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Project name: Former Gas Station Review

Project ref: 60731848-3

To:
Carlisle Board Of Health (BOH)
66 Westford Street
Carlisle, MA

From:
AECOM
David Austin, LSP
Cheryl Cormier, PG, Project Manager

Date:
June 16, 2025

Memo

Subject: Former Gasoline Station (Daisy's), 18 Lowell Street, Carlisle, MA, Release Tracking Number (RTN) 3-2578

Introduction

The purpose of this memorandum is to provide a summary of activities associated with a release of gasoline from the former Daisy Gasoline Station referenced above (site). The Town of Carlisle was awarded a Massachusetts Department of Environmental Protection (MassDEP) Technical Assistance Grant (TAG) relative to the site. The Town of Carlisle Board of Health (BOH) used the TAG to obtain technical expertise (AECOM) to review and evaluate environmental data from the former Daisy Gasoline Station site to increase public awareness by advising town officials and residents of the site response actions. Impacts from the site include petroleum hydrocarbons affecting groundwater and impacting residential drinking water wells.

Under the TAG, this memorandum is Task 2 included in AECOM's proposal and scope of work dated July 23, 2024. Task 1 was completed in Fall 2024 and included: reviewing published reports concerning the site and becoming informed on site conditions; site visit with Town of Carlisle BOH personnel; attending a Town of Carlisle BOH meeting; reviewing public repository at Town of Carlisle library; discussion with the site's Licensed Site Professional (LSP); and correspondence with Town of Carlisle Heath Agent.

This memorandum was prepared to the extent possible in layperson terms for distribution to the public (under Task 3). This memorandum provides a background information on the site property and release that caused impacts to site area groundwater; history of assessment and cleanup measures at the site and vicinity; the current extent of impacts from the release; the path to closure for the site impacts; information on private drinking water sampling; and recommendations. This memorandum was originally drafted in January 2025 and then finalized this month based upon input from the Town of

Carlisle BOH and stakeholders, and additional research. The final memorandum is being completed under Task 5 and will be available at the Gleason Public Library.

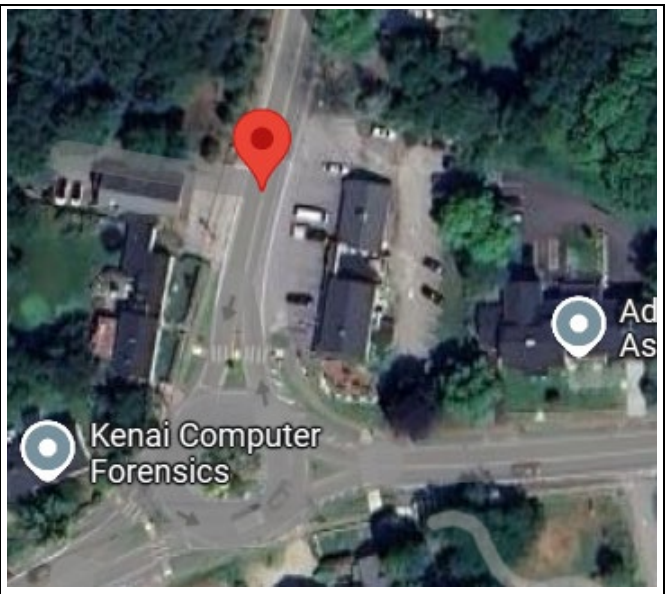
The site is regulated by MassDEP per the Massachusetts Contingency Plan (310 CMR 40.0000) due to a release of oil and/or hazardous materials to the environment (gasoline from former underground storage tanks). The site is assigned a number (Release Tracking Number (RTN 3-2578). The MCP process consists of assessment phases (Phase I and II) and remediation phase (Phases III – V), although not all sites have to go through all of the phases depending upon site conditions. In Massachusetts, LSPs oversee and provide opinions on assessment and cleanup or remediation of sites on behalf of the Potential Responsible Party for a site, following state regulations. MassDEP has the authority to audit a site and response actions completed.

Background Information – Former Daisy Gasoline Station

The former gasoline site, currently Fern's Country Store, is located at the northeast corner of Lowell Street and Bedford Street. The site operated as a retail gasoline station and convenience store from the 1930s until 1998 when the underground gasoline storage tanks were removed.

Below are a recent street level photo of Ferns County Store, an historical aerial photograph of the site when it was operating as a gasoline station, and a recent aerial photograph depicting the site in its current configuration. The central portion of the building (where the country store sign is located) was constructed to join the two buildings together during renovations implemented in 2009.

