APPENDIX G – BASELINE ENVIRONMENTAL INVENTORY

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This Appendix contains the baseline environmental inventory for the Circ-Williston project area and corridors where potential transportation improvements may occur. The corridors are defined as: 1) Brownell Road Corridor; 2) VT 2A Corridor; 3) New Roadway Corridor (includes Circ A/B alignment, new east alignment, and Mountain View Road corridors); 4) North Williston Road Corridor; and 5) VT 117 Corridor. This Appendix provides supporting documentation for the environmental screening of the conceptual alternatives evaluated in the Circ-Williston EIS Alternatives Screening Technical Report.

Each resource category in this inventory is organized into four sections: 1) Introduction; 2) Regulatory Framework; 3) Methodology; and 4) Resource Description. The resource descriptions provide a general overview, and then are more detailed by corridor. Maps referred to in the text are found in the Map Appendices, which comprise a separately-bound appendix to the Environmental Screening Technical Report. The "A" series maps depict the overall project study area, encompassing all project alternative corridors overlain onto each environmental resource category. The "B" through "G" series maps depict individual alternative corridors/alignments.

References cited in this Appendix are listed in Chapter 9 of the Alternatives Screening Technical Report. Given the overarching applicability of Vermont Act 250, Vermont's Land Use Law, to many aspects of the baseline inventory, an overview of this legislation is provided below. The primary reference document for this overview is *Act 250: A Guide to Vermont's Land Use Law*, issued by the State of Vermont Environmental Board in September 2003.

Vermont Act 250

Act 250 is a Vermont law designed to control development proposed on a relatively large scale, and/or in sensitive areas. The Act 250 process protects Vermont's environment and gives citizens, municipalities, local and regional planning commissions, and other interested parties a chance to participate and express concerns. Development and land subdivision proposals that fall under the Act's jurisdiction must apply for a land use permit. The permit can be granted, denied, or granted with conditions by Vermont's Natural Resources Board, which came into effect as a result of Act 115 in January, 2005.

Act 250 is a comprehensive law that requires the evaluation of the probable impact of developments according to a set of ten criteria. These criteria are specific standards that District Commissions must use to evaluate every development and subdivision application that falls under Act 250. The ten criteria focus on projected impacts on air and water quality, water supplies, traffic, local schools and services, municipal costs, and historic and natural resources, including scenic beauty. Developments must also confirm to local and regional land use plans.

An Act 250 permit is required for certain kinds of development, such as subdivisions of ten lots or more, the building of ten or more housing units, any development above 2,500 feet in elevation, and commercial projects on more than ten acres (if the town has permanent zoning and subdivision regulations) or on more than one acre (if it does not). A permit is also required for construction for a governmental purpose if the project involves more than ten acres, or is part of a larger project that will involve more than ten acres of land. Some of the conceptual alternatives under consideration for the Circ-Williston Transportation Project may involve construction for a governmental purpose involving more than ten acres of land; thus, Act 250 may apply and the applicable criteria from the Act are discussed in their relevant sections of this Appendix.

1.0 Groundwater Resources

1.1 Introduction

Groundwater is formed from rain and snowmelt infiltrating into the ground and collecting in an area of porous soil or rock until the area is fully saturated. It is affected by bedrock and surficial geology; where conditions are suitable, groundwater can collect in a water-bearing soil or rock formation capable of yielding useable amounts of water, i.e. an aquifer.

1.2 Regulatory Framework

Groundwater in Vermont is protected under State statutes (10 VSA Chapters 48 and 56) and the Groundwater Protection Rule and Strategy 2005. Groundwater is assigned to one of four classifications. Class 1 and 2 groundwater sources are considered excellent with potential for potable water supply, Class 3 is the default if not mapped, and Class 4 is non-potable. At present, the entire project area is classified as Class 3 (Ashley Lucht, VANR, personal communication, July 25, 2005).

Public wells are categorized as community or non-community and transient or non-transient. Public community wells are protected via Source Protection Areas (SPAs). SPAs are either defined based on geology or are established at a default radius of 3,000 feet from the well. SPAs are defined in subsection 1428(e) of the Federal Safe Drinking Water Act as follows: "The surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are likely to move toward and reach such water and wellfields." SPAs are delineated into three zones:

- **Zone 1** is an isolation zone with a radius of 200 feet, surrounding the water supply system. Contaminant impact in this zone would be certain and immediate.

- **Zone 2** is a groundwater recharge zone outside of Zone 1. Zone 2 contributes directly to the public water supply well. Impacts from unmitigated sources of contamination would be probable in this zone.

- **Zone 3** consists of the remaining recharge area to the water supply system, not delineated as Zone 1 or Zone 2. There may be possible impacts from unmitigated sources of contamination.

The State does not allow construction within Zone 1. Stormwater runoff within Zones 2 and 3 is permitted but cannot result in contamination of the groundwater.

1.3 Methodology

Groundwater information was obtained from the CCRPC and the Vermont Agency of Transportation (VTrans) (1986). Information on private water wells was obtained from the Vermont Agency of Natural Resources (VANR) (2005). Verification on specific aquifers and public supply well locations was obtained from VANR (Ashley Lucht, personal communication, July 14, 2005). Public water supply source information was obtained from the Champlain Water District (CWD, 2001).

1.4 Resource Description (Maps A1-G1)

Within the project area, residents within the western half (approximately) of the overall area receive their drinking water from the Champlain Water District. Lake Champlain provides the drinking water resource for more than 108,000 Chittenden County residences and many thousands of businesses. The remaining area is supplied through public groundwater supply sources and private wells. The source for this drinking water is Shelburne Bay, an embayment of Lake Champlain in South Burlington. The surface water source protection area (SPA) for Shelburne Bay is located outside of the Circ-Williston project area.

There are five public groundwater supply sources (i.e., wells) located in the project area (Map A1). Two of these sources are public community water systems (PCWS) located near the intersection of VT 117 and I-89. PCWS supply at least 15 service connections used by year-round residents or supply at least 25 year-round residents. These two systems have a designated SPA that extends for approximately two miles to the northeast from these wells. Another SPA is located around the PCWS well on Old Creamery Road (near the intersection with Porterwood Drive) to the south of I-89.

The other two public water supply wells are transient non-community wells. One of these wells is located along I-89, approximately 500 yards to the west of the intersection of Oak Hill Road and I-89. The second well is located to the east of Williston Road on the Williston Golf Club property. These wells do not have designated SPAs.

Residents and businesses outside of the public water supply areas use private wells. Map A1 includes wells recorded by VANR; however, this map may not include all private wells in the area. Only the northern portions of the Circ A/B and North Williston Road corridors, and the eastern portions of the VT 117 corridor, rely on groundwater as a water supply.

2.0 Surface Water Resources

2.1 Introduction

Surface water is comprised of lakes, rivers, ponds and streams and the corresponding watersheds associated with these water bodies. Surface water is an important source of drinking water in the project area and, because of its connections with groundwater, also influences the quality of well water. It also has important functions as wildlife habitat and as a visual and recreational resource.

Surface water quality in Chittenden County can be adversely affected by two main sources:

- Phosphorus from household and agricultural run-off raises nutrient levels in water bodies, causing eutrophication, or depleted oxygen levels, as a result of excessive aquatic plant growth.

- Stormwater containing a combination of pollutants, soil and nutrients such as phosphorus degrades water quality and inhibits natural ecological function.

In addition to pollutants carried by stormwater, increases in impervious surfaces can increase the quantity of stormwater runoff and lead to stream channel instability, sedimentation and increased flooding. Impacts associated with the increased quantity of stormwater runoff have been the focus of recent stormwater management policy in Vermont and Chittenden County in particular. In recognition of this, a number of streams in Vermont have been designated by

VANR as stormwater impaired, in lieu of listing stormwater pollutants (see further discussion below).

2.2 Regulatory Framework

Lakes and Ponds
Potential impacts to lakes and ponds are regulated under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act and Vermont's Shoreland Encroachment (Lakes and Ponds) Permit. Vermont Act 250, Section 401 Water Quality Certification, and Dam Construction Permits are also applicable.

Rivers and Streams
Potential impacts to rivers and streams are regulated under Sections 401, 402 and 404 of the Clean Water Act (CWA), Section 10 of the Rivers and Harbors Act, and the Vermont Stream Alteration Permit program. Section 402 includes the National Pollutant Discharge Elimination System (NPDES) stormwater program which in Vermont is administered by VANR. Most of the project area is covered by existing separate storm sewer system (MS4) permits issued to municipalities, VTrans, the University of Vermont, and the Burlington International Airport. Any road improvements within the limits of these existing MS4 permits would need to be in compliance with permit conditions.

The CWA directs the U.S. Environmental Protection Agency (EPA) to promulgate regulations and to implement programs to improve the water quality of the nation's rivers and streams. The CWA requires states to identify and publish a list (303[d] list) of those rivers and streams that are "water quality impaired" (i.e., that do not meet water quality standards). In Vermont, the 303(d) list currently includes 17 waterways that are impaired, due principally to stormwater runoff. Twelve of these waterways are located in Chittenden County.

The CWA also requires Vermont to develop a Total Maximum Daily Load (TMDL) study for each waterway on the 303(d) list. Each TMDL study would confirm the existing pollutant levels in the waterway, compare these levels with Vermont standards, and develop an allocation to new and existing dischargers so that the impairment is corrected. Vermont stormwater law (10 VSA Section 1264) requires that TMDLs are issued for EPA approval by September 2007.

The following two surface water classifications apply to the project area (Vermont Water Quality Standards, effective July 2000):

- **Class A(2)** waters are waters that are managed primarily for the use as public water supply, but are also designed to support aquatic biota, wildlife and aquatic habitat; aesthetics; swimming and primary recreation; and boating, fishing and other recreational uses.

- **Class B** waters are waters designed to fully support aquatic biota, wildlife and aquatic habitat; aesthetics; water supply (with filtration and disinfection); irrigation of crops and other agricultural uses; swimming and primary recreation; and boating, fishing and other recreational uses.

Stormwater Permitting
Stormwater permitting on the State level is governed under Vermont stormwater law (10 VSA Section 1263 and 1264a-c). The State requires General Permit 3-9015 for stormwater runoff from impervious surfaces for the operation of a project. For construction, the State requires General Permit 3-9001 for disturbances exceeding one acre. However, if the project is located in the watershed of an impaired water body, an Individual Permit may be required both for

construction and operation. Vermont stormwater law (and the proposed Stormwater Management Rule for Stormwater-impaired Waters issued in June 2005) includes provisions for an interim program while VANR develops TMDL studies or Water Quality Remediation Plans (WQRPs) as the long-term permit program for stormwater discharges to impaired waters. WQRPs will incorporate hydrologic elements to the plan to address significant contributors of stormwater-related problems.

In the project area, the following streams are listed as impaired (with cause of impairment):

- Winooski River (mercury)
- Allen Brook east of VT 2A (stormwater and *E. coli.*)
- Muddy Brook (toxics, nutrients, temperature)
- Unnamed tributary to Muddy Brook in Taft Corners (toxics [TCE])
- Indian Brook (stormwater)

Outstanding Resource Waters
None of the streams in the project area are designated as Wild and Scenic Rivers under the Nationwide Rivers Inventory. The State of Vermont classifies a river as an Outstanding Resource Water if its value or use is outstanding compared to other rivers in the State. The sponsoring body (i.e., municipality, organization) must petition the Vermont Water Resources Board for inclusion of that waterway. None of the streams in the project area have been designated as Outstanding Resource Waters since legislation was passed in 1987 (Kellie Merrell, VANR, personal communication, July 14, 2005).

2.3 Methodology

Surface water information was obtained from the Draft 2006 Chittenden County Regional Plan and USGS maps. Water quality and impaired water designation was obtained from the State of Vermont 2004 303(d) List of Impaired Waters. Verification on specific surface water aspects was obtained from VANR (Kellie Merrell and Padraic Monks, VANR, personal communication, July 14-15, 2005).

2.4 Resource Description (Maps A2-G2)

Waterways in the Project Area
The project area is located within the greater Lake Champlain Basin. The Winooski River is the largest river in the project area and discharges directly into Lake Champlain. It has a drainage area of 1,080 square miles. It is impaired due to mercury (VTDEC, 2004). The largest tributaries to the Winooski River within the project area are described below under each of the project corridors (Map A2). In addition to these brooks, there are a number of smaller unnamed tributaries to the Winooski River within the project area. The project area does not contain mapped lakes, ponds, or larger man-made water bodies.

There are three streams in the project area that are located outside of the Winooski River watershed:

- **Indian Brook:** Located to the north of Essex Junction, this brook drains directly into Mallets Bay of Lake Champlain. Indian Brook is impaired due to stormwater.

- **Potash Brook:** Located in South Burlington to the west of Muddy Brook, Potash Brook drains into Burlington Bay within Lake Champlain. It is impaired due to stormwater and *E. coli*.

- **Browns River:** Browns River is part of the Lamoille River watershed and is located in the northeastern part of the project area, draining parts of Jericho and Essex.

All waters within the portion of the Winooski River watershed that is within the project area are classified as Class B, with two exceptions which are classified as A(2):

- **Unnamed tributary to the Winooski River** (length: 0.5 mile): The mouth of the tributary is located approximately two miles downstream of the confluence of Alder Brook and the Winooski River. This brook is not a water supply source.

- **Unnamed tributary to Alder Brook** (length: 0.4 mile): This tributary is a former water supply for Winooski, Essex Center, Essex Junction, and Pinewood Manor. It is no longer in use as such.

Streams outside of the Winooski River watershed are also classified as Class B waters (i.e., Indian Brook, Potash Brook, and Browns River).

Waterways in the project corridors are located entirely within the Winooski River watershed, and are as follows:

Brownell Road Corridor (Map B2)

- **Allen Brook:** Allen Brook is located at the north end of the corridor. It drains a large part of Williston. Allen Brook is an impaired waterway and watershed, and is impaired due to stormwater and *E. coli*. It is associated for much of its length with an emergent and scrub-shrub riparian corridor.

- **Muddy Brook:** This brook flows from Shelburne Pond, located to the south of the project area, straight to the north following the boundary between Williston and South Burlington. The main stem of the brook does not cross the Brownell Road Corridor; however, the unnamed tributary to Muddy Brook crosses it in the vicinity of I-89. This unnamed tributary is listed as impaired for toxics. Muddy Brook merges with Allen Brook just before entering the Winooski River. Muddy Brook is listed as impaired due to toxics, nutrients and temperature.

VT 2A Corridor (Map C2)

- **Winooski River:** VT 2A crosses the Winooski River just south of VT 15. The Winooski River is listed as impaired for mercury.

- **Allen Brook:** Allen Brook crosses the corridor south of the intersection with Industrial Avenue. It drains a large part of Williston. Allen Brook is listed as impaired for stormwater and *E. coli.*

New Roadway Corridor (Maps D2a, D2b)

- **Winooski River:** The New Roadway Corridor crosses the Winooski River just south of the existing intersection of VT 289 and VT 117.

- **Allen Brook:** Allen Brook crosses the corridor south of the intersection with Industrial Avenue. It drains a large part of Williston. Allen Brook is listed as impaired for stormwater and *E. coli.*

- **Redmond Creek:** There is a small tributary to the Winooski River (locally referred to as Redmond Creek) which crosses the corridor just to the west of the former landfill and transfer station off Redmond Road.

- **Alder Brook:** The lower section of Alder Brook extends parallel to VT 289. It enters the Winooski River near the intersection of VT 289 with VT 117. Although it is not crossed by the corridor, improvements to the interchange would be in close proximity.

North Williston Road Corridor (Maps E2, E2a)

- **Winooski River:** The corridor crosses the Winooski River east of the intersection of VT 117 and VT 289.

- **Allen Brook:** Allen Brook is located at the north end of the corridor. It drains a large part of Williston.

VT 117 Corridor (Maps F2, G2)

- **Winooski River:** The VT 117 corridor extends parallel to the Winooski River on the north or east side from the intersection with US 2 and I-89 along most of its length. Stormwater runoff from the corridor can drain directly into the river in many locations.

- **Mill Brook:** It is located in Jericho, entering the Winooski River from the east near the intersection of VT 117 and Barber Farm Road.

- **Alder Brook:** The lower section of Alder Brook extends parallel to VT 289. It enters the Winooski River near the intersection of VT 289 with VT 117. It also crosses the VT 117 corridor.

3.0 Floodplains

3.1 Introduction

The floodplain is the perimeter surrounding a stream that can accommodate flood waters. Specifically, a 100-year floodplain is defined as the area subject to flooding by the 100-year flood (having a 1% chance of being exceeded in any given year). A 500-year floodplain is defined as the area subject to flowing by the 500-year flood (a flood having a 0.2% chance of being exceeded in any given year).

3.2 Regulatory Framework

Floodplains and floodways are protected in Vermont under Executive Order 11988 and Act 250. If floodplains are impacted, a specific finding based on Executive Order 11988 is required in any EIS or EA associated with a project. Projects needing Act 250 approval must address criterion 1(d). This criterion requires activities within a floodway to not restrict or divert the flow of flood waters.

3.3 Methodology

Floodplain information was obtained from the Flood Insurance Rate Maps (FIRM) compiled by the Federal Emergency Management Agency (FEMA) for the project area.

3.4 Resource Description (Maps A3-G3)

The largest floodplain in the project area is associated with the Winooski River (Map A3). The widest floodplain sections are within the New Circ East Alignment and North Williston Road corridors. The floodplains for Allen Brook and the other smaller tributaries are comparatively narrow.

4.0 Wetlands

4.1 Introduction

Wetlands are unique habitats which represent an intermediate habitat between upland and aquatic ecological communities. Wetlands are important for a range of functions; they provide important fish and wildlife habitat, act as nutrient and pollution filters, facilitate groundwater recharge, and provide flood and erosion protection. Wetlands have been declining, both in acreage and quality, for many years as a result of land use changes, filling, drainage, pollution and other human activities.

In Vermont, wetlands are determined by the presence of three parameters, as established by the United States Army Corps of Engineers *Wetland Delineation Manual* (1987). These characteristics are hydrology, vegetation and hydric soil. The United States Fish and Wildlife Service (USFWS) 1988 edition of The Wetland Plant List of the State of Vermont (P.B. Reed, 1998) is used to determine the frequency of wetland vegetation.

Forested wetlands are the most abundant type of wetland in Vermont. These wetland types are predominantly either hardwood or softwood-dominated swamps. Wetlands provide feeding and nesting habitat for migratory waterfowl, nursery areas for juvenile fish, breeding and feeding habitat for amphibians, nesting and feeding areas for songbirds, and nesting and feeding areas for fish-eating raptors such as marsh hawk. Muskrat are common in the emergent marsh wetland environment. Beaver and otter are found in riverine and emergent marsh environments and beaver dam building activities create emergent marsh habitat. Many small mammals such as the deer mouse and water shrew, also utilize wetland environments. Wetlands in the project study area are predominantly Palustrine forested, shrub-scrub, emergent wetlands, and early successional wetlands developing in abandoned agricultural land. The study area also includes riverine wetlands associated with the Winooski River and Allen, Alder and Muddy Brooks.

4.2 Regulatory Framework

Wetlands in Vermont are protected under Section 401 and 404 of the Clean Water Act, Act 250, the 1272 Order, and the Vermont Wetland Rules. Under the Vermont Wetland Rules, activities occurring in a wetland which are not on a list of allowed uses are only permitted if they are covered by a Conditional Use Determination issued by the Vermont Water Resources Board. In addition, any work in navigable waters, as defined by the U.S. Army Corps of Engineers (COE) requires a COE permit under Section 10 of the Rivers and Harbors Act. With respect to Federal actions in which impacts to wetlands are unavoidable, the EIS must contain a finding under Executive Order 11990 that there were no practicable alternatives. Wetlands are also protected under Act 250, Vermont's land use law.

