DRAFT

IMMEDIATE RESPONSE ACTION PLAN MODIFICATION

Barnstable County Fire and Rescue Training Academy
155 South Flint Rock Road
Barnstable, Massachusetts
MassDEP Release Tracking No. 4-26179
Project File 6206

Prepared For:

Barnstable County
Barnstable, Massachusetts
C/o Jack Yunits, Barnstable County Administrator
3195 Main Street
Barnstable, Massachusetts

Submitted To:

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup
Southeast Regional Office
20 Riverside Drive
Lakeville, MA 02347

August 2019

August 28, 2019

Bureau of Waste Site Cleanup
Southeast Regional Office
Massachusetts Department of Environmental Protection
C/o Angela Gallagher
20 Riverside Drive
Lakeville, MA 02347

RE: DRAFT Immediate Response Action Plan Modification
Barnstable County Fire Training Academy Facility
155 South Flint Rock Road, Barnstable, Massachusetts
DEP Release Tracking No. 4-26179

Dear Ms. Gallagher:

BETA Group, Inc. (BETA) has prepared this Draft Immediate Response Action (IRA) Plan Modification for the Disposal Site referenced as the Barnstable Country Fire and Rescue Training Academy (BCFRTA) Facility located at 155 South Flint Rock Road in Hyannis, MA (the Site). This document has been prepared on behalf of our client, Barnstable County, and was completed in accordance with Massachusetts Contingency Plan (MCP) - 310 CMR 40.0000.

This Draft IRA Plan Modification has been prepared in response to the Request for Expedited Immediate Response Action Plan Modification/Interim Deadline-Enforcement Document Number 6694, dated May 1, 2019 issued by the Massachusetts Department of Environmental Protection (MassDEP) and amended by email correspondence by the MassDEP. The May 1, 2019 DEP correspondence requests an expedited submission of the IRA Plan Modification to include details for the expansion of the groundwater recovery and treatment system and capping measures to prevent infiltration of precipitation through the soils at the Site.

If you have any questions upon review of this plan, please contact us at your convenience. Thank you.

Sincerely,

BETA Group, Inc.

Mykel D. Mendes
Project Engineer

Roger P. Thibault, P.E., LSP
Senior Environmental Engineer

cc: MassDEP/BWSC
Jack Yunits, Barnstable County Administrator
Steve Tebo, Barnstable County Interim Assistant Administrator and Director of Facilities

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1.0 INTRODUCTION

BETA Group Inc. (BETA) has prepared this Draft Immediate Response Action (IRA) Plan Modification (Mod) to address a release of potentially hazardous materials related to fire-fighting foams and attributed to the Barnstable County Fire and Rescue Training Academy (BCFRTA) facility located at 155 South Flint Rock Road in Barnstable, Massachusetts (the BCFRTA or facility). This document has been prepared and is being submitted to the Massachusetts Department of Environmental Protection (MassDEP) – Bureau of Waste Site Cleanup (BWSC) in response to the detection of elevated concentrations of per- and polyfluoroalkyl substances (PFAS), including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), in soil and groundwater at the facility and in adjacent areas, in particular to the east, southeast of the facility. This Draft IRA Plan Modification has been prepared on behalf of our client, Barnstable County and is in draft form for public comment per the Final Public Involvement Plan, dated June 27, 2019, prepared by BETA Group, Inc. for the BCFRTA release Site on behalf of Barnstable County.

This Draft IRA Plan Modification has been prepared in accordance with the Massachusetts Contingency Plan, 310 CMR 40.0000 (MCP) in response to the Notice of Audit Findings/Compliance and Technical Assistance/Interim Deadline, dated November 21, 2018 issued by the Massachusetts Department of Environmental Protection (MassDEP) and the Request for Expedited Immediate Response Action Plan Modification/Interim Deadline-Enforcement Document Number 6694, (Request for IRA Plan Mod) dated May 1, 2019 also issued by the MassDEP, as amended by email correspondence. The original November 21, 2018 Interim Deadline document established February 28, 2019 as a deadline for feasibility evaluation of several remedial response actions and the date of the subsequent six-month IRA Status Report (August 28, 2019) as the deadline for presentation of detailed plans for the response actions deemed feasible. The May 1, 2019 DEP Request for IRA Plan Mod requested an expedited submission of the IRA Plan Modification to be completed on or before June 28, 2019. MassDEP requested that this IRA Plan Modification include details for the expansion of the groundwater recovery and treatment system and capping measures to prevent infiltration of precipitation through the soils at the Site. On June 3, 2019, the County submitted a formal request to restore the original IRA Plan Modification Deadline to August 28, 2019, indicating that it was not technically feasible to meet the expedited deadline and that the Public Involvement Plan for the Site required that the document be a public comment draft only. The letter was submitted to MassDEP via the eDEP system and is posted on the MassDEP's Site Database. The County later received email response by Angela Gallagher of MassDEP that MassDEP accepted the County's request and the deadline for the IRA Plan Modification will be restored to August 28, 2019.

The completed BWSC 105 Immediate Response Action (IRA) Transmittal Form will be submitted to the MassDEP electronically via the eDEP system. This document is being submitted to MassDEP as an attachment to that form. A copy of this form prior to electronic signature is included in Appendix A.

As current owners of the BCFRTA, Barnstable County, as represented by the Barnstable County Commissioners, have been named as the Potentially Responsible Party (PRP) for this release. The contact person for the Site and release is:

Jack Yunits, County Administrator
Barnstable County
3195 Main Street
Barnstable, MA 02630

Telephone: 508-375-6643
Email: jyunits@barnstablecounty.org

BETA is performing MCP Response Actions at the Site on behalf of the Barnstable County Commissioners. The Licensed Site Professional (LSP) overseeing Response Actions for this release is:

Roger Thibault, P.E., LSP No. 1443
BETA Group Inc.
701 George Washington Highway
Lincoln, RI 02865

Telephone: 401-333-2382
Email: rthibault@beta-inc.com

2.0 GENERAL DISPOSAL SITE INFORMATION

2.1 Property and Site Description

The Barnstable County Fire and Rescue Training Academy (BCFRTA) facility is located on South Flint Rock Road in the Town of Barnstable. It appears on the United States Geological Survey (USGS) Topographic Quadrangle – Hyannis, Massachusetts. See Figure 1 – Site Location map, prepared from a portion of the referenced USGS Topographic Quadrangle map. The Site is currently zoned for industrial use.

At this time, the preliminary MCP Disposal Site (the Site) associated with RTN 4-26179 is considered to comprise approximately the southern half of the BCFRTA facility, a portion of the westerly adjacent Flintrock Pond, and a large woodland area to the southeast of the BCFRTA facility, approaching Mary Dunn Pond, as shown on Figure 2A.

The 6.2 acre BCFRTA facility is improved by four primary buildings: an auxiliary fire station and training building (with two classrooms, administrative offices, and two apparatus bays), a classroom building, a smokehouse, and a burn building (for live fire suppression training), along with several sheds and outbuildings used for fire and rescue training activities. Refer to Figure 2B. The BCFRTA facility is secured by chain link fencing and a locked gate.The BCFRTA facility is listed on the Town of Barnstable Assessor's on-line records as Map 313, Lot 007. The current owner-of-record is the County of Barnstable, who acquired the facility from the Town of Barnstable in 1983 by deed recorded June 3, 1983, Barnstable Registry of Deeds, Book 3759, Page 39. Utilities servicing the BCFRTA include municipal water, a private underground septic system, aboveground electricity and telecommunications. The BCFRTA was first constructed on land donated to the Town of Barnstable by the Cobb Trust in 1955. The BCFRTA has been used for public safety training since the 1950's. The BCFRTA has been used and continues to be used for public safety training by fire departments and fire districts from throughout Barnstable County, fire departments outside of Barnstable County, and other public and private institutions. Water training activities have been halted as of June 2019.

Land surrounding the facility is primarily undeveloped, wooded land within a public water supply protection area. Flintrock Pond occupies approximately 6 acres directly to the west of the facility. Several public water supply wells and their related facilities are located to the east, southeast, and west of the BCFRTA. The southeastern portion of the Site includes land owned by the Town of Barnstable, which is crossed by two electric power transmission lines running presumably within easements.

Private industrial properties and related structures are located approximately 500 to 1,000 feet south of the Site. The Barnstable Municipal Airport is located to the west (runway 15 – 33) and south of the Site and the BCFRTA.

The nearest residential properties are located approximately ¼ mile to the north of the Site. Based on 2010 U.S. Census data, the residential population located within a ½ mile radius of the Site is estimated to be less than 150 people. There are no known Institutions located within 500 feet of the Site. The facility currently has approximately 2 to 5 workers who may be considered full-time. During training activities, 20 to 30 fire fighters or rescue personnel and training personnel may temporarily use the facility. The municipal well pumping facilities are not staffed full-time.

2.2 Latitude and Longitude / Universal Transverse Mercator's

The coordinates for the Site are shown below. For simplicity, these coordinates are for the southerly end of the BCFRTA.

Latitude/Longitude	Latitude:	41º 40' 41.53"
	Longitude:	70º 17' 7.82"
UTM Coordinates	Easting:	393,002
	Northing:	4,614,847

2.3 Environmental Setting and Sensitive Receptors

BETA's review of the Massachusetts GIS Priority Resources (21E) mapping revealed that the Site is located within a Zone II Public Water Supply Protection Area and a Medium-Yield Sole Source Aquifer. The BCFRTA is situated to the west and most likely upgradient of the Mary Dunn public water supply wells 1, 2, and 3 under pumping conditions. Mary Dunn Wells 1, 2, and 3 are located within the preliminary Disposal Site boundary at this time due to the detections of PFAS in the groundwater at those wells. See Figure 3 – Phase I Site Assessment Map. There are no known private potable water wells located within 500 feet of the Site.

Mary Dunn Well 3 (MD-3), which is the nearest public water supply well to the facility, has been documented to pump at an average rate of 380 to 450 gallons per minute (gpm). Mary Dunn Wells 1 and 2 (MD-1 and MD-2) are located approximately 1600 feet and 1800 feet, respectively, southwest of the BCFRTA. These wells have been reported to have been pumped at rates of 400 gpm, each. Airport Well 1, understood to not be in use, is located further to the southeast of the Site, south of Mary Dunn Pond. Two other public water supply wells, identified as BFD-2 and BFD-5, are located to the west and most likely upgradient of the Site.

According to the USGS Topographic Quadrangle – Hyannis, Massachusetts, elevations at the Site are approximately 30 to 50 feet above mean sea level (MSL). Topography of the Site can be categorized as generally flat with slight to moderate slopes downward to the west and southeast, toward Flintrock Pond and Mary Dunn Pond, respectively.

The nearest surface water body to the Site is Flintrock Pond, located adjacent to the BCFRTA. A portion of Flintrock Pond is located within the preliminary MCP Disposal Site Boundary based on the detection of PFAS in sediment and surface water. There are no streams or wetlands located at the Site. Please refer to Figures 2A and 2B.

2.4 MassDEP Method 1 Categories

2.4.1 Ground Water Category

As noted, the Site is located within a Zone II Public Water Supply Protection Area and a Medium-Yield Sole Source Aquifer. Therefore, MCP Method 1 Ground Water Category 1 (GW-1) applies to the Site. Groundwater at the Site is conservatively categorized as Method 1 GW-2 because groundwater has been measured at depths less than 15 feet below grade and an occupied building is located within the BCFRTA facility. All ground waters within the Commonwealth are considered a potential source of discharge to surface waters and shall be categorized, at a minimum, as Method 1 GW-3. Therefore, the applicable Method 1 Ground Water Categories for the Site are GW-1, GW-2 and GW-3.

2.4.2 Soil Category

Soil categorization is based upon the type of human receptor and three potential exposure criteria: frequency of use, intensity of use, and accessibility of soil. The BCFRTA portion of the Site is occupied by a fire and rescue training facility. Based on the nature of the facility, children are assumed to be "not present." Adults who work at the site as staff members are assumed to be present at "high frequency." Impacted soils have been identified beneath unpaved areas at depths ranging from approximately less than 3 to 15 feet below the ground surface. Therefore, impacted soils at the BCFRTA are considered "potentially accessible."

Only groundwater impacts at significant depths below the ground surface have been identified at the remainder of the Site (outside of the BCFRTA), which consists of undeveloped, industrially zoned land, a portion of a utility easement, and three unmanned public water supply well stations.

Intensity of use in regard to soil disturbance in the release area for adults at the Site is considered "high" because the area of impact at the BCFRTA could potentially be disturbed during firefighting / rescue training activities; however, on-Site training activities involve a relatively short duration of high intensity use. Therefore, for current Site uses, soils at the Site are categorized as Soil Category S-2. The applicable Soil Categories for current Site uses have been identified as S-2/GW-1, S-2/GW-2 and S-2/GW-3.

The applicable Soil Categories for unrestricted future Site uses are S-1/GW-1, S-1/GW-2 and S-1/GW-3.

3.0 DISPOSAL SITE HISTORY

The BCFRTA has historically been the subject of four MassDEP RTNs: 4-190, 4-11707, 4-20021, and 4-26179. This IRA Plan Modification is being submitted for RTN 4-26179 only. The original RTN, 4-190, is being managed separately; closure has been achieved for the remaining two RTNs.

3.1 Release History and Description - RTN 4-26179 (PFAS Release)

In May 2012, USEPA issued their final rule "Revisions to the Unregulated Contaminant Monitoring Rule (UCMR3) for Public Water Systems," which was a national sampling mandate for "emerging contaminants" in public water supplies. The required sampling list included PFAS (PFOS and PFOA). In November 2013, samples were collected from Mary Dunn supply wells MD-1, MD-2 and MD-3 and analyzed for PFAS. At the time of the testing, the US EPA Provisional Health Advisory (HA) was 0.20 micrograms per liter (µg/L) for PFOS. Analytical results revealed evidence of PFOS contamination in all three wells sampled. MD-1 and MD-2 were temporarily removed from service. MD-3 was apparently not in use at that time. A treatment system that utilizes granular activated carbon (GAC) was later implemented for MD-1 and MD-2 [July 2015] by the Hyannis Water Department. In 2016, GAC treatment was also implemented for MD-3. [See below].

In November 2013, Barnstable County personnel also collected soil and groundwater samples from the BCFRTA property, located approximately 1,000 feet west of the Mary Dunn wells, and submitted them for laboratory analysis of PFAS. Groundwater analytical results revealed that BCFRTA groundwater was impacted by PFOS and MassDEP was subsequently notified. PFOS was also detected in soil at the BCFRTA and in surface water and sediment within the adjacent Flintrock Pond. As summarized in the Notice of Responsibility (NOR) issued by MassDEP on August 4, 2016 (see below), based on the detected PFAS concentrations in soil and groundwater at the BCFRTA and the inferred groundwater flow direction being to the southeast (toward the Mary Dunn wells), MassDEP determined that the releases of PFAS from the use of AFFF at the BCFRTA is a source of PFAS detected in the Mary Dunn wells.

As a voluntary measure, Barnstable County refurbished the former perchlorate pump and treat system located at the BCFRTA to help remediate and contain the PFOS apparently migrating from the BCFRTA facility. The groundwater pumping and treatment system (GWP&TS) was re-started using GAC for treatment in July 2015. The system utilizes a groundwater recovery well, PRW-4, located approximately 800 feet southeast of the BCFRTA. The groundwater treatment system (GWTS) itself is located in a structure on the BCFRTA grounds.

In August 2015, Barnstable County funded a more detailed hydrogeological assessment, continued implementation of a groundwater pump and treat system to capture PFOS upgradient of the Mary Dunn wells, and additional assessment and immediate response actions. The Cape Cod Commission evaluated subsurface soil and groundwater conditions at the BCFRTA facility as part of the IRA assessment activities. The soil results indicated a broad area of PFOS contamination throughout the subsurface. The highest PFOS concentrations were detected near the southwestern corner of the BCFRTA, a location subsequently referred to as the hot spot.

Groundwater analytical results from the 2015 assessment revealed PFOS contamination ranging from less than 0.070 µg/L) (the current US EPA HA) to greater than 70 µg/L.

The groundwater samples were collected from monitoring wells across the Site, located between the BCFRTA and the Mary Dunn wells. Like the soil results, the highest PFOS concentrations were detected near the southwestern corner of the BCFRTA.

In May 2016, US EPA revised/lowered its HA for PFAS from 0.20 µg/L of PFOS and PFOA to 0.070 µg/L for either compound or the total of the two.

EPA noted that the HA was for drinking water exposures only. In response to the lowered HA PFAS concentrations, on August 4, 2016, MassDEP issued a Notice of Responsibility (NOR) to Barnstable County and required submittal of an Immediate Response Action (IRA) Plan no later than September 15, 2016. MassDEP requested that the Site owner evaluate potential Imminent Hazards relative to downgradient public and private water supply wells. MassDEP indicated that this evaluation should include identification of all nearby public and private water supply wells, review of any existing analytical data for those wells, and sampling and analysis of any nearby wells that have not been sampled for PFAS. MassDEP also stated that the IRA Plan should include measures to prevent, eliminate, and/or abate any hazards associated with the consumption of drinking water impacted by PFAS above the HA level of 0.070 ug/L.

MassDEP also required, as part of the IRA, activities to reduce the mass of PFAS at the BCFRTA and the concentrations of PFAS in groundwater migrating from the BCFRTA facility, such as excavating the soil hot spot and expanding the existing groundwater treatment system to decrease the mass of PFAS in groundwater.

On September 27, 2016, on behalf of Barnstable County, the Cape Cod Commission submitted an IRA Plan to MassDEP to address the PFOS/PFOA impacts. The IRA Plan included an evaluation of imminent hazards to downgradient public and private water supplies, specific plans for a Hot Spot removal action, and plans for an interim expansion of the existing groundwater pump and treatment system. The IRA Plan also contained an evaluation of water supply alternatives. The proposed IRA to address the soil Hot Spot was to excavate up to 200 cubic yards from a 400 square foot area for off-Site disposal. The Hot Spot soil was removed in January 2017, reducing the primary source of PFOS contamination leaching into groundwater.

Between December 2016 and February 2018, the Cape Cod Commission submitted 15 IRA Status and Remedial Monitoring Reports (RMRs) to MassDEP for the PFAS release. The RMRs addressed the County's GWP&TS, which is recovering and treating approximately 50,000 gallons per day (gpd) of groundwater from well PRW-4. The upgradient on-Site groundwater pump and treat system is also working to reduce PFAS concentrations in the aquifer before it reaches the Mary Dunn treatment system. Refer to Section 3.3 for further details regarding the on-Site groundwater treatment system.

The GAC treatment of the Mary Dunn wells is actively preventing a potential Imminent Hazard to the Hyannis community by removing the PFAS compounds from the water supply. A Settlement Agreement is in place between the Town of Barnstable and Barnstable County that requires the County to fund a portion of the costs associated with operating the treatment system. Timely exchange of pumping and performance data related to the treatment of the Mary Dunn well water supplies to verify effectiveness of the IRA is noted in the settlement agreement between the parties.

As detailed in the July 2019 Reporting Period IRA Status and RMR reports, which reported the most recent July 2019 groundwater monitoring data at locations across the Site, PFAS concentrations are still present in Site groundwater. Analytical data from select monitoring wells indicate that PFAS concentrations in groundwater sampled in the former Hot Spot area have significantly decreased (following the repair of the cap); PFAS concentrations remain stable in groundwater sampled from wells immediately adjacent to and southeast of the BCFRTA; and PFAS concentrations remain elevated in groundwater sampled from within the area farther southeast of the BCFRTA between the facility and the Mary Dunn wells. The results from the July 2019, monitoring event will be presented and depicted in the IRA Status and RMR No. 32. IRA Status and RMR reports have been submitted monthly since December 13, 2016.

On behalf of Barnstable County, BETA has submitted IRA Status reports and RMRs since March 2018. The RMR for August 2019 is in preparation.

3.2 Groundwater Pump and Treat System

Response actions to address the early 1990s petroleum releases and the later detection of perchlorate included extensive subsurface assessment including installation of a significant network of monitoring wells. In addition, to help remediate and control migration from the petroleum and perchlorate releases, in 1998 and 2007, respectively, response actions included the installation/upgrade and/or renovation of a groundwater pumping and treat system (GWP&TS). As noted above, Barnstable County refurbished the former GWP&TS in July 2015 to help remediate and contain the PFOS migration from the BCFRTA. The GWP&TS was later noted in the NOR issued by MassDEP in August 2016. The NOR also requested that Barnstable County install additional recovery wells or increase the groundwater recovery rate to increase PFAS removal.

In July 2015, the primary influent/recovery well pump installed in recovery well PRW-4 was repaired, a new variable frequency drive (VFD) unit pump was installed in the treatment system, and all accompanying electrical components were evaluated and repaired. The system was restarted in July 2015 upon the installation of 1500 pounds (lbs.) of aqueous phase GAC (Filtrasorb 400 virgin GAC) into each of the two, existing Siemens treatment vessels. The "capture zone" of PRW-4 was reportedly estimated to be 200 ft. at 40 gallons per minute (gpm). Groundwater is pumped from recovery well PRW-4, through an eight-hundred-foot force main to the treatment building on the BCFRTA; see Figures 2A and 2B.

The groundwater is discharged to an equalization tank, then filtered through a 5-10 micron size bag filter and pumped through the two (in series) GAC vessels and discharged to the several large recharge chambers located in the center of the BCFRTA, upgradient of the recovery well and approximately cross-gradient of the highest levels of PFAS contamination detected at the BCFRTA property.

Since the restart of the groundwater pump and treat system in 2015, Coastal Engineering of Orleans, MA was contracted by Barnstable County to provide operation and maintenance (O & M) of the GWPTS up until January 2019. Currently, Groundwater Treatment Technologies, LLC (GWTT) is contracted by Barnstable County to provide O&M of the GWPTS, including but not limited to, bag filter checks and replacements, VFD pump monitoring, carbon vessel backwashing, and GAC replacement oversight.

3.3 Phase I Initial Site Investigation and Tier Classification

In May 2018, a Phase I Initial Site Investigation (ISI) Report and Tier Classification Submittal was submitted to MassDEP by Nover-Armstrong Associates on behalf of Barnstable County in response to the discovery of concentrations of PFAS compounds in soil and groundwater exceeding applicable USEPA Health Advisory (HA) levels. The Phase I ISI confirmed that the primary contaminant of concern is PFOS and, to a lesser extent, PFOA.

Data, prepared previously by the Cape Cod Commission and compiled in the Phase I ISI report by Nover-Armstrong, indicates that it is likely that PFOS and PFOA migration through groundwater in a southeasterly direction from the BCFRTA Site towards the Mary Dunn well field is occurring. The Cape Cod Commission previously identified a plume of the highest concentrations approximately 200 feet wide. The average PFOS concentration in groundwater beneath a broad portion of the Site downgradient of the former Hot Spot area was reported in the IRA Plan to be approximately 3,000 ng/L.

Based on the compiled Phase I Initial Site Investigation data, Nover-Armstrong is of the opinion that continuation of the IRA activities and additional assessment and, potentially, additional remedial Response Actions are warranted at the Disposal Site. A Phase II Conceptual Scope of Work (SOW) was submitted with the Phase I ISI outlining the scope, nature of investigation, and sample programs proposed to characterize the risk of harm posed to health, safety, public welfare, and the environment (for regulatory closure). The Phase II SOW proposes additional remedial and/or response actions such as continued monitoring of the Site groundwater conditions, potential soil removal or modifications to the existing groundwater treatment system to be implemented in the near future.

A Tier Classification was submitted to MassDEP concurrently with the Phase I Report. Based on the need to continue remedial actions as IRAs under the current IRA Plan, and on the continuing need to abate a potential Imminent Hazard condition related to impacts to public water supplies, the RTN 4-26179 release was classified as Tier I.

3.3 Flintrock Pond Assessments

Per the Order of Conditions: Special Conditions of Approval (SE3-5606), Item 17, the Town of Barnstable Conservation Commission pending "new testing results for PFAS in Flintrock Pond." In November 2018 and March 2019, BETA conducted surface water and sediment sampling at Flintrock Pond. Concentrations of the total summed of the five PFAs chemicals (PFOS, PFOA, PFNA, PFHxS, and PFHpA) were documented in the pond surface water above the MassDEP ORS Guideline during both November and March sampling events; however, it should be noted that the US EPA HA and the MassDEP ORS Guideline do not directly apply to surface waters. Elevated concentrations of the total summed of the five PFAs chemicals (PFOS, PFOA, PFNA, PFHxS, and PFHpA) were documented in the pond sediments; however, no MassDEP or US EPA regulatory standards or guidelines are available for comparison. Concentrations of PFAS documented within Pond sediments are dominated by the PFOS fraction and increase with distance from the Pond's bank and appear to be consistent with the 2015 data. Refer to the previously completed IRA Status Reports submitted to MassDEP for complete information on the ongoing assessment of Flintrock Pond.