(Source: Historicalaerials.com, 1981)



(source: Google Maps, 2024)

Initial Release Identified - 1978:

In 1978, gasoline-impacted water was reportedly detected from the faucet in a residential apartment at the gas station site. The gasoline underground storage tanks were removed and replaced. Holes were observed in the tanks when they were removed. The contaminated or impacted soil below the tanks was removed; however, reportedly this contaminated soil was placed on top of the new tanks.

Second Release Identified – 1989 – MassDEP Issues Release Tracking Number 3-2578:

In February 1989, one of the underground gasoline tanks failed a tightness test and was removed in March 1989. During the removal, a leak in one of the lines from the tank to the dispenser was identified. The line was repaired and approximately 20 cubic yards of impacted soil were removed. The MassDEP was notified of this condition on October 11, 1989 and MassDEP issued Release RTN 3-2578.

Based on previous reports, methyl-tert-butyl ether (MTBE) was detected in a drinking water well at 15 Lowell Street [76 parts-per-billion (ppb)] in October of 1989 and in a drinking water well at 65 Lowell Street (17 ppb) in June 1990. As a result, Point of Entry Treatment (POET) water filtration systems were installed on numerous private drinking water supply wells in Carlisle center (the location of the POETs was not provided in documents reviewed).

MTBE was first added to gasoline in the United States in the mid-to-late 1980s:

- 1979: MTBE was introduced at low levels to replace lead as an octane enhancer
- MTBE was generally not introduced into New England gasoline blends before the mid-1980's
- 1990s: MTBE was used more widely to meet the Clean Air Act's requirement for oxygenated gasoline in areas with ozone problems
- 2005: MTBE was removed from gasoline in the United States after the Energy Policy Act removed the oxygenate requirement

Septic System Excavation and Potable Water Sampling– June and November 1995

During soil excavation for a new septic system at the site, petroleum odors were noted. The MassDEP was notified of this in July 1995 and subsequently conducted a soil gas survey (using a portable gas chromatograph) and no volatile organic vapors were reported.

A water sample was collected from a bedrock well on the gasoline station site and evidence of gasoline contamination was identified. Reportedly, the sample contained total xylenes [4 ppb) and 1,2,4-trimethylbenzene (2 ppb). MTBE was noted as not being tested. The concentrations of xylenes and trimethylbenzene were not above drinking water standards.

MCP Phase I ISI and Tier Classification – August/October 1996

Per the MCP, the site was classified as a Tier II disposal site in October 1996. MassDEP sent a letter to the owner of Daisy's indicating that one or more Immediate Response Actions (IRA) were required due to the potential release of MTBE from the gasoline station to several private water supply wells in the area.

Public Involvement Plan – March 1997 and IRA Plan to Address Off-site Drinking Water

On November 14, 1996, a petition was signed by 13 Carlisle residents to make the Daisy gasoline station a Public Involvement Plan (PIP) site. The PIP was presented to the Town of Carlisle on February 27, 1997 and approved in March 1997.

An IRA Plan was submitted to MassDEP on December 2, 1996 to address off-site drinking water quality. Quarterly sampling of drinking wells was conducted by 21E consulting firm in 1997. Concentrations of MTBE in post-filtered drinking water samples were below the drinking water standard of 70 µg/l. However, the concentration of MTBE in samples collected prior to filtration was upwards of 610 µg/l. Daisy's attorney submitted a letter to MassDEP indicating the site's owners lacked the financial ability to perform response actions.

