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ECOLOGICAL INVENTORY REPORT

**Snyder Property
46 Springdale Avenue
Dover, Massachusetts**

Prepared For:

Dover Conservation Commission
P.O. Box 250
Dover, MA 02030

Prepared By:



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President

June 18, 2014

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1.0 Foreword

This report summarizes investigations conducted by EcoTec Inc. of Worcester, MA (“EcoTec”) relative to property known as 46 Springdale Avenue in Dover, MA (hereinafter, “the Site”). The purpose of EcoTec’s evaluation was to provide the Town of Dover with information concerning the ecological conditions on the site, for consideration by the Town as part of deliberations about possible purchase of the property. EcoTec’s evaluation did not include consideration of possible contamination by oil and/or hazardous materials.

Mr. James Snyder, the property owner, provided EcoTec with unrestricted access to the site to complete this investigation.

Description of the experience and qualifications of EcoTec staff who contributed to this evaluation are attached to this report.

2.0 Introduction

EcoTec understands that the Town of Dover is considering the purchase of a parcel of property known as 46 Springdale Avenue. The parcel is shown as Lot 49 of Map 11 of the Dover Assessors Maps (Figure 1). EcoTec understands that GLM Engineering Consultants, Inc. of Holliston, MA (“GLM”) is preparing a survey plan of the site, in addition to the Wetland Delineation. EcoTec’s report includes several figures developed from on-line sources intended to depict environmental resources, however those figures should not in any way be assumed to supersede the information on the GLM plan.

In accordance with EcoTec’s May 20, 2014 proposal to the Dover Conservation Commission, this report includes information on the following subjects:

- Field delineation of wetland boundaries on the property
- Discussion of regulatory restrictions related to wetlands;
- Evaluation of ecological communities;
- Review of existing information relative to state-listed species;
- Evaluation of an on-site mapped “Potential Vernal Pool;”
- Review of existing information relative to soils; and
- Review of existing information relative to surface water flow and watersheds.
- Recommendations related to possible ecological management of the site in the event that the Town acquires the property;

3.0 General Site Description:

According to assessor’s records, the Site consists of an approximately 27.2 acre parcel on the south site of Springdale Avenue. The Site includes the following five general land types:

- Developed area near Springdale Avenue that includes two residential structures, a barn, paddock areas, manicured lawn, paved driveway, and related features associated with residential use;
- Wooded wetlands;

- Open water;
- Wetland and upland (i.e., non-wetland) field; and
- Wooded uplands.

These areas are described in more detail below.

The main hydrographic feature of the Site is a stream that flows onto the southern portion of the Site through a culvert under the railroad grade that forms the southern Site boundary. Joyce Hastings, PLS of GLM Engineering reports that historic plans on file at the Registry of Deeds refer to the stream as “Spring Brook.” Stream flows are generally to the north, and the stream forms the easterly property line in the northern portion of the Site (see GLM plan). The stream character, its source and eventual confluence with the Charles River to the north, are described below in section 6.0.

The Site is generally depicted below on Figure 1 (portion of Assessor’s Map 11) and Figure 2 (Massachusetts Department of Environmental Protection – “MassDEP” data layers on ortho photo).

Figure 1: Portion of Assessor’s Map 11 (Site = parcel 11-049)

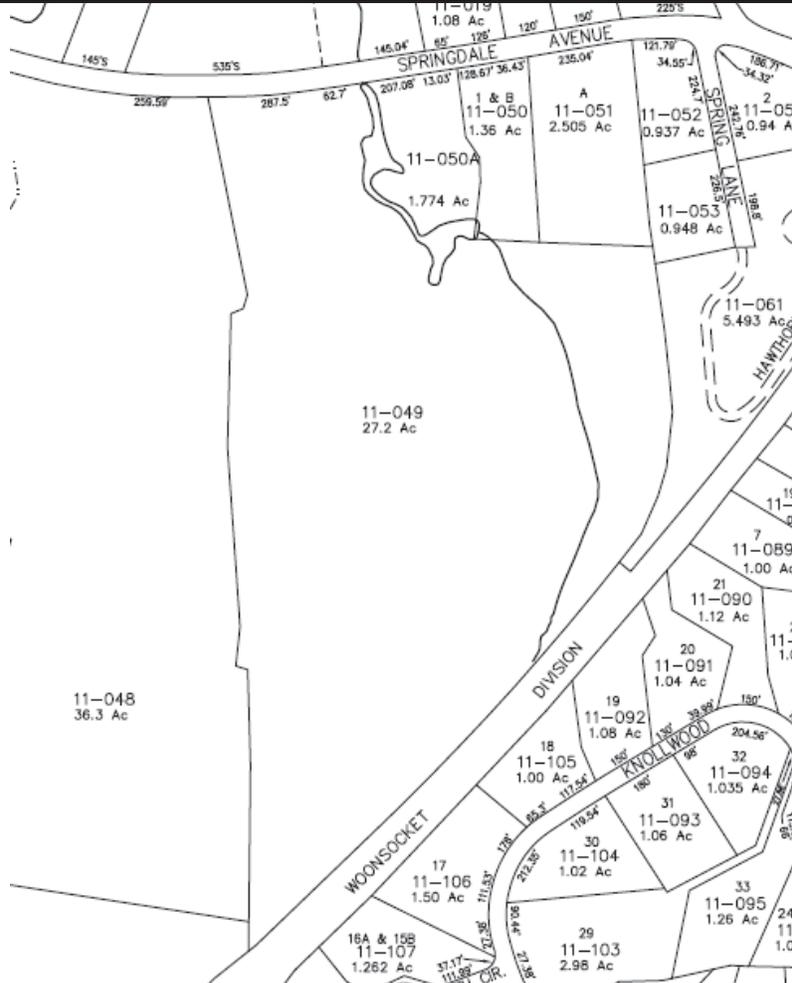
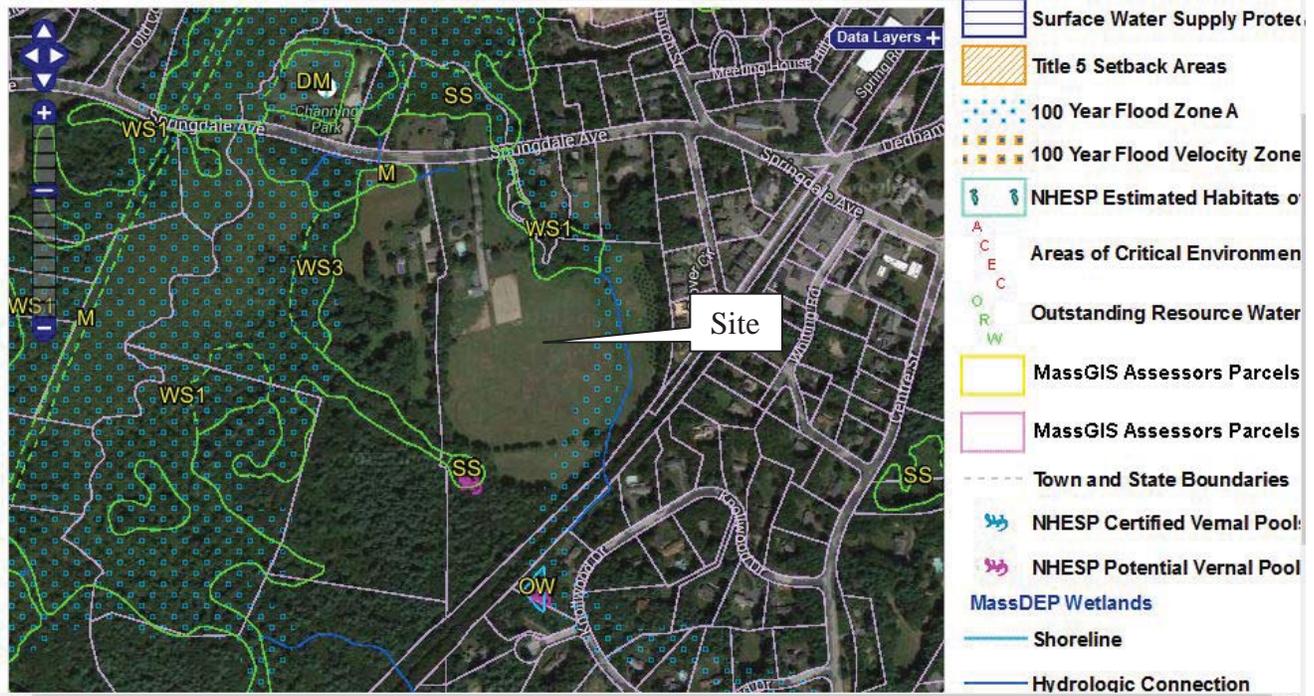


Figure 2: MassDEP data layers on ortho photo



4.0 Wetlands and Wildlife:

4.1 Wetland Resources: During the Site inspections, EcoTec evaluated the Site for the presence of Wetland Resource Areas as defined by: (1) the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131, S. 40; the “Act”) and its implementing regulations (310 CMR 10.00 *et seq.*; the “Regulations”); (2) the Dover Wetlands Protection Bylaw and its associated Rules and Regulations (“the Bylaw”); and (3) the U.S. Clean Water Act (i.e., Section 404 and 401 wetlands). The reader should be aware that the regulatory authority for determining wetland jurisdiction rests with local, state, and federal authorities. The Site includes the following Wetland Resource Areas: Land Under Water Bodies and Waterways, Bordering Land Subject To Flooding, Bank and Bordering Vegetated Wetland. These Resource Areas are defined below in terms of state Regulations, as well as in ecological terms. All of the Wetland Resource Areas noted at the Site are subject to local, state, and federal wetlands jurisdiction. Reference is made below to state wetland Regulations definitions, recognizing that the Bylaw has concurrent jurisdiction and similar definitions.

