

CHAPTER 4 – IMPACTS AND MITIGATION

4.1 Introduction

This section of the Hazardous Materials Technical Report evaluates the potential presence of subsurface contamination, and the potential presence of hazardous materials in surface structures containing contaminated materials, that could be affected by the construction and operation of the project's build alternatives as well as the No Build Alternative. It also addresses the potential impacts on worker safety, public health, and the environment from potential contaminants/hazardous materials and identifies management practices that would be incorporated into the project to preclude significant adverse impacts during construction. This section does not discuss the relative merits of the project alternatives, rather it presents the conditions expected with development of any of the alternatives. This chapter presents relevant information regarding each alternative, beginning with the No Build Alternative, followed by the VT 2A Alternatives, the Circ A/B Alternatives and the Hybrid Alternatives.

4.1.1 Context and Key Issues

Typical highway projects can be expected to encounter contaminated materials during construction activities such as excavation and earthwork, dewatering and building demolition. Contaminated materials that could be encountered include petroleum products, metals, chemicals, and asbestos and lead-based paint in building materials, as outlined below.

Potential impacts from these activities can occur when construction workers, the public or the environment are exposed to hazardous materials. When it occurs, such exposure generally results from construction activities that establish new pathways for contaminant migration, or activities that expose contamination to existing pathways. Subsurface contaminants typically affect soil and groundwater, and activities that disrupt these media could open migration pathways. Additionally, contaminants in building materials could affect air quality if released to the atmosphere during building demolition. Isolation and treatment of contaminated groundwater, soils and building materials would prevent contaminant migration and would protect workers and the public from exposure to contaminants.

Contaminated materials that exist in buildings, soil, and/or groundwater can present health risks to workers, the public and the environment during construction and/or operation if not properly controlled, contained or otherwise managed. Contaminated materials present in properties to be acquired may cause liabilities to the new owner, unless properly understood. At a minimum, the time and funding needed to properly manage these materials must be understood so as not to compromise construction/operational schedules and budgets. Even if no contaminated materials are discovered in the pre-purchase and pre-construction activities, appropriate diligence must be exercised so that appropriate measures are enacted in the event that unanticipated hazardous materials are encountered.

4.1.2 Potential Contaminants

Subsurface Contaminants

The ground subsurface in the project area could contain contaminants associated with historical uses and prior releases. Certain contaminants, such as petroleum products, could have been released from surface spills or from leaking petroleum storage tanks. Other contaminants, such as volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, and polychlorinated biphenyls (PCBs) could have resulted from spills at former rail yards and other types of industrial or commercial facilities. Pesticides and herbicides could have been applied

to undeveloped properties or along railroad lines. Electrical substations have the potential to contaminate soil and/or groundwater, with releases of petroleum-containing PCBs.

When contaminants migrate to adjacent properties, it is typically via groundwater flow. Proximity to a construction area that will require subsurface disturbance is the primary factor when determining the potential for impacts from hazardous materials. The closer a known or suspected contaminated site is to a construction area, the greater is the potential for encountering the subsurface contamination. Contaminated sites located hydraulically upgradient to a construction site have a greater potential to cause impacts when disturbed than contaminated sites located downgradient, since groundwater may act as a conduit for the transport of subsurface contaminants. Characteristics of potential contaminants are discussed below.

Volatile Organic Compounds (VOCs)

VOCs include petroleum-associated compounds such as benzene, toluene, ethylbenzene, and xylenes (BTEX); methyl-tertiary-butyl-ether (MTBE); and chlorinated compounds such as tetrachloroethene and trichloroethene, which are found in solvents, degreasers, and cleaners. Methane, produced by the decomposition of organic matter from natural and anthropogenic sources, could also be present as a result of landfilling areas that were formerly inundated, or in municipal landfills. Methane, in itself, is not considered toxic; however, it can be potentially explosive when present in significant concentrations. When present with other VOCs, methane can pose a health and safety risk.

VOCs in soil gas have the potential to affect worker and public health and safety when inhaled. Exposure to VOC vapors can be as harmful as direct contact with, or ingestion of, VOC-contaminated soil or groundwater. Dry cleaning operations and properties with petroleum storage tanks are potential sources for VOC contamination.

Semi-Volatile Organic Compounds (SVOCs)

SVOCs can include naphthalene, anthracene, fluorene and pyrene, which are constituents of diesel fuel. The most commonly encountered SVOC compounds are polyaromatic hydrocarbons (PAHs), which are constituents of partially combusted coal, petroleum, and petroleum-based products such as asphalt. SVOCs are generally not readily soluble in water and therefore are not likely to migrate far from their source. In most instances, they do not pose a significant threat to human health unless there is direct contact (e.g., dermal contact).

Metals (including Arsenic, Barium, Cadmium, Chromium, Mercury, Nickel, Lead and Selenium)

Metals were used in foundries, smelters, and metalwork facilities, and can be found in paints, inks, petroleum product additives, and coal ash. Although many metals are naturally occurring, elevated (i.e., above regulatory action levels) metal concentrations are often found in areas primarily comprised of fill material. Metals generally do not migrate significantly in the subsurface environment and, therefore, would usually only be of concern on sites where the contaminant was generated.

Polychlorinated Biphenyls (PCBs)

Commonly present in dielectric fluid from transformers and feeder cables, PCBs are of concern at rail yards, train maintenance facilities, and electric transformer locations where leakage into soil could have occurred. Occasionally, PCB-containing waste oils were applied in rail yards to limit vegetation; these waste oils were also used on coal piles and dirt roads as a dust suppressant.

Pesticides and Herbicides

These compounds are used to control rodents, insects, and vegetation at undeveloped properties or along railroad tracks. Pesticides and herbicides are generally not widespread in subsurface urban soils and groundwater.

Above-Grade Contaminants (Building Materials)***Asbestos-Containing Materials (ACM)***

Building materials used in the construction of existing buildings could contain asbestos. Asbestos fibers are potentially harmful if they become airborne and are inhaled. The EPA prohibited the use of asbestos in spray-on fireproofing in 1972 and in thermal insulation in 1978. In addition, normally non-friable asbestos-containing products (i.e., those that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure) that are typically stable could be damaged during demolition activities, and would be considered friable ACM thereafter.

Lead-Based Paint (LBP)

Buildings and other structures constructed or re-painted prior to 1960 may contain LBP. It has been determined that dust from LBP may cause learning disabilities and other adverse health effects when inhaled or ingested. Although the use of LBP in residences was banned by the Consumer Products Safety Commission in 1978, the use of LBP was common prior to this ban.

PCB-Containing Equipment

PCBs are present in transformers, electrical feeder cables, hydraulic equipment, and fluorescent light ballasts that were manufactured prior to 1978. Disposal of such items must be in accordance with applicable federal and State regulations, so as to minimize human and environmental contact with PCBs. PCBs do not readily break down in the environment, and thus could remain in place for long periods of time. With regard to construction, PCBs can present risks to workers and public health and safety, through direct contact or ingestion of soil containing PCBs.

4.1.3 Summary of Environmental Protection Measures

Management measures have been developed to address managing hazardous materials that could be encountered through construction of projects in Vermont. Soil and debris classified as a hazardous waste is regulated by the provisions of the Vermont Hazardous Waste Management Regulations. VANR Waste Management Division (WMD) and the Vermont Agency of Human Services, Department of Health have published guidance documents related to addressing contamination encountered during construction of public works projects. Examples of such documents include *Guidance for Construction of Public Works Projects in Areas Where Contamination is Suspected or Known* (March, 2002), *Agency Guidelines for Petroleum Contaminated Soil and Debris*, (August 1996), Vermont Regulations for Lead Control (18 V.S.A. Chapter 38) and Vermont Regulations for Asbestos Control (18 V.S.A. Chapter 26).

In areas where construction activities related to the project alternatives would occur, and contaminated materials are known or suspected, subsurface and above-grade investigations would reveal the extent and concentrations of any contamination. Subsurface investigation would likely include soil borings, test pits and groundwater monitoring, and can be conducted during geotechnical investigations. Above-grade investigations would include Phase I Environmental Site Assessments and Phase II assessments, which would include sampling building materials and laboratory analyses. If contamination is confirmed, treatment, handling and disposal would be conducted according to local, state and federal regulations.

Contaminated Soil

Contaminated soil is often encountered at both active and inactive hazardous waste sites. A plan would be developed in order to deal with contaminated soils and would include work procedures, treatment and disposal locations. Methods to treat contaminated soils include polyencapsulation, soil vapor extraction, bioremediation, incineration, asphalt batching, bioventing and landfarming. The work plan would be developed by the contractor and approved by VTrans and WMD. Treatment, and disposal or reuse of any contaminated soil would be the responsibility of the contractor and would comply with local, state and federal regulations.

Contaminated Groundwater

Construction activities in areas with a locally high water table could require pumping water from the construction site in a process known as dewatering. If this water is contaminated it would be treated prior to disposal. Treatment methods may include activated carbon filtration, air stripping, fractionation (separating into constituents), or disposal to wastewater treatment plants (with appropriate permission and approval). A permit from WMD is required if treated water is to be discharged to a surface water body.