3.5 Public Involvement

In January 2019, a petition from a group of residents of Barnstable and Hyannis, MA was received, requesting that the Site be designated a Public Involvement Plan (PIP) Site. In response to the request from the local petitioners, Barnstable County designated the Site as a PIP site and has begun PIP activities in accordance with 310 CMR 40.01404. Notification of the Site Designation and the initial public meeting was provided to all petitioners and the Town of Barnstable officials in writing in February 2019.

On May 2, 2019, a public meeting was held and a Draft Public Involvement Plan (PIP) was prepared, presented, and distributed. Additionally, comments were received by the County on the Draft Plan for a minimum of 20 days after the distribution of this Draft Plan per 310 CMR 40.1405(5)(b). Public comments (as they relate to the response actions implemented for the release of PFAS at the Site and are in accordance with 310 CMR 40.01404) have been incorporated into the final Plan, which was completed and submitted to MassDEP on June 27, 2019. As stated in the Final PIP, prior to the completion of a major regulatory milestone, public comment will be solicited and comments received will potentially be incorporated prior to the implementation of the milestone/response action. As a result, this IRA Plan Modification is being submitted to MassDEP in Draft; the Plan will become final after the receipt of (any) public comments.

4.0 HISTORICALLY AND RECENTLY COMPLETED IRA ACTIVITIES

Since the submittal of the IRA Plan in September 2016 (and as detailed in section 3.0), remedial response actions and assessment activities have continued to address the PFAS impacts at the Site. Most notably, the Barnstable County and the Cape Cod Commission implemented response actions to refurbish and re-start the existing groundwater pump and treatment system in 2015 and oversaw the excavation of 200 cubic yards of PFAS impacted soils from the former "Hot Spot" area (a 400 square foot area) for off-Site disposal in January 2017. From December 2018 through February 2019, Barnstable County implemented the regrading and temporary capping of the southwest corner of the BCFRTA, including the former Hot Spot area, with related stormwater controls, termed the Phase I Stormwater Management Improvements/IRA Plan Modification.

The following sections summarize the historic, continuing, and recent IRA response actions including the continuing operation and maintenance of the GWPTS, the quarterly groundwater monitoring, and more recently, the focused test pit investigation.

4.1 Continuing Operation & Maintenance of GWP&TS

Cape Cod Commission oversaw and documented the GWP&TS performance on behalf of Barnstable County from July 2015 through February 2018. The Cape Cod Commission also conducted groundwater monitoring and operation of the recovery well, PRW-4. After system startup in July 2015, monitoring samples were collected from the influent (PRW-4), midpoint, and effluent sample locations, biweekly and were submitted for the laboratory analysis of PFAS to aid in determining performance efficiency and monitor breakthrough of the PFAS. The Cape Cod Commission submitted monthly IRA Status and RMR Reports between December 2016 and February 2018 documenting the performance of the GWP&TS at the BCFRTA.

On average, the GWP&TS reportedly recovered and treated groundwater at approximately 50 gpm (high average - continuous) or approximately 2.2 million gallons monthly, removing approximately 0.015 pounds of PFOS a month. In mid-February 2018 the main transfer pump on the GWP&TS failed and the system temporarily shut down while procurement of a new pump, installation of the pump and required repairs were conducted.

Constant monitoring of the system is required to maintain operation of the VFD and recovery well pump including carbon exchanges, regular backwashing of the carbon vessels, force mains cleanouts, and replacement of the recovery well pumps. This work is currently performed by a wastewater treatment system operator contracted by the County.

IRA activities performed and completed during the earlier reporting periods were described in detail in previously completed IRA Status Reports submitted to MassDEP. Refer to those submittals for complete information. The previously submitted documents are available in MassDEP Sites Database; refer to the follow link to access these reports.

https://eeaonline.eea.state.ma.us/portal#!/wastesite/4-0026179.

As previously noted, IRA and other assessment activities performed prior to the issuance of the NOR were described in the IRA Plan submitted to MassDEP in September 2016 and IRA Plan Modification submitted to MassDEP in June 2018 (as discussed in section 5.3).

On behalf of Barnstable County, BETA will submit shortly the 32nd IRA monthly remedial monitoring report and status report summarizing pump and treat system operations for the month of July 2019. System sampling and IRA Status and RMR submittals continue on a monthly basis.

4.2 Quarterly Groundwater Monitoring

Groundwater monitoring activities related to the documented PFAS Release on Site have been ongoing since November 2013. BETA, formerly Nover-Armstrong Associates, was contracted by Barnstable County to provide LSP and environmental services in April 2018 and has conducted groundwater monitoring activities since June 2018.

In November 2018, BETA proposed a long-term monitoring sampling plan for Site-wide groundwater monitoring on a quarterly and annual basis. Following discussion, MassDEP approved of the sampling plan (a copy of the plan can be found in previous IRA Status report submittals). BETA conducted quarterly groundwater assessment in January 2019, April 2019, and July 2019. The January 2019 event was selected as the annual monitoring program utilizing a minimum of 20 monitoring wells. The subsequent (April and July 2019) events included the dozen wells selected for the quarterly monitoring programs. The July 2019 event will be detailed in the IRA Status Report and RMR for the July 2019 reporting period.

In summary, PFAS concentrations detected in groundwater across the Disposal Site have been similar to historic ranges. Although the sum of the total PFAS concentrations (six PFAS compounds currently of concern according to MassDEP) documented in groundwater within the Disposal Site area significantly above the current applicable MassDEP ORS Guideline, concentrations have trended towards a significant decrease since PFAS assessment activities started at the Site in 2015, specifically in the Hot Spot area.

PFAS concentrations noticeably decreased within the Hot Spot remediation area following the impacted soil removal action (January 2017), and again, following construction of the Phase I cap and stormwater diversion in the Hot Spot area in December 2018 through February 2019. Prior to implementation of the Phase I controls and temporary cap, PFAS concentrations noticeably increased in groundwater immediately southeast of the BCFRTA, but they have been decreasing since the completion of the Phase I cap and stormwater diversion.
Additionally, BETA has observed increases in PFAS concentrations with increased rainfall and higher water tables. PFAS documented in wells located on the Academy property and immediately east of the Academy property appear to be relatively stable. PFAS concentrations documented in wells located farther southeast and downgradient of the Academy, specifically PC-11, PC-28, and PC-30, have notably increased. The analytical data summary tables and laboratory reports generated from monitoring events prior to July 2019 have been included as attachments to previously submitted IRA Status reports. Those from the July 2019 monitoring event will be included with the upcoming status report.

4.3 Test Pit Excavation

On August 6, 2019, BETA oversaw the excavation of two test pits on the Academy property for conducting percolation tests and soil evaluation for the design of improving stormwater best management practices at the Site. In addition to the two pits for soil evaluation, three additional test pits were excavated for subsurface assessment of PFAS in soil. Percolation test results have been incorporated into the stormwater management report and calculations included as Appendix D. The five test pits were identified as TP-1 through TP-5, refer to Figure 2B for sampling locations.

In each test pit soil samples were collected at approximately 4 to 5 ft and from 8 to10 ft (just above the soil -water interface or vadose zone) and submitted to Bureau Veritas Laboratories in Mississauga, Ontario, for the laboratory analysis of PFAS via the ASTM Modified Method D7968-17a for PFAS in solids and for Total Iron and Total Organic Carbon (TOC) via USEPA Methods. Elevated concentrations of the total summed of the six PFAs chemicals (PFOS, PFOA, PFNA, PFHxS, PFHpA, and PFDA) were documented in the soil samples; there are currently no MassDEP or US EPA regulatory standards or guidelines are available for comparison. However, MassDEP released in April 2019 draft MCP Method 1 soil risk standards for public comment. The proposed risk standard for soil category S-1/GW-1 for the total sum of the six PFAS compounds of concern is 0.2 micrograms per kilogram (µg/kg). MassDEP has received extensive comments on the appropriateness of the proposed soil risk standard. It is not known if the final MCP Method 1 soil risk standards will be revised significantly from the current proposed standard. For the purposes of this document, soil PFAS analytical results are being compared to the Public Comment Draft risk standards; the detected total of six PFAS concentrations are well above the draft S-1/GW-1 risk standard. Concentrations of PFAS documented within these soil samples are dominated by the PFOS fraction and are higher at the shallower depths (surface to 5 ft bgs). Concentrations of total Iron and TOC from each test pit were elevated as well. BETA did not observe significant trends or correlations between total PFAS and Iron concentrations and/or total PFAS and TOC concentrations. However, the test pits with the highest documented PFAS concentrations, TP-1 and TP-5 (from 0-4 ft. bgs) also had the highest TOC concentrations. Refer to Table 1 and 2 for a summary of the PFAS and Total Iron and TOC analytical data from the test pits respectively. Copies of the laboratory reports are included in Appendix B. It should be noted that soil with elevated PFAS concentrations, as represented by the results for the TP-1 testing, will be excavated as part of the construction of the proposed infiltration basin (see section 7. 1).

5.0 IRA EVALUATIONS

In accordance with the MCP, this section presents evaluations of potential IRA conditions at the Site.

5.1 Assessment for Substantial Release Migration (SRM)

Due to the documentation that PFAS has most likely migrated more than 200 feet downgradient and has been detected in a public water supply well and surface water body, the Site meets the criteria for a Condition of Substantial Release Migration (SRM), as defined by 310 CMR 40.0006.

5.2 Identification of Critical Exposure Pathways (CEP)

No Critical Exposure Pathways, as defined by 310 CMR 40.0006, currently exist at the Disposal Site.

5.3 Imminent Hazard (IH) Evaluation

Based on the concentrations of PFOS exceeding the USEPA HA level in the Mary Dunn wells in 2013, the Cape Cod Commission identified the presence of an Imminent Hazard (IH) condition pursuant to 310 CMR 40.0321(2)(c).

The GAC treatment of the Mary Dunn Wells has been assumed to be actively preventing a potential Imminent Hazard to the Hyannis community by removing the PFAS compounds from the water supply. The Mary Dunn wells are monitored on a regular basis by the Hyannis Water Department to ensure that exposure to humans is less than the USEPA HA and MassDEP ORS Guidance level.

5.4 Assessment of Need for Immediate Response Actions (IRA)

The operation of the on-Site groundwater pumping and treatment system to reduce PFAS concentrations downgradient of the BCFRTA will continue as an IRA. Continuation of assessment IRAs is warranted; specifically, periodic monitoring of groundwater at the Site and monitoring the PFAS treatment of the output of the Mary Dunn Wells. In addition, additional technologies to treat / remove PFAS from soil and groundwater at the BCFRTA may be evaluated in the near future. The results of such evaluations would be reported in appropriate IRA submittals or MCP phase reports.

6.0 PROPOSED IRA PLAN MODIFICATION – GROUNDWATER RECOVERY AND TREATMENT

This section presents the detailed plan for the expansion of the existing groundwater recovery and treatment system at the Site as required by the Request for IRA Plan Modification/Interim Deadline. The Interim Deadline applies to expansion of groundwater recovery and treatment as an IRA Plan Modification, rather than a Comprehensive Response Action (CRA). However, the evaluation of alternatives for proposed expansion indicated that implementing a new recovery well and, potentially, a new recharge location, as IRAs that will also continue to be utilized as CRAs will be advantageous for Site remediation. Such implementation, however, has disadvantages related to time to implement.

Therefore, in order to manage the technical and institutional complexities of expansion, the proposed expansion has been divided into short-term and medium-term expansion programs for groundwater recovery and treatment. These are presented in sections 6.1 and 6.2, respectively. The proposed expansion of groundwater treatment is presented in section 6.3, and the schedule for expansion is presented in section 6.4.

6.1 Groundwater Recovery Expansion – Short-Term

The proposed short-term expansion is based on increasing groundwater withdrawal by re-starting and utilizing the existing recovery well RW-1. See Figures 2A and 2B for the location of RW-1, a 4-inch diameter well believed to have been installed during response actions for the historic petroleum release at the Site (circa 1990s) and refurbished circa 2006/2007. As shown on Figure 2B, RW-1 is located approximately 50 feet east of the boundary of the FTA property. Available information on the construction of RW-1 is not complete. However, the well is currently equipped with an operable submersible pump, power and electrical connections to the well through the treatment system control panel, and an operating force main to the treatment building.

Groundwater in the area of RW-1 is impacted with total PFAS (proposed MassDEP six PFAS of concern) in the range of 2 to 3 µg/L, as indicated by analytical results for monitoring wells in the vicinity, although PFAS concentrations must be considered approximate because the closest existing wells sampled recently (regular quarterly or annual monitoring) are not directly adjacent to RW-1. The most highly impacted groundwater based on quarterly sampling and analyses is located approximately 300 to 500 feet ± south and southeast of RW-1, in the portion of the Disposal Site, immediately downgradient of the most impacted, southern end of the FTA facility.

The objective of this expansion would be to provide short-term extraction of impacted groundwater. The recovered groundwater will be pumped to a rented, temporary treatment system housed in a mobile structure and then recharged using the existing north recharge basins on the FTA; see section 6.3. A target flow rate of approximately 30 gpm has been assumed. RW-1 operation and flow treatment would operate simultaneously with the current recovery and treatment system. The intent would be to operate the expanded system for a period of up to 1 year, consistent with the timeframes for implementation of a new, downgradient recovery well – see section 6.2.

The major components and specific tasks for implementation of the short-term expansion via re-start of RW-1 include:

a. Schedule a drilling contractor to pull the existing operating pump for cleaning and inspection. If feasible, the contractor will also perform a video inspection of the well to verify screen type and interval.
b. The drilling contractor will also clean and de-scale the well screen, de-scale the force main, and replace riser piping, if warranted.
c. Re-start and test RW-1 and run a pump test (approximately 6 hrs., with monitored shutdown/groundwater recovery period) while continuously gauging (via transducers) the pumping well and adjacent monitoring wells mon.
d. Evaluate the effective instantaneous and average flow rates from the recovery well and calculate the approximate capture zone.
e. Divert RW-1 flow to temporary treatment unit- see section 6.3.
f. Install gravity drain from temp. unit to North Basins.

Recovery well RW-1 will be operated with discharge to the temporary treatment unit until the new IRA Plan Modification/permanent recovery well can be approved by all parties and implemented; see section 6.2. As soon as flow is generated permanently by the new permanent recovery well (section 6.2), it is anticipated that RW-1 will be turned off. However, if it is determined that the efficacy of recovery well RW-1's overall groundwater capture and impact on contaminant migration is better than anticipated, and sufficient treatment capacity is available (at that time), RW-1 may remain in operation in lieu of or in addition to a new permanent recovery well.

6.2 Groundwater Recovery– Medium-Term

Several medium-term expansion options were considered, such as replacing the current recovery well, PRW-4, with a substantially larger well, or installing a new recovery well approximately 100 feet downgradient (southeast) of the southeast corner of the FTA. PRW-4, after maintenance and well pump replacement, has been operating reasonably effectively. Therefore, the evaluation focused on expanding groundwater recovery laterally. Due to current groundwater PFAS concentrations, additional downgradient (southeast of the FTA) groundwater recovery was judged to be more effective to manage the plume.

Implementation of several additional downgradient recovery wells at the same approximate distance from the FTA as the existing recovery well (approximately 750 feet southeast of the FTA) was evaluated on a preliminary basis. However, based on the objective to meet multiple goals with a single well and the need to work within limited County resources, the medium-term, IRA Plan Mod expansion of groundwater recovery is based on a new recovery well proposed for the general area approximately 200 to 300 feet southeast of the southeast corner of the FTA, in the vicinity of monitoring wells PC-1, PC-4, and PC-36. The preliminary area proposed for the new recovery well is shown on Figure 4. The objective would be to increase withdrawal and capture of impacted groundwater in the plume migrating to the southeast. The proposed area for the new well is most likely not on County property. Due to the technical and institutional complexities of implementing a new recovery well in this location, a specific location and size of well has not been determined. The anticipated, planned implementation steps for a new permanent recovery well are presented below as the detailed plan for medium-term expansion of groundwater treatment for the FTA PFAS release Site.

The major components and specific tasks for implementation of the medium-term expansion of groundwater recovery via a new, permanent well include:

a. Continue evaluating all available hydrogeologic data and identify a suitable recovery well location
b. Obtain approvals from the landowner and approvals for route of new force main.
c. Develop preliminary specifications for the new well and anticipated approximate flow rate. At this time, it is assumed that it will be a 6-inch diameter well with a full length well screen across the water table and to the full depth of the well.
d. Prepare final design and specifications for new well.
e. Prepare a supplemental IRA Plan Modification for the proposed permanent recovery well and submit to MassDEP for conditional or presumptive approval.
f. Install the new well and nearby monitor wells, if not currently available. Perform pump test and select final pumping equipment.
g. Install a new pump, piping, electrical service, and control manholes.
h. Install a new force main piping.

i. Switch over new well output to temporary treatment unit until new or expanded GWTS is designed, procured, and implemented.

6.3 Groundwater Treatment Expansion – Short-Term and Medium Term

6.3.1 Groundwater Treatment Expansion – Short-Term

As noted, the proposed short-term expansion is based on re-starting groundwater withdrawal using existing recovery well RW-1. The well currently is equipped with power and electrical connections to the treatment system building and control panel and an operating force main to the treatment building. Groundwater in the area of RW-1 is believed to be impacted with total PFAS in the range of 2 to 3 µg/L.

To manage the groundwater recovered at RW-1, the proposed IRA Plan Modification will utilize a temporary, rental treatment unit to be installed to the east of the treatment building. The temporary treatment system was the subject of evaluation in the February 2019 IRA Plan Modifications feasibility study and correspondence with MassDEP indicating that it would be implemented as a continuing IRA due to the current, higher rates of flow available from the existing PRW-4 recovery well. As expected, that flow is slowly decreasing from PRW-4, most likely due to build-up of iron sediment. The yield from RW-1 will be diverted at the current terminus of its force main in the treatment building and piped to the new temporary treatment unit.

As noted, the proposed rental treatment system will be housed in a heated, weather-tight temporary structure. The system will be capable of treating PFAS-impacted groundwater at a target flow rate of approximately 30 gallons per minute (gpm). The temporary groundwater treatment will include the following components and tasks:

a. 1000-gallon, equalization/storage/iron precipitation tank
b. Integrated, automatically controlled transfer pump
c. conventional bag filter filtration (5 µm) to collect precipitated iron
d. two granular activated carbon (GAC) adsorption vessels in series, each with approximately 40 cubic feet (1,300 pounds) of virgin, coal based GAC
e. Flow meter and additional instruments as required
f. Integrated control panel and new electrical service
g. Ancillary equipment including sampling ports, heaters, and lighting.

A new gravity discharge line, consisting of 4-inch PVC pipe, will be installed below grade to one of the existing north basins for recharge.

Although considered a short-term measure, the system will be fully winterized and capable of 12 month per year, continuous operation. RW-1 operation and temporary treatment expansion would operate simultaneously with the current recovery and treatment system. The intent would be to operate the expanded system for a period of up to 1 year, consistent with the timeframes for implementation of a new, downgradient recovery well – see section 6.2. However, it may continue in use beyond that point if it is determined to be a cost-effective means to provide additional treatment capacity. Based on detailed evaluation of the yield from a new permanent recovery well, the viability of continuing to use the temporary system versus design and implementation of a permanent, expanded treatment system would be conducted.

Barnstable County has solicited and already received proposals to equip, mobilize and start-up a temporary treatment system housed in a shipping container to facilitate rapid implantation. The County will select and notify the vendor in early September 2019 to begin the contracting process.

6.3.2 Groundwater Treatment Expansion – Medium and Long-Term

As noted, the proposed short-term expansion is based on using a rented, temporary treatment system. As soon as flow is generated permanently by the new permanent recovery well, RW-1 will most likely be turned off and flow from a new force main from the new permanent recovery well would be hard-piped into the temporary treatment unit. The capacity of the temporary system would be utilized for the new well flow.

However, increased flow rates are anticipated from the new well and may continue to be produced by the existing recovery well. Therefore, the existing treatment system, supplemented by the temporary system, is not anticipated to be able to effectively treat all flow that may be produced. Therefore, permanent expansion of the groundwater treatment system must be evaluated. The existing treatment system would essentially have to be rebuilt and substantially expanded, as would piping and recharge basins. It is certain that a building expansion would be required to house much larger GAC vessels and related major upgrades would be required to filtration, controls and pumps. In the opinion of BETA and Barnstable County, the detailed evaluation of permanent, major groundwater treatment expansion is not feasible to conduct as an IRA and should be considered as a CRA. This work will be performed as part of the Phase II/ Phase III and Phase IV processes under the MCP. Therefore, medium-term groundwater treatment will be provided by the existing treatment system supplemented by the temporary unit. Groundwater recovery rates will be managed to meet the treatment capacity. Consideration will be given to performing the evaluation, selection, design and implementation of expanded groundwater treatment, a building to house it, and ancillary features including utilities and discharge, on an expedited schedule.

<u>Treated Groundwater Recharge</u>

Discharge/recharge of an increased volume of treated groundwater using the existing north recharge basins on the FTA is feasible and will be used for the short- and medium-term. However, it is not considered ideal in terms of the long-term, effective management of the PFAS-impacted plume. As part of the medium-term groundwater recovery expansion, the following major components and tasks for implementation of a new treated water recharge location will be included:

a. Continue the evaluation of all available hydrogeologic data and select one or more down, or cross-gradient proposed locations for major recharge basin(s). Ideally, the location(s) would serve to focus the flow of PFAS-impacted groundwater toward the recovery wells.
b. Develop preliminary specifications for the new basin.
c. Obtain approvals from the landowner and approvals for route of a new treated water force main required to convey flow to a new basin (gravity flow will most likely not be feasible.)
d. Prepare final design and specifications for the new basin, as well as final design for the new transfer pumping equipment needed to convey flow to the basin and a new force main.

e. Prepare a supplemental IRA Plan Modification for the proposed permanent new recharge basin and submit to MassDEP for conditional or presumptive approval.
f. Install new basins, force main and manholes as required.
g. Install new transfer pumping equipment, piping, electrical service, and controls.
h. Switch over discharge from the existing and temporary treatment systems to the new recharge basin.

6.4 Groundwater Recovery Expansion – Proposed Schedule

The proposed approximate schedule for implementation of the components of the proposed overall expansion of groundwater recovery and treatment is presented below (Table 3). As noted, the procurement of rented, temporary treatment is already underway and will proceed on a short schedule, see below. The remaining components of expansion are presented in this Draft IRA Plan Modification as subject to the public dissemination and comment components of the final Public Involvement Plan for the Site. Therefore, the public comment time periods must be incorporated into the timeline, as does the submittal of the final IRA Plan Modification (after close of the public comment period) and the required period of MassDEP approval for this type of IRA Plan Modification.

Table 3 – Groundwater Recovery Expansion Implementation Schedule

No.	Task or Component	Public Comment Period & MassDEP Review [1]	Initiate Implementation	Task or Component Completed	Comments
1.	Draft IRA Plan Mod Public Comment and MassDEP Approval	42 days	42 days	10/11/2019	
2.	Short-Term Groundwater Recovery Expansion at RW-1	42 days	09/30/2019	10/30/2019	
3.	Temporary Treatment System – Short/Medium Term Expansion	NA [2]	Underway [2]	10/18/2019	
4.	Medium-Term Groundwater Recovery Expansion [3] - Preliminary	42 days	10/30/2019	02/28/2020	See Note 4.
5.	Medium-Term Groundwater Recovery Expansion -Final Tasks	42 days, initial & 42 days follow-up [5]	02/28/2020	06/20/2020	See Note 5.
6.	Long-term Groundwater Treatment Expansion		09/01/2020	02/28/2021	See Note 6.

Notes to Schedule:

1. Based on 21-day public comment period, August 30, 2019 through September 20, 2019 and 21-day review by MassDEP.
2. Procurement process underway based on previous IRA Plan submittals and correspondence with MassDEP.
3. Work to include new recharge basin(s).
4. Preliminary work to support presentation of final well location and design in an IRA Plan Modification with the February 2020 IRA Status Report. Preliminary work to include: Evaluation and preliminary design over two-month period; Two-month period anticipated for approvals from landowners; and Two-month period for preparation of final design and Draft (for public comment) IRA Plan Modification.
5. Final tasks to follow the Draft IRA Plan Modification within February 2020 IRA Status Report to include: 42-day public comment period; final IRA Plan Modification & MassDEP review; two months for solicitation of bids/proposals; and two-month period for construction/installation.
6. To be conducted as expedited Comprehensive Response Action evaluations and implementation.

