

MALLARD LANE

South Bolton Road
Bolton, MA 01740

COMPREHENSIVE PERMIT APPLICATION

(11 Units of Homeownership Housing)

SUBMITTED TO:

Zoning Board of Appeals
June 2021

SUBMITTED BY:

Northeast Classic Builders
P.O. Box #155
Bolton, MA 01740
(774) 696-2246

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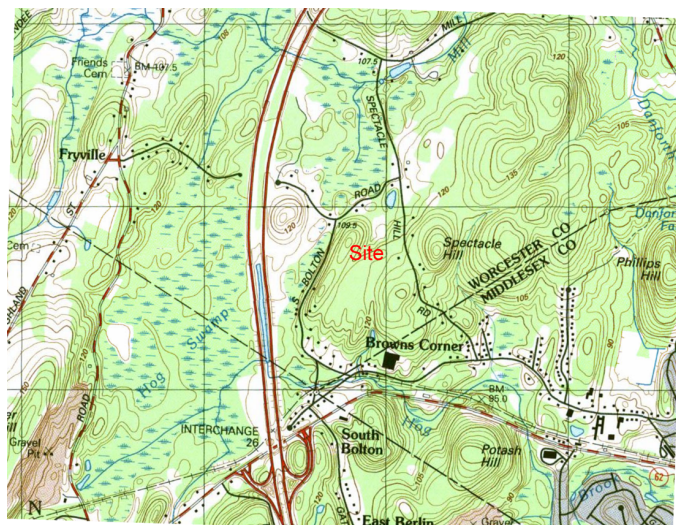
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1. OVERVIEW

Mallard Lane is a proposed residential development on approximately 4.7 acres of land located on South Bolton Road in Bolton. The 4.7 acre parcel is currently a vacant field with wooded along the perimeter. Mallard Lane will consist of 11 detached single family homes. These units will consist of two (2) bedrooms, two and a half (2 1/2) bathrooms, and a two (2) car garage.

Massachusetts General Law Chapter 40B requires that a minimum of 25% of the units be made affordable to families whose income is at or below 80% of the median family income, adjusted for household size for the United States Department of Housing and Urban Development (HUD) Fair Market (FMR) Area, as determined by the Massachusetts Department of Housing and Community Development (DHCD). In conformance with the MGL Chapter 40B the development will contain three (3) affordable units.

Figure 1 - Locus Map



MassHousing

A copy of MassHousing's corporate information is provided as Exhibit A. The program, administered by MassHousing and funded through the New England Fund ("NEF") program of the Federal Home Loan Bank of Boston, is the lending program for the development. The program overview is included as Exhibit B.

MassHousing will serve as the project administrator. A copy of the project eligibility application is attached as Exhibit C. MassHousing granted a Project Eligibility (Site

Approval) Letter dated 7/2/2019. A copy of the Project Eligibility Letter is attached as Exhibit D.

Application of the Program requirements to the development is proposed as follows:

- A. The Applicant will offer a minimum of 25% of the units for sale to households earning n more than 80% of the area median income. Adjusted for household size, as published by HUD. The most recent HUD income limits indicate that 80% of the current median family income for a 4-person household for Bolton is \$71,900.00.
- B. An Affordable housing Restriction ensuring the units remain affordable to future buyers in perpetuity will govern the affordable units. See exhibit E for the affordable Housing Restriction.
- C. The Applicant is a limited dividend organization and has agreed to limit the profit on the development in conformance with the regulations. A copy of the projected ProForma is attached hereto as Exhibit F.
- D. The Applicant will comply with the Land Value Policy described in section IV (B) (1) of the Comprehensive Permit Guidelines issued by the DHCD and, if applicable, MassHousing's Acquisition Value Policy. The maximum permissible acquisition value that can be included in the Development Budget approved at Final Approval and at the time of Cost Examination/Cost Certification, for limited dividend purposes is the "As Is" value (determined by the MassHousing commissioned independent appraisal) of \$355,000.00 plus reasonable and verifiable carrying costs (where permitted by the Guidelines) from the date if the Site Approval application.
- E. The Applicant will enter into a Regulatory Agreement with MassHousing in the form for the applicable program, ensuring compliance with the requirements of the Comprehensive Permit Rules and the Program. The legal description of the site attached to the Regulatory Agreement will be recordable. See Exhibit G for the Regulatory Agreement.
- F. In order to satisfy the Program requirements, financing for the Development will originate from the subsidizing lender currently proposed to be Clinton Savings Bank, which is a member of the Federal Home Loan Bank of Boston (FHLBB). A minimum of 25% of the construction costs will be obtained from the NEF Program. Evidence of form commitment for financing for the Development will be provided during the request to MassHousing for Final Approval. The Regulatory Agreement will provide that any transfer of all or a portion of the NEF lender's interest construction financing will be subject to the approval of the Subsidizing Agency.

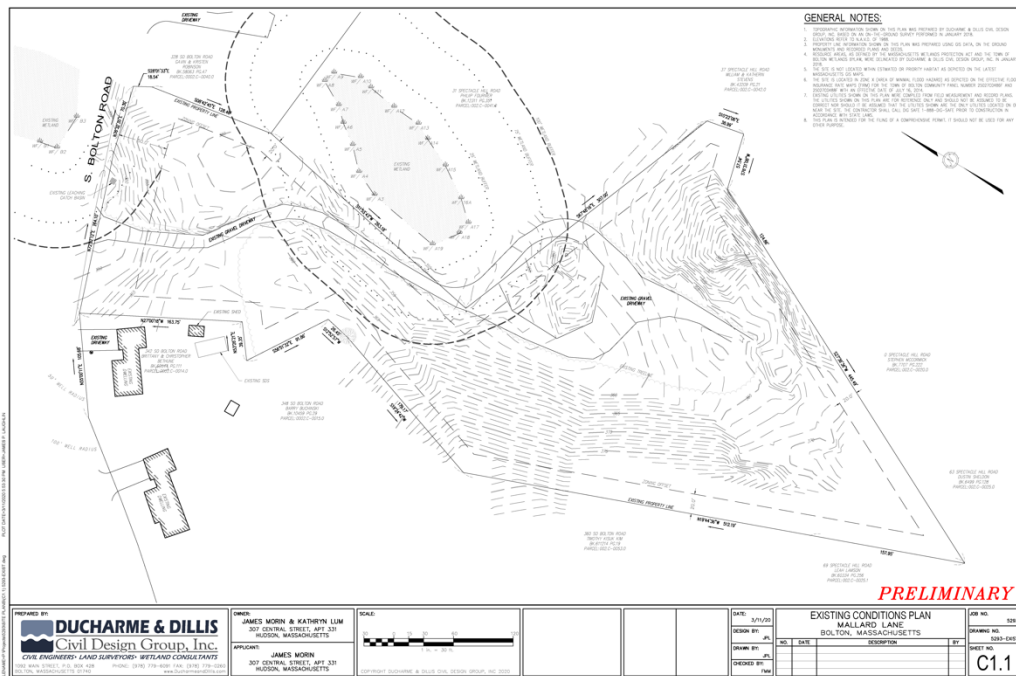
- G. The development will comply with the Commonwealth's Sustainable Development Principles embraced by DHCD.

2. THE PREMISES

Existing Conditions

The project site is located on South Bolton Road between Wheeler Road and Spectacle Hill Road. The parcel is mapped as Bolton Tax Map 2C, Parcel 15.1. The existing lot is approximately 4.7 acres and undeveloped. The Parcel is also home to a mix of hardwoods and pines natural to the local ecosystem. Additionally, as noted on the plan there is a wetland area located on the adjacent parcel, but most of the proposed development will be outside the 100-foot wetland buffer.

Figure-2 Existing Conditions



The Natural Resources Conservation Service (NRCS) soil survey of Worcester County, Massachusetts describes 79.9% of soils in the proposed Development as Pits, gravel. Additionally Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes, can be found in about 9.9% of the lot. This leaves the remaining approximate 10% to be made up of both Hinckley loamy sand, 25 to 35 percent slopes, and Canton fine sandy loam, 0 to 8 percent slopes, very stony, respectfully. A more detailed map of the soils, and definitions for the

soils and their areas can be found in Exhibit H. Deep hole and percolation tests, along with soil testing conducted on the site for purposes of designing a subsurface sewage disposal system confirm this soil classification.

Subsurface testing was performed on the site under the supervision of the Bolton Board of Health August 2020. The tests were performed to determine the suitability of the soil for and onsite sewage disposal system. The tests revealed that the soils consist of medium loamy sandy soils, with a maximum percolation of 2 minutes per inch. Groundwater was observed at 120 inches below grade in the location of the testing.

A plan showing the existing site conditions and the surrounding areas is included in the site Plans. See Exhibit I for Site Plans.

Existing Resource Areas

As noted above the, the parcel borders conservation land within a 100-foot buffer. The conservation land consists of wetland resource areas as defined and regulated by the Wetland Protection Act (WPA) 310 CMR 10.00 and the Bolton Wetland Bylaw.

3. THE DEVELOPMENT

The proposed Development will be accessed by the construction of an approximate 700 foot private way (Mallard Lane) and cul-de-sac for eleven (11) age restricted single story two bedroom homes. The homes will be approximately 2,000 SF, have two and a half (2 1/2) baths, a two (2) car garage, truss roofs, forced hot air heat (propane / natural gas), central air conditioning, resilient flooring, high efficiency appliances, energy efficient double hung windows, Hardie siding and paved driveways. There will be a shared private well and three shared septic systems.

Three out of the 11 units will be sold at below market rate (affordable) and the remaining 8 will be sold at the market rate. The homes will be designed with no interior load bearing walls, in order to allow for easier renovations if health care issues or a change in preference arise. Additionally, the homes will have energy efficient appliances, heating systems, windows and doors. Steps throughout the homes will be kept to a minimum to allow easier access. Each home will have architectural siding and trim that matches that of the existing abutters as explained above to give the entire community a cohesive neighborhood feel. Finally, the landscaping that is planned will provide views of the natural woodland areas

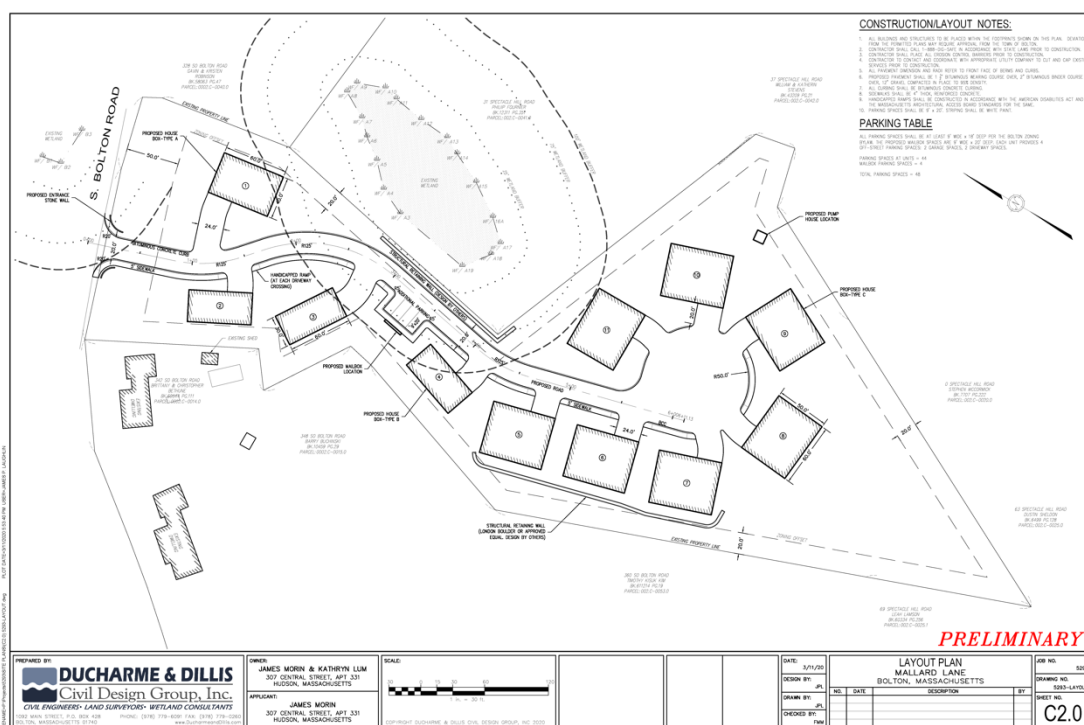


Figure-4 Architectural Drawings

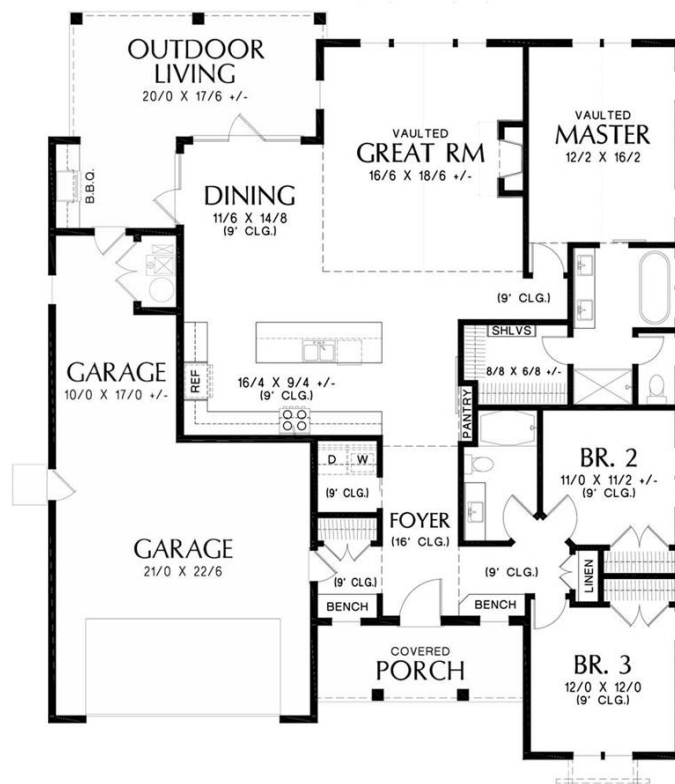
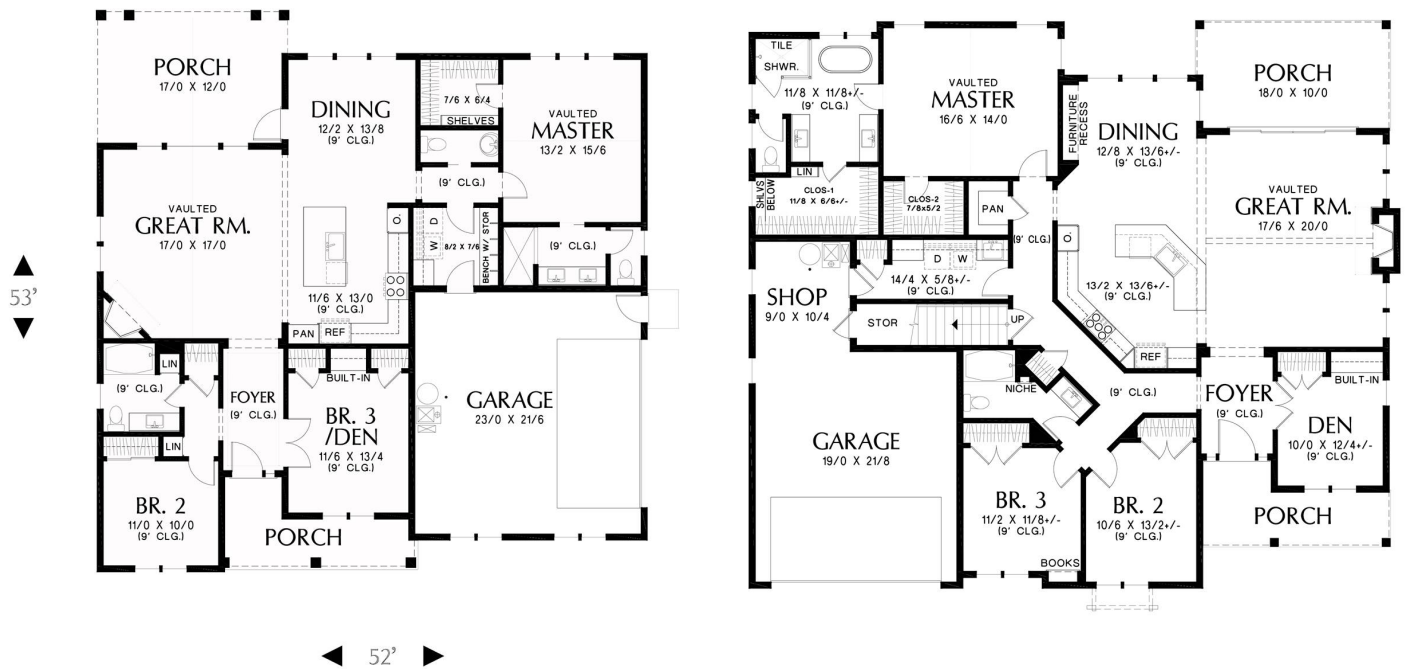


Figure-5 Open Space Summary

	PROPOSED
BUILDING AREA	24,568 SF (12%)
PAVEMENT AREA	20,473 SF (10%)
TOTAL LOT COVERAGE (BUILDING & PAVEMENT)	45,041 SF (22%)
OPEN SPACE	159,691 SF (78%)
TOTAL AREA	204,732 SF (100%)

The Development has been designed to encourage the preservation of open land and develop housing for low to median income families. With this development, 78% of the tract would be preserved as open space and 25% of the housing would be made available for low to median income families. The development has also been designed to be set back from South Bolton Road providing a buffer between units and the road.

Figure-6 Zoning Summary

TABULAR ZONING ANALYSIS

	EXISTING ZONNING REQUIREMENTS	PROPOSED
250-13 B. MINIMUM LOT AREA	80,000 SF	LESS THAN 80,000 SF
250-13 B. MINIMUM LOT FRONTAGE	200 FT	LESS THAN 200 FT
250-13 B. MINIMUM FRONT SETBACK	50 FT	50 FT
250-13 B. MINIMUM SIDE SETBACK	20 FT	10 FT
250-13 B. MINIMUM REAR SETBACK	20 FT	20 FT
250-13 B. ,MINIMUM OTHER YARDS – INTERIOR SIDELINE SETBACK		3 FT
250-13 B. MINIMUM LOT WIDTH FOR 100 FEET BACK FROM STREET LINE	150 FT	NOT TO APPLY LOTS 2 & 3
250-13 C. UNITS PER LOT	1	GREATER THAN 1
250-17 – DRIVEWAY & PARKING		SPECIAL PERMIT FOR A SHARED DRIVEWAY TO ACCESS 11 DWELLINGS ON 3 LOTS
250-13 G. LOT SHAPE FACTOR	GREATER THAN 0.5	LESS THAN 0.5

A. Utilities

Water

Water will be supplied to the development by separate wells for each unit, all ordinances and by-laws (except as waived by the Zoning Board of Appeals) will be met.

Electric/Telephone/Cable

Electric, telephone and cable exist on South Bolton Road and will be extended into the Development with no adverse impact on existing service anticipated.

Sanitary Waste

Each home will be serviced by a shred subsurface sewage disposal system, which has been designed in accordance with Massachusetts 310 CMR 15.000. The individual homes have been sized to meet or exceed the nitrogen loading requirements specified in 310 CMR 15.214.

B. Construction

It is estimated that construction would commence within 90 days of the final approvals and would take 24 months to complete. The Development sequence would include building the infrastructure (pavement, utilities, drainage, and grading) first and then constructing the individual units. The market rate units would be sold as they are completed, and the affordable units would be sold in accordance with the DHCD guidelines.

4. NARRATIVE STATEMENT OF DEVELOPMENT IMPACTS

General

A. Traffic/Access

The proposed Development will be accessed from a new 24-foot-wide private drive off South Bolton Road. The private drive will provide access for all units from South Bolton Road and will remain privately owned by the future Homeowner's Association. The access drive will be approximately 600 feet long and will terminate in a cul-de-sac sized to allow emergency vehicles and homeowners to turn around safely.

Visibility off of the private drive onto South Bolton Road is excellent and the drive provides for 20-foot radius rounding's at the road intersection.

The net increase in traffic on South Bolton Road will be generated by the 11 additional homes in the development. Based on the Institute of Transportation Engineers Trip Generation 7th Edition manual, the average trips per day per dwelling unit is 5.86. Therefore, a total of 65 vehicle trips per day are expected because of this development. Given characteristics of South Bolton Road, this increase in traffic is not significant and will not result in any decreased level of service.

B. Historical

No historic structures or resources are proposed to be impacted with the proposed Development.

C. Open Space

This Development has been designed to encourage the preservation of open land and development housing for low to median income families. With this Development, 78% of the tract would be open space. A portion of the open space will provide a buffer to the homes from South Bolton Road.

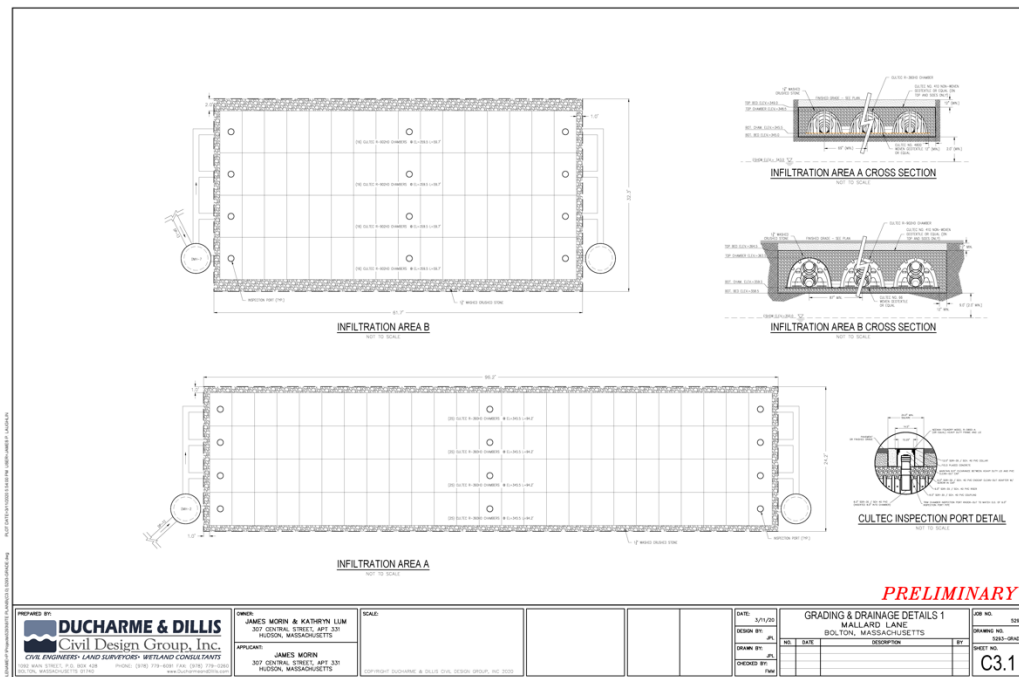
A tabulation of proposed buildings and summary of land use percentages is shown in Figures 5 and 6 above.

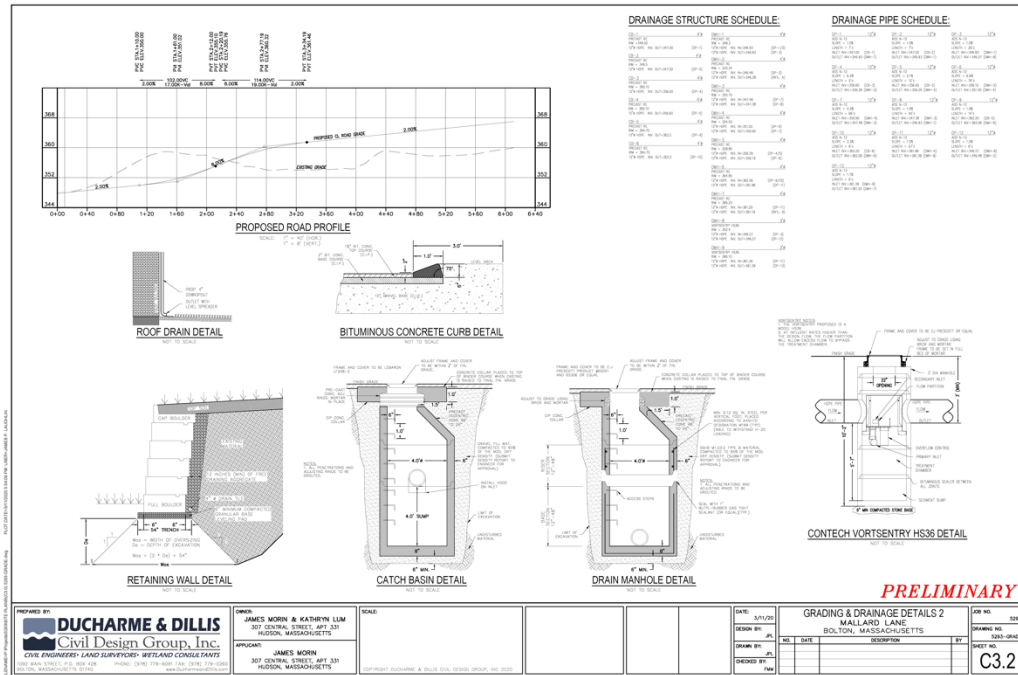
D. Wetlands

The project will not result in the filing of bordering vegetated wetlands. However, the Development will require the filing of a Notice of Intent with the Bolton Conservation Commission under the Massachusetts Wetland Protection Act.

E. Stormwater

Figure-9 Cultec Subsurface Infiltration System

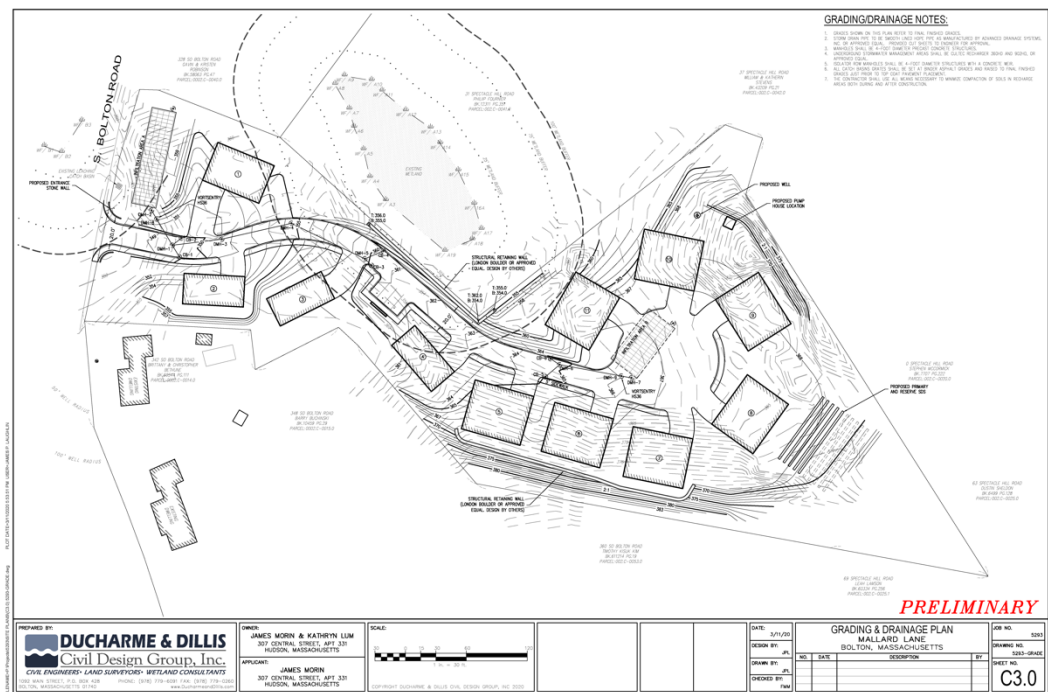




Stormwater management for this Development has been designed in compliance with the Stormwater Management Standards as outlined in 310 CMR 10.05(6)(k) through (q) and defined in detail in the DEP's Stormwater Management Handbook. The system incorporates Best Management Practices (BMPs). The Development has been designed to minimize impacts on nearby resource areas from both the construction and post-construction activities of the proposed Development. See Exhibit N for Drainage Calculations.

A closed drainage system would collect stormwater runoff from the site and discharge portions of it to a subsurface infiltration system. The drainage system will provide water quality treatment, recharge, and infiltration of runoff generated from paved areas. The drainage system has been designed to treat rainfall events up to and including the 100-year storm event. The runoff from the site Development will be collected in a catch basin and manhole system, and discharged to two (2) subsurface infiltration areas. One of the systems will be located within the paved turnaround with the other being located near the entrance to the Development. The configuration of these system can be seen in the figure below. The system will provide pretreatment and result in no adverse impact to the resource areas. A narrative of the drainage design is attached, and full storm water drainage reports have been submitted along with this application (Exhibit K).

Figure 10- Infiltration System Configuration



Municipal Services

A. Public Safety

The Development will be serviced by the Bolton Police and Fire Departments. The Development team has already met with the Fire Department to address any safety concerns that they may have. As a result of these meetings, we have provided a larger turn around to accommodate for the fire apparatus. We have also agreed to provide each home with the appropriate fire suppression system according to the fire department.

B. School

According to the 2003 “Housing the Commonwealth’s School-Age Children” study prepared for Citizens’ Housing and Planning Association (CHAPA) by Community Opportunity Groups, Inc., new multi-family developments with two-bedroom units always generate enough revenue to pay for services used by their residents, often generating surplus revenue.

Accordingly, given the age restriction of this development there would be no impact on the Town of Bolton's public-school system.

Construction Impacts

A. Noise

As designed, the proposed Development will not result in or generate any excessive amount of noise during the construction process. The Development will be regulated during construction by final permit conditions that limit construction access and noise pollution.

B. Dust

As designed, the proposed Development will not result in or generate any excessive amount of dust during the construction process. The Development will be regulated during construction by final permit conditions that limit construction access and dust pollution.

C. Erosion/Siltation

To help control runoff during construction, erosion and sediment control measures have been provided. Additionally, a storm water management system maintenance schedule will be provided for use during and after construction. The proposed Development has been designed in accordance with the DEP Stormwater Management Handbook. All drainage calculations and a more detailed description of the proposed stormwater management system are included in the Stormwater Management Report.

D. Potential Releases

The Developer will be required to adhere to all State and local safety standards during construction.

5. OWNER/ APPLICANT

The Owners of the property are James J. Morin & Kathryn M. Lumb, P.O. Box #155 Bolton, MA 01740. A copy of the deed for the property is attached as Exhibit M.

The Applicant is Northeast Classic Builders, LLC, P.O. Box #155 Bolton, MA 01740. Information regarding the applicant is attached hereto as Exhibit N.

6. DEVELOPMENT FINANCING

As previously discussed, the Development will be funded through the Federal Home Loan Bank of Boston's New England Fund Program with MassHousing as Project Administrator or any appropriate funding source.

7. SUMMARY

The proposed Development of Mallard Lane will help increase the Town of Bolton's affordable housing inventory and to help the town reach their 10% goal of affordable housing. The developer is committed to working with the Town to create a Development that is consistent with the character of the Town of Bolton.

Please see Exhibit O for Abutter's List and Exhibit P for breakdown of filing fees.

Exhibit A

MassHousing Corporate Information



search:

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Our Mission, Values and Leadership Model

MassHousing will confront the housing challenges facing the Commonwealth to improve the lives of its people.

MassHousing will achieve its mission and its business goals through

Investment in staff development and continuous organizational improvement;

Innovation and agility in the delivery of responsible lending products, housing opportunities and services; and

An intense focus on the needs of our customers and the people and communities we serve.

Our Values

The following Values guide the culture of MassHousing into the future:

Integrity

Excellence

Collaboration

Respect

Accountability

Service

Our Leadership Model

MassHousing is committed to fostering an entrepreneurial mindset that focuses on investing in our people, innovation, strategic decision-making and risk management. Our active management model helps us

Mobilize our teams in Pursuit of the Agency's Vision

Expect and inspire Excellence throughout our organization

Create a Learning Culture that is data driven

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Equal Housing Lender

Exhibit B

Program Overview



home: about masshousing : agency backgrounder

Agency Backgrounder

MassHousing is an independent public authority that provides financing for the construction and preservation of affordable rental housing, and for affordable first and second mortgages for homebuyers and homeowners.

How We Finance Affordable Housing Loans

MassHousing was created to be self-sustaining. We do not use taxpayer dollars to fund our programs, but sell bonds on Wall Street to raise capital. We then use the proceeds from the bond sales to lend to eligible borrowers at affordable rates and terms. Investors in MassHousing bonds receive a return on their investment that is supported by the monthly mortgage payments made by our borrowers.

Our Business Structure

MassHousing's organization allows the Agency to quickly respond to changes and opportunities in the marketplace and to the needs of our many customers.

Home Ownership

Our homeownership mission is twofold: to provide people with modest incomes with access to affordable mortgage loans and to make sure they can afford their loan for the long-term. MassHousing makes only fixed rate loans, with no adjustable rates, hidden fees or other surprises. Borrowers must fully document their employment and income, must have good credit and in most cases must receive homebuyer counseling. Buyers must meet other program requirements including income limits.

MassHousing is a wholesale, not a retail lender. We do not operate branch offices nor do we employ loan officers. Instead, we contract with more than 150 local lenders across Massachusetts to "originate" our loans. These lenders work with homebuyers all the way through the mortgage origination process. Once a borrower has been approved for a MassHousing loan, MassHousing purchases the loan from the lender and borrowers make their monthly payments to MassHousing.

MassHousing also provides affordable second mortgage loans to help people remove lead paint, upgrade septic systems or make general, non-luxury improvements that will keep the home well-maintained.

We are committed to helping our borrowers stay in their homes for as long as possible. Through our in-house servicing staff, we patiently work with borrowers who may have difficulty keeping up with their monthly payments, making every effort to help these homeowners develop alternative payment plans in order to avoid missing payments or going into foreclosure. We pride ourselves on the fact that our delinquency and foreclosure rates are consistently lower than those of conventional lenders.

Learn more at www.masshousing.com/homeownership.

Rental Housing Programs

MassHousing's second core mission is to provide financing for affordable rental housing. To accomplish this, MassHousing sells bonds and lends money to real estate developers who agree to build apartments where at least 20% of the units are affordable to lower-income residents. We also make refinancing loans to the owners of existing apartment communities who agree to keep their affordable units affordable for the long term. Thus, private developers and apartment owners have an incentive to build and maintain affordable rental housing: in exchange for keeping certain units affordable, borrowers receive below-market interest rates.

Multifamily housing developers and owners come to MassHousing for a variety of financing needs, such as construction loans, bridge loans, low-income housing tax credits and permanent financing with low interest rates and loan terms of up to 40-years. MassHousing staff has decades of experience with all kinds of state and federal subsidy programs and the regulations that govern subsidized housing. This allows us to structure loans to serve nearly every conceivable property type in every region of Massachusetts.

Our goal is to finance well-built, attractive rental housing that serves the local community. In the underwriting process, we thoroughly examine the proposed site and design of the housing, the creditworthiness and experience of the developer/borrower, and the feasibility and long-term sustainability of the project. We require developers of new housing to incorporate environmentally sound "green" technologies.

For existing rental communities with affordable units, we work with borrowers to develop creative refinancing options that preserve long-term affordability for residents and also provide funding for upgrades to the properties.

MassHousing takes a proactive approach to overseeing its rental housing portfolio, which includes more than 100,000 apartments. Our staff conducts thorough annual reviews of the physical and financial condition of each of the more than 500 MassHousing-financed rental housing developments. We also

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oversee millions of dollars of state and federal subsidies that support these apartments. The goal of this extensive oversight is to ensure that these properties remain viable and well-maintained for the long-term.

Unlike other commercial lenders, we take a proactive approach to fostering strong communities among the people who live in the housing we finance. We facilitate educational programs and activities for residents. We also offer a wealth of trainings, workshops and conferences for the property managers that handle the day-to-day operations.