The Vermont Wetland Rules distinguish between three wetland classes. Class One wetlands are characterized as "exceptional or irreplaceable." There are no Class One designated wetlands in the project area. Class Two wetlands include those shown on National Wetlands Inventory (NWI) mapping or those contiguous to mapped wetlands. In this Appendix, the term "mapped wetland" is used to identify Class Two wetlands. Class Three wetlands include all other wetlands which are not regulated under the Vermont Wetland Rules but may fall under Act 250 jurisdiction.

4.3 Methodology

The primary source of jurisdictional data for wetlands within the project area is based on Vermont Significant Wetland Inventory (VSWI) mapping available from the Vermont Center for Geographic Information (VCGI). The source of this information is mapping originally completed by the USFWS NWI via photo interpretation from high altitude color infrared aerial photographs flown between 1975 and 1978. The VANR estimates there are about 25% more wetlands on the landscape than appear on the NWI mapping. Under the Vermont Wetland Rules, Class Two wetlands are those shown on or contiguous to wetlands mapped by the NWI. Locations of mapped hydric soils based on the U.S. Department of Agriculture (USDA) Chittenden County Soil Survey were also considered as potential areas of additional wetlands. Corridors were also reviewed in the field to supplement existing data sources. In order to provide a comparable level of information for all conceptual alternatives, this approach was also utilized for the New Roadway Corridor, in lieu of more detailed wetlands information available only for this alternative.

This use of existing data supplemented with limited field reconnaissance is consistent with the approach recommended in the COE New England District's Highway Methodology. This approach was developed in order to effectively integrate the COE 404 permit requirements under the Clean Water Act with NEPA requirements. This level of information on wetland resources, as well as similar detail on constraints relevant to federal permitting requirements, is typically deemed sufficient in order to test the practicability of alternatives. Under this methodology, more detailed identification of wetland boundaries is conducted during subsequent (Phase II) studies in order for the COE to select the Least Environmentally Damaging Practicable Alternative (LEDPA). Specific findings along each corridor are discussed in the next section.

4.4 Resource Description (Maps A4-G4)

Class Two wetlands within the project area are generally associated with mapped floodplains of perennial water courses, including the Winooski River, Sunderland Brook, Indian Brook, Mill Brook, Allen Brook and Muddy Brook. Excluding the open water associated with the Winooski River, wetlands in the project area are all classified as Palustrine under the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). Palustrine system wetlands typically include all non-tidal wetlands dominated by trees, shrubs or persistent emergent vegetation (e.g., marshes and wet meadows). Other unmapped wetlands within the project area are associated with smaller unnamed tributaries or relatively large isolated topographic depressions. Several hydric soil types occur within the project area, including: muck and peat, Enosburg and Whately, Scarboro loam, and Cabot and Limerick silt loam. Areas mapped as hydric soils are typically more extensive than wetlands mapped by the NWI. Relatively large areas within the project area are mapped as Enosburg and Whately hydric soils. Both of these series are soils formed in finely stratified sediments deposited under calm water conditions. The project area also includes large areas mapped as Cabot silt loam. This series is formed in compact glacial till. The Limerick series is the next most commonly mapped hydric

soil to occur within the project area. This series is composed of alluvial deposits along river floodplains. Scarboro loam is formed sandy or gravelly material on glacial outwash features. Many areas mapped as hydric soil are likely to be contiguous to NWI mapped wetlands while others are likely to be considered Class Three.

Brownell Road Corridor (Map B4)

A narrow band of forested wetland is found at the existing Industrial Avenue bridge crossing of Allen Brook, especially upstream of the crossing. Downstream of the bridge, Allen Brook cascades down falls. Although not mapped by the NWI, scrub-shrub wetlands with a forested wetland fringe are also found near the I-89 overpass associated with an unnamed tributary to Muddy Brook.

VT 2A Corridor (Map C4)

No NWI mapped wetlands are shown along the VT 2A corridor, although there are large areas of mapped hydric soil adjacent to the corridor. While most of the corridor consists of commercial and high density residential land uses, several areas of isolated potential wetlands along the corridor were noted during field reconnaissance. These wetlands typically consisted of small hillside seeps or cattail-dominated depressions receiving stormwater runoff from surrounding development. A narrow band of forested wetland is also found adjacent to the existing bridge crossing of Allen Brook. No wetlands occur within the steep Winooski River banks below the dam and falls. North of Taft Corners, near the intersection of US 2 and VT 2A, isolated pockets of wetland dominated by cattail and reed canary grass occur on the east side of the road extending from the road ditch eastward between the developed areas of the properties. Some patches of the invasive purple loosestrife were observed. These areas provide habitat for small marsh nesting birds, particularly red-winged blackbird. Killdeer also sometimes nest on the margins of these areas, especially where road shoulders and parking areas provide a juxtaposition of sandy, gravelly habitat

New Roadway Corridor (Map D4)

Several areas of Class Two wetlands are located within the New Roadway Corridor, generally south of Mountain View Road and in areas proximate to the Winooski River. The corridor passes through an extensive area of hydric soils (Enosburg and Whately), again primarily south of Mountain View Road. Secondary data sources were used to identify three wetland areas within the alignment south of the Winooski River crossing. These included a shrub swamp within a narrow floodplain associated with Allen Brook, a wet meadow just south of Mountain View Road and a forested wetland to the north of Mountain View Road.

North Williston Road Corridor (Maps E4, E4a)

There are several mapped areas adjacent to the North Williston Road Corridor. NWI mapped forested wetlands are found along the existing crossing of Allen Brook and an unnamed tributary to the north. In addition, there are several unmapped wet meadows within low-lying areas of pasture land just to the north of Mountain View Road and just to the south of the railroad crossing. The corridor passes through an extensive area of hydric soil (Enosburg and Whately) south of Mountain View Road, and through a smaller area of hydric soil (Cabot Extremely Stony Silt Loam) north of Ledgewood Drive.

VT 117 Corridor (Maps F4, G4)

The VT 117 corridor is adjacent to a number of mapped wetlands associated with the Winooski River and several unnamed tributaries which drain in a southerly and westerly direction (under VT 117) before entering the river. A large forested floodplain wetland dominated by silver maple is found to the east of the corridor near the intersection with I-89. Other wetland areas are

associated with the Winooski River floodplain or numerous streams flowing under the roadway including Mill Brook and Alder Brook.

5.0 Riparian Habitat/Significant Buffers

5.1 Introduction

Riparian areas are the zones along water bodies that serve as interfaces between terrestrial and aquatic ecosystems. Riparian ecosystems generally compose a minor proportion of the landscape. Typically, however, they are more structurally diverse and more productive in plant and animal biomass than adjacent upland areas. Riparian areas supply food, cover and water for a large diversity of animals, and serve as migration routes and connectors between habitats for a variety of wildlife. Riparian habitat is affected by and ecologically interacts with the surrounding watershed. The interactions between the land and water create a diverse and productive habitat for plants and animals. The majority of wildlife species in Vermont depend on riparian and aquatic habitat for all or part of their life cycles. Riparian habitat is important for a range of functions. The environmental functions include: protection of water quality through filtration of overland run-off: protection and maintenance of terrestrial and aquatic habitat: protection of channel, lakeshore and floodplain stability: and maintenance of wetlands. Riparian habitat also offers social and economic benefits in terms of flood control, recreation, and landscape and aesthetic value.

Land use practices adjacent to stream systems along with the number and extent of roadway crossings can greatly reduce the functional value of existing riparian buffers. Poorly designed or undersized culverts can further restrict the movement of wildlife and aquatic organisms and influence stream dynamics.

Aquatic habitat within lakes, ponds, streams and rivers is important for a diverse range of plant and animal species, either as permanent habitat or during a particular life cycle stage. Aquatic and riparian habitats are fundamentally connected with each other and with the surrounding land and watershed. Many of Vermont's threatened and endangered species are associated with riparian and/or aquatic habitat. Wooded riparian corridor is a particularly important habitat type which may include both wetland and upland areas. The wooded riparian corridor is the prime habitat for mink and is also important for otter. The wooded riparian corridors also provide passage corridors for many species from small mammals to deer. Fish eating birds such as belted kingfisher utilize the riparian wetlands of small streams for nesting and feeding.

5.2 Regulatory Framework

Riparian habitat is protected in Vermont under a number of State programs, including the 1272 Order; Title 10 VSA Chapter 47, Section 2272; Act 250 Water Resources Management, Regulation of Streamflow, Water Pollution Control; and Section 401 of the Clean Water Act. The State's general permit for stormwater runoff (issued by VANR under the NPDES program), as well as the anti-degradation clause contained in the State's Water Quality Policy (10 VSA Section 1250) also offer protection for aquatic species. Regulations pertaining to wetlands and surface water may also benefit riparian habitat. Aquatic species are federally protected under the Fish and Wildlife Coordination Act and the Endangered Species Act (where applicable). State protection is afforded by the Vermont Endangered and Threatened Species Act and Act 250.

The VANR recently published a guidance document on riparian buffers (VANR 2005). In general, VANR recommends a buffer of up to 100 feet with the goal of maintaining or enhancing

functions and values of riparian areas. Typically, the buffer is measured horizontally from the top of bank or slope, or the upland edge of contiguous wetlands.

5.3 Methodology

Information regarding aquatic resources within the project area was obtained from biomonitoring reports prepared by VANR and VTrans and conversations with Vermont Fish and Wildlife fisheries biology staff (B. Pientka, personal communication, July 14, 2005). The initial assessment of riparian buffers was based on GIS mapping using available hydrologic data of water courses, aerial photogrammetry and limited field reconnaissance.

Riparian and aquatic habitat was characterized based on existing GIS data and supplemented with data from published secondary sources. Secondary sources included:

- VTrans records, USGS maps and data, published reports, articles, and maps from scientific literature and Federal and State agencies that regulate natural resources;
- Unpublished data, previous private and public studies (EIS and EAs), relevant to the project area; and
- Communications, including telephone conversations, meetings and written consultations with resource agencies.

A field reconnaissance was also conducted in July 2005.

5.4 Resource Description (Maps A2-G2)

Riparian habitat in the project area is associated with numerous watercourses and water bodies, including smaller water courses within the Winooski drainage area (including Allen Brook, Muddy Brook and Alder Brook) as well as the Winooski River. The smaller watercourses are characterized as meandering, lower gradient channels within narrow floodplains. Stream bottoms are typically a silt and sand substrate with fewer locations of hard bottom substrates (gravel or exposed bedrock). These streams typically support a warm water fish population with low angler interest. Common fish species include creek chub, black nose dace and sunfishes. Indian and Sunderland Brooks also typically support warm water species. Sunderland Brook is periodically treated under VANR's sea lamprey control project. Due to existing barriers to fish passage, sea lamprey are not known to occur elsewhere within the project area. There are several State-listed aquatic species which are known to occur within the project area. These species are discussed in Section 12.0 of this Appendix.

Most of the Winooski River within the project area lies upstream of the Essex No. 19 Dam located just upriver from the VT 2A bridge crossing over the river. There are two additional dams downstream from this location which restricts fish passage from Lake Champlain. However, both steelhead and land-locked Atlantic salmon are stocked by Vermont Fish and Wildlife within this reach. Spawning habitat for these species within the project area is limited to the lower section of Mill Brook which flows from the Town of Jericho under VT 117 and into the Winooski River. The primary area of spawning habitat is within the Huntington River, which enters the Winooski River in Richmond. The Winooski River also supports populations of small mouth bass, brown trout and rainbow trout.

Sections of Mill Brook, along with Browns River, located in the northeastern portion of the project area, support a cold water fishery and are stocked by Vermont Fish and Wildlife with brook, rainbow and brown trout.

A large portion of riparian areas associated with stream systems in the project area (e.g., Allen Brook) have been previously impacted by agricultural, residential and commercial development and the existing roadway infrastructure. Due to existing water quality impairments, the available riparian buffers likely are providing important water quality enhancement functions along with limited aquatic and wildlife habitat. The largest extent of contiguous riparian area within the project is located along the banks of the Winooski River.

Following is a description of riparian habitat/significant buffers by project corridor:

Brownell Road Corridor (Map B2)
Riparian and aquatic habitat in the Brownell Road Corridor is primarily limited to Allen Brook, located at the north end of the corridor. The corridor may also impact riparian areas associated with a small drainage to Muddy Brook which flows under Brownell Road near I-89. However, no obvious stream channel exists at this location. The existing Industrial Avenue crossing of Allen Brook is a relatively large bridge structure as well as a pedestrian bridge which likely do not impede the movement of aquatic organisms or wildlife. The wooded riparian corridor in this area includes box elder; black locust; American elm; basswood, and European buckthorn. A large silver maple is located southwest of the bridge.

Just below the crossing, Allen Brook flows over a pronounced falls which would be a natural barrier for the movement of some aquatic organisms. There is a relatively narrow zone of forested riparian habitat along the brook both upstream and downstream of the crossing. The size of the available habitat is limited by existing development bordering the water course and other roadway crossings, especially the VT 2A crossing, which is a short distance upstream.

VT 2A Corridor (Map C2)
Riparian and aquatic habitat in the VT 2A corridor is primarily associated with the Allen Brook crossing. The existing crossing of Allen Brook is a relatively large bridge structure which likely does not impede the movement of aquatic organisms or wildlife. There is a relatively narrow zone of forested riparian habitat along the brook both upstream and downstream of the crossing. The wooded riparian corridor for the brook runs almost parallel to VT 2A on the east side for approximately 700 feet south of the crossing. This wooded riparian corridor consists of mixed deciduous and coniferous trees. White pine is the dominant conifer and box elder is the dominant deciduous tree. Similar to the Brownell Road Corridor crossing, the size of the available riparian habitat is limited by existing development bordering the water course and other roadway crossings.

VT 2A crosses the Winooski River south of the intersection of VT 15 and VT 117. Overlook Park, a park maintained by Green Mountain Power Corporation, is on the west side of the road on the south shore of the river. The park encompasses wooded riparian corridor which contains some large eastern cottonwood and poplar. Along the east side of VT 2A, southeast of the bridge, a band of mixed hardwoods provides a visual buffer between the roadway and the power line corridor. A narrow wooded riparian margin is present around the bridge on the north side of the river.

New Roadway Corridor (Map D2)
The New Roadway Corridor includes aquatic habitat and riparian areas associated with Allen Brook, Redmond Creek, and the Winooski River. Riparian habitat along Allen Brook is fragmented by nearby stream crossing of residential roads, both upstream and downstream. Further, the proposed crossing location is not associated with a broad forested riparian zone. Nonetheless, the limited available habitat is likely supporting limited numbers of riparian habitat dependent species, as well as serving social values associated with water quality enhancement

and flood protection. Habitat along Redmond Creek is characterized as steeply sloping mixed forest within a well defined valley setting. The location of the crossing, as well as a larger forested zone to the south, are mapped as a deer wintering area and, therefore, has the potential to serve as a travel corridor for wildlife. The location of the corridor crossing over the Winooski River is adjacent to the railroad on the southern bank and an improved section of VT 117 along the northern bank. The banks of the Winooski River are likely serving as a wildlife travel corridor.

North Williston Road Corridor (Maps E2, E2a)

Riparian and aquatic habitat in the North Williston Road Corridor includes existing crossings of Allen Brook and the Winooski River. The road crosses the Winooski River approximately 0.2 miles south of the VT 117 intersection. At the Winooski River crossing, the wooded riparian corridor includes box elder and silver maple. Reed canary grass and Japanese knotweed are present along the shoreline near the bridge abutments and canoe access area.

The road crosses Allen Brook approximately three miles south of VT 117. Allen Brook is a low gradient stream at this point, and a riparian wetland complex is mapped along the brook at this crossing point. Upstream of the bridge on the northwest side of the stream is a small backwater area between Lefebvre Lane; the brook contained large tadpoles in this location. Downstream of the pedestrian bridge, box elders form a closed canopy over the stream and ostrich fern occur in the understory. The riparian area opens out into an emergent wetland visible from the pedestrian bridge.

The North Williston Road crossing of Allen Brook is a larger box culvert structure which may restrict the movement of some animals due to the height clearance and the lack of a dry shelf. Similar to the other corridor locations, the extent of the available riparian habitat is limited by existing development bordering the water course and other roadway crossings, including US 2, which is a short distance upstream.

VT 117 Corridor, Section 1 (Map F2)

The VT 117 Corridor is in close proximity to the Winooski River, as well as the many named and unnamed stream crossings which pass through the corridor.

At the intersection with VT 289, VT 117 runs close to the river and the river bank begins a few feet from the guardrail. Although steep, the river bank is well vegetated. Box elder, poplar, and sumac grow on the bank, and reed canary grass extends to the water's edge. At the eastern ramp of VT 289, the river turns away from the road and it crosses Alder Brook. Alder Brook passes under the roadway through a large corrugated iron culvert that is perched above the stream, and which may represent a barrier to the movement of some species. Some scrub-shrub vegetation is present along the stream channel.

Approximately 3.6 miles east of Five Corners, east of the Sand Hill Road intersection, the road crosses a small stream. On the north side of the road, this stream has a mapped riparian wetland complex associated with it. This is a predominantly wooded riparian area with box elder, poplar, and white pine as the most common species. This wooded riparian corridor extends south of the road also, although the stream is more open.

VT 117 Corridor, Section 2 (Map G2)

Just west of the Rogers Lane intersection, the river meanders away from VT 117. A roadside recreational area occurs west of the road where it again runs close to the river. A large wetland complex is mapped to the southeast. Much of the area is covered with herbaceous vegetation, goldenrod and reed canary grass being most notable near the road. Silver maple and willow

occur closer to the river bank. This complex provides an old field, wet meadow habitat which grades into the wooded riparian corridor.

Approximately 2.2 miles from US 2, the road crosses Mill Brook. The existing crossing of Mill Brook is a relatively large bridge structure which likely does not impede the movement of aquatic organisms or wildlife. Upstream of the bridge, the stream flows in an open riparian corridor between agricultural fields. Downstream of the bridge, the stream corridor narrows and larger trees are present in the riparian corridor. The river meanders very close to the road north of Barber Farm Road and then meanders away from the road. A wooded riparian corridor continues along the river bank to the end of this segment and the river meanders along the route. The broad floodplain areas to the west and south of the road are in agricultural use.

6.0 Geology and Soils

6.1 Introduction

Chittenden County lies within the Champlain Valley. The area is dominated in geological terms by Ordovician limestones, dolomites, and shales and has some of the oldest rocks in the northeast United States. The soils and surficial geology within which they are formed consist primarily of water-deposited material within the Champlain Valley and glacial till on the surrounding foothills of the Green Mountains.

The Chittenden County Soil Survey published by the Natural Resources Conservation Service (NRCS) and in digital form by VCGI, indicates that Chittenden County includes several areas of Highly Erodible Soils/Land (HEL). NRCS classify HEL based on its potential to erode. The classification uses an index; the Erodibility Index (EI), which considers the physical and chemical properties of the soil and local climatic conditions. The higher the index, the greater the investment needed to maintain the sustainability of the soil resource base if intensively cropped. In Chittenden County, Highly Erodible Soils are located on land with slopes ranging from 12 to 60%, with the majority being located on slopes greater than 20%.