7.0 PROPOSED IRA PLAN MODIFICATION – SITE CAPPING MEASURES

This section presents the detailed plan for the capping measures at the Site as required by the Request for IRA Plan Modification/Interim Deadline. The Interim Deadline applies to the expansion of capping measures to be implemented to prevent infiltration of precipitation through the PFAS-contaminated soil at the Site as an IRA Plan Modification, rather than a Comprehensive Response Action (CRA). As discussed in the February 2019 IRA Status report, the County considered the feasibility of alternatives to create paved catchment areas around the major fire training features of the FTA, the burn building and the pad where fire extinguisher training occurs, as well as paving of most of the area of the FTA within the existing paved "track" that encircles the training facility.

Based on the directive from MassDEP to prepare a detailed plan for additional capping of PFAS-impacted soils at the Site, a proposed capping alternative to mitigate PFAs impacts to the groundwater was selected based on overall feasibility, effectiveness, and cost. The implementation of significant capping measures also requires the design and implementation of substantial collection, conveyance, and management systems for collected stormwater (which no longer systems to comply with stormwater best management practices and the applicable Massachusetts Stormwater Regulations.

The implementation/construction of the capping and stormwater systems has constraints related to the need for time to: 1) conduct additional Phase II CSA soil and groundwater assessment that may be impeded by, or damage the cap, 2) demolition of unused buildings to the extent feasible, 3) WPA permitting, and 4) assuring to the extent possible that the cap will not compromise future CRA remediation and/or re-use of the Site.

The proposed capping alternative is presented in section 7.1. The schedule for implementing the cap is presented in section 7.2

7.1 Site Capping Construction Plan

This Site capping plan includes covering/capping approximately 40,000 square feet of the existing unpaved portion of the Site with 2-inches of hot mixed asphalt (HMA) and mounding the central portion of the Site to allow stormwater flow/conveyance to an open/surface infiltration basin (by gravity flow). To note, existing concrete pads will be preserved, if the grading is compatible, or paved over as part of the capping design. The paving will be installed over new, compacted granular fill and relocated soil – see below. Stormwater flow/runoff would be captured through a series of catch basins installed along the outer existing paved "track" that encircles the training facility. The flow will be conveyed through a stormwater treatment type of manhole and then to an open infiltration basin proposed for the northeast corner of the FTA property.

The proposed infiltration basin is designed to provide approximately 16,000 cubic feet of available storage allowing for infiltration / recharge to groundwater and redirection of stormwater flow from the west-southwest to the southeast based on the current assessment of soil and groundwater PFAS impacts and existing topographic data for the Academy. Construction of the infiltration basin will include excavation of soil with elevated PFAS concentrations detected in and represented by the test pit TP-1 soil analytical results (section 4.3).

In addition, soil beneath and surrounding the preliminary grading for the infiltration basin may be over-excavated based on additional assessment during final design and confirmatory sampling at the time of construction. All soil excavated for basin construction and over-excavation will be relocated on the Academy property to areas to be capped. The soil will be used to adjust grades to those proposed in the preliminary plan. Refer to Appendix C for a copy of the preliminary Construction Plan (and Detail Sheets) for the Site capping design and Appendix D for a copy of the stormwater modeling report used for development of the design.

The major components and specific tasks required prior to and during the construction and implementation of this capping plan include:

a. Develop the extensive Phase II CSA, multiple boring and multi-level/stratum soil assessment plan across the Site.
b. Schedule and execute the advancement of soil borings, excavation of test pits, and installation of additional groundwater monitoring wells, as needed, within the areas to be capped.
c. Plan and execute the demolition of select buildings on the FTA Property.
d. Prepare final design and specifications for the cap and stormwater management project.
e. Prepare and submit a Notice of Intent to the Town of Barnstable Conservation Commission or revised design plan applicable to existing NOI
f. Obtain approvals (e.g., Order of Conditions) from the Conservation Commission for the installation of the capping design and stormwater components.
g. Solicit bids and award contract for construction of the sitewide capping design/stormwater systems.
h. Construct the plan: regrading, soil relocation, installation of the cap, catch basins, drainage pipe network, open infiltration basin, and manholes as required.
i. Stormwater Runoff Monitoring and Implementation of Stormwater Best Management Practices.

7.2 Site Capping Construction and Design Implementation schedule

The proposed approximate schedule for implementation of the components of the proposed overall capping design of the FTA property is presented below (Table 4). The components of the capping design presented in this Draft IRA Plan Modification are subject to the public dissemination and comment components of the final Public Involvement Plan for the Site. Therefore, the public comment time periods must be incorporated into the timeline, as does the submittal of the final IRA Plan Modification (after close of the public comment period) and the required period of MassDEP approval for this type of IRA Plan Modification. Additional time must be allotted for final design, followed by and Barnstable Conservation Commission approval. These time elements will most likely result in a final approved design ready for bidding and award during the winter of 2019/2020. Construction would require waiting until asphalt plants re-open at the start of the 2020 construction season, which would coincide with the construction of the planned works.

Table 4 – Site Capping Construction and Design Implementation schedule

No.	Task or Component	Public Comment Period & MassDEP Review [1]	Initiate Implementation	Task or Component Completed	Comments
1.	Draft IRA Plan Mod Public Comment and MassDEP Approval	42 days	42 days	10/11/2019	
2.	Site Wide Capping - Finalization of Design	Starts after 42 days in No. 1	10/11/2019	11/30/2019	
3.	Develop and conduct a multiple boring soil assessment and obtain necessary landowner and town approvals	NA	10/01/2019	02/29/2020	Based on public comment and finalized IRA Plan Mod and assessment plan underway from Phase II CSA SOW
4.	Submit NOI and obtain local approvals	NA	11/30/2019	12/31/2019	
5.	Solicit bids and award construction contract	NA	01/25/2020	02/28/2020	Assumes Order of Conditions issued by 12/31/2019
6.	Building Demolition	NA	11/01/2019	03/30/2020	Simultaneous
7.	Installation/Construction of Capping Systems	NA	03/30/2020	06/30/2020	

Notes to Schedule:

1. Based on 21-day public comment period, August 30, 2019 through September 20, 2019 and 21-day review by MassDEP.

8.0 PUBLIC NOTIFICATIONS

Copies of public notification letters regarding the proposed IRA activities sent to officials of the Town of Barnstable in accordance with MCP 310 CMR 40.1403(3) (a) requirements are included as Appendix E. Per the Final PIP, email and written notifications regarding the submittal of this Draft IRA Plan Modification to MassDEP and the availability of the Draft Plan at the Site repository will be sent to those listed on the PIP Mailing List.

TABLES

Table 1 - Summary of 2019 Soil Analytical Data - PFAS
Barnstable Country Fire and Rescue Training Academy
155 Flint Rock Road, Barnstable, MA
RTN 4-26179

SAMPLE ID	DRAFT* MCP Method 1 S-1/GW-1 Soil Standards	TP-1		TP-2		TP-3		TP-4		TP-5	
SAMPLE DEPTH (FT)		0-4	10	0-4	10	4	10	5	8	4	9
SAMPLING DATE		8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019
UNITS	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PFAS (USEPA Method 537)											
PFOS	NE	360	8.6	3.1	15	1.1	1.1	17	14	530	4.3
PFOA	NE	6.1	5.0	BRL (<0.16)	0.22	BRL (<0.14)	BRL (<0.14)	0.49	0.38	3.5	2.4
PFHpA	NE	1.6	1.1	BRL (<0.18)	BRL (<0.18)	BRL (<0.18)	BRL (<0.18)	BRL (<0.18)	BRL (<0.18)	BLR (<1.8)	0.31
PFNA	NE	6.00	0.5	BRL (<0.15)	BRL (<0.15)	BRL (<0.15)	BRL (<0.15)	0.38	0.32	30	2.3
PFHxS	NE	1.7	1.2	0.48	0.6	BRL (<0.14)	BRL (<0.14)	0.55	0.45	BRL (<1.4)	4.2
PFDA	NE	BRL (<0.31)	BRL (<0.31)	BRL (<0.31)	BRL (<0.31)	BRL (<0.31)	BRL (<0.31)	BRL (<0.31)	BRL (<0.31)	BRL (<3.1)	BRL (<3.1)
Total Sum (PFAS)	0.2	375	16.4	3.58	15.8	1.1	1.1	18.4	15.2	564	13.5

Notes:

1. PFOS: Perfluorooctanesulfonic acid (PFOS)
2. PFOA: Perfluoro-n-Octanoic Acid
3. PFHpA: Perfluoroheptanoic Acid (PFHpA)
4. PFHxS: Perfluorohexane Sulfonate
5. PFNA: Perfluorononanoic Acid
6. PFDA: Perfluorodecanoic acid
7. Concentrations in µg/kg - micrograms per kilogram
8. (BRL <0.14) - Below Laboratory Detection LimitI shown in parentheses.
9. MassDEP does not have standards established for PFAS in soil. However, on April 19, 2019 MassDEP released draft Soil Category S-1/GW-1 Risk Standards for the total sum of the six PFAS (PFOS, PFOA, PFHpA, PFNA, PFHxs, and PFDA) compounds.
10. TP-1 : Test Pit 1

Table 2 - Summary of 2019 Soil Analytical Data - Total Iron and TOC
Barnstable Country Fire and Rescue Training Academy
155 Flint Rock Road, Barnstable, MA
RTN 4-26179

SAMPLE ID	MCP Method 1	TP-1		TP-2		TP-3		TP-4		TP-5	
SAMPLE DEPTH (FT)	S-1/GW-1	0-4	10	0-4	10	4	10	5	8	4	9
SAMPLING DATE	Soil Standards	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019	8/6/2019
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Total Iron											
Iron	NE	3,830	5,010	2290	2,540	2,320	1,870	3,300	2,950	3,320	2,770
Total Organic Carbon											
TOC	NE	573	108	101	103	101	95.2	164	462	323	93

Notes:

1. Concentrations presented in mg/kg - milligrams per kilogram

2. NE : Not Established. There is no current or applicable standard.

3. Soil samples were collected from test pits with the approximate dimensions (L:8 FT. W: 3 FT. H: 8-10 FT.

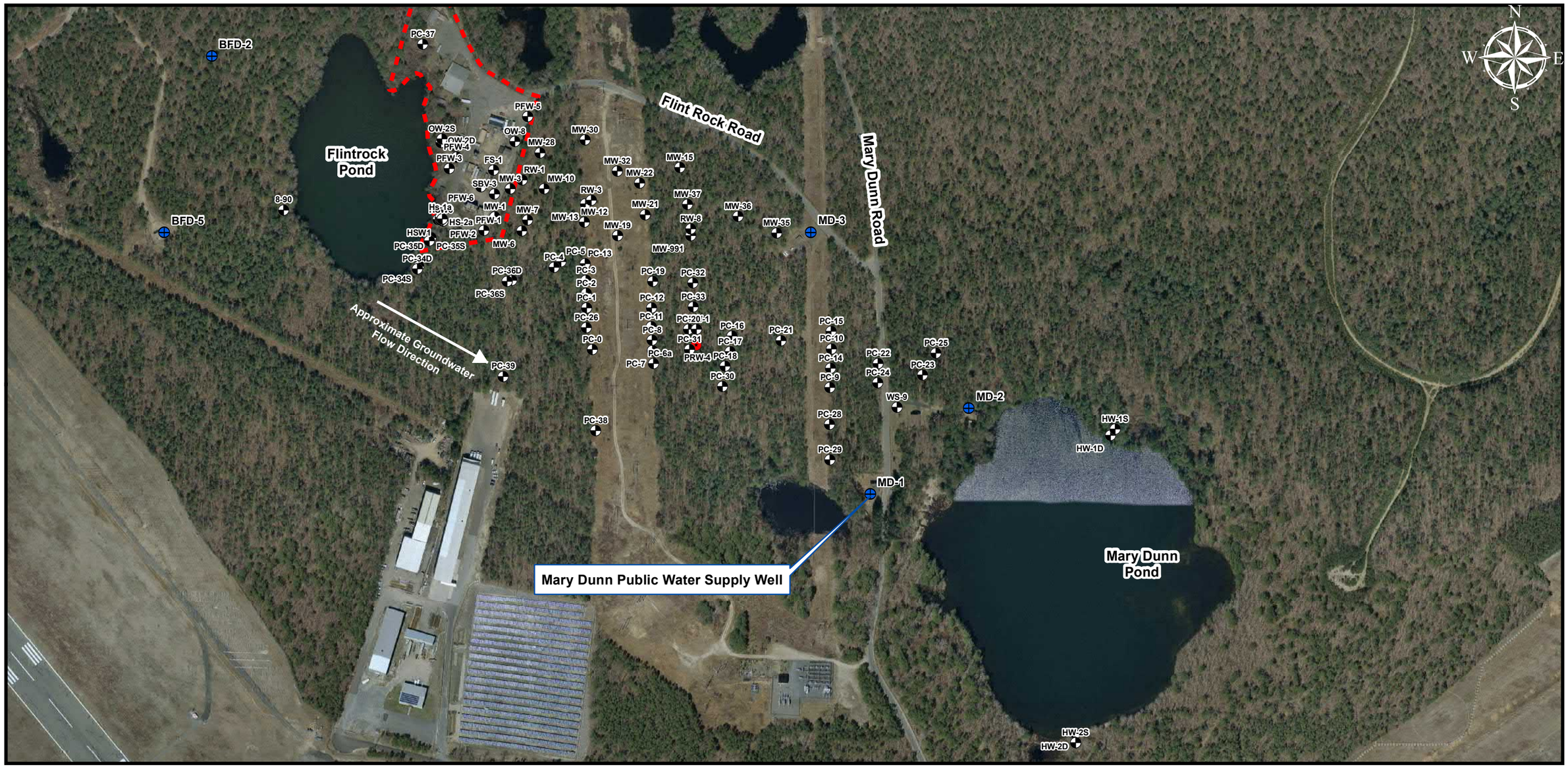
FIGURES

Figure 1
Site Location
Barnstable County Fire & Rescue Training Academy

155 South Flint Rock Road
Hyannis, Massachusetts

NOVER-ARMSTRONG ASSOCIATES, INC.

RTN 4-26179 April 2018



Legend

- Monitoring Wells
- Groundwater Pump & Treatment System Recovery Well (PRW-4)
- Public Water Supply Wells
- Barnstable County Fire & Rescue Training Academy Facility

FIGURE 2A - SITE PLAN

Barnstable County Fire & Rescue Training Academy

155 South Flint Rock Road, Barnstable, MA

0 250 500 1,000 Feet

BETA

Source: Google Ortho Imagery 2013 & MassGIS Standardized Level 3 Assessors Parcel 2013

Created By: GRC 04/26/18 Revised By: MDM 08/20/19

Legend

- Monitoring Wells
- Approximate Facility Boundary
- Test Pit -2019
- Major Facility Structures

0 50 100 200 300 Feet

1 inch = 125 feet

FIGURE 2B - SITE PLAN DETAIL

Barnstable County Fire & Rescue Training Academy
155 South Flint Rock Road
Barnstable, MA
RTN 4-26179

BETA

Source: Google Ortho Imagery 2013 & MassGIS Standardized Level 3 Assessors Parcel 2013

Prepared By: GRC 4/27/18 Edited By: MDM 08/20/19

MassDEP - Bureau of Waste Site Cleanup

Phase 1 Site Assessment Map: 500 feet & 0.5 Mile Radii

Site Information:
BARNSTABLE COUNTY FIRE TRAINING ACADEMY
155 SOUTH FLINT ROCK ROAD HYANNIS, MA
4-000026175
NAD83 UTM Meters:
4614847mN , 393002mE (Zone: 19)
April 18, 2018

The information shown is the best available at the date of printing. However, it may be incomplete. The responsible party and LSP are ultimately responsible for ascertaining the true conditions surrounding the site. Metadata for data layers shown on this map can be found at: http://www.mass.gov/mgis/.

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection

Figure 3

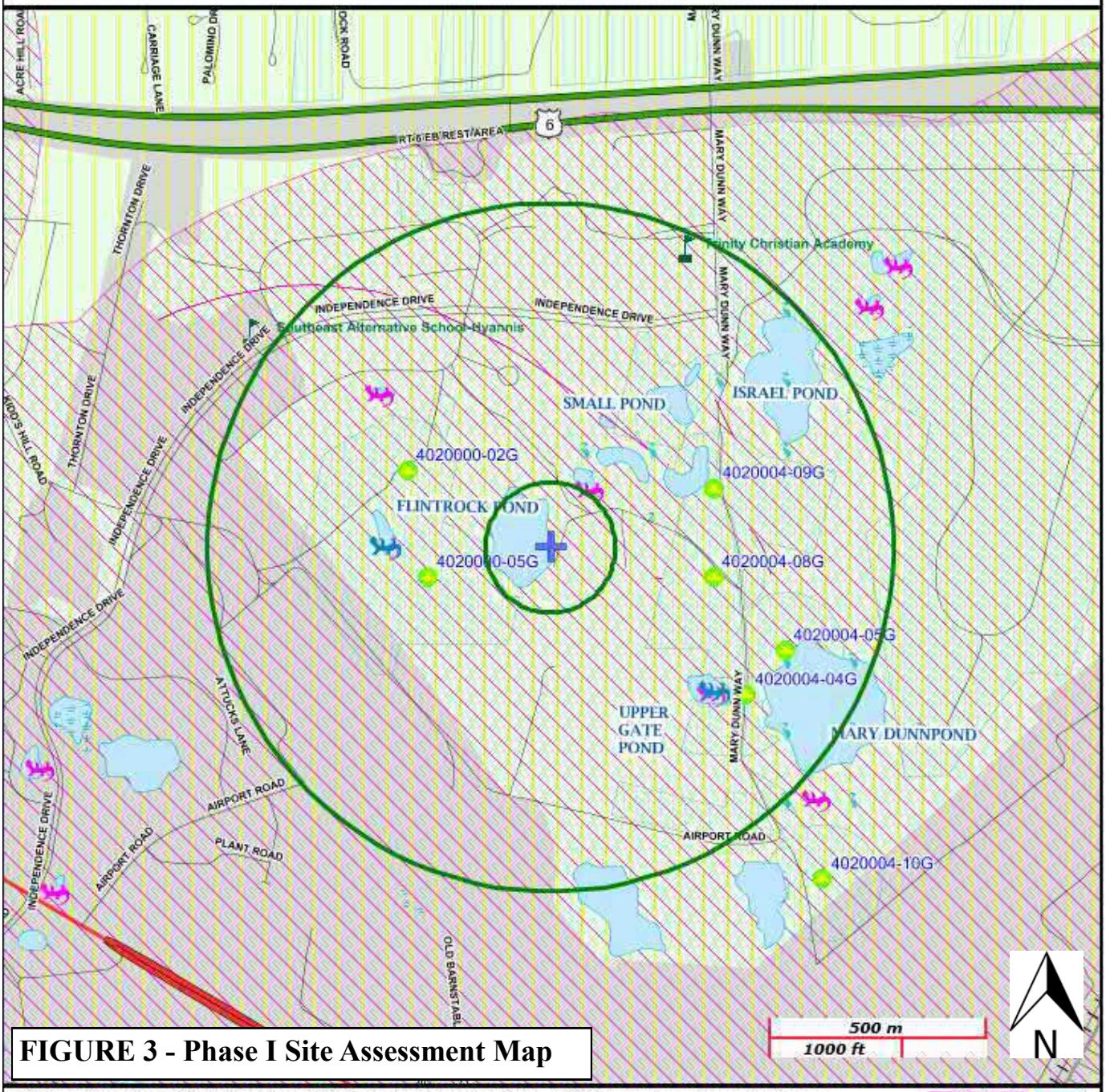
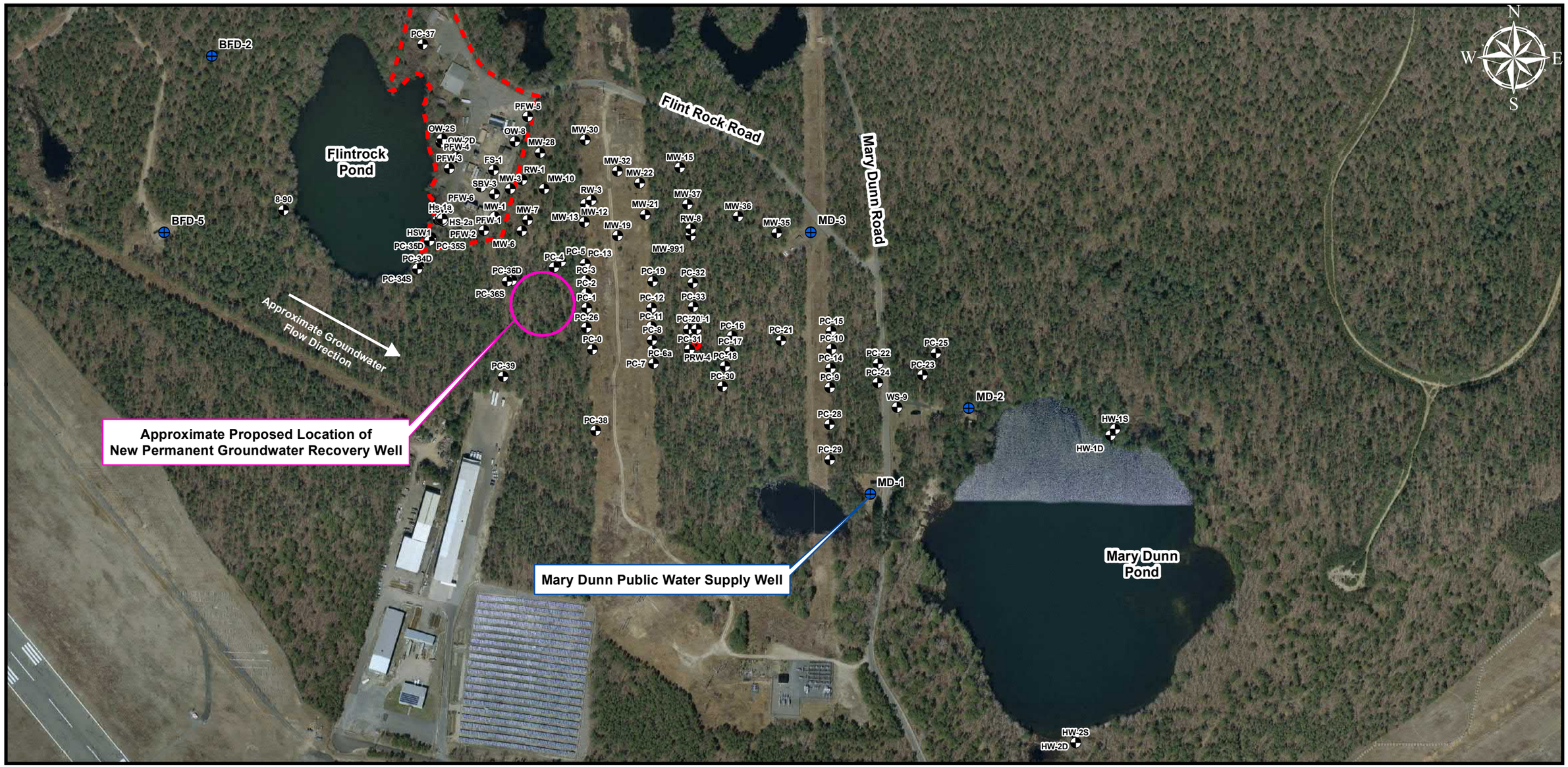


FIGURE 3 - Phase I Site Assessment Map

Roads: Limited Access, Divided, Other Hwy, Major Road, Minor Road, Track, Trail
Boundaries: Town, County, DEP Region; Train; Powerline, Pipeline, Aqueduct
Basins: Major, PWS; Streams: Perennial, Intermittent, Man Made Shore, Dam
Aquifers: Medium Yield, High Yield, EPA Sole Source
Non Potential Drinking Water Source Area: Medium, High (Yield)
PWS Protection Areas: Zone II, IWPA, Zone A
Hydrography: Open Water, PWS Reservoir, Tidal Flat
Wetlands: Freshwater, Saltwater, Cranberry Bog
FEMA 100yr Floodplain; Protected Open Space; ACEC
Est. Rare Wetland Wildlife Hab; Vernal Pool: Cert., Potential
Solid Waste Landfill; PWS: Com GW,SW, Emerg, Non-Com

NOVER-ARMSTRONG
A DIVISION OF BETA



Legend

- Monitoring Wells
- Groundwater Pump & Treatment System Recovery Well (PRW-4)
- Public Water Supply Wells
- Barnstable County Fire & Rescue Training Academy Facility

FIGURE 4- IRA Plan Modification SIte Plan
Proposed New Permanent Recovery Well Location

Barnstable County Fire & Rescue Training Academy
155 South Flint Rock Road,
Barnstable, MA
RTN 4-26179

0 250 500 1,000
Feet

BETA

Source: Google Ortho Imagery 2013 & MassGIS Standardized Level 3 Assessors Parcel 2013

Created By: GRC 04/26/18 Revised By: MDM 08/20/19

APPENDIX A

Copy of Transmittal Form

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

Immediate Response Action (IRA) Transmittal Form
Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

BWSC 105

Release Tracking Number
4 - 26179

A. SITE LOCATION:

1. Release Name/Location Aid: BARNSTABLE COUNTY FIRE TRAINING ACADEMY

2. Street Address: 155 SOUTH FLINT ROCK ROAD

3. City/Town: BARNSTABLE 4. Zip Code: 026300000

☐ 5. Check here if this location is Adequately Regulated, pursuant to 310 CMR 40.0110-0114.

