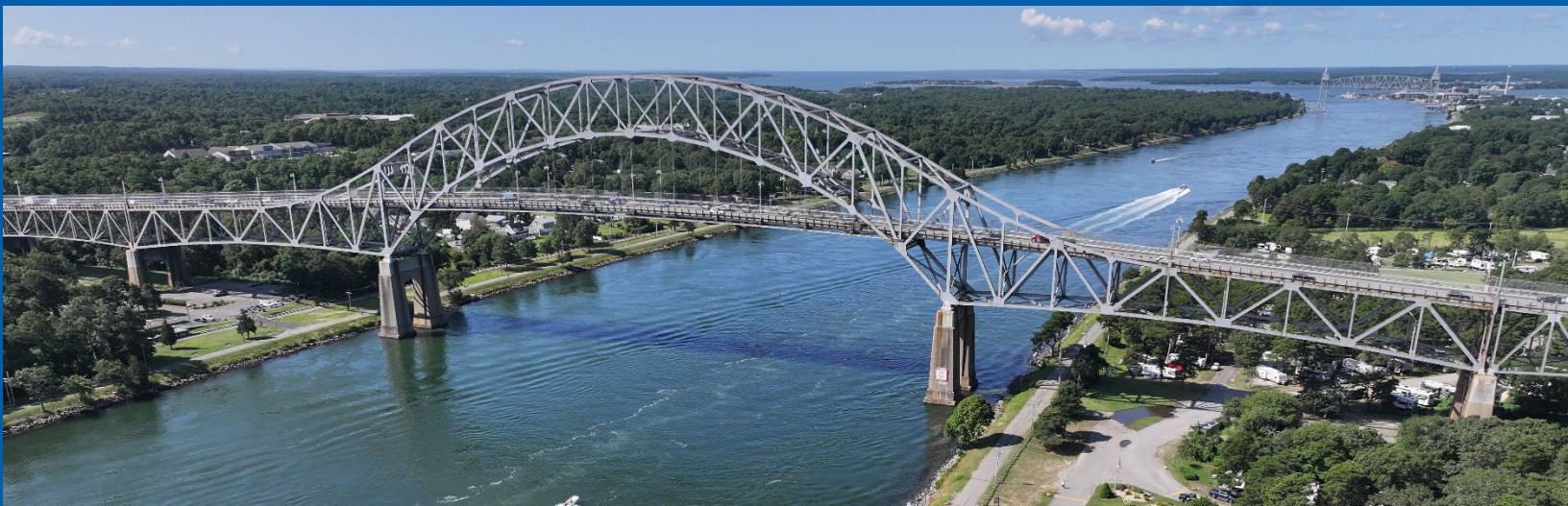




Cape Cod Bridges Program

Bourne, Massachusetts

Appendix 4.18

Solid and Hazardous Waste Material Management Technical Report

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AUL	Activity and Use Limitations
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
EDR	Environmental Data Resources
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MCP	Massachusetts Contingency Plan
NPL	National Priorities List
OHM	oil and/or hazardous material
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
Program	Cape Cod Bridges Program
RCRA	Resource Conservation and Recovery Act
RTN	Release Tracking Number
SVOC	semi-volatile organic compounds
USC	United States Code
UST	underground storage tank
VOC	volatile organic compounds
VSQG	Very Small Quantity Generator

1 Introduction

This Solid and Hazardous Waste Material Management Technical Report has been prepared in support of the [Final](#) Environmental Impact Statement for the Cape Cod Bridges Program (Program), in accordance with the following regulations and guidance:

- National Environmental Policy Act of 1969, as amended, 42 United States Code (USC) 4321 et seq.
- Efficient Environmental Reviews for Project Decision making and One Federal Decision, 23 USC 139
- Federal Highway Administration's regulations implementing the National Environmental Policy Act, *Environmental Impact and Related Procedures* (23 Code of Federal Regulations [CFR 771]), and corresponding guidance, Technical Advisory (T 6640.8A): *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (October 30, 1987)

2 Summary of Findings

Massachusetts Department of Transportation (MassDOT) performed [a](#) due-diligence review to identify potential sources of solid and hazardous waste materials that may be encountered within the construction limits of the Build Alternative for the Program in the town of Bourne, Barnstable County, Massachusetts. The Study Areas for this impact assessment include the construction limits of disturbance at the Sagamore and Bourne Bridges, including a buffered distance of up to one-quarter mile around the disturbance limits at each bridge crossing. [Since filing of the Draft Environmental Impact Statement, refinements have been made to the Project Limits. Additional evaluations were completed to verify that the 0.25-mile buffer reflects the updated Project Limits and to identify any new oil and/or hazardous material \(OHM\) considerations. The refined Project Limits extend into areas outside the original Study Area; however, no OHM concerns were identified in these locations. Further details regarding the areas outside of the original Study Area are provided in Section 6.1.2.1.](#)

A review of state and federal databases identified potential sources of contamination within and/or near the Study Areas from a variety of sources:

- Historical land use activities, including railroad usage, gasoline service stations, manufacturing facilities, and the Massachusetts Military Reservation/Joint Base Cape Cod, that likely released OHMs into the environment. Historical industrial, commercial and railway uses contribute to residual impacts to soil and groundwater, including metals, coal and ash-containing lead and arsenic, railroad ties treated with creosote and other chemicals, spilled or leaked petroleum products, and other OHM. In addition, historical fill materials placed within the bridges' approaches likely contain contaminants.
- There is one active and one inactive landfill within the Bourne South Quadrant. Historical landfilling did not have well-defined boundaries, so there is the potential to find buried trash material just beyond the main landfill limits from poor management practices. In addition, historical landfills

were not lined at the bottom, presenting an opportunity for contamination to leach into the groundwater.

- Storage of OHM in underground storage tanks (UST) occurs at all gasoline service stations and at many large commercial and municipal properties. Several USTs were found within and near the Study Areas, which present potential sources of contamination that could affect soil and/or groundwater from an unknown or unreported release.
- Based on the anticipated right-of-way takings and with respect to the bridge structures themselves, there is a need to perform a hazardous materials building survey to determine if lead-based paint, asbestos-containing materials, polychlorinated biphenyl (PCB) containing materials, mercury-containing equipment, and/or other hazardous building materials are present. If hazardous building materials are confirmed, proper abatement in accordance with all state and federal regulations must occur before demolition. Demolition materials that test negative for OHM would be considered solid waste.
- Numerous sites within each Study Area have documented release of contamination to the environment. These sites typically involve current and historical gasoline stations where releases of petroleum products to soil and/or groundwater have occurred. The known releases have, or are currently undergoing, assessment or remediation consistent with the requirements of the Massachusetts Contingency Plan (MCP). The Massachusetts Department of Environmental Protection (MassDEP) has requirements for the handling and management of soil, soil reuse, or off-site disposal at approved receiving facilities for sites regulated under the MCP. To the extent that dewatering is planned within regulated areas, proper management, treatment, and/or disposal of pumped groundwater will be necessary.
- As reported in the U.S. Army Corps of Engineers Major Rehabilitation Evaluation Report/Environmental Assessment for the Cape Cod Canal Highway Bridges, the existing paint system on Sagamore and Bourne Bridges still contains lead paint.¹
- One release site within the Sagamore Bridge Study Area was closed with an Activity and Use Limitation (AUL) deed restriction.

3 Regulatory Framework

Solid and hazardous waste management in Massachusetts is regulated under the federal Resource Conservation and Recovery Act (RCRA) [42 USC Section 6901 et seq] and through state regulations codified as 310 Code of Massachusetts Regulations (CMR) 19.00 for solid waste and 310 CMR 30.00 for hazardous waste. The cleanup and assessment of hazardous waste sites is regulated under the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, commonly referred to as “Superfund”) [42 USC Section 9601 et seq.] and Massachusetts General Law Chapter 21E (MGL 21E), which is implemented by MassDEP through the MCP [310 CMR 40.0000]. The management

¹ U.S. Army Corps of Engineers. March 2020. Cape Cod Canal Highway Bridges Major Rehabilitation Evaluation Report/Environmental Assessment.

of dredged sediment in Massachusetts is regulated by Section 401 of the Clean Water Act and implemented through 314 CMR 9.00: 401 Water Quality Certification Regulations.