Learn more at www.masshousingrental.com.

Planning & Programs/Chapter 40B

MassHousing is one of several state entities authorized to provide site approval/project eligibility, final approval and cost certification for both rental and homeownership housing proposals made under Chapter 40B, the state's affordable housing law. We work with developers, town residents and municipal officials to make certain that all opinions are heard and to encourage new housing that best serves the community. It should be noted that MassHousing does not finance every housing development for which it provides initial approval. Developers often secure financing from other sources for these projects.

Our Commitment to Minority- and Women-Owned Businesses

MassHousing is committed to increasing economic opportunities for minority- and women-owned businesses (MBEs and WBEs) in Massachusetts. We work with housing developers, general contractors and property managers to set goals for utilizing MBEs and WBEs at the properties we finance and oversee. We also help MBEs and WBEs access contracts and subcontracts through an online directory of businesses and open contracts. Additionally, we sponsor trade fairs and mentoring programs, promote equal access to housing and foster our own hiring and procurement practices that facilitate opportunities for minorities and women. Learn more about the work of our [Diversity & Inclusion Division](#).

Nondiscrimination Statement

MassHousing does not discriminate on the basis of race, color, religion, sex, national origin, ancestry, sexual orientation, gender identity, age, familial status, children, marital status, veteran status or membership in the armed services, the receiving of public assistance, or physical or mental disability in the access or admission to its programs or employment, or in its programs' activities, functions or services. The following persons are responsible for coordinating compliance with applicable nondiscrimination requirements:

Myra Carmona, Vice President of Talent & Culture

Colin McNiece, General Counsel

Andrea J. Laing, Director of Diversity & Inclusion

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Equal Housing Lender

Exhibit C

Project Eligibility Application

MALLARD LANE

South Bolton Road
Bolton, MA 01740

PROJECT ELIGIBILITY/ SITE APPROVAL

(11 Units of Homeownership Housing)

SUBMITTED TO:

MassHousing
JULY 2019

SUBMITTED BY:

Northeast Classic Builders
P.O. Box #155
Bolton, MA 01740
(774) 696-2246

Application Checklist

The documentation listed below must, where applicable, accompany each application. For detailed descriptions of these required documents, please see the relevant sections of the application form.

* Applications missing any of the documents indicated by an asterisk will not be processed by MassHousing until MassHousing receives the missing item(s).

- ☐ * Completed application form, and certification under pains and penalties of perjury (one (1) signed original) accompanied by one (1) electronic copy of the completed application package
- ☐ * Location Map
- ☐ Tax Map
- ☐ * Directions to the proposed Site
- ☐ * Existing Conditions Plan
- ☐ Aerial Photographs
- ☐ Site/Context Photographs
- ☐ * Documentation Regarding Site Characteristics/Constraints
- ☐ * By Right Site Plan, if applicable
- ☐ * Preliminary Site Layout Plan(s)
- ☐ * Graphic Representations of Project/Preliminary Architectural Plans
- ☐ * Narrative Description of Design Approach
- ☐ * Tabular Zoning Analysis
- ☐ Sustainable Development Principles Evaluation Assessment Form
- ☐ * Evidence of site control (*documents and any plans referenced therein*)
- ☐ Land Disposition Agreement, if applicable
- ☐ * NEF Lender Letter of Interest
- ☐ Market Sales Comparables
- ☐ Market Study, if required by MassHousing
- ☐ * Development Team Qualifications
- ☐ Applicant's Certification (*any required additional sheets*)
- ☐ Narrative describing prior contact (*if any*) with municipal officials
- ☐ * Evidence that a copy of the application package has been received by the Chief Elected Official in the municipality (*may follow after initial submission of application package, but site visit will not be scheduled nor request for municipal comments made until such evidence is received by MassHousing*)
- ☐ Copy of notification letter to DHCD
- ☐ *\$2,500 Fee payable to MassHousing (*once an appraiser has been selected by MassHousing and an appraisal fee quoted, an additional non-refundable appraisal fee will be required*)
- ☐ *Technical Assistance/Mediation Fee payable to Massachusetts Housing Partnership.



Comprehensive Permit Site Approval Application/Homeownership****

www.masshousing.com | www.masshousingrental.com

Comprehensive Permit Site Approval Application/Homeownership

Attached is the Massachusetts Housing Finance Agency ("MassHousing") application form for Project Eligibility/Site Approval ("Site Approval") under the state's comprehensive permit statute (M.G.L. c. 40B, Sections 20-23 enacted as Chapter 774 of the Acts of 1969) known as "Chapter 40B". Developers seeking a comprehensive permit to construct affordable housing under Chapter 40B and intending to use a MassHousing financing program or financing through the New England Fund ("NEF") program must receive Site Approval from MassHousing. This approval (also referred to as "project eligibility approval") is a required component of any comprehensive permit application to be submitted to the local Zoning Board of Appeals of the municipality in which the development is to be located.

As part of its review of your application, MassHousing will conduct an inspection of the site and will solicit comments from the relevant municipality. MassHousing will consider any relevant concerns that the municipality might have about the proposed project or the developer. The applicant is encouraged, therefore, to make contact with the municipality prior to submitting the Site Approval application in order to ensure that the applicant understands any concerns that the municipality may be likely to raise regarding the proposed development.

In order for a project to receive Site Approval, MassHousing must determine that (i) the applicant has sufficient legal control of the site, (ii) the applicant is a public agency, non-profit organization or limited dividend organization, and (iii) the applicant and the project are generally eligible under the requirements of the MassHousing program selected by the applicant, subject to final eligibility review and approval. Furthermore, MassHousing must determine that the site of the proposed project is generally appropriate for residential development (taking into consideration municipal actions previously taken to meet affordable housing needs) and that the conceptual project design is generally appropriate for the site. In order for MassHousing to be able to make these findings (required by 760 CMR 56.04 (4)), it is important that you answer all questions in the application and include all required attachments.

Please note that MassHousing requires that all applicants meet with a member of our 40B Department staff before submitting their application. Applications for any projects that have not been the subject of a required pre-application meeting will not be accepted or processed.

Upon completion of its analysis, MassHousing will either issue a Site Approval Letter that approves, conditionally approves or denies the application. If the application is approved, the applicant should apply to the Zoning Board of Appeals within two years from the date of the Site Approval Letter (unless MassHousing extends such term in writing).

Please note that Site Approval from MassHousing does not constitute a loan commitment by MassHousing or any other financing program. All potential MassHousing financing is subject to further review and underwriting by MassHousing's Rental Lending Department.

Please be sure you have familiarized yourself with all of the applicable requirements set forth in the Chapter 40B regulations and guidelines, which can be found at

<http://www.mass.gov/hed/economic/eohed/dhcd/legal/regs/760-cmr-56.html> and
www.mass.gov/hed/docs/dhcd/legal/comprehensivepermitguidelines.pdf.

Instructions for completing the Site Approval Application are included in the application form which is attached. The completed application form and all additional documentation should be sent, after your pre-application meeting has been held, to:

Gregory Watson, Manager of Comprehensive Permit Programs
MassHousing, One Beacon Street, Boston, MA 02108

We look forward to working with you on your proposed development. Please contact Gregory Watson at 617-854-1880 or gwatson@masshousing.com to discuss scheduling your pre-application meeting or if there is any assistance that we can provide in the meantime to make your application process a smooth and efficient one.

Our Commitment to You

MassHousing recognizes that applicants seek some measure of predictability regarding the timeframe for our processing of their applications. Our staff will endeavor to adhere to the following schedule for reviewing applications for site approval:

Within two (2) business days of receipt of your application (provided that you have attended a required pre-application meeting) a member of our staff will notify you of any of the items listed on the checklist at the end of the application form that were missing from your application package. Please note that our acknowledgement of receipt of an item does not indicate that any substantive review has yet taken place.

If your application package is missing any of the items indicated on the checklist by an asterisk, we will not be able to continue processing your application until such items are received.

If we have received the information which is crucial to the commencement of our review process, we will proceed to (i) give the municipality a period of thirty (30) days in which to submit comments relating to your proposal, (ii) schedule and conduct a site visit, and (iii) solicit bids for and commission and review an "as is" appraisal of your site.

If during our review of your application package we determine that additional information or clarification is needed, we will notify you as soon as possible. Depending on when we receive such additional information, this may affect the amount of time required for MassHousing to complete the site approval process.

Assuming that your application package was complete and that you respond in a timely manner to requests for additional information or clarification, we would expect to issue or deny your site approval within 60 days of our receipt of your application package.



**Application for Chapter 40B Project Eligibility/Site Approval
for MassHousing-Financed and New England Fund (“NEF”) Homeownership Projects**

Please be sure to answer ALL questions. Indicate “N/A”, “None” or “Same” when necessary.

Section 1: GENERAL INFORMATION (also see Required Attachments listed at end of Section 1)

Name of Proposed Project: _____

Municipality: _____

Address of Site: _____

Cross Street (if applicable): _____

Zip Code: _____

Tax Parcel I.D. Number(s) (Map/Block/Lot): _____

Name of Proposed Development Entity (typically a single purpose entity): _____

Entity Type: Limited Dividend Organization _____ Non-Profit* _____ Government Agency _____

** If the Proposed Development Entity is a Non-Profit, please contact MassHousing regarding additional documentation that must be submitted.*

Has this entity already been formed? Yes ___ No ___

Name of Applicant (typically the Proposed Development Entity or its controlling entity or individual): _____

Applicant's Web Address, if any: _____

Does the Applicant have an identity of interest with any other member of the development team or other party to the Proposed Project? Yes ___ No ___ If yes, please explain: _____

Primary Contact Information (required)

Name of Individual: _____

Relationship to Applicant: _____

Name of Company (if any): _____

Street Address: _____

City/Town/Zip: _____

Telephone (office and cell) and Email: _____

Secondary Contact Information (required)

Name of Individual: _____

Relationship to Applicant: _____

Name of Company (if any): _____

Street Address: _____

City/Town/Zip: _____

Telephone (office and cell) and Email: _____

Additional Contact Information *(optional)*

Name of Individual: _____

Relationship to Applicant: _____

Name of Company *(if any)*: _____

Street Address: _____

City/Town/Zip: _____

Telephone *(office and cell)* and Email: _____

Anticipated Financing: MassHousing ____ NEF Bank ____

Name of NEF Bank: _____

Total Number of Units ____ # Affordable Units ____ # Market Rate Units ____

Age Restricted? Yes ☐ No ☐ If Yes, 55+ ☐ or 62+ ☐

Brief Project Description (150 words or less):

Required Attachments Relating to Section 1

1.1 Location Map

Provide a USGS or other form of map clearly marked to show the site's location, and an approximate property boundary.

1.2 Tax Map

Provide a copy of municipal tax map (assessor's plan) with subject parcels and parcel ID #'s clearly identified.

1.3 Directions

Provide detailed written directions to the site, noting the entrance to the site, relevant boundaries and any prominent landmarks that can be used for identification purposes.

Application for Chapter 40B Project Eligibility/Site Approval for MassHousing-Financed and New England Fund (“NEF”) Homeownership Projects

Section 2: EXISTING CONDITIONS / SITE INFORMATION (also see Required Attachments listed at end of Section 2)

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that the site is generally appropriate for residential development.

Name of Proposed Project: _____

Buildable Area Calculations

Sq. Feet/Acres (enter “0” if applicable—do not leave blank)

Total Site Area	
Wetland Area	
Flood/Hazard Area	
Endangered Species Habitat (animal and/or plant)	
Conservation/Article 97 Land	
Protected Agricultural Land	
Other Non-Buildable (Describe)	
Total Non-Buildable Area	
Total Buildable Site Area	

Current use of the site and prior use if known:

Is the site located entirely within one municipality? Yes ____ No ____

If not, in what other municipality is the site located? _____

How much land is in each municipality? (the Existing Conditions Plan must show the municipal boundary lines) _____

Current zoning classification and principal permitted uses:

Previous Development Efforts

Please list (on the following page) any previous applications pertaining to construction on or development of the site, including (i) type of application (comprehensive permit, subdivision, special permit, etc.); (ii) application filing date; (iii) date of denial, approval or withdrawal. Also indicate the current Applicant’s role, if any, in the previous applications. Note that, pursuant to 760 CMR 56.03 (1), a decision of a Zoning Board of Appeals to deny a Comprehensive Permit, or (if the Statutory Minima defined at 760 CMR 56.03 (3) (b or c) have been satisfied) grant a Comprehensive Permit with conditions, shall be upheld if a related application has previously been received, as set forth in 760 CMR 56.03 (7).

To the best of your knowledge, has this site ever been rejected for project eligibility/site approval by another subsidizing agency or authority? _____

Existing Utilities and Infrastructure	Yes/No	Description
Wastewater- private wastewater treatment		
Wastewater - public sewer		
Storm Sewer		
Water-public water		
Water-private well		
Natural Gas		
Electricity		
Roadway Access to Site		
Sidewalk Access to Site		
Other		

Describe surrounding land use(s): _____

Surrounding Land Use/Amenities	Distance from Site	Available by Public Transportation?
Shopping Facilities		
Schools		
Government Offices		
Multi-Family Housing		
Public Safety Facilities		
Office/Industrial Uses		
Conservation Land		
Recreational Facilities		
Houses of Worship		
Other		

List any public transportation near the Site, including type of transportation and distance from the site:

Site Characteristics and Development Constraints

Please answer "Yes", "No" or "Unknown" to the following questions. If the answer is "Yes" please identify on Existing Conditions Plan as required for Attachment 2.1 and provide additional information and documentation as an attachment as instructed for Attachment 2.4, "Documentation Regarding Site Characteristics/Constraints."

Are there any easements, rights of way or other restrictions of record affecting the development of the site? _____

Is there any evidence of hazardous, flammable, or explosive material on the site? _____

Is the site, or any portion thereof, located within a designated flood hazard area? _____

Does the site include areas designated by Natural Heritage as endangered species habitat? _____

Are there documented state-designated wetlands on the site? _____

Are there documented vernal pools on the site? _____

Is the site within a local or state Historic District or listed on the National Register or Historic Places? _____

Has the site or any building(s) on the site been designated as a local, state or national landmark? _____

Are there existing buildings and structures on site? _____

Does the site include documented archeological resources? _____

Does the site include any known significant areas of ledge or steep slopes? _____

Required Attachments Relating to Section 2

2.1 Existing Conditions Plan

Please provide a detailed Existing Conditions Plan showing the entire site, prepared, signed and stamped by a Registered Engineer or Land Surveyor. Plans should be prepared at a scale of 1"=100' or 1"=200' and should include the following information:

- a. Reduced scale locus map
- b. Surveyed property boundaries
- c. Topography
- d. Wetland boundaries (if applicable)
- e. Existing utilities (subsurface and above ground).
- f. Natural features including bodies of water, rock outcroppings
- g. Existing easements and/or rights of way on the property
- h. Existing buildings and structures, including walls, fences, wells
- i. Existing vegetated areas
- j. Existing Site entries and egresses

Please provide one (1) set of full size (30"x40") plans along with one (1) set of 11"x17" reproductions and one electronic set of plans. Please note that MassHousing cannot accept USB flash drives.

2.2 Aerial Photographs

Please provide one or more aerial photograph(s) of the Site (such as those available on-line) showing the immediate surrounding area if available. Site boundaries and existing site entrance and access points must be clearly marked.

2.3 Site/Context Photographs

Please provide photographs of the Site and surrounding physical and neighborhood context, including nearby buildings, significant natural features and land uses. Please identify the subject and location of all photographs.

2.4 Documentation Regarding Site Characteristics/Constraints

Please provide documentation of site characteristics and constraints as directed including narratives, summaries and relevant documentation including:

- Flood Insurance Rate Map (FIRM) showing site boundaries
- Wetlands delineation
- Historic District Nomination(s)

2.5 By-Right Site Plan *(if available)*

MassHousing will commission, at your expense, an "as-is" appraisal of the site in accordance with the Guidelines, Section B (1). Therefore, if there is a conceptual development plan which would be permitted under current zoning and which you would like the appraiser to take into consideration, or if permits have been issued for alternative development proposals for the site, please provide two (2) copies of a "by-right" site plan showing the highest and best use of the site under current zoning, and copies of any existing permits. These will assist the appraiser in determining the "as is" value of the Site without any consideration being given to its potential for development under Chapter 40B.

Application for Chapter 40B Project Eligibility/Site Approval for MassHousing-Financed and New England Fund (“NEF”) Homeownership Projects

Section 3: PROJECT INFORMATION (also see Required Attachments listed at end of Section 3)

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that the proposed project appears generally eligible under the requirements of the housing subsidy program and that the conceptual project design is generally appropriate for the site.

Name of Proposed Project: _____

Project Type (mark both if applicable): New Construction _____ Rehabilitation _____ Both _____

Total Number of Dwelling Units: _____

Total Number of Affordable Units: _____

Number of 50% AMI Affordable Units: _____

Number of 80% AMI Affordable Units: _____

Unit Mix: Affordable Units

Unit Type	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom
Number of Units					
Number of Bathrooms					
Square Feet/Unit					

Unit Mix: Market Rate

Unit Type	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom
Number of Units					
Number of Bathrooms					
Square Feet/Unit					

Percentage of Units with 3 or More Bedrooms*: _____

** Note that the January 17, 2014 Interagency Agreement Regarding Housing Opportunities for Families with Children requires that at least 10% of the units in the project must have three (3) or more bedrooms. Evidence of compliance with this requirement must be provided at Final Approval.*

Number of Handicapped Accessible Units: _____ Market Rate: _____ Affordable: _____

Gross Density (units per acre): _____

Net Density (units per buildable acre): _____

Residential Building Information

Building Type and Style <i>(single family detached, townhouse, multi-family)</i>	Construction or Rehabilitation	Number of Stories	Height	GFA	Number Bldgs. of this type

Non-Residential Building Information

Building Type and Style	Construction or Rehabilitation	Number of Stories	Height	GFA	Number Bldgs. of this type

Will all features and amenities available to market unit residents also be available to affordable unit residents?
If not, explain the differences.

Parking

Total Parking Spaces Provided: _____

Ratio of Parking Spaces to Housing Units: _____

Lot Coverage *(Estimate the percentage of the site used for the following)*

Buildings: _____

Parking and Paved Areas: _____

Usable Open Space: _____

Unusable Open Space: _____

Lot Coverage: _____

Does project fit definition of "Large Project" (as defined in 760 CMR 56.03 (6))? Yes/No _____

Required Attachments Relating to Section 3

3.1 Preliminary Site Layout Plan(s)

Please provide preliminary site layout plans of the entire Site prepared, signed and stamped by a registered architect or engineer. Plans should be prepared at a scale of 1"=100' or 1"=200', and should show:

- Proposed site grading
- Existing lot lines
- Easements (existing and proposed)
- Access to a public way must be identified
- Required setbacks
- Proposed site circulation (entrances/egresses, roadways, driveways, parking areas, walk ways, paths, trails)
- Building and structure footprints (label)
- Utilities (existing and proposed)
- Open space areas
- Schematic landscaping and screening
- Wetland and other restricted area boundaries and buffer zones

Please provide one (1) set of full size (30"x40") plans along with one (1) set of 11"x17" reproductions and one (1) electronic set of plans. Please note that MassHousing cannot accept USB flash drives.

3.2 Graphic Representations of Project/Preliminary Architectural Plans

- Typical floor plans
- Unit plans showing dimensions, bedrooms, bathrooms and overall unit layout
- Exterior elevations, sections, perspectives and illustrative rendering.

3.3 Narrative Description of Design Approach

Provide a narrative description of the approach to building massing, style, and exterior materials; site layout, and the relationship of the project to adjacent properties, rights of way and existing development patterns. The handbook called [Approach to Chapter 40B Design Reviews](#) prepared by the Cecil Group in January 2011 may be helpful in demonstrating the nature of the discussion that MassHousing seeks in this narrative.

3.4 Tabular Zoning Analysis

Zoning analysis in tabular form comparing existing zoning requirements to the waivers that you will request from the Zoning Board of Appeals for the proposed project, showing required and proposed dimensional requirements including lot area, frontage, front, side and rear setbacks, maximum building coverage, maximum lot coverage, height, number of stories, maximum gross floor area ratio, units per acre, units per buildable acre; number of parking spaces per unit/square foot and total number of parking spaces (proposed and required).

3.5 Completed Sustainable Development Principles Evaluation Assessment Form *(see attached form)*

Application for Chapter 40B Project Eligibility/Site Approval for MassHousing-Financed and New England Fund ("NEF") Homeownership Projects

Section 4: SITE CONTROL (also see Required Attachments listed at end of Section 4)

In order to issue Site Approval, MassHousing must find (as required by 760 CRM 56.04 (4)) that the Applicant controls the site.

Name of Proposed Project: _____

Describe current ownership status of the entire site as shown on the site layout plans (attach additional sheets as necessary if the site is comprised of multiple parcels governed by multiple deeds or agreements):

Owned (or ground leased) by Development Entity or Applicant _____

Under Purchase and Sale Agreement _____

Under Option Agreement _____

Note: The Grantee/Buyer on each document must be either the Applicant or the Proposed Development Entity, or you must attach an explanation showing direct control of the Grantee/Buyer by the Applicant or the Proposed Development Entity.

Grantor/Seller: _____

Grantee/Buyer: _____

Grantee/Buyer is (check one):

Applicant _____ Development Entity _____ Managing General Partner of Development Entity _____

General Partner of Development Entity _____ Other (explain) _____

Are the Parties Related? _____

For Deeds or Ground Leases

Date(s) of Deed(s) or Ground Lease(s): _____

Purchase Price: _____

For Purchase and Sale Agreements or Option Agreements

Date of Agreement: _____

Expiration Date: _____

If an extension has been granted, date of extension: _____

If an extension has been granted, new expiration date: _____

Purchase Price: _____

Will any easements or rights of way over other properties be required in order to develop the site as proposed?

Yes _____ No _____

If Yes, please describe current status of easement:

Owned (or ground leased) by Development Entity or Applicant _____

Under Purchase and Sale Agreement _____

Under Option Agreement _____

Note: The Grantee/Buyer on each document must be either the Applicant or the Proposed Development Entity, or you must attach an explanation showing direct control of the Grantee/Buyer by the Applicant or the Proposed Development Entity.

Grantor/Seller: _____

Grantee/Buyer: _____

Are the Parties Related? _____

For Easements

Date(s) of Easement(s): _____

Purchase Price: _____

For Easement Purchase and Sale Agreements or Easement Option Agreements

Date of Agreement: _____

Expiration Date: _____

If an extension has been granted, date of extension: _____

If an extension has been granted, new expiration date: _____

Purchase Price: _____

Required Attachments Relating to Section 4

4.1 Evidence of Site Control *(required)*

Copies of all applicable, fully executed documents (deed, ground lease, purchase and sale agreement, option agreement, land disposition agreement) showing evidence of site control, including any required easements, along with copies of all amendments and extensions. Copies of all plans referenced in documents must be included.

Application for Chapter 40B Project Eligibility/Site Approval for MassHousing-Financed and New England Fund (“NEF”) Homeownership Projects

Section 5: FINANCIAL INFORMATION – Site Approval Application Homeownership 40B

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that an initial pro forma has been reviewed and that the Proposed Project appears financially feasible and consistent with the Chapter 40B Guidelines, and that the Proposed Project is fundable under the applicable program.

Name of Proposed Project: _____

Initial Capital Budget (please enter “0” when no such sales/revenue or cost is anticipated)

Sales / Revenue

Market	_____
Affordable	_____
Related Party	_____
Other Income	_____
Total Sales/Revenue	_____

Pre-Permit Land Value, Reasonable Carrying Costs

Item	Budgeted
Site Acquisition: pre-permit land value (to be determined by MassHousing commissioned appraisal) plus reasonable carrying costs.	

Costs

Item	Budgeted
Acquisition Cost	
Site Acquisition: pre-permit land value (to be determined by MassHousing Commissioned Appraisal) plus reasonable carrying costs	_____
Subtotal Acquisition Costs	_____
Construction Costs–Residential Construction (Hard Costs)	
Building Structure Costs	_____
Hard Cost Contingency	_____
Subtotal – Residential Construction (Hard Costs)	_____

Costs

Item	Budgeted
Construction Costs–Site Work (Hard Costs)	
Earth Work	_____
Utilities: On Site	_____
Utilities: Off-Site	_____
Roads and Walks	_____
Site Improvement	_____
Lawns and Planting	_____
Geotechnical Condition	_____
Environmental Remediation	_____
Demolition	_____
Unusual Site Conditions/Other Site Work	_____
Subtotal –Site Work (Hard Costs)	_____
Construction Costs–General Conditions, Builders Overhead and Profit (Hard Costs)	
General Conditions	_____
Builder's Overhead	_____
Builder's Profit	_____
Subtotal – General Conditions Builder's Overhead and Profit (Hard Costs)	_____
General Development Costs (Soft Costs)	
Appraisal and Marketing Study (not 40B "as is" appraisal)	_____
Lottery	_____
Commissions/Advertising–Affordable	_____
Commissions/Advertising–Market	_____
Model Unit	_____
Closing Costs (unit sales)	_____
Real Estate Taxes (during construction)	_____
Utility Usage (during construction)	_____
Insurance (during construction)	_____
Security (during construction)	_____
Inspecting Engineer	_____
Fees to Others	_____
Construction Loan Interest	_____
Fees to Construction Lender	_____
Architectural	_____
Engineering	_____
Survey, Permits, Etc.	_____
Clerk of the Works	_____
Construction Manager	_____

Item	Budgeted
General Development Costs (Soft Costs) – Continued	
Bond Premiums (<i>Payment/Performance/Lien Bond</i>)	_____
Legal	_____
Title (<i>including title insurance</i>) and Recording	_____
Accounting and Cost Certification (<i>incl. 40B</i>)	_____
Relocation	_____
40B Site Approval Processing Fee	_____
40B Technical Assistance/Mediation Fund Fee	_____
40B Land Appraisal Cost (<i>as-is value</i>)	_____
40B Final Approval Processing Fee	_____
40B Subsidizing Agency Cost Certification Examination Fee	_____
40B Monitoring Agent Fees	_____
40B Surety Fees	_____
Other Financing Fees	_____
Development Consultant	_____
Other Consultants (<i>describe</i>)	_____
Other Consultants (<i>describe</i>)	_____
Soft Cost Contingency	_____
Other General Development (Soft) Costs	_____
Subtotal – General Development Costs (Soft Costs)	_____
 Developer Overhead	
Developer Overhead	_____
Subtotal – Developer Overhead	_____
 Summary of Subtotals	
Sales/Revenue	_____
Site Acquisition	_____
Residential Construction	_____
Site Work	_____
Builder's Overhead, Profit and General Conditions	_____
General Development Costs	_____
Developer Overhead	_____
 Summary	
Total Sales/Revenue	_____
Total Development Costs (TDC)	_____
Profit (Loss) from Sales/Revenue	_____
Percentage of Profit (Loss) Over the Total Development Costs	_____

Initial Unit/Sales Price

	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom
Affordable Units					
Number of Units					
Number of Sq. Ft					
Sales Price					
Condo / HOA Fee					

	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom
Affordable Units					
Number of Units					
Number of Sq. Ft					
Sales Price					
Condo / HOA Fee					

Describe your approach to calculating any additional fees relating to Condominium Association or a Homeowners Association.

Required Attachments Relating to Section 5

5.1 New England Fund Lender Letter of Interest

Please attach a Letter of Interest from a current Federal Home Loan Bank of Boston (FHLBB) member bank regarding financing for the proposed development. The letter of interest must include, at a minimum, the following:

- Identification of proposed borrower, and brief description of the bank's familiarity with the borrower;
- Brief description of the Proposed Project
- Confirmation that the bank is a current FHLBB member bank and that the bank will specifically use NEF funds for the proposed development.

NOTE: Binding Financing Commitments (or evidence of closed loans) will be required at the time you apply for Final Approval from MassHousing.

5.2 Market Sale Comparables (required)

Please provide a listing of market sales being achieved in properties comparable to the proposed project.

5.3 Market Study (if requested)

MassHousing may require a market study for projects located in areas where the need or demand for the type of housing being proposed cannot be clearly demonstrated.

Application for Chapter 40B Project Eligibility/Site Approval for MassHousing-Financed and New England Fund (“NEF”) Homeownership Projects

Section 6: APPLICANT QUALIFICATIONS, ENTITY INFORMATION, AND CERTIFICATION

In order to issue Site Approval MassHousing must find (as required by 760 CRM 56.04 (4)) that the applicant is either a non-profit public agency or would be eligible to apply as a Limited Dividend Organization and meets the general eligibility standards of the program.

Name of Proposed Project: _____

Development Team

Developer/Applicant: _____

Development Consultant (if any): _____

Attorney: _____

Architect: _____

Contractor: _____

Lottery Agent: _____

Management Agent: _____

Other (specify): _____

Other (specify): _____

Role of Applicant in Current Proposal

Development Task	Developer/Applicant	Development Consultant (identify)
Architecture and Engineering		
Local Permitting		
Financing Package		
Construction Management		
Other		

Applicant's Ownership Entity Information

Please identify for each of (i) the Applicant and, if different (ii), the Proposed Development Entity, the following (collectively with the Applicant and the Proposed Development Entity, the “Applicant Entities”): the Managing Entities, Principals, Controlling Entities and Affiliates of each.

Note: For the purposes hereof, “Managing Entities” shall include all persons and entities (e.g. natural persons, corporations, partnerships, limited liability companies, etc., including beneficiaries of nominee trusts) who are managers of limited liability companies, general partners of limited partnerships, managing general partners of limited liability partnerships, directors and officers of corporations, trustees of trusts, and other similar persons and entities which have the power to manage and control the activities of the Applicant and/or Proposed Development Entity.

"Principal or Controlling Entities" shall include all persons and entities (e.g. natural persons, corporations, partnerships, limited liability companies, etc., including beneficiaries of nominee trusts) that shall have the right to:

- (i) approve the terms and conditions of any proposed purchase, sale or mortgage;*
- (ii) approve the appointment of a property manager; and/or*
- (iii) approve managerial decisions other than a decision to liquidate, file for bankruptcy, or incur additional indebtedness.*

Such rights may be exercisable either (i) directly as a result of such person's or entity's role within the Applicant or the Proposed Development Entity or the Managing Entities of either or (ii) indirectly through other entities that are included within the organizational structure of the Applicant and/or Proposed Development Entity and the Managing Entities of either.

In considering an application, MassHousing will presume that there is at least one Principal or Controlling Entity of the Applicant and of the Proposed Development Entity. Any person or persons who have purchased an interest for fair market value in the Applicant and/or Proposed Development Entity solely for investment purposes shall not be deemed a Principal or Controlling Entity.

"Affiliates" shall include all entities that are related to the subject organization by reason of common control, financial interdependence or other means.

1. Applicant

Name of Applicant: _____

Entity Type (limited liability company, limited partnership, limited liability partnership, corporation, trust, etc.): _____

State in which registered/formed: _____

List all Managing Entities of Applicant (you must list at least one):

List all Principals and Controlling Entities of Applicant and (unless the Managing Entity is an individual) its Managing Entities (use additional pages as necessary):

List all Affiliates of Applicant and its Managing Entities (use additional pages as necessary):

Proposed Development Entity

Name of Proposed Development Entity: _____

Entity Type *(limited liability company, limited partnership, limited liability partnership, corporation, trust, etc.):*

State in which registered/formed: _____

List all Managing Entities of Proposed Development Entity (you must list at least one):

List all Principals and Controlling Entities of Proposed Development Entity and *(unless the Managing Entity is an individual)* its Managing Entities *(use additional pages as necessary)*:

List all Affiliates of Proposed Development Entity and its Managing Entities *(use additional pages as necessary)*:

Certification and Acknowledgment

I hereby certify on behalf of the Applicant, *under pains and penalties of perjury*, that the information provided above for each of the Applicant Entities is, to the best of my knowledge, true and complete; and that each of the following questions has been answered correctly to the best of my knowledge and belief:

(Please attach a written explanation for all of the following questions that are answered with a "Yes". Explanations should be attached to this Section 6.)

Is there pending litigation with respect to any of the Applicant Entities? Yes ___ No ___

Are there any outstanding liens or judgments against any properties owned by any of the Applicant Entities? Yes ___ No ___

Have any of the Applicant Entities failed to comply with provisions of Massachusetts law related to taxes, reporting of employees and contractors, or withholding of child support? Yes ___ No ___

Have any of the Applicant Entities ever been the subject of a felony indictment or conviction? Yes ___ No ___

During the last 10 years, have any of the Applicant Entities ever been a defendant in a lawsuit involving fraud, gross negligence, misrepresentation, dishonesty, breach of fiduciary responsibility or bankruptcy? Yes ___ No ___

Have any of the Applicant Entities failed to carry out obligations in connection with a Comprehensive Permit issued pursuant to M.G.L. c. 40B and any regulations or guidelines promulgated thereunder (whether or not MassHousing is or was the Subsidizing Agency/Project Administrator) including, but not limited to, completion of a cost examination and return of any excess profits or distributions? Yes ___ No ___

Have any of the Applicant Entities ever been charged with a violation of state or federal fair housing requirements? Yes ___ No ___

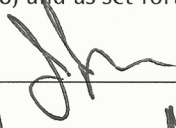
Are any of the Applicant Entities not current on all existing obligations to the Commonwealth of Massachusetts, and any agency, authority or instrument thereof? Yes ___ No ___

I further certify that the information set forth in this application (including attachments) is true, accurate and complete as of the date hereof to the best of my/our knowledge, information and belief. I further understand that MassHousing is relying on this information in processing the request for Site Approval in connection with the above-referenced project.

I further certify that we have met with a representative of the 40B Department at MassHousing and understand the requirements for a) completing this application and b) the procedures if and when Site Approval is granted, including the requirement for (i) the use of the standard MassHousing Regulatory Agreement, and (ii) submission to MassHousing, within one hundred eighty (180) days after substantial completion or, if later, within ninety (90) days of the date on which all units are sold, of a cost certification examined in accordance with AICPA attestation standards by an approved certified public accountant.

I hereby acknowledge our commitment and obligation to comply with requirements for cost examination and limitations on profits and distributions, all as found at 760 CMR 56.04(8) and will be more particularly set forth in the MassHousing Regulatory Agreement.

I hereby acknowledge that it will be required to provide financial surety, by means of bond, cash escrow and a surety escrow agreement or letter of credit with the agreement that it may be called upon or used in the event that the Developer fails either to (i) complete and submit the Cost Examination as required by 760 CMR 56.04(8) and the MassHousing Regulatory Agreement, or (ii) pay over to the Municipality any funds in excess of the limitations on profits and distributions as required by 760 CMR 56.04(8) and as set forth in the MassHousing Regulatory Agreement.

Signature: 

Name: JAMES Morin

Title: Owner

Date: 10/21/2020

Required Attachments Relating to Section 6

6.1 Development Team Qualifications

Please attach resumes for principal team members (Applicant, consultant, attorney, architect, general contractor, management agent, lottery agent, etc.) and list of all relevant project experience for 1) the team as a whole and 2) individual team members. Particular attention should be given to demonstrating experience with (i) projects of a similar scale and complexity of site conditions, (ii) permitting an affordable housing development, (iii) design, and (iv) financing. The development team should demonstrate the ability to perform as proposed and to complete the Project in a competent and timely manner, including the ability to pursue and carry out permitting, financing, marketing, design and construction.

(If the Applicant (or, if the Applicant is a single purpose entity, its parent developer entity) has received financing from MassHousing within the past five (5) years for a development of comparable size and complexity to the Proposed Project, no resume or list of project experience need be submitted for the Applicant or, as applicable, its parent developer entity. Information regarding the other team members still will be required.)

6.2 Applicant Entity 40B Experience

Please identify every Chapter 40B project in which the Applicant or any Applicant Entity has or had an interest. For each such project, state whether the construction has been completed and whether cost examination has been submitted.

6.3 Applicant's Certification

Please attach any additional sheets and any written explanations for questions answered with "yes" as required for Certification.