The Site stream is mapped on the current USGS Topographic Map (Figure 3) as a perennial stream. During EcoTec’s June 4, 2014 Site evaluation, the southerly portion of the stream lacked flowing or standing water, however flow was present in the northern portion of the stream. For purposes of this assessment, EcoTec considers the stream, at least in part, to be perennial.

Figure 3: USGS Topographic Map



In the southern portion of the Site, there is a ponding area in a localized depression. Mr. Snyder reported that the ponding fluctuates seasonally, but that he has ever seen the area without standing water, although he stated that he has never made a study of the matter. EcoTec assumes for purposes of this evaluation and regulatory assessment that the ponding area contains some standing water in most years. Based upon this assumption, and the presence of a maximum annual ponded water surface in excess of 10,000 square feet, the area would be considered a Pond under the Regulations:

A Pond is defined (310 CMR 10.04) as:

"...any open body of fresh water with a surface area observed or recorded within the last ten years of at least 10,000 square feet. Ponds may be either naturally occurring or man-made by impoundment, excavation, or otherwise. Ponds shall contain standing water except for periods of extended drought. For purposes of this definition, extended drought shall mean any period of four or more months during which the average rainfall for each month is 50% or less of the ten year average for that same month..."

The freshwater Wetland Resource Areas observed present at the Site are:

- Bank, of Spring Brook, and the Site Pond (see Potential Vernal Pool evaluation, below, for additional discussion);

Inland Banks are defined by the Regulations as:

“the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and the adjacent flood plain or, in the absence of these, it occurs between a water body and an upland. A bank may be partially or totally vegetated, or it may be comprised of exposed soil, gravel, or stone” [310 CMR 10.54(2)(a)].

The stream Banks are very well defined in the northern portion of the property east of the Site buildings, and relatively well defined in the extreme southern portion where flows enter the Site from the railroad culvert. As surface water moves north through the Site field, the channel becomes less well defined, to the point where there ceases to be a definite channel in the ground, and surface flows are diffuse through the wetland. Further north within the field, flows are again confined within a definite channel, which continues in a generally northerly direction to a culvert under Springdale Avenue.

- Land Under Water Bodies and Waterways (“LUW”) is defined as:

“...the land beneath any creek, river, stream, pond or lake. Said land may be composed of organic muck or peat, fine sediments, rocks, or bedrock” [310 CMR 10.56(2)(a)].

Perennially inundated areas of the pond and Spring Brook are considered LUW. LUW areas include shallow zones with emergent aquatic vegetation, deeper areas with floating aquatic plants, and primarily unvegetated open water areas.

- Bordering Vegetated Wetland (BVW);

The Regulations state that:

“Bordering Vegetated Wetlands are freshwater wetlands which border on creeks, rivers, streams, ponds and lakes. The types of freshwater wetlands are wet meadows, marshes, swamps and bogs. Bordering Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The ground and surface water regime and the vegetational community which occur in each type of freshwater wetland are specified in M.G.L. c. 131, § 40 [310 CMR 10.55(2)(a)].”

BVW areas at the Site include wet meadow within the Site field as well as wooded swamp in the northern portion of the Site and a small fringe of shrub swamp near the railroad culvert.

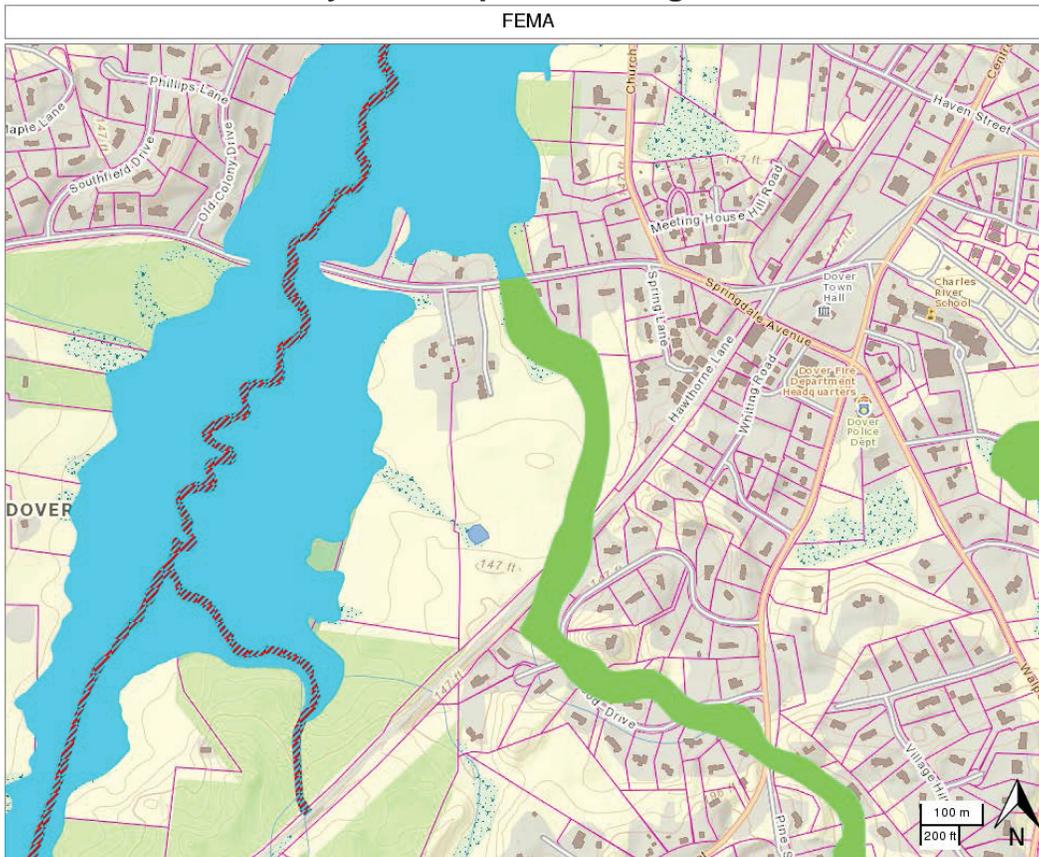
- Bordering Land Subject To Flooding (BLSF) is defined as:

“...an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, streams, rivers, ponds, and lakes. It extends from the banks of these waterways and water bodies;

where a *Bordering Vegetated Wetland* occurs, it extends from said wetland' [310 CMR 10.57(2)(a)1].

Thus, areas located outside of the BVW that are subject to flooding during a 100-year flood event would be considered BLSF. A flood map generated from the MassGIS website is attached as Figure 4. The appended Wetland Delineation Plan by GLM also includes the "Zone A" mapped floodplain limits.

**Figure 4: FEMA 100 year floodplain (approximate limits)
100 year floodplain = dark green**



- Riverfront Area is the 200 foot wide
"area of land between a river's mean annual high water line and a parallel line measured horizontally. The riverfront area may include or overlap other resource areas or their buffer zones.... A river is any natural flowing body of water that empties to any ocean, lake, pond, or other river and which flows throughout the year" [310 CMR 10.58 (2)(a)].

The Massachusetts Wetlands Protection Act and Regulations and Dover Wetlands Bylaw presume that the various Wetland Resource Areas are significant to the protection of a

number of identified Interests of the Act and Bylaw. The Regulatory presumptions of significance for the Wetland Resource Areas at the Site are presented in Table 1, below.

Table 1
Wetland Resource Areas on the Site and Presumed Statutory Interests
Under the Massachusetts Wetlands Protection Regulations
And Dover Wetlands Protection Bylaw

Interest	BVW	Bank	LUW	Riverfront Area	BLSF
Public/Private Water Supply	X	X	X	X	
Groundwater Supply	X	X	X	X	
Flood Control	X	X	X	X	X
Storm Damage Prevention	X	X	X	X	X
Prevention of Pollution	X	X	X	X	
Protection of Land Containing Shellfish (where present)	X	X	X	X	
Protection of Fisheries	X	X	X	X	
Protection of Wildlife Habitat	X	X	X	X	X
Erosion and sedimentation control ¹	X	X	X	X	X
Plant life ¹	X	X	X	X	
Water pollution ¹	X	X	X	X	
Recreation ¹	X	X	X	X	
Aesthetics ¹	X	X	X	X	
Agriculture and aquaculture ¹	X	X	X	X	

¹Bylaw only

4.2 Delineation of Wetland Resource Areas:

The site was inspected, and areas suspected to qualify as wetland resources were identified in accordance with: (1) the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131, § 40; the “Act”) and its implementing regulations (310 CMR 10.00 *et seq.*; the “Regulations”); (2) the U.S. Clean Water Act (i.e., Section 404 and 401 wetlands) and; (3) The Dover Wetlands Bylaw and Regulations. Vegetated wetlands were delineated in accordance with the definition set forth in the Act Regulations at 310 CMR 10.55(2)(c). Section 10.55(2)(c) states that “The boundary of Bordering Vegetated Wetlands is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist.” The methodology used to delineate Bordering Vegetated Wetlands is further described in: (1) the BVW Policy “*BVW: Bordering Vegetated Wetlands Delineation Criteria and Methodology*,” issued March 1, 1995; and (2) “*Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act: A Handbook*,” produced by the Massachusetts Department of Environmental Protection, dated March 1995. The plant taxonomy used in this report is based on the *National Wetland Plant List (Massachusetts 2012 Final State Wetland Plant List)*, ERDC/CRREL TR-12-11 (Lichvar, 2012). Federal wetlands were presumed to have boundaries conterminous with the delineated Bordering Vegetated Wetlands. Note that state and local wetland regulations require that when vegetation is altered (which is

defined to include mowing) BVW delineations rely solely on the presence of indicators of wetland hydrology).