The term “solid waste” includes both hazardous and non-hazardous wastes and is defined as any garbage, refuse, sludge for a wastewater treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities.² Hazardous wastes are a type of solid waste that requires additional regulation because they are dangerous or known to be harmful to human health and/or the environment. Solid waste anticipated for the Program includes construction debris and excavated soils and sediment. The term “hazardous materials” is a broader term collectively used to describe the following:

- Hazardous wastes (as defined by RCRA).
- Hazardous substances (as defined by CERCLA [Section 101[14]] and listed at 40 CFR 302 to include listed hazardous wastes or unlisted solid wastes that exhibit specific characteristics such as ignitability, corrosivity, reactivity, or toxicity characteristic).
- Asbestos (referring to the naturally occurring fibrous minerals used in many commercial and industrial applications, also defined under 40 CFR 302 as a hazardous substance).
- Petroleum products (materials derived from crude oil, such as fuel oil and gasoline).
- Any item or chemical that, when being transported or moved in commerce, is a risk to public safety of the environment and is regulated as such under the United States Pipeline and Hazardous Materials Safety Administration Regulations.
- Any substance or chemical that is a “health hazard” or “physical hazard” as defined by the Occupational Safety and Health Administration (OSHA).

Other regulations and guidance documents that provided framework for this analysis include the following:

- 310 CMR 7.15, MassDEP Asbestos Regulations
- 40 CFR 312, Standards and Practices for All Appropriate Inquiries under CERCLA
- American Society for Testing and Materials E1527-21, “Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process,” November 2021
- MassDEP, Similar Soils Provision Guidance (WSC#-13-500)
- OSHA Standard 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response
- 29 CFR 1926.62, OSHA Lead Standard for the Construction Industry
- St. 1998 c.206 – Brownfields Act
- MassDEP, Construction of Buildings in Contaminated Areas (Policy WSC#-00-425)

² 42 U.S.C. Section 6903(27)

- MassDEP, Reuse and Disposal of Contaminated Soil at Massachusetts Landfills (Policy #COMM-97Z-001)

4 Methodology

4.1 Data Resources

MassDOT performed a desktop review to identify the presence, or likely presence, of OHM within the Sagamore and Bourne Bridge Study Areas through review of the following:

- MassDEP’s Waste Site & Reportable Releases Data Portal
 - This database provides information on known contaminants released to soil and groundwater throughout the Commonwealth of Massachusetts. **Attachment 1 through Attachment 5** provide a list of these sites.
- Federal, state, and Tribal environmental databases prepared by Environmental Data Resources, Inc.
 - Environmental Data Resources (EDR) reports dated September 18, 2024, available upon request³
 - Based upon a review utilizing state and federal databases, known or potential sources of contamination are identified within the Study Areas. To evaluate the information available, the locations of concern were categorized using a grading system of high, moderate, or low environmental concern.
 - Sites identified as high environmental concern include locations where OHM impacts are known to exist, or it is highly likely to encounter OHM in environmental media (soil, sediment, groundwater, and/or surface water) irrespective of regulatory closure status. These sites are most likely associated with soil or groundwater contamination within the construction limits.
 - Sites identified as moderate environmental concern include locations within the construction limits where OHM may exist in environmental media, but due to the age, type, and the extent of the release, and/or regulatory status as closed, are not expected to present significant contaminant management concerns.
 - Sites identified as low environmental concern include locations where no known releases have occurred, or where the databases listings do not indicate potential for environmental impacts (i.e., registered RCRA generators, locations that have permitted aboveground storage tanks or USTs, locations where asbestos removal occurred, etc.).

³ The Environmental Data Resources (EDR) Report was designed to assist parties seeking to meet the search requirements of the U.S. Environmental Protection Agency’s Standards and Practices, for All Appropriate Inquiries (40 Code of Federal Regulations Part 312) and applicable American Society for Testing and Materials Standard Practices associated with real estate due diligence. The EDR reports were prepared on September 18, 2024. The search radii included information from databases up to 1 mile beyond the construction limits of the replacement Sagamore and Bourne Bridges.

- Historical Sanborn® Fire Insurance Rate Maps (provided by EDR)
 - Sanborn® fire insurance rate maps were developed for use by insurance companies to depict facilities, properties, and their uses for many locations throughout the United States. These maps provide information on the history of prior land use and are useful in assessing whether there may be potential environmental contamination from historical property uses.
 - EDR provided the Sanborn® maps for the two bridge alignments. Summaries of the findings are presented as **Attachment 6** for Sagamore Bridge and **Attachment 7** for Bourne Bridge.
- Historical U.S. Geological Survey Topographical Maps (provided by EDR)
 - These topographic maps for the two bridge alignments provide information on the history of land development and are useful in assessing the potential for environmental contamination from historical property uses such as urbanization, existence of railways, placement of fill, etc. Summaries of the topographic map findings are presented as **Attachment 8** for Sagamore Bridge and **Attachment 9** for Bourne Bridge.
- Historical aerial photographs (provided by EDR)
 - These historical aerial photographs for the two bridge alignments provide information on the history of prior land use and are useful in assessing the potential for environmental contamination. Summaries of the aerial photographs are presented as **Attachment 10** for Sagamore Bridge and **Attachment 11** for Bourne Bridge.
- Massachusetts Geographic Information Systems (GIS) Maps
 - GIS mapping provides information on past and present landfills, sensitive receptors, underground storage tank locations, deed restrictions, etc.
- Google Maps
 - Google maps can be used to inform current land uses.

4.2 Primary Contaminants of Concern

Within the Study Areas, several contaminants of concern are expected to be present based on historical land uses. Several of the most common ones are summarized in the following:

- **Metals** – Likely metals include arsenic, cadmium, chromium, cobalt, lead, mercury, selenium, and silver. They are used in smelting, foundries, and metal works, and can be present in paint, ink, petroleum products, coal ash, and mechanical waste fluids. Some metals are naturally occurring in soil and include iron, manganese, copper, zinc, nickel, chromium, arsenic, lead, cobalt, and vanadium. Certain metals like lead, mercury, arsenic, and cadmium are considered “heavy metals” and can be particularly toxic to living organisms even at low concentrations. Metals are persistent in the environment and can accumulate in sediment. Exposure to metals, particularly heavy metals, can lead to a range of health effects, including neurological damage, kidney dysfunction, liver damage, gastrointestinal issues, reproductive problems, increased cancer risk, and in severe cases, even death.
- **Volatile Organic Compounds (VOC)** – VOCs are compounds that have a high vapor pressure and low water solubility. Many VOCs are human-made chemicals that are used and produced to

manufacture paints, pharmaceuticals, and refrigerants. VOCs also include such aromatic compounds as benzene, toluene, ethylbenzene, and xylenes (commonly found in petroleum products), and chlorinated compounds like trichloroethene and tetrachloroethene, which are common ingredients in solvents and commercial cleansers. VOCs can be harmful to human health, and some can cause cancer. Exposure to VOCs can cause a variety of health effects, including upper and lower respiratory symptoms and worsening of asthma.

- **Semi-Volatile Organic Compounds (SVOC)** – SVOCs are more likely to be liquids or solids at lower temperatures than VOCs. Products that include SVOCs include pesticides, oil-based products, and fire retardants. SVOCs include polycyclic aromatic hydrocarbons (PAH), which are common constituents of partially combusted coal or petroleum derived products, such as waste oils, creosote, coal and coal ash, wood ash, and asphalt. Like metals, some PAHs are also persistent in the environment. SVOCs have been associated with adverse health effects in animals and humans, including endocrine and thyroid disruption, immunotoxicity, reproductive toxicity, cancer, and adverse effects on fetal and child development and neurologic function.
- **Polychlorinated Biphenyls (PCB)** – PCBs belong to a broad family of human-made organic chemicals known as chlorinated hydrocarbons. PCBs were domestically manufactured from 1929 until manufacturing was banned in 1979. Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including paints, the dielectric fluid found in electrical transformers and feeder cables and are often associated with electrical generation stations/substations and train yards. PCBs do not readily break down once in the environment and can be carried long distances. They have been demonstrated to cause a variety of adverse health effects including skin conditions, liver damage, reproductive effects and are a probable human carcinogen.
- **Asbestos-containing materials (ACM)** – Asbestos is a group of six naturally occurring minerals that are fibrous and have many commercial uses. Asbestos is resistant to heat, fire, and chemicals, and does not conduct electricity. It has been used in many products including roofing shingles, ceiling and floor tiles, asbestos cement products, automobile break and transmission parts, heat-resistant fabrics, and coatings. Asbestos fibers are potentially harmful if they become airborne and are inhaled. Non-friable asbestos-containing materials that are typically stable could be damaged during the construction process and would be considered friable asbestos-containing materials thereafter. Breathing in asbestos fibers can cause serious health problems including lung cancer, mesothelioma, and asbestosis.
- **Anthropogenic contamination** – This type of contamination is commonly found in urban settings, resulting from historical land use and/or filling activities. Historical industrial, commercial and railway uses may contribute to residual impacts to soil and groundwater including metals, coal and ash-containing lead and arsenic, railroad ties treated with chemicals such as creosote, spilled or leaked petroleum products, and other OHM. Some contaminants, like petroleum products, may have been released during a surface spill or from leaking USTs. Others, such as PAHs, metals, and/or PCBs, may have resulted from manufacturing operations and former coal storage.
- **Perchlorates** – Perchlorates are inorganic chlorine oxyanions widely used as strong oxidizers in rocket propellants, military munitions, and fireworks, making them a recurring contaminant at