**Application for Chapter 40B Project Eligibility/Site Approval
for MassHousing-Financed and New England Fund (“NEF”) Homeownership Projects**

Section 7: NOTIFICATIONS AND FEES

Name of Proposed Project: _____

Notice

Date(s) of meetings, if any, with municipal officials prior to submission of application to MassHousing: _____

Date copy of complete application sent to chief elected office of municipality: _____

Date notice of application sent to DHCD: _____

Fees *(all fees should be submitted to MassHousing)*

MassHousing Application Processing Fee (\$2500) Payable to MassHousing: _____

Chapter 40B Technical Assistance/Mediation Fee Payable to Massachusetts Housing Partnership:

a. Base Fee:
(Limited Dividend Sponsor \$2500, Non-Profit or Public Agency Sponsor \$1,000) _____

b. Unit Fee:
(Limited Dividend Sponsor \$50 per unit, Non-Profit or Public Agency Sponsor \$30 per unit) _____

Land Appraisal Cost

You will be required to pay for an “as-is” market value appraisal of the Site to be commissioned by MassHousing. MassHousing will contact you once a quote has been received for the cost of the appraisal.

Required Attachments Relating to Section 7

- 7.1** Narrative describing any prior correspondence and/or meetings with municipal officials
- 7.2** Evidence (such as a certified mail receipt) that a copy of the complete application package was sent to the Chief Elected Official of Municipality (may be submitted after the application is submitted to MassHousing)
- 7.3** Copy of notice of application sent to DHCD
- 7.4** Check made out to MassHousing for Processing Fee (\$2500)
- 7.5** Check made payable to Massachusetts Housing Partnership for Technical Assistance/Mediation Fee
- 7.6** W-9 (Taxpayer Identification Number)

SUSTAINABLE DEVELOPMENT CRITERIA SCORECARD

Project Name: _____

Project Number: _____

Program Name: _____

Date: _____

MassHousing encourages housing development that is consistent with sustainable development designs and green building practices. Prior to completing this form, please refer to the Commonwealth's Sustainable Development Principles (adopted May 2007) available at: [Sustainable Development Principles](#)

DEVELOPER SELF-ASSESSMENT

(for consistency with the Sustainable Development Principles)

Redevelop First

Check "X" below if applicable

If Rehabilitation:

- Rehabilitation/Redevelopment/Improvements to Structure ☐
- Rehabilitation/Redevelopment/Improvements to Infrastructure ☐

If New Construction:

- Contributes to revitalization of town center or neighborhood ☐
- Walkable to: ☐
 - (a) transit ☐
 - (b) downtown or village center ☐
 - (c) school ☐
 - (d) library ☐
 - (e) retail, services or employment center ☐
- Located in municipally-approved growth center ☐

Explanation (Required)

Optional – Demonstration of Municipal Support:

Check "X" below if applicable

- Letter of Support from the Chief Elected Official of the municipality* ☐
- Housing development involves municipal funding ☐
- Housing development involves land owned or donated by the municipality ☐

**Other acceptable evidence: Zoning variance issued by ZBA for project; Minutes from Board of Selectman meeting showing that project was discussed and approved, etc.*

Explanation (Required)

Method 2: Development meets a minimum of **five (5)** of the Commonwealth's *Sustainable Development Principles*, as shown in the next section below.

If the development involves strong **municipal support** (evidence of such support must be submitted as an attachment), the development need only meet **four (4)** of the *Sustainable Development Principles*. However, one (1) of the Principles met must be **Protect Land and Ecosystems**.

Please explain at the end of each category how the development follows the relevant *Sustainable Development Principle(s)* and explain how the development demonstrates each of the checked "X" statements listed under the *Sustainable Development Principle(s)*.

(1) Concentrate Development and Mix Uses

Support the revitalization of city and town centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources, and integrates uses. Encourage remediation and reuse of existing sites, structures, and infrastructure rather than new construction in undeveloped areas. Create pedestrian friendly districts and neighborhoods that mix commercial, civic, cultural, educational, and recreational activities with open spaces and homes.

Check "X" below if applicable

- Higher density than surrounding area ☐
- Mixes uses or adds new uses to an existing neighborhood ☐
- Includes multi-family housing ☐
- Utilizes existing water/sewer infrastructure ☐
- Compact and/or clustered so as to preserve undeveloped land ☐
- Reuse existing sites, structures, or infrastructure ☐
- Pedestrian friendly ☐
- Other (discuss below) ☐

Explanation (Required)

(2) Advance Equity & Make Efficient Decisions

Promote equitable sharing of the benefits and burdens of development. Provide technical and strategic support for inclusive community planning and decision making to ensure social, economic, and environmental justice. Ensure that the interests of future generations are not compromised by today's decisions.

Promote development in accordance with smart growth and environmental stewardship.

Check "X" below if applicable

- Concerted public participation effort (beyond the minimally required public hearings) ☐
- Streamlined permitting process, such as 40B or 40R ☐
- Universal Design and/or visitability ☐
- Creates affordable housing in middle to upper income area and/or meets regional need ☐
- Creates affordable housing in high poverty area ☐
- Promotes diversity and social equity and improves the neighborhood ☐
- Includes environmental cleanup and/or neighborhood improvement in an Environmental Justice Community ☐
- Other (discuss below) ☐

Explanation **(Required)**

(3) Protect Land and Ecosystems

Protect and restore environmentally sensitive lands, natural resources, agricultural lands, critical habitats, wetlands and water resources, and cultural and historic landscapes. Increase the quantity, quality and accessibility of open spaces and recreational opportunities.

Check "X" below if applicable

- Creation or preservation of open space or passive recreational facilities ☐
- Protection of sensitive land, including prime agricultural land, critical habitats, and wetlands ☐
- Environmental remediation or clean up ☐
- Responds to state or federal mandate (e.g., clean drinking water, drainage, etc.) ☐
- Eliminates or reduces neighborhood blight ☐
- Addresses public health and safety risk ☐
- Cultural or Historic landscape/existing neighborhood enhancement ☐
- Other (discuss below) ☐

Explanation **(Required)**

(4) Use Natural Resources Wisely

Construct and promote developments, buildings, and infrastructure that conserve natural resources by reducing waste and pollution through efficient use of land, energy, water and materials.

Check "X" below *if applicable*

- Uses alternative technologies for water and/or wastewater treatment ☐
- Uses low impact development (LID) or other innovative techniques ☐
- Other (discuss below)

Explanation **(Required)**

(5) Expand Housing Opportunities

Support the construction and rehabilitation of homes to meet the needs of people of all abilities, income levels and household types. Build homes near jobs, transit, and where services are available. Foster the development of housing, particularly multifamily and single-family homes, in a way that is compatible with a community's character and vision and with providing new housing choices for people of all means.

Check "X" below *if applicable*

- Includes rental units, including for low/mod households ☐
- Includes homeownership units, including for low/mod households ☐
- Includes housing options for special needs and disabled population ☐
- Expands the term of affordability ☐
- Homes are near jobs, transit and other services ☐
- Other (discuss below) ☐

Explanation **(Required)**

(6) Provide Transportation Choice

Maintain and expand transportation options that maximize mobility, reduce congestion, conserve fuel and improve air quality. Prioritize rail, bus, boat, rapid and surface transit, shared-vehicle and shared-ride services, bicycling and walking. Invest strategically in existing and new passenger and freight transportation infrastructure that supports sound economic development consistent with smart growth objectives.

Check "X" below if applicable

- Walkable to public transportation ☐
- Reduces dependence on private automobiles (e.g., provides previously unavailable shared transportation, such as Zip Car or shuttle buses) ☐
- Increased bike and ped access ☐
- For rural areas, located in close proximity (i.e., approximately one mile) to a transportation corridor that provides access to employment centers, retail/commercial centers, civic or cultural destinations ☐
- Other (discuss below) ☐

Explanation **(Required)**

(7) Increase Job and Business Opportunities

Attract businesses and jobs to locations near housing, infrastructure, and transportation options. Promote economic development in industry clusters. Expand access to education, training and entrepreneurial opportunities. Support growth of local businesses, including sustainable natural resource-based businesses, such as agriculture, forestry, clean energy technology and fisheries.

Check "X" below if applicable

- Permanent jobs ☐
- Permanent jobs for low- or moderate-income persons ☐
- Jobs near housing, service or transit ☐
- Housing near an employment center ☐
- Expand access to education, training or entrepreneurial opportunities ☐
- Support local businesses ☐
- Support natural resource-based businesses (i.e., farming, forestry or aquaculture) ☐
- Re-uses or recycles materials from a local or regional industry's waste stream ☐
- Support manufacture of resource-efficient materials, such as recycled or low-toxicity materials ☐
- Support businesses that utilize locally produced resources such as locally harvested wood or agricultural products ☐
- Other (discuss below) ☐

Explanation **(Required)**

(8) Promote Clean Energy

Maximize energy efficiency and renewable energy opportunities. Support energy conservation strategies, local clean power generation, distributed generation technologies, and innovative industries. Reduce greenhouse gas emissions and consumption of fossil fuels.

Check "X" below if applicable

- Energy Star or equivalent* ☐
- Uses renewable energy source, recycled and/or non-/low-toxic materials, exceeds the state energy code, is configured to optimize solar access, and/or otherwise results in waste reduction and conservation of resources ☐
- Other (discuss below) ☐

*All units are required by MassHousing to be Energy Star Efficient. Please include in your explanation a description of how the development will meet Energy Star criteria.

Explanation **(Required)**

(9) Plan Regionally

Support the development and implementation of local and regional, state and interstate plans that have broad public support and are consistent with these principles. Foster development projects, land and water conservation, transportation and housing that have a regional or multi-community benefit. Consider the long term costs and benefits to the Commonwealth.

Check "X" below if applicable

- Consistent with a municipally supported regional plan ☐
- Addresses barriers identified in a Regional Analysis of Impediments to Fair Housing ☐
- Measurable public benefit beyond the applicant community ☐
- Other (discuss below) ☐

Explanation **(Required)**

For further information regarding 40B applications, please contact Greg Watson, Manager, Comprehensive Permit Programs, at (617) 854.1880 or gwatson@masshousing.com

Exhibit D

Project Eligibility Letter



Massachusetts Housing Finance Agency
One Beacon Street, Boston, MA 02108

TEL: 617.854.1000
FAX: 617.854.1091 | www.masshousing.com

Videophone: 857.366.4157 or Relay: 711

July 2, 2019

Northeast Classic Builders
c/o James Morin
P.O. Box 155
Bolton, MA 01740

**RE: Mallard Lane–Bolton, MA
Project Eligibility/Site Approval
MassHousing ID No. 1031**

Dear Mr. Morin:

This letter is in response to your application as “Applicant” for a determination of Project Eligibility (“Site Approval”) pursuant to Massachusetts General Laws Chapter 40B (“Chapter 40B”), 760 CMR 56.00 (the “Regulations”) and the Comprehensive Permit Guidelines issued by the Department of Housing and Community Development (“DHCD”) (the “Guidelines” and, collectively with Chapter 40B and the Regulations, the “Comprehensive Permit Rules”), under the New England Fund (“NEF”) Program (“the Program”) of the Federal Home Loan Bank of Boston (“FHLBank Boston”).

You have proposed to build eleven (11) age-restricted single-family homes, including three (3) affordable homes (the “Project”) on approximately 4.29 acres of land located on South Bolton Road (the “Site”) in Bolton, MA (the “Municipality”).

In accordance with the Comprehensive Permit Rules, this letter is intended to be a written determination of Project Eligibility (“Site Approval”) by MassHousing acting as Subsidizing Agency under the Guidelines, including Part V thereof, “Housing Programs in Which Funding Is Provided by Other Than a State Agency.”

MassHousing has performed an on-site inspection of the Site, which local boards and officials were invited to attend, and has reviewed the pertinent information for the Project submitted by the Applicant, the Municipality and others in accordance with the Comprehensive Permit Rules.

Municipal Comments

Pursuant to the Regulations, the Municipality was given a thirty (30) day period in which to review the Site Approval application and submit comments to MassHousing. The Town Administrator submitted a letter on May 2, 2019, summarizing comments from municipal officials and staff.

The following concerns were identified in their comments:

- The Municipality recommends that the Applicant apply for design review through Bolton's Design Review Board. The intention of the design review is to encourage development that aligns with Bolton's historical and rural character. The Planning Board believes that the additional design review will enhance the Project and benefit both the Applicant and the Town.
- The Municipality expressed concern about the Project's impact on area wetlands, surface water, groundwater and existing environmental conditions. In addition, the Municipality expressed concern with the excavation work planned for the Project and how it will impact the surrounding area.
- The Fire Department requested that the Applicant install and maintain a cistern or install a residential sprinkler system in each home.

MassHousing Determination and Recommendations

MassHousing staff has determined that the Project appears generally eligible under the requirements of the Program, subject to final review of eligibility and to Final Approval. As a result of our review, we have made the findings as required for a determination of eligibility pursuant to 760 CMR 56.04(1) and (4). Each such finding, with supporting reasoning, is set forth in further detail on Attachment 1 hereto. It is important to note that Comprehensive Permit Rules limit MassHousing to these specific findings in order to determine Project Eligibility. If, as here, MassHousing issues a determination of Project Eligibility, the Applicant may apply to the Zoning Board of Appeals of the Municipality for a Comprehensive Permit. At that time local boards, officials and members of the public are provided the opportunity to further review the Project to ensure compliance with applicable state and local standards and regulations.

Based on MassHousing's consideration of comments received from the Municipality, and its site and design review, the following issues should be addressed in your application to the local Zoning Board of Appeals ("ZBA") for a Comprehensive Permit and fully explored in the public hearing process prior to submission of your application for Final Approval under the Program:

- Development of this Site will require compliance with all state and federal environmental laws, regulations and standards applicable to existing conditions and to the proposed use related to building construction, stormwater management, wastewater collection and treatment, and hazardous waste safety. The Applicant should expect that the Municipality will require evidence of such compliance prior to the issuance of a building permit for the Project.
- The Applicant should continue to engage with municipal officials in a good-faith discussion regarding design review matters and other Site related concerns raised by local boards and officials.
- The Applicant should be prepared to discuss their plans to install residential sprinkler systems in each home.

MassHousing has also reviewed the application for compliance within the requirements of 760 CMR 56.04(2) relative to Application requirements and has determined that the material provided by the Applicant is sufficient to show compliance.

This approval is expressly limited to the development of no more than eleven (11) homeownership units under the terms of the Program, of which not less than three (3) of such units shall be restricted as affordable for low-or moderate-income persons or families as required under the terms of the Guidelines. It is not a commitment or guarantee of financing and does not constitute a site plan or building design approval. Should you consider, prior to obtaining a Comprehensive Permit, the use of any other housing subsidy program, the construction of additional units or a reduction in the size of the Site, you may be required to submit a new Site Approval application for review by MassHousing. Should you consider a change in tenure type or a change in building type or height, you may be required to submit a new Site Approval application for review by MassHousing.

For guidance on the Comprehensive Permit review process, you are advised to consult the Guidelines. Further, we urge you to review carefully with legal counsel the M.G.L. c.40B Comprehensive Permit Regulations at 760 CMR 56.00.

This approval will be effective for a period of two years from the date of this letter. Should the Applicant not apply for a Comprehensive Permit within this period or should MassHousing not extend the effective period of this letter in writing, this letter shall be considered to have expired and no longer be in effect. In addition, the Applicant is required to notify MassHousing at the following times throughout this two-year period: (1) when the Applicant applies to the local ZBA for a Comprehensive Permit, (2) when the ZBA issues a decision and (3) if applicable, when any appeals are filed.

Should a Comprehensive Permit be issued, please note that prior to (i) commencement of construction of the Project or (ii) issuance of a building permit, the Applicant is required to submit to MassHousing a request for Final Approval of the Project (as it may have been amended) in accordance with the Comprehensive Permit Rules (see especially 760 CMR 56.04(07) and the Guidelines including, without limitation, Part III thereof concerning Affirmative Fair Housing Marketing and Resident Selection). Final Approval will not be issued unless MassHousing is able to make the same findings at the time of issuing Final Approval as required at Site Approval.

Please note that MassHousing may not issue Final Approval if the Comprehensive Permit contains any conditions that are inconsistent with the regulatory requirements of the New England Fund Program of the FHLBank Boston, for which MassHousing serves as Subsidizing Agency, as reflected in the applicable regulatory documents. In the interest of providing for an efficient review process and to avoid the potential lapse of certain appeal rights, the Applicant may wish to submit a "final draft" of the Comprehensive Permit to MassHousing for review. Applicants who avail themselves of this opportunity may avoid significant procedural delays that can result from the need to seek modification of the Comprehensive Permit after its initial issuance.

If you have any questions concerning this letter, please contact Michael Busby at (617) 854-1219.

Sincerely,



Chrystal Kornegay
Executive Director

cc: Janelle Chan, Undersecretary, DHCD
The Honorable Dean A. Tran
The Honorable Kate Hogan
Stanley Wysocki, Chairman, Board of Selectmen
Gerard Ahearn, Chairman, Zoning Board of Appeals

Attachment 1

760 CMR 56.04 Project Eligibility: Other Responsibilities of Subsidizing Agency
Section (4) Findings and Determinations

Mallard Lane, Bolton, MH ID No. 1031

MassHousing hereby makes the following findings, based upon its review of the application, and in consideration of information received during the site visit and from written comments:

(a) that the proposed Project appears generally eligible under the requirements of the housing subsidy program, subject to final approval under 760 CMR 56.04(7);

The Project is eligible under the NEF housing subsidy program and at least 25% of the units will be available to households earning at or below 80% of the Area Median Income, adjusted for household size, as published by the U.S. Department of Housing and Urban Development ("HUD"). The most recent HUD income limits indicate that 80% of the current median income for a four-person household in Bolton is \$73,200.

A letter of interest regarding project financing was provided by Clinton Savings Bank, a member bank of the FHLBank Boston.

(b) that the site of the proposed Project is generally appropriate for residential development, taking into consideration information provided by the Municipality or other parties regarding municipal actions previously taken to meet affordable housing needs, such as inclusionary zoning, multifamily districts adopted under c.40A, and overlay districts adopted under c.40R, (such finding, with supporting reasoning, to be set forth in reasonable detail);

Based on a site inspection by MassHousing staff, internal discussions, and a thorough review of the application, MassHousing finds that the Site is suitable for residential use and development and that such use would be compatible with surrounding uses and would directly address the local need for housing.

The Town of Bolton does not have a DHCD-approved Housing Production Plan. According to DHCD's Chapter 40B Subsidized Housing Inventory (SHI), updated through June 26, 2019, Bolton has 62 Subsidized Housing Inventory (SHI) units (3.59% of its housing inventory). An additional 111 units would be required for the Town to achieve the 10% threshold of 173 units.

(c) that the conceptual project design is generally appropriate for the site on which it is located, taking into consideration factors that may include proposed use, conceptual site plan and building massing, topography, environmental resources, and integration into existing development patterns (such finding, with supporting reasoning, to be set forth in reasonable detail);

In summary, based on an evaluation of the site plan using the following criteria, MassHousing finds that the proposed conceptual Project design is generally appropriate for the Site. The following plan review findings are made in response to the conceptual plan, submitted to MassHousing:

Relationship to Adjacent Building Typology (including building massing, site arrangement, and architectural details):

The Site is located in an area that consists of single-family homes ranging from 3 to 5 bedrooms on two-acre lots. The proposed residential structures will reflect a New England vernacular featuring eleven (11) single story two-bedroom homes that would allow residents to age in place. The proposed architectural elements include varied rooflines, façade details and overhangs, all of which contribute to lessening the overall perception of the building's height and impact of the Project's massing.

Relationship to Adjacent Streets

The Site is located in the southeast quadrant of Bolton close to the Hudson and Berlin town lines. The surrounding area is a rural setting encompassed by woodlands within one mile of the interchange of Routes 495 and 62 and the sprawling Highland Commons retail development. The relationship of the proposed Site access and egress to South Bolton Road does not present any discernable public safety impacts. There appear to be adequate lines of sight for vehicles entering and exiting the proposed Site. The view into the Site from South Bolton Road establishes a relationship that is appropriate to that of other similar developments found in the Municipality.

Density

The Applicant proposes to build eleven (11) homes on approximately 4.29-acres, all buildable. The resulting density is 2.56 units per buildable acre, which is acceptable given the proposed housing type and similar uses found in the surrounding context.

Conceptual Site Plan

The proposed main access to the Site will be a road extending approximately 500 feet from South Bolton Road to a cul-de-sac at the rear of the Site. The units will average 2,000 sq. ft. and will have exclusive use driveway parking. The interior roadway is appropriately designed to meet the vehicular needs of the proposed development. A key design approach was to site 2 single-family homes at the front portion of the Site to maintain the existing streetscape and place the remaining 9 homes around the cul-de-sac.

Environmental Resources

The subject property is not located within any significant defined resource area and does not include any unique environmental features that enhance or restrict the proposed use.

Topography

The subject property elevates gently from South Bolton Road frontage to the rear of the property which is impacted by steep sloping. The existing topography is proposed to be shaped in a manner that will assist the Applicant in utilizing the Site efficiently, but careful attention must be taken in reworking the existing slope. The topographic features of the Site have been considered in relationship to the proposed development plans and do not constitute an impediment to development of the Site.

(d) that the proposed Project appears financially feasible within the housing market in which it will be situated (based on comparable rentals or sales figures);

The Project appears financially feasible based on a comparison of sales submitted by the Applicant.

(e) that an initial pro forma has been reviewed, including a land valuation determination consistent with the Department's Guidelines, and the Project appears financially feasible and consistent with the Department's Guidelines for Cost Examination and Limitations on Profits and Distributions (if applicable) on the basis of estimated development costs;

The initial pro-forma has been reviewed for the proposed residential use and the Project appears financially feasible with a projected profit margin of 10.62%. In addition, a third-party appraisal commissioned by MassHousing has determined that the "As-Is" land value for the Site of the Proposed Project is \$355,000.

(f) that the Applicant is a public agency, a non-profit organization, or a Limited Dividend Organization, and it meets the general eligibility standards of the housing program; and

The Applicant must be organized as a Limited Dividend Organization prior to applying for Final Approval. MassHousing sees no reason this requirement could not be met given information reviewed to date. The Applicant meets the general eligibility standards of the NEF housing subsidy program and has executed an Acknowledgment of Obligations to restrict their profits in accordance with the applicable limited dividend provisions.

(g) that the Applicant controls the site, based on evidence that the Applicant or a related entity owns the site, or holds an option or contract to acquire such interest in the site, or has such other interest in the site as is deemed by the Subsidizing Agency to be sufficient to control the site.

The Applicant controls the entire 4.29-acre Site under a deed of ownership.

Exhibit E

Affordable Housing Restriction

Application for Chapter 40B Project Eligibility/Site Approval for MassHousing-Financed and New England Fund (“NEF”) Homeownership Projects

Section 3: PROJECT INFORMATION (also see Required Attachments listed at end of Section 3)

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that the proposed project appears generally eligible under the requirements of the housing subsidy program and that the conceptual project design is generally appropriate for the site.

Name of Proposed Project: _____

Project Type (mark both if applicable): New Construction _____ Rehabilitation _____ Both _____

Total Number of Dwelling Units: _____

Total Number of Affordable Units: _____

Number of 50% AMI Affordable Units: _____

Number of 80% AMI Affordable Units: _____

Unit Mix: Affordable Units

Unit Type	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom
Number of Units					
Number of Bathrooms					
Square Feet/Unit					

Unit Mix: Market Rate

Unit Type	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom
Number of Units					
Number of Bathrooms					
Square Feet/Unit					

Percentage of Units with 3 or More Bedrooms*: _____

** Note that the January 17, 2014 Interagency Agreement Regarding Housing Opportunities for Families with Children requires that at least 10% of the units in the project must have three (3) or more bedrooms. Evidence of compliance with this requirement must be provided at Final Approval.*

Number of Handicapped Accessible Units: _____ Market Rate: _____ Affordable: _____

Gross Density (units per acre): _____

Net Density (units per buildable acre): _____

Exhibit F

ProForma

Application for Chapter 40B Project Eligibility/Site Approval for MassHousing-Financed and New England Fund (“NEF”) Homeownership Projects

Section 5: FINANCIAL INFORMATION – Site Approval Application Homeownership 40B

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that an initial pro forma has been reviewed and that the Proposed Project appears financially feasible and consistent with the Chapter 40B Guidelines, and that the Proposed Project is fundable under the applicable program.

Name of Proposed Project: _____

Initial Capital Budget (please enter “0” when no such sales/revenue or cost is anticipated)

Sales / Revenue

Market	_____
Affordable	_____
Related Party	_____
Other Income	_____
Total Sales/Revenue	_____

Pre-Permit Land Value, Reasonable Carrying Costs

Item	Budgeted
Site Acquisition: pre-permit land value (to be determined by MassHousing commissioned appraisal) plus reasonable carrying costs.	

Costs

Item	Budgeted
Acquisition Cost	
Site Acquisition: pre-permit land value (to be determined by MassHousing Commissioned Appraisal) plus reasonable carrying costs	_____
Subtotal Acquisition Costs	_____
Construction Costs–Residential Construction (Hard Costs)	
Building Structure Costs	_____
Hard Cost Contingency	_____
Subtotal – Residential Construction (Hard Costs)	_____

Costs

Item	Budgeted
Construction Costs–Site Work (Hard Costs)	
Earth Work	_____
Utilities: On Site	_____
Utilities: Off-Site	_____
Roads and Walks	_____
Site Improvement	_____
Lawns and Planting	_____
Geotechnical Condition	_____
Environmental Remediation	_____
Demolition	_____
Unusual Site Conditions/Other Site Work	_____
Subtotal –Site Work (Hard Costs)	_____
Construction Costs–General Conditions, Builders Overhead and Profit (Hard Costs)	
General Conditions	_____
Builder's Overhead	_____
Builder's Profit	_____
Subtotal – General Conditions Builder's Overhead and Profit (Hard Costs)	_____
General Development Costs (Soft Costs)	
Appraisal and Marketing Study (not 40B "as is" appraisal)	_____
Lottery	_____
Commissions/Advertising–Affordable	_____
Commissions/Advertising–Market	_____
Model Unit	_____
Closing Costs (unit sales)	_____
Real Estate Taxes (during construction)	_____
Utility Usage (during construction)	_____
Insurance (during construction)	_____
Security (during construction)	_____
Inspecting Engineer	_____
Fees to Others	_____
Construction Loan Interest	_____
Fees to Construction Lender	_____
Architectural	_____
Engineering	_____
Survey, Permits, Etc.	_____
Clerk of the Works	_____
Construction Manager	_____

Item	Budgeted
General Development Costs (Soft Costs) – Continued	
Bond Premiums (<i>Payment/Performance/Lien Bond</i>)	_____
Legal	_____
Title (<i>including title insurance</i>) and Recording	_____
Accounting and Cost Certification (<i>incl. 40B</i>)	_____
Relocation	_____
40B Site Approval Processing Fee	_____
40B Technical Assistance/Mediation Fund Fee	_____
40B Land Appraisal Cost (<i>as-is value</i>)	_____
40B Final Approval Processing Fee	_____
40B Subsidizing Agency Cost Certification Examination Fee	_____
40B Monitoring Agent Fees	_____
40B Surety Fees	_____
Other Financing Fees	_____
Development Consultant	_____
Other Consultants (<i>describe</i>)	_____
Other Consultants (<i>describe</i>)	_____
Soft Cost Contingency	_____
Other General Development (Soft) Costs	_____
Subtotal – General Development Costs (Soft Costs)	_____
Developer Overhead	
Developer Overhead	_____
Subtotal – Developer Overhead	_____
Summary of Subtotals	
Sales/Revenue	_____
Site Acquisition	_____
Residential Construction	_____
Site Work	_____
Builder's Overhead, Profit and General Conditions	_____
General Development Costs	_____
Developer Overhead	_____
Summary	
Total Sales/Revenue	_____
Total Development Costs (TDC)	_____
Profit (Loss) from Sales/Revenue	_____
Percentage of Profit (Loss) Over the Total Development Costs	_____

Initial Unit/Sales Price

	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom
Affordable Units					
Number of Units					
Number of Sq. Ft					
Sales Price					
Condo / HOA Fee					

	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom
Affordable Units					
Number of Units					
Number of Sq. Ft					
Sales Price					
Condo / HOA Fee					

Describe your approach to calculating any additional fees relating to Condominium Association or a Homeowners Association.

Required Attachments Relating to Section 5

5.1 New England Fund Lender Letter of Interest

Please attach a Letter of Interest from a current Federal Home Loan Bank of Boston (FHLBB) member bank regarding financing for the proposed development. The letter of interest must include, at a minimum, the following:

- Identification of proposed borrower, and brief description of the bank's familiarity with the borrower;
- Brief description of the Proposed Project
- Confirmation that the bank is a current FHLBB member bank and that the bank will specifically use NEF funds for the proposed development.

NOTE: Binding Financing Commitments (or evidence of closed loans) will be required at the time you apply for Final Approval from MassHousing.

5.2 Market Sale Comparables (required)

Please provide a listing of market sales being achieved in properties comparable to the proposed project.

5.3 Market Study (if requested)

MassHousing may require a market study for projects located in areas where the need or demand for the type of housing being proposed cannot be clearly demonstrated.

Exhibit G

Regulatory Agreement

REGULATORY AGREEMENT

For Comprehensive Permit Projects in Which Funding is Provided Through Other than a State Entity

This Regulatory Agreement (this "Agreement") is made as of the ____ day of _____ 20__, by and between the Massachusetts Housing Finance Agency acting as Subsidizing Agency as defined under the provisions of 760 CMR 56.02 (the "Subsidizing Agency"), and _____, a Massachusetts _____, having an address at _____, and its successors and assigns (the "Developer").

RECITALS

WHEREAS, the Developer intends to construct a housing development known as _____ consisting of _____ for-sale [*condominium units/single-family*] residences (the "Project") on a ____-acre site located at _____ in the [*City/Town*] of _____ (the "Municipality"), which property is more particularly described in Exhibit A attached hereto and made a part hereof; and

WHEREAS, the Project is being financed with a \$_____ construction loan from _____ (the "NEF Lender"), a non-governmental entity; and

WHEREAS, the Massachusetts Housing Finance Agency acts as Subsidizing Agency for the Project, on behalf of DHCD, pursuant to Massachusetts General Laws Chapter 40B Sections 20-23 (the "Act"), the regulations at 760 CMR 56.00, and the Comprehensive Permit Guidelines issued pursuant thereto (collectively, the "Comprehensive Permit Rules"); and

WHEREAS, the Developer has received a comprehensive permit (as it may previously have been amended, the "Comprehensive Permit") from the Zoning Board of Appeals of the Municipality in accordance with the Act, which permit is [*recorded/filed*] at the _____ County [*Registry of Deeds/Registry District of Land Court*] ("Registry") [*in Book _____, Page _____ / as Document No. _____*], as amended by the terms of this Agreement; and

WHEREAS, pursuant to the requirements of the Comprehensive Permit Rules, twenty-five percent (25%) of the units in the Project (____ units) (the "Affordable Units") will be sold at prices specified in this Agreement to Eligible Purchasers (as defined herein) and will be subject to resale restrictions as set forth herein; and

WHEREAS, the Subsidizing Agency may delegate to an affordability monitoring agent (the “Affordability Monitoring Agent”) certain administration, monitoring and enforcement services regarding compliance of the Project with the Comprehensive Permit Rules during the period of affordability of the Affordable Units; and

WHEREAS, the parties recognize that Affirmative Fair Marketing (as defined herein) is an important precondition for initial sales and resales of Affordable Units and that local preference cannot be granted in a manner which results in a violation of applicable fair housing laws and regulations.

NOW, THEREFORE, in consideration of the agreements hereinafter set forth, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Subsidizing Agency and the Developer hereby agree as follows:

1. Definitions. Capitalized terms used and not defined herein shall have the same meaning as set forth in the Affordable Housing Restriction attached hereto as Exhibit B and incorporated herein by reference (the “Affordable Housing Restriction”). In addition to the defined terms in the Affordable Housing Restriction and the capitalized terms defined in the Recitals above, the following terms shall have the meanings set forth below:

Affordability Monitoring Services Agreement shall have the meaning set forth in Section 5 hereof.

Affordability Requirement shall mean the obligations of the Developer described in Section 3 hereof.

Allowable Profit shall have the meaning set forth in Section 4(a) hereof.

Cost Examination shall have the meaning set forth in Section 4(b) hereof.

DHCD shall mean the Department of Housing and Community Development.

Eligible Purchaser shall have the meaning set forth in the Affordable Housing Restriction attached hereto as Exhibit B, and, in addition, must also (i) be a First-Time Homebuyer, and (ii) own assets not in excess of the limit set forth in the Comprehensive Permit Rules.

Excess Profit shall have the meaning set forth in Section 4(e) hereof.

Event of Default shall have the meaning set forth in Section 10(a) hereof.

Limited Dividend Requirement shall mean the obligations of the Developer described in Section 4 hereof.

Limited Dividend Monitoring Services Agreement shall have the meaning set forth in Section 4 hereof.

Marketing Documentation shall have the meaning set forth in Section 3(c) hereof.

Marketing Plan shall have the meaning set forth in Section 3(c) hereof.

Maximum Initial Sale Price means the purchase price for which a credit-worthy Eligible Purchaser earning seventy percent (70%) of the Area Median Income for an Appropriate Size Household could obtain mortgage financing as determined by the Subsidizing Agency using the same methodology then used by DHCD for its Local Initiative Program or similar comprehensive permit program.

Plans and Specifications shall have the meaning set forth in Section 2 hereof.

Resale Price Certificate means the certificate in recordable form issued by the Subsidizing Agency and recorded with the first deed of each Affordable Unit from the Developer to the initial Eligible Purchaser, which certificate sets forth the Resale Price Multiplier to be applied on the resale of such Affordable Unit, according to the terms of the Affordable Housing Restriction for such unit, for so long as the restrictions set forth in the Affordable Housing Restriction continue, and any subsequent certificate issued by the Affordability Monitoring Agent in accordance with the terms of the Affordable Housing Restriction.

Substantial Completion shall have occurred for purposes of this Agreement when the construction of the Project is sufficiently complete so that all of the units may be occupied and amenities may be used for their intended purpose, except for designated punch list items and seasonal work which does not interfere with the residential use of the Project.

Term shall have the meaning set forth in Section 14(a) hereof.

Total Development Costs means the total budget for the acquisition and construction of the Project (including both hard and soft costs and such other sums as the Subsidizing Agency may determine constitute the Developer's contribution to the Project, but not including any fee paid to the Developer), as approved by Subsidizing Agency pursuant to the Comprehensive Permit Rules, this Regulatory Agreement, and the Limited Dividend Monitoring Services Agreement, using the standards of the Subsidizing Agency applicable to comprehensive permit projects, and as finally determined by the Subsidizing Agency in accordance with the Comprehensive Permit Rules.

2. Construction Obligations. (a) The Developer agrees to construct the Project in accordance with plans and specifications approved by the Subsidizing Agency and the Municipality (the "Plans and Specifications"), in accordance with all on-site and off-site construction, design and land use conditions of the Comprehensive Permit, and in accordance with the information describing the Project provided by the Developer to the

Subsidizing Agency in its Application for Final Approval. All Affordable Units to be constructed as part of the Project must be similar in exterior appearance to other units in the Project and shall be evenly dispersed throughout the Project. In addition, all Affordable Units must contain complete living facilities including but not limited to a stove, kitchen cabinets, plumbing fixtures, and washer/dryer hookup, all as more fully shown in the Plans and Specifications. Materials used for the interiors of the Affordable Units must be of good quality. The Project must fully comply with the State Building Code and with all applicable state and federal building, environmental, health, safety and other laws, rules, and regulations, including without limitation all applicable federal and state laws, rules and regulations relating to the operation of adaptable and accessible housing for the handicapped. Except to the extent that the Project is exempted from such compliance by the Comprehensive Permit, the Project must also comply with all applicable local codes, ordinances and by-laws. The Affordable Units shall be constructed on a schedule that provides substantially for the construction of one (1) Affordable Unit for every three (3) market rate units constructed. In no event shall any five (5) market rate units be constructed without completion of one Affordable Unit.

