DRAINAGE REPORT

For

McDonald's USA, LLC

EXISTING

225 Pond Street
Town of Ashland, Massachusetts
Middlesex County

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I. EXECUTIVE SUMMARY

This report examines the changes in drainage that can be expected as the result of the proposed redevelopment of an existing McDonald's Restaurant with drive-thru. The site contains approximately 37,251 square feet of land which exists as a McDonald's Restaurant with drive-thru, associated parking and utilities. The current condition of the property is good, primarily consisting of the restaurant building, parking lot, and landscaping. Based on MassGIS and available record plans, there are wetland resource areas to the southeast of the site consisting of bordering vegetated wetlands and an intermittent culverted stream running underground across Pond Street. The site is bordered to the North by a single-family dwelling, to the south by Nickerson Road, to the east by Pond Street, and to the west by a storage business.

The project proposes the redevelopment of the existing McDonald's restaurant and paved parking area. The proposed site layout includes the reconfiguration of the existing drive-thru to propose a new dual order point drive-thru with two lanes, the relocation of the existing ADA parking stalls, reconstruction of the existing trash coral, and new landscaping. The below report addresses the comparative analysis of the pre- and post-development site runoff conditions of the 0.86-acre parcel. The project will also provide erosion and sedimentation controls during the demolition and construction periods, as well as long term stabilization of the site.

For the purposes of this analysis the pre- and post-development drainage conditions were analyzed at one (1) "point of analysis" (POA) where stormwater runoff currently drains to under existing conditions. These POA is described in further detail in **Section II** below. A summary of the existing and proposed conditions peak runoff rates for the 2-, 10-, 25-, and 100-year storms can be found in **Table 1.1** below. Additionally, the project has been designed to meet or exceed the Stormwater Management Standards for a redevelopment as detailed herein.

Table 1.1: Point of Analysis Peak Runoff Rate Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
POA 1	2.08	2.08	**0**	3.72	3.72	**0**	4.75	4.75	**0**	5.49	5.49	**0**

**Flows are represented in cubic feet per second (cfs)*

II. EXISTING SITE CONDITIONS

Existing Site Description

The site contains approximately 0.86 acres of land and is developed with a McDonald's Restaurant with drive-thru. The current condition of the property is good, primarily consisting of the restaurant building, parking lot, and landscaping. Based on MassGIS and available record plans, there are wetland resource areas to the southeast of the site consisting of bordering vegetated wetlands and an intermittent culverted stream running underground across Pond Street. The site is bordered to the North by a single-family dwelling, to the south by Nickerson Road, to the east by Pond Street, and to the west by a storage business.

On-Site Soil Information

The majority of the soils at the site are mapped as Merrimack Urban Land Complex, primarily classified by the Natural Resource Conservation Service (NRCS) as Hydrologic Soil Group (HSG) "A". Refer to **Appendix C** for additional information.

Existing Collection and Conveyance

The majority of the site drains in the easterly direction from the rear of the site to the frontage along Pond Street to two (2) existing leaching catch basins that are fully contained on site. The site is gently graded and currently has a minimum elevation of 186.90 at the existing leaching catch basin and a maximum elevation of 191.0 along the rear of the site to the East.

Existing Watersheds and Point of Analysis Information

The site was considered as one (1) sub catchment for the existing conditions as described below to analyze existing and proposed flow rates at the POA.

The pre- and post-development drainage conditions for the site were then analyzed at one (1) "point of analysis" (POA) where stormwater runoff currently drains to under existing conditions.

Point of Analysis #1 (POA 1) represents the two (2) existing leaching catch basins located at the front of the property. Under existing conditions, this analysis point receives stormwater flows from approximately 0.86 acres of on-site land within the proposed project area, designated as subcatchment "E-1". This subcatchment mainly contains an asphalt parking lot, building rooftop, and landscaped areas with a calculated minimum time of concentration of 6 minutes.

Refer to **Table 1.1 and 5.1** for the calculated existing conditions peak rates of runoff. For additional hydrologic information, refer to **Appendix D** and the Drainage Area Maps in the appendices of this report for a graphical representation of the existing drainage areas.

III. PROPOSED SITE CONDITIONS

Proposed Development Description

The project proposes the redevelopment of the existing McDonald's restaurant and paved parking area located at 225 Pond Street in Ashland, MA. The proposed site layout includes the reconfiguration of the existing drive-thru to propose a new dual order point drive-thru with two lanes, the relocation of the existing ADA parking stalls, reconstruction of the trash coral, and new landscaping. No changes to the existing drainage system are proposed and the site will continue directing stormwater to flow into one of two (2) existing leaching catch basins. The proposed site improvements result in a net decrease of ±105 SF of impervious area, resulting in an overall net balance or decrease in stormwater runoff from the property.

Proposed Development Collection and Conveyance

The proposed site improvements will generally maintain the existing drainage patterns directing stormwater to sheet flow across the site, utilizing the existing system of on-site leaching catch basins to collect and infiltrate stormwater. The proposed site improvements result in a net decrease of ±105 SF of impervious area, resulting in an overall net balance or decrease in stormwater runoff from the property. In addition, a Stormwater Operation and Maintenance (O&M) Plan, attached in **Appendix G**, has been developed which includes scheduled maintenance and periodic inspections of stormwater management structures.

Proposed Watersheds and Point of Analysis Information

The project has been designed to maintain existing drainage watersheds to the greatest extent possible, with the same point of analysis (POA) described in **Section II** above.

The site was considered as one (1) sub catchment for the proposed conditions as described below to analyze existing and proposed flow rates at the POA.

Subcatchment P1 consists of 0.86 acres of the entire project site including pavement, roof, and landscaping areas which drawings to the existing leaching catch basins. A 6.0 minute time of concentration was used the model.

Refer to **Table 1.1 and 5.1** for the calculated proposed conditions peak rates of runoff. For additional hydrologic information, refer to **Appendix D** and the Drainage Area Maps in the appendices of this report for a graphical representation of the proposed drainage areas.

IV. METHODOLOGY

Peak Flow Calculations

Methodology utilized to design the proposed stormwater management system includes compliance with the guidelines set forth in the latest edition of the Massachusetts DEP Stormwater Handbook. The pre- and post-development runoff rates being discharged from the site were computed using the HydroCAD computer program. The drainage area information was entered into the program, which routes storm flows based on NRCS TR-20 and TR-55 methods. The other components of the model were determined following standard NRCS procedures for Curve Numbers (CNs) and times of concentrations documented in the appendices of this report. The rainfall data utilized and listed below in table 4.1 below for stormwater calculations is based on NOAA rainfall data. Refer to **Appendix F** for more information.

Table 4.1: NOAA Rainfall Data

Frequency	2 year	10 year	25 year	100 year
Rainfall* (inches)	3.35	5.24	6.43	8.25

*Values derived from NOAA ATLAS (obtained in April 2021)

The proposed stormwater management as designed will provide a decrease in peak rates of runoff from the proposed facility for the 2-, 10-, 25- and 100-year design storm events. Additionally, the proposed project meets, or exceeds, the MADEP Stormwater Management standards for a redevelopment and compliance with these standards is described further below.

V. STORMWATER MANAGEMENT STANDARDS

Standard #1: No New Untreated Discharges

The proposed project is expected to result in a ±105 square foot reduction in impervious coverage and there is no new untreated stormwater discharges are anticipated.

Standard #2: Peak Rate Attenuation

As outlined in **Table 1.1** and **Table 5.1**, the proposed site and stormwater management system have been designed so that post-development peak rates of runoff are maintained or below pre-development conditions for the 2-, 10-, 25- and 100-year storm events at all points of analysis (POAs).

Standard #3: Recharge

The proposed project is expected to result in a ±105 square foot reduction in impervious coverage on-site resulting in an overall increase to recharge volume.

Standard #4: Water Quality

The proposed project is expected to result in a ±105 square foot reduction in impervious coverage providing improved water quality treatment. No changes to the existing leaching catch basin system on site are proposed as part of the redevelopment project.

Standard #5: Land Use with Higher Potential Pollutant Loads

The proposed project involves “Land Uses with Higher Potential Pollutant Loads.” The proposed project is anticipated to reduce the overall impervious surface on the site by approximately 105 square feet providing improved stormwater quality to the maximum extent practicable for a redevelopment.

Standard #6: Critical Areas

The proposed project is not located within a critical area.

Standard #7: Redevelopment

As described the project is a redevelopment of an existing site. The project has been designed to improve existing conditions by decreasing the overall impervious area by approximately 105 SF balancing or reducing peak stormwater runoff rates as outlined in Table 1.1.