Worker Health and Safety

In order to protect the health and safety of construction workers, a site specific Health and Safety Plan (HASP) would be developed for the project construction. The HASP would be developed based on known and suspected conditions throughout the area of construction, and would be compliant with Occupational Safety and Health Administration (OSHA) "Hazardous Waste Operations and Emergency Response" (29CFR 19200.120). The HASP would cover hazards associated with documented and suspected contamination and would include provisions for:

- on-site monitoring
- soil and groundwater screening
- protective equipment for workers, and
- worker training requirements

Asbestos and Lead-Based Paint

The EPA established the National Emission Standards for Hazardous Air Pollutants (NESHAP) for asbestos to minimize the release of fibers during activities involving asbestos handling. The Asbestos NESHAP, 40 CFR Part 61, Subpart M, requires written notification of demolition or renovation operations under Section 61.145. The NESHAP Notification Form is to be used to notify the EPA of any renovation or demolition project at least ten days prior to the start of work.

In areas along VT 2A where buildings would be demolished, asbestos and lead-based paint could be encountered in building materials, and a plan would be developed pursuant to 18 V.S.A. Chapter 26 to protect workers and the public from exposure to asbestos, and 18 V.S.A. Chapter 38 to protect workers and the public from exposure to lead-based paint. Federal and Vermont law requires that prior to conducting demolition activities, the affected facility must be thoroughly inspected for the presence of asbestos-containing materials. Vermont Regulations for Asbestos Control require that only Vermont-certified asbestos consultants can conduct asbestos assessments in public and commercial buildings. Demolition materials must be disposed of according to VANR regulations. Notification to the USEPA as per CFR Part 61 prior to demolition activities will be performed.

Underground Petroleum and Chemical Storage Tanks

The VANR Department of Environmental Conservation (DEC) regulates petroleum and chemical underground storage tanks (USTs) that are 10 percent or more beneath the surface of the ground (10 V.S.A. Chapter 59). All USTs are required to be registered with the Agency

except for: (a) Tanks less than 1,100 gallons containing fuel oil (#2-#6) which is used for on-premises heating and domestic hot water, and (b) farm and residential tanks less than 1,100 gallons containing motor fuel which is used for noncommercial purposes. In addition, certain registered USTs are required to have permits for their operation and are subject to other operational standards. All USTs are subject to closure (removal) requirements upon being taken permanently out of service.

4.2 No Build Alternative

Under the No Build Alternative the proposed project would not occur. No impacts would occur as a result of increased public exposure to hazardous materials due to earthwork, building demolition and other construction activities associated with construction of the proposed project. VT 2A would remain in its current configuration and any impacts from hazardous materials due to operation of the highway would be consistent with current operational impacts and/or actions to control or remediate such impacts through regulatory oversight (e.g., occasional petroleum spills, migration of materials along highway drainage corridors and within underground utility corridors). It is possible, depending on the extent of the improvements, that projects included in the No Build could encounter contamination during construction. Such development would be subject to Vermont regulations regarding hazardous materials and therefore it is not expected that No Build project would generate impacts related to hazardous materials.

4.3 VT 2A Alternatives

4.3.1 Alternative 2 – Four-Lane VT 2A with Signalized Intersection Improvements

Soil and Groundwater Contamination

Soil and groundwater contaminants that could reasonably be expected to be encountered during development of Alternative 2 include chlorinated solvents, polycyclic aromatic hydrocarbons (PAHs), metals, petroleum products, pesticides and herbicides. Construction activities involving earth work (e.g., excavation, grading, etc.) could encounter petroleum contaminated soil and groundwater along VT 2A at the gasoline filling station and the State Police Barracks between I-89 and Marshall Avenue on the east side of the highway (“1” and “2” on Figure 3-1), southwest of the intersection of Wright Avenue (“5” on Figure 3-1), and petroleum and chemical contamination at Taft Corners (“3” and “4” on Figure 3-1). Farther north along the VT 2A corridor, petroleum contamination could be encountered along the east side of VT 2A approximately 800 feet north of Mountain View Road and south of Morgan Parkway (“16” and “17”, respectively, on Figure 3-3). Petroleum and chemical contamination could be encountered during construction along VT 2A in the vicinity of James Brown Drive and East View Drive (“19”, “20” and “22” on Figure 3-3), and development of a potential stormwater management area located between VT 2A and the Tire Kingdom store (“22” on Figure 3-3) could encounter petroleum and chemical contamination. Contamination associated with an electrical transmission facility could be encountered in the area south of the Winooski River (“M” on Figure 3-3).

North of the Winooski River, petroleum contamination could be encountered at the intersection of River Street and directly north of Iroquois Avenue (“24” and “25”, respectively, on Figure 3-4). The area along VT 2A north from Iroquois Avenue to Five Corners, and the area surrounding Five Corners, has been subjected to numerous historical and recent petroleum spills and has a history of industrial use. Contamination associated with these uses could be encountered during construction in this area. Additionally, contaminants associated with railroad uses (metals, pesticides, herbicides, PCBs, etc.) and contaminants associated with industrial uses (metals, VOCs, SVOCs, etc.) could be encountered in this area.

Asbestos and Lead-Based Paint

Any buildings that must be demolished in order to increase the width of VT 2A would be investigated for the presence of ACM and LBP. Widening the highway under Alternative 2 would require acquisition of properties along one or both sides of the current VT 2A right-of-way. There is the potential to encounter asbestos and LBP during demolition of structures at the intersection US 2 ("B" on Figure 3-1), the restaurant approximately 200 feet south of Zephyr Road, and buildings directly south of Knight Lane ("C" on Figure 3-2).

Underground Petroleum and Chemical Storage Tanks

Some residences and businesses along the VT 2A corridor use fuel oil for heating and hot water, with fuel oil stored in USTs and aboveground storage tanks (ASTs). Some USTs need not be permitted (e.g., residential heating fuel tanks with a capacity of less than 1,100 gallons) and, therefore, documented evidence of their existence may be unavailable. Visual and anecdotal evidence may be the only methods for determining the location of such USTs. As noted in Chapter 3 of this report, evidence of USTs was observed along the VT 2A corridor. Because older neighborhoods were developed closer to the highway than newer developments, the potential for encountering USTs is greatest in the older residential neighborhoods west of VT 2A both north and south of Industrial Avenue/Mountain View Road, and along the length of VT 2A in Essex Junction.

Vent pipes typically associated with USTs and aboveground storage tanks were observed during visual reconnaissance of the VT 2A corridor. Instances where construction activity could disturb properties where vent pipes or aboveground storage tanks were observed are located:

- approximately 200 feet north of O'Brien Court on the east side of VT 2A ("E" on Figure 3-2),
- an aboveground storage tank located directly north of Sharon Drive on the west side of VT 2A ("J" on Figure 3-3),
- at River Cove Drive on the east side of VT 2A ("K" on Figure 3-3),
- at First Quality Carpet opposite Morgan Parkway on the west side of VT 2A ("L" on Figure 3-3),
- opposite Mill Street on the west side of VT 2A ("O" on Figure 3-4), and
- on parcels directly southwest, northwest and southeast of the intersection of VT 2A and South Street/River Street ("P", "Q", and "R", respectively, on Figure 3-4).

Potential Acquisition Liability

Alternative 2 would require partial or full acquisition of properties along VT 2A. Because there is a potential for environmental liability associated with acquisition of contaminated properties, those properties proposed to be acquired with known or suspected contamination are identified below. In addition to the properties noted below, because of the suspected age of residential structures on either side of VT 2A in Essex Junction, any structures to be demolished in this area should be investigated for the presence of asbestos and LBP.

**Table 4-1
Potentially Contaminated Properties – Alternative 2**

Map ID	Parcel ID	Take (Partial / Full)	Potential Contaminant	Owner
[5]	0475908-103-013000	Partial	Petroleum	Imported Car Center, Inc.
[A]	0475913-103-029000	Partial	Asbestos, LBP	Taft Corners Associates
[3]	0475908-102-001000	Full	Hazardous Waste, Petroleum	Jolley Associates