6.2 Regulatory Framework

Earth resources, such as sand, gravel, topsoil, marble and granite, are regulated under Act 250 criterion 9(D). Projects which contain accessible resources or interfere with the future extraction of these earth resources may require review under Act 250.

6.3 Methodology

Information regarding surficial and bedrock geology within the project area was obtained from published maps made available through the Vermont Geological Survey, information published by CCRPC in the Draft 2006 Chittenden County Regional Plan and conversations with VTrans Materials and Research staff (T. Eliasson, personal communication, July 20, 2005). Soils information is based upon the USDA NRCS Soil Survey of Chittenden County.

6.4 Resource Description (Maps A5-G5, A13-G13)

Bedrock within the project area is bisected by a distinct fault line (Hinesburg Thrust) which roughly divides the project area in half. Bedrock to the east of the fault line consists of the Underhill Formation, comprised of slate, graywackle, and conglomerate and the Pinnacle Formation, comprised of schist, phyllitie, gneiss and granofels. These are common formations within the highlands of northern and central Vermont. West of the fault line, within the

Champlain Valley, bedrock consists of calcareous rocks and carbonate–rich limestone and dolomite.

There were 12 earth resource operations reported as present within the County in 2001 (CCRPC 2001). These operations comprise sand and gravel pits and crushed stone quarries, and included private industries and municipally-owned pits for highway construction and maintenance. Surficial geology mapping of the project area shows large areas of sands deposited by glacial melt waters, finely stratified sediment deposited under former glacial lake and marine areas, and more recent alluvial deposits along the floodplain of the Winooski River. Areas of gravel are less common and may be locally scarce within the County (CCRPC 2001). The southern portion of the project area consists primarily of glacial till deposits which are not considered an important source of extractable materials.

Soils which were formed in the more recent alluvial deposits along the Winooski River are included in the Limerick-Hadley-Winooski association. These soils are typically loamy in texture, nearly level and subject to flooding. Soil associations formed in glaciolacustrine and glaciofluvial deposits extend well to the north and south of the current river floodplain and are the most common within the project area. The two soil associations covering the majority of this zone are Adam-Windsor and Munson-Raynham-Scantic. The Adams-Windsor association is comprised of sandy soils formed on glacial deltas, beaches and terraces. The Munson-Raynham-Scantic association is comprised of more finely grained loam or loam over clay formed in glacial lake plains.

Existing sand and gravel operations are found off Redmond Road, VT 117 and North Williston Road. The Hinesburg Sand and Gravel site off Redmond Road directly abuts the New Roadway Corridor, but could remain operational with the construction of this alternative. The other existing operations are not located within or immediately adjacent to the limits of the improvement corridors.

There are at least two active crushed stone quarries within the project area. One is located southeast of Burlington International Airport and a second is found south of I-89 off South Brownell Avenue. There are no active marble or granite quarries within the project area.

Highly Erodible Soils within the project area include a range of soil types dominated by loam and sandy soils. The majority of thee soils are found on slopes greater than 15%, with approximately one third of the soil types found on slopes greater than 30%.

7.0 Primary Agricultural Soil

7.1 Introduction

Primary Agricultural Soils are soils that have been classified and mapped as of high importance for agriculture. In Vermont, the national definition of Prime Farmland was modified to include additional information with respect to soils. According to the Vermont office of the Natural Resource Conservation Service (NRCS), Prime Farmland is defined as:

> "*land that has the best combination of physical and chemical characteristics for producing food, feed fiber, forage, and oilseed crops and is also available for these uses. The present land use may be cropland, pasture, forestland or other land uses, but not urban and built-up or water. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods. Prime farmland has an adequate*

and dependable water supply from precipitation, a favorable temperature and growing season, acceptable acidity or alkalinity and few or no surface stones or boulders."

In general, Prime Farmland is permeable to water and air, is not excessively erodible or saturated with water for a long period of time, and either does not flood frequently or is protected from flooding.

7.2 Regulatory Framework

In Vermont, farmland is regulated under the Federal Farmland Protection Policy Act (FPPA) and Vermont Act 250, as summarized below.

The Farmland Protection Policy Act of 1981

- Protects farmland and seeks to maximize compatibility with state and local farmland programs and policies.
- Requires early coordination with the NRCS, completion of a Farmland Conversion Impact Rating process, and determination of whether or not to proceed with conversion based on the severity of impacts and other environmental considerations.

Title 10 VSA Chapter 151, The Land Use and Development Law, Act 250

- Established "to protect and conserve the lands and the environment of the state and to insure that these lands and environment are devoted to uses which are not detrimental to the public welfare and interests."
- Establishes conditions and criteria for the issuance of permits by the district commissions. Impacts to agricultural soils are addressed under Criteria 9(B) and 9(C).
- Is applicable to "construction by state or local government if the project involves more than 10 acres."

The NRCS has compiled a national rating system for soils based on agricultural potential. These ratings, termed "Important Farmland Ratings," include Prime Farmland, Unique Farmland, Additional Farmland of Statewide Importance, and Additional Farmland of Local Importance. In Vermont, the Important Farmland Ratings are listed in the publication *Farmland Classification Systems for Vermont Soils* (NRCS, 2003). Important Farmland Soils located within the project area include Prime Farmland and Additional Farmland of Statewide Importance.

Additional Farmland of Statewide Importance is: "*land, in addition to Prime and Unique Farmland, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.*" The dominant soils in these soil map units have limitations from one or more of the following:

- Excess slope and erosion hazard
- Excess wetness or slow permeability
- A flooding hazard
- Shallow depth (less than 20 inches) to bedrock or other layers that limit the rooting zone and available water capacity
- Moderately low to very low available water capacity

The Vermont office of the NRCS has further organized soil map units into Agricultural Value Groups. Agricultural Value Groups are a land classification system that can be used to compare the "relative value" for crop production of one soil map unit to another. The groups

consist of soil map units that have similar characteristics, limitations, management requirements and potential for crop production. Soil map units in Group 1 have the highest potential for crop production, while those in Group 12 have the least. Relative values for each group were developed on a scale of 0 to 100, with 100 representing the highest agricultural value. Soils classified in Agricultural Value Groups 1 through 7 are located within the project area. Brief descriptions of these groups follow.

Group 1 – These soil map units have an Important Farmland rating of Prime. Most of the soil map units have few limitations that restrict their use, or moderate limitations that reduce the choice of plants or require moderate conservation practices. Their relative value is 100.

Group 2 – These soil map units have an Important Farmland rating of Statewide. Most of the soil map units have moderate limitations that reduce the choice of plants or require moderate conservation practices. Their relative value is 97.

Group 3 – These soil map units have an Important Farmland rating of Prime. Most of the soil map units have moderate limitations that reduce the choice of plants or require moderate conservation practices; or have severe limitations that reduce the choice of plants or require special conservation practices, or both. Their relative value is 84.

Group 4 – These soil map units have an Important Farmland rating of Statewide. Most of the soil map units have moderate limitations that reduce the choice of plants or require moderate conservation practices; have severe limitations that reduce the choice of plants or require special conservation practices, or both; or have very severe limitations that reduce the choice of plants or require very careful management, or both. Their relative value is 82.

Group 5 – These soil map units have an Important Farmland rating of Statewide. Most of the soil map units have severe limitations that reduce the choice of plants or require special conservation practices, or both. Their relative value is 69.

Group 6 – These soil map units have an Important Farmland rating of Statewide. Most of the soil map units have moderate limitations that reduce the choice of plants or require moderate conservation practices; have severe limitations that reduce the choice of plants or require special conservation practices, or both; or have very severe limitations that reduce the choice of plants or require very careful management, or both. Their relative value is 63.

Group 7 – These soil map units have an Important Farmland rating of Statewide. Most of the soil map units have severe limitations that reduce the choice of plants or require special conservation practices, or both. Their relative value is 57.

Vermont's Land Use and Development Law, Act 250 also refers to Primary Agricultural Soils. Under this Law, such soils are evaluated according to Criterion 9B, which states:

"A permit will be granted for the development or subdivision of primary agricultural soils only when it is demonstrated by the applicant that, in addition to all other applicable criteria, either the subdivision or development will not significantly reduce the agricultural potential of the primary agricultural soils; or, … there are no nonagricultural or secondary agricultural soils owned or controlled by the applicant which are reasonably suited to the purpose; and … the development or subdivision will not significantly interfere with or

> *jeopardize the continuation of agriculture or forestry on adjoining lands or reduce their agricultural or forestry potential."*

Primary Agricultural Soils are defined by the act as:

> "*soils which have a potential for growing food and forage crops, are sufficiently well drained to allow sowing and harvesting with mechanized equipment, are well supplied with plant nutrients or highly responsive to the use of fertilizer, and have few limitations for cultivation or limitations which may be easily overcome. In order to qualify as primary agricultural soils, the average slope of the land containing such soils must not exceed 15 percent, and such land is of a size capable of supporting or contributing to an economic agricultural operation."*

According to the NRCS, Primary Agricultural Soils include all soils that have an Important Farmland rating of Prime or Statewide. Act 250 defines Secondary Agricultural Soils as:

> "*soils which are not primary agricultural soils but which have reasonable potential for commercial forestry or commercial agriculture, and which have not yet been developed. In order to qualify as forest or secondary agricultural soils the land containing such soils shall be characterized by location, natural conditions and ownership patterns capable of supporting or contributing to present or potential commercial forestry or commercial agriculture.*"

7.3 Methodology

Primary and Secondary Agricultural Soils in the project area were identified and mapped through the use of available GIS data, land use data, soil surveys, aerial photography and field verification. Information on soil types and classifications was obtained from the Chittenden County Metropolitan Planning Organization (CCMPO), the Chittenden County Regional Planning Commission (CCRPC), and the Vermont Center for Geographic Information (VCGI). In addition, information on Agricultural Value Groups was obtained from the Vermont NRCS' *State Data Table TOP20* (April 15, 2003), as well as from their Electronic Field Office Technical Guide (eFOTG).

7.4 Resource Description (Maps A6-G6)

A substantial amount of prime agricultural soils are located within the project area, as discussed below.

Brownell Road Corridor (Map B6)
The soils located within the Brownell Road Corridor are predominantly classified as Additional Farmland of Statewide Importance, Agricultural Value Group 6. Located at the southern end of the corridor are isolated pockets of Prime Farmland, Agricultural Value Group 1 and Prime Farmland, Agricultural Value Group 3. Located at the northern end of the corridor is a small pocket of Additional Farmland of Statewide Importance, Agricultural Value Group 4.

VT 2A Corridor (Map C6)
The soils located within the VT 2A Corridor south of US 2 are not classified as Primary Farmland soils. Between US 2 and the Winooski River, soils are present that are classified as Prime Farmland, Agricultural Value Groups 1 and 3; as well as Additional Farmland of Statewide Importance, Agricultural Value Groups 4 and 6. North of the river, the soils are

predominantly classified as Additional Farmland of Statewide Importance, Agricultural Value Group 6, with small pockets of Prime Farmland, Agricultural Value Groups 1 and 3.

New Roadway Corridor (Map D6)
Much of the soils located within the New Roadway Corridor, primarily south of Mountain View Road, are not classified as Primary Farmland soils. Isolated pockets of Prime Farmland, Agricultural Value Groups 1 and 3; as well as Additional Farmland of Statewide Importance, Agricultural Value Groups 4 and 6 and 7 are present south of Mountain View Road. North of this road, to the Winooski River, larger areas of these soils are present, primarily west of Ledgewood Drive. North of the river, to VT 117, much of the soil in the area of the New Roadway is classified as Prime Farmland, Agricultural Value Group 1.

North Williston Road Corridor (Maps E6, E6a)
The soils located within the North Williston Road Corridor south of US 2 are not classified as Primary Farmland soils. Between US 2 and Governor Chittenden Road, the soils are primarily classified as Additional Farmland of Statewide Importance, Agricultural Value Group 6, with smaller pockets of Prime Farmland, Agricultural Value Group 1 also present. North of Governor Chittenden Road the soils are mainly classified as Additional Farmland of Statewide Importance, Agricultural Value Group 6 and Prime Farmland, Agricultural Value Group 1, with a large area not classified as Primary Farmland soils located near the railroad. The soils located on the banks of the Winooski River, as well as the soils north of the river, are predominantly classified as Prime Farmland, Agricultural Value Group 1. The section of the corridor north of Mountain View Road and east of Ledgewood Drive is located within small isolated areas of Agricultural Value Group 6 soils.

VT 117 Corridor

- **Section 1 (Map F6)**

This corridor passes through large areas of soils classified as Prime Farmland, Agricultural Value Group 1 and Additional Farmland of Statewide Importance, Agricultural Value Group 6, with small pockets of soils not classified as Primary Farmland also present.

- **Section 2 (Map G6)**

The majority of the land between this corridor and the Winooski River is classified as Prime Farmland, Agricultural Value Group 1. Much of the land to the north of the corridor is not classified as Primary Farmland, however isolated pockets of Prime Farmland, Agricultural Value Groups 1 and 3, as well as Additional Farmland of Statewide Importance, Agricultural Value Groups 4 and 6 are also present.

8.0 Conserved Lands, Recreation Sites, Other Open Space

8.1 Introduction

Public and privately conserved lands are an important part of the Vermont landscape. Lands may be conserved from future development through outright acquisition (commonly used for publicly-held properties) and conservation easements that remove development rights from land that typically remains in private ownership. Conservation easements are frequently used to protect natural areas, farmland, and forest lands. Conservation easements may be purchased and held by local governments, the Vermont Housing and Conservation Board (VHCB, discussed in next section), or non-profit entities such as land trusts. Public lands are usually managed for multiple uses and provide a variety of recreation opportunities while allowing for activities like sustainable timber harvesting. Conserved lands that remain in private ownership

are protected to preserve any number of natural features while limiting or prohibiting future development, and may or may not allow for public access. Recreational resources discussed in this section may or may not be conserved from future development, depending on the ownership. This section focuses on permanently conserved lands, as opposed to land in various USDA conservation programs that may have conservation value but are not permanently prevented from development.

8.2 Regulatory Framework

Governmental responsibility for the conservation of land in Vermont rests primarily with the Vermont Housing and Conservation Board (VHCB), an independent, state-supported funding agency that provides grants, loans and technical assistance to nonprofit organizations, municipalities and state agencies for the conservation of important agricultural land, recreational land, natural areas and historic properties.

VHCB's Farmland Preservation Program is focused on retaining the state's quality agricultural land base in strong farming regions of the state. The primary instrument utilized by VHCB is the purchase of conservation easements. Selling a conservation easement enables a landowner to keep land in agricultural use and also be compensated for the potential development value of the land. The landowner retains title to the land and agrees to the terms of the conservation easement limiting future ability to subdivide and develop the land. Some farm projects involve the protection of a natural habitat of statewide importance, or of significant historic or archeological features, or offer public access to trails or water. Since 1987, more than 300 farms comprising nearly 100,000 acres of agricultural land have been conserved with VHCB funds.

With respect to natural areas and recreational lands, VHCB funds projects that best provide quality recreation opportunities, preserve valuable access to the state's water resources, conserve wildlife and plant habitat, protect watershed and water quality, add value to the state's travel and tourism industries, and ensure the future stewardship of the state's natural resources. VHCB funds have helped to conserve a total of 241,156 acres of natural areas and recreational lands since 1987.

Land protected under the various VHCB programs is either acquired in fee by a private conservation group or local government or a conservation easement is purchased. A conservation easement is a legally binding covenant that is publicly recorded and runs with the property deed for a specified time or in perpetuity. It gives the holder the responsibility to monitor and enforce the property restrictions imposed by the easement for as long as it is designed to run. An easement does not grant ownership nor does it absolve the property owner from traditional owner responsibilities, i.e. property tax, upkeep, maintenance, or improvements.

8.3 Methodology

Parks and public and privately conserved lands in the project area were identified through consultation with each respective town plan, the use of available GIS data, field verification and conversations with a representative of District 4 of the Vermont Environmental Board Information on VHCB's conservation programs was obtained from the VHCB website (www.vhcb.org/conservation.html).

8.4 Resource Description (Maps A7-G7)

Numerous parks and recreation areas are located within the project area. To a lesser degree, public and privately conserved lands are located within the project area as well, as discussed below.

Brownell Road Corridor (Map B7)
There is one recreational resource, a public park, located within the Brownell Road Corridor between US 2 and VT 2A. There are no public or privately conserved lands located in the corridor.

VT 2A Corridor (Map C7)
The VT 2A Corridor contains one recreational resource between I-89 and US 2. In addition there is one recreational resource located on US 2 just outside the corridor to the west. Between US 2 and the Winooski River, there are two recreational resources, one located outside the corridor to the east on Mountain View Road, the other located proximate to the river. North of the river, there are two recreational resources located within the corridor, as well as one located outside the corridor immediately to the west on South Street. A park is also located on South Street. There are no public or privately conserved lands located in the corridor.

New Roadway Corridor (Map D7)
There are two recreation resources, a recreation site and an area of private open space (homeowner's common) located in the New Roadway Corridor between I-89 and US 2. Between US 2 and Mountain View Road, the corridor passes through three recreation areas, four recreation sites and three areas of private open space (homeowner's common). On the south bank of the Winooski River, two parks are located adjacent to the corridor on either side.

North Williston Road Corridor (Maps E7, E7a)
There is one recreational resource located in the North Williston Road Corridor, at the intersection with US 2. Between US 2 and Mountain View Road, the corridor passes through two recreation areas. Further north within the corridor, there is one recreational resource and a hiking trail located at the Winooski River. The Talcott Forest, a 90-acre forest protected by the University of Vermont, is located approximately ½-mile to the east of the corridor, between US 2 and Governor Chittenden Road. Although there are no set trails or road access into the forest, it has historically been popular with hikers and Nordic skiers.

VT 117 Corridor

- **Section 1 (Map F7)**

There are two recreational resources located in this corridor. Both are in the Village of Essex Junction, east of VT 15. There are no public or privately conserved lands located in the corridor.

- **Section 2 (Map G7)**

A natural area is located within the corridor, on the north bank of the Winooski River near the intersection of VT 117 and VT 289. There is also a hiking trail located in the corridor, just east of its intersection with the North Williston Road Corridor. In addition, a small portion of the Jericho Research Forest, a 365-acre forest protected by the University of Vermont, is located within the corridor, near the southern terminus.

9.0 Woodlands/Forest

9.1 Introduction

Woodlands provide habitat for many types of wildlife including game animals, game birds, song birds, raptors, and many small mammals. They also provide a commercial resource for wood products and fire wood. The woodlands in the project area are highly fragmented by village and suburban development. Large tracts of 1,000 acres or more of contiguous woodland which would provide high quality woodland habitat at an ecosystem scale do not exist in the project area. The largest contiguous tract of woodland mapped in the project area is formed by the University of Vermont Research Forest and the Town of Jericho Mobbs Farm property. A small portion of the University of Vermont Research Forest falls within the project area and the VT 117 corridor. Smaller woodland tracts provide habitat for woodland species that are able to meet their lifecycle needs in smaller areas and also provide important travel corridors for wide ranging wildlife. Mapped deer wintering areas and deciduous, coniferous, and mixed forest cover types are shown on Map A8. An area mapped as potential bear habitat is outside the project area.