Standard #8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

The proposed project will provide construction period erosion and sedimentation controls as indicated within the site plan set provided for this project. This includes proposed inlet protection and various other techniques as outlined on the Demolition & Erosion Control Plan and Detail Sheet in the enclosed Proposed Site Plan Documents.

Standard #9: Operation and Maintenance Plan (O&M Plan)

An Operation and Maintenance (O&M) Plan for this site has been prepared and is included in **Appendix G** of this report. The O&M Plan outlines procedures and time tables for the long term operation and maintenance of the proposed site stormwater management system, including initial inspections upon completion of construction, and periodic monitoring of the system components, in accordance with established practices and the manufacturer's recommendations. The O&M Plan includes a list of responsible parties and an estimated budget for inspections and maintenance.

Standard #10: Prohibition of Illicit Discharges

The proposed stormwater system will only convey allowable non-stormwater discharges (firefighting waters, irrigation, air conditioning condensates, etc.) and will not contain any illicit discharges from prohibited sources.

VI. SUMMARY

In summary, the proposed stormwater management system illustrated on the drawings prepared by Bohler results in a reduction in peak rates of runoff from the subject site when compared to pre-development conditions for the 2-, 10-, 25- and 100-year storm frequencies. The pre-development versus post-development stormwater discharge comparisons are contained in **Table 6.1** below:

Table 6.1: Point of Analysis Peak Runoff Rate Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
POA 1	2.08	2.08	**0**	3.72	3.72	**0**	4.75	4.75	**0**	5.49	5.49	**0**

As outlined above, the stormwater management system will maintain or decrease peak rates of runoff for the 2-, 10-, 25- and 100-year storm events. Additionally, the project meets the MADEP Stormwater Management Standards to the maximum extent practicable for this redevelopment project.

APPENDIX A: MASSACHUSETTS STORMWATER MANAGEMENT CHECKLIST

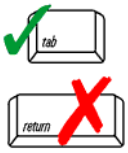
- *MASSACHUSETTS STORMWATER MANAGEMENT CHECKLIST*

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

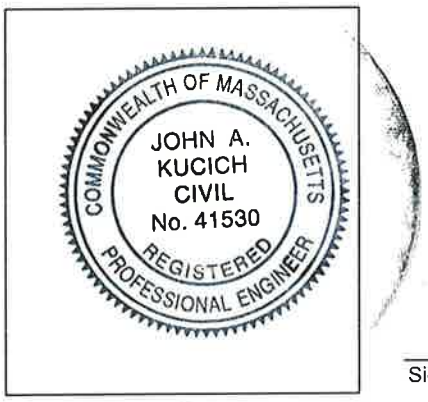
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



8/3/2022

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- [X] No disturbance to any Wetland Resource Areas
- [ ] Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- [X] Reduced Impervious Area (Redevelopment Only)
- [X] Minimizing disturbance to existing trees and shrubs
- [ ] LID Site Design Credit Requested:
  - [ ] Credit 1
  - [ ] Credit 2
  - [ ] Credit 3
- [ ] Use of "country drainage" versus curb and gutter conveyance and pipe
- [ ] Bioretention Cells (includes Rain Gardens)
- [ ] Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- [ ] Treebox Filter
- [ ] Water Quality Swale
- [ ] Grass Channel
- [ ] Green Roof
- [ ] Other (describe): _____

Standard 1: No New Untreated Discharges

- [X] No new untreated discharges
- [X] Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- [X] Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge - Existing Drywell Structures to remain

☐ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☐ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☒ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☒ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

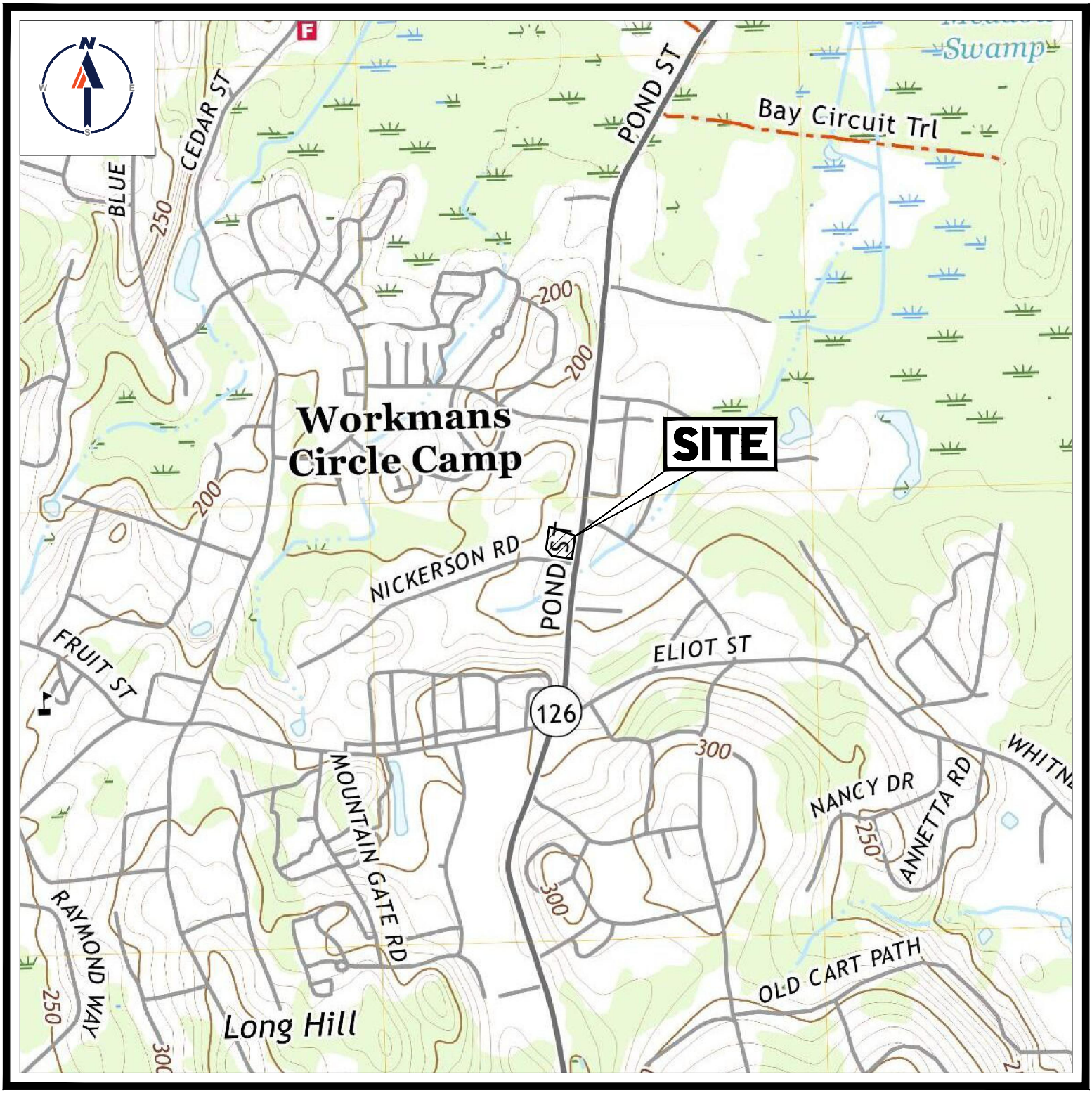
☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