**Table 4-1
Potentially Contaminated Properties – Alternative 2**

[4, 9, 10]	0475908-102-002000	Partial	Chlorinated Solvent, Petroleum	TCSC Development LLC
[12]	0475908-062-008000	Partial	Hazardous Waste	TBD
[C]	0475908-102-008000	Full	Asbestos, LBP	Judge Development Corp
[D]	0475908-102-015000	Partial	UST	Mcloughlin, Maureen
[E]	0475908-102-040000	Partial	UST	Reynolds, Katherine
[F]	0475908-102-058000	Partial	Asbestos, LBP	Audette, Raynard T
[G]	0475908-035-001000	Partial	UST	Tyner, Jon & Joan
[H]	0475903-038-002000	Partial	UST	Schoolcraft, Garry & Vera
[I]	0475903-102-048000	Partial	Asbestos, LBP	Skelton, Gregory
[J]	0475903-048-002000	Partial	AST	Gaskill, Paul R
[16]	0475903-102-092000	Partial	Petroleum	Christ Memorial Church
[K]	0475903-102-130000	Partial	UST	Barry, Bruce P
[L]	0475903-102-109000	Partial	AST	Farrell, Mark & Brian
[17]	0475903-046-001000	Partial	Petroleum	Church Of The Nazarene
[19]	0475903-102-111000	Full	Petroleum	CD Cairns Irrevocable Trusts
[20]	0475903-102-117000	Partial	Petroleum, Chloromethane, Naphthalene	Munson/Yandow Real Estate, LLC
[21]	0475903-102-150000	Partial	UST	Vermont Electric Power Company
[22]	0475903-102-125000	Partial	Hazardous Waste	Northern States Tire Inc
[M]	0475903-102-060000	Partial	Petroleum, PCBs	Poon S Lai As Agent For Corp To Be
[N], [38]	1000000002	Partial	Petroleum, PCBs, Hazardous Waste	TBD
[O]	1020203000	Partial	UST	TBD
[P]	1020162000	Partial	UST	TBD
[Q]	1021081000	Partial	UST	TBD
[R]	1021068000	Full	UST	TBD
[24]	1021069000	Partial	Petroleum	TBD
[25]	1028031000	Partial	Petroleum	TBD
[27], [S]	1029226000, 1029216000, 1029215000	Partial	Petroleum, PCBs, Metals, SVOCs	TBD
[T]	1028033000	Partial	Petroleum	TBD
[28], [U]	1029214000	Partial	Petroleum, VOCs	TBD
[33]	1029009000	Partial	Petroleum	TBD
[34]	1029047000	Full	Petroleum	TBD

4.3.2 Alternative 3 – Four-Lane VT 2A with Roundabouts

Soil and Groundwater Contamination

Soil and groundwater contaminants that could reasonably be expected to be encountered during development of Alternative 3 include chlorinated solvents, polycyclic aromatic hydrocarbons (PAHs), metals, petroleum products, pesticides and herbicides. Construction activities involving earth work (e.g., excavation, grading, etc.) could encounter petroleum contaminated soil and groundwater along VT 2A in the vicinity of the gasoline filling station and the State Police Barracks between I-89 and Marshall Avenue on the east side of the highway (“1” and “2” on Figure 3-1), southwest of the intersection of Wright Avenue (“5” on Figure 3-1), and petroleum and chemical contamination at Taft Corners (“3” and “4” on Figure 3-1). Farther north along the VT 2A corridor, petroleum contamination could be encountered along the east side of VT 2A approximately 800 feet north of Mountain View Road and south of Morgan Parkway (“16” and “17”, respectively, on Figure 3-3). Petroleum and chemical contamination

could be encountered during construction along VT 2A in the vicinity of James Brown Drive and East View Drive ("19", "20" and "22" on Figure 3-3), and contamination associated with an electrical transmission facility could be encountered in the area south of the Winooski River ("M" on Figure 3-3).

North of the Winooski River petroleum contamination could be encountered at the intersection of River Street and directly north of Iroquois Avenue ("24" and "25", respectively, on Figure 3-4). The area along VT 2A north from Iroquois Avenue to Five Corners, and the area surrounding Five Corners, has been subjected to numerous petroleum spills and has a history of industrial use. Contamination associated with these uses could be encountered during construction in this area. Additionally, contaminants associated with railroad uses (metals, pesticides, herbicides, PCBs, etc.) and contaminants associated with industrial uses (metals, VOCs, SVOCs, etc.) could be encountered in this area.

Asbestos and Lead-Based Paint

Any buildings that must be demolished in order to increase the width of VT 2A would be investigated for the presence of ACM and LBP. Widening the highway under Alternative 3 would require acquisition of properties along one or both sides of the current VT 2A right-of-way. There is the potential to encounter asbestos and LBP during demolition of structures at the intersection US 2 ("B" on Figure 3-1), the restaurant approximately 200 feet south of Zephyr Road, and buildings directly south of Knight Lane ("C" on Figure 3-2), north of Beaudry Lane ("F" on Figure 3-2), and at the intersection of Mountain View Road ("I" on Figure 3-3).

Construction of the roundabout at the intersection of VT 2A and River Street/South Street would involve demolition of several buildings bordering the intersection. The age of buildings in this area suggest that building materials in these structures could contain asbestos and/or LBP. Several buildings along the east side of VT 2A between River Street/South Street and Five Corners may need to be demolished and the age of these buildings suggest the potential to encounter asbestos and LBP in these buildings. Buildings that could be partially or fully demolished in order to construct the roundabout at five corners, including buildings at the southeast corner of VT 2A and VT 117 and those between VT 117 and VT 15 near Five Corners could contain asbestos and LBP.

Underground Petroleum and Chemical Storage Tanks

Some residences and businesses along the VT 2A corridor use fuel oil for heating and hot water, with fuel oil stored in USTs and ASTs. Some USTs need not be permitted (e.g., residential heating fuel tanks with a capacity of less than 1,100 gallons) and therefore documented evidence of their existence may be unavailable. Visual and anecdotal evidence may be the only methods for determining the location of such USTs. As noted in Chapter 3 of this report, evidence of USTs was observed along the VT 2A corridor. Because older neighborhoods were developed closer to the highway than newer developments, the potential for encountering USTs is greatest in the older residential neighborhoods west of VT 2A both north and south of Industrial Avenue/Mountain View Road, and along the length of VT 2A in Essex Junction.

Vent pipes typically associated with USTs, and above-ground storage tanks were observed during visual reconnaissance of the VT 2A corridor. Instances where construction activity could disturb properties where vent pipes or above-ground storage tanks were observed are located:

- approximately 200 feet north of O'Brien Court on the east side of VT 2A ("E" on Figure 3-2),
- directly north of Hickory Hill Road and west of VT 2A ("H" on Figure 3-2),

- an above-ground storage tank located directly north of Sharon Drive on the west side of VT 2A (“J” on Figure 3-3),
- at River Cove Drive on the east side of VT 2A (“K” on Figure 3-3),
- at First Quality Carpet opposite Morgan Parkway on the west side of VT 2A (“L” on Figure 3-3),
- opposite Mill Street on the west side of VT 2A (“O” on Figure 3-4), and
- on parcels directly southwest, northwest and southeast of the intersection of VT 2A and South Street/River Street (“P”, “Q”, and “R”, respectively, on Figure 3-4).

Potential Acquisition Liability

Alternative 3 would require partial or full acquisition of properties along VT 2A. Because there is a potential for environmental liability associated with acquisition of contaminated properties, those properties proposed to be acquired with known or suspected contamination are identified below. In addition to the properties noted below, because of the suspected age of residential structures on either side of VT 2A in Essex Junction, any structures to be demolished in this area should be investigated for the presence of asbestos and LBP.

Table 4-2
Potentially Contaminated Properties – Alternative 3

Map ID	Parcel ID	Take (Partial / Full)	Potential Contaminant	Owner
[5]	0475908-103-013000	Partial	Petroleum	Imported Car Center, Inc.
[A]	0475913-103-029000	Partial	Asbestos, LBP	Taft Corners Associates
[B]	0475908-105-001000	Partial	Asbestos, LBP	Winter Development Corporation
[3]	0475908-102-001000	Partial	Hazardous Waste, Petroleum	Jolley Associates
[4, 9, 10]	0475908-102-002000	Partial	Chlorinated Solvent, Petroleum	TCSC Development LLC
[12]	0475908-062-008000	Partial	Hazardous Waste	TBD
[C]	0475908-102-008000	Partial	Asbestos, LBP	Judge Development Corp
[D]	0475908-102-015000	Partial	UST	Mcloughlin, Maureen
[E]	0475908-102-040000	Partial	UST	Reynolds, Katherine
[F]	0475908-102-058000	Partial	Asbestos, LBP	Audette, Raynard T
[G]	0475908-035-001000	Partial	UST	Tyner, Jon & Joan
[H]	0475903-038-002000	Partial	UST	Schoolcraft, Garry & Vera
[I]	0475903-102-048000	Partial	Asbestos, LBP	Skelton, Gregory
[J]	0475903-048-002000	Partial	AST	Gaskill, Paul R
[16]	0475903-102-092000	Partial	Petroleum	Christ Memorial Church
[K]	0475903-102-130000	Partial	UST	Barry, Bruce P
[L]	0475903-102-109000	Partial	AST	Farrell, Mark & Brian
[17]	0475903-046-001000	Partial	Petroleum	Church Of The Nazarene
[19]	0475903-102-111000	Full	Petroleum	CD Cairns Irrevocable Trusts
[20]	0475903-102-117000	Partial	Petroleum, Chloromethane, Naphthalene	Munson/Yandow Real Estate, LLC
[21]	0475903-102-150000	Partial	UST	Vermont Electric Power Company
[22]	0475903-102-125000	Partial	Hazardous Waste	Northern States Tire Inc
[M]	0475903-102-060000	Partial	Petroleum, PCBs	Poon S Lai As Agent For Corp To Be
[N], [38]	1000000002	Partial	Petroleum, PCBs, Hazardous Waste	TBD
[O]	1020203000, and 1021077000	Partial	UST	TBD
[P]	1020162000, and 1021074000	Partial	UST	TBD