defense facilities, including the Joint Base Cape Cod where historical training and munitions activities have released perchlorate into soil and groundwater. Once released, perchlorate is highly soluble, extremely mobile, and persistent, enabling it to migrate through the aquifer beneath the base and contribute to regional groundwater plumes. The primary human-health concern is perchlorate's ability to interfere with iodide uptake by the thyroid, affecting hormone production and posing heightened risks to sensitive populations. Because improved analytical methods have only recently enabled low-level detection, perchlorate is now recognized as an emerging contaminant and contaminant of concern at military facilities. Investigations around the town of Bourne have linked detections of perchlorate in groundwater to legacy activities at Joint Base Cape Cod, where munitions use and historic training operations contributed to contamination migrating toward surrounding towns. As a result, areas downgradient of the base, including portions of Bourne, have been included in long-term groundwater monitoring and remediation efforts associated with the perchlorate plume.

Contamination may be found in environmental media within the Study Areas. OHM can also be found in roadway and bridge building materials, as well as other buried utilities throughout the Study Areas. Some of these building materials and utilities would likely be disturbed during construction.

Historical land uses present some likely contaminants of concern. Fill material of unknown origin associated with bridge construction or other shoreline changes may be present within the upland site limits. MassDOT owns the Cape Cod Central Railway, and Mass Coastal Rail operates the Cape Flyer. Rail corridors commonly contain railroad ties treated with chemicals such as creosote, spilled or leaked liquids such as oil, gasoline, cleaning solvents, herbicides use, fossil fuel combustion products (PAHs), asbestos, transformers, and capacitors. The railway was reported to have historically been utilized for transporting coal ash waste from the Canal Generating Power Plant located approximately 1 mile east of Sagamore Bridge. Coal ash may be a source of environmental contaminants, including metals and PAHs. [Section 5](#) (Sagamore Bridge) and [Section 6](#) (Bourne Bridge) present areas of concern specific to each Study Area in more detail.

4.3 Study Area

The Study Areas for assessment of potential effects of the Build Alternative on OHM include areas within the construction limits of disturbance for the Build Alternative, with an additional buffered distance of up to one-quarter mile around the disturbance limits at each bridge crossing. This distance was selected because it is generally considered highly unlikely for contaminated media to migrate greater than one-quarter mile.

For documentation of historical land use and existing conditions relative to this assessment, the Study Areas are divided into four different quadrants:

- Sagamore North
- Sagamore South
- Bourne North
- Bourne South

This approach uses Cape Cod Canal as the dividing line between north and south.

5 Sagamore Bridge Study Area

5.1 Land Use

5.1.1 Current Land Use

Current land uses within the Sagamore Bridge Study Area consist of Sagamore Bridge, the associated roadways, and a mix of wooded, residential, and commercial uses.

5.1.1.1 Sagamore North Quadrant

To the north of Sagamore Bridge is the interchange connecting State Route 3, U.S. Route 6, and Meetinghouse Lane. A MassDOT maintenance facility is [located](#) within the ramp from State Road onto State Route 3 north, and Sagamore Recreation Area is along the northern bank of the canal. A large undeveloped parcel is on the north side of the canal to the west of the alignment.

Three registered federal RCRA generator sites are known to generate hazardous waste: Nouria, [an active gasoline service station](#), at 1 Canal Street, the Pepsi Bottling Group at 103 State Road [and the United States Postal Service at 58 Meetinghouse Lane](#) are all registered as a Very Small Quantity Generators (VSQG). VSQGs generate 100 kilograms or less per month of hazardous waste or 1 kilogram or less per month of acutely hazardous waste. SQGs generate more than 100 kilograms, but less than 1,000 kilograms of hazardous waste per month.

Several waste products are not considered to be federal RCRA hazardous wastes but are regulated as hazardous waste on the state level. In Massachusetts, waste oil is the most common example. Six sites are known to generate Massachusetts-regulated hazardous waste.

5.1.1.2 Sagamore South Quadrant

The Cape Cod Air Force Station owns a large portion of the land to the south of Sagamore Bridge. The remaining parcels in and near the Sagamore South quadrant include residential or commercial properties that include a large grocery store (Market Basket), school, gasoline stations, auto repair businesses, convenience stores, coffee shops, retail stores, and a landscape supply store.

[Two sites within the Sagamore South quadrant are known to generate a Massachusetts-regulated hazardous waste. This includes an auto and truck repair shop at 100 Cranberry Highway and a former Christmas Tree Shop and current retail furniture store at 5 Cranberry Highway; both are registered as VSQGs.](#)

5.1.2 Historical Land Use

MassDOT reviewed historical Sanborn® maps, topographic maps, and aerial photographs to identify historical land use activities that could be potential sources of contamination within the Sagamore Bridge Study Area.

5.1.2.1 Sagamore North Quadrant

Historical Sanborn® Maps are not available for the Sagamore North quadrant.

Available topographic maps date back to 1889 and identify an unnamed river running along the approximate location of the present-day Cape Cod Canal. **Attachment 8** provides detailed findings.

The earliest aerial photograph is from 1951, which depicts the alignment of Sagamore Bridge and Sagamore Rotary. **Attachment 10** provides detailed findings.

5.1.2.2 Sagamore South Quadrant

The area to the south of Cape Cod Canal has a longer history of development and use than the northern side of the canal due to the presence of the railroad. Within the Sagamore South quadrant, the Otis Air National Guard Base/Camp Edwards has gone by several different names and refers to the large parcel of land to the south of the bridge that has been used by the military since 1935. The use of this land for various military training activities has resulted in significant soil and groundwater contamination, the nature of which is discussed in [Section 5.4.2](#).

Railroad tracks run along the south side of Cape Cod Canal and have been in operation for decades. The Old Colony Railroad was constructed in the mid-1800s and first appeared on available mapping in 1889. The railroad was historically used to transport coal/fly ash waste, which contained high levels of arsenic, from the Cape Cod Power Plant approximately 1 mile away to a nearby disposal facility. Approximately 1,000 tons of coal/fly ash waste were transported along the rail line per day.

EDR provided Sanborn® maps for the years 1913, 1924, 1941, and 1962. The 1913 and 1924 maps depict the Keith Electric Car Company, located on the south side of the canal to the east of the bridge, which manufactured horse-drawn carriages, stagecoaches, prairie schooners for the Gold Rush, and later freight/box cars for the railroad system. Structure labels include fire department, hospital, woodworking, painting, coal storage, mechanical, assembling facilities, and a network of rail lines and spurs. The plant reportedly was 1 mile in length that stretched westerly from Freight House Road past Sagamore Bridge. Sanborn® maps show an entrance point into the plant at Plymouth and Pleasant Streets. An inset map indicates tenement housing was at the intersection of Main Street/County Road and Adams Street with a baseball field across (north side) Main Street. In 1928, the company closed after 82 years in business, and the plant was stripped for materials. The buildings were demolished in the 1930s following the second expansion of the canal. Much of the northern portion of the property the plant occupied may now be within the Cape Cod Canal.

The 1924 maps identify a “Steel Viaduct Across Canal” at the location of the existing Sagamore Bridge. To the west of the bridge approach was the site of a forge shop with a large coal pile storage area (identified in 1913 and 1924 map), a filling station (1941 and 1962 maps), and the Coca Cola bottling company (1941 and 1962 maps). The Coca Cola Bottling Co. is depicted on the west side of the approach to Sagamore Bridge along with a filling station with gas tanks to the north of the Coca Cola facility. Additional filling stations historically existed on Sandwich Street opposite the Adams Street intersection and on the north and south sides of U.S. Route 6 near the intersection with Vermont Street.

Available topographic maps date back to 1889 and identify an unnamed river running along the approximate location of the present-day Cape Cod Canal. The canal is first depicted on the 1915 topographic map. **Attachment 8** identifies detailed findings.