☐ a. CERCLA ☐ b. HSWA Corrective Action ☐ c. Solid Waste Management

☐ d. RCRA State Program (21C Facilities)

B. THIS FORM IS BEING USED TO: (check all that apply)

1. List Submittal Date of Initial IRA Written Plan (if previously submitted): 9/26/2016

☐ 2. Submit an **Initial IRA Plan**.

☑ 3. Submit a **Modified IRA Plan** of a previously submitted written IRA Plan.

☐ 4. Submit an **Imminent Hazard Evaluation**. (check one)

☐ a. An Imminent Hazard exists in connection with this Release or Threat of Release.

☐ b. An Imminent Hazard does not exist in connection with this Release or Threat of Release.

☐ c. It is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release, and further assessment activities will be undertaken.

☐ d. It is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release. However, response actions will address those conditions that could pose an Imminent Hazard.

☐ 5. Submit a request to **Terminate an Active Remedial System or Response Action(s) Taken to Address an Imminent Hazard**.

☐ 6. Submit an **IRA Status Report**

☐ 7. Submit a **Remedial Monitoring Report**. (This report can only be submitted through eDEP.)

a. Type of Report: (check one) ☐ i. Initial Report ☐ ii. Interim Report ☐ iii. Final Report

b. Frequency of Submittal: (check all that apply)

☐ i. A Remedial Monitoring Report(s) submitted monthly to address an Imminent Hazard.

☐ ii. A Remedial Monitoring Report(s) submitted monthly to address a Condition of Substantial Release Migration.

☐ iii. A Remedial Monitoring Report(s) submitted every six months, concurrent with an IRA Status Report.

☐ iv. A Remedial Monitoring Report(s) submitted annually, concurrent with an IRA Status Report.

c. Number of Remedial Systems and/or Monitoring Programs: _____

A separate BWSC105A, IRA Remedial Monitoring Report, must be filled out for each Remedial System and/or Monitoring Program addressed by this transmittal form.

☐ 8. Submit an **IRA Completion Statement**.

☐ a. Check here if future response actions addressing this Release or Threat of Release notification condition will be conducted as part of the Response Actions planned or ongoing at a Site that has already been Tier Classified under a different Release Tracking Number (RTN)

b. Provide Release Tracking Number of Tier Classified Site (Primary RTN): _____ _____

These additional response actions must occur according to the deadlines applicable to the Primary RTN. Use the Primary RTN when making all future submittals for the site unless specifically relating to this Immediate Response Action.

☐ 9. Submit a **Revised IRA Completion Statement**.

☐ 10. Submit a **Plan for the Application of Remedial Additives** near a sensitive receptor, pursuant to 310 CMR 40.0046(3).

(All sections of this transmittal form must be filled out unless otherwise noted above)

C. RELEASE OR THREAT OF RELEASE CONDITIONS THAT WARRANT IRA:

1. Media Impacted and Receptors Affected: (check all that apply)
☐ a. Paved Surface ☐ b. Basement ☐ c. School
☑ d. Public Water Supply ☑ e. Surface Water ☑ f. Zone 2 ☐ g. Private Well ☐ h. Residence ☑ i. Soil
☑ j. Groundwater ☑ k. Sediments ☐ l. Wetland ☐ m. Storm Drain ☐ n. Indoor Air ☐ o. Air
☐ p. Soil Gas ☐ q. Sub-Slab Soil Gas ☐ r. Critical Exposure Pathway ☐ s. NAPL ☐ t. Unknown
☐ r. Others Specify: _____

2. Sources of the Release or TOR: (check all that apply)
☐ a. Transformer ☐ b. Fuel Tank ☐ c. Pipe
☐ d. OHM Delivery ☐ e. AST ☐ f. Drums ☐ g. Tanker Truck ☐ h. Hose ☐ i. Line
☐ j. UST Describe: _____ ☐ k. Vehicle ☐ l. Boat/Vessel
☐ m. Unknown ☑ n. Other: FIRE FIGHTING FOAM

3. Type of Release or TOR: (check all that apply)
☐ a. Dumping ☐ b. Fire ☐ c. AST Removal ☐ d. Overfill
☐ e. Rupture ☐ f. Vehicle Accident ☐ g. Leak ☐ h. Spill ☐ i. Test failure ☐ j. TOR Only
☐ k. UST Removal Describe: _____
☐ l. Unknown ☑ m. Other: HISTORIC FOAM USE

4. Identify Oils and Hazardous Materials Released: (check all that apply)
☐ a. Oils ☐ b. Chlorinated Solvents
☐ c. Heavy Metals ☑ d. Others Specify: PFAS

D. DESCRIPTION OF RESPONSE ACTIONS: (check all that apply, for volumes list cumulative amounts)

☑ 1. Assessment and/or Monitoring Only
☑ 2. Temporary Covers or Caps
☐ 3. Deployment of Absorbent or Containment Materials
☐ 4. Temporary Water Supplies
☐ 5. Structure Venting System/HVAC Modification System
☐ 6. Temporary Evacuation or Relocation of Residents
☐ 7. Product or NAPL Recovery
☐ 8. Fencing and Sign Posting
☑ 9. Groundwater Treatment Systems
☐ 10. Soil Vapor Extraction
☐ 11. Remedial Additives
☐ 12. Air Sparging
☐ 13. Active Exposure Pathway Mitigation System
☐ 14. Passive Exposure Pathway Mitigation System

D. DESCRIPTION OF RESPONSE ACTIONS: (cont.)

☑ 15. Excavation of Contaminated Soils.

☐ a. Re-use, Recycling or Treatment ☐ i. On Site Estimated volume in cubic yards

☐ ii. Off Site Estimated volume in cubic yards

iia. Receiving Facility: Town: State:

iib. Receiving Facility: Town: State:

iii. Describe:

☐ b. Store ☐ i. On Site Estimated volume in cubic yards

☐ ii. Off Site Estimated volume in cubic yards

iia. Receiving Facility: Town: State:

iib. Receiving Facility: Town: State:

☑ c. Landfill ☐ i. Cover Estimated volume in cubic yards

Receiving Facility: Town: State:

☑ ii. Disposal Estimated volume in cubic yards 200

Receiving Facility: TAUNTON LANDFILL Town: TAUNTON State: MA

☐ 16. Removal of Drums, Tanks, or Containers:

a. Describe Quantity and Amount:

b. Receiving Facility: Town: State:

c. Receiving Facility: Town: State:

☐ 17. Removal of Other Contaminated Media:

a. Specify Type and Volume:

☐ 18. Other Response Actions:

Describe:

☐ 19. Use of Innovative Technologies:

Describe:

E. LSP SIGNATURE AND STAMP:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisionsof 309 CMR 4.02(2) and (3), and 309 CMR 4.03(2), and (iii) the provisions of 309 CMR 4.03(3), to the best of my knowledge, information and belief,

> if Section B of this form indicates that an **Immediate Response Action Plan** is being submitted, the response action(s) that is(are) the subject of this submittal (i) has (have) been developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is(are) appropriate and reasonable to accomplish thepurposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B of this form indicates that an **Imminent Hazard Evaluation** is being submitted, this Imminent Hazard Evaluation was developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and the assessment activity(ies) undertaken to support this Imminent Hazard Evaluation comply(ies) with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000;

> if Section B of this form indicates that an **Immediate Response Action Status Report** and/or a **Remedial Monitoring Report** is(are) being submitted, the response action(s) that is (are) the subject of this submittal (i) is (are) being implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000,(ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) comply(ies) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B of this form indicates that an **Immediate Response Action Completion Statement** or a request to **Terminate an Active Remedial System or Response Action(s) Taken to Address an Imminent Hazard** is being submitted, the response action(s) that is(are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is(are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) comply(ies) with the identified provisions of all orders, permits, and approvals identified in this submittal.

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

1. LSP #: 1443

2. First Name: ROGER P 3. Last Name: THIBAULT

4. Telephone: 508-331-2700 5. Ext: 6. Email:

7. Signature:

8. Date: *(mm/dd/yyyy)* 9. LSP Stamp:

F. PERSON UNDERTAKING IRA:

1. Check all that apply: ☐ a. change in contact name ☐ b. change of address ☐ c. change in the person undertaking response actions

2. Name of Organization: BARNSTABLE COUNTY COMMISSIONERS

3. Contact First Name: JACK 4. Last Name: YUNITS

5. Street: 3195 MAIN ST 6. Title:

7. City/Town: BARNSTABLE 8. State: MA 9. Zip Code: 026300000

10. Telephone: 508-375-6643 11. Ext: 12. Email: JYUNITS@BARNSTABLECOUNTY.ORG

G. RELATIONSHIP TO RELEASE OR THREAT OF RELEASE OF PERSON UNDERTAKING IRA:

☐ Check here to change relationship

☑ 1. RP or PRP ☑ a. Owner ☐ b. Operator ☐ c. Generator ☐ d. Transporter

☐ e. Other RP or PRP Specify Relationship:

☐ 2. Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

☐ 3. Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))

☐ 4. Any Other Person Undertaking Response Actions: Specify Relationship:

H. REQUIRED ATTACHMENT AND SUBMITTALS:

☐ 1. Check here if any Remediation Waste, generated as a result of this IRA, will be stored, treated, managed, recycled or reused at the site following submission of the IRA Completion Statement. If this box is checked, you must submit one of the following plans, along with the appropriate transmittal form.

☐ a. A Release Abatement Measure (RAM) Plan (BWSC106) ☐ b. Phase IV Remedy Implementation Plan (BWSC108)

☑ 2. Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by MassDEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.

☑ 3. Check here to certify that the Chief Municipal Officer and the Local Boardof Health were notified of the implementation of an Immediate Response Action taken to control, prevent, abate or eliminate an Imminent Hazard.

☐ 4. Check here to certify that the Chief Municipal Officer and the Local Boardof Health were notified of the submittal of a Completion Statement for an Immediate Response Action taken to control, prevent, abate or eliminate an Imminent Hazard.

☐ 5. Check here if any non-updatable information provided on this form is incorrect, e.g. Release Address/Location Aid. Send corrections to BWSC.eDEP@state.ma.us.

☑ 6. Check here to certify that the LSP Opinion containing the material facts, data, and other information is attached.

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC 105

Immediate Response Action (IRA) Transmittal Form
Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number
4 - 26179

I. CERTIFICATION OF PERSON UNDERTAKING IRA:

1. I, _____, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form; (ii) that, based on my inquiry of the/those individual(s) immediately responsible for obtaining the information, the material information contained herein is, to the best of my knowledge, information and belief, true, accurate and complete; (iii) that, to the best of my knowledge, information and belief, I/the person(s) or entity(ies) on whose behalf this submittal is made satisfy(ies) the criteria in 310 CMR 40.0183(2); (iv) that I/the person(s) or entity(ies) on whose behalf this submittal is made have provided notice in accordance with 310 CMR 40.0183(5); and (v) that I am fully authorized to make this attestation on behalf of the person(s) or entity(ies) legally responsible for this submittal. I/the person(s) or entity(ies) on whose behalf this submittal is made is/are aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

2. By: _____ 3. Title: _____

4. For: BARNSTABLE COUNTY COMMISSIONERS 5. Date: _____ (mm/dd/yyyy)

☐ 6. Check here if the address of the person providing certification is different from address recorded in Section F.

7. Street: _____

8. City/Town: _____ 9. State: _____ 10. Zip Code: _____

11. Telephone: _____ 12. Ext: _____ 13. Email: _____

YOU ARE SUBJECT TO AN ANNUAL COMPLIANCE ASSURANCE FEE OF UP TO $10,000 PER BILLABLE YEAR FOR THIS DISPOSAL SITE. YOU MUST LEGIBLY COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.

Date Stamp (DEP USE ONLY:)

APPENDIX B
Laboratory Reports

CERTIFICATE OF ANALYSIS

Roger Thibault
Beta Engineering
701 George Washington Hwy 2nd FL
Lincoln, RI 02865

RE: Barnstable County (18.06206.00)
ESS Laboratory Work Order Number: 19H0187

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 4:29 pm, Aug 14, 2019

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County

ESS Laboratory Work Order: 19H0187

SAMPLE RECEIPT

The following samples were received on August 07, 2019 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Lab Number	Sample Name	Matrix	Analysis
19H0187-01	TP-1 0-4ft	Soil	6010C, 9060
19H0187-02	TP-1 10ft	Soil	6010C, 9060
19H0187-03	TP-2 0-4ft	Soil	6010C, 9060
19H0187-04	TP-2 10ft	Soil	6010C, 9060
19H0187-05	TP-3 4ft	Soil	6010C, 9060
19H0187-06	TP-3 10ft	Soil	6010C, 9060
19H0187-07	TP-4 5ft	Soil	6010C, 9060
19H0187-08	TP-4 96in	Soil	6010C, 9060
19H0187-09	TP-5 4ft	Soil	6010C, 9060
19H0187-10	TP-5 96in	Soil	6010C, 9060

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County

ESS Laboratory Work Order: 19H0187

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County

ESS Laboratory Work Order: 19H0187

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-1 0-4ft
Date Sampled: 08/06/19 08:00
Percent Solids: 93

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-01
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**3830** (4.53)		6010C		1	KJK	08/13/19 1:28	2.38	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-1 0-4ft
Date Sampled: 08/06/19 08:00
Percent Solids: 93

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-01
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	**573** (97.2)		9060		1	CCP	08/12/19 15:31	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-1 10ft
Date Sampled: 08/06/19 08:15
Percent Solids: 91

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-02
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**5010** (2.17)		6010C		1	KJK	08/13/19 1:32	5.07	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-1 10ft
Date Sampled: 08/06/19 08:15
Percent Solids: 91

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-02
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	ND (108)		9060		1	CCP	08/12/19 16:02	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-2 0-4ft
Date Sampled: 08/06/19 08:30
Percent Solids: 97

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-03
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**2290** (4.04)		6010C		1	KJK	08/13/19 1:46	2.55	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-2 0-4ft
Date Sampled: 08/06/19 08:30
Percent Solids: 97

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-03
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	ND (101)		9060		1	CCP	08/12/19 16:51	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-2 10ft
Date Sampled: 08/06/19 08:45
Percent Solids: 97

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-04
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**2540** (1.95)		6010C		1	KJK	08/13/19 1:50	5.29	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-2 10ft
Date Sampled: 08/06/19 08:45
Percent Solids: 97

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-04
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	ND (103)		9060		1	CCP	08/12/19 17:08	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-3 4ft
Date Sampled: 08/06/19 09:00
Percent Solids: 97

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-05
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**2320** (3.43)		6010C		1	KJK	08/13/19 1:54	3	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-3 4ft
Date Sampled: 08/06/19 09:00
Percent Solids: 97

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-05
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	ND (101)		9060		1	CCP	08/12/19 17:24	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-3 10ft
Date Sampled: 08/06/19 09:15
Percent Solids: 97

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-06
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**1870** (4.28)		6010C		1	KJK	08/13/19 1:58	2.4	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-3 10ft
Date Sampled: 08/06/19 09:15
Percent Solids: 97

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-06
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	ND (95.2)		9060		1	CCP	08/12/19 20:35	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-4 5ft
Date Sampled: 08/06/19 10:40
Percent Solids: 95

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-07
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**3300** (3.49)		6010C		1	KJK	08/13/19 2:01	3.02	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-4 5ft
Date Sampled: 08/06/19 10:40
Percent Solids: 95

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-07
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	**164** (94.9)		9060		1	CCP	08/12/19 17:57	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-4 96in
Date Sampled: 08/06/19 10:45
Percent Solids: 93

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-08
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**2950** (3.22)		6010C		1	KJK	08/13/19 2:05	3.34	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-4 96in
Date Sampled: 08/06/19 10:45
Percent Solids: 93

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-08
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	**462** (96.7)		9060		1	CCP	08/12/19 20:43	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-5 4ft
Date Sampled: 08/06/19 11:00
Percent Solids: 93

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-09
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**3320** (5.20)		6010C		1	KJK	08/13/19 2:09	2.06	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-5 4ft
Date Sampled: 08/06/19 11:00
Percent Solids: 93

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-09
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	**323** (95.7)		9060		1	CCP	08/12/19 19:05	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-5 96in
Date Sampled: 08/06/19 11:30
Percent Solids: 95

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-10
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Iron	**2770** (1.96)		6010C		1	KJK	08/13/19 2:12	5.36	100	CH91247

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County
Client Sample ID: TP-5 96in
Date Sampled: 08/06/19 11:30
Percent Solids: 95

ESS Laboratory Work Order: 19H0187
ESS Laboratory Sample ID: 19H0187-10
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Total Organic Carbon (Average)	ND (93.2)		9060		1	CCP	08/12/19 19:20	mg/kg dry	[CALC]

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County

ESS Laboratory Work Order: 19H0187

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch CH91247 - 3050B										
Blank										
Iron	ND	5.00	mg/kg wet							
LCS										
Iron	9230	17.9	mg/kg wet	9960		93	80-120			
LCS Dup										
Iron	9000	18.9	mg/kg wet	9960		90	80-120	2	20	
Classical Chemistry										
Batch CH90932 - General Preparation										
Blank										
Total Organic Carbon (1)	ND	100	mg/kg							
Total Organic Carbon (2)	ND	100	mg/kg							
LCS										
Total Organic Carbon (1)	9610	100	mg/kg	10000		96	80-120			
Total Organic Carbon (2)	9820	100	mg/kg	10000		98	80-120			
LCS Dup										
Total Organic Carbon (1)	9560	100	mg/kg	10000		96	80-120	0.5	20	
Total Organic Carbon (2)	9720	100	mg/kg	10000		97	80-120	1	20	

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County

ESS Laboratory Work Order: 19H0187

Notes and Definitions

U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Barnstable County

ESS Laboratory Work Order: 19H0187

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/ML

ESS Project ID: 19H0187
Date Received: 8/7/2019

Were all containers scanned into storage/lab? Initials _____ Yes / No
Are barcode labels on correct containers? Yes / No / NA
Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
Are all Hex Chrome stickers attached? Yes / No / NA
Are all QC stickers attached? Yes / No / NA
Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: _____ Date & Time: 8/7/19 14:14

Reviewed By: _____ Date & Time: 8/8/19 1334

Delivered By: _____ 8/8/19 1334

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/ML

Shipped/Delivered Via: ESS Courier

ESS Project ID: 19H0187
Date Received: 8/7/2019
Project Due Date: 8/14/2019
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 0.9 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / (NA)
10. Were any analyses received outside of hold time? Yes / (No)

11. Any Subcontracting needed? Yes / (No)
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / (No)
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? (Yes) / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / (No)
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
01	374398	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
01	374399	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
02	374396	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
02	374397	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
03	374394	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
03	374395	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
04	374392	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
04	374393	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
05	374390	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
05	374391	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
06	374388	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
06	374389	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
07	374386	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
07	374387	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
08	374384	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
08	374385	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
09	374382	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
09	374383	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
10	374380	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
10	374381	Yes	NA	Yes	4 oz. Jar - Unpres	NP	

2nd Review

CHAIN OF CUSTODY

ESS Laboratory
Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston RI 02910
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

ESS Lab # 19H0187
Reporting Limits S1/GW1
Electonic Deliverables ☑ Data Checker ☑ Excel ☐ Other (Please Specify →)

Turn Time: 5 Days
Regulatory State
Is this project for any of the following?: ○ CT RCP ● MA MCP ○ RGP

Company Name	Project #	Project Name
BETA Group Inc	18,06206	Barnstable County

Contact Person	Address	PO #
Roger Thibault	701 George Washington Highway	

City	State	Zip Code
Lincoln	Rhode Island	02865

Telephone Number	FAX Number	Email Address
401-333-2382		RThibault@BETA-Inc.com

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	Analysis: Iron	Analysis: TOC
1	8-6-19	8:00 AM	Composite	Soil	TP-1 (0-4')	1	1
2	8-6-19	8:15 AM	Composite	Soil	TP-1 (10')	1	1
3	8-6-19	8:30 AM	Composite	Soil	TP-2 (0-4')	1	1
4	8-6-19	8:45 AM	Composite	Soil	TP-2 (10')	1	1
5	8-6-19	9:00 AM	Composite	Soil	TP-3 ~~(0-4')~~ (4')	1	1
6	8-6-19	9:15 AM	Composite	Soil	TP-3 (10')	1	1
7	8-6-19	10:40 AM	Composite	Soil	TP-4 ~~(0-4')~~ (5')	1	1
8	8-6-19	10:45 AM	Composite	Soil	TP-4 ~~(10')~~ (96")	1	1
9	8-6-19	11:00 AM	Composite	Soil	TP-5 ~~(0-4')~~ (4')	1	1
10	8-6-19	11:30 AM	Composite	Soil	TP-5 ~~(10')~~ (96")	1	1

Container Type: AC-Air Cassette ~~AG-Amber Glass~~ B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial
Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*
Preservation Code: (1-Non Preserved) 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*
Number of Containers per Sample: 2

Laboratory Use Only
Cooler Present: ✓
Seals Intact: ✓
Cooler Temperature: 0.9 °C
Drop Off / PickUp

Sampled by: Mykel Mendes
Comments: Please specify "Other" preservative and containers types in this space
Corrections to ID's as per Client jjs 8/8/19

Relinquished by: (Signature, Date & Time)	Received By: (Signature, Date & Time)	Relinquished By: (Signature, Date & Time)	Received By: (Signature, Date & Time)
8-7-19 8:30 AM	8/7/19 9:16	8/7/19 10:05	8/7/19 11:40
Relinquished by: (Signature, Date & Time)	Received By: (Signature, Date & Time)	Relinquished By: (Signature, Date & Time)	Received By: (Signature, Date & Time)

CHAIN OF CUSTODY

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www.esslaboratory.com

ESS Lab # 19H0187

Turn Time	5	Days	
Regulatory State			
Company Name: BETA Group Inc	Project #: 18,06206	Project Name: Barnstable County	
Contact Person: Roger Thibault	Address: 701 George Washington Highway		
City: Lincoln	State: Rhode Island	Zip Code: 02865	PO #:
Telephone Number: 401-333-2382	FAX Number:	Email Address: RThibault@BETA-Inc.com	

Is this project for any of the following?: ○ CT RCP ● MA MCP ○ RGP

Reporting Limits: S1/GW1

Electonic Deliverables: ☑ Data Checker ☑ Excel ☐ Other (Please Specify →)

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	Analysis: Iron	Analysis: TOC
1	8-6-19	8:00 AM	Composik	Soil	TP-1 (0-4')	1	1
2	8-6-19	8:15 AM	Composik	Soil	TP-1 (10')	1	1
3	8-6-19	8:30 AM	Composik	Soil	TP-2 (0-4')	1	1
4	8-6-19	8:45 AM	Composik	Soil	TP-2 (10')	1	1
5	8-6-19	9:00 AM	Composite	Soil	TP-3 (0-4')	1	1
6	8-6-19	9:15 AM	Composite	Soil	TP-3 (10')	1	1
7	8-6-19	10:40 AM	Composite	Soil	TP-4 (0-4')	1	1
8	8-6-19	10:45 AM	Composite	Soil	TP-4 (10')	1	1
9	8-6-19	11:00 AM	Composik	Soil	TP-5 (0-4')	1	1
10	8-6-19	11:30 AM	Composik	Soil	TP-5 (10')	1	1

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial

Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*

Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Number of Containers per Sample: 2

Laboratory Use Only

Cooler Present: ✓
Seals Intact:
Cooler Temperature: 0.9 °C
Drop Off / PickUp

Sampled by: Mykel Mendes

Comments: Please specify "Other" preservative and containers types in this space

Relinquished by: (Signature, Date & Time)	Received By: (Signature, Date & Time)	Relinquished By: (Signature, Date & Time)	Received By: (Signature, Date & Time)
8-7-19 8:30 AM	8/7/19 9:16	8/7/19 10:05	8/7/19 11:40
Relinquished by: (Signature, Date & Time)	Received By: (Signature, Date & Time)	Relinquished By: (Signature, Date & Time)	Received By: (Signature, Date & Time)