**Table 4-2
Potentially Contaminated Properties – Alternative 3**

[Q]	1021081000	Partial	UST	TBD
[R]	1021068000	Full	UST	TBD
[24]	1021069000	Full	Petroleum	TBD
[25]	1028031000	Partial	Petroleum	TBD
[26]	1029213000	Full	Petroleum	TBD
[27], [S]	1029226000, 1029216000 1029215000, 1028032000	Partial	Petroleum, PCBs, Metals, SVOCs	TBD
[T]	1028033000	Partial	Petroleum	TBD
[28], [U]	1029214000	Partial	Petroleum, VOCs	TBD
[33]	1029009000	Partial	Petroleum	TBD
[34]	1029047000	Full	Petroleum	TBD

4.3.3 Alternative 22 – Tapered Widening on VT 2A with Signalized and Roundabout Intersections

Soil and Groundwater Contamination

Soil and groundwater contaminants that could reasonably be expected to be encountered during development of Alternative 22 include chlorinated solvents, polycyclic aromatic hydrocarbons (PAHs), metals, petroleum products, pesticides and herbicides. Construction activities involving earth work (e.g., excavation, grading, etc.) could encounter soil and groundwater petroleum contamination along VT 2A at the gasoline filling station and the State Police Barracks between I-89 and Marshall Avenue on the east side of the highway (“1” and “2” on Figure 3-1), southwest of the intersection of Wright Avenue (“5” on Figure 3-1), and petroleum and chemical contamination at Taft Corners (“3” and “4” on Figure 3-1). Farther north along the VT 2A corridor, petroleum contamination could be encountered along the east side of VT 2A approximately 800 feet north of Mountain View Road and south of Morgan Parkway (“16” and “17”, respectively, on Figure 3-3). Petroleum and chemical contamination could be encountered during construction along VT 2A in the vicinity of James Brown Drive and East View Drive (“19”, “20” and “22” on Figure 3-3), and contamination associated with an electrical transmission facility could be encountered in the area south of the Winooski River (“M” on Figure 3-3).

The area along VT 2A north from Iroquois Avenue to Five Corners, and the area surrounding Five Corners, has been subjected to numerous petroleum spills and has a history of industrial use. Contamination associated with these uses could be encountered during construction in this area. Additionally, contaminants associated with railroad uses (metals, pesticides, herbicides, PCBs, etc.) and contaminants associated with industrial uses (metals, VOCs, SVOCs, etc.) could be encountered in this area.

Asbestos and Lead-Based Paint

Any buildings that must be demolished in order to increase the width of VT 2A would be investigated for the presence of ACM and LBP. Widening the highway under Alternative 22 would require acquisition of properties along one or both sides of the current VT 2A right-of-way. There is the potential to encounter asbestos and LBP during demolition of structures at the intersection US 2 (“B” on Figure 3-1), the restaurant approximately 200 feet south of Zephyr Road, and buildings directly south of Knight Lane (“C” on Figure 3-2), and at the intersection of Mountain View Road (“I” on Figure 3-2). Buildings that could be partially or fully demolished in order to construct the roundabout at Five Corners, including buildings at the southeast corner of VT 2A and VT 117 and those between VT 117 and VT 15 near Five Corners could contain asbestos and LBP.

Underground Petroleum and Chemical Storage Tanks

Some residences and businesses along the VT 2A corridor use fuel oil for heating and hot water, with fuel oil stored in USTs and ASTs. Some USTs need not be permitted (e.g., residential heating fuel tanks with a capacity of less than 1,100 gallons) and therefore documented evidence of their existence may be unavailable. Visual and anecdotal evidence may be the only methods for determining the location of such USTs. As noted in Chapter 3 of this report, evidence of USTs was observed along the VT 2A corridor. Because older neighborhoods were developed closer to the highway than newer developments, the potential for encountering USTs is greatest in the older residential neighborhoods west of VT 2A both north and south of Industrial Avenue/Mountain View Road, and along the length of VT 2A in Essex Junction.

Vent pipes typically associated with USTs, and above-ground storage tanks were observed during visual reconnaissance of the VT 2A corridor. Instances where construction activity could disturb properties where vent pipes or above-ground storage tanks were observed are located:

- approximately 200 feet north of O'Brien Court on the east side of VT 2A ("E" on Figure 3-2),
- directly north of Hickory Hill Road and west of VT 2A ("H" on Figure 3-2),
- an above-ground storage tank located directly north of Sharon Drive on the west side of VT 2A ("J" on Figure 3-3),
- at River Cove Drive on the east side of VT 2A ("K" on Figure 3-3),
- at First Quality Carpet opposite Morgan Parkway on the west side of VT 2A ("L" on Figure 3-3),
- opposite Mill Street on the west side of VT 2A ("O" on Figure 3-4), and
- on parcels directly southwest, northwest and southeast of the intersection of VT 2A and South Street/River Street ("P", "Q", and "R", respectively, on Figure 3-4).

Potential Acquisition Liability

Alternative 22 would require partial or full acquisition of properties along VT 2A. Because there is a potential for environmental liability associated with acquisition of contaminated properties, those properties proposed to be acquired with known or suspected contamination are identified below. In addition to the properties noted below, because of the suspected age of residential structures on either side of VT 2A in Essex Junction, any structures to be demolished in this area should be investigated for the presence of asbestos and LBP.

Table 4-3
Potentially Contaminated Properties – Alternative 22

Map ID	Parcel ID	Take (Partial / Full)	Potential Contaminant	Owner
[5]	0475908-103-013000	Partial	Petroleum	Imported Car Center, Inc.
[A]	0475913-103-029000	Partial	Asbestos, LBP	Taft Corners Associates
[B]	0475908-105-001000	Partial	Asbestos, LBP	Winter Development Corporation
[2]	0475913-103-020000	Partial	Petroleum	State of Vermont
[3]	0475908-102-001000	Partial	Hazardous Waste, Petroleum	Jolley Associates
[4, 9, 10]	0475908-102-002000	Partial	Chlorinated Solvent, Petroleum	TCSC Development LLC
[12]	0475908-062-008000	Partial	Hazardous Waste	TBD
[C]	0475908-102-008000	Full	Asbestos, LBP	Judge Development Corp
[E]	0475908-102-040000	Partial	UST	Reynolds, Katherine
[F]	0475908-102-058000	Partial	Asbestos, LBP	Audette, Raynard T
[H]	0475903-038-002000	Partial	UST	Schoolcraft, Garry & Vera

**Table 4-3
Potentially Contaminated Properties – Alternative 22**

[J]	0475903-102-048000	Partial	Asbestos, LBP	Skelton, Gregory
[16]	0475903-102-092000	Partial	Petroleum	Christ Memorial Church
[K]	0475903-102-130000	Partial	UST	Barry, Bruce P
[L]	0475903-102-109000	Partial	AST	Farrell, Mark & Brian
[17]	0475903-046-001000	Partial	Petroleum	Church Of The Nazarene
[19]	0475903-102-111000	Full	Petroleum	CD Cairns Irrevocable Trusts
[22]	0475903-102-125000	Partial	Hazardous Waste	Northern States Tire Inc
[M]	0475903-102-060000	Partial	Petroleum, PCBs	Poon S Lai As Agent For Corp To Be
[25]	1028031000	Partial	Petroleum	TBD
[33]	1029009000	Partial	Petroleum	TBD
[34]	1029047000	Full	Petroleum	TBD

4.4 Circ A/B Alternatives

4.4.1 Alternative 16(a,b,c) – Circ A/B Limited Access Highway with VT 2A Spot Improvements

Alternative 16 would consist of highway construction through all segments of the Circ A/B corridor, as discussed in Chapter 3 of this document. Contaminants that could be encountered during construction of this alternative include petroleum, metals and other hazardous materials in soils and groundwater.

Two documented instances of contamination were identified where US 2 intersects the proposed Circ A/B alignment. One is a former SHWS located approximately 1,400 feet east of the Circ A/B alignment (“2” on Figure 3-5). The second instance involves a SHWS within the Circ A/B right-of-way north of and adjacent to US 2 (“1” on Figure 3-5).

An apparently long-abandoned passenger vehicle was observed during a March, 2006 site visit (“A” on Figure 3-6). Due to the apparent length of time that the vehicle has been at this location (age of trees surrounding the vehicle, and the deteriorated condition of the vehicle) it is unlikely that contamination from the vehicle remain in concentrations above DEC action levels.

The Chittenden Solid Waste District waste transfer facility, the former Williston Landfill and several other environmental concerns were identified in the northern portion of the Circ A/B alignment. As such, there is potential to encounter hazardous materials during construction in this area (see Figure 3-8). Documented groundwater constituents from monitoring wells in the area of the landfill include arsenic, manganese, nickel, mtbw, benzene, methylene chloride, vinyl chloride, tetrachloroethene and cadmium. Additionally, there is a potential to encounter petroleum in soils and groundwater in the area of the landfill due to instances of leaking petroleum storage tanks.