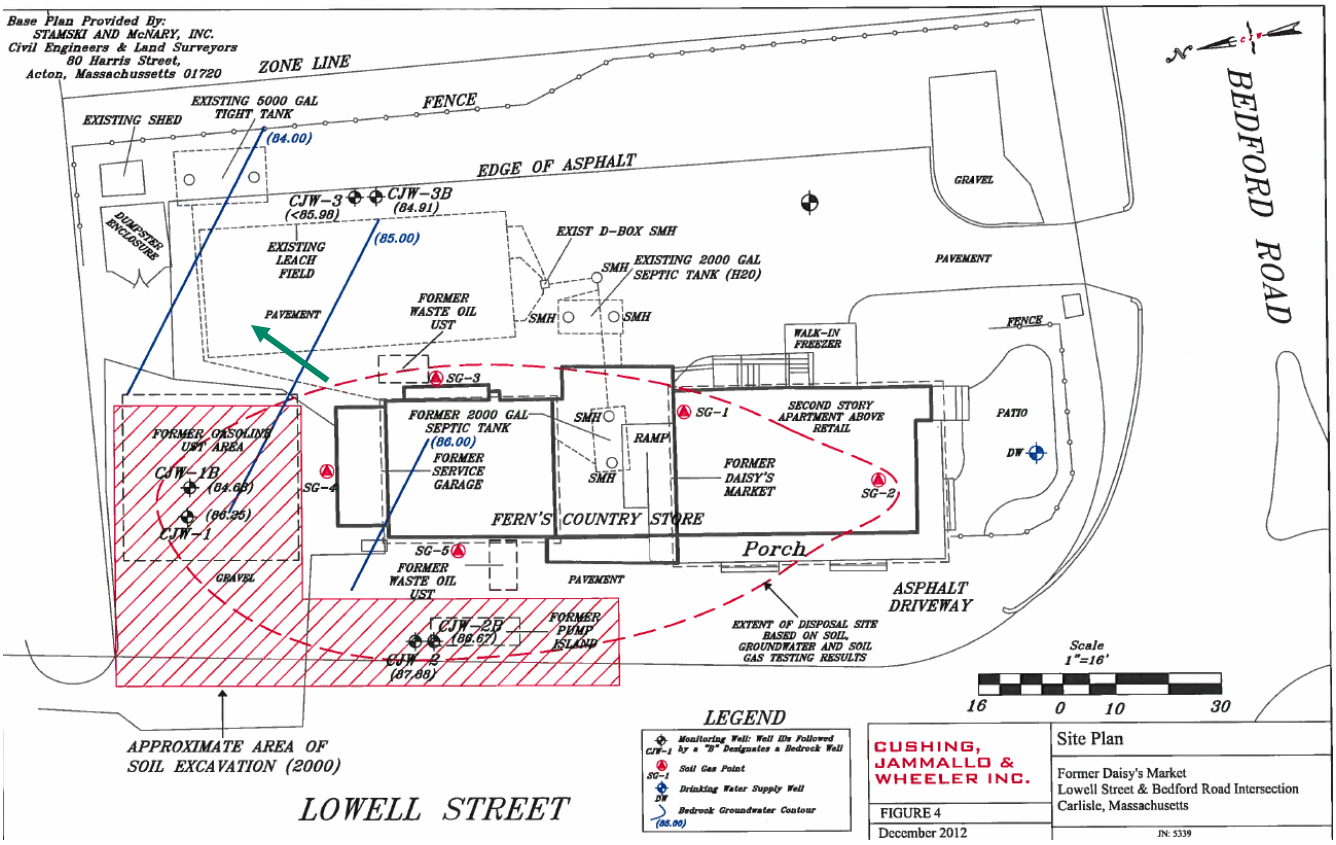
Site Redevelopment, Remedial Actions – 1998 through 2003

During the removal of the underground storage tank systems and dispenser islands in December 1998, several monitoring wells were installed and sampled. Impacted groundwater was identified to the north and east of the former underground storage tank pit/dispenser island. The consultant at that time (21E) was proposing remediation including groundwater recovery, vacuum enhanced groundwater recovery, and a soil vapor extraction system (SVE).

Due to the Daisy's financial inability to perform response actions, Handex, Inc. (Handex), on behalf of MassDEP, oversaw the removal of 1,062.95 tons of petroleum-impacted soil from the former underground storage tank and dispenser island locations in 2000. Handex collected 19 soil samples from the excavation. Nine of the 19 samples contained concentrations of petroleum hydrocarbon fractions in excess of applicable soil regulatory limits. The higher concentrations were detected in the location of the former pump island at approximately 10 to 11 feet below grade or ground surface.

Handex also conducted quarterly sampling from onsite monitoring wells between 2000 and 2003. Groundwater flow direction was reportedly in a northeasterly direction. Impacted groundwater remained on the northern and western portions of the property.

Below is a site plan depicting former and current property details. The plan shows the location of the former service garage and market, the former USTs and pump island, the former septic tank, and former soil excavation area (red hash lines). Additionally, the plan shows the current store configuration, the current septic tank and tight tank locations, the current leach field, and the current potable well location. The green arrow depicts the groundwater flow direction.



(Ref: Cushing, Jammallow & Wheeler, Inc., Partial Phase II Comprehensive Site Assessment, January 10, 2013)

Regulatory Non-Compliance/Financial Inability Status

The MassDEP issued a Notice of Non-Compliance (NON) to Mr. Daisy (site owner) for failure to provide MCP reports in a timely manner (Phase II, Phase III, Phase IV, and Response Action Outcome [now referred to as a permanent or temporary solution]) as well as indicating that the site was located within a Zone II Wellhead Protection Area that changed the site classification from Tier II to Tier I. The MassDEP notified Mr. Daisy that they were terminating their response activities at the site in March 2004.