The earliest aerial photograph is from 1951, which depicts the alignment of the Sagamore Bridge and Sagamore Rotary. **Attachment 10** provides detailed findings.

5.2 Solid Waste Landfills

No active or inactive solid waste landfills are within or near the Sagamore Bridge Study Area.

5.3 Underground Storage of Oils and/or Hazardous Materials

Storage of OHM in USTs occurs at all gasoline service stations and at many large commercial and municipal properties. Modern tanks that are registered and adequately monitored likely do not pose a risk to the environment. However, these storage vessels represent potential sources of contamination that could impact soil and/or groundwater from an unknown or unreported release.

5.3.1 Sagamore North Quadrant

Three sites are identified within the Sagamore North quadrant that either currently or have historically contained USTs.

- 1 Canal Road – Active gasoline service station
- 19 Meetinghouse Lane – Former gasoline service station and repair shop
- 48 Meetinghouse Lane – Gasoline service pump associated with United States Postal Service (USPS)

Attachments 1 and 2 provide additional details on USTs.

5.3.2 Sagamore South Quadrant

Five known sites identified within the Sagamore South quadrant either currently or have historically contained USTs:

- 847 Sandwich Road – Active gasoline service station
- 896 Sandwich Road – Former retail store. Two USTs containing gasoline were removed in 1993
- 70 Cranberry Highway – Canal Fuel Company (There is a record of a release from the tank at 70 Cranberry Highway.)
- 80 Cranberry Highway – Active Stop & Shop gasoline service station
- 100 Cranberry Highway – Sagamore Service Station

Attachments 1 and 2 provide additional details on USTs.

5.4 Locations of Known or Potential Contamination

Several MCP release sites are within the Sagamore Bridge Study Area; however, most sites are related to small fuel and oil spills that were cleaned up and closed with no restrictions. [Figure 5.4-1](#) and [Figure 5.4-2](#), respectively, illustrate the locations of impact and the associated level of environmental concern for the identified MCP release sites relative to the Sagamore North and Sagamore South quadrants. Refer to [Section 5.4.1](#) and [Section 5.4.2](#), respectively, for summary descriptions of MCP release sites within the Sagamore North and Sagamore South quadrants.

5.4.1 Sagamore North Quadrant

No Federal National Priority List (NPL - Superfund) sites are within the Sagamore North quadrant.

No database site locations are of high environmental concern as defined in [Section 4.1](#). Four database listings within the Sagamore North quadrant are of moderate environmental concern—all of which are associated with MassDEP Release Tracking Numbers (RTN). **Attachment 1** provides details on each site. The remaining 22 sites within the Sagamore North quadrant are of low environmental concern, 8 of which are associated with closed RTNs. **Attachment 2** details information concerning these listings.

One open Downgradient Property Status remains within the northern end of the Sagamore Bridge Study Area, which is related to residual contamination within groundwater tied to the abutting Sorenti Texaco Station.

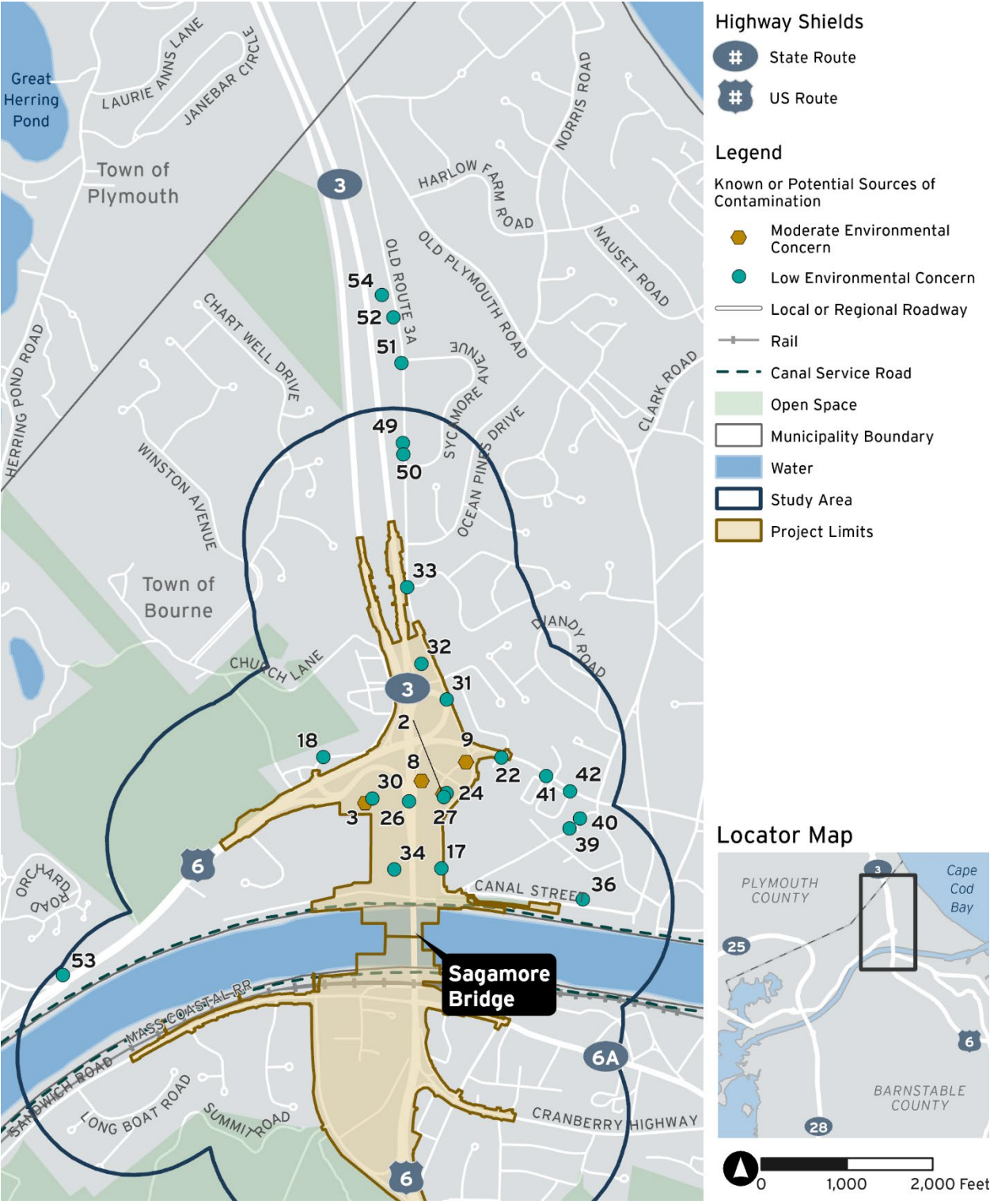
5.4.2 Sagamore South Quadrant

One site is listed on the federal NPL as a Superfund site within the Sagamore South quadrant. The Otis Air National Guard Base/Camp Edwards, discussed in [Section 5.1.2](#), has gone by several different names and refers to the large parcel of land to the south of the bridge that has been used by the military since 1935. This site contains multiple areas of hazardous material contamination found in both the soil and groundwater. The closest plume is approximately 2 miles southeast of the Sagamore Bridge Study Area. The release occurred at a training range, situated over the peak of the Cape Cod aquifer, where groundwater infiltrates and flows in all directions. The ammunition used on the training range contains a lead core in a metal ally jack, usually composed of lead, copper, iron, antimony, and nickel. The military also used various explosives that contributed to on-site contamination. In addition, per- and polyfluoroalkyl substances have been identified at this location. Contamination from these substances is primarily due to the historical use of firefighting foam during training exercises.