Two sets of DEP Bordering Vegetated Wetland Delineation Field Data Forms completed for observation plots located in the wetlands and uplands near flags A-3 and B-7 are appended. Table 5 below provides the Flag Numbers, Flag Type, and Wetland Types and Locations for the delineated wetland resources.

Table 2: Wetland Delineation Flagging

Flag Numbers	Flag Type	Wetland Types and Locations
Start A-1 to A-6 Stop	Blue Flags	Boundary of Bordering Vegetated Wetlands located in the northwesterly corner of the site that is associated with additional wetlands on the westerly abutting property.
Start B-1 to B-129 Stop	Blue Flags	Boundary of Bordering Vegetated Wetlands located in the easterly portion of the site that is associated with the north-flowing, mapped perennial Spring Brook.
Start D-1 to D-24 Stop	Blue Flags	Boundary of Bordering Vegetated Wetlands located in the southwesterly portion of the site that is associated with a Pond.
Start C-1 to C-38 Stop	Red Flags	Northerly portion of Mean Annual High-water Line (MAHWL) of mapped perennial stream within wetland B (west side of brook only flagged).
Start CC-1 to CC-6 Stop	Red Flags	Southerly portion of Mean Annual High-water Line (MAHWL) of mapped perennial stream within wetland B (west side of brook only flagged).

Wetland A (i.e., flags A-1 to A-6) consists of a shrub swamp and wet lawn located in the northwesterly corner of the site that is associated with additional off-Site wetlands on the western abutting property. Plant species observed include eastern poison-ivy (*Toxicodendron radicans*) climbing woody vines; southern arrow-wood (*Viburnum dentatum*), silky dogwood (*Cornus amomum*), gray dogwood (*Cornus racemosa*), European buckthorn (*Rhamnus cathartica*) and black elderberry (*Sambucus nigra*) shrubs; and sensitive fern (*Onoclea sensibilis*), skunk-cabbage (*Symplocarpus foetidus*), spotted touch-me-not (*Impatiens capensis*), sedges (Cyperaceae sp.), rushes (Juncaceae sp.), uptight sedge (*Carex stricta*), lamp rush (*Juncus effusus*), goldenrods (*Solidago* sp.), goldentop (*Euthamia* sp.), beggar-tick's (*Bidens* sp.), buttercup (*Ranunculus* sp.), smartweed (*Persicaria* sp.), bedstraw (*Gallium* sp.), aster (*Symphotrichum* sp.), ground cover. Evidence of wetland hydrology, including hydric soils, high groundwater, saturated soils and pore linings was observed within the delineated wetland. This vegetated wetland eventually borders a stream; accordingly, the vegetated wetlands would be regulated as Bordering Vegetated Wetlands under the Act and Bylaw. A 100-foot Buffer Zone extends horizontally outward from the edge of Bordering Vegetated Wetlands under the Act and Bylaw.

Wetland B (i.e., flags B-1 to B-129) consists of a wooded swamp, wet meadow and wet lawn located in the northerly and easterly portions of the site that is associated with Spring Brook. Plant species observed include red maple (*Acer rubrum*), swamp white oak (*Quercus bicolor*), black tupelo (*Nyssa sylvatica*), green ash (*Fraxinus pensylvanica*), willow (*Salix sp.*), and American elm (*Ulmus americana*) trees, saplings, and/or shrubs; eastern poison-ivy (*Toxicodendron radicans*) climbing woody vines; highbush blueberry (*Vaccinium corymbosum*), common winterberry (*Ilex verticillata*), southern arrow-wood (*Viburnum dentatum*), silky dogwood (*Cornus amomum*), gray dogwood (*Cornus racemosa*), European buckthorn (*Rhamnus cathartica*), black elderberry (*Sambucus nigra*), coastal sweet pepperbush (*Clethra alnifolia*) and clammy azalea (*Rhododendron viscosum*), shrubs; and sheep-laurel (*Kalmia angustifolia*), bristly dewberry (*Rubus hispidus*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda spectabilis*), interrupted fern (*Osmunda claytoniana*), sensitive fern (*Onoclea sensibilis*), subarctic lady fern (*Athyrium filix-femina*), eastern marsh fern (*Thelypteris palustris*), New York fern (*Parathelypteris noveboracensis*), Massachusetts/bog fern (*Parathelypteris simulata*), spinulose wood fern (*Dryopteris carthusiana*), skunk-cabbage (*Symplocarpus foetidus*), American False Hellebore (*Veratrum viride*), Jack-in-the-pulpit (*Arisaema triphyllum*), three-leaf goldthread (*Coptis trifolia*), maystar (*Trientalis borealis*), spotted touch-me-not (*Impatiens capensis*), Cardinal-flower (*Lobelia cardinalis*), yellow marsh-marigold (*Caltha palustris*), spotted touch-me-not (*Impatiens capensis*), sedges (Cyperaceae sp.), rushes (Juncaceae sp.), uptight sedge (*Carex stricta*), lamp rush (*Juncus effusus*), goldenrods (*Solidago sp.*), goldentop (*Euthamia sp.*), beggar-tick's (*Bidens sp.*), buttercup (*Ranunculus sp.*), smartweed (*Persicaria sp.*), bedstraw (*Gallium sp.*) and aster (*Symphyotrichum sp.*) ground cover. Evidence of wetland hydrology, including hydric soils, high groundwater, saturated soils, pore linings, evidence of flooding, and drainage patterns, was observed within the delineated wetland. This vegetated wetland borders a mapped perennial stream; accordingly, the vegetated wetlands would be regulated as Bordering Vegetated Wetlands and the perennial stream would be regulated as Bank and Land Under Water Bodies and Waterways under the Act and Bylaw, with a 100-foot Buffer Zone.

Wetland D (i.e., flags D-1 to D-24) consists of a wooded swamp located in the southwesterly portion of the site that is associated with a possible pond/Potential Vernal Pool. Plant species observed include red maple (*Acer rubrum*), swamp white oak (*Quercus bicolor*) and American elm (*Ulmus americana*) trees, saplings, and/or shrubs; eastern poison-ivy (*Toxicodendron radicans*) climbing woody vines; highbush blueberry (*Vaccinium corymbosum*), southern arrow-wood (*Viburnum dentatum*), silky dogwood (*Cornus amomum*), gray dogwood (*Cornus racemosa*), European buckthorn (*Rhamnus cathartica*), black elderberry (*Sambucus nigra*), shrubs; and cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda spectabilis*), interrupted fern (*Osmunda claytoniana*), sensitive fern (*Onoclea sensibilis*), skunk-cabbage (*Symplocarpus foetidus*), Jack-in-the-pulpit (*Arisaema triphyllum*), three-leaf goldthread (*Coptis trifolia*), maystar (*Trientalis borealis*), spotted touch-me-not (*Impatiens capensis*), spotted touch-me-not (*Impatiens capensis*), sedges (Cyperaceae sp.), rushes (Juncaceae sp.), uptight sedge (*Carex stricta*), lamp rush (*Juncus effusus*), goldenrods (*Solidago sp.*), goldentop (*Euthamia sp.*), beggar-tick's (*Bidens sp.*), buttercup (*Ranunculus sp.*), smartweed (*Persicaria sp.*),

bedstraw (*Gallium sp.*) and aster (*Symphotrichum sp.*) ground cover. Evidence of wetland hydrology, including hydric soils, high groundwater, saturated soils, pore linings and evidence of flooding was observed within the delineated wetland. This vegetated wetland borders a presumed pond; accordingly, the vegetated wetlands would be regulated as Bordering Vegetated Wetlands and the pond would be regulated as Bank and Land Under Water Bodies and Waterways under the Act and Bylaw, with a 100-foot Buffer Zone. In the event that the ponding area does not hold standing water throughout non-drought years, it would not be regulated as a Pond. In that instance, the vegetated wetland would still be regulated under the Bylaw, however under state Regulations the area would be regulated less strictly as an Isolated Land Subject To Flooding, with a boundary defined by flooding limits in accordance with state Regulations:

Isolated Land Subject to Flooding (ILSF): is defined as "*...an isolated depression or closed basin without an inlet or an outlet. It is an area which at least once a year confines standing water to a volume of at least 1/4 acre feet and to an average depth of at least six (6) inches.... The boundary of ILSF is the perimeter of the largest observed or recorded volume of water confined in said area*" [310 CMR 10.57(2)(b)].