In July 2007, an attorney on behalf of the Potentially Responsible Parties (PRPs – Mr. Daisy, Ms. Culkin, and Carlisle Center Ventures, LLC) notified the MassDEP of MTBE in post-filter drinking water samples above drinking water standards from several surrounding residential wells. In March 2008, the PRPs filed for financial inability status. The MassDEP and PRPs entered into a settlement agreement in October 2008 (ACO-BO-08-3-Z007-SETT) that outlined deadlines to complete MCP phased reports (Phase II, Phase III, RAO) by May 30, 2013. Several letters were issued to MassDEP by the PRPs' consultant, Cushing, Jammallo & Wheeler, Inc. (CJW) noting a delay in response actions and requesting extensions due to insufficient funds.

Site Redevelopment – 2009

Site redevelopment activities included filling of an existing septic tank between the buildings, construction of a slab foundation that connected the southern and northern buildings, remodeling the garage into the country store, and the installation of a new septic tank and composting toilet to the east of the building addition. During construction activities, soil was managed under a MCP Release

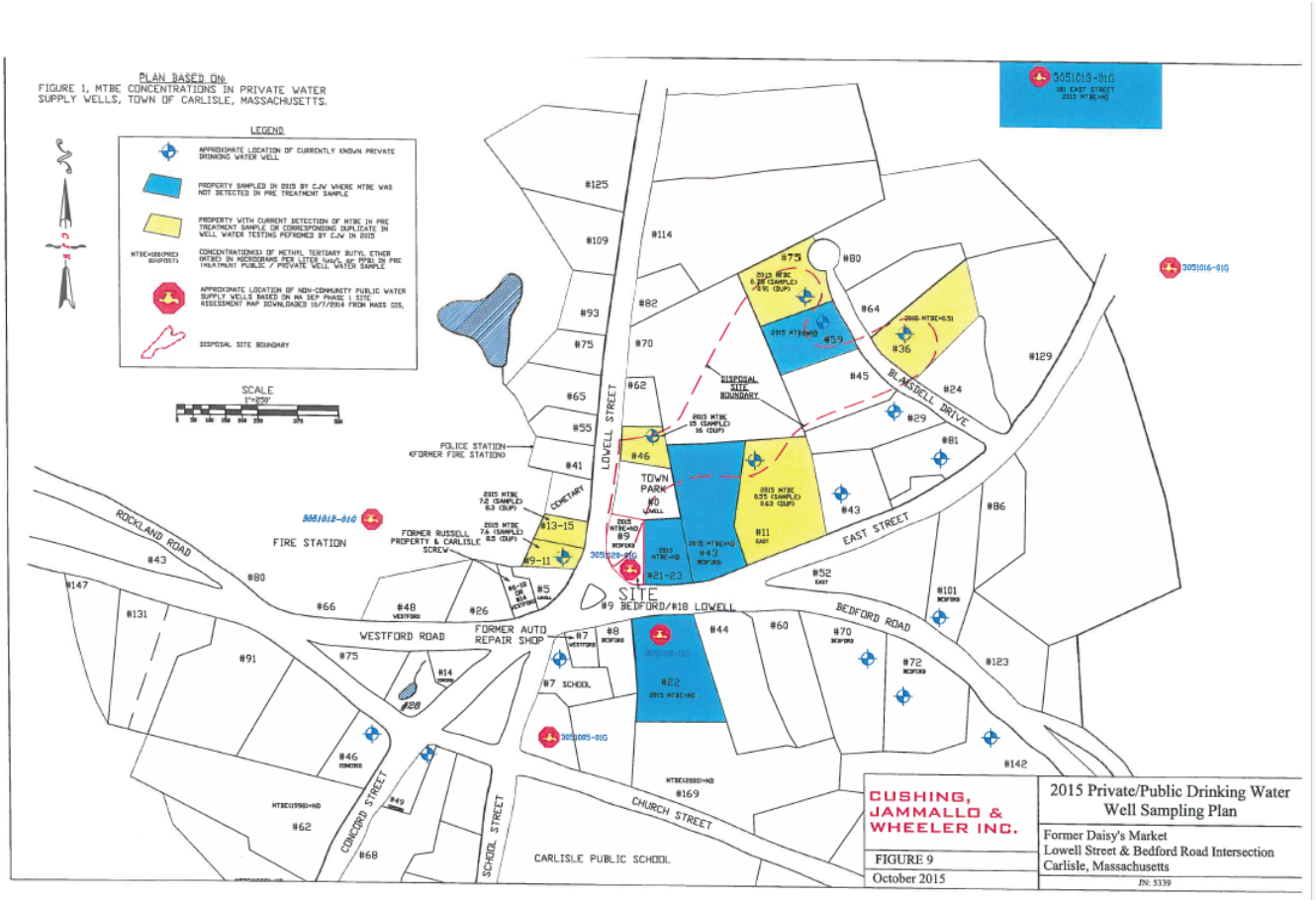
Abatement Measure (RAM) Plan. No impacted soil was encountered above regulatory limits. The RAM Completion report was filed with MassDEP in August 2009.