[Supplemental information is provided in Table 6.4-1.](#)

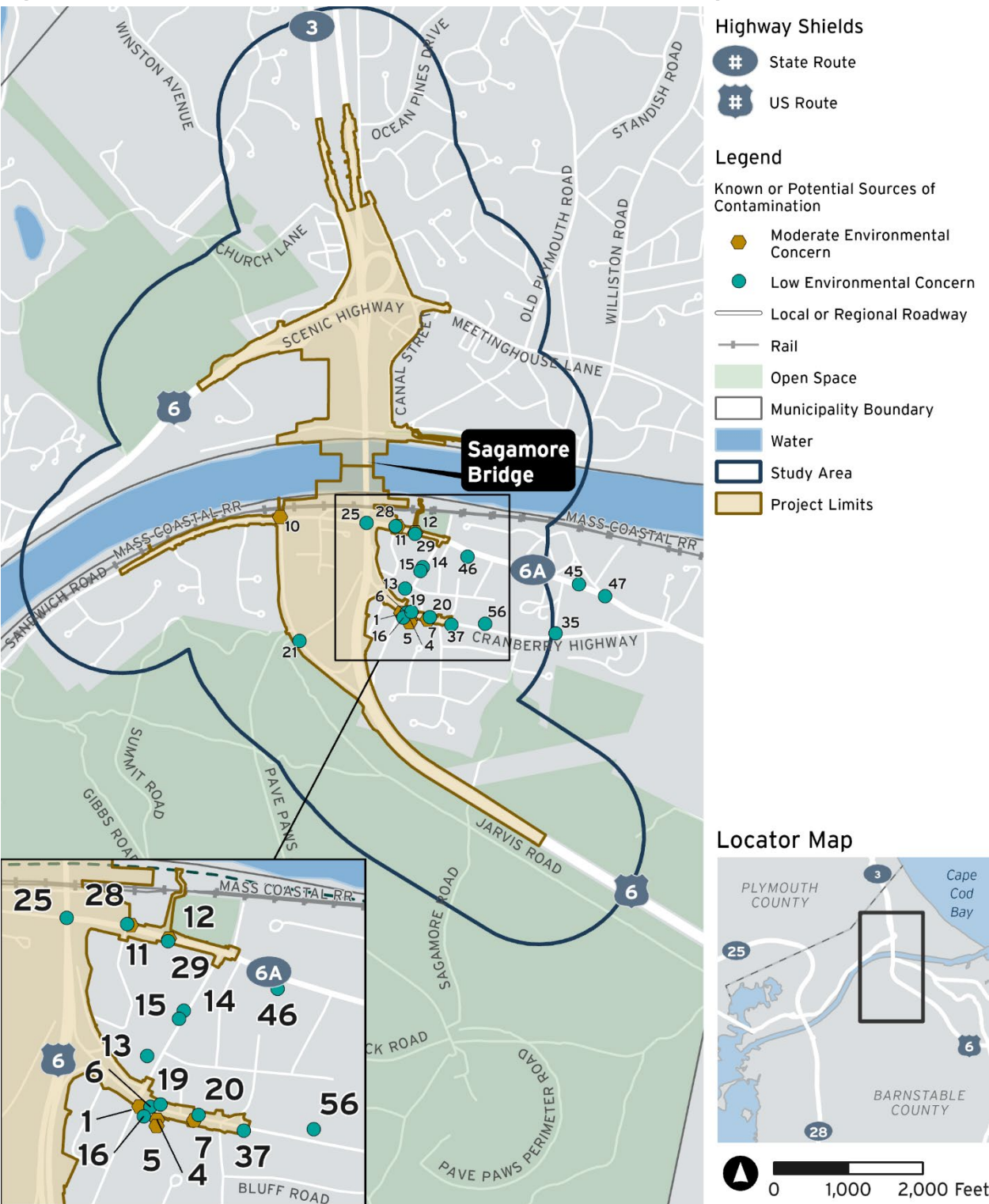
No database site locations are of high environmental concern, which is a category defined in [Section 4.1](#). Seven database listings are within the Sagamore South quadrant that are of moderate environmental concern, of which two [sites](#) are associated with [MassDEP RTNs](#). [There are a total of three RTNs listed in the Sagamore South Quadrant. Of these sites, Pairpoint Manufacturing Company, Inc. is associated with two separate RTNs. This site was closed with an AUL and is further discussed in Section 5.5 - Deed Restrictions.](#) **Attachment 1** provides details on each site. The remaining 22 sites within the Sagamore South quadrant are of low environmental concern, of which eight are associated with a closed RTN. **Attachment 2** includes information concerning these listings.

Figure 5.4-1. Known or Potential Sources of Contamination (Sagamore North Quadrant)



Source: Massachusetts Department of Transportation, 2025

Figure 5.4-2. Known or Potential Sources of Contamination (Sagamore South Quadrant)



Source: Massachusetts Department of Transportation, 2025

5.5 Deed Restrictions

AULs are deed restrictions that are implemented under the MCP following response actions at a release site. AULs require oversight and regulatory coordination for any excavation or disturbance within the boundaries of the AUL area.

One release site within the Sagamore Bridge Study Area was closed with an AUL. Pairpoint Manufacturing Company, Inc., is a glass manufacturing company located at 851 Sandwich Road and is located within the Sagamore South quadrant construction limits (**Attachment 1**). It has been determined to be a site of moderate environmental concern (**Attachment 1**) considering it was the location of a historical release of lead and arsenic (RTN:4-0023279 and 4-0028274) from glass manufacturing (1960—1990). The release achieved Permanent Solution with Conditions regulatory status in 2021. An AUL was implemented to restrict certain activities that may compromise the structural integrity of the basement slab and building floor or affected soil behind the building. The area of the AUL includes the northern half of the building and the area of the parcel behind the building on the north side. As such, construction activities to the south of the property along Sandwich Road are not anticipated to disturb the AUL area. This AUL immediately abuts the identified construction limits on the western quadrant of the release site. Any disturbance of the AUL area must be overseen by an LSP and performed in accordance with the requirements of the AUL and MCP.

5.6 Demolition Waste and Material Management

Table 5.6-1 presents estimated demolition waste quantities that are expected to be generated for the Build Alternative. **Table 5.6-2** presents estimated quantities of excavated and fill material that would be generated for the Build Alternative.

Table 5.6-1. Demolition Waste Quantity Estimates (Sagamore Bridge)

Location	Waste Type	Estimated Quantity
Sagamore Bridge Canal Span/Approaches	Steel	4,600 tons
	Rebar (steel)	1,500 tons
	Concrete	63,200 tons
Sagamore Bridge North Quadrant, U.S. Route 6 over Scenic Highway	Steel	0 tons
	Rebar (steel)	230 tons
	Concrete	6,300 tons

Source: Massachusetts Department of Transportation, 2024

Table 5.6-2. Material Quantity Estimates (Sagamore Bridge)

Location	Type	Estimated Quantity
Sagamore Bridge North Quadrant	Excavated Material	460,000 cubic yards
	Fill Material	215,000 cubic yards
Sagamore Bridge South Quadrant	Excavated Material	689,000 cubic yards
	Fill Material	161,000 cubic yards

Source: Massachusetts Department of Transportation, 2024

6 Bourne Bridge Study Area

6.1 Land Use

6.1.1 Current Land Use

The main land uses within the Bourne Bridge Study Area are the Bourne Bridge, associated roadways, and the Bourne Rotary. The remaining parcels are residential or commercial in nature. Commercial uses include gasoline/auto repair stations, printing services, convenience stores, motels, coffee shops, dry cleaning, schools, state police barracks, auto dealerships, pharmacy, and ice skating. In addition, Bourne Scenic Park is on the north side of Cape Cod Canal to the east of the bridge. A large undeveloped and wooded area exists on the south side of the canal to the east of the bridge.

6.1.1.1 Bourne North Quadrant

To the north of Bourne Bridge is the interchange connecting State Route 25, State Route 28, and U.S. Route 6. Land uses in this area consist of a mix of commercial and residential uses with conservation and wooded space.

Four registered federal RCRA generator sites are known to generate hazardous waste: Bourne Petroleum at 2 Head of the Bay Road, PetSmart at 2 Bourne Bridge Approach (2 listings), and Bourne Scenic Park at 370 Scenic Highway are each registered as VSQGs.

Several waste products are not considered to be federal RCRA hazardous wastes but are regulated as hazardous waste on the state level. In Massachusetts, waste oil is the most common example. Three sites within the Bourne North quadrant are known to generate Massachusetts-regulated hazardous wastes.

6.1.1.2 Bourne South Quadrant

The Cape Cod Air Force Station owns a large portion of the land south of Bourne Bridge. The remaining parcels in and near the alignment are residential or commercial properties that include a large grocery store (Market Basket), school, gasoline stations, auto repair businesses, convenience stores, coffee shops, retail stores, and a landscape supply store. The Bourne Integrated Solid Waste Management Facility (Bourne Landfill) is to the south-west of the roadway approach.

Five registered RCRA generator sites are known to generate hazardous waste. The Upper Cape Cod Regional Technical [High](#) School, Cumberland Farms, Battles Buick GMC, and Battles Nissan are registered as VSQGs. Angels Touch of Bourne, at 148 MacArthur Boulevard, is registered as a Small Quantity Generator. There are 11 sites that are known to generate Massachusetts-regulated hazardous waste.