4.4.2 Alternative 17 – Circ A/B Boulevard with VT 2A Spot Improvements

Alternative 17 would consist of highway construction through all segments of the Circ A/B corridor, as discussed in Chapter 1 of this document. Contaminants that could be encountered during construction of this alternative include petroleum, metals and other hazardous materials in soils and groundwater.

Two documented instances of contamination were identified where US 2 intersects the proposed Circ A/B alignment. One is a former SHWS located approximately 1,400 feet east of

the Circ A/B alignment (“2” on Figure 3-5). The second instance involves a SHWS within the Circ A/B right-of-way north of and adjacent to US 2 (“1” on Figure 3-5).

An apparently long-abandoned passenger vehicle was observed during a March, 2006 site visit (“A” on Figure 3-6). Due to the apparent length of time that the vehicle has been at this location (age of trees surrounding the vehicle, and the deteriorated condition of the vehicle) it is unlikely that contamination from the vehicle remain in concentrations above DEC action levels.

The Chittenden Solid Waste District waste transfer facility, the former Williston Landfill and several other environmental concerns were identified in the northern portion of the Circ A/B alignment. As such there is potential to encounter hazardous materials during construction in this area (see Figure 3-8). Documented groundwater constituents from monitoring wells in the area of the landfill include arsenic, manganese, nickel, mtbw, benzene, methylene chloride, vinyl chloride, tetrachloroethene and cadmium. Additionally, there is a potential to encounter petroleum in soils and groundwater in the area of the landfill due to instances of leaking petroleum storage tanks.

4.5 Hybrid Alternatives

4.5.1 Alternative 18 – Four-Lane VT 2A with Signalized Intersection Improvements Plus Circ Street

Soil and Groundwater Contamination – VT 2A Component

Soil and groundwater contaminants that could reasonably be expected to be encountered during development of Alternative 18 include chlorinated solvents, polycyclic aromatic hydrocarbons (PAHs), metals, petroleum products, pesticides and herbicides. Construction activities involving earth work (e.g., excavation, grading, etc.) could encounter soil and groundwater petroleum contamination along VT 2A at the gasoline filling station and the State Police Barracks between I-89 and Marshall Avenue on the east side of the highway (“1” and “2” on Figure 3-1), southwest of the intersection of Wright Avenue (“5” on Figure 3-1), and petroleum and chemical contamination at Taft Corners (“3” and “4” on Figure 3-1). Farther north along the VT 2A corridor, petroleum contamination could be encountered along the east side of VT 2A approximately 800 feet north of Mountain View Road and south of Morgan Parkway (“16” and “17”, respectively, on Figure 3-3). Petroleum and chemical contamination could be encountered during construction along VT 2A in the vicinity of James Brown Drive and East View Drive (“19”, “20” and “22” on Figure 3-3), and development of a potential stormwater management area located between VT 2A and the Tire Kingdom store (“22” on Figure 3-3) could encounter petroleum and chemical contamination. Contamination associated with an electrical transmission facility could be encountered in the area south of the Winooski River (“M” on Figure 3-3).

North of the Winooski River petroleum contamination could be encountered at the intersection of River Street and directly north of Iroquois Avenue (“24” and “25”, respectively, on Figure 3-4). The area along VT 2A north from Iroquois Avenue to Five Corners, and the area surrounding Five Corners, has been subjected to numerous historical and recent petroleum spills and has a history of industrial use. Contamination associated with these uses could be encountered in this area. Additionally, contaminants associated with railroad uses (metals, pesticides, herbicides, PCBs, etc.) and contaminants associated with industrial uses (metals, VOCs, SVOCs, etc.) could be encountered in this area.

Asbestos and Lead-Based Paint – VT 2A Component

Any buildings that must be demolished in order to increase the width of VT 2A would be investigated for the presence of ACM and LBP. Widening the highway under Alternative 18 would require acquisition of properties along one or both sides of the current VT 2A right-of-way. There is the potential to encounter asbestos and LBP during demolition of structures at the intersection US 2 (“B” on Figure 3-1), the restaurant approximately 200 feet south of Zephyr Road, and buildings directly south of Knight Lane (“C” on Figure 3-2).

Underground Petroleum and Chemical Storage Tanks – VT 2A Component

Some residences and businesses along the VT 2A corridor use fuel oil for heating and hot water, with fuel oil stored in USTs and ASTs. Some USTs need not be permitted (e.g., residential heating fuel tanks with a capacity of less than 1,100 gallons) and therefore documented evidence of their existence may be unavailable. Visual and anecdotal evidence may be the only methods for determining the location of such USTs. As noted in Chapter 3 of this report, evidence of USTs was observed along the VT 2A corridor. Because older neighborhoods were developed closer to the highway than newer developments, the potential for encountering USTs is greatest in the older residential neighborhoods west of VT 2A both north and south of Industrial Avenue/Mountain View Road, and along the length of VT 2A in Essex Junction.

Vent pipes typically associated with USTs, and above-ground storage tanks were observed during visual reconnaissance of the VT 2A corridor. Instances where construction activity could disturb properties where vent pipes or above-ground storage tanks were observed are located:

- approximately 200 feet north of O’Brien Court on the east side of VT 2A (“E” on Figure 3-2),
- an above-ground storage tank located directly north of Sharon Drive on the west side of VT 2A (“J” on Figure 3-3),
- at River Cove Drive on the east side of VT 2A (“K” on Figure 3-3),
- at First Quality Carpet opposite Morgan Parkway on the west side of VT 2A (“L” on Figure 3-3),
- opposite Mill Street on the west side of VT 2A (“O” on Figure 3-4), and
- on parcels directly southwest, northwest and southeast of the intersection of VT 2A and South Street/River Street (“P”, “Q”, and “R”, respectively, on Figure 3-4).

Potential Acquisition Liability – VT 2A Component

Alternative 18 would require partial or full acquisition of properties along VT 2A. Because there is a potential for environmental liability associated with acquisition of contaminated properties, those properties proposed to be acquired with known or suspected contamination are identified below. In addition to the properties noted below, because of the suspected age of residential structures on either side of VT 2A in Essex Junction, any structures to be demolished in this area should be investigated for the presence of asbestos and LBP.

**Table 4-4
Potentially Contaminated Properties – Alternative 18**

Map ID	Parcel ID	Take (Partial / Full)	Potential Contaminant	Owner
[5]	0475908-103-013000	Partial	Petroleum	Imported Car Center, Inc.
[A]	0475913-103-029000	Partial	Asbestos, LBP	Taft Corners Associates
[3]	0475908-102-001000	Full	Hazardous Waste, Petroleum	Jolley Associates
[4, 9, 10]	0475908-102-002000	Partial	Chlorinated Solvent, Petroleum	TCSC Development LLC
[12]	0475908-062-008000	Partial	Hazardous Waste	TBD

**Table 4-4
Potentially Contaminated Properties – Alternative 18**

[C]	0475908-102-008000	Full	Asbestos, LBP	Judge Development Corp
[D]	0475908-102-015000	Partial	UST	Mcloughlin, Maureen
[E]	0475908-102-040000	Partial	UST	Reynolds, Katherine
[F]	0475908-102-058000	Partial	Asbestos, LBP	Audette, Raynard T
[G]	0475908-035-001000	Partial	UST	Tyner, Jon & Joan
[H]	0475903-038-002000	Partial	UST	Schoolcraft, Garry & Vera
[I]	0475903-102-048000	Partial	Asbestos, LBP	Skelton, Gregory
[J]	0475903-048-002000	Partial	AST	Gaskill, Paul R
[16]	0475903-102-092000	Partial	Petroleum	Christ Memorial Church
[K]	0475903-102-130000	Partial	UST	Barry, Bruce P
[L]	0475903-102-109000	Partial	AST	Farrell, Mark & Brian
[17]	0475903-046-001000	Partial	Petroleum	Church Of The Nazarene
[19]	0475903-102-111000	Full	Petroleum	CD Cairns Irrevocable Trusts
[20]	0475903-102-117000	Partial	Petroleum, Chloromethane, Naphthalene	Munson/Yandow Real Estate, LLC
[21]	0475903-102-150000	Partial	UST	Vermont Electric Power Company
[22]	0475903-102-125000	Partial	Hazardous Waste	Northern States Tire Inc
[M]	0475903-102-060000	Partial	Petroleum, PCBs	Poon S Lai As Agent For Corp To Be
[N], [38]	1000000002	Partial	Petroleum, PCBs, Hazardous Waste	TBD
[O]	1020203000	Partial	UST	TBD
[P]	1020162000	Partial	UST	TBD
[Q]	1021081000	Partial	UST	TBD
[R]	1021068000	Full	UST	TBD
[24]	1021069000	Partial	Petroleum	TBD
[25]	1028031000	Partial	Petroleum	TBD
[27], [S]	1029226000, 1029216000 1029215000	Partial	Petroleum, PCBs, Metals, SVOCs	TBD
[T]	1028033000	Partial	Petroleum	TBD
[28], [U]	1029214000	Partial	Petroleum, VOCs	TBD
[33]	1029009000	Partial	Petroleum	TBD
[34]	1029047000	Full	Petroleum	TBD

Soil and Groundwater Contamination – Circ Street Component

Two documented instances of contamination were identified where US 2 intersects the proposed Circ Street alignment. One is a former SHWS located approximately 1,400 feet east of the Circ Street alignment (“2” on Figure 3-5). The second instance involves a SHWS within the Circ Street right-of-way north of and adjacent to US 2 (“1” on Figure 3-5).