Your Project #: BARNSTABLE COUNTY
Site#: 18.06206
Site Location: BFTA
Your C.O.C. #: 731070-06-01

Attention: Steven Tebo

Barnstable County
3195 Main Street
PO Box 427
Barnstable, MA
USA 02630

Report Date: 2019/08/21
Report #: R5847948
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9L8909
Received: 2019/08/08, 13:35

Sample Matrix: Soil
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	10	N/A	2019/08/10	CAM SOP-00445	Carter 2nd ed 51.2 m
PFAS in soil by SPE/LCMS (1)	10	2019/08/14	2019/08/16	CAM SOP-00894	ASTM D7968-17a m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Your Project #: BARNSTABLE COUNTY
Site#: 18.06206
Site Location: BFTA
Your C.O.C. #: 731070-06-01

Attention: Steven Tebo

Barnstable County
3195 Main Street
PO Box 427
Barnstable, MA
USA 02630

Report Date: 2019/08/21
Report #: R5847948
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9L8909
Received: 2019/08/08, 13:35

Encryption Key

Bureau Veritas Laboratories
21 Aug 2019 11:43:34

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Patricia Legette, Project Manager
Email: Patricia.Legette@bvlabs.com
Phone# (905)817-5799
==========
This report has been generated and distributed using a secure automated process.
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Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9L8909
Report Date: 2019/08/21

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BFTA
Sampler Initials: MM

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KLV114			KLV115			KLV116			
Sampling Date		2019/08/06 10:45			2019/08/06 11:00			2019/08/06 10:40			
COC Number		731070-06-01			731070-06-01			731070-06-01			
	UNITS	TP-4 (96'')	RDL	MDL	TP-5 (4')	RDL	MDL	TP-4 (60'')	RDL	MDL	QC Batch
Inorganics											
Moisture	%	6.3	1.0	0.50	6.4	1.0	0.50	5.7	1.0	0.50	6273637
Perfluorinated Compounds											
Perfluorobutanoic acid	ug/kg	0.23	1.0	0.12	<1.2	10	1.2	0.22	1.0	0.12	6279962
Perfluoropentanoic Acid (PFPeA)	ug/kg	0.26	1.0	0.10	<1.0	10	1.0	0.23	1.0	0.10	6279962
Perfluorohexanoic Acid (PFHxA)	ug/kg	0.18	1.0	0.14	<1.4	10	1.4	0.16	1.0	0.14	6279962
Perfluoroheptanoic Acid (PFHpA)	ug/kg	<0.18	1.0	0.18	<1.8	10	1.8	<0.18	1.0	0.18	6279962
Perfluorooctanoic Acid (PFOA)	ug/kg	0.38	1.0	0.16	3.5	10	1.6	0.49	1.0	0.16	6279962
Perfluorononanoic Acid (PFNA)	ug/kg	0.32	1.0	0.15	30	10	1.5	0.38	1.0	0.15	6279962
Perfluorodecanoic Acid (PFDA)	ug/kg	<0.31	1.0	0.31	<3.1	10	3.1	<0.31	1.0	0.31	6279962
Perfluoroundecanoic Acid (PFUnA)	ug/kg	0.44	1.0	0.15	<1.5	10	1.5	0.38	1.0	0.15	6279962
Perfluorododecanoic Acid (PFDoA)	ug/kg	<0.19	1.0	0.19	<1.9	10	1.9	<0.19	1.0	0.19	6279962
Perfluorotridecanoic Acid	ug/kg	<0.17	1.0	0.17	<1.7	10	1.7	<0.17	1.0	0.17	6279962
Perfluorotetradecanoic Acid	ug/kg	<0.15	1.0	0.15	<1.5	10	1.5	<0.15	1.0	0.15	6279962
Perfluorobutanesulfonic acid	ug/kg	<0.14	1.0	0.14	<1.4	10	1.4	<0.14	1.0	0.14	6279962
Perfluorohexanesulfonic acid	ug/kg	0.45	1.0	0.14	<1.4	10	1.4	0.55	1.0	0.14	6279962
Perfluoroheptanesulfonic acid	ug/kg	<0.087	1.0	0.087	<0.87	10	0.87	<0.087	1.0	0.087	6279962
Perfluorooctanesulfonic acid	ug/kg	14	1.0	0.21	530	100	21	17	1.0	0.21	6279962
Perfluorodecanesulfonic acid (PFDS)	ug/kg	<0.27	1.0	0.27	<2.7	10	2.7	<0.27	1.0	0.27	6279962
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	17	1.0	0.19	<1.9	10	1.9	7.5	1.0	0.19	6279962
EtFOSA	ug/kg	<0.31	1.0	0.31	<3.1	10	3.1	<0.31	1.0	0.31	6279962
MeFOSA	ug/kg	<0.28	1.0	0.28	<2.8	10	2.8	<0.28	1.0	0.28	6279962
EtFOSE	ug/kg	<0.27	1.0	0.27	<2.7	10	2.7	<0.27	1.0	0.27	6279962
MeFOSE	ug/kg	<0.17	1.0	0.17	<1.7	10	1.7	<0.17	1.0	0.17	6279962
6:2 Fluorotelomer sulfonic acid	ug/kg	<0.13	1.0	0.13	3.4	10	1.3	<0.13	1.0	0.13	6279962
8:2 Fluorotelomer sulfonic acid	ug/kg	<0.33	1.0	0.33	5.2	10	3.3	<0.33	1.0	0.33	6279962
Surrogate Recovery (%)											
13C2-6:2-Fluorotelomersulfonic Acid	%	76	N/A	N/A	93	N/A	N/A	79	N/A	N/A	6279962
13C2-8:2-Fluorotelomersulfonic Acid	%	67	N/A	N/A	90	N/A	N/A	75	N/A	N/A	6279962
13C2-Perfluorodecanoic acid	%	63	N/A	N/A	83	N/A	N/A	65	N/A	N/A	6279962
13C2-Perfluorododecanoic acid	%	60	N/A	N/A	84	N/A	N/A	67	N/A	N/A	6279962
13C2-Perfluorohexanoic acid	%	70	N/A	N/A	84	N/A	N/A	72	N/A	N/A	6279962
13C2-perfluorotetradecanoic acid	%	58	N/A	N/A	82	N/A	N/A	65	N/A	N/A	6279962

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: B9L8909
Report Date: 2019/08/21

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BFTA
Sampler Initials: MM

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KLV114			KLV115			KLV116			
Sampling Date		2019/08/06 10:45			2019/08/06 11:00			2019/08/06 10:40			
COC Number		731070-06-01			731070-06-01			731070-06-01			
	UNITS	TP-4 (96'')	RDL	MDL	TP-5 (4')	RDL	MDL	TP-4 (60'')	RDL	MDL	QC Batch
13C2-Perfluoroundecanoic acid	%	61	N/A	N/A	83	N/A	N/A	66	N/A	N/A	6279962
13C3-Perfluorobutanesulfonic acid	%	65	N/A	N/A	85	N/A	N/A	68	N/A	N/A	6279962
13C4-Perfluorobutanoic acid	%	72	N/A	N/A	83	N/A	N/A	73	N/A	N/A	6279962
13C4-Perfluoroheptanoic acid	%	68	N/A	N/A	84	N/A	N/A	71	N/A	N/A	6279962
13C4-Perfluorooctanesulfonic acid	%	60	N/A	N/A	86	N/A	N/A	65	N/A	N/A	6279962
13C4-Perfluorooctanoic acid	%	65	N/A	N/A	83	N/A	N/A	68	N/A	N/A	6279962
13C5-Perfluorononanoic acid	%	63	N/A	N/A	81	N/A	N/A	66	N/A	N/A	6279962
13C5-Perfluoropentanoic acid	%	71	N/A	N/A	83	N/A	N/A	72	N/A	N/A	6279962
13C8-Perfluorooctane Sulfonamide	%	60	N/A	N/A	85	N/A	N/A	66	N/A	N/A	6279962
18O2-Perfluorohexanesulfonic acid	%	60	N/A	N/A	82	N/A	N/A	65	N/A	N/A	6279962
D3-MeFOSA	%	45 (1)	N/A	N/A	84	N/A	N/A	49 (1)	N/A	N/A	6279962
D5-EtFOSA	%	44 (2)	N/A	N/A	80	N/A	N/A	46 (2)	N/A	N/A	6279962
D7-MeFOSE	%	56	N/A	N/A	83	N/A	N/A	61	N/A	N/A	6279962
D9-EtFOSE	%	54	N/A	N/A	81	N/A	N/A	59	N/A	N/A	6279962

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Methylperfluorooctane sulfonamide).
(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Ethylperfluorooctane sulfonamide).

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Report Date: 2019/08/21

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BFTA
Sampler Initials: MM

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KLV117	KLV118			KLV119	KLV119			
Sampling Date		2019/08/06 11:30	2019/08/06 08:05			2019/08/06 08:00	2019/08/06 08:00			
COC Number		731070-06-01	731070-06-01			731070-06-01	731070-06-01			
	UNITS	TP-5 (109'')	TP-1 (10')	RDL	MDL	TP-1 (0-4')	TP-1 (0-4') Lab-Dup	RDL	MDL	QC Batch
Inorganics										
Moisture	%	4.1	8.2	1.0	0.50	9.0	N/A	1.0	0.50	6273637
Perfluorinated Compounds										
Perfluorobutanoic acid	ug/kg	0.25	0.21	1.0	0.12	0.47	0.42	1.0	0.12	6279962
Perfluoropentanoic Acid (PFPeA)	ug/kg	0.31	0.41	1.0	0.10	0.79	0.79	1.0	0.10	6279962
Perfluorohexanoic Acid (PFHxA)	ug/kg	0.30	0.32	1.0	0.14	0.48	0.51	1.0	0.14	6279962
Perfluoroheptanoic Acid (PFHpA)	ug/kg	0.31	1.1	1.0	0.18	1.6	1.6	1.0	0.18	6279962
Perfluorooctanoic Acid (PFOA)	ug/kg	2.4	5.0	1.0	0.16	6.1	6.4	1.0	0.16	6279962
Perfluorononanoic Acid (PFNA)	ug/kg	2.3	0.50	1.0	0.15	6.0	6.5	1.0	0.15	6279962
Perfluorodecanoic Acid (PFDA)	ug/kg	<0.31	<0.31	1.0	0.31	<0.31	<0.31	1.0	0.31	6279962
Perfluoroundecanoic Acid (PFUnA)	ug/kg	<0.15	<0.15	1.0	0.15	<0.15	<0.15	1.0	0.15	6279962
Perfluorododecanoic Acid (PFDoA)	ug/kg	<0.19	<0.19	1.0	0.19	<0.19	<0.19	1.0	0.19	6279962
Perfluorotridecanoic Acid	ug/kg	<0.17	<0.17	1.0	0.17	<0.17	<0.17	1.0	0.17	6279962
Perfluorotetradecanoic Acid	ug/kg	<0.15	<0.15	1.0	0.15	<0.15	<0.15	1.0	0.15	6279962
Perfluorobutanesulfonic acid	ug/kg	<0.14	<0.14	1.0	0.14	<0.14	<0.14	1.0	0.14	6279962
Perfluorohexanesulfonic acid	ug/kg	4.2	1.2	1.0	0.14	1.7	1.8	1.0	0.14	6279962
Perfluoroheptanesulfonic acid	ug/kg	1.2	1.8	1.0	0.087	3.6	3.6	1.0	0.087	6279962
Perfluorooctanesulfonic acid	ug/kg	4.3	8.6	1.0	0.21	360	360	10	2.1	6279962
Perfluorodecanesulfonic acid (PFDS)	ug/kg	<0.27	<0.27	1.0	0.27	<0.27	<0.27	1.0	0.27	6279962
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	<0.19	<0.19	1.0	0.19	<0.19	<0.19	1.0	0.19	6279962
EtFOSA	ug/kg	<0.31	<0.31	1.0	0.31	<0.31	<0.31	1.0	0.31	6279962
MeFOSA	ug/kg	<0.28	<0.28	1.0	0.28	<0.28	<0.28	1.0	0.28	6279962
EtFOSE	ug/kg	<0.27	<0.27	1.0	0.27	<0.27	<0.27	1.0	0.27	6279962
MeFOSE	ug/kg	<0.17	<0.17	1.0	0.17	<0.17	<0.17	1.0	0.17	6279962
6:2 Fluorotelomer sulfonic acid	ug/kg	15	21	1.0	0.13	13	12	1.0	0.13	6279962
8:2 Fluorotelomer sulfonic acid	ug/kg	<0.33	0.56	1.0	0.33	7.3	7.8	1.0	0.33	6279962
Surrogate Recovery (%)										
13C2-6:2-Fluorotelomersulfonic Acid	%	74	68	N/A	N/A	67	73	N/A	N/A	6279962
13C2-8:2-Fluorotelomersulfonic Acid	%	76	77	N/A	N/A	65	68	N/A	N/A	6279962
13C2-Perfluorodecanoic acid	%	67	68	N/A	N/A	60	64	N/A	N/A	6279962
13C2-Perfluorododecanoic acid	%	67	68	N/A	N/A	57	59	N/A	N/A	6279962
13C2-Perfluorohexanoic acid	%	69	69	N/A	N/A	66	68	N/A	N/A	6279962

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Report Date: 2019/08/21

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BFTA
Sampler Initials: MM

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KLV117	KLV118			KLV119	KLV119			
Sampling Date		2019/08/06 11:30	2019/08/06 08:05			2019/08/06 08:00	2019/08/06 08:00			
COC Number		731070-06-01	731070-06-01			731070-06-01	731070-06-01			
	UNITS	TP-5 (109'')	TP-1 (10')	RDL	MDL	TP-1 (0-4')	TP-1 (0-4') Lab-Dup	RDL	MDL	QC Batch
13C2-perfluorotetradecanoic acid	%	62	67	N/A	N/A	48 (1)	53	N/A	N/A	6279962
13C2-Perfluoroundecanoic acid	%	67	66	N/A	N/A	58	60	N/A	N/A	6279962
13C3-Perfluorobutanesulfonic acid	%	64	72	N/A	N/A	66	70	N/A	N/A	6279962
13C4-Perfluorobutanoic acid	%	70	69	N/A	N/A	68	69	N/A	N/A	6279962
13C4-Perfluoroheptanoic acid	%	69	71	N/A	N/A	66	70	N/A	N/A	6279962
13C4-Perfluorooctanesulfonic acid	%	66	68	N/A	N/A	86	80	N/A	N/A	6279962
13C4-Perfluorooctanoic acid	%	68	69	N/A	N/A	63	67	N/A	N/A	6279962
13C5-Perfluorononanoic acid	%	67	68	N/A	N/A	61	65	N/A	N/A	6279962
13C5-Perfluoropentanoic acid	%	68	69	N/A	N/A	67	68	N/A	N/A	6279962
13C8-Perfluorooctane Sulfonamide	%	61	63	N/A	N/A	56	59	N/A	N/A	6279962
18O2-Perfluorohexanesulfonic acid	%	64	70	N/A	N/A	62	68	N/A	N/A	6279962
D3-MeFOSA	%	41 (2)	45 (2)	N/A	N/A	44 (2)	50	N/A	N/A	6279962
D5-EtFOSA	%	34 (3)	45 (3)	N/A	N/A	37 (3)	45 (3)	N/A	N/A	6279962
D7-MeFOSE	%	57	62	N/A	N/A	50	54	N/A	N/A	6279962
D9-EtFOSE	%	52	60	N/A	N/A	45 (4)	54	N/A	N/A	6279962

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked soil resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (Perfluorotetradecanoic acid).

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Methylperfluorooctane sulfonamide).

(3) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Ethylperfluorooctane sulfonamide).

(4) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked soil resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (N-Ethylperfluorooctane sulfonamidoethanol).

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BV Labs Job #: B9L8909
Report Date: 2019/08/21

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BFTA
Sampler Initials: MM

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KLV120	KLV121	KLV122	KLV123			
Sampling Date		2019/08/06 08:45	2019/08/06 08:30	2019/08/06 09:00	2019/08/06 09:15			
COC Number		731070-06-01	731070-06-01	731070-06-01	731070-06-01			
	UNITS	TP-2 (10')	TP-2 (0-4')	TP-3 (4')	TP-3 (101'')	RDL	MDL	QC Batch
Inorganics								
Moisture	%	3.3	4.7	3.1	2.7	1.0	0.50	6273637
Perfluorinated Compounds								
Perfluorobutanoic acid	ug/kg	<0.12	<0.12	<0.12	<0.12	1.0	0.12	6279962
Perfluoropentanoic Acid (PFPeA)	ug/kg	<0.10	<0.10	<0.10	<0.10	1.0	0.10	6279962
Perfluorohexanoic Acid (PFHxA)	ug/kg	<0.14	<0.14	<0.14	<0.14	1.0	0.14	6279962
Perfluoroheptanoic Acid (PFHpA)	ug/kg	<0.18	<0.18	<0.18	<0.18	1.0	0.18	6279962
Perfluorooctanoic Acid (PFOA)	ug/kg	0.22	<0.16	<0.16	<0.16	1.0	0.16	6279962
Perfluorononanoic Acid (PFNA)	ug/kg	<0.15	<0.15	<0.15	<0.15	1.0	0.15	6279962
Perfluorodecanoic Acid (PFDA)	ug/kg	<0.31	<0.31	<0.31	<0.31	1.0	0.31	6279962
Perfluoroundecanoic Acid (PFUnA)	ug/kg	0.90	0.33	7.4	2.5	1.0	0.15	6279962
Perfluorododecanoic Acid (PFDoA)	ug/kg	<0.19	<0.19	<0.19	<0.19	1.0	0.19	6279962
Perfluorotridecanoic Acid	ug/kg	0.24	<0.17	0.58	0.23	1.0	0.17	6279962
Perfluorotetradecanoic Acid	ug/kg	<0.15	<0.15	<0.15	<0.15	1.0	0.15	6279962
Perfluorobutanesulfonic acid	ug/kg	<0.14	<0.14	<0.14	<0.14	1.0	0.14	6279962
Perfluorohexanesulfonic acid	ug/kg	0.60	0.48	<0.14	<0.14	1.0	0.14	6279962
Perfluoroheptanesulfonic acid	ug/kg	<0.087	<0.087	<0.087	<0.087	1.0	0.087	6279962
Perfluorooctanesulfonic acid	ug/kg	15	3.1	1.1	1.1	1.0	0.21	6279962
Perfluorodecanesulfonic acid (PFDS)	ug/kg	<0.27	<0.27	<0.27	<0.27	1.0	0.27	6279962
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	2.7	1.4	2.8	4.3	1.0	0.19	6279962
EtFOSA	ug/kg	<0.31	<0.31	<0.31	<0.31	1.0	0.31	6279962
MeFOSA	ug/kg	<0.28	<0.28	<0.28	<0.28	1.0	0.28	6279962
EtFOSE	ug/kg	<0.27	<0.27	<0.27	<0.27	1.0	0.27	6279962
MeFOSE	ug/kg	<0.17	<0.17	<0.17	<0.17	1.0	0.17	6279962
6:2 Fluorotelomer sulfonic acid	ug/kg	<0.13	<0.13	<0.13	<0.13	1.0	0.13	6279962
8:2 Fluorotelomer sulfonic acid	ug/kg	<0.33	<0.33	<0.33	<0.33	1.0	0.33	6279962
Surrogate Recovery (%)								
13C2-6:2-Fluorotelomersulfonic Acid	%	78	74	87	71	N/A	N/A	6279962
13C2-8:2-Fluorotelomersulfonic Acid	%	71	69	80	65	N/A	N/A	6279962
13C2-Perfluorodecanoic acid	%	66	64	71	58	N/A	N/A	6279962
13C2-Perfluorododecanoic acid	%	63	60	68	57	N/A	N/A	6279962
13C2-Perfluorohexanoic acid	%	69	67	76	61	N/A	N/A	6279962

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: B9L8909
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Barnstable County
Client Project #: BARNSTABLE COUNTY
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Sampler Initials: MM

RESULTS OF ANALYSES OF SOIL

BV Labs ID		KLV120	KLV121	KLV122	KLV123			
Sampling Date		2019/08/06 08:45	2019/08/06 08:30	2019/08/06 09:00	2019/08/06 09:15			
COC Number		731070-06-01	731070-06-01	731070-06-01	731070-06-01			
	UNITS	TP-2 (10')	TP-2 (0-4')	TP-3 (4')	TP-3 (101'')	RDL	MDL	QC Batch
13C2-perfluorotetradecanoic acid	%	61	58	63	48 (1)	N/A	N/A	6279962
13C2-Perfluoroundecanoic acid	%	63	61	70	57	N/A	N/A	6279962
13C3-Perfluorobutanesulfonic acid	%	70	64	68	55	N/A	N/A	6279962
13C4-Perfluorobutanoic acid	%	70	69	76	62	N/A	N/A	6279962
13C4-Perfluoroheptanoic acid	%	68	66	76	61	N/A	N/A	6279962
13C4-Perfluorooctanesulfonic acid	%	65	61	66	55	N/A	N/A	6279962
13C4-Perfluorooctanoic acid	%	66	65	74	59	N/A	N/A	6279962
13C5-Perfluorononanoic acid	%	64	63	73	58	N/A	N/A	6279962
13C5-Perfluoropentanoic acid	%	68	67	76	61	N/A	N/A	6279962
13C8-Perfluorooctane Sulfonamide	%	62	60	68	57	N/A	N/A	6279962
18O2-Perfluorohexanesulfonic acid	%	67	62	70	53	N/A	N/A	6279962
D3-MeFOSA	%	44 (2)	43 (2)	46 (2)	37 (2)	N/A	N/A	6279962
D5-EtFOSA	%	42 (3)	43 (3)	45 (3)	36 (3)	N/A	N/A	6279962
D7-MeFOSE	%	55	57	65	52	N/A	N/A	6279962
D9-EtFOSE	%	56	55	62	49 (4)	N/A	N/A	6279962

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked soil resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (Perfluorotetradecanoic acid).

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Methylperfluorooctane sulfonamide).

(3) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Ethylperfluorooctane sulfonamide).

(4) Extracted internal standard analyte recovery was below the defined lower control limit (LCL). Laboratory spiked soil resulted in satisfactory recovery of the extracted internal standard analyte. When considered together, these QC data suggest that matrix interferences may be increasing the variability of the associated native analyte result (N-Ethylperfluorooctane sulfonamidoethanol).

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TEST SUMMARY

BV Labs ID: KLV114 **Collected:** 2019/08/06
Sample ID: TP-4 (96'') **Shipped:**
Matrix: Soil **Received:** 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

BV Labs ID: KLV115 **Collected:** 2019/08/06
Sample ID: TP-5 (4') **Shipped:**
Matrix: Soil **Received:** 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

BV Labs ID: KLV116 **Collected:** 2019/08/06
Sample ID: TP-4 (60'') **Shipped:**
Matrix: Soil **Received:** 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

BV Labs ID: KLV117 **Collected:** 2019/08/06
Sample ID: TP-5 (109'') **Shipped:**
Matrix: Soil **Received:** 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

BV Labs ID: KLV118 **Collected:** 2019/08/06
Sample ID: TP-1 (10') **Shipped:**
Matrix: Soil **Received:** 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

BV Labs ID: KLV119 **Collected:** 2019/08/06
Sample ID: TP-1 (0-4') **Shipped:**
Matrix: Soil **Received:** 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

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BV Labs Job #: B9L8909
Report Date: 2019/08/21

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BFTA
Sampler Initials: MM

TEST SUMMARY

BV Labs ID: KLV119 Dup
Sample ID: TP-1 (0-4')
Matrix: Soil
Collected: 2019/08/06
Shipped:
Received: 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

BV Labs ID: KLV120
Sample ID: TP-2 (10')
Matrix: Soil
Collected: 2019/08/06
Shipped:
Received: 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

BV Labs ID: KLV121
Sample ID: TP-2 (0-4')
Matrix: Soil
Collected: 2019/08/06
Shipped:
Received: 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

BV Labs ID: KLV122
Sample ID: TP-3 (4')
Matrix: Soil
Collected: 2019/08/06
Shipped:
Received: 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

BV Labs ID: KLV123
Sample ID: TP-3 (101'')
Matrix: Soil
Collected: 2019/08/06
Shipped:
Received: 2019/08/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	6273637	N/A	2019/08/10	Mithunaa Sasitheepan
PFAS in soil by SPE/LCMS	LCMS	6279962	2019/08/14	2019/08/16	Marian Godax

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GENERAL COMMENTS

Samples received at an elevated temperature. Client consented to proceed with analysis.