MCP Phase II/II and Temporary Solution Statement (TSS)

Between 2013 and 2017, the Phase II was completed as well as termination of the PIP in 2015. As part of the Phase II activities, new monitoring wells were installed. These included three shallow and three bedrock wells. Soil samples collected from the new monitoring wells did not contain hydrocarbon fractions in excess of regulatory limits. Petroleum hydrocarbons were detected in groundwater above applicable GW-1 regulatory limits (i.e. drinking water) in wells located to the north and west of the building (wells CJW-1/1B, CJW-2/2B).

The on-site drinking water well was sampled in 2012, 2013 and 2016. No volatile organic compounds (VOCs) were detected above laboratory reporting limits during these sampling rounds. Lead was detected in the drinking water sample analyzed in 2013 at a concentration below regulatory limits (reportable concentrations).

As part of the Phase II activities, analytical data was compiled from numerous public/private wells between 1995 and 2014. In August 2015, CJW collected drinking water samples from 12 off-site private wells. MTBE was not detected above drinking water standards in the samples collected; however, MTBE was identified in 6 of the samples above the laboratory reporting limit at locations that were equipped with POETs. MTBE was not present in post-treatment samples. Below is a figure depicting the location of known private drinking water wells (blue and white circles), properties with potable wells sampled in 2015 where MTBE was not detected in the pre-treatment samples (blue shading), properties with potable wells sampled in 2015 with detections of MTBE in the pre-treatment samples or in the duplicate sample (yellow shading), and public supply wells (red faucets).



(Ref: Cushing, Jammallo & Wheeler, Inc., 5-Year Periodic Review, August, 2023)

Summary of August 13, 2015 Drinking Water Sampling (CJW, Phase II, 2017)

Below is table summarizing the potable water supply address, concentrations of MTBE detected and if the sample was collected prior to a treatment system.

Address	MTBE Concentration (initial/duplicate) in micrograms per liter (µg/l) = ppb	Treatment System
181 East Street	ND	No
43 Bedford Road	ND	No
22 Bedford Road	ND	No
21-23 Bedford Road	ND	No
9 Bedford Road	ND	No
59 Blaisdell Drive	ND	No
46 Lowell Street	**15/16**	**Yes, sample before system**
75 Blaisdell Drive	**0.8/0.91**	**Yes, sample before system**
9-11 Lowell Street	7.6/8.5	Yes, sample before system
11 East Street	**0.55/0.63**	**Yes, sample before system**
13-15 Lowell Street	7.2/8.3	Yes, sample before system
36 Blaisdell Drive	**0.51/ND**	**Yes, sample before system**

Highlighted cells are included in the disposal site boundary

According to CJW (consultant for site PRPs), properties located to the west of Lowell Street along Westford Road were not included in the disposal site boundary as previous reports indicated that Lowell Street, that runs north to south through Carlisle Center, represents a topographic high with topography sloping downgradient to the east and west from Lowell Street and upgradient from the south.

Additionally, other off-site potential sources of contaminants of concern included:

- a former UST at the Carlisle police station (41 Lowell Street), located to the northwest;
- a former high test gasoline UST at the Former Carlise Screw (6 Westford Street); and,
- a former automotive repair shop at 7 Westford Road.

Based on the risk assessments completed as part of the Phase II, no substantial hazard for current and ecological receptors to site soil, groundwater, or indoor air were identified; no significant risk for potential human exposure to soil by construction workers or residents for current and foreseeable future conditions was identified; and no significant risk to the environment, safety and public welfare

was identified. However, a condition of no significant risk did not exist for unrestricted future residential use for groundwater as drinking water.

Phase III Remedial Action Plan (CWJ, October 2017)

The MCP Phase III Remedial Action Plan (RAP) evaluates potential remedial action to achieve regulatory closure taking into consideration costs and feasibility of remedial actions. CJW evaluated several remedial options to achieve regulatory closure and chose Monitoring Natural Attenuation (MNA). MNA is an effective remedial strategy for petroleum hydrocarbons and under favorable conditions, it may reduce contaminant concentrations by natural degradation processes to achieve site closure. MNA requires continued monitoring and evaluation of site conditions.

Temporary Solution Statement (TSS) – July 2018/ 5 Year Review - 2023

Based on the Method 3 risk characterization completed during Phase II, due to the presence of impacts to drinking water, it was not possible to file a Permanent Solution Statement (PSS) or site closure; therefore, the TSS was filed. The MCP requires that every 5 years the TSS be re-evaluated. Under the TSS, groundwater samples were proposed to be analyzed from 9 of the onsite monitoring wells for hydrocarbon fractions with target analytes and soil gas samples would be collected annually.