An apparently long-abandoned passenger vehicle was observed during a March, 2006 site visit (“A” on Figure 3-6). Due to the apparent length of time that the vehicle has been at this location (age of trees surrounding the vehicle, and the deteriorated condition of the vehicle) it is unlikely that contamination from the vehicle remain in concentrations above DEC action levels.

4.5.2 Alternative 19 – Four-Lane VT 2A with Roundabouts Plus Circ Street

Soil and Groundwater Contamination – VT 2A Component

Soil and groundwater contaminants that could reasonably be expected to be encountered during development of Alternative 19 include chlorinated solvents, polycyclic aromatic hydrocarbons (PAHs), metals, petroleum products, pesticides and herbicides. Construction activities involving earth work (e.g., excavation, grading, etc.) could encounter soil and groundwater petroleum contamination along VT 2A in the vicinity of the gasoline filling station and the State Police Barracks between I-89 and Marshall Avenue on the east side of the highway (“1” and “2” on Figure 3-1), southwest of the intersection of Wright Avenue (“5” on Figure 3-1), and petroleum and chemical contamination at Taft Corners (“3” and “4” on Figure 3-1). Farther north along the VT 2A corridor, petroleum contamination could be encountered along the east side of VT 2A approximately 800 feet north of Mountain View Road and south of Morgan Parkway (“16” and “17”, respectively, on Figure 3-3). Petroleum and chemical contamination could be encountered during construction along VT 2A in the vicinity of James Brown Drive and East View Drive (“19”, “20” and “22” on Figure 3-3), and contamination associated with an electrical transmission facility could be encountered in the area south of the Winooski River (“M” on Figure 3-3).

North of the Winooski River petroleum contamination could be encountered at the intersection of River Street and directly north of Iroquois Avenue (“24” and “25”, respectively, on Figure 3-4). The area along VT 2A north from Iroquois Avenue to Five Corners, and the area surrounding Five Corners, has been subjected to numerous petroleum spills and has a history of industrial use. Contamination associated with these uses could be encountered during construction in this area. Additionally, contaminants associated with railroad uses (metals, pesticides, herbicides, PCBs, etc.) and contaminants associated with industrial uses (metals, VOCs, SVOCs, etc.) could be encountered in this area.

Asbestos and Lead-Based Paint – VT 2A Component

Any buildings that must be demolished in order to increase the width of VT 2A would be investigated for the presence of ACM and LBP. Widening the highway under Alternative 19 would require acquisition of properties along one or both sides of the current VT 2A right-of-way. There is the potential to encounter asbestos and LBP during demolition of structures at the intersection US 2 (“B” on Figure 3-1), the restaurant approximately 200 feet south of Zephyr Road, and buildings directly south of Knight Lane (“C” on Figure 3-2), north of Beaudry Lane (“F” on Figure 3-2), and at the intersection of Mountain View Road (“I” on Figure 3-3).

Construction of the roundabout at the intersection of VT 2A and River Street/South Street would involve demolition of several buildings bordering the intersection. The age of buildings in this area suggest that building materials in these structures could contain asbestos and/or LBP. Several buildings along the east side of VT 2A between River Street/South Street and Five Corners may need to be demolished, and the age of these buildings suggest the potential to encounter asbestos and LBP in these buildings.

Underground Petroleum and Chemical Storage Tanks – VT 2A Component

Some residences and businesses along the VT 2A corridor use fuel oil for heating and hot water, with fuel oil stored in USTs and ASTs. Some USTs need not be permitted (e.g., residential heating fuel tanks with a capacity of less than 1,100 gallons) and therefore documented evidence of their existence may be unavailable. Visual and anecdotal evidence may be the only methods for determining the location of such USTs. As noted in Chapter 3 of this report, evidence of USTs was observed along the VT 2A corridor. Because older neighborhoods were developed closer to the highway than newer developments the potential for encountering USTs is greatest in the older residential neighborhoods west of VT 2A north and

south of Industrial Avenue/Mountain View Road, and along the length of VT 2A in Essex Junction.

Vent pipes typically associated with USTs, and above-ground storage tanks were observed during visual reconnaissance of the VT 2A corridor. Instances where construction activity could disturb properties where vent pipes or aboveground storage tanks were observed are located:

- approximately 200 feet north of O'Brien Court on the east side of VT 2A ("E" on Figure 3-2),
- directly north of Hickory Hill Road and west of VT 2A ("H" on Figure 3-2),
- an aboveground storage tank located directly north of Sharon Drive on the west side of VT 2A ("J" on Figure 3-3),
- at River Cove Drive on the east side of VT 2A ("K" on Figure 3-3),
- at First Quality Carpet opposite Morgan Parkway on the west side of VT 2A ("L" on Figure 3-3),
- opposite Mill Street on the west side of VT 2A ("O" on Figure 3-4), and
- on parcels directly southwest, northwest and southeast of the intersection of VT 2A and South Street/River Street ("P", "Q", and "R", respectively, on Figure 3-4).

Potential Acquisition Liability – VT 2A Component

Alternative 19 would require partial or full acquisition of properties along VT 2A. Because there is a potential for environmental liability associated with acquisition of contaminated properties, those properties proposed to be acquired with known or suspected contamination are identified below. In addition to the properties noted below, because of the suspected age of residential structures on either side of VT 2A in Essex Junction, any structures to be demolished in this area should be investigated for the presence of asbestos and LBP.

**Table 4-5
Potentially Contaminated Properties – Alternative 19**

Map ID	Parcel ID	Take (Partial / Full)	Potential Contaminant	Owner
[5]	0475908-103-013000	Partial	Petroleum	Imported Car Center, Inc.
[A]	0475913-103-029000	Partial	Asbestos, LBP	Taft Corners Associates
[B]	0475908-105-001000	Partial	Asbestos, LBP	Winter Development Corporation
[3]	0475908-102-001000	Partial	Hazardous Waste, Petroleum	Jolley Associates
[4, 9, 10]	0475908-102-002000	Partial	Chlorinated Solvent, Petroleum	TCSC Development LLC
[12]	0475908-062-008000	Partial	Hazardous Waste	TBD
[C]	0475908-102-008000	Partial	Asbestos, LBP	Judge Development Corp
[D]	0475908-102-015000	Partial	UST	Mcloughlin, Maureen
[E]	0475908-102-040000	Partial	UST	Reynolds, Katherine
[F]	0475908-102-058000	Partial	Asbestos, LBP	Audette, Raynard T
[G]	0475908-035-001000	Partial	UST	Tyner, Jon & Joan
[H]	0475903-038-002000	Partial	UST	Schoolcraft, Garry & Vera
[I]	0475903-102-048000	Partial	Asbestos, LBP	Skelton, Gregory
[J]	0475903-048-002000	Partial	AST	Gaskill, Paul R
[16]	0475903-102-092000	Partial	Petroleum	Christ Memorial Church
[K]	0475903-102-130000	Partial	UST	Barry, Bruce P
[L]	0475903-102-109000	Partial	AST	Farrell, Mark & Brian
[17]	0475903-046-001000	Partial	Petroleum	Church Of The Nazarene
[19]	0475903-102-111000	Full	Petroleum	CD Cairns Irrevocable Trusts
[20]	0475903-102-117000	Partial	Petroleum, Chloromethane,	Munson/Yandow Real

**Table 4-5
Potentially Contaminated Properties – Alternative 19**

			Naphthalene	Estate, LLC
[21]	0475903-102-150000	Partial	UST	Vermont Electric Power Company
[22]	0475903-102-125000	Partial	Hazardous Waste	Northern States Tire Inc
[M]	0475903-102-060000	Partial	Petroleum, PCBs	Poon S Lai As Agent For Corp To Be
[N], [38]	1000000002	Partial	Petroleum, PCBs, Hazardous Waste	TBD
[O]	1020203000, and 1021077000	Partial	UST	TBD
[P]	1020162000, and 1021074000	Partial	UST	TBD
[Q]	1021081000	Partial	UST	TBD
[R]	1021068000	Full	UST	TBD
[24]	1021069000	Full	Petroleum	TBD
[25]	1028031000	Partial	Petroleum	TBD
[26]	1029213000	Full	Petroleum	TBD
[27], [S]	1029226000, 1029216000 1029215000, 1028032000	Partial	Petroleum, PCBs, Metals, SVOCs	TBD
[T]	1028033000	Partial	Petroleum	TBD
[28], [U]	1029214000	Partial	Petroleum, VOCs	TBD
[33]	1029009000	Partial	Petroleum	TBD
[34]	1029047000	Full	Petroleum	TBD

Soil and Groundwater Contamination – Circ Street Component

Two documented instances of contamination were identified where US 2 intersects the proposed Circ Street alignment. One is a former SHWS located approximately 1,400 feet east of the alignment (“2” on Figure 3-5). The second instance involves a SHWS within the Circ Street right-of-way north of and adjacent to US 2 (“1” on Figure 3-5).

