4.0 ENVIRONMENTAL EFFECTS

This chapter of the SDEIS for the Central Corridor Light Rail Transit (LRT) Project describes the existing conditions of the natural and built environments. The Key Project Elements were analyzed to determine the potential effects on the Central Corridor LRT Study Area's natural resources, its habitats, and effects of byproducts of the built environment, such as noise, hazardous materials, and energy consumption.

Each section describes the Issue Area defined for each topic, the methods used to make the assessments, the existing conditions of each resource, and long- and short-term effects anticipated as well as mitigation of effects.

Section 4.1 provides a description of the geologic resources along and adjacent to the Central Corridor LRT Study Area including the geology, soils, and groundwater of the Central Corridor LRT Study Area, and the likelihood of impacts from implementation of the Key Project Elements.

Section 4.2 discusses the streams, floodplains, wetlands, and critical areas that make up the surface waters in the Central Corridor LRT Study Area, and the likelihood of impacts from implementation of the Key Project Elements.

Section 4.3 presents descriptions of aquatic and terrestrial habitats in the Central Corridor LRT Study Area.

Section 4.4 identifies and discusses plant or animal species that are classified as rare, threatened, or endangered by federal and state agencies, and that exist in the Central Corridor LRT Study Area; and the likelihood of impacts from implementation of the Key Project Elements.

Section 4.5 describes the air quality impact analysis conducted for the project. The potential air quality impacts of the Central Corridor LRT Project related to emissions from motor vehicle traffic associated with the Key Project Elements were evaluated.

Section 4.6 includes an introduction to basic noise concepts, including noise descriptors, the prediction methodologies and modeling assumptions used to analyze the noise impacts of the Key Project Elements. The results of the ambient noise monitoring program and the evaluation of potential impacts of the alternatives along the Central Corridor LRT Study Area are also presented.

Section 4.7 introduces some basic ground-borne vibration concepts, including the prediction methodologies and modeling assumptions. The results of the evaluation of potential impacts of the Key Project Elements are presented.

Section 4.8 describes the potential for discovering hazardous or contaminated materials during construction of the Key Project Elements, and summarizes the extent of any suspected contamination and appropriate mitigation measures.

Section 4.9 presents an assessment of the impact of the Key Project Elements on electromagnetic fields and utilities in the Central Corridor LRT Study Area. This analysis was conducted to assess the likelihood of impacts due to implementation of the Key Project Elements.

Section 4.10 presents the quantitative assessment of the impact of the Key Project Elements on the transportation-related energy consumption in the Central Corridor LRT Study Area. This analysis was conducted to assess the likelihood of substantial increases in energy consumption due to implementation of Key Project Elements.

4.1 Groundwater and Soil Resources

None of the Key Project Elements would alter the geology or groundwater resources in the Central Corridor LRT Study Area. The existing soils resources are mostly disturbed and covered with pavement or other impervious surfaces. The existing surfaces that are not paved or impervious are, nonetheless, highly disturbed. No long-term impact to soil resources is anticipated.

Short-term impacts are primarily related to construction activities that cause soil disturbance, dewatering or potential groundwater contamination because of accidental spills. Best Management Practices (BMPs) would be used to minimize potential impacts. Table 4-1 provides a summary of the potential impacts to groundwater resources due to pollution sensitivity.

Table 4-1 Groundwater Resource Impacts Summary

Planning Segment	Key Project Elements								
	Hiawatha/ Central Connection	U of M Alignment	Future Infill Stations	Capitol Area Alignment/ Stations	Downtown St. Paul Alignment/ Stations	Traction Power Substations	Three-car Platforms	Vehicle Maintenance and Storage Facility	Washington Avenue Bridge
Downtown St. Paul	N/A	N/A	N/A	N/A	Very high sensitivity to pollution; potential dewatering	Very high sensitivity to pollution; potential dewatering	No Issues	Very high sensitivity to pollution; potential dewatering	N/A
Capitol Area	N/A	N/A	N/A	Very high sensitivity to pollution; potential dewatering	N/A	Very high sensitivity to pollution; potential dewatering	No Issues	N/A	N/A
Midway East	N/A	N/A	Very high sensitivity to pollution; potential dewatering	N/A	N/A	Very high sensitivity to pollution; potential dewatering	No Issues	N/A	N/A
Midway West	N/A	N/A	No Issues	N/A	N/A	Potential dewatering	No Issues	N/A	N/A
University/ Prospect Park	N/A	Potential dewatering	N/A	N/A	N/A	Potential dewatering	No Issues	N/A	No Issues
Downtown Minneapolis	No Issues	N/A	N/A	N/A	N/A	Potential dewatering	No Issues	N/A	N/A

NA - Not Applicable. Indicates that the Key Project Element is not relevant to the particular planning segment.