(b) The Subsidizing Agency shall monitor compliance with the construction obligations set forth in this section in such manner as the Subsidizing Agency may deem reasonably necessary. In furtherance thereof, the Developer shall provide to the Subsidizing Agency (i) evidence that the final plans and specifications for the Development comply with the requirements of the Comprehensive Permit and that the Development was built substantially in accordance with such plans and specifications; and (ii) such information as the Subsidizing Agency may reasonably require concerning the expertise, qualifications and scope of work of any construction monitor proposed by the NEF Lender, and if such information is acceptable to the Subsidizing Agency, the Developer shall provide to the Subsidizing Agency prior to commencement of construction a certification from the NEF Lender concerning construction monitoring in a form acceptable to the Subsidizing Agency. Such certification shall also include a representation that the NEF Lender will maintain certain minimum funding levels to meet the subsidy requirements of the Act.

3. Affordability Requirement. (a) The Developer shall sell the Affordable Units only to Eligible Purchasers at no greater than the Maximum Initial Sale Price. There shall be Affirmative Fair Marketing and the Developer shall comply with the lottery procedures set forth in the Comprehensive Permit Rules prior to the selection of an Eligible Purchaser. At the time of sale of each Affordable Unit by the Developer, the Developer shall execute and shall as a condition of the sale cause the purchaser of the Affordable Unit to execute an Affordable Housing Restriction in the form of Exhibit B attached hereto and incorporated herein by reference. Such Affordable Housing Restriction shall be attached to and made a part of the deed from the Developer to the initial purchaser of the Affordable Unit and each subsequent deed of such unit so that the affordability of the Affordable Unit will be preserved each time a resale of the Affordable Unit occurs.

(b) Prior to the publication of any Marketing Documentation for the Affordable Units, the Developer shall request the Subsidizing Agency to calculate the Maximum Initial Sale Price for each Affordable Unit and shall advertise the price so calculated in marketing the Affordable Units. Prior to the delivery of the first deed for each Affordable Unit, the Developer shall notify the Subsidizing Agency of the actual purchase price for each Affordable Unit (which shall in no event be greater than the Maximum Initial Sale Price calculated by the Subsidizing Agency), and the Subsidizing Agency shall issue a Resale Price Certificate to the Developer calculating the Resale Price Multiplier. The Developer shall as a condition of the sale cause the purchaser to record the Resale Price Certificate immediately after the first deed of each Affordable Unit.

(c) Prior to marketing or otherwise making available for sale any of the Units, the Developer must obtain the Subsidizing Agency's approval of a marketing plan (the "Marketing Plan") for the Affordable Units to be administered under the supervision of the Affordability Monitoring Agent. After such approval, the Marketing Plan may not be amended without the Subsidizing Agency's consent. The Marketing Plan must describe the buyer selection process for the Affordable Units, including any lottery or similar procedure for choosing among Eligible Purchasers, and must provide for Affirmative Fair Marketing of Affordable Units. If required under the Comprehensive Permit and approved by the Subsidizing Agency, the Marketing Plan may also include a preference for local residents, which in no event may exceed more than seventy percent (70%) of the Affordable Units; provided that, in the event a local resident preference is established, use of the preference shall not violate applicable fair housing laws and regulations. All costs of carrying out the Marketing Plan with respect to outreach, location and selection of the initial Eligible Purchasers shall be paid by the Developer; thereafter, such costs shall be paid from the Resale Fee (as defined in the Affordable Housing Restriction). The Developer agrees to maintain for at least five (5) years following the sale of the last Affordable Unit, a record of all newspaper ads, outreach letters, translations, leaflets, and all Affirmative Fair Marketing efforts (collectively "Marketing Documentation") as described in the Marketing Plan. The Marketing Documentation may be inspected at any time by the Affordability Monitoring Agent, the Subsidizing Agency and the Municipality. If at any time prior to or during the initial process of marketing the Affordable Units, the Subsidizing Agency determines that the Developer or the Affordability Monitoring Agent has not adequately complied with the approved Marketing Plan, the Developer or Affordability Monitoring Agent, as the case may be, shall take such additional corrective measures as shall be specified by the Subsidizing Agency.

4. Limited Dividend Requirement. (a) The Developer agrees that the aggregate profit from the Project which shall be payable to the Developer or to the partners, shareholders or other owners of Developer or the Project shall not exceed twenty percent (20%) of Total Development Costs (the "Allowable Profit"), which development costs have been approved by the Subsidizing Agency pursuant to the Comprehensive Permit Rules, this Regulatory Agreement, and the Limited Dividend Monitoring Services Agreement attached hereto as Exhibit C and incorporated herein by

reference (the “Limited Dividend Monitoring Services Agreement”). Notwithstanding the foregoing, the Subsidizing Agency shall have the sole right to approve the Cost Examination and to determine the Allowable Profit. For so long as the Developer complies with the requirements of this section, the Developer shall be deemed to be a limited dividend organization within the meaning of the Act.

(b) Within one hundred-eighty (180) days after Substantial Completion of the Project, or, if later, within ninety (90) days of the date on which all units in the Project are sold, the Developer shall deliver to the Subsidizing Agency an itemized statement of Total Development Costs together with a statement of gross income from the Project received by the Developer to date in the format provided in the Subsidizing Agency’s Cost Examination Program applicable to the Project along with all other documents required by the Cost Examination Program (the “Cost Examination”). The Cost Examination must be prepared and certified by a certified public accountant (satisfactory to the Subsidizing Agency) in accordance with the attestation standards established by the American Institute of Certified Public Accountants. If all units in the Project have not been sold as of the date the Cost Examination is delivered to the Subsidizing Agency, the Developer shall at least once every ninety (90) days thereafter until such time as all of the Units are sold, deliver to the Subsidizing Agency an updated Cost Examination. If all units have not been sold within twenty-four (24) months of Substantial Completion, a sale price for the remaining unsold units shall be imputed in an amount equal to the average of the last three (3) arm’s-length sales of comparable units, and a final Cost Examination shall be required within ninety (90) days thereafter. The Subsidizing Agency may allow additional time for submission of the Cost Examination if significant issues are determined to exist which prevent the timely submission of the Cost Examination, and may in certain circumstances (such as a halt in construction for a significant period of time) require submission of an interim Cost Examination within ninety (90) days of written notice to the Developer.

(c) All related party transactions resulting in Project costs or income must be disclosed in the Cost Examination, and documentation must be provided identifying, where applicable, what portion of costs were paid to non-related third parties (e.g., subcontractors) and what portion were retained by related parties. In the event that any unit sales are made to related parties, the amount of income to be included in the Cost Examination for such sales shall be the greater of (i) the actual sales price of the unit, and (ii) the average sales price of the highest three (3) arm’s-length sales of comparable units.

(d) If any unit is sold prior to the date the final Cost Examination is approved by the Subsidizing Agency, the Developer shall upon the request of the Subsidizing Agency provide evidence reasonably satisfactory to the Subsidizing Agency that any profit distributed to the Developer or to the partners, shareholders or other owners of Developer or the Project on such sale, combined with reasonably projected total profits from the Project, will not exceed the Allowable Profit.

(e) All profits from the Project in excess of the Allowable Profit, as finally determined by the Subsidizing Agency (the "Excess Profit"), shall be paid by the Developer to the Municipality promptly after such determination.

5. Affordability Monitoring Agent. At the request of the Subsidizing Agency, the Developer shall retain one or more Affordability Monitoring Agents for purposes of administration, monitoring and enforcement under this Agreement pursuant to an agreement substantially in the form of the Affordability Monitoring Services Agreement attached hereto as Exhibit D and incorporated herein by reference (the "Affordability Monitoring Services Agreement"). All notices and reports required to be submitted under this Agreement shall be submitted simultaneously to the specified entity and to the Affordability Monitoring Agent. The Affordability Monitoring Services Agreement may be terminated by the Subsidizing Agency or the Affordability Monitoring Agent as provided in the Affordability Monitoring Services Agreement. In the event of such termination, a successor monitoring agent shall be selected in accordance with the provisions of the Affordability Monitoring Services Agreement, and thereafter such successor shall be the Affordability Monitoring Agent for the Project.

6. Developer's Representations, Covenants and Warranties. The Developer hereby represents, covenants and warrants as follows:

(a) The Developer (i) is a _____ duly organized under the laws of the Commonwealth of Massachusetts, and is qualified to transact business under the laws of said Commonwealth, (ii) has the power and authority to own its properties and assets and to carry on its business as now being conducted, and (iii) has the full legal right, power and authority to execute and deliver this Agreement.

(b) The execution and performance of this Agreement by the Developer (i) will not violate or, as applicable, has not violated any provision of law, rule or regulation, or any order of any court or other agency or governmental body, and (ii) will not violate or, as applicable, has not violated any provision of any indenture, agreement, mortgage, mortgage note, or other instrument to which the Developer is a party or by which it or the Project is bound, and (iii) will not result in the creation or imposition of any prohibited encumbrance of any nature.

(c) The Developer will, at the time of execution and delivery of this Agreement, have good and marketable title to the premises constituting the Project free and clear of any lien or encumbrance (subject to encumbrances created pursuant to this Agreement, and any other documents executed in connection with the loan from the NEF Lender, or other encumbrances permitted by the Subsidizing Agency).

(d) There is no action, suit or proceeding at law or in equity or by or before any governmental instrumentality or other agency now pending, or, to the knowledge of the Developer, threatened against or affecting it, or any of its properties or rights, which, if adversely determined, would materially impair its right to carry on business

substantially as now conducted (and as now contemplated by this Agreement) or would materially adversely affect its financial condition.

(e) (i) That the undersigned Trustee(s) are the sole Trustee(s) of said Trust, duly appointed in accordance with the terms of the Trust; (ii) that said Trust has not been altered, amended, revoked, or terminated, and is presently in full force and effect as recorded; (iii) that pursuant to the powers granted under said Trust, the Trustee(s) have the power and authority to execute this Agreement, transfer real estate, and to execute and deliver deeds and related closing documents of any or all trust property; (iv) that if under said Trust the consent of beneficiaries is required to authorize the Trustee(s) to execute this Agreement, that written consent of all beneficiaries has been obtained; and (v) that no beneficiary is a minor, a corporation selling all or substantially all of its assets or a personal representative of an estate subject to estate tax liens or is now deceased or under any legal disability. **[for use when Developer is nominee trust]**

7. No Discrimination. There shall be full compliance with the provisions of all state or local laws prohibiting discrimination in housing, and the Developer shall not discriminate in the selection of buyers for the units in the Project on the basis of race, color, religion, sex, national origin, genetic information, ancestry, sexual orientation, age, familial status, children, marital status, veteran status or membership in the armed services, the receiving of public assistance, or physical or mental disability; and the Developer shall not so discriminate in connection with the employment or application for employment of persons for the construction, operation or management of the Project.

8. Restrictions on Transfers and Junior Encumbrances. Except for sales of units to homebuyers as permitted by the terms of this Agreement, Developer shall not sell, convey, transfer, ground lease, lease, exchange, pledge, assign, mortgage or otherwise transfer its interest, or any portion of its interest, in the Project or any portion of the Project without the prior written consent of the Subsidizing Agency. In the event the Subsidizing Agency grants such approval, the Developer agrees, prior to any transfer of ownership of the Project or any portion thereof or interest therein, to secure from the transferee a written agreement stating that the transferee will assume in full the Developer's obligations and duties under this Agreement.

9. Casualty. Until such time as decisions regarding repair of damage due to fire or other casualty, or restoration after taking by eminent domain, shall be made by a condominium association or trust not controlled by the Developer (or if the Project consists of detached dwellings, by homebuyers), Developer agrees that if the Project, or any part thereof, shall be damaged or destroyed or shall be condemned or acquired for public use, the Developer shall use its best efforts to repair and restore the Project to substantially the same condition as existed prior to the event causing such damage or destruction, or to relieve the condemnation, and thereafter to operate the Project in accordance with the terms of this Agreement, subject to the approval of the Subsidizing Agency.

10. Defaults; Remedies. (a) Any default, violation, or breach of obligations of the Developer hereunder shall constitute an Event of Default hereunder (an “Event of Default”) if such default, violation, or breach is not cured to the satisfaction of the Subsidizing Agency within thirty (30) days after the Subsidizing Agency or the Affordability Monitoring Agent gives notice to the Developer. At any time after the occurrence of an Event of Default, at the Subsidizing Agency’s option, and without further notice, the Subsidizing Agency may apply to any state or federal court for specific performance of this Agreement, or the Subsidizing Agency may exercise any other remedy at law or in equity or take any other action as may be necessary or desirable to correct non-compliance with this Agreement, including without limitation drawing upon the additional security described in Section 11 below. The Affordability Monitoring Agent shall have the same rights as the Subsidizing Agency to exercise remedies hereunder.

(b) The Developer shall pay all fees and expenses (including legal fees) of the Subsidizing Agency and the Affordability Monitoring Agent incurred in connection with enforcement of the Developer’s obligations hereunder. The Developer hereby grants to the Subsidizing Agency and the Affordability Monitoring Agent a lien on the Project, junior to the lien securing the loan from the NEF Lender, to secure payment of such fees and expenses. The Subsidizing Agency and the Affordability Monitoring Agent may perfect a lien on the Project by recording/filing one or more certificates setting forth the amount of the costs and expenses due and owing in the Registry. A purchaser of the Project or any portion of the Project shall be liable for the payment of any unpaid costs and expenses which were the subject of a recorded/filed certificate prior to the purchaser’s acquisition of the Project or any portion thereof.

(c) The Subsidizing Agency and the Affordability Monitoring Agent shall have access during normal business hours to all books and records of the Developer and the Project in order to monitor the Developer's compliance with the terms of this Agreement.

(d) The Developer agrees to submit any information, documents or certifications requested by the Subsidizing Agency or the Affordability Monitoring Agent that either shall deem necessary or appropriate to evidence the continuing compliance of the Developer with the terms of this Agreement.

11. Additional Security. As required by 760 CMR 56.04(7)(c), the Developer shall secure to the Subsidizing Agency adequate financial surety to ensure completion of the Cost Examination and to ensure distribution of any Excess Profit. In furtherance of the Developer’s obligations hereunder to construct the Project in accordance with the Plans and Specifications, to comply with the Affordability Requirement and otherwise to comply with its obligations under this Agreement, the Developer shall deliver to the Subsidizing Agency such additional security as the Subsidizing Agency may deem reasonable in form and amount (“Additional Security”). The Subsidizing Agency may waive the requirement for such Additional Security in its sole discretion.

12. Governing Law. This Agreement shall be governed by the laws of the Commonwealth of Massachusetts. Any amendments to this Agreement must be in writing and executed by all of the parties hereto. The invalidity of any clause, part, or provision of this Agreement shall not affect the validity of the remaining portions hereof.

13. Notices. (a) All notices to be given pursuant to this Agreement shall be in writing and shall be deemed given when delivered by hand or when mailed by certified or registered mail, postage prepaid, return receipt requested, to the parties hereto at the addresses set forth below, or to such other place as a party (or its successor) may from time to time designate by written notice:

The Subsidizing Agency:

Massachusetts Housing Finance Agency
One Beacon Street
Boston, MA 02108
Attention: Director of Comprehensive Permit Programs

Developer:

Affordability Monitoring Agent:

(b) The Developer shall notify the Subsidizing Agency and the Affordability Monitoring Agent promptly upon the occurrence of the following events: (i) the date of satisfaction of all conditions to funding the loan from the NEF Lender; (ii) issuance of the building permit for the Project or any portion thereof; (iii) Substantial Completion; (iv) sale of the first unit in the Project; (v) sale of the first Affordable Unit; (vi) sale of the last Affordable Unit; and (vii) sale of the last unit in the Project.

14. Term. (a) The term of this Agreement (the “Term”) shall continue until the date the Affordability Monitoring Agent and the Subsidizing Agency have determined that the Developer has complied with the Affordability Requirement and the Limited Dividend Requirement, including all substantive and reporting requirements hereunder. The recording of a discharge of this Agreement executed by the Subsidizing Agency shall evidence the end of the Term.

(b) The Developer intends, declares and covenants on behalf of itself and its successors and assigns that this Agreement and the covenants, agreements and restrictions contained herein (i) shall be and are covenants running with the land, encumbering the Project for the Term, and are binding upon the Developer's successors in title, (ii) are not merely personal covenants of the Developer, and (iii) shall bind the

Developer, its successors and assigns and enure to the benefit of the Subsidizing Agency and its successors and assigns for the Term. Developer hereby agrees that any and all requirements of the laws of the Commonwealth of Massachusetts to be satisfied in order for the provisions of this Agreement to constitute restrictions and covenants running with the land shall be deemed to be satisfied in full and that any requirements of privity of estate are also deemed to be satisfied in full.

(c) This Agreement and the use and resale restrictions contained in each of the Affordable Housing Restrictions which are to encumber each of the Affordable Units at the Project pursuant to the requirements of this Agreement shall constitute an affordable housing restriction as that term is defined in Section 31 of Chapter 184 of the Massachusetts General Laws. Such restrictions shall be for the benefit of the Municipality and the Affordability Monitoring Agent, and the Municipality and the Affordability Monitoring Agent shall be deemed to be the holders of the affordable housing restriction created by the restrictions in each of the Affordable Housing Restrictions.

15. Subsidized Housing Inventory. The Affordable Units shall be included in the Subsidized Housing Inventory as that term is described in 760 CMR 56.03(2) in accordance with rules and regulations issued by DHCD, as amended from time to time.

16. Recording. Upon execution, the Developer shall immediately cause this Agreement and any amendments hereto to be recorded or filed with the Registry, and the Developer shall pay all fees and charges incurred in connection therewith. Upon recording or filing, as applicable, the Developer shall immediately transmit to the Subsidizing Agency and the Affordability Monitoring Agent evidence of such recording or filing including the date and instrument, book and page or registration number of the Agreement.

17. Intent and Effect. The terms and conditions of this Agreement have been freely accepted by the parties. The provisions and restrictions contained herein exist to further the mutual purposes and goals of DHCD, the Subsidizing Agency, the Municipality and the Developer set forth herein to create and preserve access to land and to decent and affordable homeownership opportunities for eligible families who are often denied such opportunities for lack of financial resources.

18. Miscellaneous. (a) The rights and obligations of the Subsidizing Agency under this Agreement shall continue for the Term, regardless of whether the loan from the NEF Lender is still outstanding.

(b) Neither the Subsidizing Agency nor the Affordability Monitoring Agent shall be held liable for any action taken or omitted under this Agreement so long as it shall have acted in good faith and without gross negligence.

(c) The Developer, for itself and its successors and assigns, agrees to indemnify and hold harmless the Subsidizing Agency and Affordability Monitoring

Agent against all damages, costs and liabilities, including reasonable attorney's fees, asserted against the Subsidizing Agency or the Affordability Monitoring Agent by reason of its relationship to the Project under this Agreement and not involving the Subsidizing Agency or the Affordability Monitoring Agent acting in bad faith and with gross negligence.

(d) This Agreement shall not be amended without written consent of the Developer and the Subsidizing Agency.

(e) If at any time during the Term there is no Affordability Monitoring Agent, the Subsidizing Agency shall have all the rights and obligations set forth herein as rights and obligations of the Affordability Monitoring Agent.

19. Conflict. In the event of any conflict or inconsistency (including without limitation more restrictive terms) between the terms of the Comprehensive Permit, any other document relating to the Project and the terms of this Agreement, the terms of this Agreement shall control.

[Remainder of page intentionally left blank.]

Executed as a sealed instrument as of the date first above written.

[DEVELOPER]

By: _____
Name:
Title:

**MASSACHUSETTS HOUSING FINANCE
AGENCY**, as Subsidizing Agency as aforesaid

By: _____
Gina B. Dailey, Director of Comprehensive Permit
Programs

Acknowledgement of Zoning Board of Appeals
Exhibit A – Legal Description
Exhibit B – Form of Affordable Housing Restriction
Exhibit C – Form of Limited Dividend Monitoring Services Agreement
Exhibit D – Form of Affordability Monitoring Services Agreement

COMMONWEALTH OF MASSACHUSETTS

_____ County, ss.

On this ____ day of _____, 20____, before me, the undersigned notary public, personally appeared _____, the _____ of _____, proved to me through satisfactory evidence of identification, which was [a current driver's license] [a current U.S. passport] [my personal knowledge], to be the person whose name is signed on the preceding instrument and acknowledged the foregoing instrument to be their free act and deed and the free act and deed of _____.

Notary Public
My commission expires:

COMMONWEALTH OF MASSACHUSETTS

_____ County, ss.

On this ____ day of _____, 20____, before me, the undersigned notary public, personally appeared Gina B. Dailey, Director of Comprehensive Permit Programs of the Massachusetts Housing Finance Agency, as Subsidizing Agency as aforesaid, proved to me through satisfactory evidence of identification, which was my personal knowledge, to be the person whose name is signed on the preceding instrument and acknowledged the foregoing instrument to be her free act and deed and the free act and deed of Massachusetts Housing Finance Agency.

Notary Public
My commission expires:

ACKNOWLEDGEMENT OF ZONING BOARD OF APPEALS

The undersigned duly appointed Chairman and members of the _____ Zoning Board of Appeals hereby acknowledge that, after due consideration of the Developer's request, pursuant to the requirements of 760 CMR 56.05(11), the Board hereby agrees that the foregoing Regulatory Agreement, including the terms and conditions of the form of Affordable Housing Restriction, Affordability Monitoring Services Agreement, and Limited Dividend Monitoring Services Agreement attached thereto, satisfy the requirements of the Comprehensive Permit as defined therein. Without limiting the generality of the foregoing, the units in the Project required to be affordable under the Comprehensive Permit shall be affordable if such units are subject to an Affordable Housing Restriction in the form attached to the foregoing Regulatory Agreement; any local preference set forth in the Comprehensive Permit shall be implemented only to the extent in compliance with applicable state and federal fair housing rules; and compliance with the limited dividend requirement shall be determined solely by the Subsidizing Agency (as defined at 760 CMR 56.02) under the Regulatory Agreement using the standards of the Subsidizing Agency applicable to comprehensive permit projects in accordance with the Comprehensive Permit Guidelines. In addition, the conflict provision of the Regulatory Agreement shall control over any conflict provision of the Comprehensive Permit.

ZONING BOARD OF
APPEALS

Chairman

COMMONWEALTH OF MASSACHUSETTS

_____ County, ss.

On this ____ day of _____, 20__, before me, the undersigned notary public, personally appeared _____, the Chairman of the _____ Zoning Board of Appeals, proved to me through satisfactory evidence of identification, which was [a current driver's license] [a current U.S. passport] [my personal knowledge], to be the person whose name is signed on the preceding instrument and acknowledged the foregoing instrument to be his or her free act and deed and the free act and deed of the _____ Zoning Board of Appeals.

Notary Public

My commission expires:

Exhibit H

Soil Report



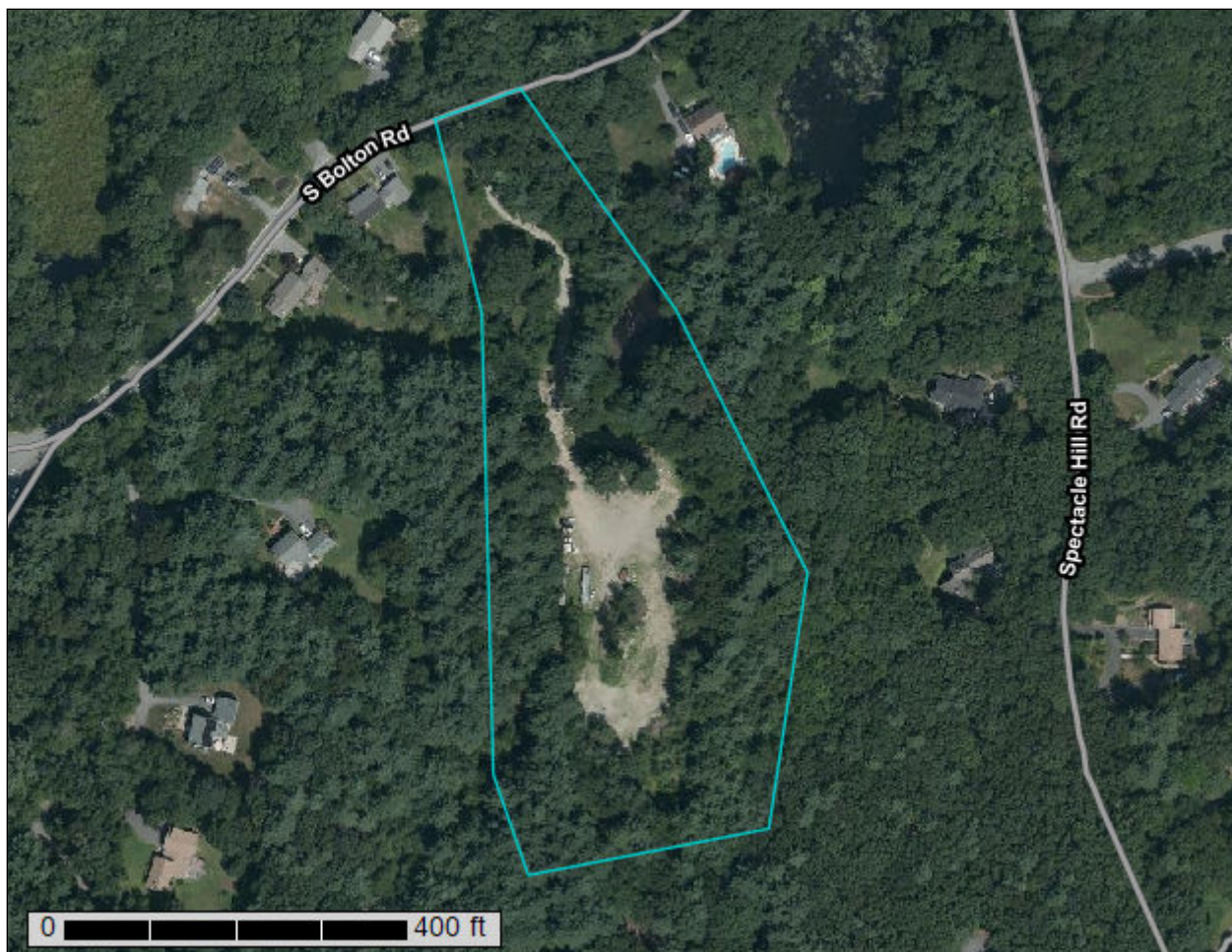
United States
Department of
Agriculture

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 Worcester County, Massachusetts, Northeastern Part



October 7, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

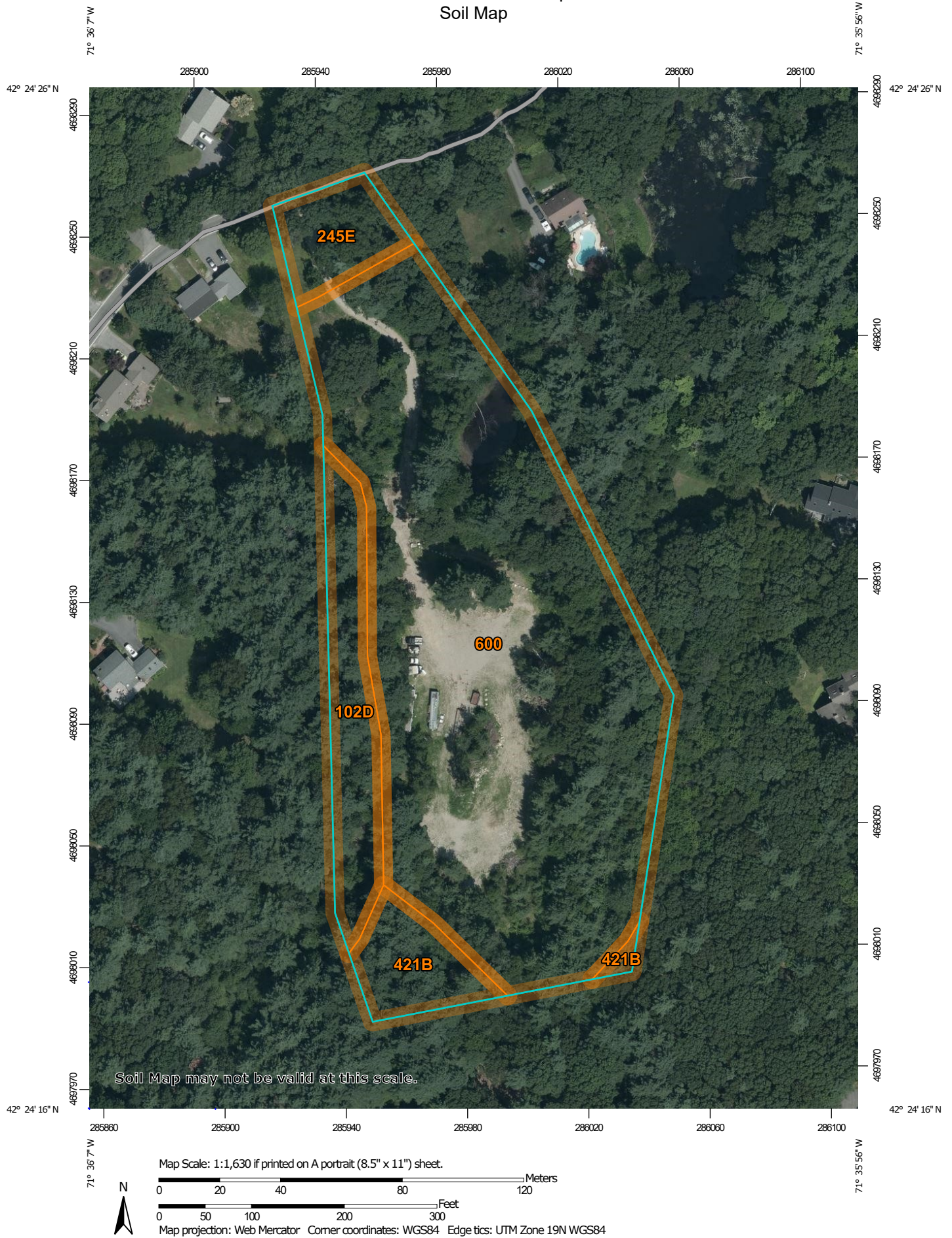
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


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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 1:20,000.

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: Worcester County, Massachusetts,
Northeastern Part
Survey Area Data: Version 15, Jun 10, 2020

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

Date(s) aerial images were photographed: Jul 26, 2019—Oct 5, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	0.6	9.9%
245E	Hinckley loamy sand, 25 to 35 percent slopes	0.3	5.2%
421B	Canton fine sandy loam, 0 to 8 percent slopes, very stony	0.3	5.8%
600	Pits, gravel	4.4	79.1%
Totals for Area of Interest		5.6	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.

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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.