Bordering Land Subject to Flooding ("BLSF") consists of areas that flood due to a rise in floodwaters from a bordering waterway or water body. As such, BLSF is not delineated based upon normally observed characteristics in the field. Where flood studies have been completed, the boundary of BLSF is based upon flood profile data prepared by the National Flood Insurance Program. Section 10.57(2)(a)3 of the Regulations states that "The boundary of Bordering Land Subject to Flooding is the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm." Figure 4 depicts the mapped FEMA floodplain, which is an estimated floodplain, rather than a detailed flood study, and indicates that BLSF occurs in the vicinity of the mapped perennial stream for its full length across the Site. Bordering Land Subject to Flooding only occurs in areas where the 100-year flood elevation is located outside of or upgradient of the delineated Bordering Vegetated Wetlands or Bank boundary. Bordering Land Subject to Flooding does not have a Buffer Zone under the Act, but has a 100 foot Buffer Zone under the Bylaw.

The Massachusetts Rivers Protection Act amended the Act to establish an additional wetland resource area: Riverfront Area ("RFA"). Based upon a review of the current USGS Map (Figure 3), a stream that is shown as perennial (Spring Brook) is located within wetland B. Streams that are shown as perennial on the current USGS map are presumptively designated perennial under the Massachusetts Wetlands Protection Act regulations. Unless this perennial designation is overcome, Riverfront Area is presumed to extend 200 feet horizontally upgradient from the mean annual high-water line of the stream. Section 10.58(2)(a)2. states that the "Mean annual high-water line of a river is the line that is apparent from visible markings or changes in the character of soils or vegetation due to prolonged presence of water and that distinguishes between predominantly aquatic and predominantly terrestrial land. Field indicators of bankfull conditions shall be used to determine the mean annual high-water line. Bankfull field

indicators include but are not limited to: changes in slope, changes in vegetation, stain lines, top of pointbars, changes in bank materials, or bank undercuts.” Section 10.58(2)(a)2.a. states that “In most rivers, the first observable break in slope is coincident with bankfull conditions and the mean annual high-water line.” The mean annual high-water line on the west side of the stream was delineated in the field with flags C-1 to C-38 and CC-1 to CC-6 based upon the above-referenced regulation. There is no definite stream channel between flags C-38 and CC-1, and therefore, in EcoTec’s opinion, there is no River in this area. Furthermore, based upon a review of the current USGS Map and observations made during the site inspection, there are no other mapped or unmapped streams located within 200 feet of the site. Accordingly, Riverfront Area would occur on the site only in the area noted. Riverfront Area does not have a Buffer Zone under the Act, but may overlap other wetland resources and their Buffer Zones. State Regulations and the Bylaw allow for overcoming the perennial stream presumption through detailed documentation of a lack of perennial flow on all or part of a presumed perennial stream. Table 3, below provides commentary on the issue of the mapped perennial stream in several discrete sections of Spring Brook on the Site.

**Table 3: Site Stream and Presumed Perennial Flow:
Upstream to downstream segments**

Flag Numbers	Status on June 4, 2014	Comments regarding perennial presumption based upon limited observations and data*
CC-1 to CC-5	Not flowing	Presumption could likely be overcome
CC-5 to C-38	No definite channel	Lack of a channel should overcome presumption
C-23 to C-38	Slight flow	Flow likely decreases and possibly disappears for all or part of this stream segment during summer conditions (EcoTec estimates high to moderate likelihood moving from upstream to downstream). Requires monitoring, documentation, and regulatory filing/ concurrence to overcome the presumption.
C-23 to C-1	Obvious flow	In addition to the slight flow of water from the upstream segment, there was an even more substantial flow of water emanating from a spring bounded by wetland flags C-16, C-17, and C-18. Based upon the presence of the substantial groundwater breakout and aquatic plants in this section of the stream, perennial flow in this section of the stream appears much more likely. Nevertheless, all or part of this stream segment could potentially be determined intermittent. Appropriate monitoring, documentation, and regulatory filing/ concurrence would be required to overcome the perennial presumption.

* Opinions of EcoTec. Regulatory determinations subject to formal filing and Determination by the Dover Conservation Commission.

It is important to note that the Riverfront Regulations require the issuing authority to find that any stream is intermittent based upon a documented field observation that the stream is not flowing. A documented field observation is an observation made at least once per

day, over four days in any consecutive 12 month period, during a non-drought period on a stream not significantly affected by drawdown from withdrawals of water supply wells, direct withdrawals, impoundments, or other man-made flow reductions or diversions. As noted in section 8.0 below, the contributing watershed to the Site includes a public water supply well, and the degree to which that well may affect stream flow is unknown to EcoTec. In the event that a formal filing is made to the Conservation Commission to overcome the perennial presumption, the Commission would need to consider the issue of possible drawdown on stream flow.

4.3 Wetlands and Wildlife Permitting Considerations:

The following discussion is intended to provide a general understanding of the wetland and wildlife constraints that would apply to any proposed development or alteration of the Site. Please note that the following is intended for general guidance only, and that formal regulatory determinations and rulings relative to a specific proposal are required to achieve permitting certainty. Maintenance of the existing Site conditions, including mowing of the lawn and field areas, does not require permitting.

- **Bordering Vegetated Wetland:** In general, alteration of BVW is prohibited, with limited exception. The most typical exception is the “limited project” crossing of BVW to gain access to otherwise unreachable upland (i.e. non-wetland) area. The only upland portion of the Site that is unreachable without a wetland crossing is a small area in the extreme eastern portion of the property. Access to this area with a road or driveway would require a permit from the Dover Conservation Commission under state and local wetland regulations. Issuance of such a permit is discretionary on the part of the Conservation Commission.
- **Bank and Land Under Water Body or Waterway:** These resources are internal to the BVW and permitting constraints similar to BVW apply.
- **Bordering Land Subject To Flooding (floodplain):** BLSF limits are depicted as “Zone A” on the attached Wetland Delineation Plan by GLM. Filling of BLSF requires wetlands permit approval, and incremental flood storage replacement. Also, for projects over a specified regulatory threshold, BLSF wetland wildlife habitat provisions apply.
- **Riverfront Area:** As discussed above and noted in Table 3, RFA is presumed to exist along the entire length of the mapped stream, but this presumption can potentially be overcome for at least a significant portion of the presumed RFA. Therefore the final extent of RFA that would impose regulatory permitting restrictions is not known. Overcoming the RFA presumption on any part of the Site requires a formal filing and determination by the Dover Conservation Commission (with appeal to MassDEP under state Regulations only). Notwithstanding the current uncertainty with regard to the extent of RFA that would be regulated on the Site, RFA regulations require that:
 - a. there are no practicable and substantially equivalent economic alternatives to the proposed project with less adverse effects on wetland interests; and
 - b. the work, including the proposed mitigation, will have no significant adverse impact on the riverfront area to protect the interests identified in the Act. The "no significant adverse impact" standard requires no work in the inner riparian

area (0 to 100 feet from the River) and alteration not exceeding 5,000 sf or 10% of the site RFA (whichever is greater).

The “limited project” exception for work to access portions of the property potentially applies to RFA restrictions as well.

- **Buffer Zone:** A 100 foot regulatory Buffer Zone projects from BVW and/or Bank under both state and local wetland regulations, requiring permitting for any proposed work in that area. The Buffer Zone is more strictly regulated under the Dover Wetlands Bylaw, which establishes work setbacks within which work is generally prohibited (larger setbacks are required for steeper sloping areas, which are limited on the Site to the wooded uplands):
 - a. 25 foot no disturb zone; and
 - b. 40 foot no structure zone.

Potential Second Site Access from Springdale Avenue: If the Town of Dover were to acquire the Site property and desire an additional physical access road or driveway to the Site interior from Springdale Avenue, a development feasibility assessment of such an access would need to consider the permitting requirements briefly discussed above, in addition to other factors such as local zoning rules and regulations. At a minimum, such an access way would involve construction in the Riverfront Area and require authorization from the Dover Conservation Commission.

Other State Permitting: Depending upon the scope and scale, a proposed development project for the Site could potentially trigger other state environmental permitting and review, including the Massachusetts Environmental Policy Act (“MEPA”) which, for projects that exceed certain thresholds, requires environmental review prior to state action, including issuance of environmental permits.