APPENDIX B: PROJECT LOCATION MAPS

- *USGS MAP*
- *FEMA FIRMETTE*



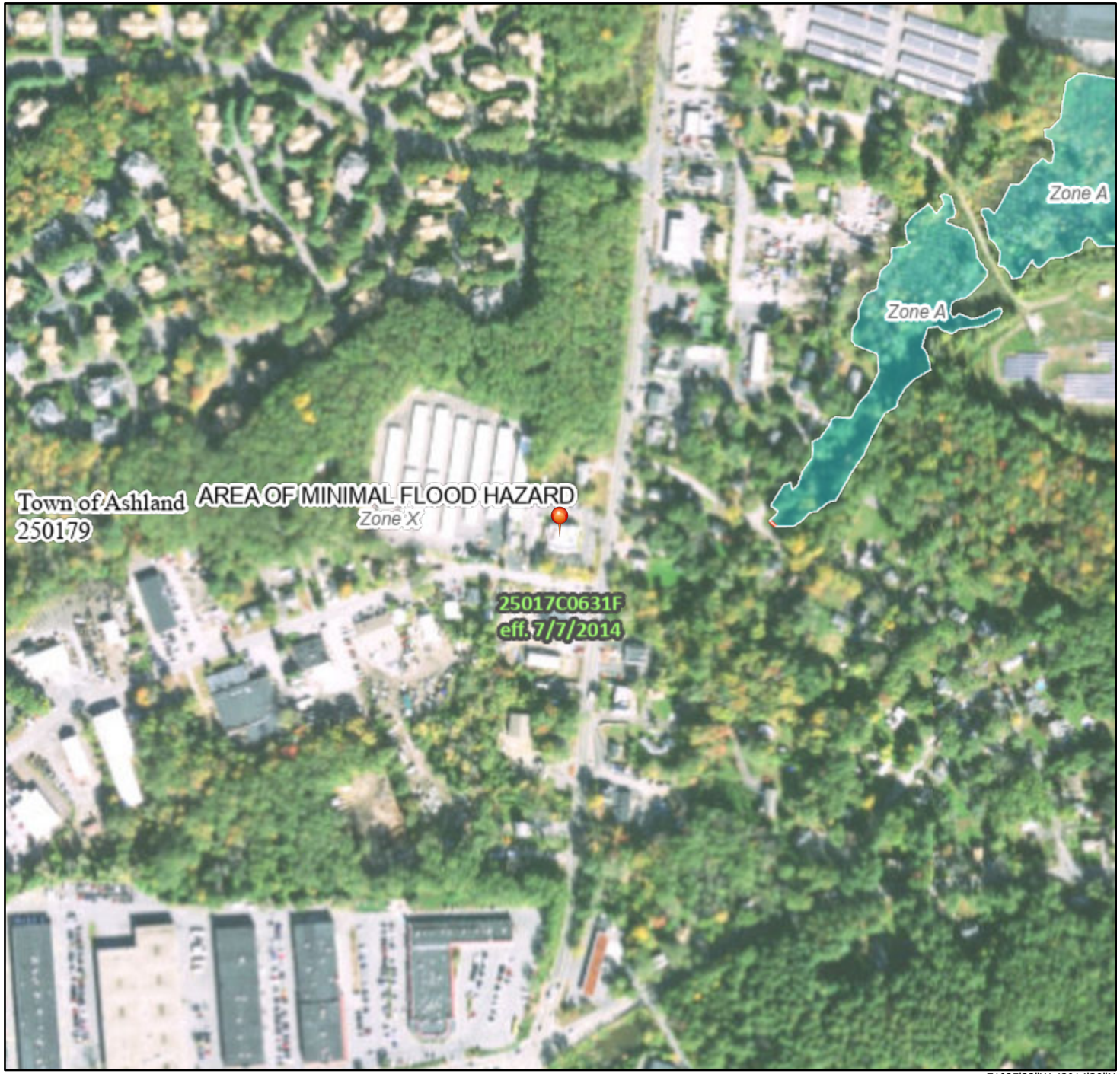
USGS MAP

SCALE: 1" = 1,000'
SOURCE: USGS HOLLISTON QUADRANGLE &
FRAMINGHAM QUADRANGLE

National Flood Hazard Layer FIRMette

FEMA

71°26'11"W 42°14'57"N



71°25'33"W 42°14'30"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/13/2022 at 10:22 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX C: SOIL AND WETLAND INFORMATION

- *NRCS CUSTOM SOIL RESOURCE REPORT*

United States Department of Agriculture

NRCS

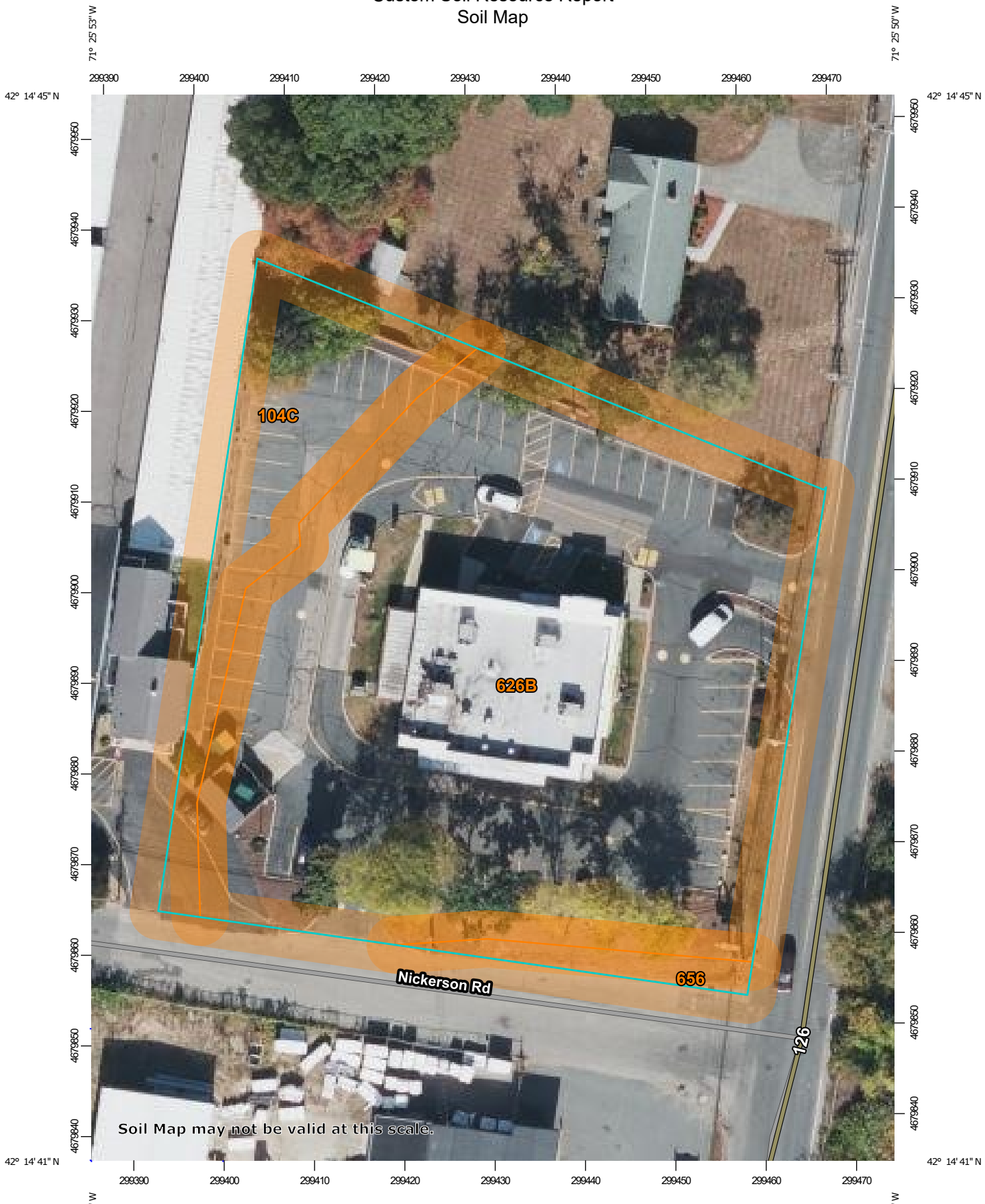
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Middlesex County, Massachusetts

July 13, 2022

Custom Soil Resource Report
Soil Map



Map Scale: 1:573 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 25 50 100 150

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: Middlesex County, Massachusetts
Survey Area Data: Version 21, Sep 2, 2021

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

Date(s) aerial images were photographed: Aug 31, 2020—Oct 22, 2020

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
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	0.2	14.9%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	0.9	82.9%
656	Udorthents-Urban land complex	0.0	2.2%
Totals for Area of Interest		**1.1**	**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 generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Middlesex County, Massachusetts

104C—Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w69p
Elevation: 0 to 1,270 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis, extremely stony, and similar soils: 35 percent
Rock outcrop: 25 percent
Charlton, extremely stony, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Side slope, nose slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands

Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Ridges, hills
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Charlton, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Canton, extremely stony
Percent of map unit: 7 percent
Landform: Moraines, hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, extremely stony
Percent of map unit: 6 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Scituate, extremely stony
Percent of map unit: 1 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Footslope, backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Montauk, extremely stony
Percent of map unit: 1 percent
Landform: Hills, recessionial moraines, ground moraines, drumlins
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

626B—Merrimac-Urban land complex, 0 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2tyr9
Elevation: 0 to 820 feet

Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Merrimac and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, crest, head slope, side slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash terraces, dunes, outwash plains, deltas
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