Worcester County, Massachusetts, Northeastern Part

102D—Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2w69h
Elevation: 0 to 1,540 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

Chatfield, extremely stony, and similar soils: 35 percent
Hollis, extremely stony, and similar soils: 30 percent
Rock outcrop: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Extremely Stony

Setting

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: Convex, linear
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: 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 capacity: Low (about 4.3 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

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Hydric soil rating: No

Description of Hollis, Extremely Stony

Setting

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: Convex, linear

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: 15 to 35 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 capacity: 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: 15 to 35 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 capacity: 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

Minor Components

Charlton, extremely stony

Percent of map unit: 7 percent

Landform: Ridges, hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear, convex

Across-slope shape: Convex

Hydric soil rating: No

Leicester, extremely stony

Percent of map unit: 4 percent

Landform: Drainageways, depressions, hills, ground moraines

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Base slope

Down-slope shape: Linear, concave

Across-slope shape: Concave

Hydric soil rating: Yes

Sutton, extremely stony

Percent of map unit: 2 percent

Landform: Ground moraines, hills

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Paxton, extremely stony

Percent of map unit: 2 percent

Landform: Hills, ground moraines, drumlins

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear, convex

Across-slope shape: Convex, linear

Hydric soil rating: No

245E—Hinckley loamy sand, 25 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2svmf

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Elevation: 0 to 1,200 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

Hinckley and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, kame terraces, eskers, kames, outwash plains, moraines

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser

Down-slope shape: Convex, concave, linear

Across-slope shape: Concave, linear, convex

Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

A - 1 to 8 inches: loamy sand

Bw1 - 8 to 11 inches: gravelly loamy sand

Bw2 - 11 to 16 inches: gravelly loamy sand

BC - 16 to 19 inches: very gravelly loamy sand

C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 25 to 35 percent

Depth to restrictive feature: More than 80 inches

Drainage class: 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

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 10 percent

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Landform: Outwash deltas, outwash terraces, kame terraces, eskers, kames, outwash plains, moraines

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser

Down-slope shape: Convex, concave, linear

Across-slope shape: Concave, linear, convex

Hydric soil rating: No

Merrimac

Percent of map unit: 3 percent

Landform: Moraines, outwash terraces, kame terraces, eskers, kames, outwash plains

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser

Down-slope shape: Linear, convex, concave

Across-slope shape: Convex, linear, concave

Hydric soil rating: No

Sudbury

Percent of map unit: 2 percent

Landform: Moraines, outwash deltas, outwash terraces, kame terraces, outwash plains

Landform position (two-dimensional): Backslope, footslope, toeslope

Landform position (three-dimensional): Base slope, tread

Down-slope shape: Concave, linear

Across-slope shape: Linear, concave

Hydric soil rating: No

421B—Canton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w81l

Elevation: 0 to 1,180 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: Farmland of statewide importance

Map Unit Composition

Canton, very stony, and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Hills, moraines, ridges

Landform position (two-dimensional): Summit, shoulder, backslope

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

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
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 capacity: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Scituate, very stony

Percent of map unit: 9 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Footslope, backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Montauk, very stony

Percent of map unit: 5 percent
Landform: Recessional moraines, drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Gloucester, very stony

Percent of map unit: 4 percent

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Landform: Hills, moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Swansea

Percent of map unit: 2 percent
Landform: Kettles, swamps, bogs, marshes, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

600—Pits, gravel

Map Unit Setting

National map unit symbol: w3g6
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits, gravel: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Gravel

Setting

Landform position (three-dimensional): Base slope
Parent material: Loose sandy and gravelly glaciofluvial deposits

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Custom Soil Resource Report

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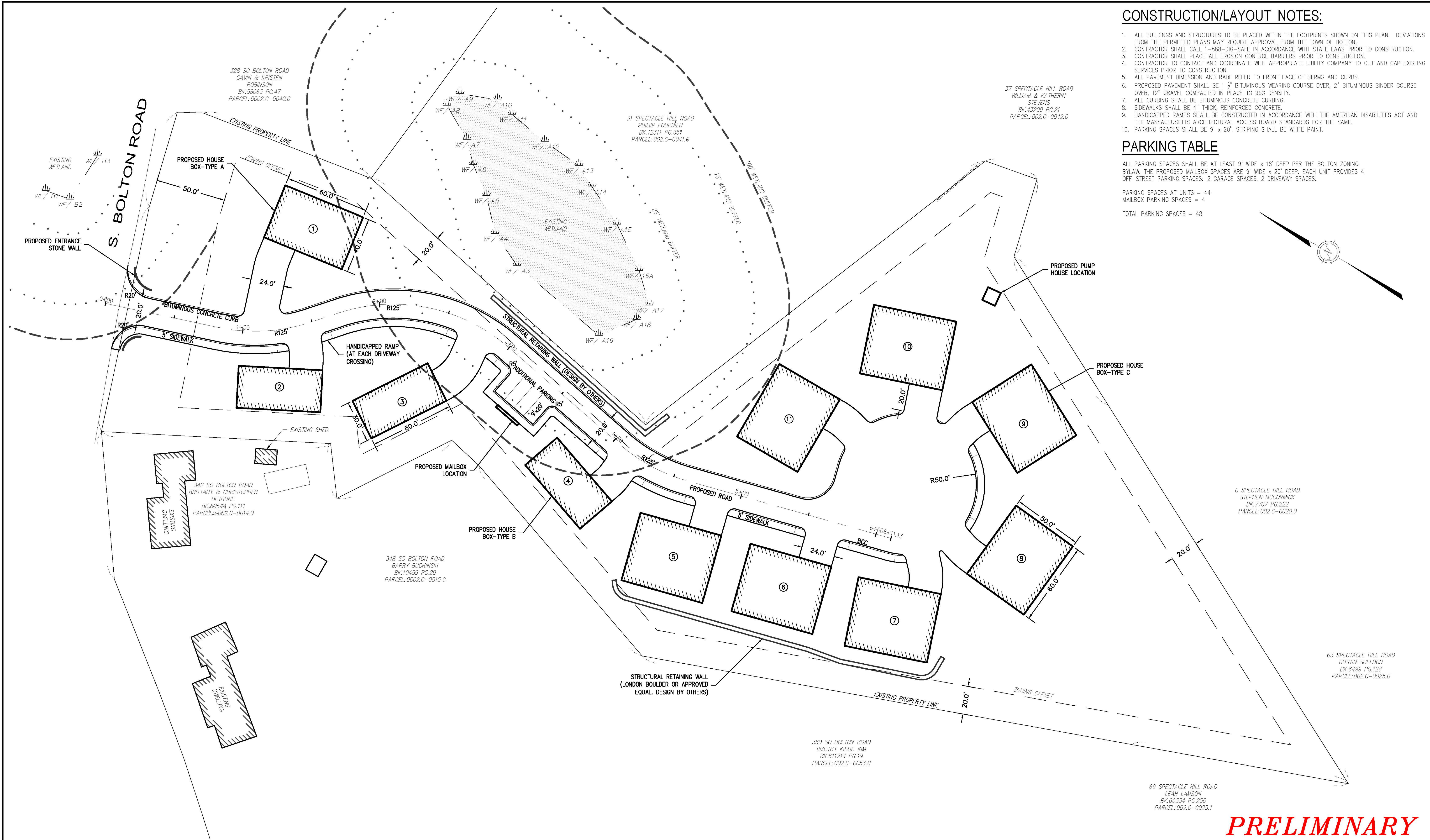
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Exhibit I

Site Plans

FILENAME=P:\Projects\5293\3\SITE PLANS\C2.0 5293-LAYOUT.dwg PLOT DATE=3/11/2020 5:53:40 PM USER=JAMES P. LAUGHLIN



<div>PREPARED BY:</div> <div><div><div></div><div></div></div><div><div>DUCHARME & DILLIS</div><div>Civil Design Group, Inc.</div><div>CIVIL ENGINEERS • LAND SURVEYORS • WETLAND CONSULTANTS</div></div></div> <div>1092 MAIN STREET, P.O. BOX 428 BOLTON, MASSACHUSETTS 01740</div> <div>PHONE: (978) 779-6091 FAX: (978) 779-0260 www.DucharmeandDillis.com</div>		<div>OWNER:</div> <div>JAMES MORIN & KATHRYN LUM 307 CENTRAL STREET, APT 331 HUDSON, MASSACHUSETTS</div>		<div>SCALE:</div> <div><div><div>3000153060120</div><div>1 in. = 30 ft.</div></div><div>COPYRIGHT DUCHARME & DILLIS CIVIL DESIGN GROUP, INC 2020</div></div>								<div>DATE:</div> <div>3/11/20</div> <div>DESIGN BY:</div> <div>JPL</div> <div>DRAWN BY:</div> <div>JPL</div> <div>CHECKED BY:</div> <div>FMM</div>		<div>LAYOUT PLAN MALLARD LANE BOLTON, MASSACHUSETTS</div> <table><tr><th>NO.</th><th>DATE</th><th>DESCRIPTION</th><th>BY</th></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>				NO.	DATE	DESCRIPTION	BY													<div>JOB NO.</div> <div>5293</div> <div>DRAWING NO.</div> <div>5293-LAYOUT</div> <div>SHEET NO.</div> <div>C2.0</div>	
NO.	DATE	DESCRIPTION	BY																																
<div>APPLICANT:</div> <div>JAMES MORIN 307 CENTRAL STREET, APT 331 HUDSON, MASSACHUSETTS</div>																																			

1. GRADES SHOWN ON THIS PLAN REFER TO FINAL FINISHED GRADES.
2. STORM DRAIN PIPE TO BE SMOOTH LINED HDPE PIPE AS MANUFACTURED BY ADVANCED DRAINAGE SYSTEMS, INC. OR APPROVED EQUAL. PROVIDED CUT SHEETS TO ENGINEER FOR APPROVAL.
3. MANHOLES SHALL BE 4-FOOT DIAMETER PRECAST CONCRETE STRUCTURES.
4. UNDERGROUND STORMWATER MANAGEMENT AREAS SHALL BE CULTEC RECHARGER 360HD AND 902HD, OR APPROVED EQUAL.
5. ISOLATOR ROW MANHOLES SHALL BE 4-FOOT DIAMETER STRUCTURES WITH A CONCRETE WEIR.
6. ALL CATCH BASINS GRATES SHALL BE SET AT BINDER ASPHALT GRADES AND RAISED TO FINAL FINISHED GRADES JUST PRIOR TO TOP COAT PAVEMENT PLACEMENT.
7. THE CONTRACTOR SHALL USE ALL MEANS NECESSARY TO MINIMIZE COMPACTION OF SOILS IN RECHARGE AREAS BOTH DURING AND AFTER CONSTRUCTION.



C3.0

FILENAME=P:\Projects\5293\3\Site Plans\C5.0 5293-UTILITIES.dwg PLOT DATE=3/11/2020 5:54:40 PM USER=JAMES P. LAUGHLIN

1092 MAIN STREET, P.O. BOX 428
BOLTON, MASSACHUSETTS 01740

PREPARED BY:

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OWNER:

JAMES MORIN & KATHRYN LUM
307 CENTRAL STREET, APT 331
HUDSON, MASSACHUSETTS

APPLICANT:

JAMES MORIN
307 CENTRAL STREET, APT 331
HUDSON, MASSACHUSETTS

SCALE:

30 0 15 30 60 120
1 in. = 30 ft.

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DATE: 3/11/20

DESIGN BY: JPL

DRAWN BY: JPL

CHECKED BY: FMM

NO. DATE DESCRIPTION BY

UTILITIES PLAN
MALLARD LANE
BOLTON, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

JOB NO. 5293

DRAWING NO. 5293-UTILITIES

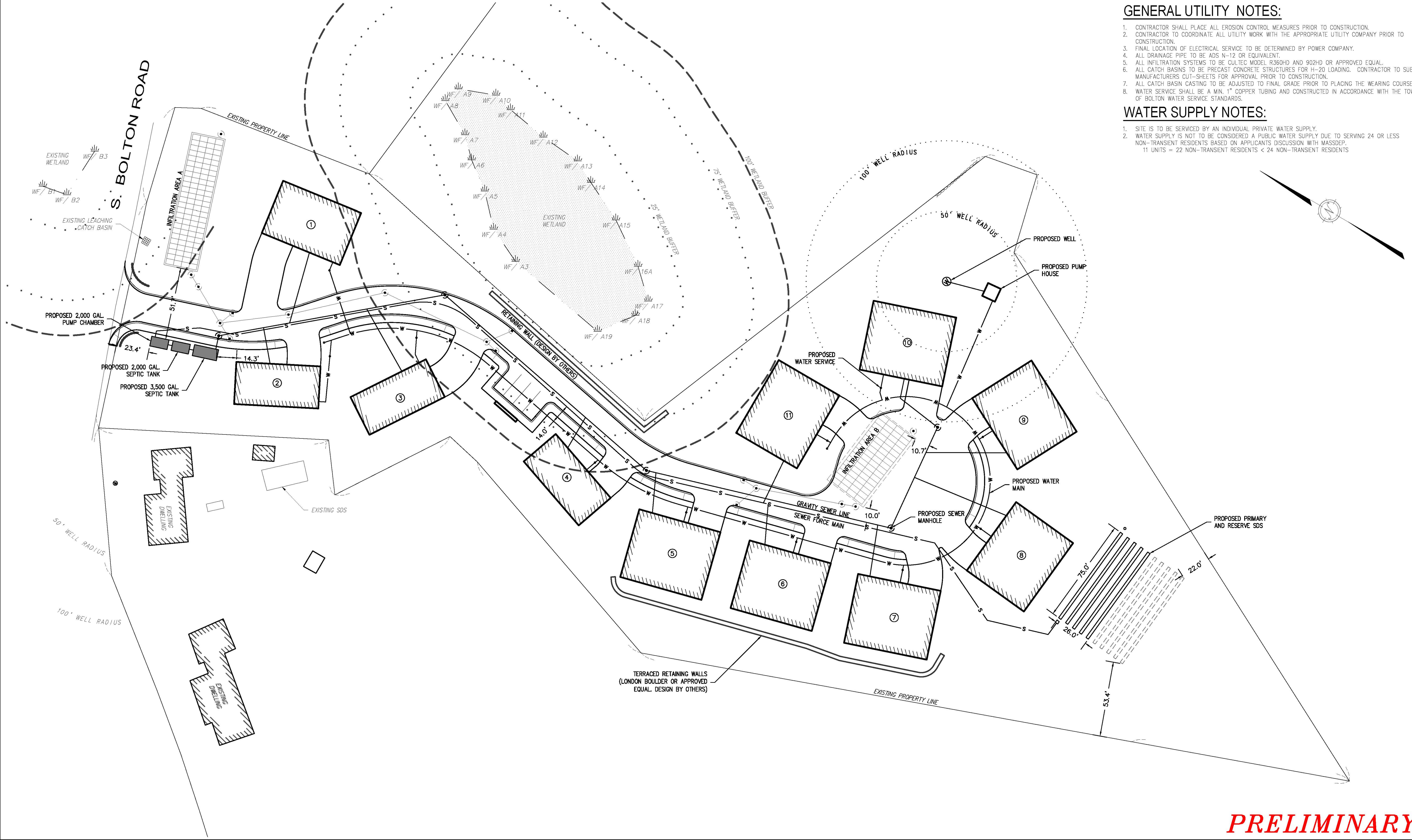
SHEET NO. C5.0

GENERAL UTILITY NOTES:

1. CONTRACTOR SHALL PLACE ALL EROSION CONTROL MEASURES PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO COORDINATE ALL UTILITY WORK WITH THE APPROPRIATE UTILITY COMPANY PRIOR TO CONSTRUCTION.
3. FINAL LOCATION OF ELECTRICAL SERVICE TO BE DETERMINED BY POWER COMPANY.
4. ALL DRAINAGE PIPE TO BE ADS N-12 OR EQUIVALENT.
5. ALL INFILTRATION SYSTEMS TO BE CULTEC MODEL R360HD AND 902HD OR APPROVED EQUAL.
6. ALL CATCH BASINS TO BE PRECAST CONCRETE STRUCTURES FOR H-20 LOADING. CONTRACTOR TO SUBMIT MANUFACTURERS CUT-SHEETS FOR APPROVAL PRIOR TO CONSTRUCTION.
7. ALL CATCH BASIN CASTING TO BE ADJUSTED TO FINAL GRADE PRIOR TO PLACING THE WEARING COURSE.
8. WATER SERVICE SHALL BE A MIN. 1" COPPER TUBING AND CONSTRUCTED IN ACCORDANCE WITH THE TOWN OF BOLTON WATER SERVICE STANDARDS.

WATER SUPPLY NOTES:

1. SITE IS TO BE SERVICED BY AN INDIVIDUAL PRIVATE WATER SUPPLY.
2. WATER SUPPLY IS NOT TO BE CONSIDERED A PUBLIC WATER SUPPLY DUE TO SERVING 24 OR LESS NON-TRANSIENT RESIDENTS BASED ON APPLICANTS DISCUSSION WITH MASSDEP.
11 UNITS = 22 NON-TRANSIENT RESIDENTS < 24 NON-TRANSIENT RESIDENTS

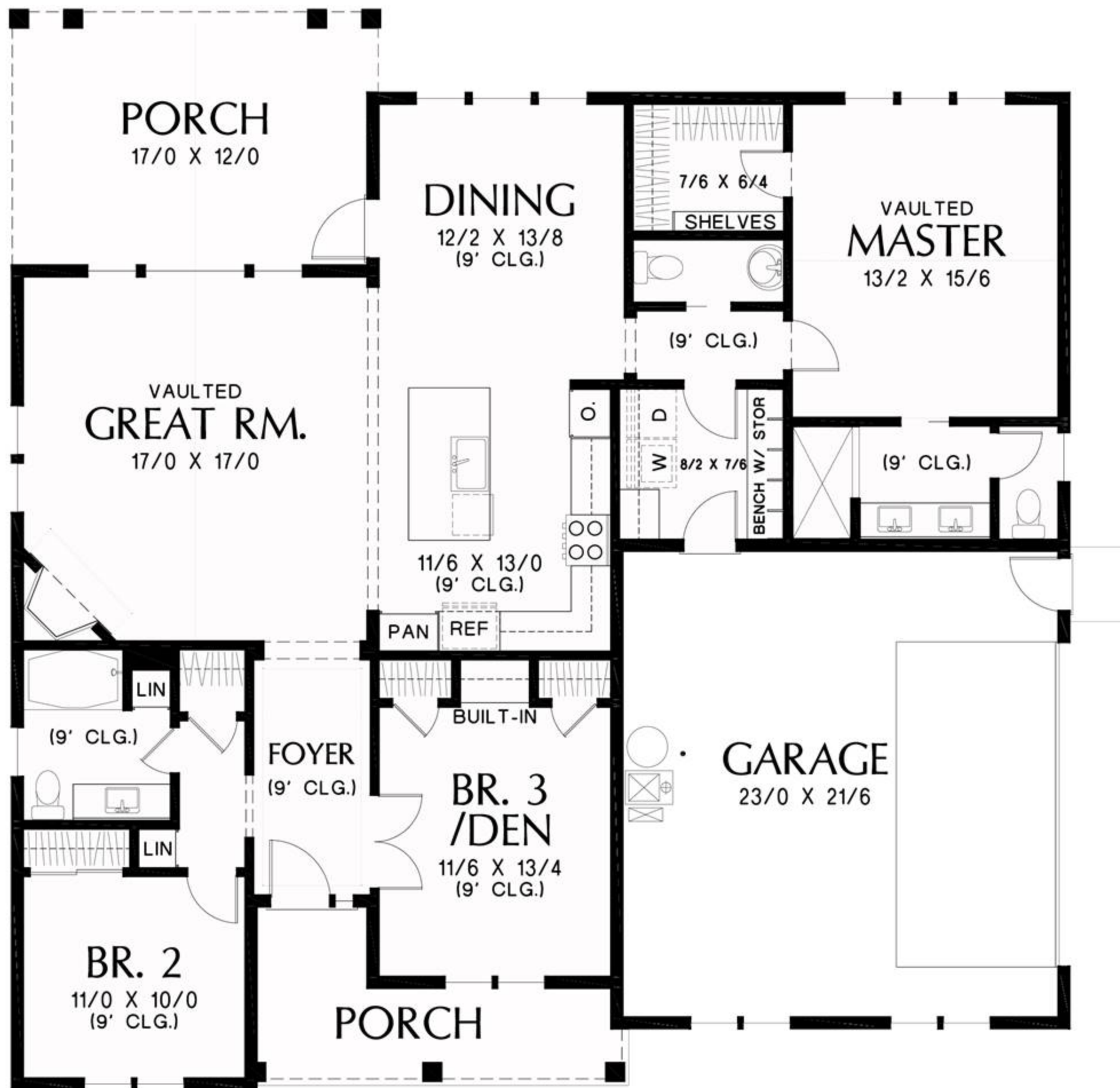


PRELIMINARY

Exhibit J

Architectural Drawings

53'



52'

20/0 X 17/6 +/-

16/6 X 18/6 +/-

12/2 X 16/2

11/6 X 14/8
(9' CLG.)

10/0 X 17/0 +/-

21/0 X 22/6

(16' CLG.)

11/0 X 11/2 +/-
(9' CLG.)

12/0 X 12/0
(9' CLG.)

B.B.Q.

REF

16/4 X 9/4 +/-
(9' CLG.)

D W
(9' CLG.)

BENCH

COVERED
PORCH

PANTRY

(9' CLG.)

 $8/8 \times 6/8 \pm$

(9' CLG.)

BENCH

LINEN

SHLVS

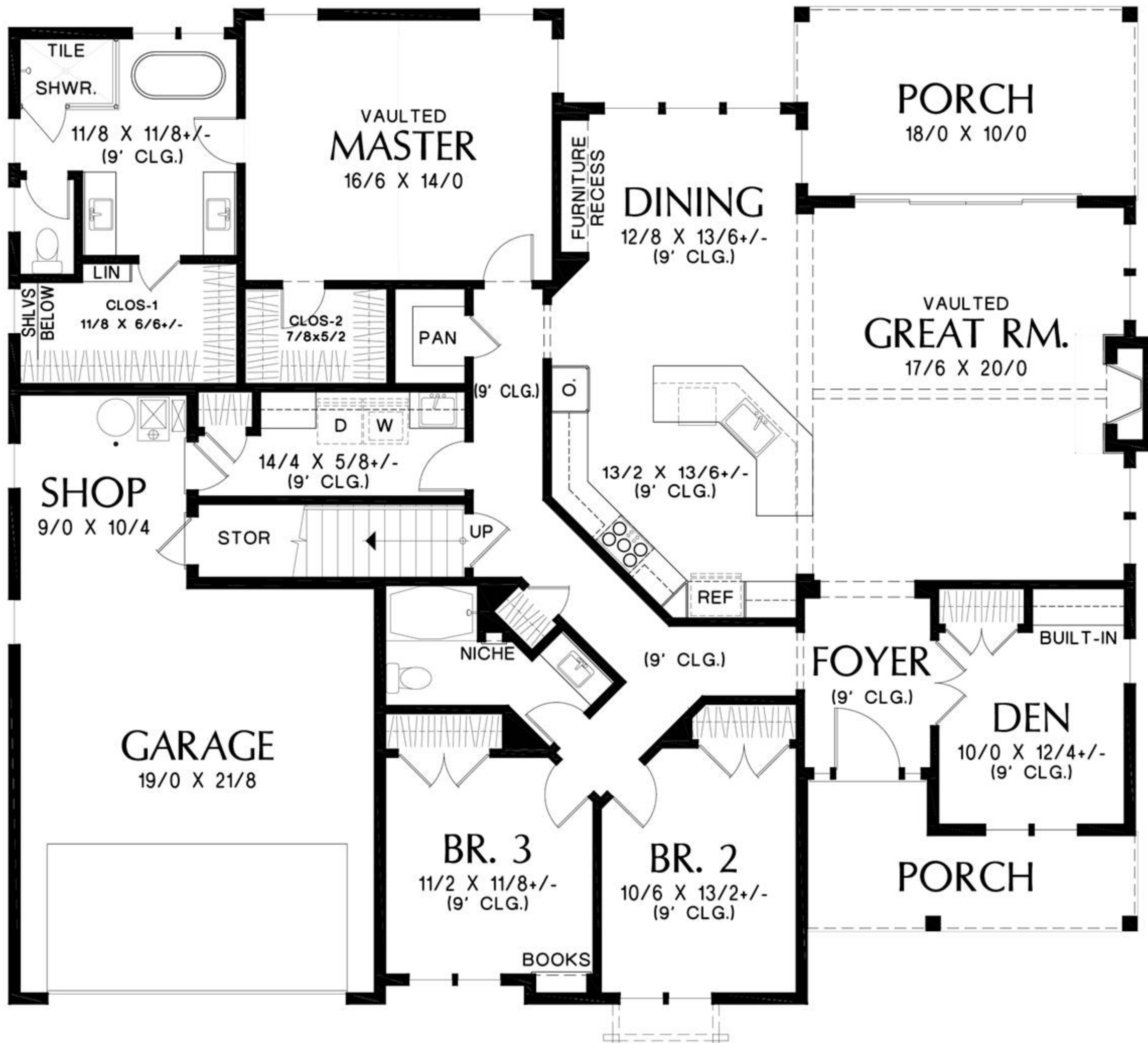


Exhibit K

Drainage Calculations

STORMWATER REPORT

FOR

MALLARD LANE

IN

**BOLTON,
MASSACHUSETTS**

PREPARED BY: DUCHARME & DILLIS
CIVIL DESIGN GROUP, INC.
P.O. Box 428
Bolton, MA

PREPARED FOR: JAMES MORIN
307 Central Street, Apt. 331
Bolton, MA

MARCH 11TH, 2020

DDCDG PROJECT # 6267

A Stormwater Report Prepared for:

James Morin
307 Central Street, Apt. 331
Bolton, MA

**Mallard Lane
Bolton, MA**

Prepared by:

James Laughlin,
Civil Engineer

Francis McPartlan, PE (MA)
Senior Civil Engineer

DUCHARME & DILLIS CIVIL DESIGN GROUP, INC.
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March 11th, 2020

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4.0 Plans

<i>Pre-development Watershed Plan</i>	
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1.0 Project Narrative

1.1 Project Type

The proposed project includes the development of 11 age restricted homes with an associated road and cul-de-sac. The homes will all be connected to a shared septic system and there will be a proposed well on site.

1.2 Purpose and Scope

This report has been prepared to comply with the requirements of the Stormwater Management Standards incorporated in the Massachusetts Wetlands Protection Act Regulations, 310 CMR 10.00. These standards are intended to promote increased groundwater recharge and prevent stormwater discharges from causing or contributing to the pollution of surface waters and ground waters of the Commonwealth. The standards aim to accomplish these goals by encouraging the greater use of low impact development techniques and improving the operation and maintenance of stormwater best management practices.

This report addresses compliance of the proposed development with each of the ten stormwater standards, it provides calculations to support the compliance information, and it provides a Long-Term Pollution Prevention Plan and an Operation and Maintenance Plan for the stormwater management system.

1.3 Proposed Development

As mentioned, the proposed project is 11 house development with an associated road and cul-de-sac. The project will be filed under a comprehensive permit plan.

The proposed road will have access off the south side of South Bolton Road approximately 670 feet from the intersection with Spectacle Hill Road. All proposed houses will be connected to a shared septic system and will get water from a proposed well on site.

1.4 LID Measures

Care has been taken to lay out the proposed site in a manner that works with existing topography. BMPs such as infiltration chambers are used to manage the stormwater runoff. Stormwater from the impervious areas of the proposed lots are routed via storm drains to the infiltration chambers which contains a sediment forebay for pretreatment. The infiltration chambers will be used to promote groundwater recharge and limit the runoff leaving the site

1.5 Site Description

The subject site is found on the south side of South Bolton Road in Bolton

Massachusetts. The site currently vacant and has a gravel driveway that provides access to the property. The site is located on Parcel 002.C-0015.1 and is approximately 5.0 acres. There is one bordering vegetated wetland north of the site across South Bolton Road and one on the abutting property east of the site.

The general topography of the site slopes from south to north/north east towards the offsite wetlands. There are steep slopes along the southern property line. The site is mostly woods except for the location of the gravel driveway.

The property was previously used as a gravel pit, so the majority of the site consists of gravel material. The NRCS soil survey information indicates that most of the site is underlain with gravel, chatfield-hollis-rock, hinkley loamy sand and canton fine sandy loam. These soils fall under the Hydrologic Soil Group A, B and D and are delineated on the Pre-Development and Post-Development drainage maps. On site soil testing confirmed the NRCS Soil Survey Data.

Proposed Stormwater Management System

Runoff from the proposed impervious areas will be conveyed and treated through a combination of BMP's and infiltrated to the groundwater. The infiltration will help to recharge the groundwater and ensure that post-development runoff rates will not exceed the pre-development rates. The following is a brief discussion of each conveyance and treatment BMP proposed.

Deep Sump Hooded Catch Basin

Deep sump hooded catch basins are proposed to convey the runoff from the proposed paved areas and roofs to the infiltration basin. These catch basins will discharge to manholes and conventional storm drains.

Subsurface Infiltration Systems

Subsurface infiltration systems are included at the entrance of the site and under the cul-de-sac. Cultec prefabricated chambers, models R-360HD and R-902HD, will be installed to collect the runoff from the roofs and pavement after pretreatment in the deep sump hooded catch basins. The infiltration systems will provide groundwater recharge as well.

Vortsentry

One Vortsentry HS36 structure will be installed upstream of each infiltration area. These structures are designed to have an 80% TSS removal rate and have been sized base the total treatment flow rate.

1.6 Methods of Analysis

United States Department of Agriculture Natural Resources Conservation Service (NRCS) soil cover complex methods (TR-20) were employed to compute runoff quantities for the subject property. HydroCAD 10.0 computer software was employed in this hydrologic analysis. A comparison of pre- and post-development runoff quantities at various analysis points downstream around the site was performed in order to design a stormwater management system that will limit peak rates of runoff from the development to predevelopment levels for 24-hour rainfall events of 2-, 10-, 25- and 100-year return frequencies. Watershed boundaries for existing conditions are depicted on the attached Pre-development Watershed Plan. Post-Developed watershed boundaries are indicated on the Post-Development Watershed Plan.

Stormwater runoff drains in two directions off the site: over the northern property line onto South Bolton Road and over the eastern property line into the wetlands on the abutting property. Therefore, two design points were used in the comparison of pre- and post-developed peak runoff rates.

2.0 Stormwater Standards Compliance

2.1 Standard 1 – Untreated Discharges (fully met)

The stormwater management system for the proposed development will not result in any new discharges of untreated stormwater to wetland resource areas. The stormwater management system has been designed such that there is no erosion or scour to wetland resource areas or waters of the Commonwealth.

2.2 Standard 2 – Peak Rate Attenuation (fully met)

The stormwater management system for the proposed development will employ subsurface infiltration systems that have been sized to retain and recharge the runoff related to a 100-year, 24-hour rainfall event.

Hydrologic calculations for existing and proposed site conditions are included in Appendices D and E respectively. Calculations for 24-hour rainfall events of 2-, 10-, 25- and 100-year return frequencies are provided. The following table provides a summary of peak rates of runoff related to each of these storms for each of the design points. For all rainfall events considered, the proposed stormwater management system will control runoff from the development such that corresponding peak flows at the design point will not exceed pre-development levels.

Table 1: DP-A Peak Runoff Rates

	Pre-Developed	Post-Development
2-year	0.00 cfs	0.00 cfs
10-year	0.07 cfs	0.06 cfs
25-year	0.24 cfs	0.16 cfs
100-year	0.84 cfs	0.49 cfs

Table 2: DP-B Peak Runoff Rates

	Pre-Developed	Post-Development
2-year	0.02 cfs	0.02 cfs
10-year	0.39 cfs	0.26 cfs
25-year	1.10 cfs	0.57 cfs
100-year	3.40 cfs	1.23 cfs

Since the Post-Development peak flow rates are less than the Pre-Development flow rates, we can determine that there will be no increase to off-site flooding during any rainfall event.

2.1 *Standard 3 – Recharge (fully met)*

As discussed in the Introduction, Natural Resource Conservation Service data indicates that the areas within the proposed development consist of soils from Hydrologic group A, B and D.

The subsurface infiltration systems have been designed to provide the required recharge and water quality volumes. They will provide groundwater recharge across the site which will create optimal conditions for the adjacent wetlands. Recharge calculations can be found in Appendix F.

2.2 *Standard 4 – Water Quality (fully met)*

A total of 85% TSS removal was achieved using BMPs. As part of the proposed project, infiltration requires a minimum of 44% TSS removal provided prior to discharge. Stormwater on site will receive full TSS treatment through the use of a Vortsentry HS structure before entering one of the infiltration areas. These structures are designed to remove 80% TSS. They have been sized based on the total treatment flow rate, giving the treatment system an adequate WQV. See Appendix F for detailed calculations. A water quality depth of 1.0” is used for the calculations since the infiltration rate is greater than 2.41 in/hr.

2.3 *Standard 5 – Land Uses with Higher Pollutant Loads (not applicable)*

The current and proposed uses of the subject site do not constitute land use with higher potential pollutant load, thus Standard 5 does not apply to the proposed project.

2.4 *Standard 6 – Critical Areas (not applicable)*

The proposed project does not involve a stormwater discharge within or near to any of the areas defined as “Critical Areas” at 314 CMR 9.02 and 310 CMR 10.04.

2.5 *Standard 7 – Redevelopment (not applicable)*

The proposed project is not categorized as a redevelopment, therefore Standard 7 does not apply.

2.6 *Standard 8 – Construction Period Pollution Prevention and Erosion and Sediment Control (to be submitted at a later date)*

The project is subject to the filing of an Environmental Protection Agency Notice of Intent (EPA NOI), therefore, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to construction. This document will be prepared to satisfy the requirements of the EPA NOI and the Standard 8 Construction Period

Pollution prevention and Erosion and Sedimentation Control Plan.

2.7 *Standard 9 – Operation and Maintenance Plan (fully met)*

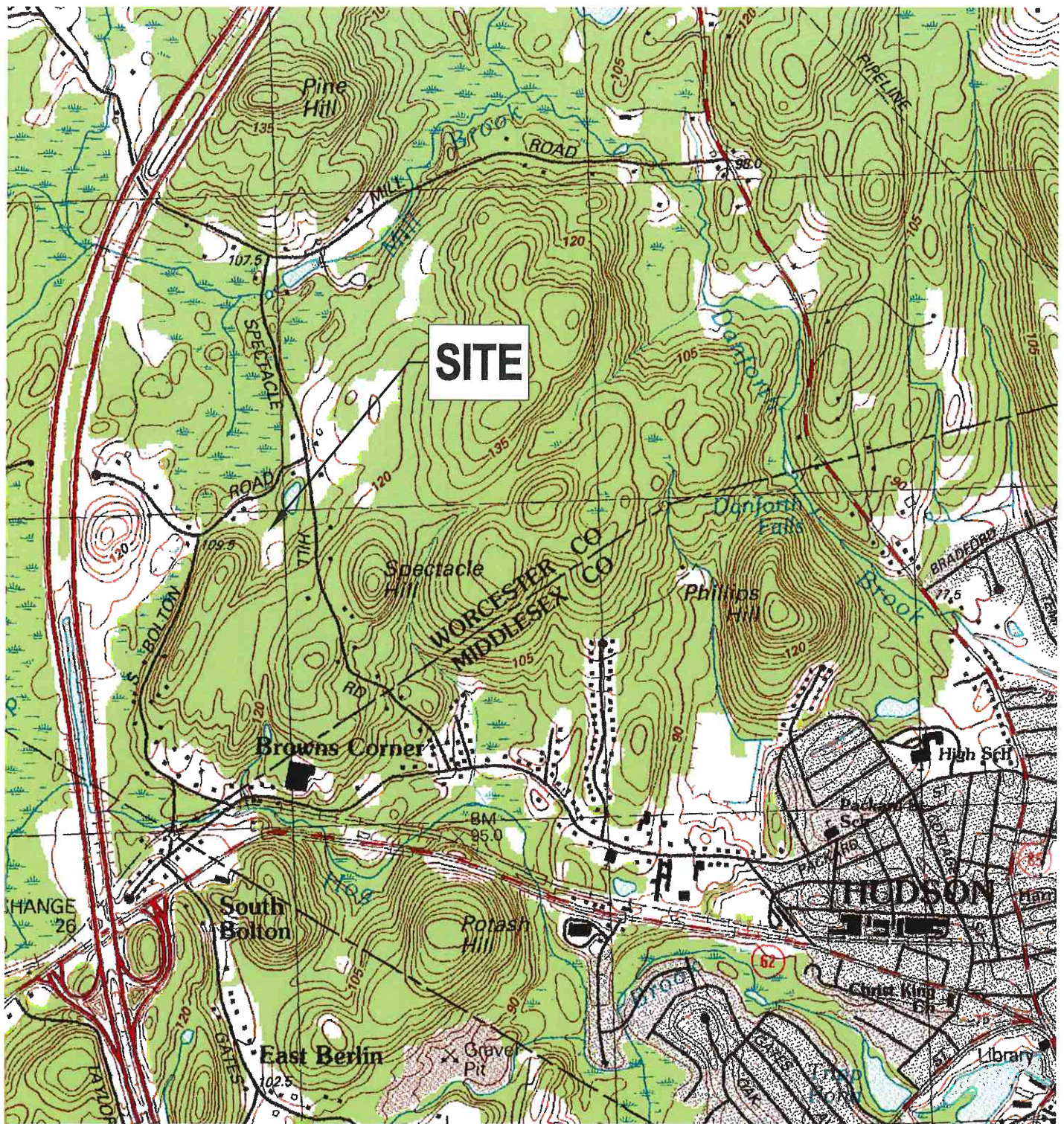
Refer to Appendix H for a complete copy of the Stormwater Operation and Maintenance Plan.

2.8 *Standard 10 – Prohibition of Illicit Discharges (to be submitted at a later date)*

An illicit discharge statement will be prepared after approvals are received and prior to construction.

APPENDIX A

Locus Map



LOCUS MAP

Prepared By: Ducharme & Dillis, Civil Design Group, Inc.
1092 Main Street
P.O. Box 428
Bolton, Massachusetts

DATE: MARCH 2020

Prepared For: James Morin
307 Central Street, Apt. 331
Bolton, Massachusetts

DUCHARME & DILLIS
Civil Design Group, Inc.
CIVIL ENGINEERS • LAND SURVEYORS • WETLAND CONSULTANTS

SCALE: 1" = 800'

APPENDIX B

Checklist for Stormwater Report



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 8²
- 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.



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

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment (Although the project is considered redevelopment, it meets all of the Standards below)

☐ 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:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ 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): Subsurface Infiltration

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ 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

- ☒ 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 Field¹
- ☐ 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)

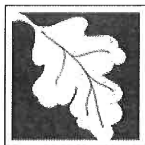
Standard 3: Recharge (continued)

- ☒ 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 proprietary 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 C

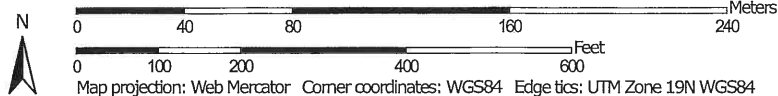
NRCS Soils Data

Hydrologic Soil Group—Worcester County, Massachusetts, Northeastern Part



Soil Map may not be valid at this scale.

Map Scale: 1:2,780 if printed on A portrait (8.5" x 11") sheet.