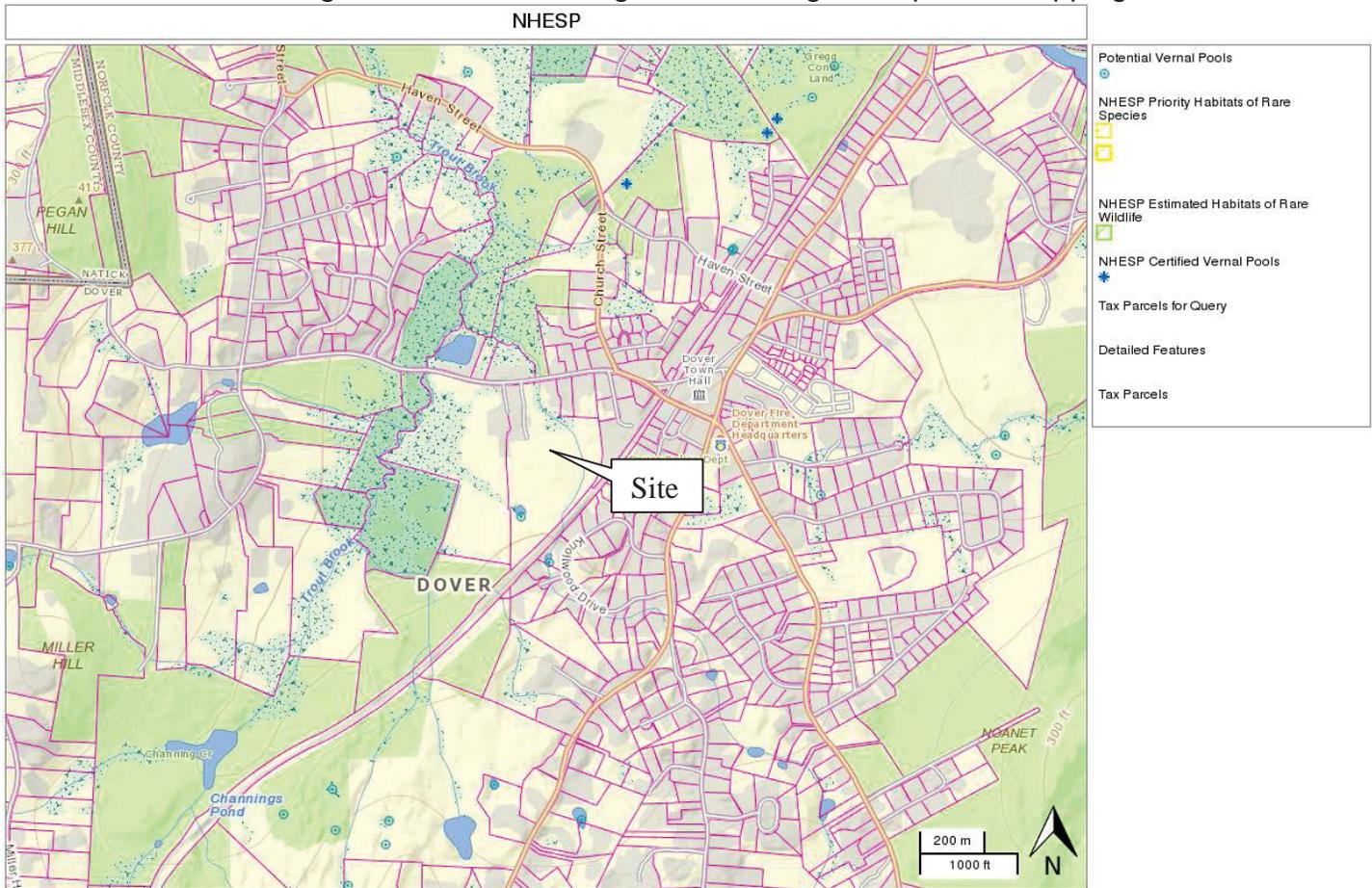
Federal Wetland Permitting: Under the US Clean Water Act, the US Army Corps of Engineers regulates discharges of fill materials to “Waters of the US” which include the site BVW, bank and LUW. Any filling of these wetlands requires compliance with the current General Permit issued by the Corps. The Army Corps does not regulate Buffer Zones or Riverfront Area, but any federally jurisdictional wetland filling triggers an analysis of “secondary impacts” which can include alterations to upland as much as 750 feet from a vernal pool. As noted, initial Corps jurisdiction is triggered only by the placement of fill in wetlands or other regulated Waters of the US.

5.0 State-Listed Species:

State Wetland Regulations require that no project may be permitted that will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures set forth at 310 CMR 10.59. Similarly, the Massachusetts Endangered Species Act (M.G.L. Ch. 131A; “MESA”) and MESA Regulations (321 CMR 10.00 et seq.)] prohibit the alteration of mapped Priority Habitat of state-listed species without project-specific MESA permitting. Based upon a review of the *Massachusetts Natural Heritage Atlas*, 13th edition, Priority Habitats and Estimated Habitats, valid from October 1, 2008, there are no Estimated Habitats [for use with the Wetlands Regulations,

Priority Habitats [for use with MESA Regulations], or Certified Vernal Pools on or in the immediate vicinity of the site. Figure 5, below, was generated from MassGIS and includes the Estimated Habitat, Priority Habitat, and Certified Vernal Pool data layers from the Massachusetts Natural Heritage and Endangered Species Program (“NHESP”). None of these resources is present on the Site. In a June 3, 2014 email to EcoTec, Lynn Harper, Habitat Protection Specialist with NHESP, stated that NHESP has no records of MESA-listed species on or near the property.

Figure 5: Natural Heritage and Endangered Species Mapping



Mr. Boynton Glidden, long time Dover resident, reported to EcoTec that he has worked in the Dover Medical Professional Building (adjacent to the Site) for approximately 40 years. As a life-long naturalist he has made observations on the Site during that time. Mr. Glidden reports seeing a variety of wildlife on the site, including the following species of birds that are included on the Massachusetts list of Endangered, Threatened and Special Concern Species:

- American Bittern
- Sharp-shinned Hawk
- Northern Parula Warbler
- Blackpoll Warbler
- Mourning Warbler

He reports that in 2014, the only species from the above list that he has observed is the Blackpoll Warbler which he observed dead on the property during the May 14 Site walk, which he attended as a member of the Dover Open Space Committee. Mr. Glidden reported that he collected the dead warbler and has it preserved in his freezer. Mr. Glidden reported that he has not submitted any documentation of his observations to NHESP.

6.0 Habitat Analysis:

The site contains the following general land types:

- Developed area;
- Wooded uplands;
- Wooded wetlands;
- Open water – Pond (Potential Vernal Pool) and Spring Brook; and
- Field - wetland and upland.

A general description of each area and the associated habitat value is presented below.

Developed Area: This area, located near Springdale Avenue, includes two residential structures, a barn, paddock areas, manicured lawn, paved driveway, and related features associated with residential use. The vegetation is closely manicured and the area provides minimal habitat value, although barn swallows were observed flying in and out of the open barn door.

Wooded upland: Wooded upland on the Site is located in the southern portion of the property (see Figure 2). This area consists of an undulating elevated landform that is likely a glacially formed kame terrace or delta. Several trails and cart paths traverse these woods. There is evidence of small scale mining of sand and gravel within the area from several decades ago. Current vegetation consists of a roughly 90% closed canopy dominated by white pine (average 20 inch diameter) red and white oak (average diameter 16 inch) and pitch pine (average diameter 12 inch) trees. There is a relatively sparse understory (due to the primarily closed canopy) including huckleberry, upland sedge, lowbush blueberry, and Canada mayflower. The area is dominated by native species, however invasive glossy buckthorn and oriental bittersweet are present, primarily along paths and forest openings. The wooded upland on the Site provides habitat to a variety of species, however the habitat is common both locally and regionally and the only unique habitat characteristic observed is that the upland forest provides necessary terrestrial habitat for any amphibians that breed in the vernal pool on Site (see Potential Vernal Pool, below).

Wooded wetlands: The wetland area to the east of the Site buildings consists of a relatively typical wooded swamp. The wetland provides dense tree, shrub and herbaceous cover. It appears to have been left undisturbed for several decades, although remnant ditching and a remnant split rail fence west of the brook provide evidence that the area was historically open agricultural land. The swamp area includes zones of seasonally saturated relatively dry to highly saturated soils, which provide habitat for a range of local wildlife. Proximity to the brook's long term or permanent open water source

increases the habitat value of this area. The wooded wetlands provide important wetland habitat, although that habitat is not unique locally or regionally.