9.2 Regulatory Framework

As noted above, woodlands provide habitat for game animals; thus, their importance is discussed in this context. Game animals are managed by the State of Vermont, Department of Fish and Wildlife, and in the case of migratory waterfowl, the USFWS. Non-game species, and rare and endangered fauna and flora are managed by the Vermont Non-game and Natural Heritage Program, a division within the Department of Fish and Wildlife. Necessary wildlife habitat is regulated under Act 250 Criterion 8(A) and is defined in the statute as "…concentrated habitat that is identifiable and is demonstrated as being decisive to the survival of a species of wildlife at any period in its life including breeding and migratory periods." The review standard is that a proposed project will not have an undue adverse effect. Migratory waterfowl are federally protected under the Migratory Bird Treaty.

Vermont hunting and trapping regulations apply to the taking of large game animals: white-tailed deer, moose, black bear, and wild turkey. Regulated small game animals include: rabbit/hare, gray squirrel, ruffed grouse, and woodcock. Regulated furbearers include: bobcat, red fox, gray fox, raccoon, coyote, skunk, mink, fisher, otter, muskrat, and beaver. All of these species may occur in the project area. Actions that would result in a "taking" of nongame species may require a permit issued by the Vermont Nongame and Natural Heritage Program, Agency of Natural Resources. Woodcock, mink, otter, and muskrat use river and emergent wetland habitats, but may utilize adjacent wooded areas as well.

9.3 Methodology

Resource maps were prepared from GIS data obtained from the CCRPC, VCGI, and Vermont Nongame and Natural Heritage Program (VNNHP), including 2004 orthophotos of the routes with hydric soils and wetlands mapping from the Vermont Center for Geographic Information, and Rare, Threatened, and Endangered Species and Significant Habitat Mapping from the VNNHP. A field reconnaissance was conducted in July 2005.

9.4 Resource Description (Maps A8-G8)

Brownell Road Corridor (Map B8)
From the interstate overpass to Shunpike Road, the area is primarily commercial, and from Shunpike Road north to VT 2A, the area is primarily residential.

North of the intersection of Brownell Road and US 2, a wooded strip follows the road just south of its intersection with Industrial Avenue and extends west around a public park and tennis courts located in a depression between Industrial Avenue and Brownell Road. This wooded margin contains white pine, red maple, and red oak. The shrub layer includes tatarian honeysuckle.

VT 2A Corridor (Map C8)
This is a densely developed corridor bordered by commercial and residential development. At approximately 0.1 mile north of Exit 12, a small patch of mixed hardwoods is present on the east side of VT 2A immediately north of the Sunoco station. This is an old field community in an advanced stage of succession. The predominant tree species is American Elm, with apple, and some red maple are also present. The tree canopy is open and in the sunnier areas typical old field grasses and forbs are present.

New Roadway Corridor (Map D8)
North of Mountain View Road, the corridor passes through deciduous forest and then an area of mixed forest with smaller coniferous stands The alignment crosses a mapped deer wintering area northeast of the sand pit and south of the Winooski River. Isolated pockets of deciduous forest are located within the New Roadway Corridor between I-89 and Mountain View Road. Located north of Mountain View Road to the Winooski River is a larger area of deciduous forest, within which are smaller coniferous and mixed stands.

North Williston Road Corridor (Maps E8, E8a)
This corridor passes through two settled areas, North Williston, immediately south of the Winooski River, and Williston Village, between Mountain View Road and the I-89 overpass. Map E8 presents the woodlands and mapped deer wintering area in this corridor. From the intersection with VT 117 to the Winooski River Bridge, the road passes through farm fields. The forested margin of a large oxbow wetland complex is visible west of the road. Several large black willows are visible along with red maple. Cottonwood trees are visible in this complex closer to the river. The road continues through the settlement of North Williston which includes two farms and several other residences. It then traverses a wooded area mapped as deer wintering area by the Vermont Department of Fish and Wildlife (VDFW). The evergreen cover in this area is provided by white pine and hemlock. The power line right-of-way along the road has been cleared and has a shrub layer that includes ferns, berry bushes, and elderberry. The section of the corridor running northwest from Mountain View Road crosses an area of deciduous forest north of Ledgewood Drive and traverses an area of forest designated as deer wintering habitat just south of the Winooski River.

VT 117 Corridor

- **Section 1 (Map F8)**

Section 1 of the VT 117 Corridor extends from Five Corners in Essex Junction to the intersection with North Williston Road. An open old field community extends from the south side of the road to a wooded area and this wooded area runs close to the road opposite the Pinewood Plaza. Large cottonwoods are visible in the tree canopy along the river. Other trees occurring closer to the road include box elder and green ash. A large, mapped, oxbow wooded

wetland complex occurs south of the road. It is separated from the roadway by narrow agricultural fields. Discussion of this complex is included in the preceding North Williston Road narrative.

- **Section 2 (Map G8)**

Section 2 of this corridor extends from the North Williston Road intersection to its terminus at US 2. This section of the corridor passes through a rural area. Farmland occurs between the road and the river to the south. With the exception of the Chittenden Solid Waste District Transfer Station south of Rodgers Lane, and the open fields of the Fay Farm at the Barber Farm Road intersection, the northeast side of this corridor is bordered by woodland. To the north of the corridor, much of the woodland is being subdivided for rural residential development. The University of Vermont Research Forest abuts the corridor (Map G7). On the west side of VT 117 north of Rodgers Lane, the VDFW has mapped a deer wintering area. A mapped deer wintering area extends close to the road northwest of the intersection with Skunk Hollow Road, and deer crossing signs are posted on the road.

10.0 Significant Natural Communities and Critical/Significant Habitat

10.1 Introduction

Vermont has several habitat protection designations which offer varying levels of state protection. These designations include Significant Natural Communities and Critical and Significant Habitats.

10.2 Regulatory Framework

Significant Natural Communities
Significant Natural Communities are intact natural communities of plants and animals that show the interrelationship between living organisms and the abiotic environment absent significant man-made disturbance. Many of these Significant Natural Communities contain rare, threatened, or endangered species. A Significant Natural Community that has been of particular concern in the project area has been the Pine-Oak-Heath Sandplain Forest (Map A8), although this rare habitat is not present within any of the project corridors

At the state level, Vermont natural communities are not protected under the Vermont Endangered Species Law but can have a state rarity ranking (see Section 12.3) and may be protected under Vermont Act 250 if they are considered Critical Habitat.

Critical Habitat
At the federal level, the Endangered Species Act (ESA) mandates designation of Critical Habitat — areas set aside for recovering populations of federally protected species. Although the ESA requires that Critical Habitat be designated for each protected species within one year of listing, only about 15% of threatened or endangered species have had such habitat designated. There is no federally designated habitat in the project area.

In Vermont, Critical Habitat is habitat designated as “necessary wildlife habitat decisive to the survival of the species that depends upon that habitat.” Deer wintering and bear habitat are both designated as Critical Habitat in Vermont. Such habitat is present in the project area.

Significant Habitat
Significant Habitat is wetland habitat that supports federally or state Threatened or Endangered Species. Under the Vermont Wetland Rules, such wetlands may qualify as Significant Habitat and are legally protected. Such wetlands may exist in the project area.

In determining whether a wetland is Significant Habitat for the Threatened and Endangered Species Habitat function, the Vermont Natural Resources Board considers, at a minimum, the extent to which the wetland meets the following criteria:

- There is creditable documentation that the wetland provides important habitat for any species on the federal or state threatened or endangered species list of animals or plants;
- There is creditable documentation that the wetland has contained one or more threatened or endangered species on the federal or state list in the past ten years.

Wetlands designated as Significant Habitat under the Vermont Wetland Rules are also protected under Act 250. The Water Resources Panel of the Natural Resources Board is responsible for the management and protection of Vermont's water resources with respect to Act 250, including significant wetlands.

Habitat that supports a Threatened or Endangered species is also protected indirectly via the Vermont Endangered Species Law. Act 250 also offers habitat protection; it designates and regulates rare and irreplaceable natural areas under Criterion 8, and necessary wildlife habitat and endangered species under Criterion 8(A).

10.3 Methodology

Resource maps were prepared from GIS data obtained from the VNNHP.

10.4 Resource Description (Maps A8-G8)

Brownell Road Corridor (Map B8)
The Red Maple Acidic Basin Swamp community mapped by the VNNHP is separated from the Brownell Road corridor by commercial development.

VT 2A Corridor (Maps C8a, C8b)
Overlook Park, a park maintained by Green Mountain Power Corporation, is on the west side of the road on the south shore of the Winooski River. The Green Mountain Power Essex Dam is east of the bridge and the power station is on the north shore west of the bridge. The river passes through a rocky gorge at this location. The many rock crevasses provide an environment for rare and state listed threatened plant species. An island downstream of this gorge is mapped by the VNNHP as a Silver Maple-Ostrich Fern Riverine Floodplain Forest, a significant natural community.

New Roadway Corridor (Maps D8a, D8b)
Two areas of Critical Habitat are located in this corridor; an area of deer wintering habitat just south of the Winooski River and north of Ledgewood Drive, and the southern boundary of another area of deer wintering habitat west of IBM Road. No Significant Natural Communities are mapped in this corridor

North Williston Road Corridor (Maps E8, E8a)
A large tract of Critical Habitat; an area of deer wintering habitat, runs east to west on both sides of this corridor north of Governor Chittenden Road. The northern section of the corridor north of Ledgewood Drive also traverses this habitat tract. No Significant Natural Communities are mapped in this corridor.

VT 117 Corridor

- **Section 1 (Map F8)**

No Significant Natural Communities or Critical Habitat are mapped in this corridor.

- **Section 2 (Map G8)**

This discussion follows the corridor from east to west starting at the VT 117 intersection with US 2 in the Town of Richmond. Just west of the Rogers Lane intersection, the river meanders away from VT 117. The VNNHP has mapped a significant Silver Maple-Ostrich Fern community on the riparian edge of the farm fields southwest of the roadway and railroad that runs north to where a railroad bridge crosses the Winooski River. Rivershore Grassland has been mapped at the riverine edge of the Silver Maple-Ostrich Fern community. Just west of the Rogers Lane intersection, the river meanders away from VT 117. A roadside recreational area occurs west of the road where the river again runs close to the river. The VNNHP has mapped another occurrence of the Silver Maple-Ostrich Fern community on the opposite bank of the river at this point. No areas of Critical Habitat are mapped in this corridor.

11.0 Other Habitat Types

11.1 Introduction

Other habitat types present in the project area include wetlands, riparian corridor, small areas of woodland/hedgerow, old field, and urban/suburban green space. Old field and urban/suburban green space are not indicated on the maps. Old fields are areas that are no longer cropped and are dominated by woody forbs, shrubs, and eventually small trees. This transitional environment provides habitat for woodchuck, small mammals and song birds, hunting areas for raptors, fox and coyote, and in older fields, browse for deer. Urban and suburban open space provide similar habitat, but are often more fragmented and disturbed than old field environments. Some wildlife species have become well adapted to urban and suburban environments. These include raccoon, skunk, woodchuck, chipmunk, gray squirrel, red squirrel, and red fox.

11.2 Regulatory Framework

Protection of necessary wildlife habitat is one of the criteria in the Act 250 land use permit evaluation which applies to all habitat types. Fish and wildlife and their habitats are managed by VDFW and described also in the woodland section above. Migratory waterfowl are protected by the Migratory Bird Treaty and managed also by the USFWS. Hunting for ducks and geese is also regulated at the federal level; hunters are required to have a Vermont hunting license and a federal Duck Stamp. The COE (New England District) Section 404 General Permit and Individual Permit program and the Vermont Wetland Conditional Use Determination consider habitat as one of the wetland functions and values.

11.3 Methodology

Resource maps were prepared from GIS data obtained from the CCRPC, VCGI, and VNNHP. Habitat maps specific to these other habitats were not available although wetlands, and hydric soil maps provide some information as to habitat types. Other habitat information for the project corridors is based on the field reconnaissance carried out in July 2005. During the reconnaissance, 2004 orthophotos of the project area were utilized.

11.4 Resource Description

Brownell Road Corridor (Maps B2 and B4)
This corridor is predominantly residential, with amenity landscaping and mown lawns, and small areas of woodland edge and hedgerows. A tall hedgerow was noted at the back of the property on the southwest corner of the Brownell Road/US 2 intersection. The hedgerow consisted of mature white pine, black locust and box elder. A park bordered by a woodland edge habitat is located at the northern end of the corridor close to Industrial Avenue.

VT 2A Corridor (Maps C2 and C4)
This corridor incorporates a combination of residential and commercial development, with small areas of habitat, including late successional fields, isolated wetlands and small areas of amenity trees. A park is located towards the northern end of the corridor close to the crossing of the Winooski River. This park is managed by Green Mountain Energy as part of the Winooski River hydroelectric project.

New Roadway Corridor (Maps D2 and D4)
The New Roadway Corridor between I-89 and Mountain View Road is comprised of old field habitat and woodland areas surrounded by suburban residential development. North of Mountain View Road, the corridor is primarily old field habitat with forested stands.

North Williston Road Corridor (Maps E2, E2a and E4, E4a)
The corridor passes through two settled areas, North Williston, immediately south of the Winooski River, and Williston Village, between Mountain View Road and the I-89 overpass. The corridor comprises residential areas and farmland, with extensive areas of woodland located on both east and west sides of the corridor north of Mountain View Drive, and some areas of designated and undesignated wetlands. A golf course is located south of Mountain View Road.

VT 117 Corridor

- **Section 1 (Maps F2 and F4)**

Once VT 117 leaves Essex Junction it runs roughly parallel to the Winooski River. This corridor passes through small areas of rural development, small woodlands and old fields, isolated undesignated and designated wetlands, and pasture and farmland.

An open old field community extends from the south side of the road to a wooded area and this wooded area runs close to the road opposite the Pinewood Plaza. Large cottonwoods are visible in the tree canopy along the river. Other trees occurring closer to the road included box elder and green ash.

- **Section 2 (Maps G2 and G4)**

The route narrative follows from west to east starting at the US 2 intersection. This section of the corridor passes through a rural area. Farmland occurs between the road and the river to the

south. To the north of the corridor, much of the open land is being subdivided for rural residential development. Just west of the Rogers Lane intersection, the river meanders away from VT 117. A roadside recreational area occurs west of the road where the river again runs close to the river.

12.0 Protected Species

12.1 Introduction

Protected species are a category of species present in an area in relatively low or declining numbers. Included are Federal and State-listed rare, threatened and endangered species.

12.2 Regulatory Framework

The United States Fish and Wildlife Service (USFWS) has been charged with responsibility for the listing and management of rare, threatened, and endangered species native to the United States by the federal Endangered Species Act, which was enacted in 1973. It maintains and tracks rare species with the cooperation of state Natural Heritage Programs. Federally-listed species are included on the Vermont State list of Threatened or Endangered Species and accorded the same treatment in Act 250 as state-listed species. During the preparation of the Alternatives Screening Technical Report, the USFWS was contacted to request information on federally-listed or proposed threatened or endangered species in the project area. A letter from USFWS dated September 29, 2005, indicates that occurrences of the federally endangered Indiana Bat have been noted during the summer months within 13 miles of the project area. USFWS has requested an assessment of the project area to determine the presence of suitable forested habitat that could support this species. USFWS confirmed that no other federally-listed threatened or endangered species are known to occur in the project area, with the exception of the occasional transient bald eagle.

The State of Vermont protects state-listed threatened or endangered species under the authority of 10 VSA Chapter 123. Listings are based on scientific, commercial and other data. The law does not require recovery plans, although the State is working on plans for some state-listed species. Critical habitat designation and agency consultation are not required. Actions that would result in a “taking” of these species require a permit issued by the VNNHP. “Taking” would include adverse impacts to these species and their habitat from a development project. The amended MS4 permit (under the NPDES Program) and 10 VSA Section 5405 (Conservation Program) address prohibiting takings of threatened and endangered species and establishment of programs for the conservation of endangered species. Two Scientific Advisory Groups, one for plants and one for animals, make recommendations to the Vermont Endangered Species Committee for the conservation status of species. The Vermont Endangered Species Committee assigns the State Threatened or Endangered status which provides legal protection for species. State-listed species are shown on Map A8.

In Vermont, species designated as ‘rare’ are not legally protected and do not have regulatory status but are tracked and ranked on the basis of rarity by an international network of Natural Heritage Data Centers. The VNNHP and The Nature Conservancy participate in this network. This network provides an informational listing of the global and state status of species populations. The occurrences of rare species are also shown on the map because they are tracked by the VNNHP for management purposes

Act 250 Criterion 8(A) also designates and regulates ‘necessary’ wildlife habitat and endangered species.

12.2 Methodology

Resource maps were prepared from GIS data obtained from the Vermont Non-Game and Natural Heritage Program (VNNHP). The GIS database maintained by the State (Vermont Center for Geographic Information VCGI) describes species locations, and lists both state and federal threatened and endangered species as well as species that are considered rare in Vermont

12.4 Resource Description

Brownell Road Corridor (Map B8)
A rare fish, the Brook Stickleback was collected in an unnamed tributary to Muddy Brook, near Krupp Drive. This collection location is downstream of the point where Muddy Brook crosses Brownell Road. This species is not currently considered State Threatened or Endangered but does have a state rarity ranking. Two occurrences of the State-ranked rare Red Maple Sphagnum habitat also occur in the corridor. No other threatened or endangered species or habitat are present in the corridor.

VT 2A Corridor (Map C8)
VT 2A crosses the Winooski River south of the intersection of VT 15 and VT 117. The river passes through a rocky gorge at this point. The many rock crevasses provide an environment for rare and state-listed threatened plant species. Two protected species are present in this corridor; the State-Threatened hairy wood mint and the State-Threatened blunt-leaved milkweed. Canada buffaloberry and hyssop-leaved fleabane, both State-ranked as rare, are also present in the corridor). An island downstream of the Winooski gorge is mapped by the VNNHP as a Silver Maple-Ostrich Fern Riverine Floodplain Forest, a significant natural community. The State-ranked rare riverweed, an aquatic plant, is reported in the vicinity of this island.

New Roadway Corridor (Map D8)
No State Threatened or Endangered Species are found within New Roadway Alignment Corridor. One plant species with a state-rarity ranking is present, tall millet-grass. Areas of Mesic Maple-Ash-Hickory-Oak forest are also present; this habitat is State-ranked as rare.

North Williston Road Corridor (Map E8, E8a)
This corridor crosses the Winooski River approximately 0.2 miles south of the VT 117 intersection. West of the bridge, the VNNHP has mapped the occurrence of the blacknosed shiner, a State-ranked rare fish species that is not listed as State Threatened or Endangered at this time.

VT 117 Corridor

- **Section 1 (Map F8)**

The VNNHP has mapped several rare and threatened plant species on the north side of VT 117 between Maple Street and the Pinewood Plaza commercial complex in the VELCO and Green Mountain Power transmission line right-of-way. The species include the State Threatened hairy lettuce, Houghton's cyperes, blunt-leaved milkweed, Muehlenberg's sedge, and plains frostweed, and the state-ranked rare racemed milkwort, Canadian frostweed, slender paspalum, many-leaved sedge, and sandbur. The transmission line corridor follows a ridge above the roadway and is separated from the roadway by residential lots and the Pinewood Plaza commercial complex.

- **Section 2 (Map G8)**

The mapped occurrence of the State Endangered Many-leaved Sedge, shown east of VT 117, is well away from the proposed corridor. The rare plant, wild rye, is mapped in the Silver Maple-Ostrich Fern community on the Williston side of the river.

New Roadway (Map D8)

No State Threatened or Endangered Species are found within the New Roadway Corridor. One species with a State-rarity ranking is present, tall millet-grass. Areas of Mesic Maple-Ash-Hickory-Oak forest are also present; this habitat is State-ranked as rare.