The initial 5-year review was completed in August 2023. Soil gas sampling was completed annually from 2018 through 2022, and groundwater sampling was completed six times between 2018 and 2023. Based on the groundwater analytical data, one or more petroleum constituents were detected above GW-1 standards; however, it was noted that concentrations have decreased since 2012. As of May 2023, only the concentration of petroleum hydrocarbons in well CJW-1B (bedrock, former UST), CJW-2 (former pump island) and CJW-6 (town park) were above drinking water regulatory limits. MTBE was not detected in the groundwater samples analyzed in May 2023. AECOM notes that drinking water samples have not been collected from surrounding properties since 2015.

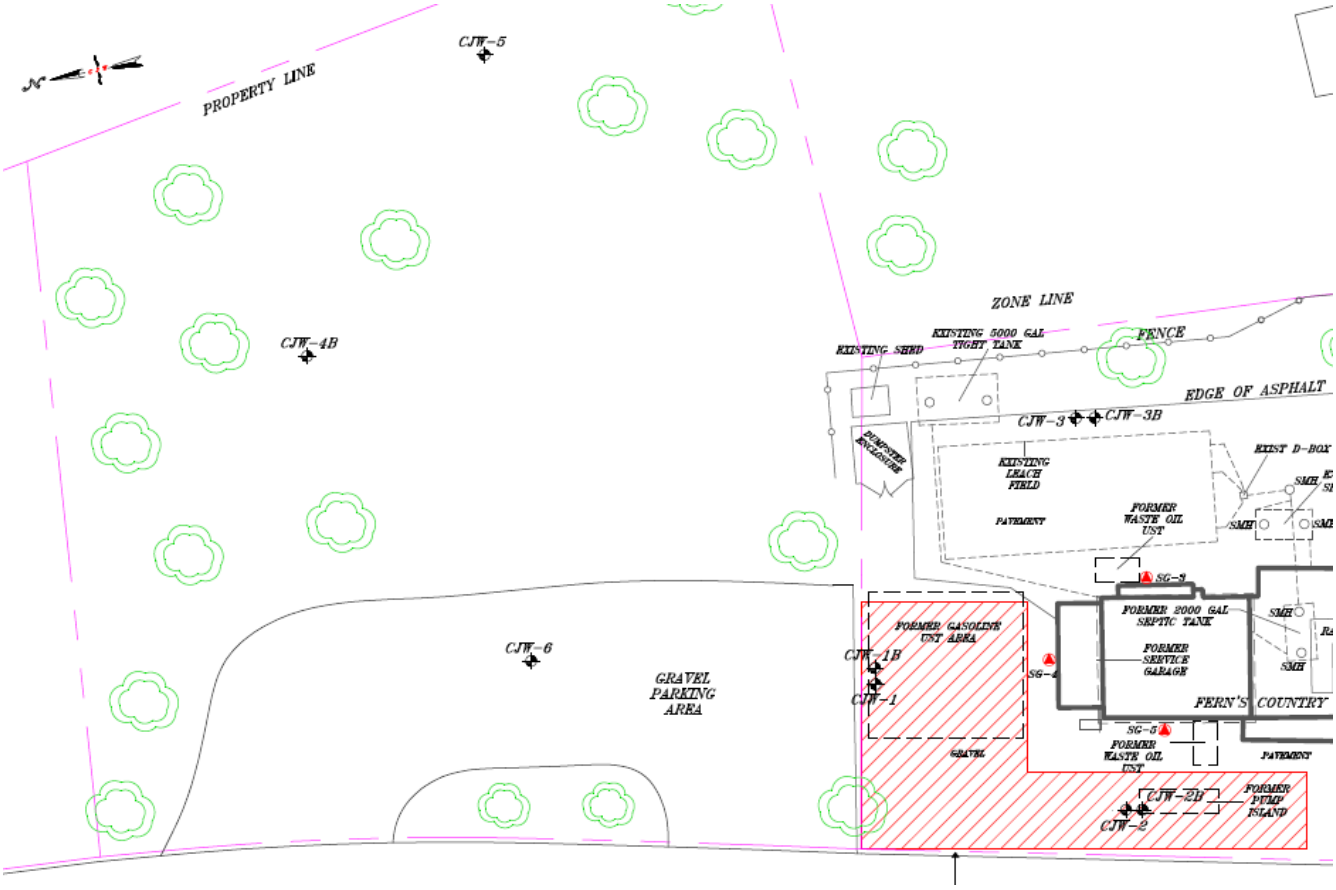
Current Status of Point of Entry Treatment Systems (POETs)

Based on documents reviewed, POETs are present in residential properties highlighted in yellow on the table above as well as the property as 45 Blaisdell Drive. A well survey was sent out to residents located near the center of Carlisle in January 2025 by the Board of Health. Of the 25 responses to the survey, only two residents whose properties fall within the disposal site boundary of the former gasoline station responded (46 Lowell St. and 45 Blaisdell), responded to the survey. Both of these residents have either POU with reverse osmosis or POET with carbon treatment. Systems with reverse osmosis and activated carbon are effective in removal of petroleum compounds from drinking water. Additional POETs may have been installed at surrounding properties; however, there is no additional information on what properties currently have POETs. It appears that ongoing maintenance of off-site POETs is not being conducted by the PRPs. Residents that have treatment systems reported to be maintaining their systems at various frequencies. A summary of the well survey responses is attached to this memorandum.