656—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 995k
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 54 inches

Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 45 percent
Urban land: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land

Minor Components

Canton

Percent of map unit: 10 percent
Landform: Hills
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Terraces, plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

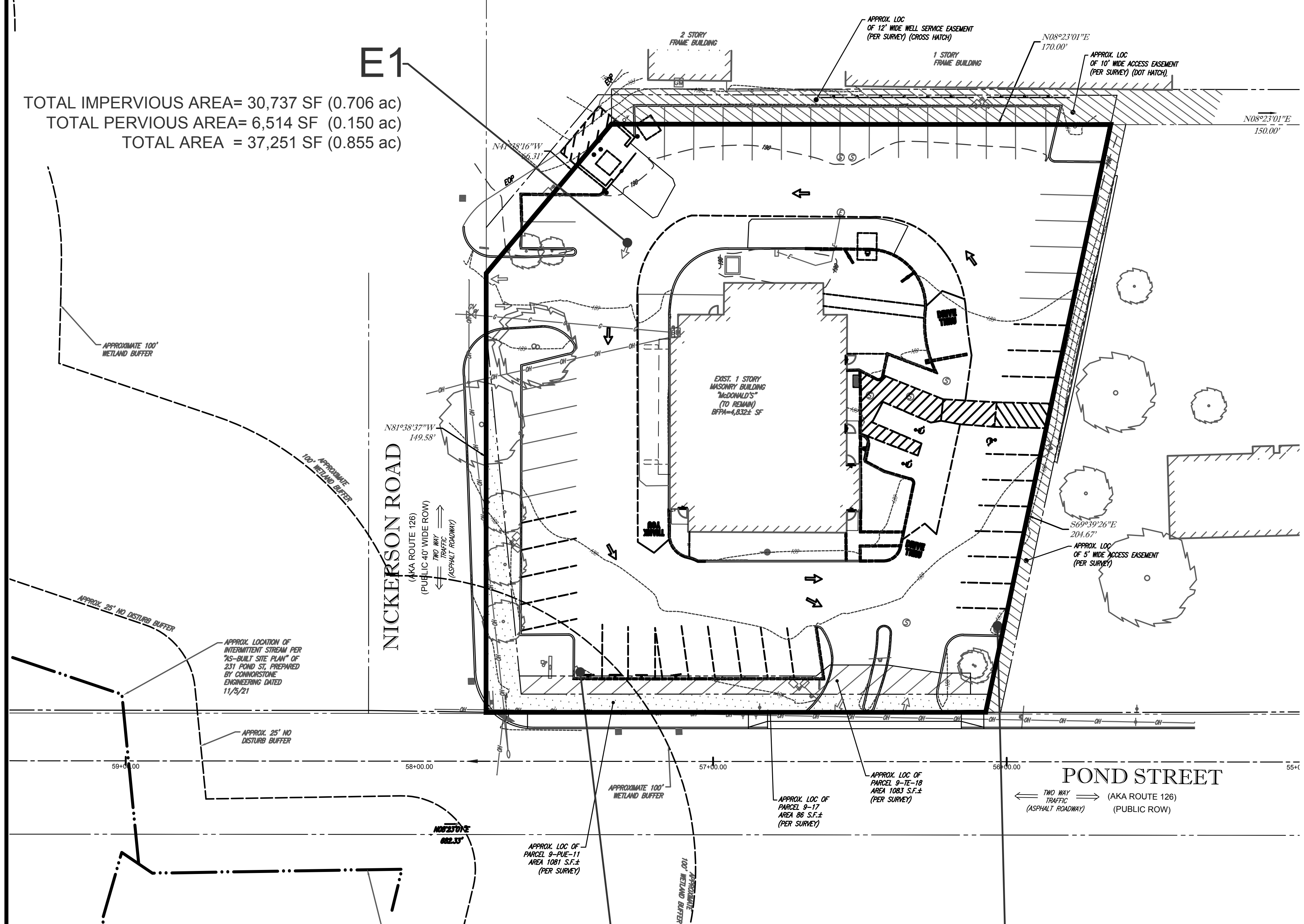
Paxton

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, summit

Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

APPENDIX D: EXISTING CONDITIONS HYDROLOGIC ANALYSIS

- *EXISTING CONDITIONS DRAINAGE MAP*
- *EXISTING CONDITIONS HYDROCAD COMPUTATIONS*



POA-1

TOTAL IMPERVIOUS AREA= 30,737 SF (0.706 ac)
TOTAL PERVIOUS AREA= 6,514 SF (0.150 ac)
TOTAL AREA = 37,251 SF (0.855 ac)

1"= 20'

811 Know what's **below.** Call before you dig.

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

BOHLER //

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

COMPLIANCE CHECK — DATE
CONSTRUCTION CHECK — DATE
CONSTRUCTION CHECK — DATE

PROJECT No.: W212019
CAD I.D. #: W212019-CVL-3.dwg

STREET ADDRESS: 225 POND STREET
CITY: ASHLAND
STATE: MA
COUNTY: MIDDLESEX
SITE I.D.: 020-0309
PLAN DESCRIPTION: **EXISTING DRAINAGE MAP**

STATUS	DATE	BY
DRAWN BY:	01/14/22	CSE
PLAN CHECKED	01/14/22	JAK
AS-BUILT		

SHEET NO. 1 OF 10

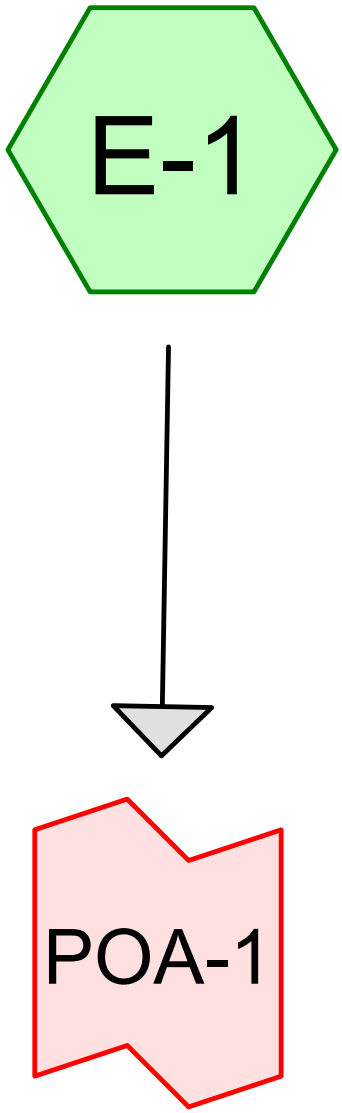
REV	DATE	DESCRIPTION	BY
1	03/16/2022	REVISED FOR WETLAND BUFFERS	CSE
2	04/22/2022	REVISED PER ADA STALL RELOCATION	CSE
3	06/01/2022	REVISED FOR CONSERVATION COMMISSION SUBMITTAL	CSE

J.A. KUCICH
PROFESSIONAL ENGINEER

McDonald's®

OFFICE: BOSTON REGION
ADDRESS: 110 N CARPENTER ST CHICAGO, IL 60607

PLAN APPROVALS
SIGNATURE — DATE
APPROVED McDONALD'S AGENT



Subcat Reach Pond Link

Routing Diagram for Pre-Development Analysis
Prepared by Bohler Engineering, Printed 7/22/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.150	39	>75% Grass cover, Good, HSG A (E-1)
0.706	98	Paved parking, HSG A (E-1)
0.855	**88**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.855	HSG A	E-1
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.855		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.150	0.000	0.000	0.000	0.000	0.150	>75% Grass cover, Good	E-1
0.706	0.000	0.000	0.000	0.000	0.706	Paved parking	E-1
0.855	**0.000**	**0.000**	**0.000**	**0.000**	**0.855**	**TOTAL AREA**	

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=37,250 sf 82.51% Impervious Runoff Depth=2.13"
Tc=6.0 min CN=88 Runoff=2.08 cfs 0.152 af

Link POA-1: Inflow=2.08 cfs 0.152 af
Primary=2.08 cfs 0.152 af

Total Runoff Area = 0.855 ac Runoff Volume = 0.152 af Average Runoff Depth = 2.13"
17.49% Pervious = 0.150 ac 82.51% Impervious = 0.706 ac

Summary for Subcatchment E-1:

Runoff = 2.08 cfs @ 12.09 hrs, Volume= 0.152 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
30,736	98	Paved parking, HSG A
6,514	39	>75% Grass cover, Good, HSG A
37,250	88	Weighted Average
6,514		17.49% Pervious Area
30,736		82.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Link POA-1:

Inflow Area = 0.855 ac, 82.51% Impervious, Inflow Depth = 2.13" for 2 Year event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 0.152 af
Primary = 2.08 cfs @ 12.09 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=37,250 sf 82.51% Impervious Runoff Depth=3.90"
Tc=6.0 min CN=88 Runoff=3.72 cfs 0.278 af

Link POA-1: Inflow=3.72 cfs 0.278 af
Primary=3.72 cfs 0.278 af

Total Runoff Area = 0.855 ac Runoff Volume = 0.278 af Average Runoff Depth = 3.90"
17.49% Pervious = 0.150 ac 82.51% Impervious = 0.706 ac

Summary for Subcatchment E-1:

Runoff = 3.72 cfs @ 12.09 hrs, Volume= 0.278 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
30,736	98	Paved parking, HSG A
6,514	39	>75% Grass cover, Good, HSG A
37,250	88	Weighted Average
6,514		17.49% Pervious Area
30,736		82.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Link POA-1:

Inflow Area = 0.855 ac, 82.51% Impervious, Inflow Depth = 3.90" for 10 Year event
Inflow = 3.72 cfs @ 12.09 hrs, Volume= 0.278 af
Primary = 3.72 cfs @ 12.09 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=37,250 sf 82.51% Impervious Runoff Depth=5.04"
Tc=6.0 min CN=88 Runoff=4.75 cfs 0.359 af

Link POA-1: Inflow=4.75 cfs 0.359 af
Primary=4.75 cfs 0.359 af

Total Runoff Area = 0.855 ac Runoff Volume = 0.359 af Average Runoff Depth = 5.04"
17.49% Pervious = 0.150 ac 82.51% Impervious = 0.706 ac

Summary for Subcatchment E-1:

Runoff = 4.75 cfs @ 12.09 hrs, Volume= 0.359 af, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=6.43"

Area (sf)	CN	Description
30,736	98	Paved parking, HSG A
6,514	39	>75% Grass cover, Good, HSG A
37,250	88	Weighted Average
6,514		17.49% Pervious Area
30,736		82.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Link POA-1:

Inflow Area = 0.855 ac, 82.51% Impervious, Inflow Depth = 5.04" for 25 Year event
Inflow = 4.75 cfs @ 12.09 hrs, Volume= 0.359 af
Primary = 4.75 cfs @ 12.09 hrs, Volume= 0.359 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=37,250 sf 82.51% Impervious Runoff Depth=6.81"
Tc=6.0 min CN=88 Runoff=6.31 cfs 0.485 af

Link POA-1: Inflow=6.31 cfs 0.485 af
Primary=6.31 cfs 0.485 af

Total Runoff Area = 0.855 ac Runoff Volume = 0.485 af Average Runoff Depth = 6.81"
17.49% Pervious = 0.150 ac 82.51% Impervious = 0.706 ac

Summary for Subcatchment E-1:

Runoff = 6.31 cfs @ 12.09 hrs, Volume= 0.485 af, Depth= 6.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.25"

Area (sf)	CN	Description
30,736	98	Paved parking, HSG A
6,514	39	>75% Grass cover, Good, HSG A
37,250	88	Weighted Average
6,514		17.49% Pervious Area
30,736		82.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

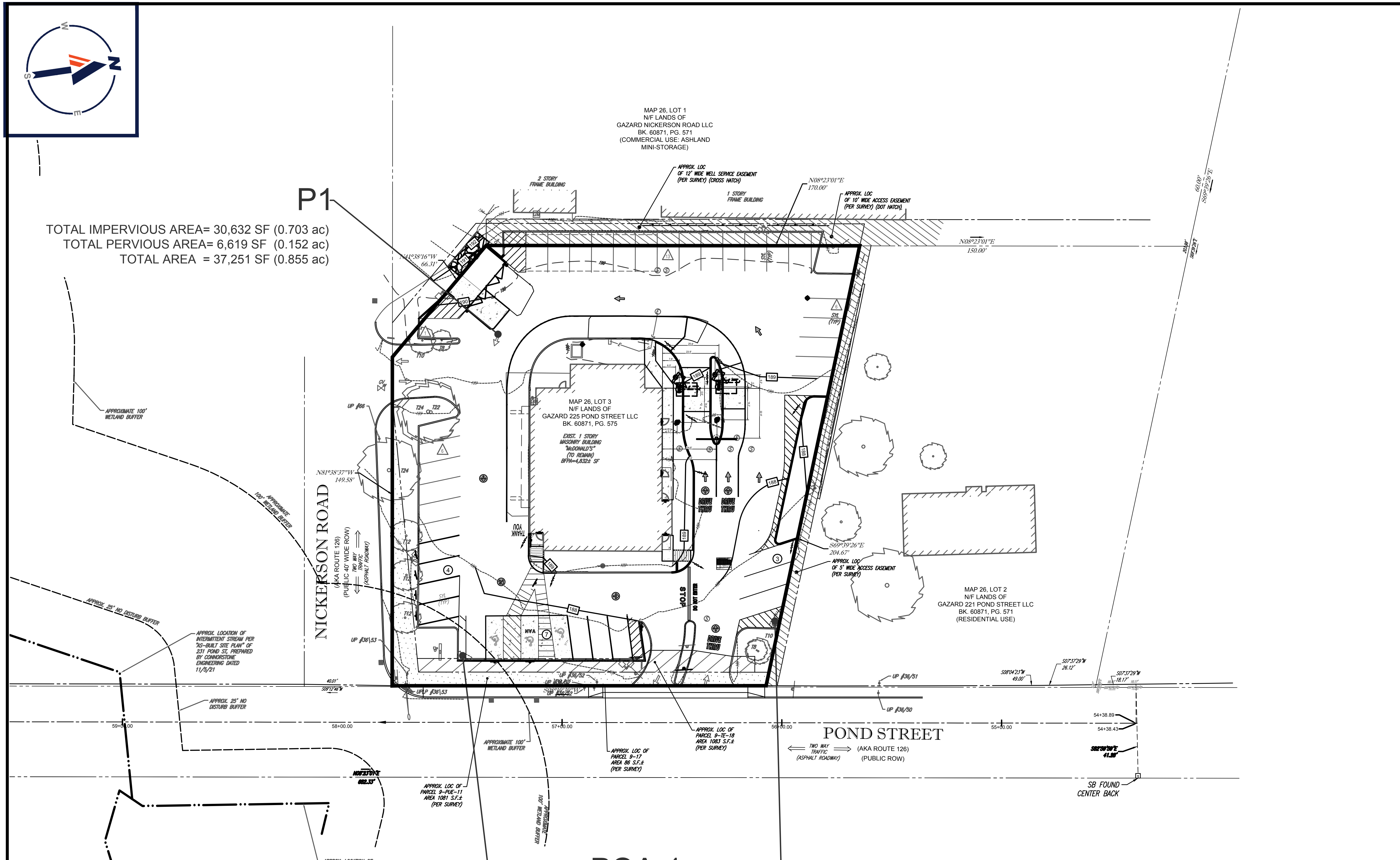
Summary for Link POA-1:

Inflow Area = 0.855 ac, 82.51% Impervious, Inflow Depth = 6.81" for 100 Year event
Inflow = 6.31 cfs @ 12.09 hrs, Volume= 0.485 af
Primary = 6.31 cfs @ 12.09 hrs, Volume= 0.485 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