13.0 Archaeological Resources

13.1 Introduction

Known archaeological sites include in-ground cultural resources that have been assigned a Vermont Archaeology Inventory (VAI) site number and that are included in the Vermont Division for Historic Preservation (VDHP) site files. These numbered sites include both pre-contact Native American sites dating between 9,500 B.C. and A.D. 1600 and historic period Euroamerican sites dating to more recent times, mainly from the late 18th-early 20th century.

Archaeologically sensitive areas include areas that have the potential to contain significant archaeological sites. Areas that are sensitive for pre-contact Native American sites include landforms which, based on natural characteristics such as proximity to water and level topography, would have been attractive for habitation by Native Americans at some point in the past. The VDHP's Environmental Predictive Model for Locating Pre-contact Archaeological Sites is the standard for evaluating the archaeological potential of a given project area. Based on the VDHP criteria, the entire project area can be considered archaeologically sensitive at this level of review given that it falls within the Winooski River drainage, includes the Winooski River and a number of its major tributaries, and includes one of the densest distributions of known pre-contact sites within Vermont.

Areas that are sensitive for historic period sites include portions of property adjacent to standing historic period structures, as well as areas that contain the ruins of structures that are no longer standing but that can be identified from historic maps, or through other documentary means.

13.2 Regulatory Framework

Under Section 106 of the National Historic Preservation Act of 1966, as amended, archaeological studies are required for any undertaking that is federally funded or regulated. Because VTrans receives federal assistance for its projects via the Federal Highways Administration (FWHA), VTrans projects are subject to archaeological review under Section 106. Other Federal and State laws also apply and necessitate the same level of review as required by Section 106. These include, but are not limited to, the National Transportation Act, the National Environmental Protection Act, and Vermont's Act 250. All archaeological studies undertaken in Vermont must follow the *Guidelines for Archaeological Studies*. Archaeological investigations undertaken for VTrans also follow the Programmatic Agreement between VTrans and VDHP, designed to expedite the archaeological review for transportation projects.

Archaeological studies in Vermont typically fall within one of four phases of investigation. These include: Archaeological Resources Assessments conducted at the project scoping stage; Archaeological Phase I Site Identification Surveys conducted in sensitive portions of a project's Area of Potential Effect (APE); Archaeological Phase II Site Evaluations conducted at known

sites within a project's APE to determine their eligibility for listing on the National Register of Historic Places (NR); and Archaeological Phase III Data Recovery at sites within a project's APE that are eligible for listing on the NR.

13.3 Methodology

Sources used for this review include the VAI and state site files, reports completed for earlier studies of the Circumferential Highway project, studies and reports from investigations completed under Act 250 review, orthophotographs and USGS topographic maps.

13.4 Resource Description (Maps A9-G9)

Brownell Road Corridor (Map B9)
There are two known pre-contact Native American sites within the Brownell Road corridor, VT-CH-364 and VT-CH-819. Site VT-CH-364 is located just north of I-89 on the west side of Brownell Road. Site VT-CH-819 is located on the opposite, eastern side of Brownell Road, also north of I-89. These sites can be dated only to the general prehistoric period, ca. 9,500 B.C.-A.D. 1600. Both sites are associated with a tributary of Muddy Brook, which parallels the southern portion of the corridor on the eastern side and crosses the corridor just north of I-89.

Numerous as yet unidentified sites are likely within this corridor, especially on well-drained landforms associated with tributaries of Muddy Brook and the main stem of Allen Brook. In particular, these areas include: portions of the corridor adjacent to Muddy Brook tributaries on the eastern side of Brownell Road, south of the Marshall Ave intersection; an area on the western side of the corridor, south of the Shunpike Road intersection; and an area adjacent to the corridor where it crosses Allen Brook, east of the Industrial Avenue intersection. In addition to these highly sensitive areas, pre-contact Native American sites are potentially present in any portion of the Brownell Road corridor that has not been significantly disturbed by previous construction activity. In terms of depth, sites in this area may contain deposits at or near the ground surface to depths of approximately 70 cm (28 in).

The Brownell Road Corridor also has the potential to contain significant historic period sites. These would include deposits associated with significant historic structures as well as the remains of residences and other structures that are no longer standing but that preserve archaeologically. Areas particularly sensitive for historic period sites within this corridor include the Shunpike Road intersection, the US 2 intersection, and the area in the vicinity of the Allen Brook crossing.

VT 2A Corridor (Maps C9a, C9b)
There are no known pre-contact Native American sites located within the VT 2A corridor. The corridor has a high potential to contain as-yet-unidentified sites, however, particularly in the northern portion of the corridor where VT 2A crosses the Winooski River, to the north and south of the Essex 19 hydroelectric dam. In addition to this highly sensitive area, pre-contact Native American sites are potentially present in any portion of the VT 2A corridor that has not been significantly disturbed by previous construction activity, given its close proximity to both Allen Brook and the Winooski River. In terms of depth, sites in this area may contain deposits at or near the ground surface to depths of approximately 70 cm (28 in).

The VT 2A Corridor also has the potential to contain significant historic period sites. Areas potentially sensitive for historic period sites within this corridor include the intersection of the Winooski River and Five Corners, and the Five Corners intersection itself.

New Roadway Corridor (Map D9)

A total of 20 pre-contact Native American sites were identified within the New Roadway Corridor during archaeological Phase I surveys conducted by the University of Vermont Consulting Archaeology Program (UVM CAP). These sites include VT-CH-197 and 198, VT-CH-209, VT-CH-211 through 219, VT-CH-233, 384, 405, and 458, and VT-CH-9199, 9210, 9231, and 9232. These sites range in age from the Paleoindian period, ca. 9,500-7,000 B.C. to the more recent Late Woodland period, ca. A.D. 1000-1600. The Phase I level study, which was initiated in 1984, was conducted within a mile-wide corridor. The project area became more focused when a preferred alignment was chosen. Five of the 20 identified sites fell within the APE of the chosen alignment and underwent Phase II site evaluations. Of these five sites, three were determined to be eligible for listing on the NR. The project's adverse effects on these sites were mitigated with Phase III data recovery excavations which were completed in 1993.

One historic period site, the Miller-Metcalf Site, VT-CH-423, was identified within the APE of a proposed new roadway and US 2 interchange. Following a Phase II site evaluation, the site was found to be not significant and not eligible for the NR. No further work was recommended at the site.

North Williston Road Corridor (Maps E9, E9a)

There are no known pre-contact Native American sites within the North Williston Road Corridor. Numerous sites are known nearby, however, and the corridor contains numerous areas that are highly sensitive for pre-contact sites. As-yet-unidentified sites are potentially present along the corridor in areas that have not been significantly disturbed by historic construction activities. The areas of highest sensitivity include the southern section of the corridor where a tributary of Allen Brook parallels the road on the west; the crossing of Allen Brook, north of the US 2 intersection; the crossing of an Allen Brook tributary just south of the Mountain View Road intersection; the high delta top landform that forms the southern margin of the Winooski River valley just south of and adjacent to the topographic break where North Williston Road descends to the floodplain; and the Winooski River floodplain on both the south and north sides of the river. In the floodplain, archaeological sites, if present, have the potential to be in deeply buried contexts, up to 3 m (10 ft) below the modern ground surface. Elsewhere within the corridor site deposits are likely to be found between the ground surface and 70 cm below (28 in).

One historic period site is known within the corridor, VT-CH-526, the Railroad Station at North Williston. This site is situated just south of the railroad intersection on the east side of North Williston Road.

VT 117 Corridor (Maps F9 and G9)

There are a total of ten pre-contact Native American sites within the VT 117 corridor. Moving from the Five Corners intersection eastward, these include VT-CH-740, 26, 206, 320, 301, 957, 667, 673, 671, and 670. All of these sites are associated with landforms in close proximity to the Winooski River which borders the southern side of the VT 117 corridor. Site VT-CH-206, situated within the previously studied Circumferential Highway corridor, was found to be significant after a Phase II site evaluation and later underwent Phase III data recovery. Phase II-level testing also was conducted at one other known site within the VT 117 corridor, VT-CH-667, located within the Rogers Farm development. Site VT-CH-667 was determined not be significant after a site evaluation and was allowed to be destroyed.

Virtually the entire VT 117 corridor, with the exception of the portion immediately east of the Five Corners intersection, is highly sensitive for pre-contact Native American sites given its proximity to the Winooski River, various tributaries, and confluences. The portion of the corridor immediately east of the Five Corners intersection is not sensitive for Native American sites

given the large amount of historic construction activities in this area which already have destroyed any pre-contact sites that may previously have existed there. As-yet-unidentified sites within the VT 117 corridor have the potential to represent all periods of prehistory, but particularly Late Archaic to Late Woodland periods, ca. 4000 B.C.-A.D. 1600. Sites in this corridor, where and if present, also have the potential to be deeply buried within the floodplain. Archaeological remains can be expected from the ground surface to depths of up to 3 m (10 ft).

There are no known historic period archaeological sites within the VT 117 corridor. Numerous areas are sensitive for historic archaeology, however. These would include properties that may contain deposits associated with significant historic structures and/or the remains of residences and other structures that are no longer standing but that preserve archaeologically sensitive structural deposits along with other non-structural deposits.

14.0 Historic Resources

14.1 Introduction

Resources qualifying for inclusion in this section are those properties that are either listed on, or meet the criteria for listing on, the State or National Registers of Historic Places. In 2001, the Vermont State Historic Preservation Office changed the State Register criteria to be identical to the National Register criteria. All buildings then listed in the State Register were deemed to be eligible for the National Register, creating a single class of historic properties and streamlining the historic preservation permitting process.

14.2 Regulatory Framework

Section 106

Section 106 of the National Historic Preservation Act (1966) is a consultative procedure requiring Federal agencies to take into account the effects of their undertakings on historic properties, and affording the Advisory Council on Historic Preservation a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by the Advisory Council on Historic Preservation (ACHP).

Section 106 – Vermont Alternate Procedure

Under 36 CFR §800.14(a), the ACHP allows Federal agencies to develop their own procedures to implement Section 106, which would substitute for Subpart B of the ACHP regulations. Alternate procedures allow Federal agencies to restructure and streamline the Section 106 process to meet the missions of the agency specifically. As allowed under the Alternate Procedure regulations, the December 2000 Statewide Section 106 Programmatic Agreement (PA) among the FHWA, ACHP, Vermont Division for Historic Preservation (VDHP), and VTrans authorizes qualified professionals within VTrans to act on behalf of VDHP in the application of Section 106 regulations. Those individuals are the VTrans Historic Preservation Officer (Scott Newman) and the VTrans Archaeology Officer (Dr. Duncan Wilkie).

National Register of Historic Places Evaluation Criteria

For the purposes of Section 106, historic properties are those meeting the criteria for inclusion on the National Register of Historic Places, as follows:

> *"The quality of significance in American history, architecture, archeology, 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; or*
> > *(b) that are associated with the lives of persons significant in our past; or*
> > *(c) that embody 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 have yielded, or may be likely to yield, information important in prehistory or history."*

Properties must, except under certain circumstances, be over 50 years old and retain their historical integrity.

Section 4(f)

In the USDOT Act of 1966, a special provision was included to provide protection to a class of natural and cultural resources. It is known as Section 4(f), and it stipulates that the FHWA will not approve any program or project which requires the use of any significant publicly-owned public park, recreation area, or wildlife or waterfowl refuge, or any land from an historic site of national, state, or local significance unless:

1. there is no feasible and prudent alternative to the use, and
2. all possible planning to minimize harm resulting from such use is included.

A "use" occurs: 1) when land from a Section 4(f) site is acquired for a transportation project; 2) when there is an occupancy of land that is adverse in terms of the statute's preservationist purposes; or 3) when the proximity impacts of the transportation project on the Section 4(f) sites, without acquisition of land, are so great that the purposes for which the Section 4(f) site exists are substantially impaired (normally referred to by courts as a constructive use).

Like Section 106, properties protected under Section 4(f) are those meeting the National Register evaluation criteria described above. Unlike Section 106, which is a consultative process, Section 4(f) is a substantive law rigorously applied to protect historic properties.

Section 4(f) applies to all historic sites, but only to significant publicly-owned public parks, recreational areas, and wildlife and waterfowl refuges. When parks, recreational areas, and wildlife and waterfowl refuges are owned by private institutions and individuals, even if such areas are open to the public, Section 4(f) does not apply.

When projects are litigated, Section 4(f) has been a frequent issue. Therefore, it is essential that the following are completely documented: 1) the applicability/non-applicability of Section 4(f); 2) the coordination efforts with the officials having jurisdiction over or administering the land (relative to significance of the land, primary use of the land, mitigation measures, etc.); 3) the location and design alternatives that would avoid or minimize harm to the Section 4(f) land; and 4) all measures to minimize harm, such as design and landscaping.

The intent of the Section 4(f) statute and the policy of the Department of Transportation is to avoid public parks, recreation areas, refuges, and historic sites. In order to demonstrate that there is no feasible and prudent alternative to the use of Section 4(f) land, the evaluation must address location alternatives and design shifts that avoid the Section 4(f) land. Supporting information must demonstrate that such alternatives result in unique problems. Unique problems

are present when there are truly unusual factors or when the costs or community disruption reach extraordinary magnitude.

Vermont Act 250

Act 250 Criterion 8 requires consideration of the effects of reviewed projects on aesthetics and historic sites. For the purposes of Act 250, historic sites are those properties listed or eligible for listing on the State Register of Historic Properties. As previously discussed, because the criteria for the two registers are identical in Vermont, Act 250 effectively considers effects to all historic properties. Through application of the Quechee Analysis, Act 250 requires evaluation of proposed effects to historic properties, avoidance alternatives, and measures to minimize harm. To obtain a permit under Act 250, projects must not result in undue adverse effects to historic properties as determined from the Quechee Analysis, explained below:

If a project is found to have an adverse effect, an analysis follows on whether that adverse effect is also an undue adverse effect. An undue adverse effect will only be found if:

> *a) the project violates a clear, written community standard intended to preserve the aesthetics or scenic beauty of the area;*
>
> *b) the project fails to take generally available mitigating steps which a reasonable person would take to improve the harmony of the project with its surroundings; or*
>
> *c) the project offends the sensibilities of the average person, is offensive or shocking because it is out of character with its surroundings or significantly diminishes the scenic qualities of the area.*

By statute, the VDHP provides expert counsel to the State Environmental Board for the consideration of projects under Criterion 8. VTrans, in the aforementioned Programmatic Agreement, also assumed the authority to provide testimony on behalf of the VDHP and the Vermont Advisory Council on Historic Preservation for Act 250, as well as the responsibility for the following as outlined in the Act 250 guidance:

> *Project review by the Division consists of identifying the project's potential impacts to historic buildings, structures, historic districts, historic landscapes and settings, and known or potential archeological resources. Under 10 VSA Chapter 151 (Act 250), Section 6001 (9), the Vermont Advisory Council on Historic Preservation is responsible for providing testimony about the significance of historic and archeological resources.*

Except for rare circumstances, the review undertaken by VTrans for Section 106 will be provided to the Environmental Board as testimony for Act 250.

14.3 Methodology

Historic properties in the Circ-Williston project area were identified using existing survey data housed at the Vermont Division for Historic Preservation in Montpelier. Due to the age of the existing data, some of it over 20 years old, it was determined necessary to update the information through field investigation. This work was undertaken by the VTrans Historic Preservation Officer in June and July, 2005. Additional field reconnaissance was conducted in August 2005, along with detailed review of GIS mapping of resources. The primary objectives of the update were to add properties that have become eligible since the surveys were undertaken, and delete properties that have either been modified such that they no longer meet the criteria or have been demolished. Properties identified for inclusion in the field reconnaissance generally front the road in their respective corridors or are contained in the 200-foot wide corridor in the absence of a road.

14.4 Resource Description (Maps A9-C9)

Brownell Road Corridor (Map B9)
Historic resources comprise individual vernacular style residences fronting the traveled way as shown on the map, predominantly on the west side of Brownell Road. The east side of Brownell Road is fronted by a substantial amount of modern commercial development.

VT 2A Corridor (Maps C9a and C9b)
Historic resource mapping indicates two historic properties between I-89 and Williston Road; the development is primarily modern commercial retail and strip malls in the area. North of Taft Corners to the Winooski River, the corridor is primarily low density residential with isolated surviving historic houses within in a predominantly modern housing stock dating from the 1960s and later.

North of the Winooski River at the entrance to Essex Junction Village is the Park Street State Register Historic District, which encompasses a concentration of historic houses on the east side of VT 2A and intersecting side streets. From the north terminus of the Park Street District to Five Corners are located numerous individual historic buildings that may constitute either a separate historic district, or an extension of the Park Street District. Houses in the area are set back 15 to 25 feet from the pavement, and the road has green belts and mature trees closely fronting the pavement on both sides. The Five Corners area of the VT 2A corridor contains some individual historic structures located at the intersection, but is not contained within a historic district. It should be noted however, the historic districts are present on all intersection roads just outside the intersection.

New Roadway Corridor (Maps D9a and D9b)
No above-ground historic properties are located within this corridor.

North Williston Road Corridor ((Maps E9, E9a)
The length of this corridor is notable for its aesthetics, scenic vistas, farming presence, and for the number of intact historic houses in their original settings. The intersection of North Williston Road and US 2 is within the Williston Village National Register Historic District, containing a mix of historic residential, commercial and institutional buildings in a variety of styles, most predominantly the Greek Revival. This district parallels US 2 in Williston and does not extend significantly north along North Williston Road. North of the District are several concentrations of historic buildings in the Greek Revival and Italianate styles in brick and clapboard, as well as several farmsteads, though none are denoted as Districts. There is remarkably little modern infill.

Surrounding the intersection of North Williston Road and the railroad tracks is the North Williston State Register Historic District. The district comprises building styles found along the rest of the corridor as well as some railroad related structures. There are no historic properties between the river and VT 117.

VT 117 Corridor (Maps F9 and G9)
The eight-mile stretch of the VT 117 Corridor between I-89 and Essex Junction is primarily rolling farmland dotted with isolated houses; only three of them qualify as historic buildings. At the entrance to Essex Junction, the Maple Street State Register Historic District straddles VT 117 with a variety of historic residential buildings closely fronting the road. Among them, are several Queen Anne, Italianate, and vernacular style structures, many with mature trees in their front yards.

15.0 Designated Scenic Roads

15.0 Introduction

Scenic roads may be designated by the state (state highways) or locally (town roads). The Scenic Road Law adopted by the Vermont Legislature in 1977 enables local officials and town residents to participate in the process of designating town-owned routes as scenic roads. The Scenic Roads Program, formed under the direction of the Vermont Scenery Preservation Council and the State Transportation Board, is designed to identify, manage and protect special and attractive, natural and man-made qualities of Vermont's rural roadways.

In 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA) funded the National Scenic Byways Program. The purpose of this program is to "identify, designate, and promote scenic byways and to protect and enhance the recreational, scenic, historic and cultural qualities of the areas through which these byways pass." In 1993, the Vermont Byways Program was established. This program integrates the state's scenic roads program, as described in Title 19 VSA, with the National Scenic Byways Program. A Vermont Byway is a highway or other public road that has special scenic, historic, recreational, cultural, archeological, and/or natural qualities, and for which a management plan has been developed at the local level. A Vermont Byway can be designated and managed with a focus on any or all of these six qualities.