Open Water - Potential Vernal Pool: The Spring 2001 *Massachusetts Aerial Photo Survey of Potential Vernal Pools* identified roughly 30,000 “Potential Vernal Pools” (“PVPs”) by assuming that spring ponding areas within a certain size range warranted consideration for vernal pool function. Vernal pools are areas that continuously pond for at least 2 months in the spring and summer, and are free of adult fish populations, and therefore provide critical breeding habitat to certain amphibians and other animals that rely on early season ponding and the lack of fish predators. As noted on Figure 2, a portion of Wetland D (see Wetland Delineation Plan) was identified as a PVP by this survey. Therefore, on June 4, 2014, EcoTec evaluated the PVP by making visual observations and conducting multiple sweeps of the water column, through vegetation, and along the bottom of the ponded area utilizing D-frame aquatic dipnets. The following animals were observed by EcoTec during this limited investigation (selected photos are appended):

Vertebrates:

- Wood frog [*Rana sylvatica*] – tadpoles
- Un ID small tadpoles [possibly spring peeper – *Pseudacris crucifer*]
- Green frog [*Rana clamitans*] – adult
- Bullfrog [*Rana catesbeiana*] – adult call

Invertebrates:

- Dragonfly [Arthropoda, Insecta, Odonata, Aeshnidae]
- Damselfly [Arthropoda, Insecta, Odonata]
- Backswimmer [Arthropoda, Insecta, Hemiptera, Notonectidae]
- Water Boatman [Arthropoda, Insecta, Hemiptera, Corixidae]
- Caddisfly [Arthropoda, Insecta, Trichoptera] – highly abundant
- Snail [Mollusca, Gastropoda, Pulmonata]
- Fingernail clam [Mollusca, Bivalvia]
- Lymnaeid Snail [Mollusca, Gastropoda, Pulmonata, Lymnaeidae]
- Midge [Arthropoda, Insecta, Diptera, Chironomidae]
- Aquatic Sow Bug [Arthropoda, Crustacea, Isopoda]
- Water scorpion [Arthropoda, Insecta, Hemiptera, Heteroptera]
- Water scavenger beetle (adult and larva) [Arthropoda, Insecta, Coleoptera]

The presence of wood frogs suggests that the ponding area does not have a fish population (fish prey on wood frog egg masses, which is why wood frogs rely on fishless vernal pools to breed). The presence of bullfrogs suggests that the ponding does not regularly dry up entirely during the summer. In total, the evidence suggests that the ponding level drops sufficiently that in the warmest days of summer, the water level warms to the point that the water column contains insufficient oxygen to support fish. Mr. Snyder reported that he is not aware of any fish being present, but stated that he has not investigated the matter.

Based upon the presence of wood frog tadpoles, which are considered an “obligate vernal pool species,” the PVP could be certified with NHESP as a vernal pool. There is a simple certification process that includes documentation of species observed. EcoTec recommends that if the Town acquires the property, a visual survey of the pool be conducted in the mid-spring of 2015 when egg masses of wood frogs and potentially other vernal pool amphibians could be most easily observed and counted, to obtain a better understanding of the vernal pool utilization.

The other species present are typical of a warm water pool in the area. Organisms, particularly caddisflies, were highly abundant and indicative of water that is at least relatively clean, but possibly seasonally deprived of oxygen.

Open Water – Spring Brook: The Wetland Delineation Plan (appended) depicts with cross-hatching areas of open water during the June, 2014 survey by GLM. These areas are generally shallow (less than 1 foot) and contained within well-defined Banks of the brook, within the multi-layer vegetational community of the wooded swamp. The Banks are mostly well vegetated, with significant overhanging vegetation. The open water areas therefore provide good aquatic habitat that includes resting (e.g. migratory birds) feeding, travel corridor, and burrowing (in Banks) habitat.

Grassland Habitat: The largest habitat type on the property is the open hayfield/meadow. This includes both upland and wetland (“wet meadow”) portions. This area is largely devoid of woody plant species, which is clear evidence of at least annual mowing. At the time of the June 4, 2014 Site inspection the grasses and other vegetation were roughly 2 feet tall, with the exception of several approximately 5 foot wide paths that had been mowed much closer to the ground around the perimeter of the paddock areas and into the interior of the meadow, apparently for walking access. The meadow area is mostly continuous, but is somewhat broken up by a single row of tall trees, primarily red cedar (*Juniperus virginiana*) that are visible in Figure 2 in the southern portion of the Site.

EcoTec collected specimens of the dominant field vegetation, and requested taxonomic identifications by Dr. Robert Bertin at the Biology Department at the College of the Holy Cross in Worcester. Dr. Bertin is a specialist in Massachusetts Botany. Dr. Bertin provided the following species lists (Latin names from Haines' Flora Novae Angliae) and noted that there were no state-listed or otherwise noteworthy specimens (asterisks denote non-native species). Uncertain identifications reflect the lack of material (e.g., flowers) at the necessary growth stage for a conclusive identification:

Upland Area

- **Phalaris arundinacea* - reed canary grass
- **Dactylis glomerata* - orchard grass
- **Holcus lanatus* - velvet grass
- **Poa pratensis* - Kentucky bluegrass
- **Festuca rubra* (probable) - red fescue
- Carex stipata* - awl-fruited sedge
- **Trifolium pratense* - red clover
- **Ranunculus acris* - buttercup

- **Galium mollugo* - bedstraw
- **Rumex acetosella* - sorrel
- **Euphorbia cyparissias* - cypress spurge
- **Vicia cracca* - cow vetch
- **Plantago lanceolata* - English plantain

Wet Meadow

- **Phalaris arundinacea* - reed canary grass
- Carex stricta* - tussock sedge
- Eleocharis* sp. (*elliptica* or *tenuis*) - spikerush
- Persicaria coccinea* (probable) - scarlet smartweed
- **Plantago lanceolata* - English plantain
- **Nasturtium officinale* (probable) - water cress

Due to the cessation of large scale farming in the Northeast US in general, and eastern Massachusetts in particular, as well as a general trend to allow protected open space to revert to forest by natural succession, meadow habitat has become increasingly rare. Therefore, the habitat provided on the Site by the meadow/ hayfield area is unique and important. Management recommendations for the meadow, in the event that the Town acquires the Site, are presented below in section 10.0.

During the June 4, 2014 Site evaluation, EcoTec observed several bird species actively utilizing the meadow area. These include what appeared to be at least three pairs of nesting bobolinks (*Dolichonyx oryzivorus*), red-winged blackbirds (*Agelaius phoeniceus*), tree swallows (*Tachycineta bicolor*) and barn swallows (*Hirundo rustica*). Although none of these species is specifically protected with rare, threatened, or special concern status by NHESP, the bobolinks in particular are dependent on the presence of significant open meadow areas where they are allowed to nest without mowing until the young leave the nest. As a result, their numbers are generally considered to be in decline as this critical habitat type becomes more rare locally and regionally.

7.0 Soils:

A Soil Survey Map (Site boundary approximate) and map legend generated by EcoTec from the Natural Resources Conservation Service Web Soil Survey database is appended. This map indicates that approximately 80% of the Site soils are mapped as loamy sand. This indicates that the soils consist primarily of sand, with a minor component of silt and clay. Such soils are well draining and easily suitable for development, including the installation of septic systems. The remaining Site soils are designated as sandy loam and muck (in the wooded swamp wetland).

Figure 6, below was generated from the MassGIS website Prime Farmland Soils data layer and indicates that Site soils have been designated as "Farmland of Statewide Importance."

Figure 6: Prime Farmland Soils



8.0 Surface Hydrology:

Figure 7, below, was generated from the USGS StreamStats program and depicts the contributing watershed to the Site. The full StreamStats output, including flow predictions based upon watershed size, slope, and soil type, is appended. Figure 8 depicts public water supply wells in the area. Of note, there is a Community Groundwater Well located just to the south (upstream) of the Site near Whiting Road.

As noted in Figure 8, surface flow from the Site is to the north, under Springdale Avenue, and then west to the confluence with Trout Brook. Trout Brook flows north, passes in close proximity to the public water supply well south of Haven Street, and discharges to the Charles River, just north of Claybrook Road.