APPENDIX E: PROPOSED CONDITIONS HYDROLOGIC ANALYSIS

- *PROPOSED CONDITIONS DRAINAGE MAP*
- *PROPOSED CONDITIONS HYDROCAD CALCULATIONS*



P1
TOTAL IMPERVIOUS AREA= 30,632 SF (0.703 ac)
TOTAL PERVIOUS AREA= 6,619 SF (0.152 ac)
TOTAL AREA = 37,251 SF (0.855 ac)
MAP 26, LOT 1
N/F LANDS OF
GAZARD NICKERSON ROAD LLC
BK. 60871, PG. 571
(COMMERCIAL USE: ASHLAND MINI-STORAGE)
2 STORY FRAME BUILDING
APPROX. LOC OF 12' WIDE WELL SERVICE EASEMENT (PER SURVEY) (CROSS HATCH)
1 STORY FRAME BUILDING
N08°23'01"E 170.00'
APPROX. LOC OF 10' WIDE ACCESS EASEMENT (PER SURVEY) (DOT HATCH)
N08°23'01"E 150.00'
MAP 26, LOT 3
N/F LANDS OF
GAZARD 225 POND STREET LLC
BK. 60871, PG. 575
EXIST. 1 STORY MASONRY BUILDING "McDONALD'S" (TO REMAIN) BFFA=4,832± SF
APPROXIMATE 100' WETLAND BUFFER
N81°38'37"W 149.58'
NICKERSON ROAD
(AKA ROUTE 126)
(PUBLIC 40' WIDE ROW)
TWO WAY TRAFFIC (ASPHALT ROADWAY)
THANK YOU
DRIVE THRU
STOP
DO NOT ENTER
S69°39'26"E 204.67'
APPROX. LOC OF 5' WIDE ACCESS EASEMENT (PER SURVEY)
MAP 26, LOT 2
N/F LANDS OF
GAZARD 221 POND STREET LLC
BK. 60871, PG. 571
(RESIDENTIAL USE)
APPROX. 25' NO DISTURB BUFFER
APPROX. LOCATION OF INTERMITTENT STREAM PER "AS-BUILT SITE PLAN" OF 231 POND ST, PREPARED BY CONNORSTONE ENGINEERING DATED 11/5/21
APPROX. 25' NO DISTURB BUFFER
APPROXIMATE 100' WETLAND BUFFER
APPROX. LOC OF PARCEL 9-PUE-11 AREA 1081 S.F.± (PER SURVEY)
APPROX. LOC OF PARCEL 9-17 AREA 86 S.F.± (PER SURVEY)
APPROX. LOC OF PARCEL 9-TE-18 AREA 1083 S.F.± (PER SURVEY)
POND STREET
TWO WAY TRAFFIC (ASPHALT ROADWAY)
(AKA ROUTE 126)
(PUBLIC ROW)
SB FOUND CENTER BACK
APPROX. LOCATION OF WETLAND BOUNDARY PER "AS-BUILT SITE PLAN" OF 231 POND STREET PREPARED BY CONNORSTONE ENGINEERING DATED 11/5/21
59+00.00
58+00.00
57+00.00
56+00.00
55+00.00
54+38.89
54+38.43
POA-1
TOTAL IMPERVIOUS AREA= 30,632 SF (0.703 ac)
TOTAL PERVIOUS AREA= 6,619 SF (0.152 ac)
TOTAL AREA = 37,251 SF (0.855 ac)

REV	DATE	DESCRIPTION	BY
1	03/16/2022	REVISED FOR WETLAND BUFFERS	CSE
2	04/22/2022	REVISED PER ADA STALL RELOCATION	CSE
3	06/01/2022	REVISED FOR CONSERVATION COMMISSION SUBMITTAL	CSE

J.A. KUCICH
PROFESSIONAL ENGINEER

McDonald's®

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OFFICE: BOSTON REGION
ADDRESS: 110 N CARPENTER ST, CHICAGO, IL 60607

PLAN APPROVALS — SIGNATURE — DATE — APPROVED McDONALD'S AGENT

BOHLER//

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

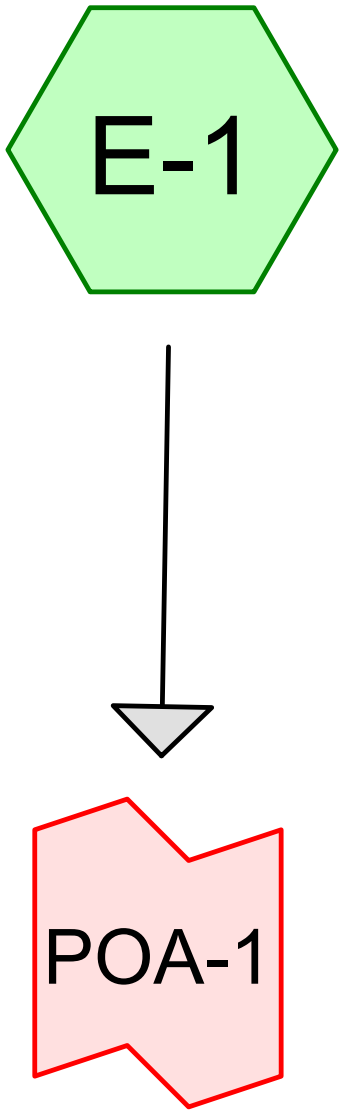
COMPLIANCE CHECK — DATE
CONSTRUCTION CHECK — DATE
CONSTRUCTION CHECK — DATE

PROJECT No.: W212019
CAD I.D. #: W212019-CVL-3.dwg

STREET ADDRESS: 225 POND STREET
CITY: ASHLAND
STATE: MA
COUNTY: MIDDLESEX
SITE I.D.: 020-0309
PLAN DESCRIPTION: **PROPOSED DRAINAGE MAP**

STATUS	DATE	BY
DRAWN BY:	01/14/22	CSE
PLAN CHECKED	01/14/22	JAK
AS-BUILT		

SHEET NO.
OF 10



Subcat Reach Pond Link

Routing Diagram for Post-Development Analysis
Prepared by Bohler Engineering, Printed 7/22/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.152	39	>75% Grass cover, Good, HSG A (E-1)
0.703	98	Paved parking, HSG A (E-1)
0.855	**88**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.855	HSG A	E-1
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.855		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.152	0.000	0.000	0.000	0.000	0.152	>75% Grass cover, Good	E-1
0.703	0.000	0.000	0.000	0.000	0.703	Paved parking	E-1
0.855	**0.000**	**0.000**	**0.000**	**0.000**	**0.855**	**TOTAL AREA**	

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=37,251 sf 82.23% Impervious Runoff Depth=2.13"
Tc=6.0 min CN=88 Runoff=2.08 cfs 0.152 af

Link POA-1: Inflow=2.08 cfs 0.152 af
Primary=2.08 cfs 0.152 af

Total Runoff Area = 0.855 ac Runoff Volume = 0.152 af Average Runoff Depth = 2.13"
17.77% Pervious = 0.152 ac 82.23% Impervious = 0.703 ac

Summary for Subcatchment E-1:

Runoff = 2.08 cfs @ 12.09 hrs, Volume= 0.152 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
30,632	98	Paved parking, HSG A
6,619	39	>75% Grass cover, Good, HSG A
37,251	88	Weighted Average
6,619		17.77% Pervious Area
30,632		82.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Link POA-1:

Inflow Area = 0.855 ac, 82.23% Impervious, Inflow Depth = 2.13" for 2 Year event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 0.152 af
Primary = 2.08 cfs @ 12.09 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=37,251 sf 82.23% Impervious Runoff Depth=3.90"
Tc=6.0 min CN=88 Runoff=3.72 cfs 0.278 af

Link POA-1: Inflow=3.72 cfs 0.278 af
Primary=3.72 cfs 0.278 af

Total Runoff Area = 0.855 ac Runoff Volume = 0.278 af Average Runoff Depth = 3.90"
17.77% Pervious = 0.152 ac 82.23% Impervious = 0.703 ac

Summary for Subcatchment E-1:

Runoff = 3.72 cfs @ 12.09 hrs, Volume= 0.278 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
30,632	98	Paved parking, HSG A
6,619	39	>75% Grass cover, Good, HSG A
37,251	88	Weighted Average
6,619		17.77% Pervious Area
30,632		82.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Link POA-1:

Inflow Area = 0.855 ac, 82.23% Impervious, Inflow Depth = 3.90" for 10 Year event
Inflow = 3.72 cfs @ 12.09 hrs, Volume= 0.278 af
Primary = 3.72 cfs @ 12.09 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=37,251 sf 82.23% Impervious Runoff Depth=5.04"
Tc=6.0 min CN=88 Runoff=4.75 cfs 0.359 af

Link POA-1: Inflow=4.75 cfs 0.359 af
Primary=4.75 cfs 0.359 af

Total Runoff Area = 0.855 ac Runoff Volume = 0.359 af Average Runoff Depth = 5.04"
17.77% Pervious = 0.152 ac 82.23% Impervious = 0.703 ac

Summary for Subcatchment E-1:

Runoff = 4.75 cfs @ 12.09 hrs, Volume= 0.359 af, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=6.43"

Area (sf)	CN	Description
30,632	98	Paved parking, HSG A
6,619	39	>75% Grass cover, Good, HSG A
37,251	88	Weighted Average
6,619		17.77% Pervious Area
30,632		82.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Link POA-1:

Inflow Area = 0.855 ac, 82.23% Impervious, Inflow Depth = 5.04" for 25 Year event
Inflow = 4.75 cfs @ 12.09 hrs, Volume= 0.359 af
Primary = 4.75 cfs @ 12.09 hrs, Volume= 0.359 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Runoff Area=37,251 sf 82.23% Impervious Runoff Depth=6.81"
Tc=6.0 min CN=88 Runoff=6.31 cfs 0.485 af