15.2 Regulatory Framework

The Scenic Roads Program provides a method of local control to guide changes to town roadways and may help protect important features such as bridges, stone walls, or lines of trees near the roadbed. Whether a road is designated for this program depends on features such as forest and agricultural patterns, panoramic and scenic views, terrain, contour, and focal points. Once a road has qualified for the Scenic Roads Program, maintenance and reconstruction work must conform to standards established by VTrans. Although this law helps to manage roads, it does not restrict development of adjacent land. It can, however, be coupled with other land use methods, such as easements, to preserve scenic vistas.

Impacts to scenic roads and byways are considered under Vermont Act 250 and the Scenic Roads Law of 1977 as summarized below.

Title 10 VSA Chapter 151, The Land Use and Development Law, Act 250:

- Established "to protect and conserve the lands and the environment of the state and to insure that these lands and environment are devoted to uses which are not detrimental to the public welfare and interests."
- Establishes conditions and criteria for the issuance of permits by the district commissions. Impacts to scenic and aesthetic resources are addressed under Criterion 8.
- Is applicable to "construction by state or local government if the project involves more than 10 acres."

Title 19 VSA Chapter 25, The Scenic Road Law of 1977:

- Protects roads designated as scenic under the Vermont Scenic Roads program.
- Requires that reconstruction or improvements conform to standards established by the Transportation Board.

15.3 Methodology

Scenic roads and byways in the project area were identified through the use of available GIS data and field verification. Information on undesignated roads and viewsheds was obtained from VANR.

15.4 Resource Description

There are no scenic roads or byways located within the project area.

16.0 Hazardous Waste Sites/Facilities

16.1 Introduction

Hazardous waste or materials present in contaminated soil, surface water, groundwater at a site present potential risks to current and future users, as well as construction workers where redevelopment is to occur. Hazardous waste/materials also pose threats to vegetation/natural communities and to persons in the area who may be exposed to air or waterborne contamination migrating from the site. In order to prevent exposure to contaminated media and to ensure that work in and around affected sites does not increase the extent of contamination, the State of Vermont's Department of Environmental Conservation (VTDEC) maintains lists of identified hazardous sites, registered hazardous waste generators, and registered underground storage tanks. Information about uses of properties in the early 20th century, available in Sanborn fire insurance maps, is also useful in determining if a past use of a site may have resulted in contamination that has not yet been investigated.

16.2 Regulatory Framework

Vermont has primacy for hazardous waste regulation and administers the federal regulations through the Vermont Hazardous Waste Management Regulations (Vermont Environmental Protection Rules, Chapter 7). Vermont also regulates underground storage tanks through the Underground Storage Tank Regulations (Vermont Environmental Protection Rules, Chapter 8). The Vermont hazardous waste quantity thresholds for large and small quantity generators are lower than the federal thresholds. Vermont also treats waste petroleum products as hazardous waste.

A hazardous site is any property where a process, spill, leak or other action has resulted in the release of hazardous materials or petroleum products, causing levels of these contaminants in soil, groundwater, surface water or indoor air at the site to be greater than the applicable enforcement standards. At an active site, the VTDEC is currently overseeing the investigation and/or cleanup of the property. A closed site refers to a property at which the VTDEC considers the release to have been adequately managed so as to not pose a significant risk to property users or surrounding media.

A hazardous waste generator is a facility (excluding households) in which a process results in a waste product that has the qualities of a hazardous material. There are three categories of hazardous waste generators: conditionally exempt; small quantity; and large quantity. As conditionally exempt generators produce (up to 220 pounds per month) and store (up to 2,200 pounds) the least amounts of material, they are subject to the fewest regulations. Small quantity generators may produce up to 2,200 pounds of hazardous wastes per month and store up to 13,200 pounds of hazardous wastes at any time. Large quantity generators may produce and store unlimited quantities of hazardous wastes for up to 90 days.

Underground storage tanks (USTs) must be permitted if they contain more than 1,100 gallons of chemicals or petroleum product, with the exception of fuel oil for on-premises heating and farm or residential tanks that store motor fuel. USTs that are no longer in use do not require a permit. Hazardous waste generators and tanks below registration/permitting thresholds are not typically identified in VTDEC's database; however, as indicated above, they are likely to be too small to represent a hazard.

16.3 Methodology

A review of the listed permitted underground storage tanks, hazardous waste generators, hazardous sites and historical concerns within the primary project area was conducted. The locations of these facilities are shown on Map A10. For current hazardous concerns (hazardous sites, waste generators and USTs), the VANR Internet Mapping Site was used to determine the locations of the relevant facilities; the addresses and other data were then verified where possible. Sanborn maps were used to locate historical concerns. If these facilities were located within or near a 250-foot buffer of a proposed or existing corridor, they were selected for inclusion on a list of potential environmental concerns.

Permitted UST information was gathered from the VTDEC Permitted UST List, updated in September, 2004.

Information on hazardous waste generators with Resource Conservation and Recovery Act (RCRA) registration numbers was provided on the VTDEC's RCRA Rep Handler List, updated on June 30, 2005. Small or large quantity waste generators within or near the proposed corridors were selected for inclusion on the corridor maps; conditionally exempt small quantity waste generators are not included as the quantities produced at these facilities are too small to present a significant hazard to the project.

The VTDEC's Vermont Active Hazardous Waste Sites list, updated June 1, 2005 and the Closed Hazardous Waste Sites database, updated November, 2004 were searched. All sites within or near the proposed corridors were included on the corridor maps.

An historical land use investigation of the proposed corridors was also performed using Sanborn Fire Insurance maps from the Vermont State Law Library in Montpelier, Vermont. Sanborn maps were available for the Five Corners intersection in Essex Junction. Due to the limited historical use (with the exception of agriculture) of the land within the remainder of the corridors, Sanborn maps were not available for those areas. The Sanborn maps used ranged in dates from November of 1884 to November of 1928.

16.4 Resource Description (Maps A10-G10)

Permitted USTs in or near the corridors contain gasoline, diesel or used oil. The VTDEC has no record of any USTs which store chemicals or hazardous materials in these areas. A listing of permitted USTs is provided in Table G-1. Small quantity hazardous waste generators in or near the corridors are shown on Table G-2. There were no large quantity generators within the project area. Multiple active and closed hazardous sites are located within or near the corridors, as shown in Table G-3.

Using the Sanborn maps, nine historical land uses in Essex Junction could potentially pose a reason for environmental concern (REC). These facilities are described below.

Brownell Road Corridor (Map B10)

There are two permitted UST facilities in this corridor at which gasoline, diesel and used oil are stored. There are no active small or large quantity hazardous waste generators. One low priority active hazardous site (contaminants of concern are gasoline and kerosene) and three closed hazardous sites are located along the corridor.

The Sanborn map coverage did not extend to this corridor. As a result, the historical land uses here are unknown.

VT 2A Corridor (Map C10)

Five permitted USTs, containing gasoline and diesel, are located in or near this corridor. One small quantity generator of automotive-related hazardous wastes is located on VT 2A. There are five active hazardous sites, three of which are listed as low priority sites, and two of which are listed as medium priority. Contaminants of concern at the low priority sites include gasoline and tetrachloroethene (TCE), while gasoline is the contaminant of concern at both medium priority sites. The four closed sites in this corridor generally have managed contamination issues related to petroleum, with the exception of coal at one site and an unspecified contaminant at another site.

The November 1884 map shows a “bleach room” at the Hunter Shiland Paper Mill located at the corner of Mill and River Streets, approximately fifty feet north of the Winooski River. The October 1910 map clearly showed two coal sheds at the most southerly railroad crossing on Park Street. The 1922 map indicates iron coal tanks at the W.B. Johnson and Son Gristmill and Grain Elevator on the southern side of the railroad west of Park Street.

Table G-1 Permitted Underground Storage Tanks

Facility ID	Facility Name	Address	Town	Owner Name	Contents
Map B10: Brownell Road Corridor					
8625972	O'Brien's Town & Country Store	139 Williston Road -US 2	Williston	S B Collins Inc	Gas & Diesel
1941	Munson Earth Moving	20 Shunpike Road	Williston	Munson Earth Moving Corporation	Diesel & Used oil
Map C10: VT 2A Corridor					
1905	Simon's Five Corner Store	2 Park Street	Essex	Simon's Five Corners	Gas
387	Williston Jiffy Mart	500 Essex Road	Williston	Champlain Oil Company	Gas
232	Taft Corners Short Stop	450 Essex Road	Williston	S B Collins Inc	Gas
511	Williston State Police Barracks	VT 2A At I-89	Williston	Vermont Department of Public Safety	Gas
106	Clark's Williston Exit Sunoco	VT 2A and I-89, 593 St. George Road	Williston	J W Sandri of Vermont Inc	Gas & Diesel
Map D10: New Roadway Corridor					
No USTs					
Map E10: North Williston Road Corridor					
130	Korner Kwik Stop	US 2 and North Williston Road	Williston	Bradford Oil Co Inc	Gas
Map F10: VT 117 Corridor Section 1					
385	Sunoco Gasoline Station	16 Maple Street	Essex	J W Sandri of Vermont Inc	Gas & Diesel
138	River Road Beverage & Redemption	45 River Road	Essex	Bradford Oil Co Inc	Gas
Map G10: VT 117 Corridor Section 2					
129	Lucky Spot Variety Store	VT 117	Richmond	Bradford Oil Co Inc	Gas

Table G-2 Hazardous Waste Generators

EPA ID	Facility Name	Address	Town	State	Zip	Type
Map B10: Brownell Road Corridor						
No small or large quantity hazardous waste generators						
Map C10a: VT 2A Corridor						
VTR000012443	Tafts Corner Mobil	450 Essex Road	Williston	VT		SQG
Map D10: New Roadway Corridor						
No small or large quantity hazardous waste generators						
Map E10: North Williston Road Corridor						
No small or large quantity hazardous waste generators						
Map F10: VT 117 Corridor Section 1						
VTD981063043	IBM Building 620	36 River Road	Essex	VT	05451	SQG
VTD988380630	Techtron Environmental Inc.	57 River Road	Essex	VT	05452	SQG
Map G10: VT 117 Corridor Section 2						
No small or large quantity hazardous waste generators						

Table G-3 Active and Closed Hazardous Sites

Site Number	Site Name	Address	Town	Priority & Contaminant	Discovery Date	Closure Date	Owner	Active?
Map B10: Brownell Road Corridor								
770091	Rossignol Ski	Industrial Avenue	Williston	SMAC- Metals, VOCs/SVOCs	-	-	Rossignol Ski Co. Inc.	Closed
961994	O'Brien's Town & Country Store	5085 Williston Road	Williston	LOW- Gas, Kerosene	19960501	-	S B Collins	Active
982332	Shunpike Road Property	20 Shunpike Road	Williston	SMAC- Gas, Paints	19970901	19980801		Closed
900578	Champlain Oil Property	S. Brownell Street	Williston	SMAC- Petroleum	-	19960901	Champlain Oil Co	Closed
Map C10: VT 2A Corridor								
961961	Essex Junction Agway	2 Park Street	Essex	LOW- Gas	19960101	-	Agway Energy Products	Active
982473	Robinsons Inc	34-35 Park Street	Essex	MED- Gas	19980729	-	Robinsons Inc	Active
20012942	Flanders Building Supply	Park Street	Essex	SMAC- Petroleum, coal	20011105	20020424		Closed
890334	Vermont Maple Products		Essex	NFAP- Fuel oil	19890503	19891031		Closed
900573	Essex Village Public Works	2 Lincoln Street	Essex	NFAP- Petroleum	-	19940601		Closed
20002805	Essex Junction Agway	VT 2A	Williston	MED- Gas	20000809	-	Agway Petroleum Corp	Active
961972	Taft Corners Short Stop	450 Essex Road	Williston	LOW- Gas	19960401	-	S B Collins	Active
770089	Judge Development Tafts Corner	Box 404	Williston	LOW- PCE, Gas	-	-	Judge Development Services Corp.	Active
900565	GMP	VT 2A	Williston	NFAP- Unknown	-	-	Green Mtn Power Corp	Closed
Map D10: New Roadway Corridor								
931428	Former Dave's Automotive	US 2	Williston	MED- Fuel oil	19930801	-	VTrans	Active
921297	Williston Landfill	Redmond Road	Williston	NFAP- Waste oil	19920903	19931012	Town Of Williston	Closed
Map E10: North Williston Road Corridor								

Site Number	Site Name	Address	Town	Priority & Contaminant	Discovery Date	Closure Date	Owner	Active?
921345	Alden Bryan Residence	68 North Williston Road	Williston	LOW- Gas	-	-	Alden Bryan	Active
951765	Williston Country Club	North Williston Road	Williston	LOW- Gas	-	-	Williston Golf Club Inc	Active
961974	Champlain Valley Cleaners	1 Blair Park Road	Williston	LOW- Chlorinated solvents	19960401	-	Ramon Lawrence Lawrence Realty	Active
951822	Korner Kwik Stop	765 US 2	Williston	LOW- Gas	-	-		Active
880188	Korner Kwik Stop	765 US 2	Williston	NFAP- Gas	-	-		Closed
Map F10: VT 117 Section 1								
951821	Howard Bank	4 Main Street	Essex	SMAC -Fuel oil	19950601	19960401	Howard Bank	Closed
961993	Road Res - Q	1 Main Street	Essex	LOW -Gas	19960501	-	Shawn Bushey	Active
982430	Busheys Sunoco	16 Maple Street	Essex	MED- Gas	19980615	-	J W Sandri Of Vermont Inc	Active
880261	The Public Warehouse		Essex	NFAP- Petroleum	19881108	19890131		Closed
941639	Grace United Methodist Church	Maple Street	Essex	SMAC- Fuel oil	19940701	19960101	Grace United Methodist Church	Closed
982351	Bread And Bottle Citgo	45 River Road	Essex	SMAC- Gas	19980201	20000216	Bradford Oil Co	Closed
Map G10: VT 117 Section 2								
900548	Lucky Spot	VT 117	Richmond	LOW- Gas	19900701	-		Active
20033085	Robert Wheeler	204Lower Circle-Riverview Commons	Richmond	HIGH- Kerosene	20030205			Active
20012853	Mayville Residence	64 Lower Circle, Riverview Commons	Richmond	HIGH- Kerosene	20010302	-	Steve Levesque	Active
890347	Patterson Fuels		Richmond	NFAP- Unknown				Closed
---*	Former Richmond Landfill	River Road	Richmond	Not a site				*

* = Not a listed hazardous site, but a potential environmental concern

New Roadway Corridor (Map D10)
Although a UST facility is shown on the map in this corridor, the USTs here have been removed; therefore, there are no registered USTs in the corridor. There are also no small or large hazardous waste generators along this corridor, although IBM, which is located on the north side of the river, is a listed small quantity generator (discussed in the "VT 117 Section 1" paragraph). One medium priority active site, contaminated with fuel oil, is located at the southern end of this corridor. One closed hazardous site, the former Williston Landfill, which had contamination issues related to petroleum, is located near the northern end of the corridor.

The Sanborn map coverage did not extend to this corridor. As a result, the historical land uses here are unknown.

North Williston Road Corridor (Maps E10, E10a)
One registered gasoline UST is located on this corridor. There are no small or large quantity hazardous waste generators along this corridor. Four active hazardous waste sites, all low priority, are located along this corridor. At three of these the contaminant of concern is gasoline, and at one of the sites, chlorinated solvents are the issue. There is also one closed site at which the gasoline contamination has been managed.

The Sanborn map coverage did not extend to this corridor. As a result, the historical land uses here are unknown.

VT 117 Corridor, Section 1 (Map F10)
There are two registered USTs along this corridor, containing gasoline and diesel. There are also two registered small quantity hazardous waste generators in the vicinity of the corridor. There are two active gasoline contaminated hazardous sites in the corridor, one with a low priority and one with a medium priority rating. There are also four petroleum related closed hazardous sites in the corridor.

The December 1904 map indicates that five gallons of gasoline was stored under the cement floor of a printing shop on the corner of Main Street and Railroad Avenue. The 1910 map indicates a second gasoline UST on Main Street located approximately 20 feet west of the printing shop previously mentioned. The April 1922 map shows a coal room at the Snowflake Canning Company between Elm Street and the railroad to the west. The 1928 Sanborn map shows two gasoline USTs behind a filling station on the corner of Main and Maple Streets, located approximately 200 feet west of the printing shop.

VT 117 Corridor, Section 2 (Map G10)
There is one registered gasoline UST facility along this corridor. No small or large quantity hazardous waste generators are located in the corridor. There are three active hazardous waste sites in the vicinity of the corridor; one is a low priority site with gasoline contamination, while the two others are high priority adjoining properties where kerosene contamination is the issue. There is one closed, likely petroleum-related hazardous site in the corridor. In addition, the former Richmond Landfill is located adjacent to this corridor. Although the landfill is not a listed site, landfills have the potential to release a broad range of contaminants into groundwater, surface water and soil.

The Sanborn map coverage did not extend to this corridor. As a result, the historical land uses here are unknown.

Other Sites not in or Near Corridors
The 1910 map also indicates a gasoline UST at an auto shed / garage on the corner of Pearl and School Street. The 1910 map also indicates at least one, possibly two, USTs at the Drury Brick and Tile Company between Brickyard Road and Indian Brook.

17.0 Community Facilities

17.1 Introduction

This section provides an inventory and description of existing community facilities, including public services, within the project area. For the purpose of this analysis, community facilities are defined as schools, churches, public libraries, museums, town halls, public healthcare facilities, courts, police and fire protection services and water treatment plants.

17.2 Methodology

A preliminary list of community facilities and services located within the project area was compiled using secondary sources such as local websites and web searches. A list of community facilities along with a brief description of them by project corridor is provided in the following section.

17.3 Resource Description (Maps A11-G11)

Brownell Road Corridor (Map B11)
Table G-4 below lists community facilities located near the Brownell Road corridor. Some community facilities may be in close proximity to more than one corridor, or the intersection of two corridors.

Table G-4
Existing Community Facilities in the Vicinity of the Brownell Road Corridor

Name	Address	City	Zip
Abundant Life Community Church	237 Commerce Street	Williston	05495
Maranatha Christian Church	85 S. Brownell Road	Williston	05495
Sisters of Mercy	232 Kirby Lane	Williston	05495

VT 2A Corridor (Map C11)
Table G-5 lists community facilities located near the VT 2A Corridor.

New Roadway Corridor (Map D11)
Table G-6 lists community facilities located near the New Roadway Corridor.

North Williston Road Corridor (Maps E11, E11a)
Table G-7 lists community facilities located near the North Williston Road Corridor.

VT 117 Corridor (Maps F11 and G11)

Table G-8 lists community facilities located near the VT 117 Corridor.