An apparently long-abandoned passenger vehicle was observed during a March, 2006 site visit (“A” on Figure 3-6). Due to the apparent length of time that the vehicle has been at this location (age of trees surrounding the vehicle, and the deteriorated condition of the vehicle) it is unlikely that contamination from the vehicle remain in concentrations above DEC action levels.

4.5.3 Alternative 23 – Tapered Widening on VT 2A with Signalized and Roundabout Intersections Plus Circ Street

Soil and Groundwater Contamination – VT 2A Component

Soil and groundwater contaminants that could reasonably be expected to be encountered during development of Alternative 23 include chlorinated solvents, polycyclic aromatic hydrocarbons (PAHs), metals, petroleum products, pesticides and herbicides. Construction activities involving earth work (e.g., excavation, grading, etc.) could encounter soil and groundwater petroleum contamination along VT 2A at the gasoline filling station and the State Police Barracks between I-89 and Marshall Avenue on the east side of the highway (“1” and “2” on Figure 3-1), southwest of the intersection of Wright Avenue (“5” on Figure 3-1), and petroleum and chemical contamination at Taft Corners (“3” and “4” on Figure 3-1). Farther north along the VT 2A corridor, petroleum contamination could be encountered along the east side of VT 2A approximately 800 feet north of Mountain View Road and south of Morgan Parkway (“16” and “17”, respectively, on Figure 3-3). Petroleum and chemical contamination could be encountered during construction along VT 2A in the vicinity of James Brown Drive and East View Drive (“19”, “20” and “22” on Figure 3-3), and contamination associated with an

electrical transmission facility could be encountered in the area south of the Winooski River (“M” on Figure 3-3).

The area along VT 2A north from Iroquois Avenue to Five Corners, and the area surrounding Five Corners, has been subjected to numerous petroleum spills and has a history of industrial use. Contamination associated with these uses could be encountered during construction in this area. Additionally, contaminants associated with railroad uses (metals, pesticides, herbicides, PCBs, etc.) and contaminants associated with industrial uses (metals, VOCs, SVOCs, etc.) could be encountered in this area.

Asbestos and Lead-Based Paint – VT 2A Component

Any buildings that must be demolished in order to increase the width of VT 2A would be investigated for the presence of asbestos containing materials and LBP. Widening the highway under Alternative 23 would require acquisition of properties along one or both sides of the current VT 2A right-of-way, throughout its entire length. There is the potential to encounter asbestos and LBP during demolition of structures at the intersection US 2 (“B” on Figure 3-1), the restaurant approximately 200 feet south of Zephyr Road, and buildings directly south of Knight Lane (“C” on Figure 3-2), and at the intersection of Mountain View Road (“I” on Figure 3-2). Buildings that could be partially or fully demolished in order to construct the roundabout at Five Corners, including buildings at the southeast corner of VT 2A and VT 117 and those between VT 117 and VT 15 near Five Corners, could contain asbestos and LBP.

Underground Petroleum and Chemical Storage Tanks – VT 2A Component

Some residences and businesses along the VT 2A corridor use fuel oil for heating and hot water, with fuel oil stored in USTs and ASTs. Some USTs need not be permitted (e.g., residential heating fuel tanks with a capacity of less than 1,100 gallons) and therefore documented evidence of their existence may be unavailable. Visual and anecdotal evidence may be the only methods for determining the location of such USTs. As noted in Chapter 3 of this report, evidence of USTs was observed along the VT 2A corridor. Because older neighborhoods were developed closer to the highway than newer developments, the potential for encountering USTs is greatest in the older residential neighborhoods west of VT 2A north and south of Industrial Avenue/Mountain View Road, and along the length of VT 2A in Essex Junction.

Vent pipes typically associated with USTs, and above-ground storage tanks were observed during visual reconnaissance of the VT 2A corridor. Instances where construction activity could disturb properties where vent pipes or above-ground storage tanks were observed are located:

- approximately 200 feet north of O’Brien Court on the east side of VT 2A (“E” on Figure 3-2),
- directly north of Hickory Hill Road and west of VT 2A (“H” on Figure 3-2),
- an above-ground storage tank located directly north of Sharon Drive on the west side of VT 2A (“J” on Figure 3-3),
- at River Cove Drive on the east side of VT 2A (“K” on Figure 3-3),
- at First Quality Carpet opposite Morgan Parkway on the west side of VT 2A (“L” on Figure 3-3),
- opposite Mill Street on the west side of VT 2A (“O” on Figure 3-4), and
- on parcels directly southwest, northwest and southeast of the intersection of VT 2A and South Street/River Street (“P”, “Q”, and “R”, respectively, on Figure 3-4).

Potential Acquisition Liability – VT 2A Component

Alternative 23 would require partial or full acquisition of properties along VT 2A. Because there is a potential for environmental liability associated with acquisition of contaminated properties,

those properties proposed to be acquired with known or suspected contamination are identified below. In addition to the properties noted below, because of the suspected age of residential structures on either side of VT 2A in Essex Junction, any structures to be demolished in this area should be investigated for the presence of asbestos and LBP.

**Table 4-6
Potentially Contaminated Properties – Alternative 23**

Map ID	Parcel ID	Take (Partial / Full)	Potential Contaminant	Owner
[5]	0475908-103-013000	Partial	Petroleum	Imported Car Center, Inc.
[A]	0475913-103-029000	Partial	Asbestos, LBP	Taft Corners Associates
[B]	0475908-105-001000	Partial	Asbestos, LBP	Winter Development Corporation
[2]	0475913-103-020000	Partial	Petroleum	State of Vermont
[3]	0475908-102-001000	Partial	Hazardous Waste, Petroleum	Jolley Associates
[4, 9, 10]	0475908-102-002000	Partial	Chlorinated Solvent, Petroleum	TCSC Development LLC
[12]	0475908-062-008000	Partial	Hazardous Waste	TBD
[C]	0475908-102-008000	Full	Asbestos, LBP	Judge Development Corp
[E]	0475908-102-040000	Partial	UST	Reynolds, Katherine
[F]	0475908-102-058000	Partial	Asbestos, LBP	Audette, Raynard T
[H]	0475903-038-002000	Partial	UST	Schoolcraft, Garry & Vera
[I]	0475903-102-048000	Partial	Asbestos, LBP	Skelton, Gregory
[16]	0475903-102-092000	Partial	Petroleum	Christ Memorial Church
[K]	0475903-102-130000	Partial	UST	Barry, Bruce P
[L]	0475903-102-109000	Partial	AST	Farrell, Mark & Brian
[17]	0475903-046-001000	Partial	Petroleum	Church Of The Nazarene
[19]	0475903-102-111000	Full	Petroleum	CD Cairns Irrevocable Trusts
[22]	0475903-102-125000	Partial	Hazardous Waste	Northern States Tire Inc
[M]	0475903-102-060000	Partial	Petroleum, PCBs	Poon S Lai As Agent For Corp To Be
[25]	1028031000	Partial	Petroleum	TBD
[33]	1029009000	Partial	Petroleum	TBD
[34]	1029047000	Full	Petroleum	TBD

Soil and Groundwater Contamination – Circ Street Component

Two documented instances of contamination were identified where US 2 intersects the proposed Circ Street alignment. One is a former SHWS located approximately 1,400 feet east of the Circ A/B alignment (“2” on Figure 3-5). The second instance involves a SHWS within the Circ A/B right-of-way north of and adjacent to US 2 (“1” on Figure 3-5).

An apparently long-abandoned passenger vehicle was observed during a March, 2006 site visit (“A” on Figure 3-6). Due to the apparent length of time that the vehicle has been at this location (age of trees surrounding the vehicle, and the deteriorated condition of the vehicle) it is unlikely that contamination from the vehicle remain in concentrations above DEC action levels.

4.6 Summary of Impacts and Mitigation

4.6.1 VT 2A Alternatives

Alternative 2 – Four-Lane VT 2A with Signalized Intersection Improvements

Assessments have been conducted to evaluate the potential presence of hazardous materials along the VT 2A corridor. This broad screening identified potentially contaminated sites where

hazardous materials within soil, groundwater and building materials may be encountered during construction of the proposed project. The screening has demonstrated that portions of the VT 2A corridor have been developed since the mid-1800s and possibly earlier, and that construction activities would likely encounter hazardous materials. Parcels along the corridor with documented or suspected contamination are distributed throughout the corridor, with higher concentrations of such parcels located between the Winooski River and Five Corners. In areas along the corridor where contamination is known or suspected, investigation and sampling/testing would be conducted to obtain sufficient information to characterize the type and extent of contamination. Subsurface investigation would likely include soil borings, test pits and groundwater monitoring. Above-grade investigations would include Phase I Environmental Site Assessments and Phase II assessments, which would include sampling and laboratory analyses of building materials. If contamination is confirmed, contamination management measures outlined in Section 4.1.3 of this report would be incorporated into the project's construction practices and would prevent contamination from affecting the health of workers, the public and the surrounding environment.