Link POA-1: Inflow=6.31 cfs 0.485 af
Primary=6.31 cfs 0.485 af

Total Runoff Area = 0.855 ac Runoff Volume = 0.485 af Average Runoff Depth = 6.81"
17.77% Pervious = 0.152 ac 82.23% Impervious = 0.703 ac

Summary for Subcatchment E-1:

Runoff = 6.31 cfs @ 12.09 hrs, Volume= 0.485 af, Depth= 6.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.25"

Area (sf)	CN	Description
30,632	98	Paved parking, HSG A
6,619	39	>75% Grass cover, Good, HSG A
37,251	88	Weighted Average
6,619		17.77% Pervious Area
30,632		82.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Link POA-1:

Inflow Area = 0.855 ac, 82.23% Impervious, Inflow Depth = 6.81" for 100 Year event
Inflow = 6.31 cfs @ 12.09 hrs, Volume= 0.485 af
Primary = 6.31 cfs @ 12.09 hrs, Volume= 0.485 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

APPENDIX F: STORMWATER CALCULATIONS

- *NOAA RAINFALL DATA*

NOAA Atlas 14, Volume 10, Version 3
Location name: Ashland, Massachusetts, USA*
Latitude: 42.2454°, Longitude: -71.4311°
Elevation: 191.32 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.330 (0.257-0.418)	0.398 (0.310-0.505)	0.509 (0.395-0.648)	0.601 (0.464-0.770)	0.728 (0.544-0.978)	0.824 (0.603-1.13)	0.924 (0.657-1.32)	1.04 (0.699-1.52)	1.20 (0.777-1.82)	1.33 (0.842-2.07)
10-min	0.467 (0.364-0.592)	0.564 (0.439-0.715)	0.721 (0.560-0.919)	0.852 (0.657-1.09)	1.03 (0.771-1.39)	1.17 (0.855-1.60)	1.31 (0.931-1.87)	1.47 (0.989-2.15)	1.70 (1.10-2.58)	1.89 (1.19-2.93)
15-min	0.550 (0.429-0.696)	0.663 (0.516-0.841)	0.848 (0.658-1.08)	1.00 (0.773-1.28)	1.21 (0.907-1.63)	1.37 (1.00-1.89)	1.54 (1.10-2.20)	1.73 (1.16-2.53)	2.00 (1.29-3.04)	2.22 (1.40-3.45)
30-min	0.754 (0.588-0.955)	0.909 (0.708-1.15)	1.16 (0.902-1.48)	1.37 (1.06-1.76)	1.66 (1.24-2.23)	1.88 (1.38-2.58)	2.11 (1.50-3.01)	2.37 (1.59-3.46)	2.73 (1.77-4.15)	3.03 (1.92-4.71)
60-min	0.958 (0.747-1.21)	1.16 (0.899-1.47)	1.48 (1.15-1.88)	1.74 (1.35-2.23)	2.11 (1.58-2.83)	2.39 (1.75-3.28)	2.68 (1.90-3.82)	3.00 (2.02-4.40)	3.47 (2.25-5.27)	3.85 (2.43-5.97)
2-hr	1.22 (0.961-1.54)	1.48 (1.16-1.87)	1.90 (1.49-2.40)	2.25 (1.75-2.86)	2.73 (2.06-3.65)	3.08 (2.28-4.23)	3.47 (2.50-4.97)	3.92 (2.65-5.72)	4.62 (3.00-6.98)	5.21 (3.31-8.04)
3-hr	1.41 (1.12-1.77)	1.71 (1.35-2.15)	2.20 (1.73-2.77)	2.61 (2.04-3.31)	3.17 (2.40-4.23)	3.58 (2.66-4.91)	4.03 (2.92-5.78)	4.58 (3.10-6.65)	5.43 (3.54-8.18)	6.17 (3.92-9.48)
6-hr	1.81 (1.44-2.25)	2.20 (1.75-2.74)	2.83 (2.24-3.55)	3.36 (2.64-4.23)	4.09 (3.12-5.43)	4.62 (3.46-6.30)	5.21 (3.80-7.44)	5.94 (4.04-8.57)	7.08 (4.62-10.6)	8.07 (5.15-12.3)
12-hr	2.29 (1.83-2.83)	2.79 (2.23-3.46)	3.61 (2.88-4.49)	4.29 (3.40-5.36)	5.23 (4.01-6.89)	5.92 (4.45-8.01)	6.67 (4.89-9.45)	7.60 (5.19-10.9)	9.05 (5.93-13.5)	10.3 (6.59-15.6)
24-hr	2.72 (2.19-3.34)	3.35 (2.70-4.12)	4.39 (3.52-5.41)	5.24 (4.18-6.51)	6.43 (4.96-8.43)	7.29 (5.53-9.82)	8.25 (6.09-11.6)	9.44 (6.47-13.4)	11.3 (7.43-16.7)	12.9 (8.30-19.5)
2-day	3.03 (2.46-3.69)	3.79 (3.08-4.63)	5.04 (4.07-6.18)	6.08 (4.88-7.50)	7.51 (5.85-9.81)	8.55 (6.53-11.5)	9.71 (7.24-13.7)	11.2 (7.70-15.8)	13.6 (8.96-19.9)	15.7 (10.1-23.5)
3-day	3.28 (2.68-3.98)	4.10 (3.34-4.98)	5.43 (4.41-6.63)	6.54 (5.27-8.03)	8.07 (6.31-10.5)	9.18 (7.04-12.3)	10.4 (7.80-14.6)	12.0 (8.29-16.9)	14.6 (9.64-21.3)	16.9 (10.9-25.1)
4-day	3.53 (2.88-4.27)	4.37 (3.57-5.30)	5.75 (4.68-7.00)	6.90 (5.58-8.44)	8.48 (6.64-11.0)	9.63 (7.40-12.8)	10.9 (8.17-15.3)	12.6 (8.67-17.6)	15.2 (10.0-22.1)	17.5 (11.3-26.0)
7-day	4.23 (3.48-5.09)	5.12 (4.21-6.17)	6.58 (5.38-7.95)	7.78 (6.33-9.47)	9.45 (7.43-12.1)	10.7 (8.22-14.1)	12.0 (9.00-16.6)	13.7 (9.50-19.1)	16.3 (10.8-23.6)	18.6 (12.0-27.5)
10-day	4.91 (4.05-5.88)	5.83 (4.81-7.00)	7.33 (6.02-8.84)	8.58 (7.00-10.4)	10.3 (8.12-13.1)	11.6 (8.92-15.2)	12.9 (9.68-17.7)	14.6 (10.2-20.3)	17.2 (11.4-24.8)	19.4 (12.6-28.6)
20-day	6.92 (5.76-8.24)	7.91 (6.57-9.43)	9.52 (7.88-11.4)	10.9 (8.93-13.1)	12.7 (10.1-16.0)	14.1 (10.9-18.2)	15.6 (11.6-20.8)	17.2 (12.0-23.7)	19.5 (13.1-27.9)	21.4 (13.9-31.3)
30-day	8.57 (7.16-10.2)	9.60 (8.01-11.4)	11.3 (9.39-13.5)	12.7 (10.5-15.2)	14.6 (11.6-18.3)	16.1 (12.4-20.5)	17.6 (13.0-23.3)	19.2 (13.5-26.2)	21.3 (14.3-30.3)	22.9 (14.9-33.4)
45-day	10.6 (8.90-12.5)	11.7 (9.79-13.8)	13.4 (11.2-15.9)	14.9 (12.4-17.8)	16.9 (13.4-21.0)	18.5 (14.3-23.4)	20.0 (14.8-26.1)	21.5 (15.2-29.3)	23.3 (15.7-33.1)	24.7 (16.1-35.8)
60-day	12.3 (10.3-14.4)	13.4 (11.3-15.8)	15.2 (12.7-18.0)	16.7 (13.9-19.9)	18.8 (15.0-23.1)	20.4 (15.8-25.7)	22.0 (16.2-28.5)	23.3 (16.5-31.7)	25.0 (16.9-35.3)	26.1 (17.1-37.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

APPENDIX G: OPERATION AND MAINTENANCE

- *STORMWATER OPERATION AND MAINTENANCE PLAN*
- *INSPECTION REPORT*
- *INSPECTION AND MAINTENANCE LOG FORM*
- *LONG-TERM POLLUTION PREVENTION PLAN*
- *ILLICIT DISCHARGE STATEMENT*
- *SPILL PREVENTION*

STORMWATER OPERATION AND MAINTENANCE PLAN

McDonald's
225 Pond Street
Ashland, MA 01721

RESPONSIBLE PARTY DURING CONSTRUCTION:

McDonald's USA, LLC
110 North Carpenter Street
Chicago, IL 60607

RESPONSIBLE PARTY POST CONSTRUCTION:

McDonald's USA, LLC
110 North Carpenter Street
Chicago, IL 60607

Construction Phase

During the construction phase, all erosion control devices and measures shall be maintained in accordance with the final record plans, local/state approvals and conditions, the EPA Construction General Permit and the Stormwater Pollution Prevention Plan (SWPPP) if applicable. Additionally, the maintenance of all erosion / siltation control measures during construction shall be the responsibility of the general contractor. Contact information of the OWNER and CONTRACTOR shall be listed in the SWPPP for this site. The SWPPP also includes information regarding construction period allowable and illicit discharges, housekeeping and emergency response procedures. Upon proper notice to the property owner, the Town or its authorized designee shall be allowed to enter the property at a reasonable time and in a reasonable manner for the purposes of inspection.