Table G-5
Existing Community Facilities in the Vicinity of the VT 2A Corridor

Name	Address	City	Zip	Description
Church of the Nazarene	2 Morgan Parkway	Williston	05495	
Essex Junction Fire Station	PO Box 5314	Essex Junction	05452	Volunteer/Paid-On Call; Services include firefighting, hazardous material response, BLS emergency medical service, Vehicle rescue, search and rescue.
Essex Junction Post Office	75 Pearl Street	Essex Junction	05453	The Essex Junction Post Office is open Week Days 08:30AM-05:00PM, Saturday 10:00AM-01:00PM.
Essex Junction Village Offices	2 Lincoln Street	Essex Junction	05452	The Essex Junction Village Offices house the majority of administrative offices for the Village.
Brownell Library	6 Lincoln Street	Essex Junction	05452	The Brownell Library opened in 1926 and today serves approximately 2,309 people a week. The library contains more than 62,000 books, 179 magazine subscriptions, 2,839 cassettes, compact disks, and 2,600 videos.
Essex Junction Wastewater Treatment Plant	Cascade Street near the Winooski River	Essex Junction	05452	The Essex Junction Wastewater Treatment Facility is owned and operated by the Village of Essex Junction. The Town of Essex and the Town of Williston have purchased portions of the plant's capacity. The three municipalities share in the plant's operation and maintenance cost.
Hiawatha School (Essex Junction)	34 Hiawatha Avenue	Essex Junction	05452	The Hiawatha School is a public primary school for grades pre-K to 3rd grade. There are approximately 213 students and 14 teachers.
New England Culinary Institute at Essex	48-1/2 Park Street	Essex Junction	05452	The Essex campus of the NECI is a private, for-profit institution with a full-time enrollment of 160 students. The Essex campus offers an associate's degree and first half of bachelor's degree in hospitality/restaurant management, an associate's degree in culinary arts and basic cooking certificate.
North Country Christian Academy	203 Essex Road, Suite 1	Williston	05495	
Park Street School (Essex Junction)				This school recently closed. Essex Junction is deciding whether it should rehab and reopen.
Trinity Baptist Church / Little Lambs Preschool	300 Trinity Drive	Williston	05495	
Williston Post Office	82 Blair Park Road	Williston	05495	Week Days 08:00AM-05:00PM, Saturday 09:00AM-12:00PM

Table G-6
Existing Community Facilities in the Vicinity of the New Roadway Corridor

Name	Address	City	Zip	Description
Allen Brook School	497 Talcott Road	Williston	05495	Allen Brook is a relatively new elementary school serving students in grades K through 4. Built in 1997, the school has 430 students and 39 faculty and staff.
IBM Wastewater Treatment Plant (Essex Junction)	IBM Corp., D792 BLDG 615-2	Essex Junction	05452	IBM, Essex Junction, VT is a 735 acre facility that manufactures silicon-based memory chips and microprocessors for computers. The manufacturing processes generate mostly spent solvents and wastewater treatment sludges.
Immaculate Heart of Mary	Williston Road	Williston	05495	
Seventh Day Adventist Church	RR 2 Box A	Williston	05495	

Table G-7
Existing Community Facilities in the Vicinity of the North Williston Road Corridor

Name	Address	City	Zip	Description
Dorothy Alling Library	21 Library Lane	Williston	05495	Library membership at the Dorothy Alling Library is open to Williston and St. George residents. The Chittenden County HOMECARD enables county residents to use most other libraries in the county. Seven computers are available with internet access, Microsoft Office, and Vermont Online Library (VOL) with access to electronic databases of newspapers, magazines, scholarly journals, reference books and other sources. Wi-fi is available in the library and courtyard.
Williston Central School	195 Central School Drive	Williston	05495	The Williston School District is made up of 1200 students in two public K-8 schools, the Williston Central School, which has served the community for over 50 years, and the Allen Brook School, now celebrating over 8 years of service
Williston Federated Church	44 North Williston Road	Williston	05495	
Williston Fire Station	7900 Williston Road	Williston	05495	Within the Williston Fire Department there is a Fire Division and a Rescue Division. Except for two Firefighters and the Chief, all fire personnel are on-call and are paid an annual stipend Currently, the department operates with one Assistant Chief, three Battalion Chiefs, one Captain, seven Lieutenants, fifteen Firefighters, three Dispatchers and three Fire Police officers.
Williston Police Station	7878 Williston Road	Williston	05495	As of March of 2005, the Police Department had fourteen full-time sworn officers, including the Chief, Detective Sergeant and two full-time dispatchers. The dispatch center is equipped with UHF and VHF base station radios, and the processing room has an infrared "DUI" machine. The fleet of police cruisers now totals four marked cars and one unmarked.
Williston Town Hall	7900 Williston Road (US 2)	Williston	05495	Residents of Williston can visit the Williston Clerk's Office Monday through Friday from 8:00 AM to 4:00 PM (until 6:00 PM on Monday). Services include voter registration, vital records, land records, licenses, motor vehicle registration renewals, green mountain passport, old brick church rental, recreation program registration and notary.

Table G-8
Existing Community Facilities in the Vicinity of the VT 117 Corridor

Name	Address	City	Zip	Description
Albert D. Lawton Middle School (Essex Junction)	104 Maple Street Rfd #4	Essex Junction	05452	The Albert D. Lawton Middle School is a public (non-vocational) school serving students approximately 361 students in the 6th through the 8th grade. There are 34 tpta; classroom teachers.
Brownell Library (Essex Junction)	6 Lincoln Street	Essex Junction	05452	The Brownell Library opened in 1926 and today serves approximately 2,309 people a week by the staff at Brownell. The library contains more than 62,000 books, 179 magazine subscriptions, 2,839 cassettes, compact disks, and Books on Tape and 2,600 videos.
Essex Junction Village Offices	2 Lincoln Street	Essex Junction	05452	The Essex Junction Village Offices house the majority of administrative offices for the Village.
Calvary Baptist Church	61 Main Street	Essex Junction	05452	Weekly worship services and a nursery present on site.
Calvary Baptist Church - Parsing	204 Main Street	Essex Junction	05452	Baptist Church
Catholic Diocese of Burlington,: St. Pius X	20 Jericho Road	Essex Junction	05452	
Champlain Valley Exposition Fairgrounds	105 Pearl Street, P.O. Box 209	Essex Junction	05453	The Champlain Valley Exposition Fair Grounds is a multi-purpose special events facility that hosts events such as trade shows and expos, festivals, banquets, weddings, concerts, conferences and the annual Champlain Valley Fair. There is also a 130-acre camp ground.
Chittenden Central S.U.	7 Meadow Terrace	Essex Junction	05452	Chittenden Central is a primary school for Special Education, pre-kindergarten students. There are 21 students and 1 teacher.
Church of Jesus Christ of Latter Day Saints Essex Ward	73 Essex Way	Essex Junction	05452	
Covenant Community Church	154 Jericho Road	Essex Junction	05452	
Ed-U-Care Children's Center	#5 Ewing Place	Essex Junction	05452	Ed-U-Care is a private early-education school serving pre-kindergarten and kindergarten students. A class size is typically 12 students.
Essex Alliance Church	37 Old Stage Road	Essex Junction	05452	
Essex Center Fire Station	190 Sandhill Road	Essex Junction	05452	
Essex Elementary School	1 Bixby Hill Road	Essex Junction	05452	The Essex Elementary School is a public primary school serving approximately

Name	Address	City	Zip	Description
				431 students in Pre-K through the second grade. There are 28 total classroom teachers.
Essex Junction Educational Center (High School)	2 Educational Drive	Essex Junction	05452	Essex High School is a public secondary school that offers a comprehensive curriculum to approximately 1600 students in grades 9-12. The school offers accelerated programs in Mathematics, Science and French; honors courses in 9th and 10th grade English; Algebra IIA, Pre Calculus and Calculus; and AP courses in French Literature, French Language, Latin (Virgil), Spanish Language; U.S. History, Calculus, U.S. Government and Politics; Calculus AB and BC, Computer Science, Chemistry, Physics C, Studio Art, Music Theory, and English Literature and Composition.
Essex Junction Town Hall	81 Main Street	Essex Junction	05452	Essex Junction Town Hall provides the following Services: Licenses (Marriage, Dog, Fish & Game, Liquor, Entertainment); pay taxes and water/sewer bill; purchase certified copies of birth, death, marriage & land records; register to vote and vote by absentee; notary services, no fee; recording of all land records for the Town of Essex & Village of Essex Junction. maintain cemetery records.
Essex Library	Jericho Road	Essex Junction	05452	The Essex Free Library offers services in 6,000 air-conditioned square feet of collection space on three floors. The library has a collection of more than 25,000 titles. At any given time, 6-7,000 titles or nearly one third of the collection is in circulation to the public.
Essex Middle School (Essex Town)	40 Foster Road	Essex Junction	05452	Essex Middle School is a public school that serves approximately 543 students in grades 6th through 8th. There are 41 total classroom teachers.
Essex Playhouse	Not Available	Essex Junction		Not Available.
Essex Post Office, Lang Farm	22 Essex Way	Essex Junction	05452	The Essex Post Office (Lang Farm) is open Week Days 08:00AM-05:00PM, Saturday 09:00AM-12:00PM.
First Congregational Church of Essex Junction	37 Main Street	Essex Junction	05452	Along with Sunday worship services, services on site include a Church school and a child day care center.
Fleming School (Essex Junction)	Prospect Street	Essex Junction	05452	The Thomas Flemming School, built in 1912 as the original High School for Essex Junction, today serves approximately 250 fourth and fifth grade students. Fleming was completely

Name	Address	City	Zip	Description
				renovated in 1995. Additions included three classrooms, a music and art complex and library-media center.
Founders Elementary School	33 Founders Road	Essex Junction	05452	The Founders Memorial School is a public primary school serving approximately 474 students in the grades 3 through 5. There are 29 total classroom teachers
Grace United Methodist Church	7 Rivendell Drive	Essex Junction	05452	
Grace United Methodist Church	130 Maple Street	Essex Junction	05452	
Holy Family Rectory	4 Prospect Street	Essex Junction	05452	
North Country Christian Academy	134 Main Street	Essex Junction	05495	North Country Christian Academy is a co-ed Christian school serving 78 students in the Pre-Kindergarten through 8th grade.
St. Michaels Fire & Rescue Station (Colchester/Essex)		Colchester/ Essex	05452	At Saint Michael's College, the Fire and Rescue Squad is an independent volunteer organization of students. Students provide fire protection and emergency medical treatment on campus and throughout the county.
St. James Episcopal Church	4 Saint James Place	Essex Junction	05452	
St. Lawrence Catholic Church	158 West Street	Essex Junction	05452	
Summit Street School (Essex Junction)	17 Summit Street	Essex Junction	05452	Summit Street School is a Pre K-3 school with approximately 230 students. There are thirteen classrooms: one preschool program (3-4 years), three half-day kindergartens, two first grades, two second grades, two 1-2 multi-age classes, and three third grades. There is a full-time special education teacher and a full-time Speech/Language Pathologist.
Unity Church of Vermont	56 Main Street	Essex Junction	05452	

18.0 Populations/Communities of Concern

18.1 Introduction

The fundamental principles of environmental justice are as follows:

- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process;
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations; and
- Avoid, minimize or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.

The environmental justice evaluation in this section follows the guidance and methodologies recommended in the Council on Environmental Quality's (CEQ's) Environmental Justice Guidance under the National Environmental Policy Act, (December 1997), and the Department of Transportation's Final Order on Environmental Justice (April 1997).

18.2 Regulatory Framework

Executive Order 12898, issued in 1994, directs federal and state agencies to incorporate environmental justice as part of their mission by identifying and addressing the effects of all programs, policies and activities on minority and low income populations (i.e., communities of concern).

In 1997, the U.S. Department of Transportation (USDOT) issued its Order to Address Environmental Justice in Minority Populations and Low Income Population (USDOT Order) to summarize and expand upon the requirements of Executive Order 12898 on environmental justice. The USDOT Order set forth the transportation agency's policy to promote the principles of environmental justice in all policies, programs and other activities that are undertaken, funded or approved by the FHWA, the Federal Transit Administration (FTA) or other USDOT entities. A determination on whether the project would have disproportionately high and adverse effects on minority and low income populations is required. "Disproportionately high and adverse effects" are adverse effects predominantly borne by a minority or low income population or suffered by the minority or low income population and would be appreciably more severe or greater in magnitude than the adverse effects that would be suffered by the non-minority or non-low income population.

18.3 Methodology

For the purpose of this evaluation, the project area has been defined as those U.S Census Bureau 2000 census block groups located within 250 feet of the five project corridors. The smaller census blocks within these block groups were further examined for race and ethnicity characteristics. The project area reflects the geographic area most likely to experience the direct impacts and, in most cases, the indirect community, human health and environmental impacts from the construction and operation of the proposed alternatives analyzed in the environmental screening. The principles of environmental justice require the assessment of whether the direct and indirect adverse impacts of the project improvements would fall disproportionately upon low income and minority populations. For comparison purposes, the demographic composition of the project area was compared and benchmarked with Chittenden County.

Minority and low income populations were identified using data on race and income from the 2000 U.S. Census. Along with persons who classified themselves as Asian, Black or African American, Native Hawaiian and Other Pacific Islander, and Others, persons of Hispanic origin who identified themselves as White were included in the calculation of minority population. Demographic data on race are reported at the census block level, the most spatially detailed level of census reporting. Data on income and poverty has been reported at the larger census block group level. The census block groups are comprised of numerous smaller census blocks that lie within their boundaries. A comparison of data at these levels of census geography provides a better understanding of the social and economic characteristics of the project area. Data for minority populations in the project area were compiled and mapped to assess spatial patterns of these populations.

18.4 Resource Description (Maps A12-G12)

Socioeconomic Characteristics and Populations of Concern in the Project Area
Based on the U.S Census 2000, the total population within the project area census blocks was estimated to be 20,917 persons. The larger census block groups contained a total of 30,703 persons. Persons of Hispanic origin within Chittenden County (1.1%) were slightly greater than the corresponding shares within the project area census blocks and block groups. Overall, the share of minorities in the project area (4.4%) was found to be marginally higher than the shares in the corresponding block groups (4.3%), but lower than the share within Chittenden County (5.6%). Map A12 presents a thematic map indicating the percentage of minorities within the project area census blocks.

A comparison of the age profile of the residents within the project area census blocks revealed that persons in the 5-17 year age group comprised the single largest age-cohort accounting for nearly 22% of the population. This was consistent with the age-cohorts exhibited by residents within the block groups and the County. Seniors or persons above the age of 65 years accounted for 9.5% of the population within the census blocks. This figure was almost identical to the percentage of seniors within the County.

Income and poverty related information was compiled from census block group level data provided by the U.S. Census Bureau. Both per capita and median household incomes within the project area census block groups were higher than those reported by the residents within the County. Levels of poverty within the block groups (2.8%) were significantly lower than those exhibited within Chittenden County (8.8%).

Brownell Road Corridor (Map B12)
The Brownell Road Corridor passes through two census block groups and 28 census blocks. A total of 720 persons lived within the census blocks located along the corridor. The share of Hispanics in the census blocks (1.5%) was higher than their corresponding share within the larger block groups (0.8%) and the County (1.1%). Census blocks along the Brownell Road corridor exhibited a higher percentage of minority persons (6.0%) than reported for the block groups (3.0%) and Chittenden County (5.6%).

Persons between the ages of 40 to 49 comprised the single largest age cohort within the project area and Chittenden County. Persons above the age of 65 accounted for 12.1 percent of the population within the project area census blocks, which was higher than the levels of this particular age cohort within the block groups (8.8%) and the County (9.4%). Per capita and median household incomes within the project area block groups were higher than those exhibited within the County.

None of the block groups along the Brownell Road corridor exhibited a higher percentage of minorities than reported for Chittenden County. Levels of poverty within the block groups were lower than those exhibited within the County.

There were four census blocks in the project area that exhibited a higher percentage of minority residents than Chittenden County as a whole. Only two of the blocks reported a minority population greater than ten persons.

VT 2A Corridor (Map C12)

The VT 2A corridor spans seven census block groups and 106 census blocks. A total of 5,177 persons lived within the census blocks located along the corridor. The share of Hispanics in the census blocks and block groups was identical and accounted for 1.1% of the total population respectively. Census blocks and block groups along the VT 2A corridor exhibited an identical percentage of minority persons (3.7%). The percentage of minority persons along the corridor was lower than that reported for Chittenden County (5.6%).

Similar to trends exhibited within the block groups and the County, persons between the ages of 5 and 17, comprised the single largest age cohort within the project area blocks and block groups. Persons above the age of 65, accounted for nearly 15% of the population within the project area census blocks compared to 9.4% in the County. Per-capita and median household incomes within the project area block groups were higher than those exhibited within the County.

None of the block groups along the VT 2A corridor exhibited a higher percentage of minorities than Chittenden County. Levels of poverty within the block groups were lower than those exhibited within the County.

There were 20 census blocks in the project area that exhibited a higher percentage of minority residents than Chittenden County as a whole. Only three blocks reported a minority population greater than ten persons.

New Roadway Corridor (Map D12)

Based on a review of the U.S Census 2000 data, a total of 8,129 persons live within the New Roadway Corridor. The New Roadway Corridor spans seven census block groups and 121 census blocks. Persons of Hispanic Origin accounted for 0.9% of the total population within the project area blocks and block groups. This percentage was lower than the share of persons of Hispanic Origin within the County (1.1%). Minorities comprised 4.2% of the population within the project area census blocks, which was lower than the levels exhibited within the larger project area block groups (4.7%) and Chittenden County (5.6%).

A comparison of the age profile of the residents within the project area census blocks revealed that persons in the 5-17 years age group comprised the single largest age-cohort accounting for nearly 22.6% of the total population. Persons in this particular age cohort comprised the single largest age cohort within the block groups and the County. Seniors or persons above the age of 65 years accounted for 10.8% of the population within the census blocks. This figure was slightly higher than the percentage of seniors within the County.

Both per-capita and median household incomes within the project area census block groups were higher than those reported by the residents within the County. Levels of poverty within the block groups (2.9%) were significantly lower than those exhibited within Chittenden County (8.8%).

Out of the seven block groups along the corridor, two block groups were found to exhibit a higher proportion of minority residents than the average for Chittenden County. Minorities accounted for 6.1% and 7.0% of the total population within these block groups respectively. None of seven block groups exhibited a higher percentage of persons in poverty than the average reported for the County.

Table G-9 presents the location and number of census blocks along the corridor that reported a higher percentage of minority persons compared to Chittenden County as a whole. There were

nine census blocks in the project area that exhibited a higher percentage of minority residents than Chittenden County as a whole. Only three of the blocks reported a minority population greater than ten persons.

Table G-9
Census Blocks Along the New Roadway Corridor with High Percentages of Minority Residents

Block	Tract	2000 Population	Minority Persons	Percent Minority
1024	31	39	3	7.7%
1027	31	30	7	23.3%
1035	31	252	17	6.7%
1040	31	46	4	8.7%
1041	31	80	7	8.8%
1043	31	27	2	7.4%
1063	31	116	12	10.3%
1070	31	16	4	25.0%
1071	31	355	23	6.5%

Source: U.S. Census of Population and Housing, 2000.

North Williston Road Corridor (Maps E12, E12a)
The North Williston Road Corridor spans two census block groups and 30 census blocks. A total of 1,672 persons reside within the census blocks located along the corridor. Persons of Hispanic origin accounted for 1.1% of the population within these census blocks. The share of Hispanics within the census blocks was identical to the share of Hispanics within the County population (1.1%). Census blocks along the North Williston corridor exhibited a lower percentage of minority persons (2.5%) than reported for the County (5.6%).

Similar to trends exhibited within the County, persons between the ages of 5 and 17, comprised the single largest age cohort within the project area. Persons above the age of 65, account for 10.2% of the population within the project area census blocks compared to 9.4% in the County. Per capita and median household incomes within the project area block groups were higher than those exhibited within the County.

None of the block groups along the North Williston Road corridor exhibited a higher percentage of minorities than reported for Chittenden County. Levels of poverty within the block groups were also lower than those exhibited within the County.

VT 117 Corridor (Maps F12 and G12)
The VT 117 corridor spans ten census block groups and 175 census blocks. A total of 10,921 persons lived within the census blocks located along the corridor. The share of Hispanics persons in the census blocks was lower than their share within the larger census block groups (0.9%) and Chittenden County (1.1%). Census blocks along the VT 117 corridor exhibited a slightly higher percentage of minority persons (5.1%) than reported for the block groups (4.4%). However, the percentage of minority persons along the corridor was lower than that reported for Chittenden County (5.6%).