Figure 7: Contributing Watershed: USGS StreamStats

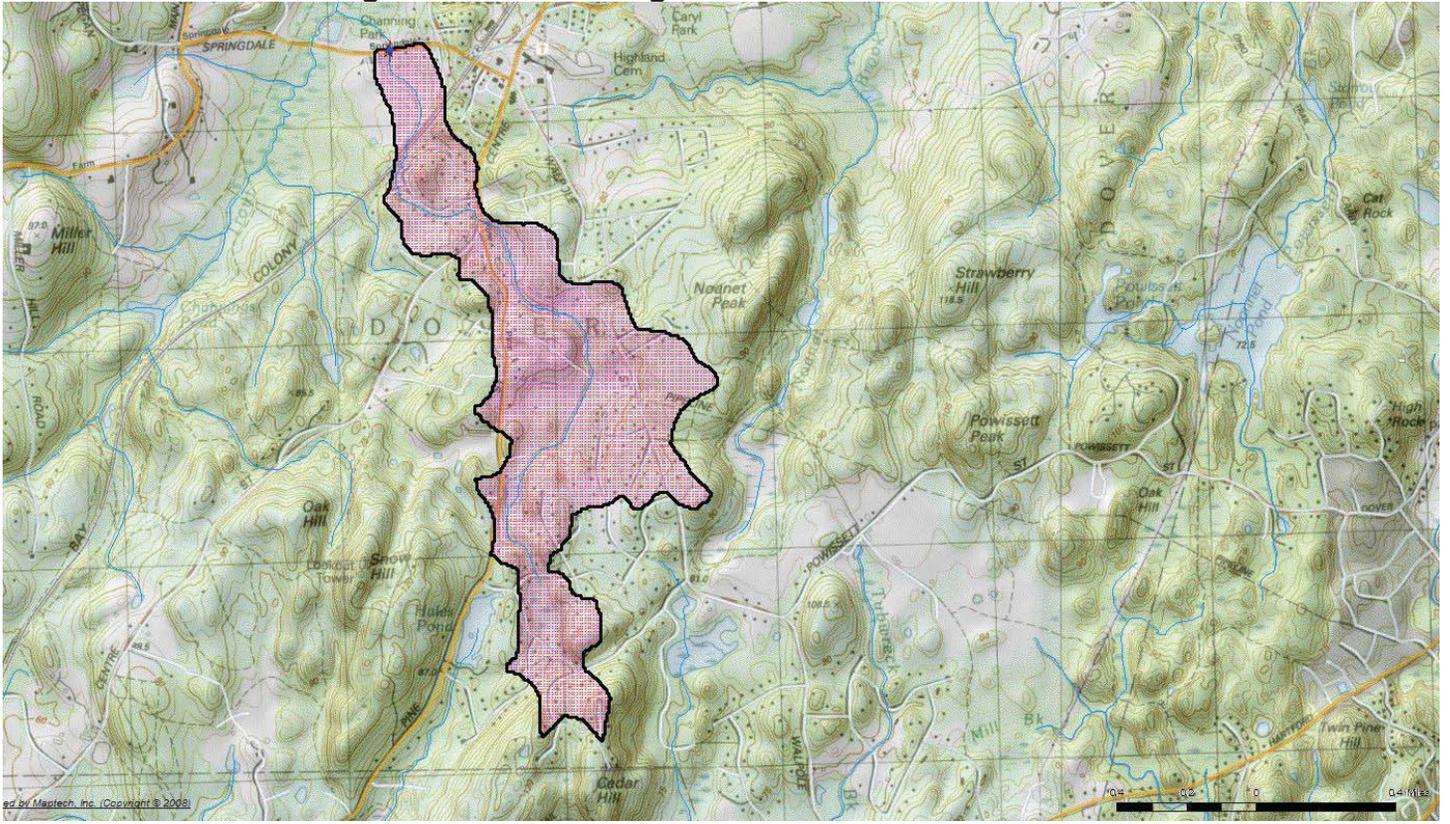
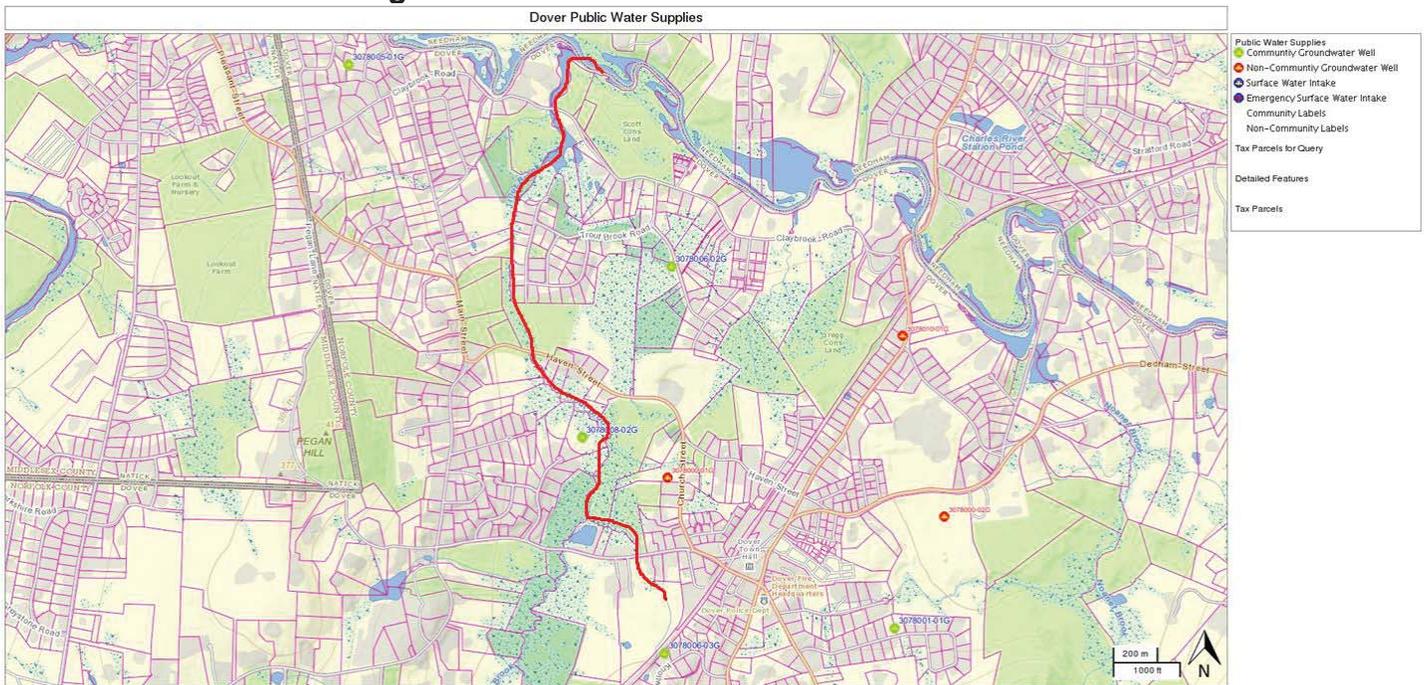


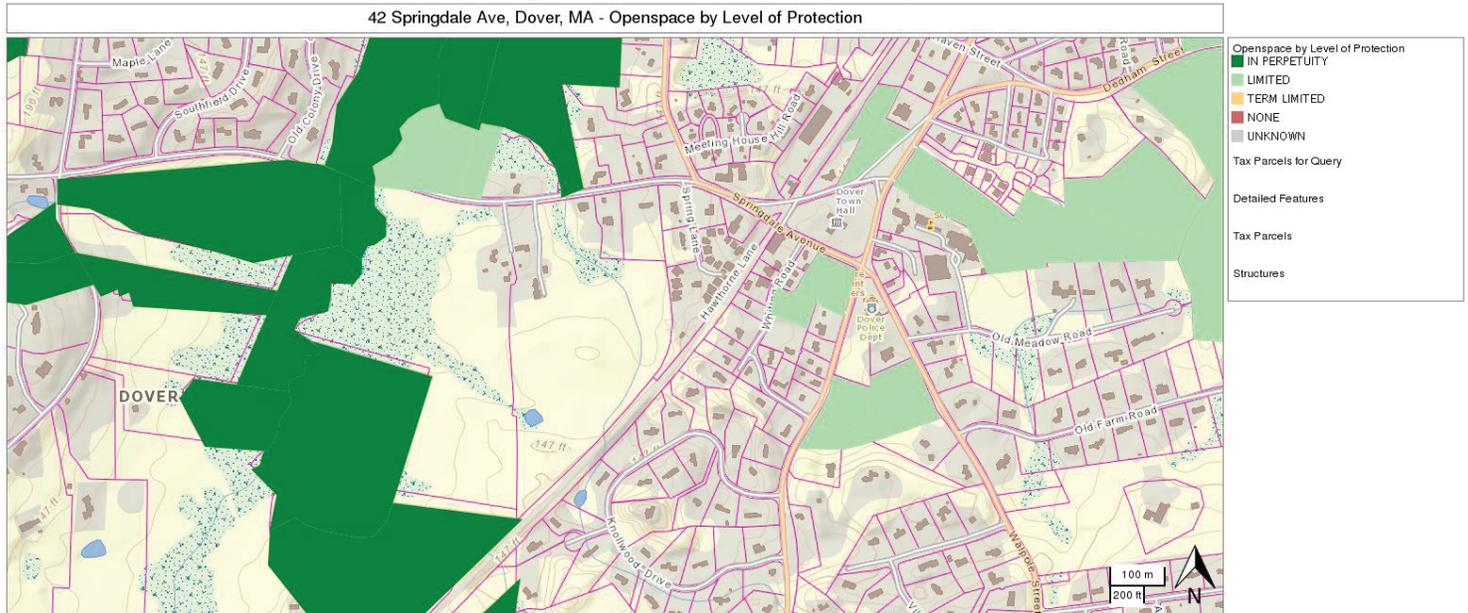
Figure 8: Surface Flow Downstream of the Site



9.0 Open Space:

Figure 9, below, was generated from MassGIS and depicts protected open space in the vicinity of the Site. Bill Clark, IT specialist for the Town of Dover is preparing under separate cover a figure showing abutting property owners and trails on and near the Site

Figure 9: Protected Open Space



Based upon a review of the Area of Critical Environmental Concern (“ACEC”) Statewide Map (EOEA, 2001), the Site is not located within or near an ACEC (see ACEC Map appended).

10.0 Management Recommendations:

As discussed above in section 6.0, the most notable habitat feature of the Site is the open field. Mass Audubon provides a discussion of the habitat value of such areas in the document: *Managing Small Grasslands for Grassland Birds*, available at: <http://www.massaudubon.org/our-conservation-work/wildlife-research-conservation/grassland-birds/grassland-birds-manual/small-grasslands>.