6.1.2 Historical Land Use

Historical Sanborn® maps, topographic maps, and aerial photographs were reviewed to identify land use activities that could be potential sources of contamination within the Bourne Bridge Study Area. Available mapping and historical information were minimal at this location.

6.1.2.1 Bourne North Quadrant

EDR provided Sanborn® maps for the years 1941 and 1962. One of the 1941 maps focuses around the Bourne Pond area on the north side of Cape Cod Canal and west of Bourne Bridge. Property uses include residential, and buildings labeled Town Hall, Police Station, and Highway Department. The maps depict a gasoline tank to the southwest of the Highway Department building. Several properties along Main Street are identified as filling stations with associated gasoline tanks. These locations are all outside of the construction limits of disturbance.

Available topographic maps date back to 1889 and identify an unnamed river running along the approximate location of the present-day Cape Cod Canal, and the canal is first depicted on the 1915 [topographic map](#). **Attachment 9** identifies detailed findings.

The earliest aerial photograph is from 1951, which depicts Bourne Bridge and Bourne Rotary. **Attachment 11** provides detailed findings.

[MassDOT reviewed online resources to evaluate land uses associated with the refined Project Limits and updated Study Area in the Final Environmental Impact Statement. The refined Project Limits extend east along Ridge Road. Current property uses in this area include recreational areas and undeveloped wooded areas.](#)

6.1.2.2 Bourne South Quadrant

To the south of Bourne Traffic Circle along State Route 28, there was a filling station and the Cape Cod Stone Company, where concrete mix and cement was stored on-site in the early 1940s. A building labeled General Storage appears on the southeast side of Bourne Traffic Circle. By the 1960s, another filling station was added to the southwest of the rotary, and the Cape Cod Stone Company became the site of an auto body repair shop. The 1962 map is an update of the same areas as the 1941 map. Additional property uses of interest include a print shop on Perry Avenue, a drycleaner on Main Street, a filling station on the southwest side of Bourne Traffic Circle, a restaurant on the northwest side, and an auto body repair shop on the southeast side. **Attachment 7** summarizes the Sanborn maps applicable to the Bourne Bridge alignment.

Available topographic maps date back to 1889 and identify an unnamed river running along the approximate location of the present-day Cape Cod Canal, and the canal is first depicted on the 1915 topographic map. A railroad is shown running along the south side of the unnamed river, crossing over the river, and running northwest. **Attachment 9** identifies detailed findings.

The earliest aerial photograph is from 1951, which depicts Bourne Bridge and Bourne Rotary. The Upper Cape Cod Regional Technical High School is first depicted on the 1970 aerial photograph. Aerial

photographs show the large, wooded parcel south of Cape Cod Canal, to the east of the bridge, being partially cleared in the 1950s and 1960s. **Attachment 11** provides detailed findings.

6.2 Solid Waste Landfills

One active solid waste facility, the Bourne Landfill, was identified within the Bourne South quadrant. This facility is on Dump Road to the east of State Route 28. The landfill is not within the construction limits but is within the quarter-mile buffer used for the review area. Portions of the Bourne Landfill are unlined but were closed in 1999 and capped, with the unlined areas primarily located northwest of the project along Dump Road. Given the anticipated excavation depths along MacArthur Boulevard, the buffer from the landfill's unlined areas, and groundwater depths of approximately 33 feet below ground surface, the potential to encounter landfill-impacted soil or groundwater is low.

Several smaller, inactive landfills were identified near, but not within the Study Areas:

- Brookside Development Corp Landfill, on MacArthur Boulevard, was an unlined sludge landfill that was closed between 1950 and 1968 and capped in 1996. This past landfill is within the current Brookside Golf Club property, east of Bourne Landfill.
- Brookside Residential LLC, at Amberwood Court, was a municipal solid waste facility that was capped in 2013. The landfill is within the Brookside Golf Club property east of Bourne Landfill.
- Nightingale Stump Landfill, within the Brookside Golf Club property, was an unlined, wood waste landfill that was closed by 1989 without a cap.
- Otis Air Force Base Landfill, which was an unlined, municipal solid waste facility, was active in the 1940s and closed with a cap in 1991.

Figure 6.3-1 identifies active and inactive solid waste landfills relative to the Bourne Bridge Study Area.

6.3 Underground Storage of Oils and/or Hazardous Materials

6.3.1 Bourne North Quadrant

Four known sites identified within the Bourne North quadrant either currently or have historically contained USTs:

- Sorenti Petrol on Canal Road – Former gasoline service station. Four USTs containing gasoline were removed in 1953. Two USTs containing bulk heating or fuel oil were removed in 1958. One UST containing bulk heating or fuel oil was removed in 1975. Two USTs containing diesel were removed in 1979.
- Bourne Bridge Approach – Former gasoline service station and oil service shop. Six USTs were removed in 1986. According to online resources, the contents of the USTs cannot be confirmed.
- 2 Head of the Bay Road – Active gasoline service station
- 343 Scenic Highway – Active gasoline service station

Attachment 3 and **Attachment 4** provide additional details on USTs.

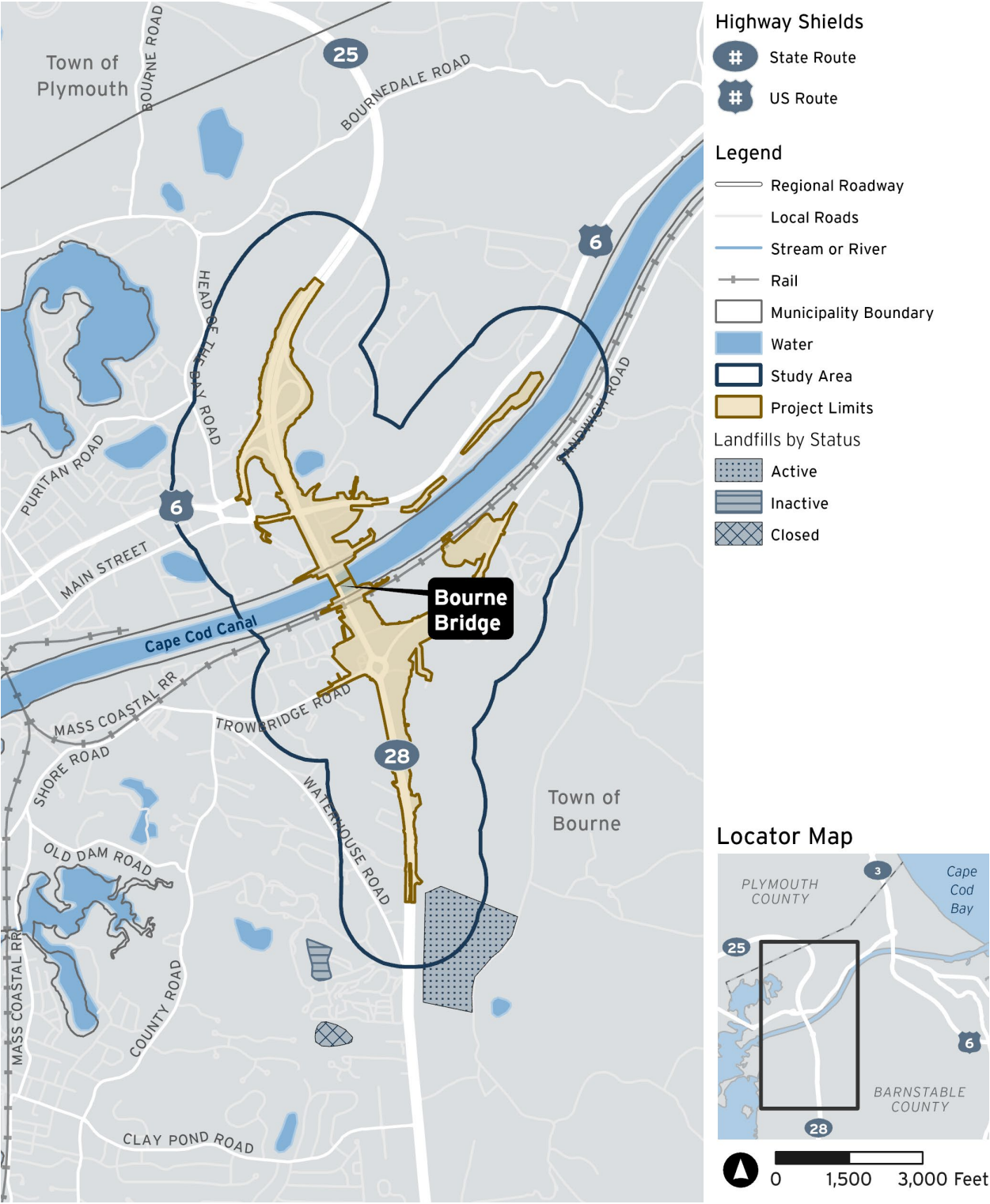
6.3.2 Bourne South Quadrant

The following [six](#) known sites historically contained USTs:

- [220 Sandwich Road – Active public school, two 6,000 gallon USTs onsite contain diesel and gasoline for motor vehicle fueling](#)
- [Bourne Bridge Rotary – Gasoline service pumps associated with Bourne State Police barracks](#)
- [4 MacArthur Boulevard – Active gasoline service station, and former Texaco property. There is a documented release associated with the former Texaco property.](#)
- [48 MacArthur Boulevard – Active car dealership. Former USTs associated with motor vehicle fueling](#)
- [50 MacArthur Boulevard – Active car dealership. Former USTs associated with motor vehicle fueling](#)
- [60 MacArthur Boulevard – Active car dealership. Former USTs associated with motor vehicle fueling](#)

Attachments 3 and 4 provide additional details on USTs.

