater than one acre of land.
NPDES/SDS Permit	Minn. R. 7001.0020	The rule requires a permit if wastewater generated from the Project is to be discharged to water of the U.S.
Utility Permit on Truck Highway ROW	Minn. R. 8810.3100-8810.3600	The rule requires a permit to install or move existing utilities on existing highway ROWs.
Water Appropriation Permit	Minn. R. 6115.0600-6115.0810; 6115.0010	The rule requires a general notification to the MnDNR if groundwater is withdrawn for construction dewatering, landscaping, or hydrostatic testing. A Water Appropriations Permit will be required if groundwater is withdrawn at a rate greater than 10,000 gallons per day or one million gallons per year.
Local Regulations and Permits		
After Hours Work Permit	City of Minneapolis Ordinance 59.30	The permit is required if construction is to be performed after 6 PM or before 7 AM on weekdays and anytime on weekends or holidays. Permits are issued by the City of Minneapolis Environmental Services Department of Regulatory Services.
Erosion Control Permit	City of Minneapolis Ordinance Chapter 52: Erosion Sediment and Control Ordinance MCWD Rule B: Erosion Control	An erosion control permit is required by the City of Minneapolis and MCWD for any activity that disturbs greater than 5,000 square-feet of land. Under permit requirements, the Applicant will be required to develop and maintain an Erosion Control Plan.
Oversize/Overweight Load Permit	Minnesota Department of Transportation	A permit for oversize, overweight, and over-width vehicles, as may needed during construction, is required from MnDOT.
Permit to Discharge to Storm Drain	City of Minneapolis Ordinance 50.60	A permit is required for all industrial wastewater discharges to the storm drains, as may occur during construction of the Project.

Sources: Xcel Energy, 2009; US Department of Energy, 2007
Notes: EO = Executive Order

In addition to the permits and approvals described above, local construction and building permits will be necessary. Design and construction of enclosures associated with the substations will be subject to county and city building requirements. Additionally, land use approvals may be required from county and city planning and zoning agencies prior to construction.

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