4.1.1 Methodology

Surficial geology, bedrock geology, and groundwater resources within the proposed Central Corridor LRT Study Area were identified using the Geologic Atlas of Hennepin County, Minnesota, and the Geologic Atlas of Ramsey County, Minnesota (MGS, 1989 and 1992). For the purposes of this evaluation, the Issue Area included a half-mile wide corridor on each side of the alignment.

Soils data were obtained from digital soil surveys of Hennepin and Ramsey counties (NRCS, 2005 and 2006). The Issue Area for the soils analysis included a half-mile wide corridor on each side of the alignment.

4.1.2 Existing Conditions

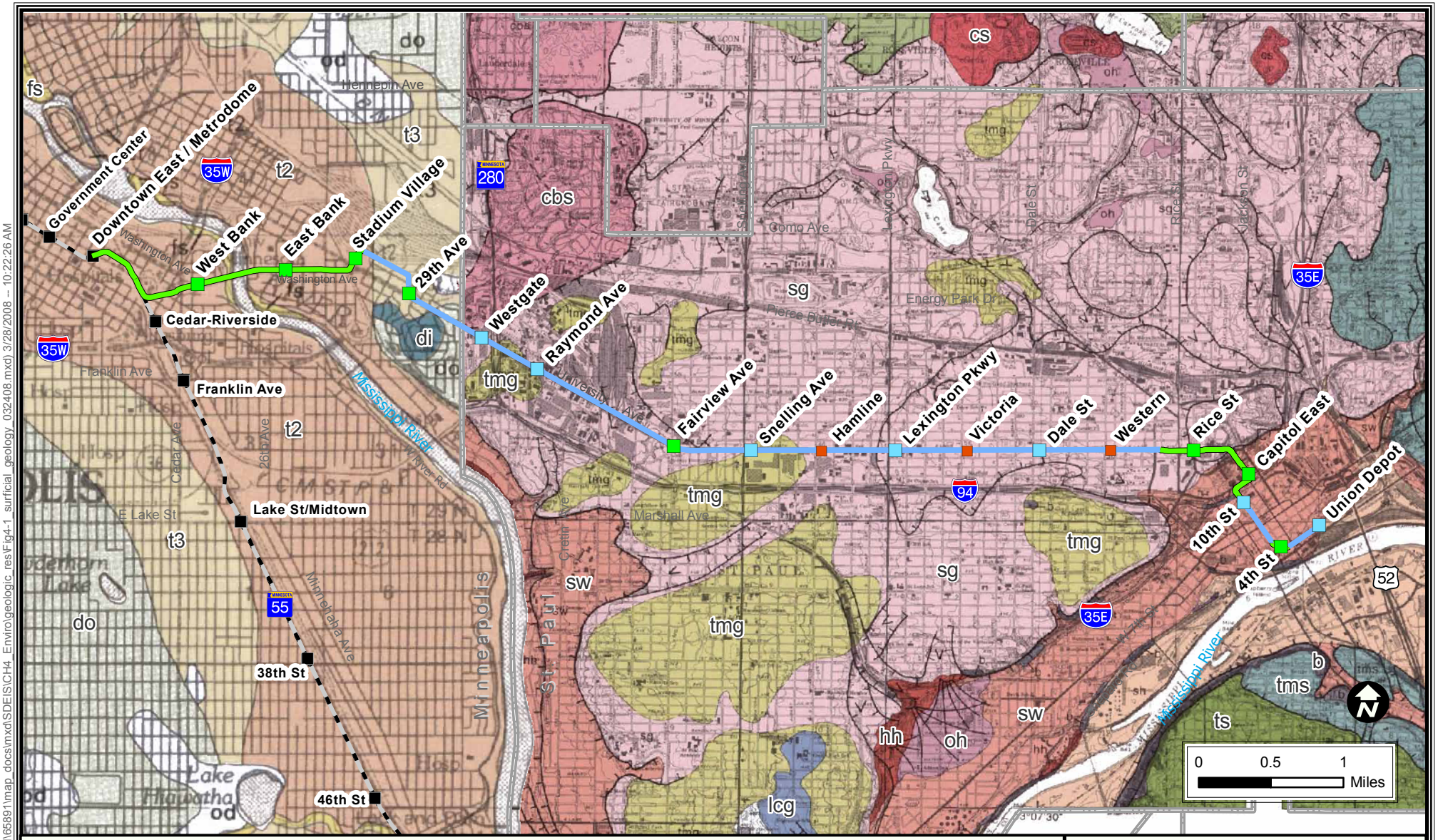
4.1.2.1 Surficial Geology

The surficial sediments of Hennepin and Ramsey counties were deposited primarily by glacial ice and meltwater during the last glaciation (Wisconsinan Stage). Sediments along the major portion of the proposed project can be attributed to the advance and retreat of the Superior lobe and Grantsburg sublobe of the Des Moines lobe, and meltwater from these lobes. The St. Paul Sand Flats, a broad sandy outwash plain deposited by the Glacial River Warren, dominates this region and extends over most of St. Paul from southwest to northeast. Sediments ranging from gravel and sand to some silt and clay are also deposited along the terraces of the former glacial river. A Surficial Geology Map for the Issue Area is shown in Figure 4.1-1.