Sample KLV115 [TP-5 (4')] : Per- and polyfluoroalkyl substances (PFAS): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Sample KLV119 [TP-1 (0-4')] : Per- and polyfluoroalkyl substances (PFAS): Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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BV Labs Job #: B9L8909
Report Date: 2019/08/21

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BFTA
Sampler Initials: MM

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
6273637	JMP	RPD - Sample/Sample Dup	Moisture	2019/08/10	14		%	20
6279962	M_G	Matrix Spike(KLV119)	13C2-6:2-Fluorotelomersulfonic Acid	2019/08/16		69	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2019/08/16		69	%	50 - 150
			13C2-Perfluorodecanoic acid	2019/08/16		67	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/16		66	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/16		70	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/16		55	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/16		66	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/16		66	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/16		72	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/16		70	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/16		55	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/16		70	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/16		69	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/16		72	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/16		65	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/16		66	%	50 - 150
			D3-MeFOSA	2019/08/16		54	%	50 - 150
			D5-EtFOSA	2019/08/16		52	%	50 - 150
			D7-MeFOSE	2019/08/16		63	%	50 - 150
			D9-EtFOSE	2019/08/16		60	%	50 - 150
			Perfluorobutanoic acid	2019/08/16		93	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/08/16		89	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/08/16		91	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/08/16		88	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/08/16		92	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/08/16		95	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/08/16		97	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/08/16		93	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/08/16		91	%	70 - 130
			Perfluorotridecanoic Acid	2019/08/16		104	%	70 - 130
			Perfluorotetradecanoic Acid	2019/08/16		93	%	70 - 130
			Perfluorobutanesulfonic acid	2019/08/16		87	%	70 - 130
			Perfluorohexanesulfonic acid	2019/08/16		90	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/08/16		82	%	70 - 130
			Perfluorooctanesulfonic acid	2019/08/16		NC	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/08/16		88	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/16		84	%	70 - 130
			EtFOSA	2019/08/16		93	%	70 - 130
			MeFOSA	2019/08/16		92	%	70 - 130
			EtFOSE	2019/08/16		91	%	70 - 130
			MeFOSE	2019/08/16		83	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2019/08/16		83	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2019/08/16		88	%	70 - 130
6279962	M_G	Spiked Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/08/16		94	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2019/08/16		93	%	50 - 150
			13C2-Perfluorodecanoic acid	2019/08/16		90	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/16		90	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/16		95	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/16		86	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/16		89	%	50 - 150

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			13C3-Perfluorobutanesulfonic acid	2019/08/16		94	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/16		98	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/16		96	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/16		89	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/16		93	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/16		90	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/16		97	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/16		78	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/08/16		91	%	50 - 150
			D3-MeFOSA	2019/08/16		58	%	50 - 150
			D5-EtFOSA	2019/08/16		56	%	50 - 150
			D7-MeFOSE	2019/08/16		73	%	50 - 150
			D9-EtFOSE	2019/08/16		73	%	50 - 150
			Perfluorobutanoic acid	2019/08/16		93	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/08/16		88	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/08/16		92	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/08/16		88	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/08/16		91	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/08/16		92	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/08/16		92	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/08/16		93	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/08/16		92	%	70 - 130
			Perfluorotridecanoic Acid	2019/08/16		96	%	70 - 130
			Perfluorotetradecanoic Acid	2019/08/16		91	%	70 - 130
			Perfluorobutanesulfonic acid	2019/08/16		85	%	70 - 130
			Perfluorohexanesulfonic acid	2019/08/16		91	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/08/16		82	%	70 - 130
			Perfluorooctanesulfonic acid	2019/08/16		92	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/08/16		90	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/16		86	%	70 - 130
			EtFOSA	2019/08/16		90	%	70 - 130
			MeFOSA	2019/08/16		89	%	70 - 130
			EtFOSE	2019/08/16		92	%	70 - 130
			MeFOSE	2019/08/16		86	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2019/08/16		87	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2019/08/16		89	%	70 - 130
6279962	M_G	Method Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/08/16		83	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2019/08/16		79	%	50 - 150
			13C2-Perfluorodecanoic acid	2019/08/16		73	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/08/16		73	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/08/16		69	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/08/16		71	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/08/16		72	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2019/08/16		64	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/08/16		71	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/08/16		71	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/08/16		69	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/08/16		71	%	50 - 150
			13C5-Perfluorononanoic acid	2019/08/16		71	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/08/16		70	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/08/16		66	%	50 - 150

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			18O2-Perfluorohexanesulfonic acid	2019/08/16		65	%	50 - 150
			D3-MeFOSA	2019/08/16		44 (1)	%	50 - 150
			D5-EtFOSA	2019/08/16		41 (2)	%	50 - 150
			D7-MeFOSE	2019/08/16		62	%	50 - 150
			D9-EtFOSE	2019/08/16		61	%	50 - 150
			Perfluorobutanoic acid	2019/08/16	<0.12		ug/kg	
			Perfluoropentanoic Acid (PFPeA)	2019/08/16	<0.10		ug/kg	
			Perfluorohexanoic Acid (PFHxA)	2019/08/16	<0.14		ug/kg	
			Perfluoroheptanoic Acid (PFHpA)	2019/08/16	<0.18		ug/kg	
			Perfluorooctanoic Acid (PFOA)	2019/08/16	<0.16		ug/kg	
			Perfluorononanoic Acid (PFNA)	2019/08/16	<0.15		ug/kg	
			Perfluorodecanoic Acid (PFDA)	2019/08/16	<0.31		ug/kg	
			Perfluoroundecanoic Acid (PFUnA)	2019/08/16	<0.15		ug/kg	
			Perfluorododecanoic Acid (PFDoA)	2019/08/16	<0.19		ug/kg	
			Perfluorotridecanoic Acid	2019/08/16	<0.17		ug/kg	
			Perfluorotetradecanoic Acid	2019/08/16	<0.15		ug/kg	
			Perfluorobutanesulfonic acid	2019/08/16	<0.14		ug/kg	
			Perfluorohexanesulfonic acid	2019/08/16	<0.14		ug/kg	
			Perfluoroheptanesulfonic acid	2019/08/16	<0.087		ug/kg	
			Perfluorooctanesulfonic acid	2019/08/16	<0.21		ug/kg	
			Perfluorodecanesulfonic acid (PFDS)	2019/08/16	<0.27		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/16	<0.19		ug/kg	
			EtFOSA	2019/08/16	<0.31		ug/kg	
			MeFOSA	2019/08/16	<0.28		ug/kg	
			EtFOSE	2019/08/16	<0.27		ug/kg	
			MeFOSE	2019/08/16	<0.17		ug/kg	
			6:2 Fluorotelomer sulfonic acid	2019/08/16	<0.13		ug/kg	
			8:2 Fluorotelomer sulfonic acid	2019/08/16	<0.33		ug/kg	
6279962	M_G	RPD - Sample/Sample Dup	Perfluorobutanoic acid	2019/08/16	NC		%	30
			Perfluoropentanoic Acid (PFPeA)	2019/08/16	NC		%	30
			Perfluorohexanoic Acid (PFHxA)	2019/08/16	NC		%	30
			Perfluoroheptanoic Acid (PFHpA)	2019/08/16	0.83		%	30
			Perfluorooctanoic Acid (PFOA)	2019/08/16	4.3		%	30
			Perfluorononanoic Acid (PFNA)	2019/08/16	8.0		%	30
			Perfluorodecanoic Acid (PFDA)	2019/08/16	NC		%	30
			Perfluoroundecanoic Acid (PFUnA)	2019/08/16	NC		%	30
			Perfluorododecanoic Acid (PFDoA)	2019/08/16	NC		%	30
			Perfluorotridecanoic Acid	2019/08/16	NC		%	30
			Perfluorotetradecanoic Acid	2019/08/16	NC		%	30
			Perfluorobutanesulfonic acid	2019/08/16	NC		%	30
			Perfluorohexanesulfonic acid	2019/08/16	3.4		%	30
			Perfluoroheptanesulfonic acid	2019/08/16	0.37		%	30
			Perfluorooctanesulfonic acid	2019/08/16	0.77		%	30
			Perfluorodecanesulfonic acid (PFDS)	2019/08/16	NC		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2019/08/16	NC		%	25
			EtFOSA	2019/08/16	NC		%	30
			MeFOSA	2019/08/16	NC		%	30
			EtFOSE	2019/08/16	NC		%	30
			MeFOSE	2019/08/16	NC		%	30
			6:2 Fluorotelomer sulfonic acid	2019/08/16	2.4		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			8:2 Fluorotelomer sulfonic acid	2019/08/16	6.0		%	30

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Methylperfluorooctane sulfonamide).

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Ethylperfluorooctane sulfonamide).

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BV Labs Job #: B9L8909
Report Date: 2019/08/21

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BFTA
Sampler Initials: MM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Brad Newman, Scientific Service Specialist

Colm McNamara, Senior Analyst, Liquid Chromatography

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

Page of

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#29803 Barnstable County	Company Name:	BETA Group Inc	Quotation #:	B57344	BV Labs Job #:	Bottle Order #: 731070
Attention:	Accounts Payable	Attention:	Steven Tebo	P.O. #:	NA		
Address:	3195 Main Street PO Box 427 Barnstable MA 02630	Address:	701 George Washington Highway Lincoln RI USA 02865	Project:	Barnstable County	COC #: C#731070-06-01	Project Manager: Patricia Legette
Tel:	(508) 362-3828 Ext: 1234 Fax:	Tel:	(508) 375-6603 Fax:	Project Name:	BETA		
Email:	eoconnell@barnstablecounty.org, stebo@barnstableco	Email:	stebo@barnstablecounty.org, rthibault@noverarmstrong	Site #:	18.06206		
				Sampled By:	Mykel Mendes		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? Yes

ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Field Filtered (please circle): Metals / Hg / Cr VI; US EPA PFAS 539

Turnaround Time (TAT) Required: Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required: ☐
Rush Confirmation Number: (call lab for #)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	US EPA PFAS 539	# of Bottles	Comments
1		TP-4 (96")	8-6-19	10:45 AM	Soil	✓	1	
2		TP-5 (4')	8-6-19	11:00 AM	Soil	✓	1	
3		TP-4 (60")	8-6-19	10:40 AM	Soil	✓	1	
4		TP-5 (109")	8-6-19	11:30 AM	Soil	✓	1	
5		TP-1 (10')	8-6-19	8:05 AM	Soil	✓	1	
6		TP-1 (0-4')	8-6-19	8:00 AM	Soil	✓	1	
7		TP-2 (10')	8-6-19	8:45 AM	Soil	✓	1	
8		TP-2 (0-4')	8-6-19	8:30 AM	Soil	✓	1	
9		TP-3 (4')	8-6-19	9:00 AM	Soil	✓	1	
10		TP-3 (101")	8-6-19	9:15 AM	Soil	✓	1	

Controlled Storage and Disposal
International Solid Sample
Heat Treat Required
High Risk material
Controlled Storage and Disposal

08-Aug-19 13:35
Patricia Legette
B9L8909
KVG ENV-1334

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Laboratory Use Only
Ryan Carkin	2019/8/7	2:10 PM	Dalmer VARMA OHM	20190808	13:35			Temperature (°C) on Recei: 21.0/22.2/21.7; Melted ice; Custody Seal Present: No; Intact: No

White: BV Labs Yellow: Client

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

APPENDIX C

IRA Plan Modification – Proposed Site Capping- Construction Alternative

PROPOSED INFILTRATION BASIN 1
AVAILABLE STORAGE VOLUME=16,000 CF
TOP OF BASIN ELEV=39.00
BOTTOM OF BASIN ELEV=33.00
BOTTOM OF BIOFILTRATION MEDIA ELEV=32.67
SEASONAL HIGH GW ELEV.=30.67

TANKER REMOVED PRIOR TO CONSTRUCTION (BY OTHERS)

87' 18" CORRUGATED HDPE PIPE S=(0.004) '/'

PROP STORMCEPTOR RIM=40.5± INV IN (18" S)=33.70 (DMH-3) INV OUT (18" N)=33.60 (FES-2)

PROP FES-2 RIM=34.5± INV OUT=(18" S)=33.55 (STORMCEPTOR)

33' 18" CORRUGATED HDPE PIPE S=(0.002) '/'

PARCEL: 313008800 N/F TOWN OF BARNSTABLE

EXISTING WELL

REMOVE AND DISPOSE EXISTING BUILDING

LIMIT OF EXCAVATION. ALL SOIL REMOVED IN BMP CONSTRUCTION TO BE RELOCATED TO AREA TO BE CAPPED PRIOR TO GRADING/PAVING

PROP. HOT MIX ASPHALT CAP NOT INTENDED FOR VEHICULAR USAGE OVER 3 TONS GVW (TYP.)

PROP DMH-3 RIM=41.0± INV IN (18" W)=34.05 (DMH-2) INV OUT (18" N)=34.05 (STORMCEPTOR)

489'± S12°36'21"W

PROP. HMA CAP OVER EXIST. CONC. PAD

EXISTING PAVED ACCESS ROADWAY

FORMER BURN BUILDING NO LONGER IN USE

PROP. HOT MIX ASPHALT CAP NOT INTENDED FOR VEHICULAR USAGE OVER 3 TONS GVW (TYP.)

PROP. BIT. BERM (TYP.)

S79°18'13"W 436.98'

PROP. COMPOST FILTER SOCK (TYP.)

PROP. 4" FRAME AND GRATE (SEE DETAIL)

UNNAMED POND

REMOVE AND DISPOSE EXISTING PAVEMENT.

PROP OVERFLOW STRUCTURE RIM=37.0± INV OUT (12" W)=33.50 (FES-1)

50' WETLAND OFFSET

ROCK (APPROX. CENTERLINE)

REMOVE AND REPLACE FABRIC STORAGE STRUCTURE. INSTALL PRECAST CONC. TIE-DOWN ANCHORS AS REQUIRED PRIOR TO PAVING

BENCHMARK: NAIL SET IN PAVEMENT ELEV.=39.11 NAVD88

PROP. LIMIT OF PAVEMENT

135' 18" CORRUGATED HDPE PIPE S=(0.004) '/'

PARCEL: 315019
6.2± AC.

195' 12" CORRUGATED HDPE PIPE S=(0.005) '/'

PROP. SAWCUT (TYP.)

93' 14" DI S=(0.004) '/'

71' 12" DI S=(0.004) '/'

GRADE TO DRAIN (TYP.)

100' 12" DI S=(0.004) '/'

PROP. HMA CAP OVER EXIST. CONC. PAD

GW TREATMENT BUILDING TO REMAIN ACCESSIBLE

PROP CB-1 RIM=38.2± INV OUT (12" S)=35.00 (DMH-2)

PROP. CRUSHED STONE FOR PIPE ENDS

PROP CB-3 RIM=38.0± INV OUT (12" NE)=35.21 (DMH-1)

PROP DMH-1 RIM=38.3± INV IN (12" SW)=34.95 (CB-3) INV IN (12" W)=35.00 (CB-2) INV OUT (14" N)=34.95 (DMH-2)

PAVEMENT AND BUILDING TO REMAIN

PROP CB-2 RIM=38.1± INV OUT (12" E)=35.10 (DMH-1)

PROP DMH-2 RIM=38.6± INV IN (12" N)=34.60 (CB-1) INV IN (14" S)=34.60 (DMH-1) INV OUT (18" E)=34.60 (DMH-3)

50' WETLAND OFFSET

PROP. COMPOST FILTER SOCK (TYP.)

PROP. 4" FRAME AND GRATE (SEE DETAIL)

PARCEL: 332010002 N/F TOWN OF BARNSTABLE (COBB TRUST)

SOUTH FLINT ROAD

APPROX. LOCATION OF SEPTIC SYSTEM

PROP FES-1 RIM=33.5± INV OUT=(12" E)=32.50 (OVERFLOW STRUCTURE)

FLINT ROCK POND
ELEV. 28.1± (7/14/17) NAVD88

BORDERING VEGETATED WETLAND (BANK) DELINEATION BY NOVER-ARMSTRONG ASSOCIATES, INC.

N10°09'02"E 814.18'

N13°26'49"E 161'±

314001 EAST PARK INC.

NOTES
1. PROPERTY LINE AND SURVEY DATA FROM "EXISTING CONDITIONS PLAN" BY LAND PLANNING, INC. DATED JULY 26, 2018
2. ONSITE TEST PIT AND SOIL EVALUATION CONDUCTED ON AUGUST 8, 2019 BY BETA GROUP, INC.
3. EX. UTILITIES SHOWN ARE APPROXIMATE AND MUST BE VERIFIED IN THE FIELD.

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: TD
DESIGNED BY: TD
CHECKED BY:

REGISTERED PROFESSIONAL
For Review Only

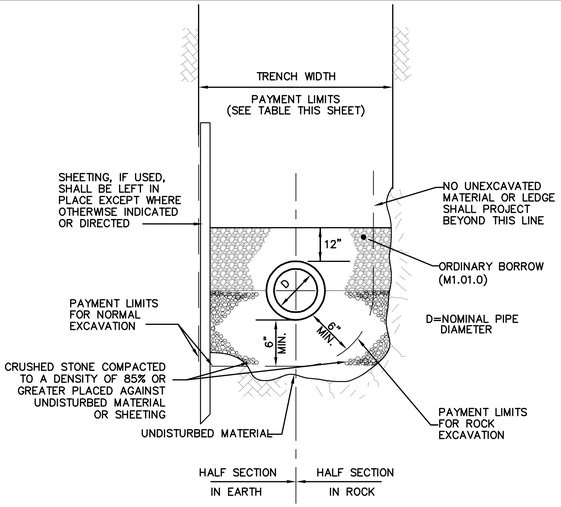
PREPARED BY
BETA
www.BETA-Inc.com

SUBCONSULTANT

SCALE
GRAPHIC SCALE
30 22.5 15 7.5 0 15 30 60
(IN FEET)
1 inch = 30 ft.

TITLE
BARNSTABLE COUNTY FIRE TRAINING ACADEMY
PRELIMINARY SITE CAPPING PLAN
BARNSTABLE, MA

BETA JOB NO. 6206
ISSUE DATE 8/19/2019 4:08 PM
SHEET NO. 1 of 4



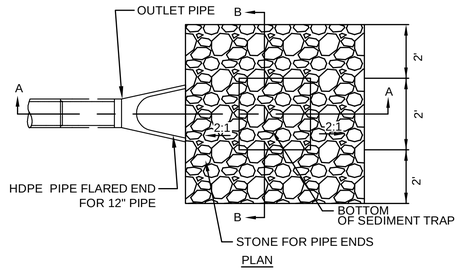
DRAIN TRENCH SECTION

MAXIMUM PAYMENT LIMITS			
DIAMETER OF PIPE D IN INCHES	TRENCH WIDTH IN FEET	TEMPORARY PAVEMENT IN FEET	
		TRENCH DEPTH	
		< OR = 10'	> 10'
12 AND SMALLER	6.00	7.00	8.00
15	6.25	7.25	8.25
18	6.50	7.50	8.50
21	6.75	7.75	8.75
24	7.00	8.00	9.00
27	7.25	8.25	9.25
30	7.50	8.50	9.50
36	8.00	9.00	10.00
42	8.50	9.50	10.50
48	9.00	10.00	11.00
54	9.50	10.50	11.50

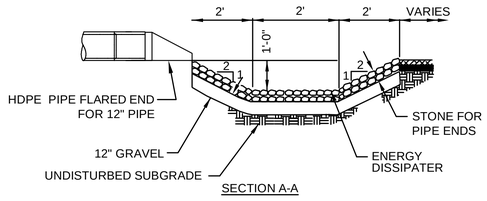
CLASS B ROCK EXCAVATION

MAXIMUM PAYMENT LIMITS	
DIAMETER OF PIPE D IN INCHES	TRENCH WIDTH IN INCHES
12 AND SMALLER	28.00
15	31.00
18	34.00
24	40.00

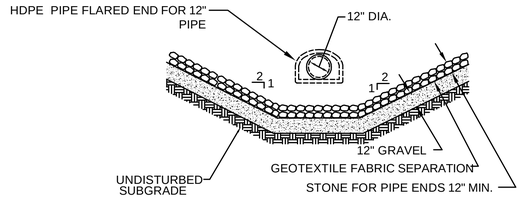
*NOTE: MAXIMUM 6" ROCK EXCAVATION BELOW PIPE.



PLAN



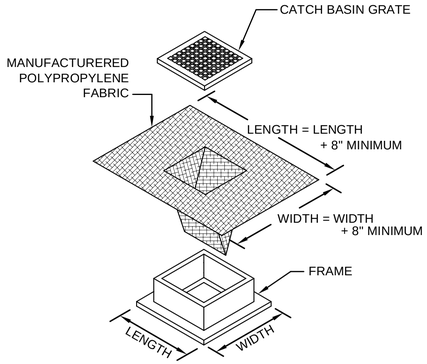
SECTION A-A



SECTION B-B

OUTLET SEDIMENT TRAP

NOT TO SCALE

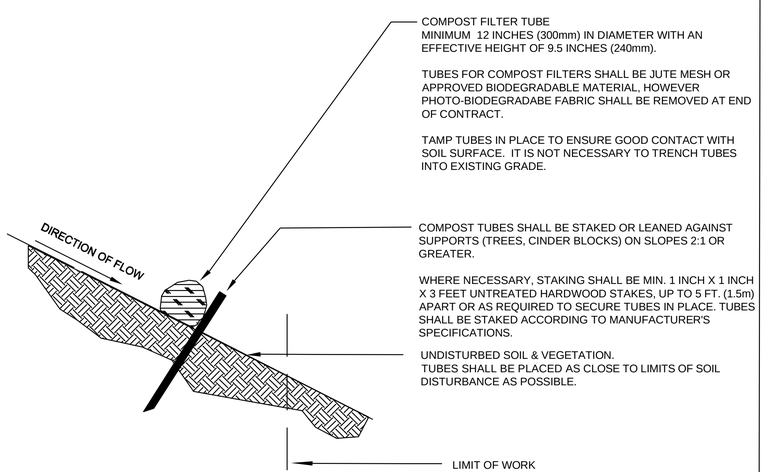


NOTES

1. LENGTH AND WIDTH OF POLYPROPYLENE FABRIC MUST EXCEED EXISTING CATCH BASIN FRAME DIMENSIONS BY A MINIMUM OF 8".
2. REMOVE CATCH BASIN GRATE AND INSTALL POLYPROPYLENE FABRIC OVER CATCH BASIN FRAME. REPLACE CATCH BASIN GRATE TO SECURE POLYPROPYLENE FABRIC IN PLACE.
3. CATCH BASIN EROSION CONTROL TO BE PLACED AT ALL CATCH BASIN WITHIN PROJECT LIMITS.

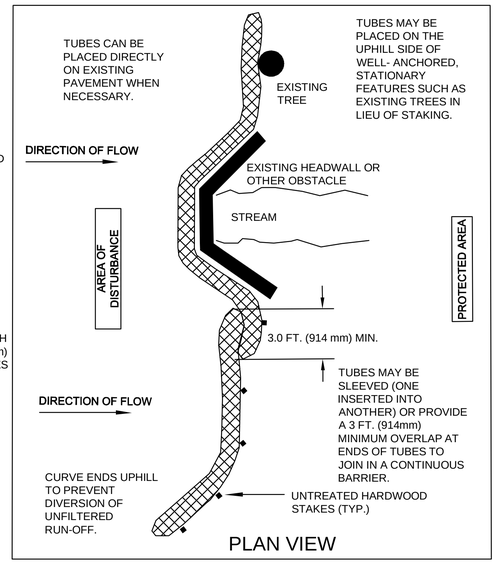
TYPICAL CATCH BASIN EROSION CONTROL PROTECTION

NOT TO SCALE



SEDIMENT CONTROL BARRIER

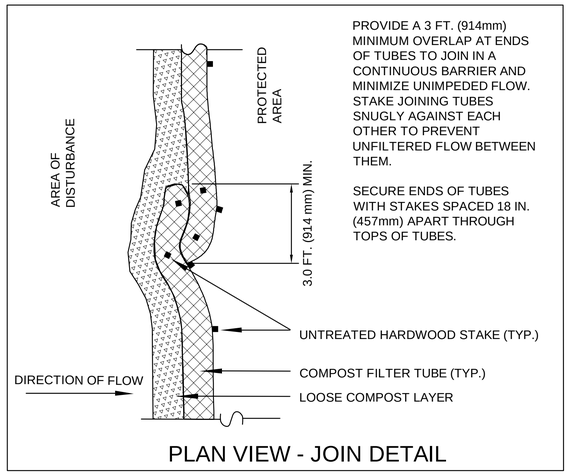
NOT TO SCALE



PLAN VIEW

GENERAL NOTES:

1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES (300mm) FOR SLOPES UP TO 50 FEET (15.24m) IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. TUBE LOCATION MAY BE SHIFTED TO ADJUST TO LANDSCAPE FEATURES, BUT SHALL PROTECT UNDISTURBED AREA AND VEGETATION TO MAXIMUM EXTENT POSSIBLE.
4. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
5. ADDITIONAL TUBES SHALL BE USED AT THE DIRECTION OF THE ENGINEER.
6. ADDITIONAL STAKING SHALL BE USED AT THE DIRECTION OF THE ENGINEER.