Updated Center Well Groundwater Analytical (2025)

On January 25, 2025, CJM collected groundwater samples from monitoring wells CJW-4B, CJW-5 and CJW-6 that are located on the town's park parcel located north of the former Daisy station (see figure below). These wells are located cross- to downgradient of the former source area and the nearest private well (46 Lowell Street). The groundwater samples were analyzed for volatile petroleum hydrocarbons (VPH) with reporting of target analytes. The target analytes include benzene, toluene, ethylbenzene, xylenes (known as BTEX compounds), naphthalene and MTBE. Concentrations of C5-C8 aliphatic hydrocarbons were detected in well CJW-4B and CJW-6 at 196 and 220 micrograms per

liter (ug/l), which are below the MCP Method 1 GW-1 standard of 300 ug/l and C9-C10 aromatic hydrocarbons were detected in well CJW-6 at 192 ug/l which is below the MCP Method 1 GW-1 standard of 200 ug/l.



Ongoing Maintenance/Sampling of Private Wells and Filtration Units

Based on the results of the water well survey, residential properties within the site limits or vicinity that have some type of filtration system in use such as point of use, point of entry or sediment/softening filters, have had these systems installed and maintained by outside contractors, self-installed and maintained, or systems were pre-existing and systems are either self-maintained or an outside contractor maintains the systems.

AECOM recommends continued maintenance of systems as required by the manufacturer, or as deemed necessary based on use as some types of filters may require more or less change outs based on water quality (i.e. sediment in water).

There is no mandatory state requirement for private well testing; however, the MassDEP recommends that private water supplies be tested every two years. The Carlisle BOH requires testing for all new wells and upon transfer from one owner to another. The Board of Health requires wells be sampled for coliform bacteria, arsenic, chloride, iron, lead, manganese, nitrogen-nitrate, pH, radon, sodium, sulfate, and conductivity. The BOH requires that residents in Residence District A have their well water further analyzed for VOCs and MTBE (Town of Carlisle Water Supply Regulations, 2019).

The State of Massachusetts provides a list of certified laboratories to use for water well testing. The link to the list is:

https://www.mass.gov/how-to/find-a-certified-laboratory-for-water-testing

Additionally, Massachusetts offers an online tool where you can enter your water quality data and learn about potential health risks and recommended water treatment options. The link for this tool is below.

Be Well Informed (BWI) online tool

The Carlisle BOH may offer periodic testing of private wells for residents located in the Residence District A. AECOM recommends contacting the BOH for additional details.

Future Sale of the Former Daisy's Gasoline Station and Future MCP Reporting

Typically, during the transfer of a Massachusetts MCP disposal site, the disposal site sampling and reporting responsibilities stay with the property. Therefore, unless otherwise outlined in the purchase and sale agreement, the new property owners would take on the responsibility of conducting the required sampling and reporting under the MCP until a permanent solution can be achieved. Future activities would include periodic sampling of groundwater monitoring wells as well as potential sampling of residential wells within the disposal site boundaries.

Currently CJW appears to sample the town park wells every two years and completed the five-year review report that covered the period from August 2018 through August 2023. The next five-year review would be anticipated to cover the period from August 2023 through August 2028.

The link below will bring you to the files submitted to the MassDEP for the former Daisy gasoline station. The transmittal forms are available on the left side of the table (Form Names) while the supporting reports are provided on the right side of the table (Attachments).

https://eeaonline.eea.state.ma.us/portal/dep/wastesite/viewer/3-0002578

Summary of Well Survey Response

Water Well Survey Response
TAG - Carlisle MA
Former Daisy Gasoline Station, RTN 3-2578