In Hennepin County, surficial geology along the proposed alignment is composed of middle terrace deposits, upper terrace deposits, sandy floodplain alluvium, and outwash. The following summarizes the composition of each deposit type:

- **Middle and Upper Terrace:** Deposits consist of sand, gravelly sand, and loamy sand, overlain by thin deposits of silt, loam, or organic sediment.
- **Sandy Floodplain Alluvium:** Consists of loamy sand, sand, and gravelly sand interbedded with and overlain by thin beds of finer sediment and organic matter.
- **Outwash:** Consists of sand, loamy sand, and gravel, overlain by less than 4-feet of loess.

In Ramsey County, surficial geology along the proposed project is composed of buried coarse meltwater stream sediment, meltwater stream sediment, till with stream-modified surface, glacial river stream sediment, and stream sediment.



CCLRT Station
- Identical to DEIS
- Changed from DEIS
- Future infill station

CCLRT Alignment Status
- Identical to DEIS
- Changed from DEIS
- HLRT station
- Hiawatha Light Rail

Hennepin County Legend*
- Middle Terrace (t2)
- Upper Terrace (t3)
- Floodplain Alluvium Sandy (fs)
- Outwash (do)
- Ice-Contact Stratified Deposits (di)
- Organic Deposits, Drained and Filled (od)

Ramsey County Legend*
- Stream Sediment of Glacial River Warren (sw)
- Meltwater Stream Sediment (sg)
- Buried, Coarse Meltwater Stream Sediment (cbs)
- Coarse Meltwater Stream Sediment (cs)
- Organic Sediment (oh)
- Hillside Sediment (hh)
- Exposed or Nearsurface Paleozoic Bedrock (b)
- Till with Stream Modified Surface (tms)
- Till with Stream Modified Surface (tmg)
- Till (ts)
- Clayey Lake Sediment (lcg)

*Hennepin and Ramsey County Surficial Geology has been mapped according to different standards.

Figure 4.1-1

Surficial Geology

Metropolitan Council

Central Corridor Light Rail Transit

Map Document: (N:\GISProj\MetCouncil\65891\map_docs\mxd\SDEIS\CH4_Enviro\geologic_res\Fig4-1_surficial_geology_032408.mxd) 3/28/2008 -- 10:22:26 AM

Data Sources: LMIC, Metropolitan Council, Mn/DOT, Hennepin SWCD, and MN Geologic Survey

The following summarizes the composition of each deposit type:

- **Buried, coarse meltwater stream sediment:** Buried by up to 40 feet of Grantsburg till, which consists of gray, loam-textured till, ranging from loamy sand to clay and commonly banded with reddish-brown Superior lobe till or sand, and thick yellow-brown or gray bands with thin red stringers near the land surface.
- **Meltwater Stream Sediment:** Consists of medium to coarse sand with pebbles. The sand is predominantly quartz with Cretaceous shale, limestone, and rare lignite grains.
- **Till with Stream-Modified Surface:** Consists of gray, loam-textured till, ranging from loamy sand to clay and commonly banded with reddish-brown Superior lobe till or sand, and thick yellow-brown or gray bands with thin red stringers near the land surface. The till topography has been modified by running water and is covered in some places with thin, discontinuous sand and gravel.
- **Stream Sediment of Glacial River Warren:** Consists of sand and gravel with some fine sediment (silt and clay).
- **Stream Sediment:** Consists of sand and gravel with areas of fine sediment and organic material.

4.1.2.2 Bedrock Geology

The uppermost bedrock along the Central Corridor LRT Study Area consists of (from youngest to oldest) Decorah Shale (shale), Platteville (dolostone and limestone) and Glenwood (shale) Formations, St. Peter Sandstone (sandstone), and Prairie du Chien Group (dolostone). A Bedrock Geology Map for the Issue Area is shown in Figure 4.1-2.

The following summarizes the composition of each formation:

- **Decorah Shale:** Consists of green calcareous shale with thin limestone interbeds.
- **The Platteville and Glenwood Formations:** Consist of fine-grained dolostone and limestone of the Platteville Formation underlain by thin, green, sandy shale (3- to 5.5-feet thick) of the Glenwood Formation.
- **St. Peter Sandstone:** Consists of fine- to medium-grained quartz sandstone, massive- to thick-bedded, underlain by multicolored beds of mudstone, siltstone, and shale with interbeds of very coarse sandstone.
- **The Prairie du Chien Group:** Consists of sandy or oolitic, thin-bedded dolostone with thin beds of sandstone, chert, and intraclastic dolostone underlain by massive- or thick-bedded dolostone. The lower part of the Prairie du Chien dolostone is not oolitic or sandy with the exception of a thin, sandy transitional zone at the base. The upper part of the Prairie du Chien dolostone may contain karst solution cavities, particularly where the overlying St. Peter Sandstone has been removed by erosion.