PLAN VIEW - JOIN DETAIL

20150226_MassDOT_rev7

8/27/2019 4:49 PM N:\6200\6206 BARNSTABLE FIRE ACAD\DRAWINGFILES\PLANSET\CONSTRUCTION DETAILS.DWG (BETA STB BW.STB)

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: TD
DESIGNED BY: TD
CHECKED BY:

REGISTERED PROFESSIONAL: For Review Only

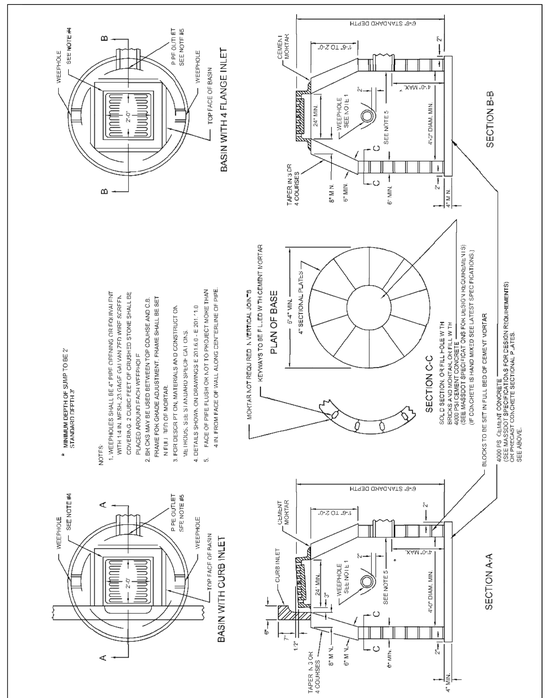
PREPARED BY: BETA www.BETA-Inc.com

SUBCONSULTANT

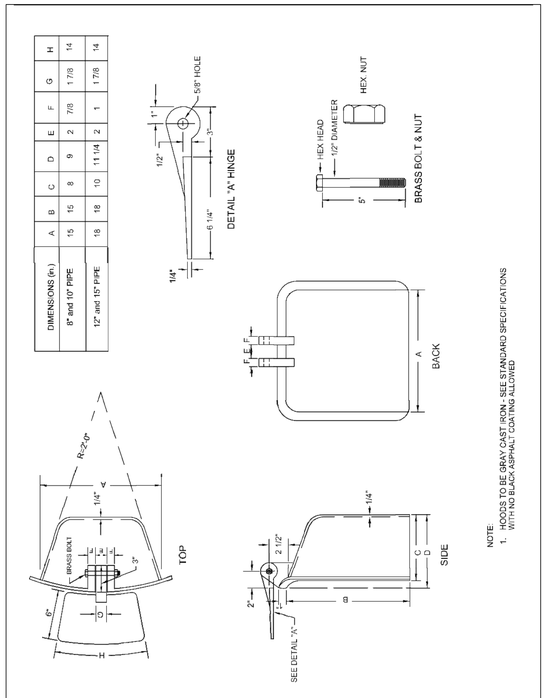
SCALE: GRAPHIC SCALE
30 22.5 15 7.5 0 15 30 60
(IN FEET)
1 inch = 30 ft.
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

TITLE: **BARNSTABLE COUNTY FIRE TRAINING ACADEMY**
CONSTRUCTION DETAILS
BARNSTABLE, MA

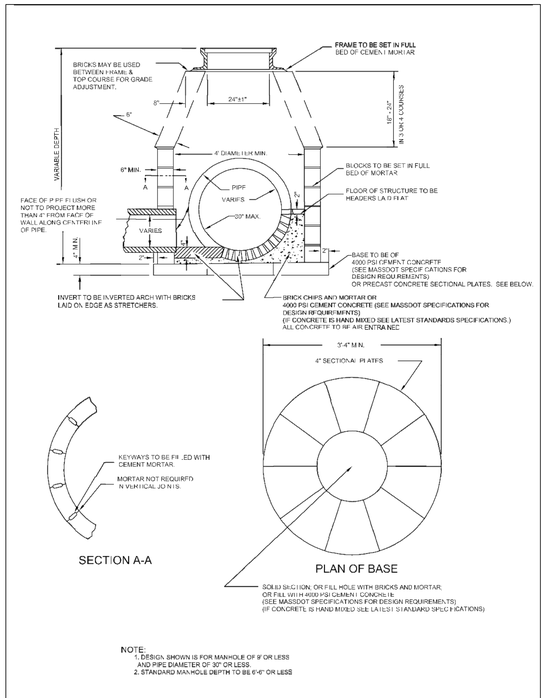
BETA JOB NO. 6206
ISSUE DATE 2/21/2019 1:42 PM
SHEET NO. 2 of 4



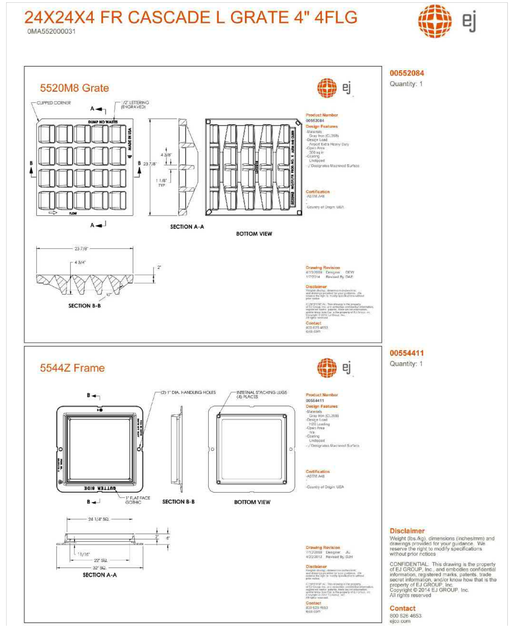
massDOT Highway Division	CONSTRUCTION STANDARDS	CONCRETE BLOCK CATCH BASIN	DATE OF ISSUE OCTOBER 2017	DRAWING NUMBER E 201.3.0



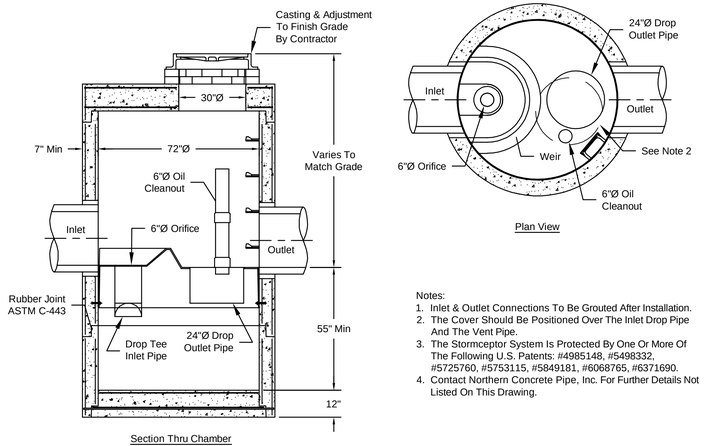
massDOT Highway Division	CONSTRUCTION STANDARDS	CATCH BASIN HOOD	DATE OF ISSUE OCTOBER 2017	DRAWING NUMBER E 201.12.0



massDOT Highway Division	CONSTRUCTION STANDARDS	CONCRETE BLOCK MANHOLE MANHOLES 9' OR LESS IN DEPTH	DATE OF ISSUE OCTOBER 2017	DRAWING NUMBER E 202.2.0

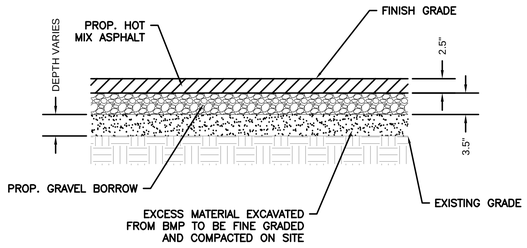


NOTES:
1. CONTRACTOR MAY USE AN APPROVED EQUAL.
2. THIS FRAME AND GRATE SHOULD BE USED WITH LOW PROFILE CATCH BASINS.
3. CONTRACTOR TO DETERMINE CORRECT GRATE ORIENTATION IN FIELD



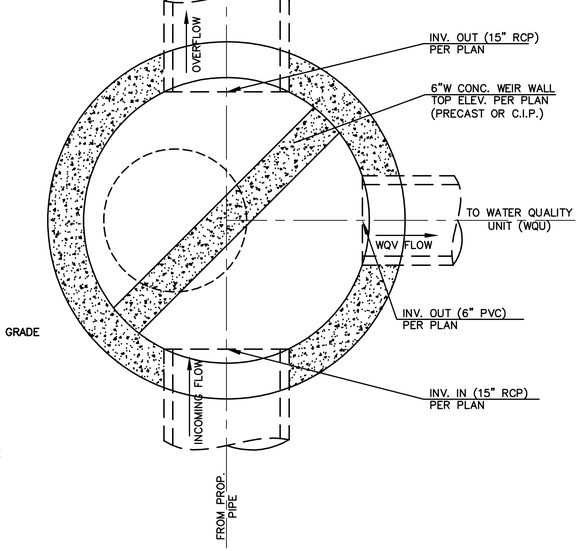
Notes:
1. Inlet & Outlet Connections To Be Grouted After Installation.
2. The Cover Should Be Positioned Over The Inlet Drop Pipe And The Vent Pipe.
3. The Stormceptor System Is Protected By One Or More Of The Following U.S. Patents: #4985148, #5498332, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact Northern Concrete Pipe, Inc. For Further Details Not Listed On This Drawing.

TYPICAL PRECAST STORMCEPTOR STC 900
NOT TO SCALE



NOTES:
1. PAVEMENT SHALL BE IN ACCORDANCE WITH SECTION 460 OF THE MASSACHUSETTS STANDARD SPECIFICATIONS.
2. GRAVEL SHALL BE IN ACCORDANCE WITH SECTION 405 AND M1 OF THE MASSACHUSETTS STANDARD SPECIFICATIONS.

TYPICAL HOT MIX ASPHALT CAP DETAIL
NOT TO SCALE



NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 201 OF THE MASSACHUSETTS STANDARD SPECIFICATIONS.
2. DEPICTED WEIR WALL ORIENTATION IS FOR DIVERSION MANHOLES WHERE WATER QUALITY FLOW PIPE IS PERPENDICULAR TO THE INCOMING PIPE.

TYPICAL DIVERSION MANHOLE
NOT TO SCALE

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: TD
DESIGNED BY: TD
CHECKED BY:

REGISTERED PROFESSIONAL: For Review Only

PREPARED BY: BETA www.BETA-Inc.com

SUBCONSULTANT:

SCALE: GRAPHIC SCALE 30 22.5 15 7.5 0 15 30 60 (IN FEET) 1 inch = 30 ft.
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

TITLE: **BARNSTABLE COUNTY FIRE TRAINING ACADEMY**
CONSTRUCTION DETAILS
BARNSTABLE, MA

BETA JOB NO. 6206
ISSUE DATE 2/21/2019 1:42 PM
SHEET NO. 3 of 4

8/27/2019 4:49 PM N:\6200\6206 BARNSTABLE FIRE ACAD\DRAWING\FILES\PLANSET\CONSTRUCTION DETAILS.DWG (BETA STB BW.STB)

APPENDIX D

Stormwater Management/Assessment Report

Barnstable, Massachusetts

Preliminary Stormwater Runoff Report

FOR

Barnstable County Fire & Rescue Training Academy

On Behalf of:

Barnstable County Commission

Submitted to:

Massachusetts Department of Environmental Protection

Prepared by:

BETA

www.BETA-Inc.com

August 2019

TABLE OF CONTENTS

FIGURES

INTRODUCTION

In accordance with the Massachusetts Wetlands Protection Act, M.G.L. Chapter 131, Section 40, and the Town of Barnstable General Ordinance, BETA Group, Inc. (BETA) has completed the preceding *Preliminary Stormwater Report* for submission to the Mass Department of Environmental Protection (MADEP) on behalf of the Barnstable County Fire & Rescue Training Academy. This project involves proposed interim site improvements at the Barnstable Fire and Rescue Training Academy (Fire Training Academy), located at 155 South Flint Rock Road in Barnstable, Massachusetts (the Site). The purpose of this overall project is to improve the surface water quality of Flint Rock Pond, and groundwater quality by reducing contaminant migration by completing Massachusetts Department of Environmental Protection (MassDEP) Bureau of Waste Site Clean-up (BWSC) mandated and approved Immediate Response Actions (IRAs) being conducted under the Massachusetts Contingency Plan Regulation, 310 CMR 40.0000.

A locus map of the project area is shown in Figure 1 – Project Location Map.

EXISTING CONDITIONS

The 6.2± acre Site is located in the Village of Barnstable, generally north of the Barnstable Municipal Airport and south of Route 6 (Figure 1). The Site operates as the Barnstable County Fire and Rescue Training Academy and is almost entirely developed or disturbed. The surrounding area is generally unimproved, consisting primarily of undeveloped forested upland and wetland. The resource areas within 100 feet of the proposed activities are Bank and Land Under Water associated with Flint Rock Pond (Figure 2). The proposed interim improvements will be made in the southwestern corner of the Site (the Project Locus).

The Site is a listed Disposal Site under the Massachusetts Contingency Plan, 310 CMR 40.0000 due to elevated levels of Per- and Polyfluoroalkyl Substances (PFAS), which were found in earlier formulations of fire-fighting foams.

SITE PARAMETERS

Soil Classification

Please refer to Figure No. 4 – Soil Map. According to the *Soil Survey of Barnstable County, Massachusetts,* prepared by the US Department of Agriculture, Natural Resources Conservation Service, underlying soils within the project area consists of one predominate soil type, as shown in the table on the following page:

Map Soil Symbol	Soil Name	HSG
259B	Carver loamy coarse sand, 3 to 8% slopes	A

Detailed individual descriptions of these soils are not provided herein but may be found in the referenced USDA soil survey.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups, according to the rate of water infiltration when 1) the soils are not protected by vegetation, 2) are thoroughly wet, and 3) receive precipitation from long-duration storms.

Per the soil survey, the general characteristics of the four (4) hydrologic soil groups are as follows:

Group A – Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B – Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C – Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D – Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

As depicted in Figure No. 4, many of the underlying soils within the project area belong to HSG A, meaning that the project area likely has a high infiltration rate with a low potential for runoff. This is supported by soil evaluations completed at five test pit locations on the site (Figure 5).

Subsurface Investigation
As stated above, the project area is underlain by soils that are generally good for use of infiltration as a stormwater management technique, so project-wide subsurface investigation was necessary. A subsurface investigation (in the form of a soil evaluation) was performed where the at five potential BMP locations throughout the site. The underlying soils in these locations consist of Carver loamy coarse sand, 3 to 8 percent slopes (HSG A).

Flood Zone Classification
Please refer to Figure No. 3 – FEMA Flood Maps. According to the Flood Insurance Rate Maps (FIRM) for Barnstable County, Map Number 25001C0566J, effective date July 16, 2014, Flint Rock Pond and the southeast corner of the site are located within Zone X, which is defined as land within the 500-year flood plain. A Bordering Land Subject to Flooding (BLSF) is not associated with this flood zone.

There are no Zone A (i.e. 100-year floodplain) areas mapped within the vicinity of the project, and therefore no BLSF's within the project area.

Existing Drainage Collection
There is no existing drainage system currently located on the site. Stormwater currently sheets off the project area in a westerly direction towards Flint Rock Pond without any water quality treatment. There is a paved boat ramp on the west side of the site leading to the pond where stormwater runoff from the site discharges directly to the pond.

There are no obvious washouts or locations of road edge erosion along the project area, nor are there any anecdotal reports of flooding. Based on this, it is surmised that the existing drainage system configuration is adequately sized to collect and convey typical roadway runoff, and the shoulders and edges of road are sufficiently stable to receive and convey runoff without the development of erosion or washouts.

Wetland Resource Areas
A site inspection was conducted by Nover-Armstrong's wetland scientists on June 13, 2017 to identify and delineate the boundary of existing wetland resource areas on the Site and in the immediate vicinity of the Site. Resource area boundaries were identified and delineated in accordance with methods

developed by the Massachusetts Department of Environmental Protection's *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act*, dated 1995, as well as definitions set forth in the Wetland Regulations, 310 CMR 10.00. Two resource areas Subject to Protection under the Act exist on the site and are described below.

Bank (to Pond) – 310 CMR 10.54

Nover Armstrong identified the resource Bank to Flint Rock Pond. According to 310 CMR 10.54(2), the definition of a Bank is the portion of the land surface which normally abuts and confines a water body, occurring between a water body and a vegetated bordering wetland and adjacent floodplain, or, in the absence of these, it occurs between a water body and an upland. The upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower.

Table 1: Bank to Pond Boundary Description

Flag Series	Waterbody Name	Description / Notes
B1 Series *Flags B1-100 to B1-152*	Flint Rock Pond	The Mean Annual High Water (MAHW) Marks/Bank of Flint Rock Pond was delineated on the Site. Flint Rock Pond is approximately 500 feet wide and 850 feet long. The Bank of the Pond is generally the 1st observable break in slope, except in two areas where the Bank is the MHW boundary, as defined in the regulations. The Bank of the pond are generally vegetated with pitch pine (*Pinus rigida*), American elm (*Ulmus americana*), red maple (*Acer rubra*), Morrow's honeysuckle *(Lonicera morrowii)*, multiflora rose *(rosa multiflora)*, sweet pepperbush (*Clethra alnifolia*), arrowood (*Viburnum dentatum*), highbush blueberry (*Vaccinium corymbosum*), woolgrass (*Scirpus cyperinus*), poison ivy (*Toxicodendron radicans*), greenbrier (*Smilax rotundifolia*), Asiatic bittersweet (*Celastrus orbiculatus*), and Virginia creeper (*Parthenocissus quinquefolia*).

Land Under Water – 310 CMR 10.56

According to 310 CMR 10.56(2), the definition of LUW is the land beneath any creek, river, stream, pond or lake and may be composed of organic muck or peat, fine sediments, rocks or bedrock. LUW exists between the Bank boundaries below the mean annual low water levels of Flint Rock Pond. The boundary of LUW is the mean annual low water level.

Bordering Land Subject to Flooding

Bordering Land subject to Flooding (BLSF) includes area inundated by flood waters rising from creeks, rivers, streams, ponds, or lakes. According to 310 CMR 10.57 (2), the boundary is the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm. Where flood studies have been completed, the boundary of BLSF is generally based upon flood profile data prepared by the National Flood Insurance Program. In cases where no flood study has been completed, the boundary is based on the topographic contour associated with the estimated annual high-water elevation.

As stated previously, based upon a review of the FIRM Map Number 25001C0566J, there is a 500-year flood zone (Zone X) associated with Flint Rock Pond which does not have a corresponding BLSF.

Estimated Habitat of Rare Wildlife

Please refer to Figure No. 2 – Environmental Resources Map. The Natural Heritage and Endangered Species Program (NHESP) has identified a Priority Habitat of Rare Species within the project area. There are no vernal pools located within 300 feet of the project area.

The Massachusetts Wetlands Protection Act requires that no project may be permitted that will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures set forth in 310 CMR 10.59.

PROJECT NARRATIVE

DESCRIPTION & OBJECTIVES

The objectives of this project are to 1) provide water quality treatment, 2) improve surface water quality of Flint Rock Pond, and 3) minimize mobilization of contaminants within the existing soil.

The project specifically includes:

- Installation of a Hot Mix Asphalt (HMA) pavement cap on most of the pervious site within the interior of the access road
- Installation of a closed drainage system on site that consists of 3 catch basins and 4 drain manholes
- Installation of a water quality pretreatment unit
- Construction of a Stormwater Infiltration Best Management Practice (BMP)

These modifications will drastically improve the drainage characteristics at the site by providing water quality treatment for all new proposed impervious pavement as well as the existing impervious area.

This project will increase the overall impervious area within the project site by approximately 37,315 s.f. but will not significantly alter existing stormwater runoff patterns tributary to the various resource areas near of the project. Work will occur within the 100' BVW buffer zones associated with the BVW adjacent to the site. There are no stormwater critical areas located within the project area.

Upon completion of the project, the Barnstable County Commission will be responsible for the annual inspection and maintenance of the stormwater features.

ENVIRONMENTAL RESOURCE AREAS

Most of the Project is within 100-foot buffer zone to inland Bank, and the 50-foot No Build Zone (as protected by the Barnstable Wetlands Protection Ordinance (Chapter 237) and regulated by the Regulations Governing Activity in the 100 ft Buffer Zone (Chapter 704)).

310 CMR 10.53(3)(q), Limited Project Status

"Limited Projects," as defined in Section 310 CMR 10.53 (3)(q), include "assessment, monitoring, containment, mitigation, and remediation to a release or threat of a release of oil and/or hazardous material." The scope of the project is to provide an immediate response to contaminants located at the project location and will provide stormwater management improvements to minimize mobilization of contaminants found within soil, specifically concentrations of Per- and Poly-fluoroalkyl Substances (PFAS) in the southern half of the facility. This project is therefore in conformance with 310 CMR 10.53 (3)(f), thus qualifying it as a Limited Project.

Wetland Impacts and Regulatory Compliance

The impacts associated with resources regulated by the Massachusetts Wetlands Protection Act are described below, as well as the project's compliance with the General Performance Standards set out in Regulations 310 CMR 10.00. As there are no impacts to Bank or Land Under Water Bodies and Waterways, those types of resource area are not discussed.

Bordering Vegetated Wetlands

No work is proposed within the Bordering Vegetated Wetlands (BVW) associated with Flint Rock Pond.

The BVW impacts will be subject to the general performance standards applicable (as noted) to same (section 310 CMR 10.55(4)), which are presented below:

General Performance Standards

(a) Where the presumption set forth in 310 CMR 10.55(3) is not overcome, any proposed work in a Bordering Vegetated Wetland shall not destroy or otherwise impair any portion of said area. **Not applicable.**

(b) Notwithstanding the provisions of 310 CMR 10.55(4)(a), the issuing authority may issue an Order of Conditions permitting work which results in the loss of up to 5,000 square feet of Bordering Vegetated Wetland when said area is replaced in accordance with the following general conditions and any additional, specific conditions the issuing authority deems necessary to ensure that the replacement area will function in a manner similar to the area that will be lost:

1. *the surface of the replacement area to be created ("the replacement area") shall be equal to that of the area that will be lost ("the lost area");*
2. *the ground water and surface elevation of the replacement area shall be approximately equal to that of the lost area;*
3. *the overall horizontal configuration and location of the replacement area with respect to the bank shall be similar to that of the lost area;*
4. *the replacement area shall have an unrestricted hydraulic connection to the same water body or waterway associated with the lost area;*
5. *the replacement area shall be located within the same general area of the water body or reach of the waterway as the lost area;*
6. *at least 75% of the surface of the replacement area shall be reestablished with indigenous wetland plant species within two growing seasons, and prior to said vegetative reestablishment any exposed soil in the replacement area shall be temporarily stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods; and*
7. *the replacement area shall be provided in a manner which is consistent with all other General Performance Standards for each resource area in Part III of 310 CMR 10.00.*

In the exercise of this discretion, the issuing authority shall consider the magnitude of the alteration and the significance of the project site to the interests identified in M.G.L. c. 131, § 40, the extent to which adverse impacts can be avoided, the extent to which adverse impacts are minimized, and the extent to which mitigation measures, including replication or restoration, are provided to contribute to the protection of the interests identified in M.G.L. c. 131, § 40. **Not applicable.**

(c) Notwithstanding the provisions of 310 CMR 10.55(4)(a), the issuing authority may issue an Order of Conditions permitting work which results in the loss of a portion of Bordering Vegetated Wetland when:

1. *said portion has a surface area less than 500 square feet;*
2. *said portion extends in a distinct linear configuration ("finger-like") into adjacent uplands; and*
3. *in the judgment of the issuing authority it is not reasonable to scale down, redesign or otherwise change the proposed work so that it could be completed without loss of said wetland.*

Not applicable.

(d) Notwithstanding the provisions of 310 CMR 10.55(4)(a),(b) and (c), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.59.

It is not anticipated that the project will have direct or indirect adverse impacts on any of the identified habitats of rare vertebrate or invertebrate species; rather, the proposed stormwater management improvements that will be constructed may have indirect beneficial impacts on the habitats of the species.