Similar to trends exhibited within the County, persons between the ages of 5 and 17 comprised the single largest age cohort within the project area blocks and block groups. Persons above the age of 65 account for 6.2% of the project area census blocks compared to 9.4% in the

County. Per capita and median household incomes within the project area block groups were higher than those exhibited within the County. Levels of poverty within the project area were lower than those reported within the County.

The Chittenden County averages for minority residents and for persons living below poverty in the project area are the basis for determining areas with higher concentrations of minority persons or persons living below poverty.

Out of the ten block groups along the VT 117 corridor, only three were found to have a higher proportion of minority residents than the average for Chittenden County. None of the ten block groups had a greater percentage of persons in poverty than the average reported for the County.

There were 35 census blocks in the project area that exhibited a higher percentage of minority residents than Chittenden County as a whole. Only eleven of the 35 blocks reported a minority population greater than ten persons.

19.0 Sensitive Noise Receptors

19.1 Introduction

Noise is defined as unwanted sound. It is emitted from many sources including airplanes, factories, railroads, and motor vehicles. The magnitude of noise is described by its sound pressure. Since the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to a common reference called the decibel (dB) scale. Sound pressures described in decibels represent a logarithmic range of sound pressure levels.

Sound is composed of various frequencies, but the human ear does not respond to all frequencies. Frequencies to which the human ear does not respond must be filtered out when measuring highway noise levels. Sound level meters are usually equipped with weighting circuits which filter out selected frequencies. It has been found that the A-scale on a sound level meter best approximates the frequency response of the human ear. Sound pressure levels measured on the A-scale of a sound meter are abbreviated dBA.

Sound generation and propagation share several general relationships. First, decibels are logarithmic units. Consequently, sound levels cannot be added by ordinary arithmetic means. A doubling of energy at the noise source produces only a 3 dB increase in the sound pressure level. Studies have shown that this increase is barely detectable by the human ear. Secondly, an increase or decrease of 10 dB in the sound pressure level is perceived by an average observer to be a doubling or halving of the sound. For example, a sound at 70 dB will sound twice as loud as a sound at 60 dB. Finally, sound intensity decreases in proportion with the square of the distance from the source. Generally, sound levels for a point source will decrease by 6 dBA for each doubling of distance. Sound levels for a highway line source vary differently with distance, because sound pressure waves are propagated all along the line and overlap at the point of measurement. A long, closely spaced continuous line of vehicles along a roadway becomes a line source and produces a 3 dBA decrease in sound level for each doubling of distance. However, experimental evidence has shown that where sound from a highway propagates close to “soft” ground (e.g., plowed farmland, grass, crops, etc.), the most accurate drop-off rate to use is not 3 dBA but rather 4.5 dBA per distance doubling. This 4.5 dBA drop-off rate is usually used in traffic noise analyses.

Federal regulations contain noise abatement criteria (NAC) which represent the upper limit of acceptable highway traffic noise for different types of land uses and human activities. The regulations do not require that the abatement criteria be met in every instance. Rather, they require that every reasonable and feasible effort be made to provide noise mitigation when the criteria are approached or exceeded. The land uses considered in the NAC include residences, schools, hotels/motels, churches, libraries, hospitals and playgrounds/recreation areas.

19.2 Regulatory Framework

Noise impacts are considered by both federal and state legislation as discussed below.

Federal Aid Highway Act of 1970
This law mandates FHWA to develop noise standards for mitigating highway traffic noise. The law requires promulgation of traffic noise level criteria for various land use activities. The law further provides that FHWA not approve the plans and specifications for a federally aided highway project unless the project is expected to exceed noise criteria.

The FHWA regulations for mitigation of highway traffic noise in the planning and design of federally aided highways are contained in 23 CFR 772. The regulations require the following during the planning and design of a highway project: 1) identification of traffic noise impacts; 2) examination of potential mitigation measures; 3) the incorporation of reasonable and feasible noise mitigation measures into the highway project; and 4) coordination with local officials to provide helpful information on compatible land use planning and control.

VTrans Noise Analysis and Abatement Policy
This is the VTrans official statewide noise policy and mirrors the federal regulations above.

19.3 Methodology

Using a calibrated FHWA Traffic Noise Prediction Model (Version 2.5) and projected volumes, design speed and vehicle mix, the approximate location of the 67 dBA contour line was mapped for each alternative. All sensitive noise receptors located within this line were then identified and mapped.

19.4 Resource Description

Numerous sensitive noise receptors are located within the project area, as depicted on Map A11 and discussed below.

Brownell Road Corridor (Map B11)
Between I-89 and US 2, one religious institution is located within the corridor and two are adjacent to the corridor to the east). Located between US 2 and VT 2A there are two residential neighborhoods. No other sensitive noise receptors are located within this corridor.

VT 2A Corridor (Map C11)
Several residential neighborhoods are located within this corridor. One religious institution and one school are located between Mountain View Road and the Winooski River. A second religious institution is located adjacent to the corridor to the east in this segment. A school is located within the corridor north of the river, between the railroad and Jackson Street. Located in close proximity to the corridor's northern terminus are the Essex Junction firehouse and the Brownell Library. Located slightly farther away are a school and three religious institutions. All of these facilities are located in the village center of Essex Junction.

New Roadway Corridor (Maps D11a and D11b)
Within the New Roadway Corridor, there are one school, two churches and several residential neighborhoods

North Williston Road Corridor* (*Maps E11, E11a)
One religious institution is located within the corridor at its intersection with US 2. A firehouse, school, library and police station are located outside the corridor to the west, on US 2. Located between US 2 and Governor Chittenden Road are two residential neighborhoods and a golf course. Located to the west of the corridor, at Williston Woods Road, is another residential neighborhood. No other sensitive noise receptors are located within this corridor.

VT 117, Section 1 (Map F11)
Located in close proximity to the corridor's western terminus are a firehouse and a library. Located slightly farther away are a school and three religious institutions All of these facilities are located in the village center of Essex Junction. Moderately dense residential development is located here as well. Located farther east along the corridor are two religious institutions and a school, as well as isolated residential pockets. No other sensitive noise receptors are located within this corridor.

VT 117, Section 2
With the exception of isolated residential pockets and a residential community located near Rogers Lane, there are no sensitive noise receptors located within this corridor.

20.0 Air Quality

20.1 Introduction

The Clean Air Act is the comprehensive Federal law that regulates air emissions from stationary and mobile sources. In response to the Clean Air Act, the EPA established health-based National Ambient Air Quality Standards (NAAQS) for six air pollutants: particulate matter, ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. These pollutants are monitored throughout the U.S. to ensure compliance with the Clean Air Act. All but one of these pollutants (lead) are monitored by the Vermont State Department of Environmental Conservation, Air Pollution Control Division (APCD). Vermont is not required to measure the concentration of lead in ambient air. Chittenden County, as well as the entire state of Vermont, is currently an air quality attainment area for all six pollutants.

This section describes current air quality conditions and regulations in Chittenden County. References used in this section include Federal and State regulations and guidelines including NEPA, the Clean Air Act and Amendments (CAAA), the Vermont State Department of Environmental Conservation, Air Pollution Control Division's (APCD) Air Pollution Control Permit Application Requirements for Indirect Source and Air Quality Impact Evaluation Guidelines, as well as the VTrans Environmental Operations Manual.

20.2 Regulatory Framework

National Ambient Air Quality Standards for Criteria Pollutants
As required by the Clean Air Act, primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), sulfur dioxide (SO_2) and lead (Pb). Primary standards protect the public health, and represent levels at which there are no known

significant effects on human health. Secondary standards are designed to protect the environment from any known or anticipated adverse effects of a pollutant, account for air pollutant effects on soil, water, visibility, vegetation and other aspects of the environment, including the effects on the human environment, such as physical structures.

Standards for hydrocarbons have been rescinded because these pollutants are primarily of concern only in their role as ozone precursors. In addition to retaining PM_{10} standards, the U.S. EPA has adopted 24-hour and annual standards for $PM_{2.5}$, or particulate matter with an aerodynamic equivalent diameter less than 2.5 micrometers (µm). This latter standard became effective September 16, 1997. As recognized by EPA, the adoption of the $PM_{2.5}$ standard is intended to provide increased protection of public health from fossil fuel combustion. EPA has also established new NAAQS for ozone. The current one-hour standard will eventually be supplanted by a new eight-hour standard. Areas that do not meet the NAAQS for a particular pollutant are called "nonattainment areas" for this criteria pollutant; areas that meet both primary and secondary standards are known as "attainment areas". Areas determined to be in recent attainment are known as "maintenance areas". Table G-10 shows the standards for these pollutants. These NAAQS and Vermont Standards have been adopted as the ambient air quality standards by the State of Vermont.

Description of Criteria Air Pollutants

The criteria pollutants regulated by the NAAQS are of concern nationally, statewide and regionally, and are described in further detail below.

- Carbon monoxide (CO): This pollutant is a colorless and odorless gas that results from the incomplete combustion of gasoline and other fossil fuels. According to the EPA, approximately 80% of CO emissions in cities are from motor vehicles. As CO disperses quickly concentrations can vary greatly over relatively short distances. Elevated concentrations are usually limited to locations near crowded intersections and along heavily congested roadways.

- Nitrogen dioxide (NO_2): This pollutant is a reddish brown gas with a pungent odor, is highly corrosive and a strong oxidizing agent. It is produced from the reaction of atmospheric nitrogen and oxygen during high temperature combustion processes such as the burning of fuel and internal combustion from motor vehicles. It can cause inflammation of the lungs and bronchial tubes at high concentrations. The combined NO_2 also contributes to haze, reduces visibility and causes injury to plant issue.

- Ozone: This colorless gas is a major constituent of photochemical smog at the earth's surface. The precursors in the formation of ozone are volatile organic compounds (VOCs) and nitrogen oxides (NO_x). In the presence of sunlight, ozone is formed through a series of chemical reactions that take place in the atmosphere. Because the reactions occur as the pollutants are diffusing downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants.

- Particulate Matter (PM): Particulate matter is emitted from various sources including industrial facilities, power plants, construction activity and diesel-powered vehicles. These particulates are less than 10 or 2.5 micrometers (µm) in diameter. An impact analysis of a proposed action is usually required if the project is located within a PM non-attainment area.

- Sulfur dioxide emissions are primarily associated with the combustion of sulfur-containing fuels, oil and coal. No appreciable quantities of this pollutant are emitted from project-related actions.

- Lead emissions are primarily associated with motor vehicles and industrial sources that use gasoline containing lead additives. All vehicles produced in the United States after 1980 are designed to use unleaded fuel, and the ambient air concentrations have declined significantly. Therefore, the analyses of lead emissions are not required. In addition, Vermont is not required to monitor for ambient concentrations of lead.

Table G-10
National and Vermont State
Ambient Air Quality Standards

Pollutant	Primary	Secondary
Carbon Monoxide (CO)		
Maximum 1-hour Average[1]	35 ppm	35 ppm
Maximum 8-hour Average[1]	9 ppm	9 ppm
Sulfur Dioxide (SO_2)		
Maximum 3-hour Average[1]	n/a	1300 ug/m^3
Maximum 24-hour Average[1]	365 µg/m^3	n/a
Annual Arithmetic Mean	80 µg/m^3	n/a
Respirable Particulates (PM_{10})		
Maximum 24-hour[2]	150 µg/m^3	150 µg/m^3
Annual Geometric Mean	50 µg/m^3	50 µg/m^3
Respirable Particulates ($PM_{2.5}$)		
Maximum 24-hour[3]	65 µg/m^3	65 µg/m^3
Annual Geometric Mean	15 µg/m^3	15 µg/m^3
Total Suspended Particulate (TSP)[4]		
Maximum 24-hour	260 µg/m^3	150 µg/m^3
Annual Geometric Mean	75 µg/m^3	n/a
Ozone (O_3)		
1-hour Average	0.12 ppm	0.12 ppm
8-hour Average	0.08 ppm	0.08 ppm
Nitrogen Dioxide (NO_2)		
Annual Arithmetic Mean	100 µg/m^3	100 µg/m^3
Lead (Pb)		
Quarterly Average	1.5 µg/m^3	1.5 µg/m^3
Sulfates[4]		
Summer Seasonal	n/a	2.0 µg/m^3
24-Hour Average	n/a	2.0 µg/m^3

Notes:
1 Not to be exceeded more than once a year.
2 Not to be exceeded by 99th percentile of 24-hr PM10 concentrations in a year (averaged over 3 years)
3 Not to be exceeded by 99th percentile of 24-hr PM2.5 concentrations in a year (averaged over 3 years)
4 TSP and Sulfates standards are Vermont State standards only.

ppm: parts per million; µg/m^3 : micrograms per cubic meter
Annual standards never to be exceeded; short-term standards not to be exceeded more than once per year.
Source: Code of Federal Regulations Title 40, Part 50, July, 1991, Ambient Air Quality Standards.

Compliance Status
The State of Vermont has been designated by the EPA as being in attainment of NAAQS for all criteria pollutants. As noted above, Vermont is not required to monitor ambient concentrations for lead.

20.3 Methodology

Mobile source air pollution (pollution from non-stationary sources) in Vermont is regulated under the Clean Air Act and the Vermont Air Pollution Control Permit Application Requirements. A detailed air quality study is only required where a project is anticipated to result in substantial increases in traffic volumes or other sources of pollutant emissions. The criteria for determining whether a potential source may adversely impact air quality impact are defined in the Vermont Air Pollution Control Regulations, Section 5-503. These criteria include any new highway project with 20,000 or more vehicles per day (ADT, Average Daily Traffic) within ten years; any action which modifies highway operation with an increase of 10,000 ADT or more within ten years; new parking lots for 1,000 or more vehicles; and parking lot expansions of 500 or more vehicles. If project-related automobile activities do not exceed these criteria, then the project is considered unlikely to be a source of mobile air pollutants that will adversely impact air quality and further analysis is not required. If these criteria are exceeded, then a detailed analysis using Level of Service (LOS), percent of project induced traffic, dispersion modeling, and other parameters shall be conducted.

Monitored Existing Ambient Air Quality Levels
Existing ambient air quality levels in Chittenden County have been evaluated based on review of recorded ambient air quality data as monitored by the VANR Department of Environmental Conservation and Air Pollution Control Division. Representative monitored concentrations for the project area are shown in Table G-11 for the year 2004. The ambient air quality data presented is the worst-case concentration data monitored by the State in the nearest monitoring stations. With respect to available pollutant concentrations in 2004, the CO, ozone, $PM_{10,}$ $PM_{2.5}$, sulfur dioxide, and nitrogen dioxide concentrations were within the standards, and no monitored data exceeded the NAAQS.

Regional Meteorological Conditions
Regional meteorological conditions were reviewed based upon National Weather Service data. The prevailing wind direction in Chittenden County is southerly, with annual mean wind speeds of approximately nine miles per hour (mph). During the winter the average wind speed is ten mph with a peak gust velocity of 62 mph.

Ambient Hazardous Pollutants and Air Toxics
Air toxics are hazardous air pollutants listed in the CAAA that are known or suspected of causing cancer or other serious health effects. These pollutants, 188 in total, include toxic VOCs, solvents, metals, pesticides, and combustion by-products. Air toxics come from a variety of sources including automobiles and diesel trucks, stationary sources, and industrial releases.

Information from Vermont's air toxics monitoring program show that air toxics exist in some areas of the state at potentially unsafe levels. These air toxics either exceed Vermont's Hazardous Ambient Air Standard (HAAS) or are considered to be potentially harmful to the public. These air toxics include the following: acetaldehyde, formaldehyde, benzene, methylene chloride, 1,3-Butadiene, tetrachloroethylene, carbon tetrachloride, mercury, chloroform, and styrene.

The APCD has been monitoring ambient air toxics at several locations in the state since 1993. The nearest monitoring site to the project area is in Burlington (150 South Winooski Street at Main Street); this site is not within the project area, however, and represents an urban location. At this site, VOCs, carbonyls, metals, PM_{10}, and $PM_{2.5}$ are monitored. Based on the APCD Air Toxics Report (February 1998, Vermont Toxicological Advisory Committee), several VOCs and other compounds measured exceed the state HAAS, as summarized in Table G-12.

Based on EPA and State summaries, estimated percentages of air toxics emissions from various sources in Vermont are: 53% from mobile sources, 30% from area sources, and 17% from point sources. To control air toxics Vermont has implemented several reduction efforts to control emissions into the atmosphere. These efforts include:

- Incorporation of checks for the effective function of vehicle emission control systems, catalytic converters, fuel tank caps and on-board diagnostic system (OBD) within the annual Motor Vehicle Inspection and Maintenance program.

- Implementation of a gasoline vapor recovery program to capture gasoline vapor displaced from gas stations' underground storage tanks during fuel deliveries (Stage I), and from motorist's fuel tanks during refueling (Stage II). This is intended to prevent gasoline vapors from escaping into the air.

- Implementation of a low emission vehicle program that requires vehicles manufactured since 2000 and sold in Vermont to meet California emission standards, resulting in 50 to 70% less emission when compared to conventional vehicles. The Vermont Low Emission Vehicle (LEV) Program began on January 1, 1999 for year 2000 and subsequent model year vehicles. This program requires that new vehicles sold in Vermont meet the same emissions requirements as new vehicles sold in California.

- Development of a comprehensive air permitting program for manufacturing sources and utilities.

Table G-11
Representative Monitored Ambient Air Quality Data
(2004)

Pollutant		Vermont State 2004 Monitored Data		
		Monitored Station	**Period**	**1st/2nd Highest**
Carbon Monoxide (CO)		150 South Winooski Street, Burlington, Chittenden County	1-hour 8-hour	3.2 / 3.0 ppm 2.2 / 1.9 ppm
Particulates ($PM_{2.5}$)		150 South Winooski Street, Burlington, Chittenden County	24-hour Annual	41 / 37 µg/m3 10.1 µg/m3
Particulates (PM_{10})		150 South Winooski Street, Burlington, Chittenden County	24-hour Annual	42 / 39 µg/m^3 16.0 µg/m^3
Ozone (O_3)		Proctor Maple Research Farm Town of Underhill, Chittenden County	1-hour 8-hour	0.093 / 0.088 ppm 0.071 ppm (4^{th})
Nitrogen Dioxide (NO_2)		150 South Winooski Street, Burlington, Chittenden County	Annual Average	28 µg/m^3
Sulfur Dioxide (SO_2)		150 South Winooski Street, Burlington, Chittenden County	3-hour 24-hour Annual	39.0 / 36.4 µg/m^3 33.8 / 20.8 µg/m^3 7.8 µg/m^3

ppm = parts per million
µg/m^3 = micrograms per cubic meter
Source: Vermont State Ambient Air Monitoring Systems (2004) and USEPA, AirData Web Site, Monitor Value Report.

Table G-12
Air Toxics Compounds Exceeding Vermont Standards

Compound		Maximum Annual Average Measured at Burlington Site ($\mu g/m^3$)		Vermont HAAS ($\mu g/m^3$)
Benzene		4.05		0.12
Benzo-a-pyrene		0.00053		0.00030
1,3-Butadiene		0.950		0.035
Chloroform		0.220		0.043
Methyl Chloride		1.39		0.01
Tetrachloroethylene		0.62		0.41
1,2,4-Trimethyl Benzene		2.80		0.15

Note $\mu g/m^3$: micrograms per cubic meter
Source: Vermont APCD Air Toxics Report, February 1998, Vermont Toxicological Advisory Committee.