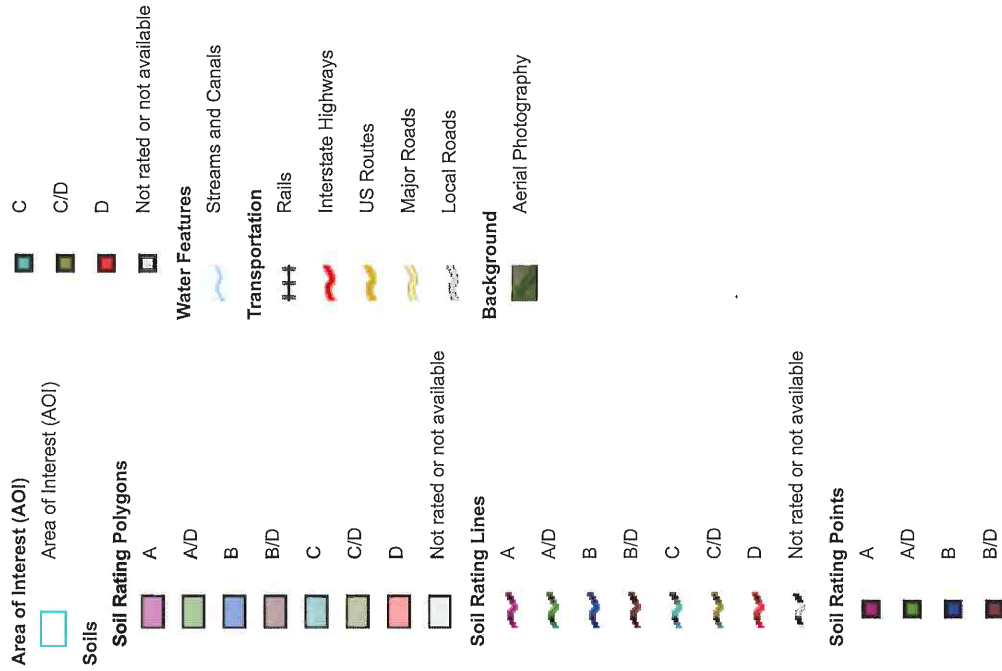


Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

2/7/2020
Page 1 of 4

MAP LEGEND



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 14, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 29, 2019

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		0.8	2.1%
52A	Freetown muck, 0 to 1 percent slopes	B/D	4.2	10.7%
102C	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	B	0.2	0.4%
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	D	8.1	20.7%
245E	Hinckley loamy sand, 25 to 35 percent slopes	A	4.7	12.1%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	2.8	7.3%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	2.6	6.7%
421B	Canton fine sandy loam, 0 to 8 percent slopes, very stony	B	7.7	19.6%
600	Pits, gravel		8.0	20.4%
Totals for Area of Interest			39.0	100.0%

Description

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 the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined 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 claypan 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.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

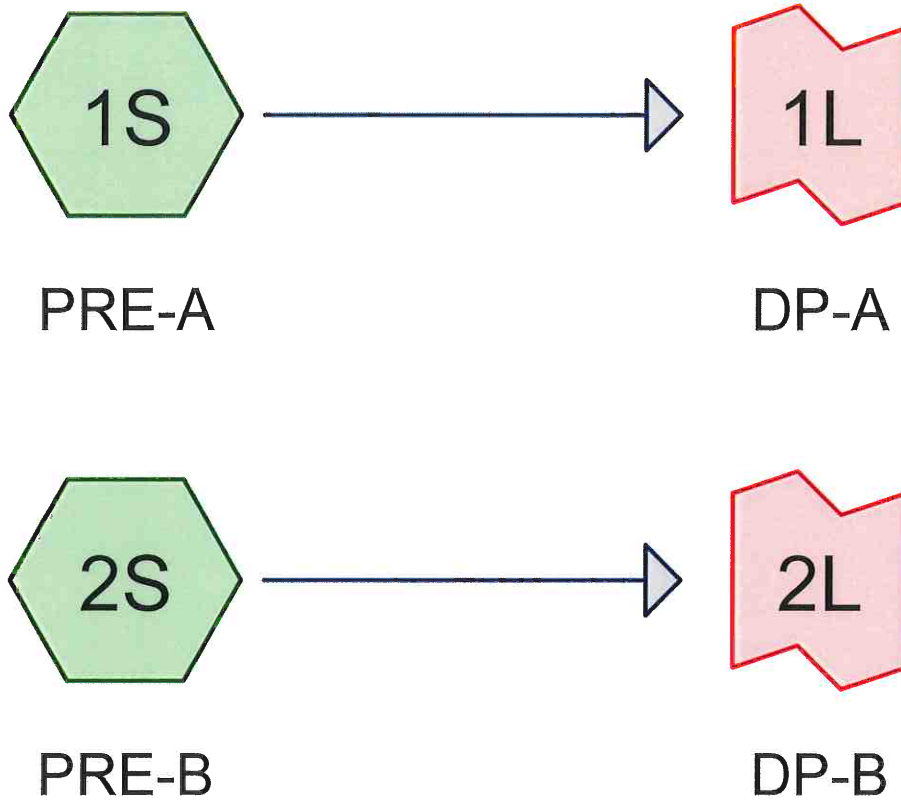
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX D

Existing Conditions – Hydrologic Calculations



5293-PRE

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.10	2
2	10-year	Type III 24-hr		Default	24.00	1	4.50	2
3	25-year	Type III 24-hr		Default	24.00	1	5.40	2
4	100-year	Type III 24-hr		Default	24.00	1	7.00	2

5293-PRE*Type III 24-hr 2-year Rainfall=3.10"*

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: PRE-ARunoff Area=52,042 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=483' Tc=11.8 min CN=43 Runoff=0.00 cfs 0.001 af**Subcatchment 2S: PRE-B**Runoff Area=131,254 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=212' Tc=7.1 min CN=46 Runoff=0.02 cfs 0.011 af**Link 1L: DP-A**Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af**Link 2L: DP-B**Inflow=0.02 cfs 0.011 af
Primary=0.02 cfs 0.011 af**Total Runoff Area = 4.208 ac Runoff Volume = 0.013 af Average Runoff Depth = 0.04"**
100.00% Pervious = 4.208 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: PRE-A

Runoff = 0.00 cfs @ 21.37 hrs, Volume= 0.001 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
1,981	96	Gravel surface, HSG A
14,669	39	>75% Grass cover, Good, HSG A
26,864	30	Woods, Good, HSG A
8,528	77	Woods, Good, HSG D
52,042	43	Weighted Average
52,042		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1300	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
5.9	433	0.0600	1.22		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	483	Total			

Summary for Subcatchment 2S: PRE-B

Runoff = 0.02 cfs @ 15.31 hrs, Volume= 0.011 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
21,041	96	Gravel surface, HSG A
94,822	30	Woods, Good, HSG A
15,391	77	Woods, Good, HSG D
131,254	46	Weighted Average
131,254		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1500	0.15		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
1.5	162	0.1300	1.80		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.1	212	Total			

Summary for Link 1L: DP-A

Inflow Area = 1.195 ac, 0.00% Impervious, Inflow Depth = 0.01" for 2-year event
Inflow = 0.00 cfs @ 21.37 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 21.37 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 2L: DP-B

Inflow Area = 3.013 ac, 0.00% Impervious, Inflow Depth = 0.05" for 2-year event
Inflow = 0.02 cfs @ 15.31 hrs, Volume= 0.011 af
Primary = 0.02 cfs @ 15.31 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

5293-PRE

Type III 24-hr 10-year Rainfall=4.50"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: PRE-ARunoff Area=52,042 sf 0.00% Impervious Runoff Depth=0.23"
Flow Length=483' Tc=11.8 min CN=43 Runoff=0.07 cfs 0.023 af**Subcatchment 2S: PRE-B**Runoff Area=131,254 sf 0.00% Impervious Runoff Depth=0.33"
Flow Length=212' Tc=7.1 min CN=46 Runoff=0.39 cfs 0.084 af**Link 1L: DP-A**Inflow=0.07 cfs 0.023 af
Primary=0.07 cfs 0.023 af**Link 2L: DP-B**Inflow=0.39 cfs 0.084 af
Primary=0.39 cfs 0.084 af**Total Runoff Area = 4.208 ac Runoff Volume = 0.106 af Average Runoff Depth = 0.30"**
100.00% Pervious = 4.208 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 10-year Rainfall=4.50"

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Summary for Subcatchment 1S: PRE-A

Runoff = 0.07 cfs @ 12.52 hrs, Volume= 0.023 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
1,981	96	Gravel surface, HSG A
14,669	39	>75% Grass cover, Good, HSG A
26,864	30	Woods, Good, HSG A
8,528	77	Woods, Good, HSG D
52,042	43	Weighted Average
52,042		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1300	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
5.9	433	0.0600	1.22		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	483	Total			

Summary for Subcatchment 2S: PRE-B

Runoff = 0.39 cfs @ 12.36 hrs, Volume= 0.084 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
21,041	96	Gravel surface, HSG A
94,822	30	Woods, Good, HSG A
15,391	77	Woods, Good, HSG D
131,254	46	Weighted Average
131,254		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1500	0.15		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
1.5	162	0.1300	1.80		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.1	212	Total			

Summary for Link 1L: DP-A

Inflow Area = 1.195 ac, 0.00% Impervious, Inflow Depth = 0.23" for 10-year event
Inflow = 0.07 cfs @ 12.52 hrs, Volume= 0.023 af
Primary = 0.07 cfs @ 12.52 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 2L: DP-B

Inflow Area = 3.013 ac, 0.00% Impervious, Inflow Depth = 0.33" for 10-year event
Inflow = 0.39 cfs @ 12.36 hrs, Volume= 0.084 af
Primary = 0.39 cfs @ 12.36 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

5293-PRE*Type III 24-hr 25-year Rainfall=5.40"*

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: PRE-ARunoff Area=52,042 sf 0.00% Impervious Runoff Depth=0.47"
Flow Length=483' Tc=11.8 min CN=43 Runoff=0.24 cfs 0.047 af**Subcatchment 2S: PRE-B**Runoff Area=131,254 sf 0.00% Impervious Runoff Depth=0.63"
Flow Length=212' Tc=7.1 min CN=46 Runoff=1.10 cfs 0.158 af**Link 1L: DP-A**Inflow=0.24 cfs 0.047 af
Primary=0.24 cfs 0.047 af**Link 2L: DP-B**Inflow=1.10 cfs 0.158 af
Primary=1.10 cfs 0.158 af**Total Runoff Area = 4.208 ac Runoff Volume = 0.205 af Average Runoff Depth = 0.59"**
100.00% Pervious = 4.208 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: PRE-A

Runoff = 0.24 cfs @ 12.40 hrs, Volume= 0.047 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.40"

Area (sf)	CN	Description
1,981	96	Gravel surface, HSG A
14,669	39	>75% Grass cover, Good, HSG A
26,864	30	Woods, Good, HSG A
8,528	77	Woods, Good, HSG D
52,042	43	Weighted Average
52,042		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1300	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
5.9	433	0.0600	1.22		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	483	Total			

Summary for Subcatchment 2S: PRE-B

Runoff = 1.10 cfs @ 12.17 hrs, Volume= 0.158 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.40"

Area (sf)	CN	Description
21,041	96	Gravel surface, HSG A
94,822	30	Woods, Good, HSG A
15,391	77	Woods, Good, HSG D
131,254	46	Weighted Average
131,254		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1500	0.15		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
1.5	162	0.1300	1.80		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.1	212	Total			

Summary for Link 1L: DP-A

Inflow Area = 1.195 ac, 0.00% Impervious, Inflow Depth = 0.47" for 25-year event
Inflow = 0.24 cfs @ 12.40 hrs, Volume= 0.047 af
Primary = 0.24 cfs @ 12.40 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 2L: DP-B

Inflow Area = 3.013 ac, 0.00% Impervious, Inflow Depth = 0.63" for 25-year event
Inflow = 1.10 cfs @ 12.17 hrs, Volume= 0.158 af
Primary = 1.10 cfs @ 12.17 hrs, Volume= 0.158 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

5293-PRE*Type III 24-hr 100-year Rainfall=7.00"*

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: PRE-ARunoff Area=52,042 sf 0.00% Impervious Runoff Depth=1.07"
Flow Length=483' Tc=11.8 min CN=43 Runoff=0.84 cfs 0.107 af**Subcatchment 2S: PRE-B**Runoff Area=131,254 sf 0.00% Impervious Runoff Depth=1.32"
Flow Length=212' Tc=7.1 min CN=46 Runoff=3.40 cfs 0.332 af**Link 1L: DP-A**Inflow=0.84 cfs 0.107 af
Primary=0.84 cfs 0.107 af**Link 2L: DP-B**Inflow=3.40 cfs 0.332 af
Primary=3.40 cfs 0.332 af**Total Runoff Area = 4.208 ac Runoff Volume = 0.439 af Average Runoff Depth = 1.25"**
100.00% Pervious = 4.208 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: PRE-A

Runoff = 0.84 cfs @ 12.22 hrs, Volume= 0.107 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
1,981	96	Gravel surface, HSG A
14,669	39	>75% Grass cover, Good, HSG A
26,864	30	Woods, Good, HSG A
8,528	77	Woods, Good, HSG D
52,042	43	Weighted Average
52,042		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1300	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
5.9	433	0.0600	1.22		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	483	Total			

Summary for Subcatchment 2S: PRE-B

Runoff = 3.40 cfs @ 12.13 hrs, Volume= 0.332 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
21,041	96	Gravel surface, HSG A
94,822	30	Woods, Good, HSG A
15,391	77	Woods, Good, HSG D
131,254	46	Weighted Average
131,254		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1500	0.15		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
1.5	162	0.1300	1.80		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.1	212	Total			

Summary for Link 1L: DP-A

Inflow Area = 1.195 ac, 0.00% Impervious, Inflow Depth = 1.07" for 100-year event
Inflow = 0.84 cfs @ 12.22 hrs, Volume= 0.107 af
Primary = 0.84 cfs @ 12.22 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 2L: DP-B

Inflow Area = 3.013 ac, 0.00% Impervious, Inflow Depth = 1.32" for 100-year event
Inflow = 3.40 cfs @ 12.13 hrs, Volume= 0.332 af
Primary = 3.40 cfs @ 12.13 hrs, Volume= 0.332 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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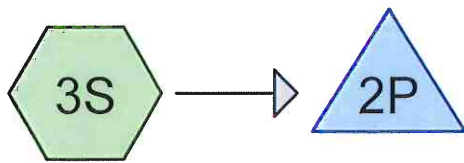
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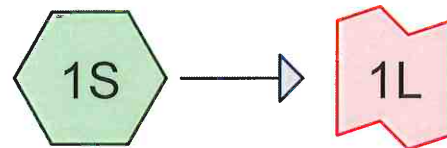
APPENDIX E

Proposed Conditions – Hydrologic Calculations



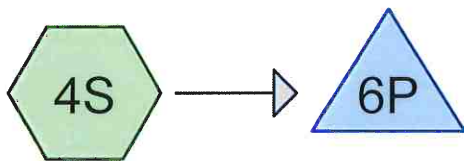
INFIL. A

INFIL. A



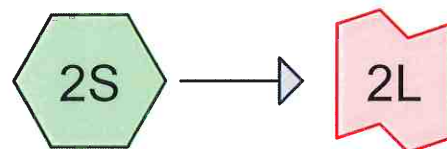
POST-A

DP-A



INFIL. B

INFIL. B



POST-B

DP-B



Routing Diagram for 5293-POST

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.10	2
2	10-year	Type III 24-hr		Default	24.00	1	4.50	2
3	25-year	Type III 24-hr		Default	24.00	1	5.40	2
4	100-year	Type III 24-hr		Default	24.00	1	7.00	2

5293-POST*Type III 24-hr 2-year Rainfall=3.10"*

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: POST-A	Runoff Area=16,077 sf 13.34% Impervious Runoff Depth=0.06" Tc=6.0 min CN=47 Runoff=0.00 cfs 0.002 af
Subcatchment 2S: POST-B	Runoff Area=27,972 sf 21.45% Impervious Runoff Depth=0.15" Tc=6.0 min CN=52 Runoff=0.02 cfs 0.008 af
Subcatchment 3S: INFIL. A	Runoff Area=39,279 sf 66.29% Impervious Runoff Depth=1.99" Tc=6.0 min CN=89 Runoff=2.05 cfs 0.150 af
Subcatchment 4S: INFIL. B	Runoff Area=77,835 sf 34.79% Impervious Runoff Depth=0.48" Flow Length=340' Tc=7.0 min CN=63 Runoff=0.64 cfs 0.071 af
Pond 2P: INFIL. A	Peak Elev=345.91' Storage=0.029 af Inflow=2.05 cfs 0.150 af Outflow=0.65 cfs 0.150 af
Pond 6P: INFIL. B	Peak Elev=358.75' Storage=0.005 af Inflow=0.64 cfs 0.071 af Outflow=0.39 cfs 0.071 af
Link 1L: DP-A	Inflow=0.00 cfs 0.002 af Primary=0.00 cfs 0.002 af
Link 2L: DP-B	Inflow=0.02 cfs 0.008 af Primary=0.02 cfs 0.008 af

Total Runoff Area = 3.700 ac Runoff Volume = 0.230 af Average Runoff Depth = 0.75"
61.99% Pervious = 2.293 ac 38.01% Impervious = 1.406 ac

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Type III 24-hr 2-year Rainfall=3.10"

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Summary for Subcatchment 1S: POST-A

Runoff = 0.00 cfs @ 15.00 hrs, Volume= 0.002 af, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
2,145	98	Paved parking, HSG A
13,932	39	>75% Grass cover, Good, HSG A
16,077	47	Weighted Average
13,932		86.66% Pervious Area
2,145		13.34% Impervious Area

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

Summary for Subcatchment 2S: POST-B

Runoff = 0.02 cfs @ 12.43 hrs, Volume= 0.008 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
6,000	98	Roofs, HSG A
21,972	39	>75% Grass cover, Good, HSG A
27,972	52	Weighted Average
21,972		78.55% Pervious Area
6,000		21.45% Impervious Area

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

Summary for Subcatchment 3S: INFIL. A

Runoff = 2.05 cfs @ 12.09 hrs, Volume= 0.150 af, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

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Type III 24-hr 2-year Rainfall=3.10"

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Area (sf)	CN	Description
15,239	98	Paved parking, HSG A
10,800	98	Roofs, HSG A
2,462	39	>75% Grass cover, Good, HSG A
10,778	80	>75% Grass cover, Good, HSG D
39,279	89	Weighted Average
13,240		33.71% Pervious Area
26,039		66.29% Impervious Area

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

Summary for Subcatchment 4S: INFIL. B

Runoff = 0.64 cfs @ 12.14 hrs, Volume= 0.071 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
15,077	98	Paved parking, HSG A
12,000	98	Roofs, HSG A
29,275	39	>75% Grass cover, Good, HSG A
6,749	80	>75% Grass cover, Good, HSG D
8,850	30	Woods, Good, HSG A
5,884	55	Woods, Good, HSG B
77,835	63	Weighted Average
50,758		65.21% Pervious Area
27,077		34.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.10"
1.6	115	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.1	175	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.0	340	Total			

Summary for Pond 2P: INFIL. A

Inflow Area = 0.902 ac, 66.29% Impervious, Inflow Depth = 1.99" for 2-year event
 Inflow = 2.05 cfs @ 12.09 hrs, Volume= 0.150 af
 Outflow = 0.65 cfs @ 12.41 hrs, Volume= 0.150 af, Atten= 68%, Lag= 19.4 min
 Discarded = 0.65 cfs @ 12.41 hrs, Volume= 0.150 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Type III 24-hr 2-year Rainfall=3.10"

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Peak Elev= 345.91' @ 12.41 hrs Surf.Area= 0.054 ac Storage= 0.029 af

Flood Elev= 349.50' Surf.Area= 0.054 ac Storage= 0.137 af

Plug-Flow detention time= 11.4 min calculated for 0.149 af (100% of inflow)

Center-of-Mass det. time= 11.4 min (823.7 - 812.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	345.00'	0.052 af	24.25'W x 96.17'L x 4.00'H Field A 0.214 af Overall - 0.085 af Embedded = 0.129 af x 40.0% Voids
#2A	345.50'	0.085 af	Cultec R-360HD x 100 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 100 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		0.137 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	345.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 343.00'

Discarded OutFlow Max=0.65 cfs @ 12.41 hrs HW=345.91' (Free Discharge)↑**1=Exfiltration** (Controls 0.65 cfs)**Summary for Pond 6P: INFIL. B**

Inflow Area = 1.787 ac, 34.79% Impervious, Inflow Depth = 0.48" for 2-year event
 Inflow = 0.64 cfs @ 12.14 hrs, Volume= 0.071 af
 Outflow = 0.39 cfs @ 12.41 hrs, Volume= 0.071 af, Atten= 38%, Lag= 16.1 min
 Discarded = 0.39 cfs @ 12.41 hrs, Volume= 0.071 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 358.75' @ 12.41 hrs Surf.Area= 0.046 ac Storage= 0.005 af

Flood Elev= 364.70' Surf.Area= 0.046 ac Storage= 0.167 af

Plug-Flow detention time= 3.4 min calculated for 0.071 af (100% of inflow)

Center-of-Mass det. time= 3.4 min (912.5 - 909.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	358.50'	0.071 af	32.25'W x 61.70'L x 6.00'H Field A 0.274 af Overall - 0.096 af Embedded = 0.178 af x 40.0% Voids
#2A	359.50'	0.096 af	Cultec R-902HD x 64 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 64 Chambers in 4 Rows Cap Storage= +2.8 cf x 2 x 4 rows = 22.1 cf
		0.167 af	Total Available Storage

Storage Group A created with Chamber Wizard

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Type III 24-hr 2-year Rainfall=3.10"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	358.50'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 350.00'

Discarded OutFlow Max=0.39 cfs @ 12.41 hrs HW=358.75' (Free Discharge)
↑**1=Exfiltration** (Controls 0.39 cfs)

Summary for Link 1L: DP-A

Inflow Area = 0.369 ac, 13.34% Impervious, Inflow Depth = 0.06" for 2-year event
Inflow = 0.00 cfs @ 15.00 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 15.00 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 2L: DP-B

Inflow Area = 0.642 ac, 21.45% Impervious, Inflow Depth = 0.15" for 2-year event
Inflow = 0.02 cfs @ 12.43 hrs, Volume= 0.008 af
Primary = 0.02 cfs @ 12.43 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Type III 24-hr 10-year Rainfall=4.50"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: POST-A	Runoff Area=16,077 sf 13.34% Impervious Runoff Depth=0.37" Tc=6.0 min CN=47 Runoff=0.06 cfs 0.011 af
Subcatchment 2S: POST-B	Runoff Area=27,972 sf 21.45% Impervious Runoff Depth=0.59" Tc=6.0 min CN=52 Runoff=0.26 cfs 0.032 af
Subcatchment 3S: INFIL. A	Runoff Area=39,279 sf 66.29% Impervious Runoff Depth=3.30" Tc=6.0 min CN=89 Runoff=3.33 cfs 0.248 af
Subcatchment 4S: INFIL. B	Runoff Area=77,835 sf 34.79% Impervious Runoff Depth=1.20" Flow Length=340' Tc=7.0 min CN=63 Runoff=2.17 cfs 0.179 af
Pond 2P: INFIL. A	Peak Elev=346.70' Storage=0.063 af Inflow=3.33 cfs 0.248 af Outflow=0.83 cfs 0.248 af
Pond 6P: INFIL. B	Peak Elev=360.21' Storage=0.044 af Inflow=2.17 cfs 0.179 af Outflow=0.46 cfs 0.179 af
Link 1L: DP-A	Inflow=0.06 cfs 0.011 af Primary=0.06 cfs 0.011 af
Link 2L: DP-B	Inflow=0.26 cfs 0.032 af Primary=0.26 cfs 0.032 af

Total Runoff Area = 3.700 ac Runoff Volume = 0.470 af Average Runoff Depth = 1.52"
61.99% Pervious = 2.293 ac 38.01% Impervious = 1.406 ac

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Type III 24-hr 10-year Rainfall=4.50"

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Summary for Subcatchment 1S: POST-A

Runoff = 0.06 cfs @ 12.32 hrs, Volume= 0.011 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
2,145	98	Paved parking, HSG A
13,932	39	>75% Grass cover, Good, HSG A
16,077	47	Weighted Average
13,932		86.66% Pervious Area
2,145		13.34% Impervious Area

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

Summary for Subcatchment 2S: POST-B

Runoff = 0.26 cfs @ 12.14 hrs, Volume= 0.032 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
6,000	98	Roofs, HSG A
21,972	39	>75% Grass cover, Good, HSG A
27,972	52	Weighted Average
21,972		78.55% Pervious Area
6,000		21.45% Impervious Area

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

Summary for Subcatchment 3S: INFIL. A

Runoff = 3.33 cfs @ 12.09 hrs, Volume= 0.248 af, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

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Type III 24-hr 10-year Rainfall=4.50"

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Area (sf)	CN	Description
15,239	98	Paved parking, HSG A
10,800	98	Roofs, HSG A
2,462	39	>75% Grass cover, Good, HSG A
10,778	80	>75% Grass cover, Good, HSG D
39,279	89	Weighted Average
13,240		33.71% Pervious Area
26,039		66.29% Impervious Area

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

Summary for Subcatchment 4S: INFIL. B

Runoff = 2.17 cfs @ 12.12 hrs, Volume= 0.179 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
15,077	98	Paved parking, HSG A
12,000	98	Roofs, HSG A
29,275	39	>75% Grass cover, Good, HSG A
6,749	80	>75% Grass cover, Good, HSG D
8,850	30	Woods, Good, HSG A
5,884	55	Woods, Good, HSG B
77,835	63	Weighted Average
50,758		65.21% Pervious Area
27,077		34.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.10"
1.6	115	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.1	175	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.0	340	Total			

Summary for Pond 2P: INFIL. A

Inflow Area = 0.902 ac, 66.29% Impervious, Inflow Depth = 3.30" for 10-year event
 Inflow = 3.33 cfs @ 12.09 hrs, Volume= 0.248 af
 Outflow = 0.83 cfs @ 12.48 hrs, Volume= 0.248 af, Atten= 75%, Lag= 23.2 min
 Discarded = 0.83 cfs @ 12.48 hrs, Volume= 0.248 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Type III 24-hr 10-year Rainfall=4.50"

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Peak Elev= 346.70' @ 12.48 hrs Surf.Area= 0.054 ac Storage= 0.063 af

Flood Elev= 349.50' Surf.Area= 0.054 ac Storage= 0.137 af

Plug-Flow detention time= 22.0 min calculated for 0.247 af (100% of inflow)

Center-of-Mass det. time= 22.0 min (820.1 - 798.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	345.00'	0.052 af	24.25'W x 96.17'L x 4.00'H Field A 0.214 af Overall - 0.085 af Embedded = 0.129 af x 40.0% Voids
#2A	345.50'	0.085 af	Cultec R-360HD x 100 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 100 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		0.137 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	345.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 343.00'

Discarded OutFlow Max=0.82 cfs @ 12.48 hrs HW=346.70' (Free Discharge)↑ **1=Exfiltration** (Controls 0.82 cfs)**Summary for Pond 6P: INFIL. B**

Inflow Area = 1.787 ac, 34.79% Impervious, Inflow Depth = 1.20" for 10-year event
 Inflow = 2.17 cfs @ 12.12 hrs, Volume= 0.179 af
 Outflow = 0.46 cfs @ 12.63 hrs, Volume= 0.179 af, Atten= 79%, Lag= 31.1 min
 Discarded = 0.46 cfs @ 12.63 hrs, Volume= 0.179 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 360.21' @ 12.63 hrs Surf.Area= 0.046 ac Storage= 0.044 af

Flood Elev= 364.70' Surf.Area= 0.046 ac Storage= 0.167 af

Plug-Flow detention time= 29.9 min calculated for 0.179 af (100% of inflow)

Center-of-Mass det. time= 29.9 min (904.7 - 874.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	358.50'	0.071 af	32.25'W x 61.70'L x 6.00'H Field A 0.274 af Overall - 0.096 af Embedded = 0.178 af x 40.0% Voids
#2A	359.50'	0.096 af	Cultec R-902HD x 64 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 64 Chambers in 4 Rows Cap Storage= +2.8 cf x 2 x 4 rows = 22.1 cf
		0.167 af	Total Available Storage

Storage Group A created with Chamber Wizard

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Type III 24-hr 10-year Rainfall=4.50"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	358.50'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 350.00'

Discarded OutFlow Max=0.46 cfs @ 12.63 hrs HW=360.21' (Free Discharge)

↑1=Exfiltration (Controls 0.46 cfs)

Summary for Link 1L: DP-A

Inflow Area = 0.369 ac, 13.34% Impervious, Inflow Depth = 0.37" for 10-year event
Inflow = 0.06 cfs @ 12.32 hrs, Volume= 0.011 af
Primary = 0.06 cfs @ 12.32 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 2L: DP-B

Inflow Area = 0.642 ac, 21.45% Impervious, Inflow Depth = 0.59" for 10-year event
Inflow = 0.26 cfs @ 12.14 hrs, Volume= 0.032 af
Primary = 0.26 cfs @ 12.14 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Type III 24-hr 25-year Rainfall=5.40"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: POST-A	Runoff Area=16,077 sf 13.34% Impervious Runoff Depth=0.69" Tc=6.0 min CN=47 Runoff=0.16 cfs 0.021 af
Subcatchment 2S: POST-B	Runoff Area=27,972 sf 21.45% Impervious Runoff Depth=0.99" Tc=6.0 min CN=52 Runoff=0.57 cfs 0.053 af
Subcatchment 3S: INFIL. A	Runoff Area=39,279 sf 66.29% Impervious Runoff Depth=4.16" Tc=6.0 min CN=89 Runoff=4.15 cfs 0.312 af
Subcatchment 4S: INFIL. B	Runoff Area=77,835 sf 34.79% Impervious Runoff Depth=1.77" Flow Length=340' Tc=7.0 min CN=63 Runoff=3.35 cfs 0.263 af
Pond 2P: INFIL. A	Peak Elev=347.26' Storage=0.086 af Inflow=4.15 cfs 0.312 af Outflow=0.95 cfs 0.312 af
Pond 6P: INFIL. B	Peak Elev=361.28' Storage=0.082 af Inflow=3.35 cfs 0.263 af Outflow=0.51 cfs 0.263 af
Link 1L: DP-A	Inflow=0.16 cfs 0.021 af Primary=0.16 cfs 0.021 af
Link 2L: DP-B	Inflow=0.57 cfs 0.053 af Primary=0.57 cfs 0.053 af

Total Runoff Area = 3.700 ac Runoff Volume = 0.650 af Average Runoff Depth = 2.11"
61.99% Pervious = 2.293 ac 38.01% Impervious = 1.406 ac

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Type III 24-hr 25-year Rainfall=5.40"

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Summary for Subcatchment 1S: POST-A

Runoff = 0.16 cfs @ 12.14 hrs, Volume= 0.021 af, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.40"

Area (sf)	CN	Description
2,145	98	Paved parking, HSG A
13,932	39	>75% Grass cover, Good, HSG A
16,077	47	Weighted Average
13,932		86.66% Pervious Area
2,145		13.34% Impervious Area

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

Summary for Subcatchment 2S: POST-B

Runoff = 0.57 cfs @ 12.11 hrs, Volume= 0.053 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.40"

Area (sf)	CN	Description
6,000	98	Roofs, HSG A
21,972	39	>75% Grass cover, Good, HSG A
27,972	52	Weighted Average
21,972		78.55% Pervious Area
6,000		21.45% Impervious Area

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

Summary for Subcatchment 3S: INFIL. A

Runoff = 4.15 cfs @ 12.09 hrs, Volume= 0.312 af, Depth= 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.40"

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Type III 24-hr 25-year Rainfall=5.40"

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Area (sf)	CN	Description
15,239	98	Paved parking, HSG A
10,800	98	Roofs, HSG A
2,462	39	>75% Grass cover, Good, HSG A
10,778	80	>75% Grass cover, Good, HSG D
39,279	89	Weighted Average
13,240		33.71% Pervious Area
26,039		66.29% Impervious Area

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

Summary for Subcatchment 4S: INFIL. B

Runoff = 3.35 cfs @ 12.11 hrs, Volume= 0.263 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.40"

Area (sf)	CN	Description
15,077	98	Paved parking, HSG A
12,000	98	Roofs, HSG A
29,275	39	>75% Grass cover, Good, HSG A
6,749	80	>75% Grass cover, Good, HSG D
8,850	30	Woods, Good, HSG A
5,884	55	Woods, Good, HSG B
77,835	63	Weighted Average
50,758		65.21% Pervious Area
27,077		34.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.10"
1.6	115	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.1	175	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.0	340	Total			

Summary for Pond 2P: INFIL. A

Inflow Area = 0.902 ac, 66.29% Impervious, Inflow Depth = 4.16" for 25-year event
 Inflow = 4.15 cfs @ 12.09 hrs, Volume= 0.312 af
 Outflow = 0.95 cfs @ 12.49 hrs, Volume= 0.312 af, Atten= 77%, Lag= 24.2 min
 Discarded = 0.95 cfs @ 12.49 hrs, Volume= 0.312 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Type III 24-hr 25-year Rainfall=5.40"

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Peak Elev= 347.26' @ 12.49 hrs Surf.Area= 0.054 ac Storage= 0.086 af

Flood Elev= 349.50' Surf.Area= 0.054 ac Storage= 0.137 af

Plug-Flow detention time= 27.8 min calculated for 0.312 af (100% of inflow)

Center-of-Mass det. time= 27.8 min (819.5 - 791.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	345.00'	0.052 af	24.25'W x 96.17'L x 4.00'H Field A 0.214 af Overall - 0.085 af Embedded = 0.129 af x 40.0% Voids
#2A	345.50'	0.085 af	Cultec R-360HD x 100 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 100 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		0.137 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	345.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 343.00'

Discarded OutFlow Max=0.95 cfs @ 12.49 hrs HW=347.26' (Free Discharge)↑**1=Exfiltration** (Controls 0.95 cfs)**Summary for Pond 6P: INFIL. B**

Inflow Area = 1.787 ac, 34.79% Impervious, Inflow Depth = 1.77" for 25-year event
 Inflow = 3.35 cfs @ 12.11 hrs, Volume= 0.263 af
 Outflow = 0.51 cfs @ 12.85 hrs, Volume= 0.263 af, Atten= 85%, Lag= 44.3 min
 Discarded = 0.51 cfs @ 12.85 hrs, Volume= 0.263 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 361.28' @ 12.85 hrs Surf.Area= 0.046 ac Storage= 0.082 af

Flood Elev= 364.70' Surf.Area= 0.046 ac Storage= 0.167 af

Plug-Flow detention time= 61.0 min calculated for 0.263 af (100% of inflow)

Center-of-Mass det. time= 61.0 min (923.4 - 862.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	358.50'	0.071 af	32.25'W x 61.70'L x 6.00'H Field A 0.274 af Overall - 0.096 af Embedded = 0.178 af x 40.0% Voids
#2A	359.50'	0.096 af	Cultec R-902HD x 64 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 64 Chambers in 4 Rows Cap Storage= +2.8 cf x 2 x 4 rows = 22.1 cf
		0.167 af	Total Available Storage

Storage Group A created with Chamber Wizard

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Type III 24-hr 25-year Rainfall=5.40"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	358.50'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 350.00'

Discarded OutFlow Max=0.51 cfs @ 12.85 hrs HW=361.28' (Free Discharge)
↑1=Exfiltration (Controls 0.51 cfs)

Summary for Link 1L: DP-A

Inflow Area = 0.369 ac, 13.34% Impervious, Inflow Depth = 0.69" for 25-year event
Inflow = 0.16 cfs @ 12.14 hrs, Volume= 0.021 af
Primary = 0.16 cfs @ 12.14 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 2L: DP-B

Inflow Area = 0.642 ac, 21.45% Impervious, Inflow Depth = 0.99" for 25-year event
Inflow = 0.57 cfs @ 12.11 hrs, Volume= 0.053 af
Primary = 0.57 cfs @ 12.11 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: POST-A	Runoff Area=16,077 sf 13.34% Impervious Runoff Depth=1.41" Tc=6.0 min CN=47 Runoff=0.49 cfs 0.043 af
Subcatchment 2S: POST-B	Runoff Area=27,972 sf 21.45% Impervious Runoff Depth=1.85" Tc=6.0 min CN=52 Runoff=1.23 cfs 0.099 af
Subcatchment 3S: INFIL. A	Runoff Area=39,279 sf 66.29% Impervious Runoff Depth=5.71" Tc=6.0 min CN=89 Runoff=5.60 cfs 0.429 af
Subcatchment 4S: INFIL. B	Runoff Area=77,835 sf 34.79% Impervious Runoff Depth=2.90" Flow Length=340' Tc=7.0 min CN=63 Runoff=5.70 cfs 0.432 af
Pond 2P: INFIL. A	Peak Elev=348.51' Storage=0.126 af Inflow=5.60 cfs 0.429 af Outflow=1.23 cfs 0.429 af
Pond 6P: INFIL. B	Peak Elev=364.34' Storage=0.164 af Inflow=5.70 cfs 0.432 af Outflow=0.64 cfs 0.432 af
Link 1L: DP-A	Inflow=0.49 cfs 0.043 af Primary=0.49 cfs 0.043 af
Link 2L: DP-B	Inflow=1.23 cfs 0.099 af Primary=1.23 cfs 0.099 af
Total Runoff Area = 3.700 ac Runoff Volume = 1.003 af Average Runoff Depth = 3.25"	
61.99% Pervious = 2.293 ac 38.01% Impervious = 1.406 ac	