(e) Any proposed work shall not destroy or otherwise impair any portion of a Bordering Vegetated Wetland that is within an Area of Critical Environmental Concern designated by the Secretary of Environmental Affairs under M.G.L. c. 21A, § 2(7) and 301 CMR 12.00. This 310 CMR 10.55(4)(e):

1. *supersedes the provisions of 310 CMR 10.55(4)(b) and (c);*
2. *shall not apply if the presumption set forth at 310 CMR 10.55(3) is overcome;*
3. *shall not apply to work proposed under 310 CMR 10.53(3)(l); and*
4. *shall not apply to maintenance of stormwater detention, retention, or sedimentation ponds, or to maintenance of stormwater energy dissipating structures, that have been constructed in accordance with a valid order of conditions.*

The proposed project is not within an Area of Critical Environmental Concern.

<u>100’ BVW Buffer Zone</u>

The entirety of the disturbance to the 100’ BVW Buffer Zone will occur within the interior of the existing access road which consists largely of previously disturbed area. The only vegetated areas on the property are along the perimeter of the property boundary. The Massachusetts Wetlands Protection Act regulations do not contain any performance standards for work in buffer zone, and activities in the buffer zone may be permitted if they will not negatively impact the adjacent resource areas.

It is not anticipated that the proposed project will have any adverse impacts on the resource areas adjacent to the 100’ BVW Buffer Zones as the installation of the stormwater BMP will result in a net decrease in stormwater discharge to Flint Rock Pond.

<u>Bordering Lands Subject to Flooding</u>

There is no Bordering Land Subject to Flooding (BLSF) within the project area.

Riverfront Area
No riverfront area will be impacted as a result of the proposed work.

Estimated Habitats of Rare Wildlife (for inland wetlands)
There is a NHESP Priority Habitat of Rare Species (PH 303) within the project area.

Per section 310 CMR 10.59:

> *If a project is within estimated habitat which is indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands Wildlife (if any) published by the Natural Heritage and Endangered Species Program (hereinafter referred to as the Program), a fully completed copy of the Notice of Intent (including all plans, reports, and other materials required under 310 CMR 10.05(4)(a) & (b)) for such project shall be sent to the Program via the U.S. Postal Service by express or priority mail (or otherwise sent in a manner that guarantees delivery within two days). Such copy shall be sent no later than the date of the filing of the Notice of Intent with the issuing authority. Proof of timely mailing or other delivery to the Program of the copy of such Notice of Intent shall be included in the Notice of Intent which is submitted to the issuing authority and sent to the Department's regional office.*
>
> *Estimated Habitat Maps shall be based on the estimated geographical extent of the habitats of all state-listed vertebrate and invertebrate animal species for which a reported occurrence within the last 25 years has been accepted by the Program and incorporated into its official database.*

It appears that a portion of the project is within the estimated/priority habitat, a full copy of the completed NOI shall be submitted to the Natural Heritage and Endangered Species Program (NHESP) for review.

MITIGATION METHODS

The following measures will be taken to avoid disturbances to inland waters, wetland features and associated jurisdictional areas. The majority of disturbances will be temporary during construction, and the site will be restored upon completion of the proposed activities.

Soil Erosion and Sedimentation Controls
Soil erosion and sedimentation control issues have been considered in the design and construction planning process of the project. The proposed soil erosion and sedimentation control measures will be installed prior to the initiation of construction activities and maintained throughout construction, and will consist of staked compost filter socks along the limits of disturbance for the land-based work. Once established, these measures will be maintained and monitored weekly until construction activities are complete and the site has been adequately stabilized.

The erosion controls will serve as the strict limits of disturbance for the project, and no alterations, including vegetative clearing or surface disturbance, will occur beyond this line. The limits of clearing, grading, and disturbance will be kept to a minimum within the proposed area of construction. All areas outside of these limits, as depicted on the project site plans, will be totally undisturbed, to remain in a completely natural condition. After any significant rainstorm (i.e. greater than 1”), all sedimentation control measures will be inspected and promptly repaired if damaged or replaced if failed.

Post-Construction Operation and Maintenance Plan
All new or existing components of the drainage system within the project area are the responsibility of the Barnstable County Commission. The following summarizes the actions that will be included in the Project Site Operation and Maintenance (O&M) plan.

- Stormwater structure inspections and cleaning shall be performed in accordance with the regular maintenance schedule as described in the O&M plan.

STORMWATER MANAGEMENT

The proposed project qualifies as a limited project under 310 CMR 10.53(3)(q) (assessment, monitoring, containment, mitigation, and remediation to a release or threat of a release of oil and/or hazardous material), and therefore has been designed to meet the Stormwater Management Standards outlined in 310 CMR 10.05(6)(k) only to the maximum extent practicable. The following describes the methodology used in the analysis and design of the stormwater management system for the roadways.

PROJECT AREA ANALYSIS & STORMWATER REQUIREMENTS CALCULATIONS

The overall project area was analyzed to determine the stormwater management requirements for the project; specifically, the groundwater recharge volume (Re_V) and water quality volume (WQ_V) requirements were determined, based on the existing and proposed project-wide impervious areas. The Stormwater Calculation Sheet in the Appendices contains the parameters and calculations summarized below.

Existing, Proposed & Net Impervious Areas
The existing, proposed and net impervious areas within the project corridor limits were determined, and the net impervious area was used in the calculations of the required Re_V and WQ_V. Impervious areas consist of existing roadways, curbing and berms, bituminous and cement concrete sidewalks, and paved driveways within and to the extents of the project limits of disturbance; impervious areas outside of the project limits of disturbance (e.g. driveways, buildings, walls, impervious site features) were not included in the determinations of existing and proposed impervious areas.

The net (new) impervious area for the project is **37,315 s.f.**

Minimum Re_V Requirement
The required Re_V is the product of the total new impervious area created by the project and a target recharge factor (measured in inches of rainfall per square foot of impervious area) for the project area. The target recharge factor based on the HSG(s) of the underlying soil(s) present within the project area.

The impervious area within this project is in an area where the soil type is predominantly HSG A. The recharge target is 0.6"/s.f. Based on 37,315 s.f. of new impervious area, the minimum Re_V is **1,866 c.f.**

Minimum WQ_V Requirement
The required WQ_V is equal to 1.0 inches of rainfall over the total new impervious area created by the project. Based on 37,315 s.f. of new impervious area, the minimum WQ_V for the project is **3,110 c.f.**

STORMWATER MANAGEMENT SYSTEM ANALYSIS AND DESIGN

The proposed drainage system will prevent stormwater from the proposed impervious area from flowing into Flint Rock Pond without receiving any water quality treatment. The site will be graded to maintain existing drainage characteristics while also uniformly raising the elevation of the site to accommodate the installation of the new pavement structure. The high and low-point locations (and the drainage configuration relative to same) will be relatively unchanged, with most of the site draining west towards the proposed catch basins rather than Flintlock Pond.

Closed Drainage Systems
The proposed closed system is designed with off-line deep sump catch basins to provide a degree of water quality treatment. The proposed outfall will drain to Flint Rock Pond to match existing conditions, and flow rates to the pond will be minimized to the maximum extent practicable in order to avoid any adverse effects to the water body.

Stormwater Infiltration Basin

The infiltration basin will receive and infiltrate runoff from all new proposed impervious area (≈37,315 s.f.), as well as the impervious area from the existing access road. It will be an in-line system, receiving all of the runoff flows that are received by the overall drainage system; the system as designed will have adequate capacity to infiltrate the runoff from storms in excess of the ten (10) year event with no overflows to other elements of the drainage system. Runoff flows generated by larger magnitude storms that exceed the capacity of the infiltration system (i.e. the 25-year event and above) will be directed via overflow structure and outlet pipes through the proposed drain system to a flared end system and riprap pad that discharges to Flint Rock Pond.

The infiltration basin design is based on eliminating any discharge to Flint Rock Pond, rather than being based strictly on the required recharge volume, and the basin sizing has been checked against the Static method requirements presented in Chapter 3 of the Stormwater Handbook. Per the methodology, the proposed footprint of the bottom of the basin (605 s.f.) exceeds the minimum required system area of 302 s.f., and the system drawdown time of ≈38.06 hours is well below the maximum drawdown time of seventy-two (72) hours.

CONFORMANCE WITH STORMWATER MANAGEMENT STANDARDS

As stated above, the project has been designed to meet the Stormwater Management Standards outlined in 310 CMR 10.05(6)(k) to the maximum extent practicable. The project's conformance with these standards is described below.

Standard 1: No New Untreated Discharges – **Met**
There will be no new untreated discharges created as part of this project; there are no existing stormwater outfalls to the adjacent environmental resource areas as stormwater currently sheets off the site directly into Flint Rock Pond. The proposed outfall will be treated prior to entering the pond by a BMP. The watersheds tributary to those outfalls will be essentially unchanged, and the stormwater management system will be designed to provide water quality treatment of all proposed impervious area within the project limits.

Standard 2: Peak Rate Control & Flood Prevention – **Met**
There will be no significant changes to the individual watersheds tributary to the drainage systems as a result of this project, but there will be a number of changes to the drainage collection and conveyance system in order to incorporate water quality treatment measures and to conform to roadway drainage standards. Therefore, existing and proposed condition watershed analyses of the various drainage systems were performed for the 2, 10, 25, and 100-year storms.

The results of the analysis indicate that the proposed condition peak discharge rates will be considerably lower than the existing peak discharge rates and will have no adverse effects on the receiving water bodies and/or resource areas. Refer to the HydroCad reports appended to this analysis.

Standard 3: Recharge to Groundwater – **Met**
The base Re_v associated with this project is **1,866 c.f** with all new proposed impervious area to be captured by the proposed drainage system and treated by the stormwater infiltration basin.

As stated previously, the Static method was used to evaluate the size of the proposed infiltration system. Using a Target Depth Factor of 0.6-inch (Target Depth Factor for HSG A soils), and a saturated hydraulic conductivity of 8.27 inches/hour (Rawl's rate for HSG A soils) the calculation verified that the proposed infiltration system footprint (3,260 s.f.) is greater than the minimum system footprint (144 s.f.) required. Therefore, the project-wide Re_v is provided by the proposed infiltration system, and this standard is met.

Standard 4: Water Quality (80% TSS Removal) – **Met**
The scope of the project includes significant alterations and upgrades to the nonexistent drainage and stormwater management systems:

- Installation of a closed drainage system, including deep sump catch basins;
- Installation of a water quality pretreatment unit;
- Installation of a stormwater infiltration basin.

The proposed water quality treatment BMP will provide the full level of water quality treatment required for the entire proposed new impervious area. The proposed alterations and upgrades shall provide significantly greater water quality treatment to stormwater entering the resource areas than the current drainage system does. In addition, the proposed infiltration system will provide greater than the 80% TSS removal for runoff from the existing impervious area thereto, which itself contains ≈16,100 of impervious area. A Water Quality unit is proposed to provide pre-treatment for the infiltration system.

Standard 5: LUHPPL's – **Met**
The proposed project is considered a land use with higher potential pollutant loading. Pretreatment is provided in the form of a water quality pretreatment unit (Stormceptor STC 900, or approved equal) prior to entering the stormwater BMP.

Pollution Prevention - Stormwater work in the vicinity of this LUHPPL is limited to the installation of the proposed drainage system and stormwater BMP. Additionally, oil-water hoods will be provided in all drainage inlet structures project-wide).

Standard 6: Critical Areas – Met
The Barnstable County Fire & Rescue Training Academy is located within a Critical Area. With the installation of the Stormwater BMP, water quality pretreatment unit (Stormceptor STC 900, or approved equal) and off-line deep sump catch basins, this standard has been met.

Standard 7: Redevelopment Projects – **Met**
The proposed project is not considered a redevelopment project and therefore fully complies with the stormwater management standards.

Standard 8: Erosion and Sediment Control – **Met**
Soil and erosion control shall be provided during construction by means of compost filter socks as described earlier in the report. A Construction Period Pollution Prevention and Erosion and Sediment Control Plan will be developed for the project site.

Standard 9: Operation and Maintenance Plan – **Met**
The long-term post-construction implementation of the Barnstable County Fire & Rescue Training Academy Operation and Maintenance (O&M) plan for the stormwater structures within the project area will be the responsibility of the Barnstable County Fire & Rescue Training Academy.

Standard 10: Illicit Discharges – **Met**
There are no known or suspected illicit discharges to the proposed stormwater conveyance system.

CONCLUSION

The Barnstable County Fire & Rescue Training Academy Project will make site and drainage improvements which will improve the surface water quality of Flint Rock Pond, and groundwater quality within the project area. The project has been designed to avoid all impacts to Resource Areas Subject to Protection under the Act and Bylaw.

In summary, the preliminary design for the proposed project will fully comply with the MADEP Stormwater Management Standards and construction of the proposed project will have no adverse impact on any adjacent sites or downgradient receiving areas. The proposed stormwater management system will provide substantially improved stormwater quality treatment than is currently provided under existing conditions.

Figure 1

PROJECT LOCATION MAP

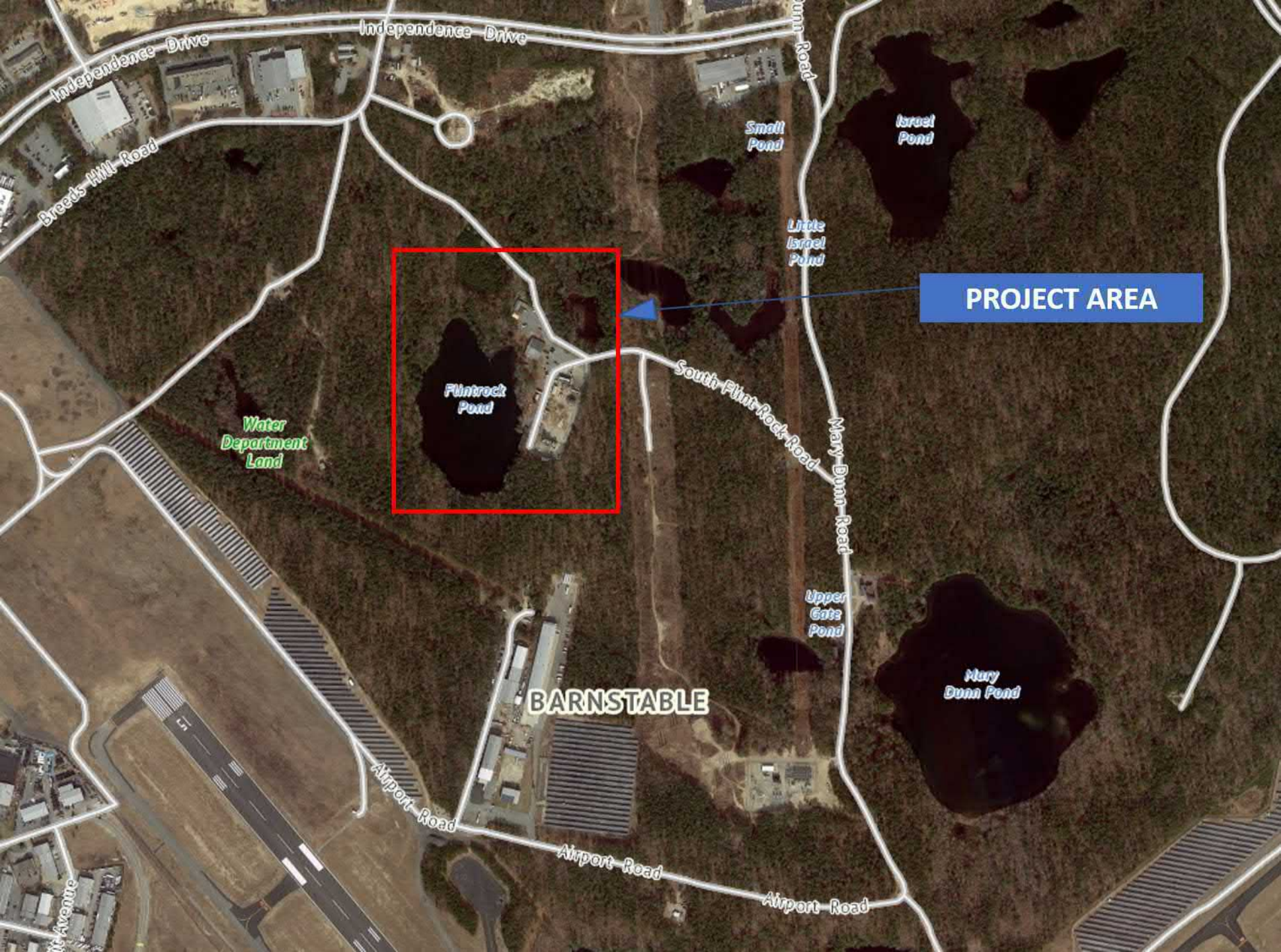

Independence Drive
Independence Drive
Breeds Hill Road
Small Pond
Israel Pond
Little Israel Pond
PROJECT AREA
Flintrock Pond
South Flint Rock Road
Water Department Land
Mary Dunn Road
Upper Gate Pond
Mary Dunn Pond
BARNSTABLE
Airport Road
Airport Road
Airport Road

Figure 2

ENVIRONMENTAL RESOURCES MAP

Figure 2
Environmental Resources Map
155 South Flint Rock Road
Barnstable, MA

Legend

- Approximate Site Locus
- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife

Surface Water Supply Protection

- ZONE A
- ZONE B
- ZONE C
- MassDEP IWPA
- MassDEP Zone II
- Outstanding Resource Water

N
W E
S

0 100 200 300 Feet

1 inch = 100 feet

Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2017), NHESP Estimated Habitats of Rare Species (2017), Surface Water Supply Protection Areas (2016), MassDEP Wellhead Protection Areas (Zone II, Zone I, IWPA)(2016), Outstanding Resource Waters (2010)

Prepared by: LK
Date: 6.19.2018

NOVER-ARMSTRONG ASSOCIATES, INC.

Figure 3

FEMA FLOOD MAP

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography. Basemap files were provided in digital form by Massachusetts Geographic Information System (MassGIS). Ortho imagery was produced at a scale of 1:5000 and is dated April 2009. The projection used in the preparation of this map is Massachusetts State Plane Mainland (FIPSZONE2001). The horizontal datum is NAD 83, GRS1980 spheroid.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

Only coastal structures that are certified to provide protection from the 1-percent-annual chance flood are shown on this panel. However, all structures taken into consideration for the purpose of coastal flood hazard analysis and mapping are present in the DFIRM database in S_Gen_Struct.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- Limit of Moderate Wave Action
- Limit of Moderate Wave Action coincident with Zone Break
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- Culvert
- Bridge
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 4989000 M — 1000-meter grid values: Massachusetts State Plane Mainland Zone (FIPS Zone 2001), Lambert Conformal Conic projection
- 4589000m N — 1000-meter Universal Transverse Mercator ticks, zone 19N
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
July 16, 2014

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0566J

FIRM

FLOOD INSURANCE RATE MAP

BARNSTABLE COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANEL 566 OF 875
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BARNSTABLE, TOWN OF	250001	0566	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25001C0566J
EFFECTIVE DATE
JULY 16, 2014

Federal Emergency Management Agency

Figure 4

SOIL MAPS

Custom Soil Resource Report
Soil Map

Map Scale: 1:6,930 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Barnstable County, Massachusetts
Survey Area Data: Version 15, Sep 5, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 10, 2018—Nov 17, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	20.5	8.9%
242C	Hinckley loamy sand, 8 to 15 percent slopes	11.6	5.1%
245A	Hinckley loamy sand, 0 to 3 percent slopes	3.8	1.6%
245B	Hinckley loamy sand, 3 to 8 percent slopes	48.3	21.1%
252C	Carver coarse sand, 8 to 15 percent slopes	3.7	1.6%
259B	Carver loamy coarse sand, 3 to 8 percent slopes	112.8	49.2%
436D	Plymouth loamy coarse sand, 15 to 35 percent slopes, very stony	14.2	6.2%
483C	Plymouth-Barnstable complex, rolling, very bouldery	5.2	2.3%
483D	Plymouth-Barnstable complex, hilly, very bouldery	9.3	4.0%
Totals for Area of Interest		**229.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They

Figure 5

TEST PIT LOCATIONS


TP-1
TP-2
TP-4
TP-3
TP-5

APPENDIX F
Public Notifications

August 2019

Mark S. Ells, Town Manager
Town of Barnstable
200 Main Street
Hyannis, MA 02601

RE: Immediate Response Action Plan Modification
Barnstable County Fire and Rescue Training Academy
155 South Flint Rock Road
Barnstable, Massachusetts
DEP Release Tracking No. 4-26179
Project File [6206]

Dear Mr. Ells,

As required by the Massachusetts Contingency Plan (MCP) 310 CMR 40.1403(3)(e) and 40.1403(6), BETA Group, Inc. (BETA) is notifying you on behalf of our client, Barnstable County, that an Immediate Response Action (IRA) Plan Modification (Mod) is being submitted to the Massachusetts Department of Environmental Protection – Bureau of Waste Site Cleanup (MassDEP – BWSC) for the release Site referenced as the Barnstable County Fire and Rescue Training Academy (BCFRTA) located at 155 South Flint Rock Road in Barnstable, Massachusetts (the Site).

Pursuant to the Massachusetts Contingency Plan (310 CMR 40.0480), an Initial Site Investigation has been performed at the site. A release of oils and/or hazardous materials has occurred at the site. In August 2016, MassDEP Southeast Regional Office issued a Notice of Responsibility (NOR) to Barnstable County, as current owner and operator of the Barnstable County Fire and Rescue Training Academy (BCFRTA), that the detection of elevated concentrations of poly- and perfluorylalkyl substances (PFAS) in groundwater at the site constituted a release under the MCP. MassDEP issued Release Tracking Number (RTN) 4-26179 to this release. As summarized in the NOR, based on the detected PFAS concentrations in soil and groundwater at the BCFRTA and the inferred groundwater flow, MassDEP determined that the releases of PFAS from the use of aqueous film-forming foam (AFFF) at the BCFRTA is a source of PFAS detected in the Mary Dunn wells.

This Draft IRA Plan Modification has been prepared in accordance with the Massachusetts Contingency Plan, 310 CMR 40.0000 (MCP) in response to the Notice of Audit Findings/Compliance and Technical Assistance/Interim Deadline, dated November 21, 2018 issued by the Massachusetts Department of Environmental Protection (MassDEP) m and the Request for Expedited Immediate Response Action Plan Modification/Interim Deadline-Enforcement Document Number 6694, (Request for IRA Plan Mod) dated May 1, 2019 also issued by the MassDEP, as amended by email correspondence. The original November 21, 2018 Interim Deadline document established February 28, 2019 as a deadline for feasibility evaluation of several remedial response actions and the date of the next six-month IRA Status Report (August 28, 2019) as the deadline for presentation of detailed plans for the response actions deemed feasible.

The May 1, 2019 DEP Request for IRA Plan Mod requested an expedited submission of the IRA Plan Modification to be completed on or before June 28, 2019. MassDEP requested that this IRA Plan Modification include details for the expansion of the groundwater recovery and treatment system and capping measures to prevent infiltration of precipitation through the soils at the Site. On June 3, 2019, the County submitted a formal request to restore the original IRA Plan Modification Deadline to August 28, 2019, indicating that it was not technically feasible to meet the expedited deadline and that the Public Involvement Plan for the Site required that the document be a public comment draft only. The letter was submitted to MassDEP via the eDEP system and is posted on the MassDEP's Site Database. The County later received email response by Angela Gallagher of MassDEP that MassDEP accepted the County's request and the deadline for the IRA Plan Modification will be restored to August 28, 2019.

At this time, IRA activities are ongoing. Continuing IRA activities will include operation and monitoring the on-Site Groundwater Pump and Treatment System (GWPTS), including performance sampling of GWPTS, review and evaluation of the on-Site GWPTS operation and maintenance activities as they affect groundwater treatment, and periodic groundwater monitoring.

The IRA Plan Modification document is available electronically via the searchable sites database of the MassGOV / MassDEP website via the following link:

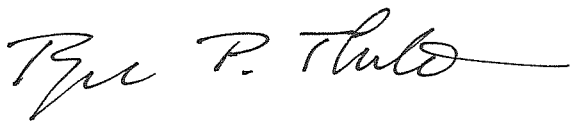
https://eeaonline.eea.state.ma.us/portal#!/wastesite/4-0026179.

A copy of the Report is available upon request by contacting the undersigned at BETA at (401) 333.2382. It is also available for review at MassDEP Southeast Regional Office (SERO), 20 Riverside Drive in Lakeville, Massachusetts 02347. You also have the right to request additional Public Involvement activities under 310 CMR 40.1403(9).

If you have any questions or comments, please do not hesitate to contact our office.

Sincerely,

BETA Group, Inc.



Roger P. Thibault, P.E., LSP
Senior Environmental Engineer

BETA GROUP, INC.
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Enclosures

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