Name	Address	M/B/L	distance (ft)/direction	Within Disposal Site	Well Type/Depth	Uses	Bottled	Equipment	Type of Treatment	# of systems	Maintenance	Frequency	Annual Costs
Margaret Rollins	13-15 Lowell St	22-29-0	50 West	N	Unknown	bathing	Y	POET	carbon, sediment	1	Culligan	1x/yr	$500
Ann Davidson	46 Lowell St.	22-41-A	160 North	Y	Unknown	drinking, bathing, irrigation	N	POU	RO, Softening/Conditioning, sediment filter	1	H2O Care	2x/yr	$ 675.00
Annette & John Lee	65 Lowell St.	22-33	325 Northwest	N	Bedrx	drinking, bathing, irrigation	N	None	NA	NA	NA	NA	NA
Gale Constable	75 Lowell Street	22-34	440 Northwest	N	Bedrx (237')	drinking, bathing, irrigation, other	N	POET	Filter sediment only	1	Homeowner	4x/yr	$100.00
Blin/Morse	82 Lowell St.	22-38-1B	550 North	N	Bedrx (400')	drinking, bathing	N	POET/POU	POET-carbon, sediment, softening, POU RO sink	2	Skillings & Sons	1x/yr	$ 700.00
Sam Madden	93 Lowell St	22-35-0	560 North	N	Bedrx/shallow (100')	drinking, bathing	N	POET/POU	sediment, softening (POET), RO (POU)	3	H2O Care	1x/yr	$ 500.00
Donna Seidlar	109 Lowell St	22-36-0	762 North	N	Bedrx	drinking, bathing irrigation	N	POET	softening, conditioning	1	Steve Sontag	2-3 yr	unk.
Edward & Elizabeth Saef	138 Lowell St	21-19-B	1,025 North	N	Bedrx	drinking, bathing	Y	POET	softening	2	owner/well company	1x/yr	$ 800.00
Kim & Tom Ratcliffe	14 Concord St.	22-22-0	410 Southwest	N	Bedx, dug	drinking, bathing, irrigation	N	POET, POU	RO, calcite filter	2	Friots Water Treatmen	1-2 x/yr (guestimate)	$ 200.00
Peter Nash	88 Concord St.	15-37-1	1,000 Southwest	N	Bedrx	drinking, bathing	N	POET/POU	POET whole house neutralization, softening, carbon, sediment. POU RO kitchen sink	2	Skillings & Sons	POET 2 yr/POU 3 yr	$1,315.00
Ali Yeyinmen	7 School Street	22-4	230 Southwest	N	Unknown	drinking, bathing, irrigation	N	POU	carbon filter, reverse osmosis, softening	3	Skillings & Sons	2x/yr	$924
Melissa Suderman	50 School Street	15-7	623 Southwest	N	Unknown	drinking, bathing, irrigation	N	POU	Reverse Osmosis	1	Homeowner	annually	$500
John Reed	112 School Street	15-4-0	1,200 Southwest	N	Unknown	drinking, bathing	N	None	sediment filter	1	owner	quarterly	$100
Carol White	140 School Street	15-3-0	1,396 Southwest	N	Dug	drinking, bathing, irrigation	N	POET	softening/conditioning	1	Skillings & Sons	unk	unk
Paddington Associates	7 Westford St.	22-3-0	South beyond circle	N	Dug	drinking, irrigation	Y	preferred by tenants	sediment, softening	1	Friots Water Treatment	4x/yr	$ 500.00
Kathleen Keller	14 Westford St	22-26-0	50 Southwest	N	Unknown	drinking, bathing	N	None	softening	unknown	HOA	unk	unk
Jenifer Bush	68 Church St.	15-8-0	665 Southwest	N	Bedrx	drinking, bathing, irrigation	N	POET	softening, sediment,		Skillings & Sons	1x/yr	unk
Melinda Burri	81 East St.	22-48-3	725 East	N	Bedrx, dug	drinking, bathing, irrigation (dug)	N	POU	RO	1	homeowner	2x/yr	$ 200.00
David & Sara Maccarthy	29 Blaisdell Dr.	22-49-2	575 East-northeast	N	Unknown	drinking, bathing	N	POET	carbon	1	A&B Water	2x/yr	unknown
Mark & Alexandra Sheehan	45 Blaisdell Dr	22-50-0	540 Northeast	Y	Unknown	drinking, bathing, irrigation	N	POET	carbon, softening,	2	AB Water	every 2 yrs	500/yr
Jeffrey Johnson	64 Blaisdell dr	22-54-32	700 Northeast	N	Shallow	drinking, bathing	N	POU	carbon, RO, sediment, calcite & mineral boost	2	Homeowner	2x/yr	$ 475.00
Martha Bedrosian	44 Bedford St	22-18	150 Southeast	N	Bedrx	drinking, bathing, irrigation, other	NA	POET, POU	iron removal, radon mitigation, softener,	5	Skillings & Sons	annually	$1,500.00
Phillip Drew	101 Bedford Rd.	22-65	850 East	N	Bedrx	drinking, bathing, laundry	N	None	NA	NA	NA	NA	NA