Alternative 3 – Four-Lane VT 2A with Roundabouts

Assessments have been conducted to evaluate the potential presence of hazardous materials along the VT 2A corridor. This broad screening identified potentially contaminated sites where hazardous materials within soil, groundwater and building materials may be encountered during construction of the proposed project. The screening has demonstrated that portions of the VT 2A corridor have been developed since the mid-1800s and possibly earlier, and that construction activities would likely encounter hazardous materials. Parcels along the corridor with documented or suspected contamination are distributed throughout the corridor, with higher concentrations of such parcels located between the Winooski River and Five Corners. In areas along the corridor where contamination is known or suspected, investigation and sampling/testing would be conducted to obtain sufficient information to characterize the type and extent of contamination. Subsurface investigation would likely include soil borings, test pits and groundwater monitoring. Above-grade investigations would include Phase I Environmental Site Assessments and Phase II assessments, which would include sampling and laboratory analyses of building materials. If contamination is confirmed, contamination management measures outlined in Section 4.1.3 of this report would be incorporated into the project's construction practices and would prevent contamination from affecting the health of workers, the public and the surrounding environment.

Alternative 22 – Tapered Widening on VT 2A with Signalized and Roundabout Intersections

Assessments have been conducted to evaluate the potential presence of hazardous materials along the VT 2A corridor. This broad screening identified potentially contaminated sites where hazardous materials within soil, groundwater and building materials may be encountered during construction of the proposed project. The screening has demonstrated that portions of the VT 2A corridor have been developed since the mid-1800s and possibly earlier, and that construction activities would likely encounter hazardous materials. Parcels along the corridor with documented or suspected contamination are distributed throughout the corridor, with higher concentrations of such parcels located between the Winooski River and Five Corners. Under Alternative 22, little earthwork would be required along VT 2A between the Winooski River and south of Five Corners and thus no contamination would be encountered in this area. At Five Corners, construction activities would likely encounter contamination. In areas along the corridor where construction activities would occur and contamination is known or suspected, investigation and sampling/testing would be conducted to obtain sufficient information to characterize the type and extent of contamination. Subsurface investigation would likely include soil borings, test pits and groundwater monitoring. Above-grade investigations would include Phase I Environmental Site Assessments and Phase II assessments, which would include

sampling and laboratory analyses of building materials. If contamination is confirmed, contamination management measures outlined in Section 4.1.3 of this report would be incorporated into the project's construction practices and would prevent contamination from affecting the health of workers, the public and the surrounding environment.

4.6.2 Circ A/B Alternatives

Alternative 16(a,b,c) – Circ A/B Limited Access Highway with VT 2A Spot Improvements

Assessments have been conducted to evaluate the potential presence of hazardous materials along the Circ A/B corridor. This broad screening identified potentially contaminated sites where hazardous materials within soil, groundwater and building materials may be encountered during construction of the proposed project. The screening has demonstrated that construction activities would likely encounter hazardous materials where the corridor crosses US 2 at the south end of the corridor, at the Chittenden Solid Waste District facility at the north end of the corridor, and possibly along VT 2A where additional turning lanes are proposed. Further investigation and sampling/testing should be conducted in these areas to obtain sufficient information to characterize the type and extent of contamination. Subsurface investigation would likely include soil borings, test pits and groundwater monitoring. Above-grade investigations would include Phase I Environmental Site Assessments and Phase II assessments, which would include sampling and laboratory analyses of building materials. If contamination in these areas is confirmed, contamination management measures outlined in Section 4.1.3 of this report would be incorporated into the project's construction practices and would prevent contamination from affecting the health of workers, the public and the surrounding environment.

Alternative 17 – Circ A/B Boulevard with VT 2A Spot Improvements

Assessments have been conducted to evaluate the potential presence of hazardous materials along the Circ A/B corridor. This broad screening identified potentially contaminated sites where hazardous materials within soil, groundwater and building materials may be encountered during construction of the proposed project. The screening has demonstrated that construction activities would likely encounter hazardous materials where the corridor crosses US 2 at the south end of the corridor, at the Chittenden Solid Waste District facility at the north end of the corridor, and possibly along VT 2A where additional turning lanes are proposed. Further investigation and sampling/testing should be conducted in these areas to obtain sufficient information to characterize the type and extent of contamination. Subsurface investigation would likely include soil borings, test pits and groundwater monitoring. Above-grade investigations would include Phase I Environmental Site Assessments and Phase II assessments, which would include sampling and laboratory analyses of building materials. If contamination in these areas is confirmed, contamination management measures outlined in Section 4.1.3 of this report would be incorporated into the project's construction practices and would prevent contamination from affecting the health of workers, the public and the surrounding environment.

4.6.3 Hybrid Alternatives (VT 2A Improvements plus Circ Street)

Alternative 18 – Four-Lane VT 2A with Signalized Intersection Improvements Plus Circ Street

Assessments have been conducted to evaluate the potential presence of hazardous materials along the VT 2A, and Circ A corridors. This broad screening identified potentially contaminated sites where hazardous materials within soil, groundwater and building materials may be encountered during construction of the proposed project. The screening has demonstrated that portions of the VT 2A corridor have been developed since the mid-1800s and possibly earlier, and that construction activities along this corridor would likely encounter hazardous materials. Parcels along the corridor with documented or suspected contamination are distributed throughout the corridor, with higher concentrations of such parcels located between the

Winooski River and Five Corners. Hazardous materials would also likely be encountered where the Circ A corridor crosses US 2 at the south end of the corridor. Further investigation and sampling/testing should be conducted in these areas to obtain sufficient information to characterize the type and extent of contamination. Subsurface investigation would likely include soil borings, test pits and groundwater monitoring. Above-grade investigations would include Phase I Environmental Site Assessments and Phase II assessments, which would include sampling and laboratory analyses of building materials. If contamination in these areas is confirmed, contamination management measures outlined in Section 4.1.3 of this report would be incorporated into the project's construction practices and would prevent contamination from affecting the health of workers, the public and the surrounding environment.

Alternative 19 – Four-Lane VT 2A with Roundabouts Plus Circ Street

Assessments have been conducted to evaluate the potential presence of hazardous materials along the VT 2A, and Circ A corridors. This broad screening identified potentially contaminated sites where hazardous materials within soil, groundwater and building materials may be encountered during construction of the proposed project. The screening has demonstrated that portions of the VT 2A corridor have been developed since the mid-1800s and possibly earlier, and that construction activities along this corridor would likely encounter hazardous materials. Parcels along the corridor with documented or suspected contamination are distributed throughout the corridor, with higher concentrations of such parcels located between the Winooski River and Five Corners. Hazardous materials would also likely be encountered where the Circ A corridor crosses US 2 at the south end of the corridor. Further investigation and sampling/testing should be conducted in these areas to obtain sufficient information to characterize the type and extent of contamination. Subsurface investigation would likely include soil borings, test pits and groundwater monitoring. Above-grade investigations would include Phase I Environmental Site Assessments and Phase II assessments, which would include sampling and laboratory analyses of building materials. If contamination in these areas is confirmed, contamination management measures outlined in Section 4.1.3 of this report would be incorporated into the project's construction practices and would prevent contamination from affecting the health of workers, the public and the surrounding environment.

Alternative 23 – Tapered Widening on VT 2A with Signalized and Roundabout Intersections Plus Circ Street

Assessments have been conducted to evaluate the potential presence of hazardous materials along the VT 2A, and Circ A corridors. This broad screening identified potentially contaminated sites where hazardous materials within soil, groundwater and building materials may be encountered during construction of the proposed project. The screening has demonstrated that portions of the VT 2A corridor have been developed since the mid-1800s and possibly earlier, and that construction activities along this corridor would likely encounter hazardous materials. Parcels along the corridor with documented or suspected contamination are distributed throughout the corridor, with higher concentrations of such parcels located between the Winooski River and Five Corners. Under Alternative 23, little earthwork would be required along VT 2A between the Winooski River and south of Five Corners and thus no contamination would be encountered in this area. At Five Corners, construction activities would likely encounter contamination. Hazardous materials would also likely be encountered where the Circ A corridor crosses US 2 at the south end of the corridor. Further investigation and sampling/testing should be conducted in these areas to obtain sufficient information to characterize the type and extent of contamination. Subsurface investigation would likely include soil borings, test pits and groundwater monitoring. Above-grade investigations would include Phase I Environmental Site Assessments and Phase II assessments, which would include sampling and laboratory analyses of building materials. If contamination in these areas is confirmed, contamination management measures outlined in Section 4.1.3 of this report would be incorporated into the

project's construction practices and would prevent contamination from affecting the health of workers, the public and the surrounding environment.