Figure 6.3-1. Solid Waste Landfills (Bourne Bridge Study Area)



Source: Massachusetts Department of Transportation, [2025](#)

6.4 Locations of Known or Potential Contamination

Several MCP release sites are within the Bourne Bridge Study Area; however, most sites are related to small fuel and oil spills that were cleaned up and closed with no restrictions. [Figure 6.4-1](#) and [Figure 6.4-2](#), respectively, show the locations of impact and the associated level of environmental concern for the identified MCP release sites relative to the Bourne North and Bourne South quadrants. Refer to [Section 6.4.1](#) and [Section 6.4.2](#), respectively, for summary descriptions of MCP release sites within the Bourne North and Bourne South quadrants.

6.4.1 Bourne North Quadrant

No federal NPL - Superfund sites are within the Bourne North quadrant.

Two database site locations are of high environmental concern. One is linked to an Exxon Station, where there was a release of gasoline that affected soil and groundwater (RTN 4-000335) and the other is linked to the Bourne Sunoco Service Station on Main Street, which was identified as having a leaking UST. [Table 6.4-1](#) and [Attachment 3](#) provide additional details.

Six database listings are of moderate environmental concern, of which four are associated with an RTN. [Attachment 4](#) provides details on each site. The remaining 44 sites within Bourne North quadrant are of low environmental concern, of which 25 are associated with a closed RTN. [Attachments 4](#) and [5](#) include information concerning these listings.

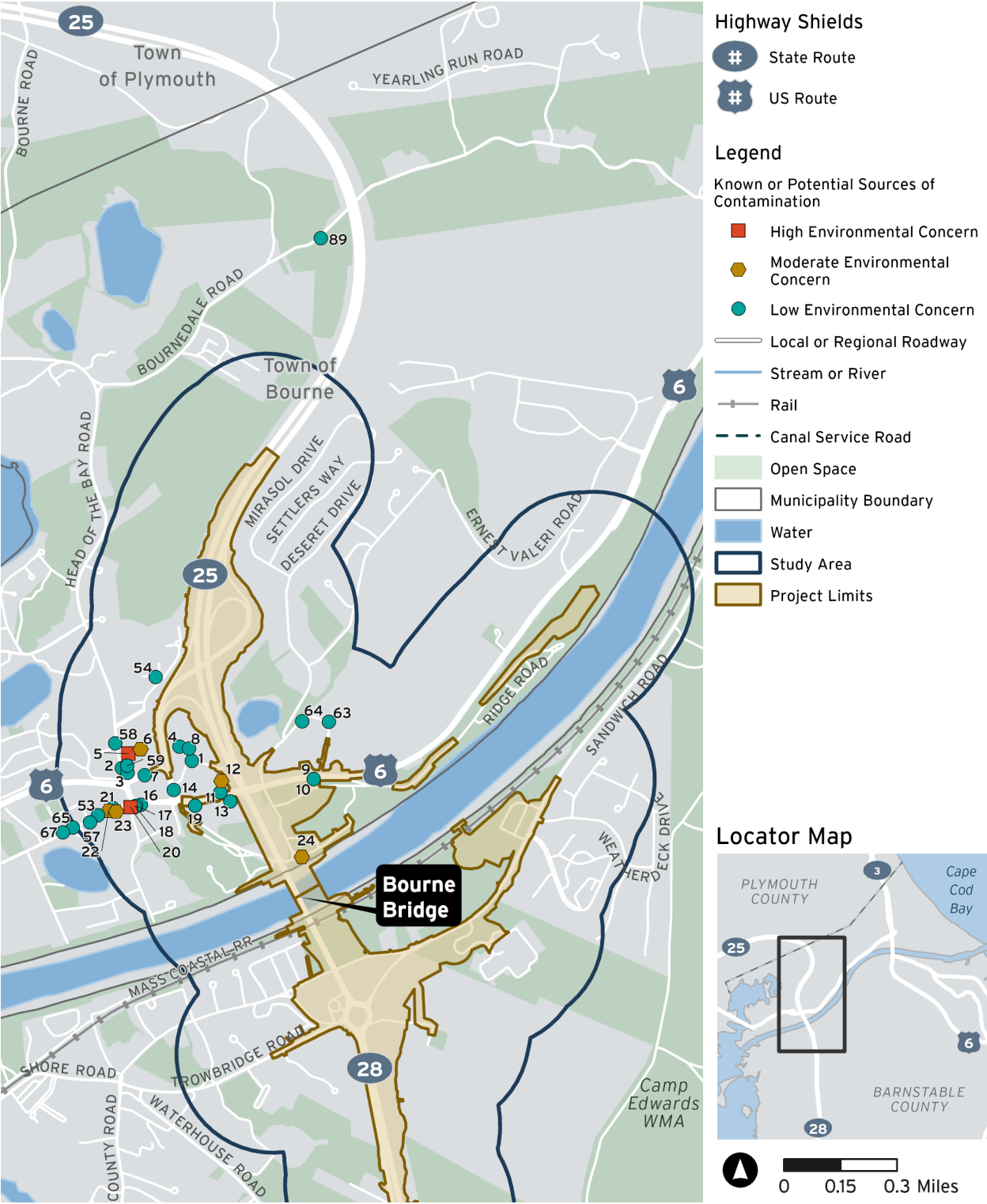
6.4.2 Bourne South Quadrant

The Otis Air National Guard Base/Camp Edwards Superfund site abuts the Bourne Bridge Study Area to the southeast and has been identified as a site of high environmental concern. Two additional sites are flagged as having high environmental concern:

- Gas station at Bourne Rotary has been remediated under RTN [4-0000335](#) and is related to the release of gasoline to soil and groundwater.
- Cumberland Farms site at 4 General MacArthur Boulevard is still undergoing remedial action related to a release ([RTN 4-0029098](#)) of gasoline to soil and groundwater.

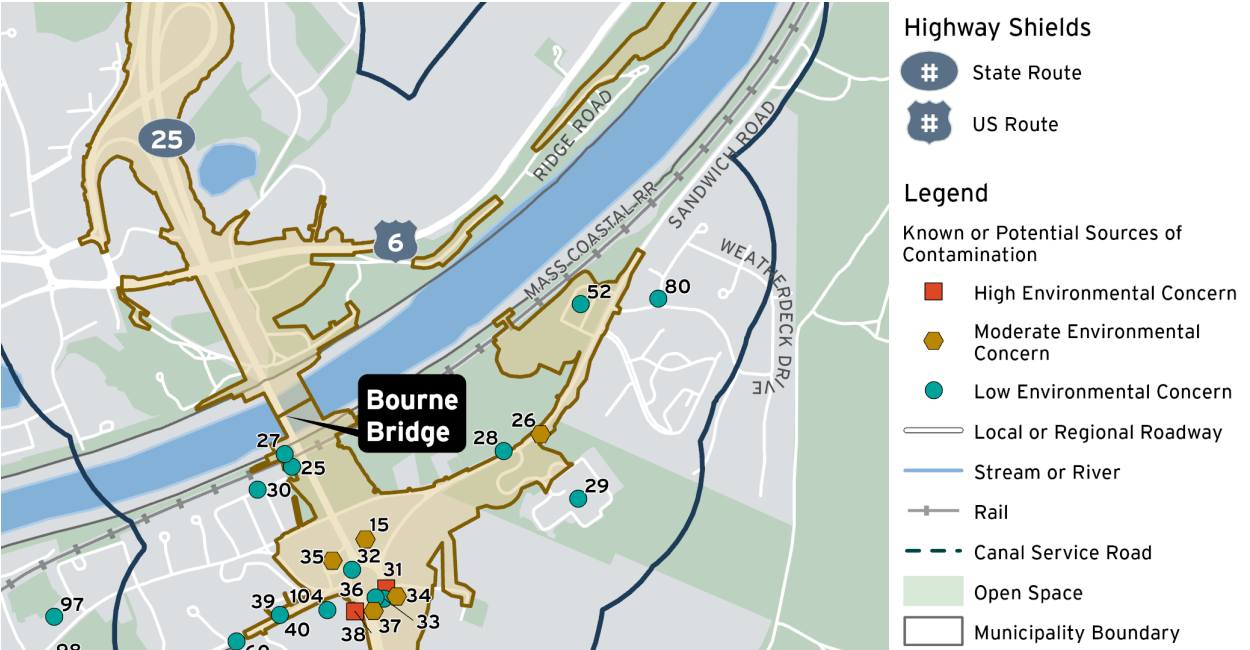
Any work that needs to occur within the boundaries of an open RTN must be performed under the oversight of a Licensed Site Professional. [Table 6.4-1](#) includes information concerning these listings.