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Type III 24-hr 100-year Rainfall=7.00"

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Summary for Subcatchment 1S: POST-A

Runoff = 0.49 cfs @ 12.11 hrs, Volume= 0.043 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
2,145	98	Paved parking, HSG A
13,932	39	>75% Grass cover, Good, HSG A
16,077	47	Weighted Average
13,932		86.66% Pervious Area
2,145		13.34% Impervious Area

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

Summary for Subcatchment 2S: POST-B

Runoff = 1.23 cfs @ 12.10 hrs, Volume= 0.099 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
6,000	98	Roofs, HSG A
21,972	39	>75% Grass cover, Good, HSG A
27,972	52	Weighted Average
21,972		78.55% Pervious Area
6,000		21.45% Impervious Area

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

Summary for Subcatchment 3S: INFIL. A

Runoff = 5.60 cfs @ 12.09 hrs, Volume= 0.429 af, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

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Type III 24-hr 100-year Rainfall=7.00"

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Area (sf)	CN	Description
15,239	98	Paved parking, HSG A
10,800	98	Roofs, HSG A
2,462	39	>75% Grass cover, Good, HSG A
10,778	80	>75% Grass cover, Good, HSG D
39,279	89	Weighted Average
13,240		33.71% Pervious Area
26,039		66.29% Impervious Area

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

Summary for Subcatchment 4S: INFIL. B

Runoff = 5.70 cfs @ 12.11 hrs, Volume= 0.432 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
15,077	98	Paved parking, HSG A
12,000	98	Roofs, HSG A
29,275	39	>75% Grass cover, Good, HSG A
6,749	80	>75% Grass cover, Good, HSG D
8,850	30	Woods, Good, HSG A
5,884	55	Woods, Good, HSG B
77,835	63	Weighted Average
50,758		65.21% Pervious Area
27,077		34.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.10"
1.6	115	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.1	175	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.0	340	Total			

Summary for Pond 2P: INFIL. A

Inflow Area = 0.902 ac, 66.29% Impervious, Inflow Depth = 5.71" for 100-year event
Inflow = 5.60 cfs @ 12.09 hrs, Volume= 0.429 af
Outflow = 1.23 cfs @ 12.50 hrs, Volume= 0.429 af, Atten= 78%, Lag= 24.6 min
Discarded = 1.23 cfs @ 12.50 hrs, Volume= 0.429 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Type III 24-hr 100-year Rainfall=7.00"

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Peak Elev= 348.51' @ 12.50 hrs Surf.Area= 0.054 ac Storage= 0.126 af

Flood Elev= 349.50' Surf.Area= 0.054 ac Storage= 0.137 af

Plug-Flow detention time= 35.9 min calculated for 0.429 af (100% of inflow)

Center-of-Mass det. time= 35.9 min (819.1 - 783.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	345.00'	0.052 af	24.25'W x 96.17'L x 4.00'H Field A 0.214 af Overall - 0.085 af Embedded = 0.129 af x 40.0% Voids
#2A	345.50'	0.085 af	Cultec R-360HD x 100 Inside #1 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 100 Chambers in 4 Rows Cap Storage= +6.5 cf x 2 x 4 rows = 51.7 cf
		0.137 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	345.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 343.00'

Discarded OutFlow Max=1.23 cfs @ 12.50 hrs HW=348.51' (Free Discharge)↑ **1=Exfiltration** (Controls 1.23 cfs)**Summary for Pond 6P: INFIL. B**

Inflow Area = 1.787 ac, 34.79% Impervious, Inflow Depth = 2.90" for 100-year event
 Inflow = 5.70 cfs @ 12.11 hrs, Volume= 0.432 af
 Outflow = 0.64 cfs @ 13.05 hrs, Volume= 0.432 af, Atten= 89%, Lag= 56.6 min
 Discarded = 0.64 cfs @ 13.05 hrs, Volume= 0.432 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 364.34' @ 13.05 hrs Surf.Area= 0.046 ac Storage= 0.164 af

Flood Elev= 364.70' Surf.Area= 0.046 ac Storage= 0.167 af

Plug-Flow detention time= 114.8 min calculated for 0.432 af (100% of inflow)

Center-of-Mass det. time= 114.8 min (962.2 - 847.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	358.50'	0.071 af	32.25'W x 61.70'L x 6.00'H Field A 0.274 af Overall - 0.096 af Embedded = 0.178 af x 40.0% Voids
#2A	359.50'	0.096 af	Cultec R-902HD x 64 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 64 Chambers in 4 Rows Cap Storage= +2.8 cf x 2 x 4 rows = 22.1 cf
		0.167 af	Total Available Storage

Storage Group A created with Chamber Wizard

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Type III 24-hr 100-year Rainfall=7.00"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	358.50'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 350.00'

Discarded OutFlow Max=0.64 cfs @ 13.05 hrs HW=364.34' (Free Discharge)
↑1=Exfiltration (Controls 0.64 cfs)

Summary for Link 1L: DP-A

Inflow Area = 0.369 ac, 13.34% Impervious, Inflow Depth = 1.41" for 100-year event
Inflow = 0.49 cfs @ 12.11 hrs, Volume= 0.043 af
Primary = 0.49 cfs @ 12.11 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 2L: DP-B

Inflow Area = 0.642 ac, 21.45% Impervious, Inflow Depth = 1.85" for 100-year event
Inflow = 1.23 cfs @ 12.10 hrs, Volume= 0.099 af
Primary = 1.23 cfs @ 12.10 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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- 20 Subcat 3S: INFIL. A
- 21 Subcat 4S: INFIL. B
- 21 Pond 2P: INFIL. A
- 22 Pond 6P: INFIL. B
- 23 Link 1L: DP-A

5293-POST

Prepared by Microsoft

HydroCAD® 10.10-3a s/n 03590 © 2020 HydroCAD Software Solutions LLC

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Printed 3/11/2020

23 Link 2L: DP-B

APPENDIX F

Recharge / WQV / TSS Calculations

- INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
 2. Select BMP from Drop Down Menu
 3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Total TSS Removal

B	C	D	E	F
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Proprietary Treatment Practice	0.80	0.75	0.60	0.15
Subsurface Infiltration Structure	0.80	0.15	0.12	0.03
	0.00	0.03	0.00	0.03
	0.00	0.03	0.00	0.03

Total TSS Removal = 97%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project:	Mallard Lane
Prepared By:	JPL
Date:	11-Mar-20

*Equals remaining load from previous BMP (E) which enters the BMP

Mallard Lane

CALCULATIONS

Recharge Volume, Rv:

$$R_v = A_c \times F \quad (\text{Static Method})$$

Hydrologic Soil Group	Impervious Area (Ac) ¹	Target Depth (F)	Recharge Volume (Rv) Ac-feet
A	1.406	0.6	0.070
Total	1.406		0.070

Total Recharge Volume Required = 0.070 Ac-ft
 Total Recharge Volume Required (Rv) = 3,062 C.ft

Required Sediment Forebay vol, Fv:

$$F_v = A_c (\text{cu. ft}) \times 0.1 \text{ inch of impervious area}$$

¹ Imp. area captured by ponds, Ap = 1.219 Ac
 Required Sediment Forebay vol, Fv = 442 C.ft

² Sediment Volume Provided = 1,970 C.ft

Capture Area Adjustment, Rvadj:

$$R_{vadj} = \frac{A_t}{A_p} \times R_v$$

¹ Imp. area captured by ponds, Ap = 1.219 Ac
¹ Total impervious area on site, At = 1.406 Ac
 Recharge volume required, Rv = 3,062 C.ft
 Capture Rate = 87% OK
 Capture Area Adjustment Factor = 1.15
 Adjusted Recharge Volume Required Rvadj = 3,532 C.ft

³ Total Recharge Volume Provided = 13,313 C.ft

NOTES:

Input Values	Calculation Values
--------------	--------------------

¹ = Refer to Post Development HydroCAD modeling report (excludes impervious area from Post A)

² = Sediment forebay volume provided is the volume of one row from each of the infiltration areas

³ = Total Recharge Volume Provided is sum of chamber and stone storage from Infiltration Areas 1 and 2

REFERENCES

Table 2.3.2: Recharge Target Depth by Hydrologic Soil Group

NRCS Hydrologic Soil Group	Approx. Soil Texture	Target Depth Factor (F)
A	sand	0.6 inch
B	loam	0.35 inch
C	silty loam	0.25 inch
D	clay	0.1 inch

Mallard Lane

Drawdown Calculations Infiltration Area A

CALCULATIONS

Proposed Infiltration Area Calculations:

$$\text{Drawdown} = \frac{R_v}{(\text{Rawls Rate})(\text{Bottom Area})}$$

Drawdown Calculations:

Soil Texture: **1 Sand**

Bottom Surface Area (A): **2,332** SF

Rawls Rate: **8.27** in/hr

Total Adjusted Recharge Volume Required = **3,532** C.ft

Drawdown: **2.20** hr

Drawdown is less than 72
Hours as Required

Total System Volume (stone & chambers) = **5,961** C.ft

Drawdown: **3.71** hr

Drawdown is less than 72
Hours as Required

NOTES:

Input Values

Calculation Values

REFERENCES

Table 2.3.3: 1982 Rawls Rates

Texture Class	NRCS Hydrologic Soil Group	Infiltration Rate
1 Sand	A	8.27 in/hr
2 Loamy Sand	A	2.41 in/hr
3 Sandy Loam	B	1.02 in/hr
4 Loam	B	0.52 in/hr
5 Silt Loam	C	0.27 in/hr
6 Sandy Clay Loam	C	0.17 in/hr
7 Clay Loam	D	0.09 in/hr
8 Silty Clay Loam	D	0.06 in/hr
9 Sandy Clay	D	0.05 in/hr
10 Silty Clay	D	0.04 in/hr
11 Clay	D	0.02 in/hr

Mallard Lane

Drawdown Calculations Infiltration Area B

CALCULATIONS

Proposed Infiltration Area Calculations:

$$\text{Drawdown} = \frac{R_v}{(\text{Rawls Rate})(\text{Bottom Area})}$$

Drawdown Calculations:

Soil Texture:

1 Sand

Bottom Surface Area (A): 1,990 SF

Rawls Rate: 8.27 in/hr

Total Adjusted Recharge Volume Required = 3,532 C.ft

Drawdown: 2.58 hr

Drawdown is less than
72 Hours as Required

Total System Volume (stone & chambers) = 7,275 C.ft

Drawdown: 5.30 hr

Drawdown is
less than 72
Hours as
Required

NOTES:

Input Values

Calculation Values

REFERENCES

Table 2.3.3: 1982 Rawls Rates

Texture Class	NRCS Hydrologic Soil Group	Infiltration Rate
1 Sand	A	8.27 in/hr
2 Loamy Sand	A	2.41 in/hr
3 Sandy Loam	B	1.02 in/hr
4 Loam	B	0.52 in/hr
5 Silt Loam	C	0.27 in/hr
6 Sandy Clay	C	0.17 in/hr
7 Clay Loam	D	0.09 in/hr
8 Silty Clay	D	0.06 in/hr
9 Sandy Clay	D	0.05 in/hr
10 Silty Clay	D	0.04 in/hr
11 Clay	D	0.02 in/hr

DDCDG Job # 5293
 Calc: JPL
 Date: 3/11/2020

1" Calculation Sheet

This spreadsheet should be used to convert water quality volume to an equivalent water quality peak flow rate as outlined in the new MA DEP guidelines that take effect on October 15, 2013.

Glossary

Water Quality Flow Rate = WQF
 Water Quality Volume = WQV*
 unit peak discharge (csm/in) = qu**
 Impervious Area in watershed (square miles) = Ai

*WQV is expressed in watershed inches (you must use 1.0-inches in all cases with this method and not 0.5-inches)

** calculate the qu based on the time of concentration (see 1" - qu Table)

Compute Water Quality Flow with the following Equation

$$WQF = (qu)(A)(WQV)$$

Input Information (in colored cells only)

Site Plan Callout		Enter qu (from 1" - qu Table)	Enter Impervious Area (SF)	Ai (sq/mi)	WQV		WQF*	
Infil. A	=	774	15239	0.000547	1	=	0.42	cfs
Infil. B	=	774	15007	0.000538	1	=	0.42	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs

*WQF used to determine Vortsentry HS model. See attached details.

1" qu Sheet

Sheet 2

	Tc (hours)	qu (csm/in)
	0.01	835
	0.03	835
	0.05	831
	0.067	814
5 Minutes	0.083	795
	0.1	774
	0.116	755
	0.133	736
	0.15	717
10 minutes	0.167	700
	0.183	685
	0.2	669
	0.217	654
	0.233	641
15 minutes	0.25	628
	0.3	593
	0.333	572
	0.35	563
	0.4	536
	0.416	528
	0.5	491
	0.583	460
	0.6	454
	0.667	433
	0.7	424
	0.8	398
	0.9	376
	1	356
	1.1	339
	1.2	323
	1.3	309
	1.4	296
	1.5	285
	1.6	274
	1.7	264
	1.8	255
	1.9	247
	2	239
	2.1	232
	2.2	225
	2.3	219
	2.4	213
	2.5	207
	2.6	202



Tc (hours)	qu (csm/in)
2.7	197
2.8	192
2.9	187
3	183
3.1	179
3.2	175
3.3	171
3.4	168
3.5	164
3.6	161
3.7	158
3.8	155
3.9	152
4	149
4.1	146
4.2	144
4.3	141
4.4	139
4.5	137
4.6	134
4.7	132
4.8	130
4.9	128
5	126
5.1	124
5.2	122
5.3	120
5.4	119
5.5	117
5.6	115
5.7	114
5.8	112
5.9	111
6	109
6.1	108
6.2	106
6.3	105
6.4	104
6.5	102
6.6	101
6.7	100
6.8	99
6.9	98
7	96

Tc (hours)	qu (csm/in)
7.1	95
7.2	94
7.3	93
7.4	92
7.5	91
7.6	90
7.7	89
7.8	88
7.9	87
8	86
8.1	85
8.2	84
8.3	84
8.4	83
8.5	82
8.6	81
8.7	80
8.8	79
8.9	79
9	78
9.1	77
9.2	76
9.3	76
9.4	75
9.5	74
9.6	74
9.7	73
9.8	72
9.9	72
10	71

VORTSENTRY HS DESIGN NOTES

VSHS RATED TREATMENT CAPACITY IS SHOWN IN THE TABLE BELOW, OR PER LOCAL REGULATIONS. MAXIMUM HYDRAULIC INTERNAL BYPASS CAPACITY VARIES. CONTACT YOUR CONTECH REPRESENTATIVE FOR ADDITIONAL INFORMATION.

THE STANDARD SOLID COVER CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW.

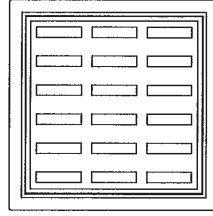
CONFIGURATION OPTION DESCRIPTION

- GRATE INLET (NO INLET PIPE)
- GRATE INLET WITH INLET PIPE

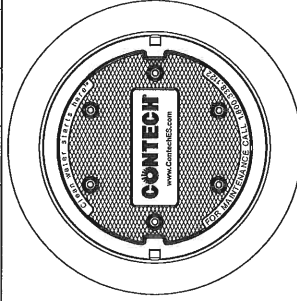
VORTSENTRY HS GENERAL INFORMATION

Model	Manhole Diameter (ID)	Total Treatment Flow Rate	Typical Total Distance Rim to Outside Bottom	Typical Distance Rim to Invert	Typical Depth Below Invert (Inside)	Approximate Minimum Distance Rim to Invert	Maximum Pipe Diameter (ID)
	FT	CFS	FT	FT	FT	FT	IN
HS36	3	0.55	10.16	4.08	5.58	3.00	18
HS48	4	1.20	13.25	6.00	6.75	4.00	24
HS60	5	2.20	15.13	6.50	7.96	4.82	30
HS72	6	3.70	16.56	6.75	9.15	5.59	36
HS84	7	5.60	18.65	7.75	10.35	6.50	42
HS96	8	8.10	20.87	8.50	11.54	6.91	48

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS)			
PEAK FLOW RATE (CFS)			
RETURN PERIOD OF PEAK FLOW (YRS)			
PIPE DATA:			
INLET PIPE 1			
OUTLET PIPE			
RIM ELEVATION			
ANTI-FLOTATION BALLAST			
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			



FRAME AND GRATE
(24" SQUARE)
N.T.S.



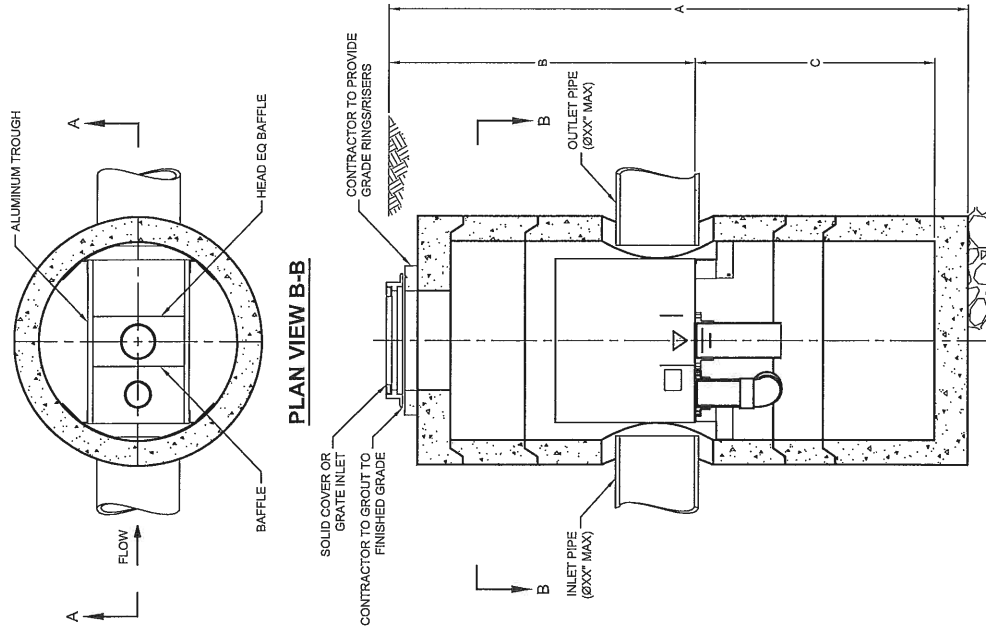
FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.conteches.com
- VORTSENTRY HS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
- STRUCTURE SHALL MEET AASHTO M293 AND CASTINGS SHALL MEET AASHTO M293 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT OR BELOW THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.

INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE STRUCTURE WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTSENTRY HS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE INLET AND OUTLET PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT. HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.



SECTION A-A

VortSentry

CONTECH ENGINEERED SOLUTIONS LLC
9205 Centre Pointe Dr., Suite 400, West Chester, OH 45389
800-335-1122 513-545-7993 FAX

CONTECH
ENGINEERED SOLUTIONS LLC
www.conteches.com

VORTSENTRY HS
STANDARD DETAIL

APPENDIX G

Stormwater Operation & Maintenance Manual

STORMWATER OPERATION & MAINTENANCE MANUAL

Mallard Lane

BOLTON, MASSACHUSETTS

**Prepared For: JAMES MORIN
307 CENTRAL STREET, APT. 331
BOLTON, MA**

**Prepared By: DUCHARME & DILLIS CIVIL DESIGN GROUP, INC
1092 MAIN STREET
BOLTON, MA 01740**

**March 11th, 2020
5293**

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- 1.1 Overview of Drainage System*
- 1.2 Routine Operation & Maintenance Tasks*
- 1.3 O&M Schedule*

2.0 Appendices

- Appendix A – Cultec Operation & Maintenance*
- Appendix B – VortSentry HS Guide*
- Appendix C – Stormwater Management System Owners/Operators*

1.0 Project Narrative

1.1 Proposed Stormwater Management System

Runoff from the proposed development will be conveyed and treated through a combination of Best Management Practices (BMP's). The following is a brief discussion of each conveyance and treatment BMP proposed.

Deep Sump Hooded Catch Basins

Deep sump hooded catch basins are proposed to convey the runoff from the proposed roadway to the subsurface infiltration system. These catch basins will discharge to manholes and conventional storm drains.

Subsurface Infiltration System

Subsurface infiltration systems are included at the entrance of the site and under the cul-de-sac. Cultec prefabricated chambers, models R-360HD and R-902HD, will be installed to collect the runoff from the roofs and pavement after pretreatment in the deep sump hooded catch basins. The infiltration systems will provide groundwater recharge as well.

VortSentry

One VortSentry HS36 structure will be installed upstream of each infiltration area. These structures are designed to have an 80% TSS removal rate and have been sized base the total treatment flow rate.

1.2 Operation & Maintenance Tasks

The following activities should be performed routinely to allow for proper functioning of the stormwater system. The following are guidelines referring to each major component of the stormwater management system.

1.2.1 Street Sweeping

Street sweeping should be preformed at least semiannually. For most effective results, sweeping should be preformed by a vacuum style truck in the early spring before spring rain events can wash silt and sediment into the stormwater system. Silt and sediment should be disposed of in accordance with local, state and federal guidelines for hazardous waste.

1.2.2 Drain Manholes

Manholes shall be inspected semi-annually for signs of wear, settling, cracking or other fatigue. Manhole casting should be inspected for signs of

root intrusion, or significant water infiltration. Weirs shall be inspected for signs of cracking or other fatigue. Manhole sumps should be checked for silt /sediment buildup and cleaned as necessary. Cleaning should be performed by a vacuum truck. Manholes should be resealed as required and outlets should be inspected incidentally with all structure inspections.

1.2.3 *Storm Drain Lines*

Storm drainage inlets and outlets should be inspected incidentally with all structure inspections. Evidence of debris intrusion or excessive siltation or sedimentation could result in the need to clean a storm drain line. Flushing or jetting should be performed as required. All flushing and jetting should be performed in the direction away from any outlet devices. A vacuum truck should be used at the opposite end of the flushing or jetting to remove any silt or sediment that is cleaned from the storm drain.

1.2.4 *Deep Sump Catch Basins*

Deep sump catch basins shall be inspected at least semi-annually for signs of wear, settling, cracking or other fatigue. Catch basin castings should be inspected for signs of root intrusion, or significant water infiltration. Catch basin sump should be check for silt/sediment buildup and cleaned as necessary. Cleaning should be performed by a vacuum truck. Catch basins should be resealed as required and outlets should be inspected incidentally with all structure inspections.

1.2.5 *Subsurface Infiltration Systems*

The subsurface infiltration systems should be monitored and maintained regularly to ensure no obstructions in the systems are present. Any depressions noticed in the areas could indicate that the system has collapsed and should be inspected immediately. The systems are equipped with inspection ports to monitor the buildup of sedimentation. If the depth of sedimentation is in excess of the manufacturer's guidelines, the systems will need to be cleaned out with high pressure water. The high-pressure water should be used on one end and a vacuum truck will be used on the opposite end to remove any silt or sediment that is cleaned from the chamber. Other maintenance will include checking the inlets and outlet for debris, survey the surrounding area for depressions and confirm no unauthorized modifications have been performed to the system. See Appendix A for the Cultec Operation and Maintenance Guidelines.

1.2.6 *VortSentry Structures*

The VortSentry HS systems should be inspected at regular intervals and maintained when necessary to ensure optimum performance. Inspection is

the key to effective maintenance and is easily performed. At a minimum, inspections should be performed twice per year (spring and fall) however more frequent inspections may be necessary since winter sanding operations may lead to rapid accumulations of a large volume of sediment.

The VortSentry HS systems should be cleaned when the sediment has accumulated to a depth of two feet in the treatment chamber. Cleaning should be done during dry weather conditions when no flow is entering the system. Cleanout should be performed with a vacuum truck through the manhole cover.

See Appendix B for the VortSentry HS Guide for further information.

O&M Schedule

O&M Task		Monthly	Quarterly	Spring	Fall	2-years	As-required
1.	Street Sweeping			x	x		
2.	Drain Manholes						
	<i>Inspect Rims</i>			x	x		
	<i>Inspect inside/inlet and outlet pipes</i>			x	x		
	<i>Remove sediment</i>						x
3.	Storm drain Lines						
	<i>Inspection</i>			x	x		
	<i>Clean</i>						x
4.	Catch Basins						
	<i>Inspect Rims</i>			x	x		
	<i>Inspect inside/inlet and outlet pipes</i>			x	x		
	<i>Remove sediment</i>						x
5.	Subsurface Infiltration Systems	(See appendix A)					
6.	VortSentry Structures						
	<i>Inspection</i>			x	x		
	<i>Clean</i>						x

APPENDIX A

Cultec Operation & Maintenance



OPERATIONS AND MAINTENANCE GUIDELINES

Published by

CULTEC, Inc.

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Contact Information:

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For technical support, please call (203)775-4416 ext. 203 or e-mail tech@cultec.com.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CLT057 01-20

January 2020

*These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.*

This manual contains guidelines recommended by CULTEC, Inc. and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

- A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to determine if any sediment has accumulated in the inlet row.
- B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.
 1. **Manhole Access**

This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

2. StormFilter Access

Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

- C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

- A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.
- B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.
- C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.
- D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance

The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance

The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

	Frequency	Action
Inlets and Outlets	Every 3 years	<ul style="list-style-type: none"> Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	<ul style="list-style-type: none"> Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	<ul style="list-style-type: none"> Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. Attain the appropriate approvals as required. Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1 st year	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	<ul style="list-style-type: none"> Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC, Inc. at 1-800-428-5832.

WQMP

Operation & Maintenance (O&M) Plan

Project Name: _____

Prepared for:

Project Name: _____

Address: _____

City, State Zip: _____

Prepared on:

Date: _____

This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.

Appendix ____

BMP SITE PLAN

Site plan is preferred on minimum 11" by 17" colored sheets, as long as legible.

BMP OPERATION & MAINTENANCE LOG

Project Name: _____

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

[illegible]

Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Month 1	Date:	
<input type="checkbox"/> Month 2	Date:	
<input type="checkbox"/> Month 3	Date:	
<input type="checkbox"/> Month 4	Date:	
<input type="checkbox"/> Month 5	Date:	
<input type="checkbox"/> Month 6	Date:	
<input type="checkbox"/> Month 7	Date:	
<input type="checkbox"/> Month 8	Date:	
<input type="checkbox"/> Month 9	Date:	
<input type="checkbox"/> Month 10	Date:	
<input type="checkbox"/> Month 11	Date:	
<input type="checkbox"/> Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Year 1	Date:	
<input type="checkbox"/> Year 4	Date:	
<input type="checkbox"/> Year 7	Date:	
<input type="checkbox"/> Year 10	Date:	
<input type="checkbox"/> Year 13	Date:	
<input type="checkbox"/> Year 16	Date:	
<input type="checkbox"/> Year 19	Date:	
<input type="checkbox"/> Year 22	Date:	

Major Maintenance

	Frequency	Action
Inlets and Outlets	Every 3 years	Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
		Notes
	<input type="checkbox"/> Year 1	Date:
	<input type="checkbox"/> Year 4	Date:
	<input type="checkbox"/> Year 7	Date:
	<input type="checkbox"/> Year 10	Date:
	<input type="checkbox"/> Year 13	Date:
	<input type="checkbox"/> Year 16	Date:
	<input type="checkbox"/> Year 19	Date:
	<input type="checkbox"/> Year 22	Date:
	Spring and Fall	Check inlet and outlets for clogging and remove any debris, as required.
		Notes
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
CULTEC Stormwater Chambers	2 years after commissioning	<input type="checkbox"/> Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
		Notes
	<input type="checkbox"/> Year 2	Date:

Major Maintenance

Frequency		Action
CULTEC Stormwater Chambers	9 years after commissioning every 9 years following	<input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	Notes	
	<input type="checkbox"/> Year 9	Date:
	<input type="checkbox"/> Year 18	Date:
	<input type="checkbox"/> Year 27	Date:
	<input type="checkbox"/> Year 36	Date:
	45 years after commissioning	<input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. <input type="checkbox"/> Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. <input type="checkbox"/> Attain the appropriate approvals as required. <input type="checkbox"/> Establish a new operation and maintenance schedule.
	Notes	
	<input type="checkbox"/> Year 45	Date:

Major Maintenance

Frequency		Action	
Surrounding Site	Monthly in 1st year		
	<input type="checkbox"/> Check for depressions in areas over and surrounding the stormwater management system.		
	Notes		
	<input type="checkbox"/> Month 1	Date:	
	<input type="checkbox"/> Month 2	Date:	
	<input type="checkbox"/> Month 3	Date:	
	<input type="checkbox"/> Month 4	Date:	
	<input type="checkbox"/> Month 5	Date:	
	<input type="checkbox"/> Month 6	Date:	
	<input type="checkbox"/> Month 7	Date:	
	<input type="checkbox"/> Month 8	Date:	
	<input type="checkbox"/> Month 9	Date:	
	<input type="checkbox"/> Month 10	Date:	
	<input type="checkbox"/> Month 11	Date:	
	<input type="checkbox"/> Month 12	Date:	
	Spring and Fall		
	<input type="checkbox"/> Check for depressions in areas over and surrounding the stormwater management system.		
	Notes		
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	Yearly		
	<input type="checkbox"/> Confirm that no unauthorized modifications have been performed to the site.		
Notes			
<input type="checkbox"/> Year 1	Date:		
<input type="checkbox"/> Year 2	Date:		
<input type="checkbox"/> Year 3	Date:		
<input type="checkbox"/> Year 4	Date:		
<input type="checkbox"/> Year 5	Date:		
<input type="checkbox"/> Year 6	Date:		
<input type="checkbox"/> Year 7	Date:		



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P: (203) 775-4416 • Toll Free: 1(800) 4-CULTEC • www.cultec.com



RETENTION • DETENTION • INFILTRATION • WATER QUALITY



VortSentry® HS Guide Operation, Design, Performance and Maintenance



VortSentry® HS

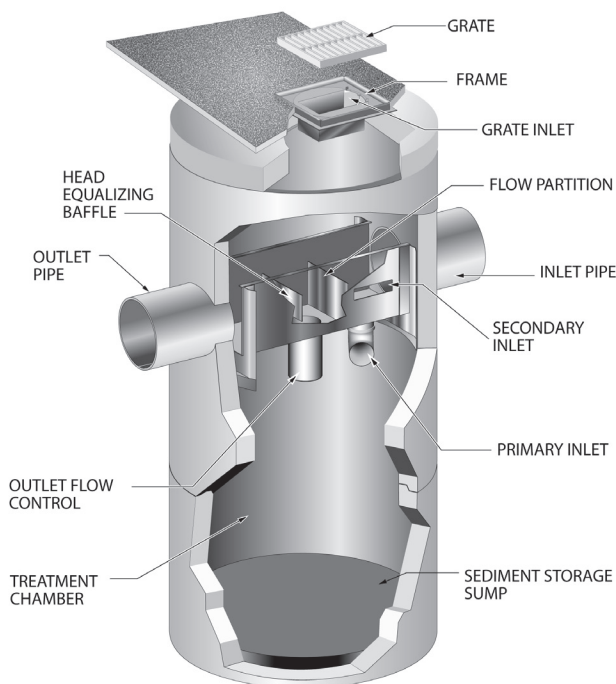
The VortSentry HS is a compact, below grade stormwater treatment system that employs helical flow technology to enhance gravitational separation of floating and settling pollutants from stormwater flows. With the ability to accept a wide range of pipe sizes, the VortSentry HS can treat and convey flows from small to large sites. A unique internal bypass design means higher flows can be diverted without the use of external bypass structures. The VortSentry HS is also available in a grate inlet configuration, which is ideal for retrofit installations.

Operation Overview

Low, frequently occurring storm flows are directed into the treatment chamber through the primary inlet. The tangentially oriented downward pipe induces a swirling motion in the treatment chamber that increases capture and containment abilities. Moderate storm flows are directed into the treatment chamber through the secondary inlet, which allows for capture of floating trash and debris. The secondary inlet also provides for treatment of higher flows without significantly increasing the velocity or turbulence in the treatment chamber. This allows for a more quiescent separation environment. Settleable solids and floating pollutants are captured and contained in the treatment chamber.

Flow exits the treatment chamber through the outlet flow control, which manages the amount of flow that is treated and helps maintain the helical flow patterns developed within the treatment chamber.

Flows exceeding the system's rated treatment flow are diverted away from the treatment chamber by the flow partition. Internal diversion of high flows eliminates the need for external bypass structures. During bypass, the head equalizing baffle applies head on the outlet flow control to limit the flow through the treatment chamber. This helps prevent re-suspension of previously captured pollutants.



Design Basics

There are two primary methods of sizing a VortSentry HS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow for a defined particle size. The summation process of the Rational Rainfall Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically, VortSentry HS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a particle gradation with an average particle size (d_{50}) of 240-microns (μm).

Water Quality Flow Rate Method

In many cases, regulations require that a specific flow rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval (i.e. the six-month storm) or a water quality depth (i.e. 1/2-inch of rainfall).

The VortSentry HS is designed to treat all flows up to the WQQ. Due to its internal bypass weir configuration, flow rates in the treatment chamber only increase minimally once the WQQ is surpassed. At influent rates higher than the WQQ, the flow partition will allow most flow exceeding the treatment flow rate to bypass the treatment chamber. This allows removal efficiency to remain relatively constant in the treatment chamber and reduces the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the VortSentry HS will remove a specific gradation of sediment at a specific removal efficiency. Therefore they are variable based on the gradation and removal efficiency specified by the design engineer and the unit size is scaled according to the project goal.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. The Rational Rainfall Method is a sizing program Contech uses to estimate a net annual sediment load reduction for a particular VortSentry HS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics. For more information on the Rational Rainfall Method, see *Vortechs Technical Bulletin 4: Modeling Long Term Load Reduction: The Rational Rainfall Method*, available at www.ContechES.com/stormwater

Treatment Flow Rate

The outlet flow control is sized to allow the WQQ to pass entirely through the treatment chamber at a water surface elevation equal to the crest of the flow partition. The head equalizing baffle applies head on the outlet flow control to limit the flow through the treatment chamber when bypass occurs, thus helping to prevent re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The VortSentry HS is available in three standard configurations: inline (with inlet and outlet pipes at 180° to each other), grated inlet, and a combination of grate and pipe inlets. All three configurations are available in 36-inch (900-mm) through 96-inch (2400-mm) diameter manholes.

The configuration of the system is determined by the suffix of the model name:

- A model name without a suffix denotes a standard pipe inlet (Example HS48).
- A “G” at the end of the model designation denotes a grate inlet (Example HS48G).
- A “GP” at the end of the model designation denotes a combination of grate and pipe inlets (Example HS48GP).

Performance

Full-Scale Laboratory Test Results

Laboratory testing of the VortSentry HS was conducted using F-55 Silica, a commercially available sand product with an average particle size of 240- μ m (Table 1). This material was metered into a model HS48 VortSentry HS at an average concentration of between 250-mg/L and 300-mg/L at flow rates ranging from 0.50-cfs to 1.5-cfs (14-L/s to 56-L/s).

US Standard Sieve Size	Particle Size Micron (μ m)	Cumulative Passing %
30	600	99.7%
40	425	95.7%
50	300	74.7%
70	212	33.7%
100	150	6.7%
140	106	0.7%

Table 1 : US Silica F-55 Particle Size Distribution

Removal efficiencies at each flow rate were calculated based on net sediment loads passing the influent and effluent sampling points. Results are illustrated in Figure 1.