Post Development Controls

Once construction is completed, the post development stormwater controls are to be operated and maintained in compliance with the following permanent procedures (note that the continued implementation of these procedures shall be the responsibility of the Owner or its assignee):

1. Parking lots and on-site driveways: Sweep at least two (2) times per year and on a more frequent basis depending on sanding operations. All resulting sweepings shall be collected and properly disposed of off site in accordance with MADEP and other applicable requirements.

   Approximate Maintenance Budget: $1000/year

2. Leaching Catch Basins: Inspect two (2) times per year and at the end of foliage and snow-removal seasons. These features shall be cleaned two (2) times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the structure to the grate. Accumulated sediment and hydrocarbons present

must be removed and properly disposed of off site in accordance with MADEP and other applicable requirements.

Approximate Maintenance Budget: $500/year per structure.

All components of the stormwater system will be accessible by the owner or their assignee.

STORMWATER MANAGEMENT SYSTEM

POST-CONSTRUCTION INSPECTION REPORT

LOCATION:

McDonald's
225 Pond Street
Ashland, MA 01721

RESPONSIBLE PARTY:

McDonald's USA, LLC
110 North Carpenter Street
Chicago, IL 60607

NAME OF INSPECTOR:	INSPECTION DATE:
Note Condition of the Following (sediment depth, debris, standing water, damage, etc.):	
Leaching Catch Basins:	
Other:	
Other:	
Other:	
Other:	

Note Recommended Actions to be taken on the Following (sediment and/or debris removal, repairs, etc.):
Leaching Catch Basins:
Other:
Other:
Other:
Other:
Other:
Comments:

STORMWATER INSPECTION AND MAINTENANCE LOG FORM			
McDonald’s USA, LLC ***225 Pond Street – Ashland , MA***			
Stormwater Management Practice	Responsible Party	Date	Maintenance Activity Performed

LONG-TERM POLLUTION PREVENTION PLAN

McDonald's
225 Pond Street
Ashland, MA 01721

RESPONSIBLE PARTY DURING CONSTRUCTION:

McDonald's USA, LLC
110 North Carpenter Street
Chicago, IL 60607

RESPONSIBLE PARTY POST CONSTRUCTION:

McDonald's USA, LLC
110 North Carpenter Street
Chicago, IL 60607

For this site, the Long-Term Pollution Prevention Plan will consist of the following:

- No outdoor maintenance or washing of vehicles allowed.
- The property owner shall be responsible for "good housekeeping" including proper periodic maintenance of building and pavement areas, curbing, landscaping, etc.
- Proper storage and removal of solid waste (dumpsters).
- Sweeping of driveways a minimum of twice per year with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
- Regular inspections and maintenance of Stormwater Management System as noted in the "O&M Plan".
- Snow removal shall be the responsibility of the property owner. Snow shall not be plowed, dumped and/or placed in forebays, infiltration basins or similar stormwater controls. Salting and/or sanding of pavement / walkway areas during winter conditions shall only be done in accordance with all state/local requirements and approvals.
- In no case shall snow be disposed of or stored in resource areas (wetlands, floodplain, streams or other water bodies).
- In no case shall snow be disposed of or stored in the detention basins, infiltration basins or bioretention areas.

- If necessary, stockpiled snow will be removed from the Site and disposed of at an off-site location in accordance with all local, state and federal regulations.

- The amount of sand and deicing chemicals shall be kept at the minimum amount required to provide safe pedestrian and vehicle travel.

- Sand and deicing chemicals should be stockpiled under covered storage facilities that prevent precipitation and adjacent runoff from coming in contact with the deicing materials. Stockpile areas shall be located outside resource areas.

- The primary agents used for deicing at parking lots, sidewalks and the access roads shall consist of salt alternatives such as calcium carbonate (CaCO3) or potassium chloride (KCl) or sodium chloride.

ILLICIT DISCHARGE STATEMENT

Certain types of non-stormwater discharges are allowed under the U.S. Environmental Protection Agency Construction General Permit. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures which have been outlined previously in this LTPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place. Any existing illicit discharges, if discovered during the course of the work, will be reported to MassDEP and the local DPW, as applicable, to be addressed in accordance with their respective policies. No illicit discharges will be allowed in conjunction with the proposed improvements.

Duly Acknowledged:

_____

Name & Title

SPILL PREVENTION AND RESPONSE PROCEDURES (POST CONSTRUCTION)

In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil or come into contact with stormwater, the following steps will be implemented:

1. All Hazardous Substances or Oil (such as pesticides, petroleum products, fertilizers, detergents, acids, paints, paint solvents, cleaning solvents, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.

2. The minimum practical quantity of all such materials will be kept on site.

3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided on site.

4. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

5. It is the OWNER's responsibility to ensure that all Hazardous Waste on site is disposed of properly by a licensed hazardous material disposal company. The OWNER is responsible for not exceeding Hazardous Waste storage requirements mandated by the EPA or state and local authorities.

In the event of a spill of Hazardous Substances or Oil, the following procedures should be followed:

1. All measures should be taken to contain and abate the spill and to prevent the discharge of the Hazardous Substance or Oil to stormwater or off-site. (The spill area should be kept well ventilated and personnel should wear appropriate protective clothing to prevent injury from contact with the Hazardous Substances.)

2. For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.

3. For spills greater than five (5) gallons of material immediately contact the MADEP at the toll-free 24-hour statewide emergency number: **1-888-304-1133**, the local fire department (**9-1-1**) and an approved emergency response contractor. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill to the emergency response contractor or coordinator, and proceed with prevention, containment and/or clean-up if so desired. (Use the form provided, or similar).

4. If there is a Reportable Quantity (RQ) release, then the National Response Center should be notified immediately at (800) 424-8802; within 14 days a report should be submitted to the EPA regional office describing the release, the date and circumstances of the release and the steps taken to prevent another release. This Pollution Prevention Plan should be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

SPILL PREVENTION CONTROL AND COUNTERMEASURE FORM

McDonald's
225 Pond Street
Ashland, MA 01721

Where a release containing a hazardous substance occurs, the following steps shall be taken by the facility manager and/or supervisor:

1. Immediately notify The Taunton Fire Department (at **9-1-1**)

2. All measures must be taken to contain and abate the spill and to prevent the discharge of the pollutant(s) to off-site locations, receiving waters, wetlands and/or resource areas.

3. Notify the Taunton Health Department at (978) 264-9634 and the Taunton Conservation Commission at (978) 929-6634.

4. Provide documentation from licensed contractor showing disposal and cleanup procedures were completed as well as details on chemicals that were spilled to the Town of Ashland Health Department and Conservation Commission.

Date of spill:_____ Time:_____ Reported By:_____

Weather Conditions:_____

Material Spilled	**Location of Spill**	**Approximate Quantity of Spill (in gallons)**	**Agency(s) Notified**	**Date of Notification**

Cause of Spill:_____

_____

Measures Taken to Clean up Spill:_____

_____

Type of equipment: _____ Make: _____ Size:_____

License or S/N: _____

Location and Method of Disposal_____

_____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring:_____

_____

Additional Contact Numbers:

- DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) EMERGENCY PHONE: 1-888-304-1133
- NATIONAL RESPONSE CENTER PHONE: (800) 424-8802
- U.S. ENVIRONMENTAL PROTECTION AGENCYPHONE: (888) 372-7341