Figure 6.4-1. Known or Potential Sources of Contamination (Bourne North Quadrant)



Source: Massachusetts Department of Transportation, 2025

Figure 6.4-2. Known or Potential Sources of Contamination (Bourne South Quadrant)



Source: Massachusetts Department of Transportation, 2025

Table 6.4-1. High Environmental Concern Sites (Bourne Bridge Study Area)

Attachment/ Site ID	Location	Address	Location (Quadrant)	Status/Comments
3/51	Otis Air National Guard Base/Camp Edwards (aka Massachusetts Military Reservation/ Joint Base Cape Cod)	Otis Air Force Base Herbert Road	Bourne South	A small portion of the Massachusetts Military Reservation/Joint Base Cape Cod (the Base) Superfund Site is located within 1 mile of the Bourne Bridge alignment on the south side of the canal. While no portion of the Base is within the alignment itself, this is still considered a high environmental risk concern based upon the site's Superfund status. Historical mapping of the Northwest Corner groundwater plume indicates perchlorate-affected groundwater migrated northerly, discharging into Cape Cod Canal. The location of the historic plume crossed through a portion of the current roadway alignment, within a couple thousand feet east-northeast of the Bourne Rotary through the parcels occupied by the Upper Cape Cod Regional Technical High School, the residential neighborhood east and northeast of the school (5 Foretop Road Release Tracking Number [RTN] 4-0017811), and the Gallo Ice Arena property (RTN 4-0017814). Plume maps updated in an April 2023 report indicate the plume has receded south and no longer affects these properties.

Attachment/ Site ID	Location	Address	Location (Quadrant)	Status/Comments
3/5	Exxon Station #35693	Bourne Rotary	Bourne North	Release Tracking Number (RTN) 4- 0000335 : Release of gasoline from USTs that impacted soil and groundwater. Volatile Petroleum Hydrocarbon (VPH) impacts are still present in groundwater. Groundwater is identified at depths greater than 15 feet below ground surface . Permanent Solution Statement with no Conditions submitted in May 2024.
3/20	Bourne Sunoco Inc. Sunoco Service Station	298 Main Street	Bourne North	Listed on the Leaking Underground Storage Tank database under the name Sunoco Service Station from 1992 to 2012. No additional information could be found with the available resources. This site does not appear to be connected to any nearby sites listed on the Massachusetts Department of Environmental Protection's (MassDEP) RTN database.

Attachment/ Site ID	Location	Address	Location (Quadrant)	Status/Comments
3/31	Texaco Station, Gulf Gas Station, Exxon Company USA	Bourne Rotary	Bourne South	<u>The Former Bourne Rotary Texaco site (RTNs 4-0014330 and 4-0014822) experienced a historical gasoline release from aging underground storage tanks (UST). This resulted in petroleum-impacted soil around the former USTs and a groundwater plume that migrated north but remained confined within a non-potable aquifer. After removal of seven USTs and approximately 550 cubic yards of contaminated soil, long-term monitoring showed stabilizing and declining concentrations of petroleum constituents, with no exceedances of groundwater (GW) 3 standards and no impacts to private wells. Comprehensive assessment and a Method 3 risk characterization determined that remaining soil and groundwater impacts pose No Significant Risk to human health, public welfare, safety, or the environment, and the plume continues to degrade under Monitored Natural Attenuation. As a result, MassDEP issued a Class A-2 Permanent Solution Response Action Outcome Statement (RAO) with no Activity and Use Limitation required. The site has achieved regulatory closure.</u>

Attachment/ Site ID	Location	Address	Location (Quadrant)	Status/Comments
3/38	Cumberland Farms Inc. 2186 Bourne Rotary Texaco	4 Macarthur Boulevard	Bourne South	<u>The Cumberland Farms site at 4 General MacArthur Boulevard in Bourne (RTN 4-0010834) experienced a historic petroleum release detected in 1994, leading to multiple phases of investigation, groundwater monitoring, and removal of an underground injection control well and associated contaminated soils. By 2006, all soil impacts had been remediated. Groundwater impacts had declined to below Method 1 GW-3 standards, with only minor residual concentrations in one well (MW-6) shown through Method 2 dispersion modeling to pose no risk to the nearest private well 1,200 feet downgradient. Further delineation to the north was deemed infeasible because a larger overlapping plume from a former Texaco station was shown to be the dominant off-site source. With no remaining uncontrolled sources, no significant risk to human health, public welfare, safety, or the environment, and all MassDEP audit deficiencies resolved, the site achieved a Class A-2 Permanent Solution under the Massachusetts Contingency Plan.</u>

At locations where work may be conducted within the boundaries of a release site, coordination with MassDEP may be required. Locations where dewatering of contaminated groundwater may be conducted will require coordination with state and federal agencies for potential dewatering and discharge permits (Dewatering and Remediation General Permit).

6.5 Deed Restrictions

No AULs or other deed restrictions are within the Bourne Bridge Study Area.

6.6 Demolition Waste and Soil Management

Table 6.6-1 presents estimated demolition waste quantities that are expected to be generated for the Build Alternative. **Table 6.6-2** presents estimated quantities of excavated and fill material that would be generated for the Build Alternative.

Table 6.6-1. Demolition Waste Quantity Estimates (Bourne Bridge)

Location	Waste Type	Estimated Quantity
Bourne Bridge Canal Span/Approaches	Steel	7,750 tons
	Rebar (steel)	2,100 tons
	Concrete	85,300 tons
Bourne Bridge North Quadrant, State Route 28 over Scenic Highway	Steel	255 tons
	Rebar (steel)	130 tons
	Concrete	3,600 tons
Bourne Bridge North Quadrant, State Route 25 On-/Off-Ramp over State Route 25	Steel	285 tons
	Rebar (steel)	135 tons
	Concrete	3,700 tons

Source: Massachusetts Department of Transportation, 2024

Table 6.6-2. Material Quantity Estimates (Bourne Bridge)

Location	Type	Estimated Quantity
Bourne Bridge North Quadrant	Excavated Material	498,000 cubic yards
	Fill Material	267,000 cubic yards
Bourne Bridge South Quadrant	Excavated Material	553,000 cubic yards
	Fill Material	328,000 cubic yards

Source: Massachusetts Department of Transportation, 2025

7 References

Cape and Islands NPR. 2018. [Keith Car Works - An Early Manufacturing Powerhouse On Cape Cod](https://www.capeandislands.org/in-this-place/2018-05-07/keith-car-works-an-early-manufacturing-powerhouse-on-cape-cod).

<https://www.capeandislands.org/in-this-place/2018-05-07/keith-car-works-an-early-manufacturing-powerhouse-on-cape-cod>. Accessed on November 7, 2024.

Environmental Data Resources, Inc., Report Bourne Bridge Project Study Area, September 18, 2024.

Environmental Data Resources, Inc., Report Sagamore Bridge Project Study Area, September 18, 2024.

Massachusetts Department of Environmental Protection (MassDEP) Policy WSC-97-701, 1997, Determining Non-Potential Drinking Water Source Areas.

[Massachusetts Department of Environmental Protection's online Searchable Sites website](https://eeaonline.eea.state.ma.us/portal/dep/wastesite).

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Massachusetts Department of Environmental Protection (MassDEP) Similar Soils Provision Guidance document Policy WSC#-13-500, September 4, 2014.