Assuming that sediment in the inlet chamber is ideally mixed, removal rates through the system will decay according to the percentage of flow bypassed. This effect has been observed in the laboratory where the test system is designed to produce a

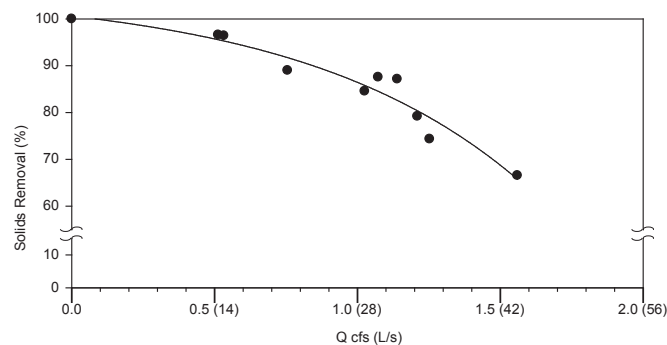


Figure 1: VortSentry HS Removal Efficiencies for 240- μ m Particle Gradation

thoroughly mixed inlet stream. All VortSentry HS models have the same aspect ratio regardless of system diameter (i.e. an increase in diameter results in a corresponding increase in depth). Operating rates are expressed volumetrically.

Removal efficiency at each operating rate is calculated according to the average of volumetric and Froude scaling methods and is described by Equation 1.

$$\text{Equation 1: } \left(\frac{\text{Diameter Prototype}}{\text{Diameter Model}} \right)^{2.75} = \left(\frac{\text{Flow Rate Prototype}}{\text{Flow Rate Model}} \right)$$

Equation 1 and actual laboratory test results were used to determine the flow rate which would be required for the various VortSentry HS models to remove 80% of solids.

View report at www.ContechES.com/stormwater

Maintenance

The VortSentry HS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, i.e., unstable soils or heavy winter sanding will cause the treatment chamber to fill more quickly, but regular sweeping will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in equipment washdown areas and in climates where winter sanding operations may lead to rapid accumulations of a large volume of sediment. It is useful and often required as part of a permit to keep a record of each inspection. A simple inspection and maintenance log form for doing so is available for download at www.ContechES.com/stormwater

The VortSentry HS should be cleaned when the sediment has accumulated to a depth of two feet in the treatment chamber. This determination can be made by taking two measurements with a stadia rod or similar measuring device; one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the distance given in Table 2, the VortSentry HS should be maintained to ensure effective treatment.

Cleaning

Cleaning of the VortSentry HS should be done during dry weather conditions when no flow is entering the system. Cleanout of the VortSentry HS with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Simply remove the manhole cover and insert the vacuum hose into the sump. All pollutants can be removed from this one access point from the surface with no requirements for Confined Space Entry.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads, which solidify the oils. These are usually much easier to remove from the unit individually, and less expensive to dispose than the oil/water emulsion that may be

created by vacuuming the oily layer. Floating trash can be netted out if you wish to separate it from the other pollutants.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. If anyone physically enters the unit, Confined Space Entry procedures need to be followed.

Disposal of all material removed from the VortSentry HS should be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

VortSentry HS Model	Diameter		Distance		Sediment Storage		Oil Spill Storage	
			Between Water Surface and Top of Storage Sump					
	in.	m	ft.	m	yd ³	m ³	gal.	liter
HS36	36	0.9	3.6	1.1	0.5	0.4	83	314
HS48	48	1.2	4.7	1.4	0.9	0.7	158	598
HS60	60	1.5	6.0	1.8	1.5	1.1	258	978
HS72	72	1.8	7.1	2.2	2.1	1.6	372	1409
HS84	84	2.1	8.4	2.6	2.9	2.2	649	2458
HS96	96	2.4	9.5	2.9	3.7	2.8	845	3199

Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile. Finer, silty particles at the top of the pile may be more difficult to feel with the measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.

Table 2: VortSentry HS Maintenance Indicators and Sediment Storage Capacities.

Logon to www.ContechES.com/stormwater to download the VortSentry HS Inspection and Maintenance Log.

For assistance with maintaining your VortSentry HS, contact us regarding the Contech Maintenance compliance certification program.



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The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

The Stormwater Management StormFilter, MFS and CDS are trademarks, registered trademarks, or licensed trademarks of Contech Engineered Solutions LLC. LEED is a registered trademark of the U.S. Green Building Council.

Support

- Drawings and specifications are available at contechstormwater.com.
- Site-specific design support is available from our engineers.

NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS AN EXPRESSED WARRANTY OR AN IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. SEE THE CONTECH STANDARD CONDITIONS OF SALE (VIEWABLE AT WWW.CONTECHES.COM/COS) FOR MORE INFORMATION.

APPENDIX B

Stormwater Management System Owners/Operators

1. Stormwater Management System Owners: To be determined
2. Current and future operators: To be determined
3. Emergency contact information: To be determined
4. Change of trustee: To be determined
5. Financial Responsible Party: To be determined
6. Routine Maintenance: To be determined
7. O&M activities: To be determined
8. Record keeping To be determined

APPENDIX H

Long Term Pollution Prevention Plan

LONG-TERM POLLUTION PREVENTION PLAN

Mallard Lane

BOLTON, MASSACHUSETTS

**Prepared For: JAMES MORIN
307 CENTRAL STREET, APT. 331
BOLTON, MA**

**Prepared By: DUCHARME & DILLIS CIVIL DESIGN GROUP, INC
1092 MAIN STREET
BOLTON, MA 01740**

**March 11th, 2020
5293**

1.0 Summary

This Long-Term Pollution Prevention Plan (LTPPP) has been prepared by Ducharme & Dillis Civil Design Group, Inc. pursuant to the Massachusetts Stormwater Regulations. The proposed project includes the development of 11 age restricted homes with an associated road and cul-de-sac. The work will reduce the stormwater runoff and improve stormwater treatment through the installation of stormwater BMP's.

Care has been taken to lay out the proposed site in a manner that works with the existing topography. The stormwater management system has been designed in accordance with the Massachusetts Stormwater Regulations to provide pretreatment of the stormwater prior to discharge.

2.0 Spill Prevention Plan

No hazardous materials other than normal cleaning items are expected to be stored on site after the construction period has ended.

It is expected that normal DEP notification procedures would be triggered for major spills such as heating oil or propane and natural gas leaks.

3.0 Stormwater System O&M

A Stormwater Operation & Maintenance plan has been prepared for the proposed stormwater management system. Refer to this document for details pertaining to the required inspections, routine maintenance and operation details including erosion stabilization.

4.0 Fertilizers, herbicides and pesticides

Application of fertilizer, herbicides and pesticides shall be performed in a manner consistent with the industry standards for the application.

No application of chemicals is to be performed within the stormwater management areas on the site.

5.0 Snow/Salt Management

5.1 Snow Plowing

It is expected that the site will be plowed by town or private personnel. Snow storage will be as far from the wetland resource area to the maximum extent practical.

5.2 *Salt/Sand Usage*

It is expected that sanding and salting will be performed on an infrequent basis during times when unusually icy conditions persist for periods of time.

5.3 *Street Sweeping*

The Stormwater Operation & Maintenance Plan calls for the proposed road to be swept in the spring, after the threat of winter precipitation has passed, and in the fall.

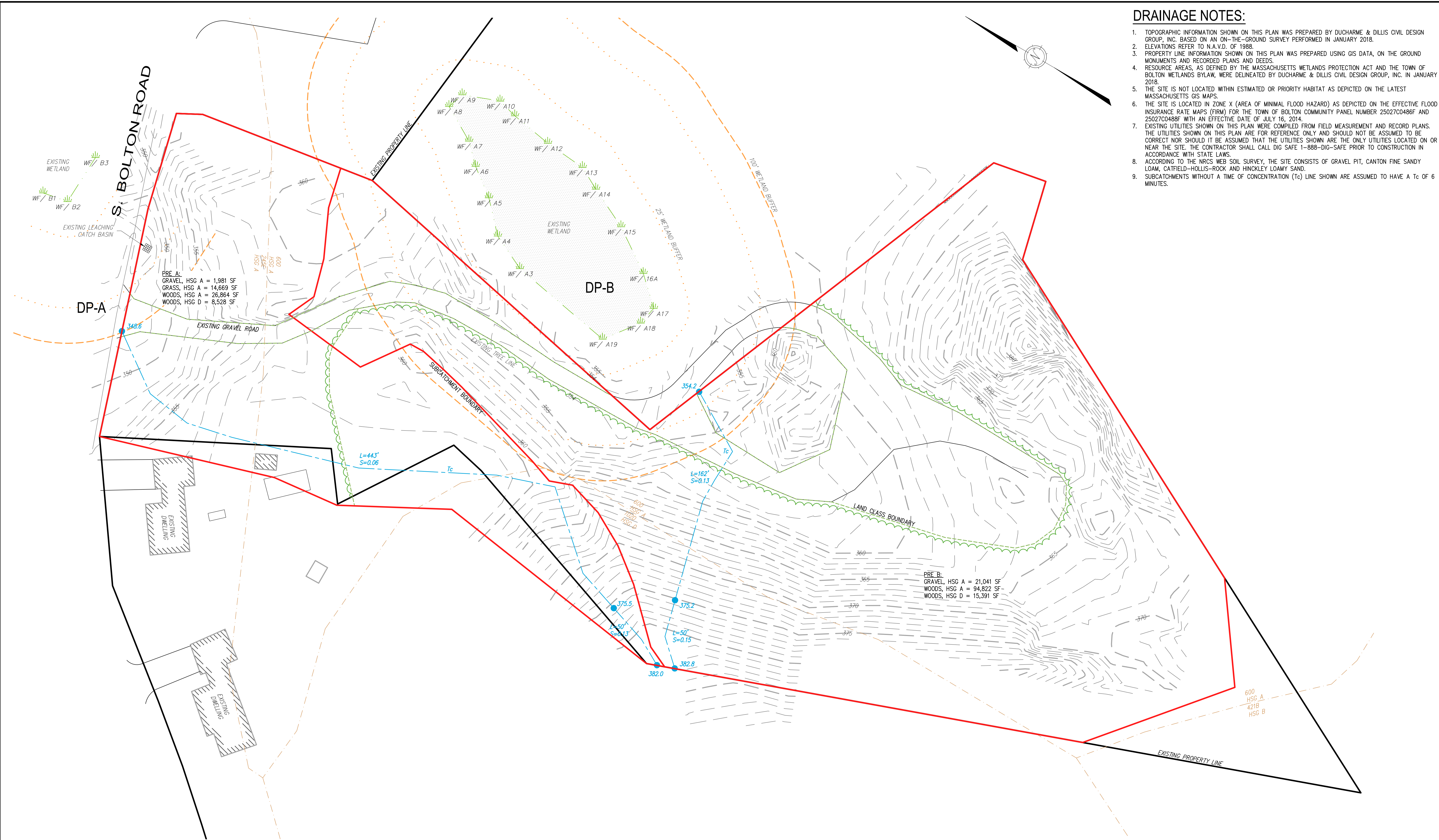
6.0 Waste Management

6.1 *Solid Waste*

A dumpster will be located on the site during construction. Each house will have their own trash containers post construction. These areas will be the primary area for the on-site storage of solid waste prior to pick-up by a waste management company.

DRAINAGE NOTES:

1. TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN WAS PREPARED BY DUCHARME & DILLIS CIVIL DESIGN GROUP, INC. BASED ON AN ON-THE-GROUND SURVEY PERFORMED IN JANUARY 2018.
2. ELEVATIONS REFER TO N.A.V.D. OF 1988.
3. PROPERTY LINE INFORMATION SHOWN ON THIS PLAN WAS PREPARED USING GIS DATA, ON THE GROUND MONUMENTS AND RECORDED PLANS AND DEEDS.
4. RESOURCE AREAS, AS DEFINED BY THE MASSACHUSETTS WETLANDS PROTECTION ACT AND THE TOWN OF BOLTON WETLANDS BYLAW, WERE DELINEATED BY DUCHARME & DILLIS CIVIL DESIGN GROUP, INC. IN JANUARY 2018.
5. THE SITE IS NOT LOCATED WITHIN ESTIMATED OR PRIORITY HABITAT AS DEPICTED ON THE LATEST MASSACHUSETTS GIS MAPS.
6. THE SITE IS LOCATED IN ZONE X (AREA OF MINIMAL FLOOD HAZARD) AS DEPICTED ON THE EFFECTIVE FLOOD INSURANCE RATE MAPS (FIRM) FOR THE TOWN OF BOLTON COMMUNITY PANEL NUMBER 2502700486F AND 2502700488F WITH AN EFFECTIVE DATE OF JULY 16, 2014.
7. EXISTING UTILITIES SHOWN ON THIS PLAN WERE COMPILED FROM FIELD MEASUREMENT AND RECORD PLANS. THE UTILITIES SHOWN ON THIS PLAN ARE FOR REFERENCE ONLY AND SHOULD NOT BE ASSUMED TO BE CORRECT NOR SHOULD IT BE ASSUMED THAT THE UTILITIES SHOWN ARE THE ONLY UTILITIES LOCATED ON OR NEAR THE SITE. THE CONTRACTOR SHALL CALL DIG SAFE 1-888-DIG-SAFE PRIOR TO CONSTRUCTION IN ACCORDANCE WITH STATE LAWS.
8. ACCORDING TO THE NRCS WEB SOIL SURVEY, THE SITE CONSISTS OF GRAVEL PIT, CANTON FINE SANDY LOAM, CATFIELD-HOLLIS-ROCK AND HINCLEY LOAMY SAND.
9. SUBCATCHMENTS WITHOUT A TIME OF CONCENTRATION (Tc) LINE SHOWN ARE ASSUMED TO HAVE A Tc OF 6 MINUTES.



PREPARED BY:

DUCHARME & DILLIS

Civil Design Group, Inc.

CIVIL ENGINEERS • LAND SURVEYORS • WETLAND CONSULTANTS

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OWNER:

JAMES MORIN & KATHRYN LUM
307 CENTRAL STREET, APT 331
HUDSON, MASSACHUSETTS

APPLICANT:

JAMES MORIN
307 CENTRAL STREET, APT 331
HUDSON, MASSACHUSETTS

SCALE:

30 0 15 30 60 120

1 in. = 30 ft.

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DATE:

3/11/20

DESIGN BY:

JPL

DRAWN BY:

JPL

CHECKED BY:

FMM

PRE-DEVELOPMENT DRAINAGE MAP			
MALLARD LANE			
BOLTON, MASSACHUSETTS			
NO.	DATE	DESCRIPTION	BY

JOB NO.

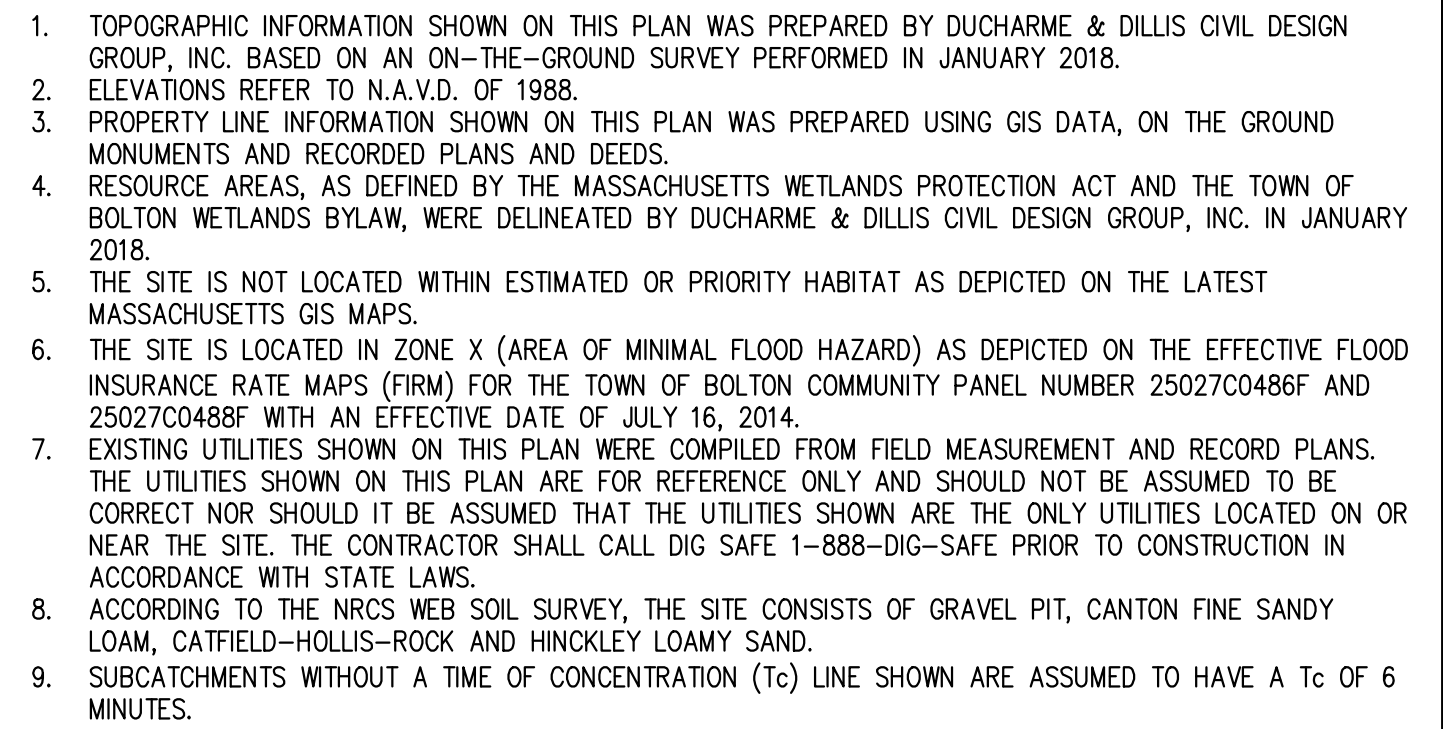
5293

DRAWING NO.

5293-PRE

SHEET NO.

1



2

Exhibit L

Requested Exceptions

SECTION 3

3.4 TABULAR ZONING ANALYSIS

	EXISTING ZONING REQUIREMENTS	PROPOSED
§250-13 B. MINIMUM LOT AREA	80,000 SF	Less than 80,000 SF
§250-13 B. MINIMUM LOT FRONTAGE	200 FT	Less than 200 FT
§250-13 B. MINIMUM FRONT SETBACK	50 FT	50 FT
§250-13 B. MINIMUM SIDE SETBACK	20 FT	10 FT
§250-13 B. MINIMUM REAR SETBACK	20 FT	20 FT
§250-13 B. MINIMUM OTHER YARDS – INTERIOR SIDELINE SETBACK		3 FT
§250-13 B. MINIMUM LOT WIDTH FOR 100 FEET BACK FROM STREET LINE	150 FT	NOT TO APPLY LOTS 2 & 3
§250-13 C. UNITS PER LOT	1	GREATER THAN 1
§250-17 - DRIVEWAY & PARKING		SPECIAL PERMIT FOR A SHARED DRIVEWAY TO ACCESS 11 DWELLINGS ON 3 LOTS
§250-13 G. LOT SHAPE FACTOR	GREATER THAN 0.5	LESS THAN 0.5

Exhibit M

Site Control



2017 00133792

Bk: 58115 Pg: 346

Page: 1 of 4 11/30/2017 12:31 PM WD

MASSACHUSETTS EXCISE TAX
Worcester District ROD #20 001
Date: 11/30/2017 12:31 PM
Ctrl# 176572 24958 Doc# 00133792
Fee: \$775.20 Cons: \$170,000.00

This space reserved for Recorder's use only

DEED

I, **ROBERT P. BONAZZOLI, AS PERSONAL REPRESENTATIVE OF THE ESTATE OF PIERINO A. BONAZZOLI**, pursuant to a Decree of Sale of Real Estate issued by the Worcester Probate and Family Court, Docket No. WO16P2727EA ("Grantor"), and **ROBERT P. BONAZZOLI, AS TRUSTEE of the BONAZZOLI FAMILY TRUST**, under the will of Pierino Bonazzoli, Probate No. 98P2607 and **ROBERT P. BONAZZOLI, AS TRUSTEE of the BONAZZOLI FAMILY 2002 NOMINEE TRUST, formerly known as the BONAZZOLI FAMILY TRUST**, under a Declaration of the Bonazzoli Family Trust, dated July 1, 2002 and recorded in Book 26938 Page 59, for good and valuable consideration paid of **ONE HUNDRED SEVENTY THOUSAND and 00/100 DOLLARS (\$170,000.00)**, grant to **JAMES J. MORIN AND KATHRYN M. LUMB**, husband and wife as tenants by the entirety, with a mailing address of 307 Central Street, Apt. #331, Hudson, Massachusetts 01749 (collectively, "Grantee"), **WITH QUITCLAIM COVENANTS**,

A certain tract of land in Bolton, Worcester County, Massachusetts, located at South Bolton Road, of approximately 5 acres, more or less, identified on the Town of Bolton Assessor's Map as of the date of the execution of this deed as Parcel 15.1, Map 2C, and being all of the premises and parcels of land together with the buildings thereon, described in a deed from The Federal Land Bank of Springfield to Giacomo Bonazzoli et als dated May 14, 1940, and recorded with Worcester District Registry of Deeds in Book 2777, Page 222, to which deed reference may be had for a more particular description of the granted premises. There is excepted and excluded from the above-described premises so much thereof as have been heretofore conveyed by instruments of record.

Grantor hereby declares under the pains and penalties of perjury that Grantor terminates any and all estates of homestead in and to the premises being conveyed, and that Grantor has no knowledge of any other person or persons who can claim the benefits under the Massachusetts Homestead Act.

Grantee assumes and agrees to pay the real estate taxes coming due on the premises conveyed hereunder for the tax period ending June 30, 2018.

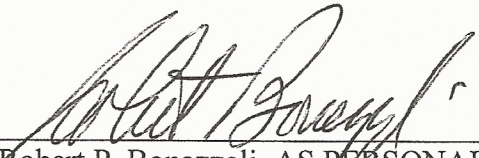
NELSON & O'CONNELL
TITLE COMPANY, INC.

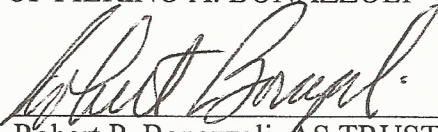
14958

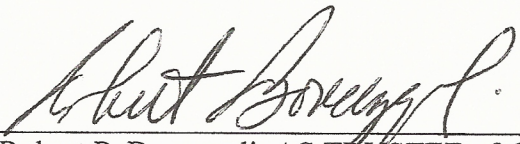
For Grantor's title see that certain deed dated July 2, 2002, recorded with the Worcester District Registry of Deeds in Book 26938, Page 64, and that certain deed dated January 12, 2016, recorded with the Worcester District Registry of Deeds in Book 54866, Page 267.

[SIGNATURE PAGE FOLLOWS]

Executed as an instrument under seal this 29th day of November, 2017.


Robert P. Bonazzoli, AS PERSONAL
REPRESENTATIVE OF THE ESTATE
OF PIERINO A. BONAZZOLI

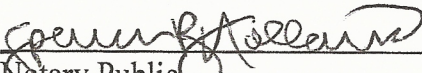

Robert P. Bonazzoli, AS TRUSTEE of the
BONAZZOLI FAMILY TRUST, under the
will of Pierino Bonazzoli

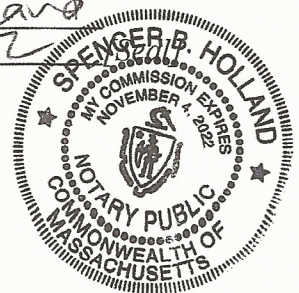

Robert P. Bonazzoli, AS TRUSTEE of the
BONAZZOLI FAMILY 2002 NOMINEE
TRUST, formerly known as the
BONAZZOLI FAMILY TRUST

COMMONWEALTH OF MASSACHUSETTS

County of Worcester

On this 29th day of November, 2017, before me, the undersigned notary public,
Robert P. Bonazzoli, as Personal Representative of the Estate of Pierino A. Bonazzoli, personally
appeared, proved to me through satisfactory evidence of identification, which was
MA driver's license, to be the person whose name is signed on the
preceding or attached document, and acknowledged to me that he signed it voluntarily for its
stated purpose individually and as voluntary act of the Estate of Pierino A. Bonazzoli.


Notary Public
Printed Name: Spencer B Holland
My Commission Expires: 11/4/22

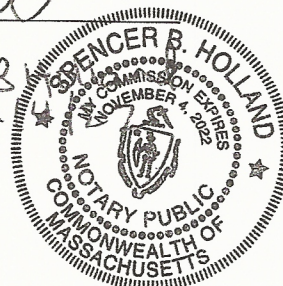


COMMONWEALTH OF MASSACHUSETTS

County of Worcester

On this 29th day of November, 2017, before me, the undersigned notary public, Robert P. Bonazzoli, AS TRUSTEE of the BONAZZOLI FAMILY TRUST, under the will of Pierino Bonazzoli, personally appeared, proved to me through satisfactory evidence of identification, which was MA driver's license, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose as AS TRUSTEE of the BONAZZOLI FAMILY TRUST, under the will of Pierino Bonazzoli.

Spencer B. Holland
Notary Public
Printed Name: Spencer B. Holland
My Commission Expires: 11/4/22
[Seal]



COMMONWEALTH OF MASSACHUSETTS

County of Worcester

On this 29th day of November, 2017, before me, the undersigned notary public, Robert P. Bonazzoli, AS TRUSTEE of the BONAZZOLI FAMILY 2002 NOMINEE TRUST, formerly known as the BONAZZOLI FAMILY TRUST, personally appeared, proved to me through satisfactory evidence of identification, which was MA driver's license, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose as AS TRUSTEE of the BONAZZOLI FAMILY 2002 NOMINEE TRUST, formerly known as the BONAZZOLI FAMILY TRUST.

Spencer B. Holland
Notary Public
Printed Name: Spencer B. Holland
My Commission Expires: 11/4/22
[Seal]

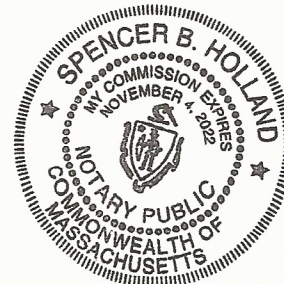
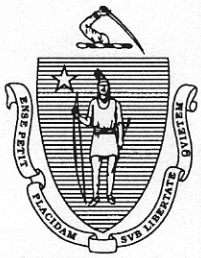


Exhibit N

Legal Existence



William Francis Galvin
Secretary of the
Commonwealth

The Commonwealth of Massachusetts
Secretary of the Commonwealth
State House, Boston, Massachusetts 02133

September 7, 2018

TO WHOM IT MAY CONCERN:

I hereby certify that a certificate of organization of a Limited Liability Company was filed in this office by

NORTHEAST CLASSIC BUILDERS LLC

in accordance with the provisions of Massachusetts General Laws Chapter 156C on **April 11, 2018.**

I further certify that said Limited Liability Company has filed all annual reports due and paid all fees with respect to such reports; that said Limited Liability Company has not filed a certificate of cancellation or withdrawal; and that said Limited Liability Company is in good standing with this office.

I also certify that the names of all managers listed in the most recent filing are: **NONE**

I further certify, the names of all persons authorized to execute documents filed with this office and listed in the most recent filing are: **JAMES JOHN MORIN, KATHRYN MARY LUMB**

The names of all persons authorized to act with respect to real property listed in the most recent filing are: **JAMES JOHN MORIN, KATHRYN MARY LUMB**

In testimony of which,

I have hereunto affixed the

Great Seal of the Commonwealth

on the date first above written.

William Francis Galvin

Secretary of the Commonwealth



Exhibit O

Abutters List



Find Results Report

Bolton, MA
June 04, 2017

Parcel Number: 001.0-0001.0 CAMA Number: 001.0-0000-0001.0 Property Address: 727 MAIN ST	Mailing Address: BONAZZOLI ROBERT P, TR PIERINO A BONAZZOLI 2009 LIVING TR P O BOX 26 BOLTON, MA 01740
Parcel Number: 001.C-0004.0 CAMA Number: 001.C-0000-0004.0 Property Address: 0 S BOLTON RD	Mailing Address: BONAZZOLI G & SONS INC P O BOX 25 BOLTON, MA 01740
Parcel Number: 001.C-0029.0 CAMA Number: 001.C-0000-0029.0 Property Address: 0 S BOLTON RD	Mailing Address: BONAZZOLI PIERINO A&ERNEST G DIXON JR T BONAZZOLI FAMILY TRUST 111 HUDSON RD BOLTON, MA 01740
Parcel Number: 002.B-0010.0 CAMA Number: 002.B-0000-0010.0 Property Address: 334 BERLIN RD	Mailing Address: GIBBONS KATHLEEN A 334 BERLIN RD BOLTON, MA 01740
Parcel Number: 002.C-0015.1 CAMA Number: 002.C-0000-0015.1 Property Address: 0 S BOLTON RD	Mailing Address: BONAZZOLI ROBERT P, TR THE BONAZZOLI FAMILY TRUST P O BOX 25 BOLTON, MA 01740
Parcel Number: 002.D-0015.0 CAMA Number: 002.D-0000-0015.0 Property Address: 0 HUDSON RD	Mailing Address: BONAZZOLI AUGUST G JR & DEBORAH M 258 HUDSON RD BOLTON, MA 01740
Parcel Number: 002.D-0020.0 CAMA Number: 002.D-0000-0020.0 Property Address: 0 HUDSON RD	Mailing Address: BONAZZOLI AUGUST G JR & DEBORAH M 258 HUDSON RD BOLTON, MA 01740
Parcel Number: 002.D-0082.0 CAMA Number: 002.D-0000-0082.0 Property Address: 59 OLD STONE CIRCLE 30A	Mailing Address: JUNG BONGJIN & HYUNMI P O BOX 865 BOLTON, MA 01740
Parcel Number: 002.E-0016.0 CAMA Number: 002.E-0000-0016.0 Property Address: 385 LONG HILL RD 2	Mailing Address: BOND STEVEN J & JEAN R THISTLE 385 LONG HILL RD BOLTON, MA 01740
Parcel Number: 003.C-0029.0 CAMA Number: 003.C-0000-0029.0 Property Address: 8 S BOLTON RD	Mailing Address: GASPER BONITA A 8 S BOLTON RD BOLTON, MA 01740
Parcel Number: 003.D-0009.0 CAMA Number: 003.D-0000-0009.0 Property Address: 258 HUDSON RD	Mailing Address: BONAZZOLI AUGUST G JR & DEBORAH M 258 HUDSON RD BOLTON, MA 01740
Parcel Number: 003.D-0016.0 CAMA Number: 003.D-0000-0016.0 Property Address: 111 HUDSON RD	Mailing Address: BONAZZOLI ROBERT P 71 GREEN HARBOR RD E FALMOUTH, MA 02536



www.cai-tech.com

Data shown on this report is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse.



Find Results Report

Bolton, MA
June 04, 2017

Parcel Number: 003.D-0027.0
CAMA Number: 003.D-0000-0027.0
Property Address: 16 CENTURY MILL RD 3

Mailing Address: CARBONE ANTHONY L & VERONICA J
16 CENTURY MILL RD
BOLTON, MA 01740

Parcel Number: 003.E-0038.0
CAMA Number: 003.E-0000-0038.0
Property Address: 87 TEELE RD 4

Mailing Address: BONNEVILLE BRIEN S & STACY M
87 TEELE RD
BOLTON, MA 01740

Parcel Number: 005.B-0008.0
CAMA Number: 005.B-0000-0008.0
Property Address: 33 WILDER RD 1A

Mailing Address: CARBONE MARK & KRISTINE FOSTER
CARBO
33 WILDER RD
BOLTON, MA 01740

Parcel Number: 005.D-0027.0
CAMA Number: 005.D-0000-0027.0
Property Address: 0 SUGAR RD

Mailing Address: BONAZZOLI G & SONS INC
P O BOX 25
BOLTON, MA 01740

Parcel Number: 006.B-0034.0
CAMA Number: 006.B-0000-0034.0
Property Address: 186 NOURSE RD

Mailing Address: BRODERS BONNIE J & CHRISTOPHER A,
TR BONNIE J BRODERS LIVING TR
186 NOURSE RD
BOLTON, MA 01740

Parcel Number: 006.C-0049.0
CAMA Number: 006.C-0000-0049.0
Property Address: 217 GREEN RD 1A

Mailing Address: KLINE DONALD R JR & BONNIE J
217 GREEN RD
BOLTON, MA 01740

Parcel Number: 006.D-0014.0
CAMA Number: 006.D-0000-0014.0
Property Address: 63 PINEWOOD RD

Mailing Address: DEFINA STEPHEN P & BONNIE L
63 PINEWOOD RD
BOLTON, MA 01740

Parcel Number: 006.E-0033.0
CAMA Number: 006.E-0000-0033.0
Property Address: 566 SUGAR RD

Mailing Address: CHARBONNEAU DAVID A & LAURIE ANN

566 SUGAR RD
BOLTON, MA 01740

Parcel Number: 007.C-0004.0
CAMA Number: 007.C-0000-0004.0
Property Address: 188 BARE HILL RD 3

Mailing Address: LABONTE MARK & CAROLYN M
188 BARE HILL RD
BOLTON, MA 01740



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Exhibit P

Filing Fees



TOWN OF BOLTON

BOARD OF APPEALS

Filed with the Town Clerk on:

Town Hall, 663 Main Street, Bolton MA 01740
Phone 978-779-3308 Fax 978-779-5461

TOWN CLERK

APPLICATION FOR HEARING

PART I. Background Information (Provided by Applicant to the Town Clerk):

Applicant/Petitioner:	Northeast Classic Builders James J. Morin Kathryn M. Lumb
Address of applicant:	P.O. Box 155 Bolton, MA 01740
Applicant is:	X -Owner <input type="checkbox"/> -Tenant <input type="checkbox"/> -Licensee <input type="checkbox"/> -Prospective Buyer
Property address:	South Bolton Road Between Wheeler Road and Spectacle Hill Road
Assessor Map/Parcel Number of property	Map 2C, Parcel 15.1
Deed reference(s):	Book <u>58115</u> Page <u>346</u>
Owner name (if person other than applicant)	Owner is Applicant
Owner address:	Same as Applicant Address
Owner telephone number:	774-696-2246
Application & all other materials and fee for:	<input type="checkbox"/> -Variance, \$100 + \$6 per abutter on certified abutters list <input type="checkbox"/> -Special Permit, \$100 + \$6 per abutter on certified abutters list <input type="checkbox"/> -Appeal of Decision, \$100 X -Comprehensive Permit Administrative Fee - \$500.00 Consultant Review Fee - \$5,000 plus \$100/unit <input type="checkbox"/> -Amend Existing Decision (\$100 + \$6 per abutter for special permits and variances; \$500 administrative fee for comprehensive permits if change(s) are deemed substantial. If necessary, additional consultant review fee determined by ZBA)

Description of problem for which relief is sought:	Seeking Comprehensive Permit
Applicable section(s) of Zoning Bylaws or other reference for consideration by Board of Appeals:	M.G.L. Chapter 40B
Justification for request: (attach additional information if necessary)	Applicant is seeking Comprehensive Permit pursuant to M.G.L. Chapter 40B and the Bolton Zoning Board of Appeals Comprehensive Permit rules and regulations.
<p>The undersigned certifies that he/she has read and examined this application and the Bolton Zoning Board of Appeals Rules and Regulations, and that the proposed project is accurately represented in the statements made in this application.</p> <p>I hereby request a hearing before the Board of Appeals with reference to the above application.</p> <div style="display: flex; justify-content: space-between;"> <div>  Property Owner's Signature (REQUIRED) </div> <div> <u>6/23/2021</u> / Date </div> </div> <div style="display: flex; justify-content: space-between;"> <div>  Property Owner's Signature (REQUIRED) </div> <div> <u>6/23/2021</u> / Date </div> </div> <div style="display: flex; justify-content: space-between;"> <div> _____ Applicant's Signature (if different from owner) </div> <div> _____ Date </div> </div>	

This form, completed by the applicant, must accompany the pertinent application materials (see sections 4, 5, or 6 of the Zoning Board of Appeals Rules and Regulations) to comprise a complete application.

This application will be reviewed by the Board of Appeals. An application found to be incomplete upon receipt by the Board of Appeals may be returned to the applicant for completion and re-filing. The date of any re-filing shall be the date of the application.