This document characterizes grassland areas between 10 and 75 acres as “small” grasslands, and provides recommendations for managing such areas to maximize the habitat value for grassland birds, noting that “these smaller patches are not suitable for all species of grassland birds, such as upland sandpipers that require at least 100 acres of continuous grassland habitat for breeding. However, there are other grassland birds, such as bobolinks, eastern meadowlarks, and savannah sparrows that rely on these small areas throughout the year.” Management recommendations from Mass Audubon that would be applicable to the Site include:

- Mow after August 1 (Lynn Harper, NHESP Habitat Protection Specialist cited a July 15th mowing schedule as sufficient to allow ground nesting birds to bring off fledglings successfully).
- Be aware of where grassland birds are nesting in fields. If mowing is essential prior to August 1 (such as in fields leased to farmers for hay), try to avoid areas where birds are frequently seen or to leave small patches such as edges or strips unmowed as nesting areas. Even when young birds appear to have left the nest, small unmowed patches are still needed to provide cover and feeding areas for the remainder of the summer until they migrate south.
- Limit mowing to every one to three years in fields not harvested for high-quality hay. It is not necessary to mow every year for grassland birds. Not mowing a field one year or delaying mowing until late August will allow development of late-blooming wildflowers and butterflies.
- Maintain some areas of fields with patches of bare ground. Killdeers and horned larks, for example, require patches of bare ground for nesting and feeding. This can simply be in areas where grass growth is poor due to soil conditions, or in small areas intensively grazed. Bare ground can also be exposed by removing hay from fields where thatch (compressed dead grass) becomes thicker than two inches.
- Use conservative mowing practices where possible. These may include practices such as raising mower blades to six inches or more (may prevent the destruction of some nests and young in early mowing); avoiding night mowing because this often kills or injures roosting birds and young; using flushing bars on haying equipment to move birds hiding in the grass.

Other possible management options include:

- Consider removal of the row of cedar trees that fragments the field into two sections;
- Add (and annually maintain) bird boxes, which could potentially attract tree swallows, eastern bluebirds, and possibly American kestrels and other species;
- Position any hiking and/or equestrian trails along the field edges, and provide mowing and signage to direct users to stay on dedicated trails, especially during nesting season.

LIST OF APPENDICES

- Site Photos
- Wetland Delineation Field Forms
- ACEC Statewide Map with Site locus
- Soil Survey Map and Legend
- USGS StreamStats Output
- Wetland Delineation Plan by GLM Engineering
- Resume of Paul J. McManus, LSP, PWS
- Resume of Arthur Allen, CPSS

Snyder Property Springdale Ave Dover – Photos by Paul McManus EcoTec Inc. 6/4/2014



A series Wetland Near Springdale Ave



Spring



Culvert Under Driveway



Remnant Split Rail Fence

Snyder Property Springdale Ave Dover – Photos by Paul McManus EcoTec Inc. 6/4/2014



Stream: North Section



Lawn including wetland east of driveway



Lawn including wetland east of driveway



Stream: View Upstream from Springdale Ave



Typical Wooded Swamp



Soil Mound



Gravel Stream Bed



Paddock

Snyder Property Springdale Ave Dover – Photos by Paul McManus EcoTec Inc. 6/4/2014



Paddock and barn



Stream: Central Portion View upstream (south) toward field



View South into field, with mowed walking path



Stream in field

Snyder Property Springdale Ave Dover – Photos by Paul McManus EcoTec Inc. 6/4/2014



Stream by RR culvert



Ponded Wetland



Field: Southern portion view west



White-breasted Nuthatch



Typical upland forest



Caddisfly larva in case



Borrow Pit



Predaceous diving beetle larva



Woodfrog Tadpole

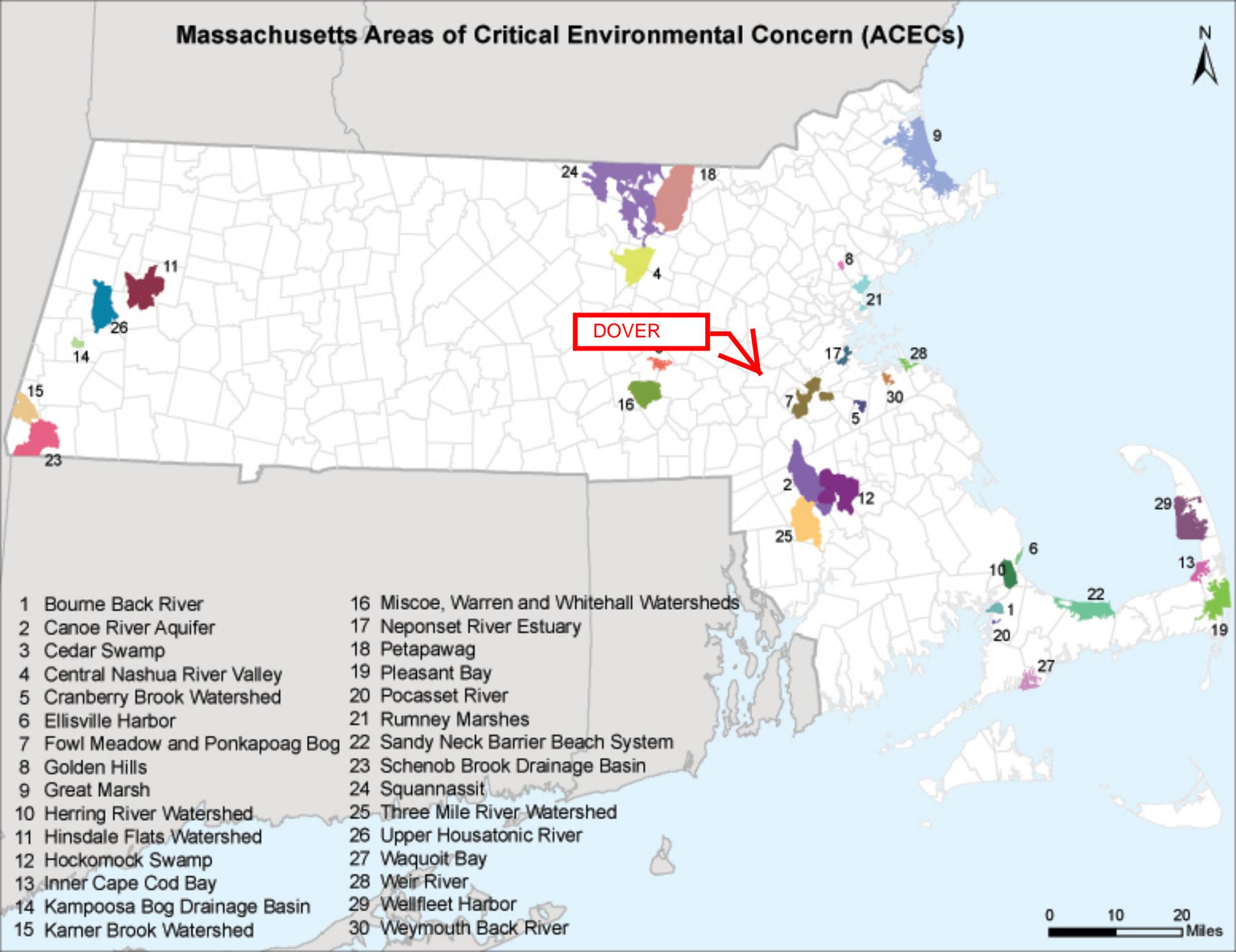


Green Frog in duckweed



Water scorpion

Massachusetts Areas of Critical Environmental Concern (ACECs)



DOVER

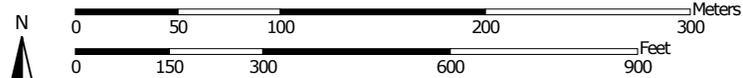
- | | |
|---------------------------------|--|
| 1 Bourns Back River | 16 Miscoe, Warren and Whitehall Watersheds |
| 2 Canoe River Aquifer | 17 Neponset River Estuary |
| 3 Cedar Swamp | 18 Petapawag |
| 4 Central Nashua River Valley | 19 Pleasant Bay |
| 5 Cranberry Brook Watershed | 20 Pocasset River |
| 6 Ellisville Harbor | 21 Rumney Marshes |
| 7 Fowl Meadow and Ponkapoag Bog | 22 Sandy Neck Barrier Beach System |
| 8 Golden Hills | 23 Schenob Brook Drainage Basin |
| 9 Great Marsh | 24 Squannassit |
| 10 Herring River Watershed | 25 Three Mile River Watershed |
| 11 Hinsdale Flats Watershed | 26 Upper Housatonic River |
| 12 Hockomock Swamp | 27 Waquoit Bay |
| 13 Inner Cape Cod Bay | 28 Weir River |
| 14 Kamposoa Bog Drainage Basin | 29 Wellfleet Harbor |
| 15 Kerner Brook Watershed | 30 Weymouth Back River |



Soil Map—Norfolk and Suffolk Counties, Massachusetts



Map Scale: 1:3,670 if printed on A portrait (8.5" x 11") sheet.



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



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

6/6/2014
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 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: Norfolk and Suffolk Counties, Massachusetts
 Survey Area Data: Version 9, Dec 17, 2013

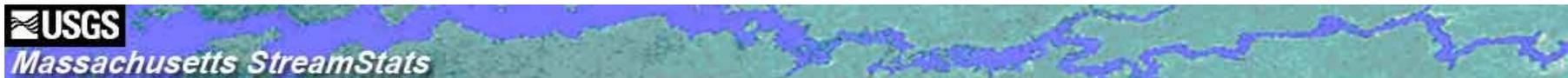
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2011—May 1, 2011

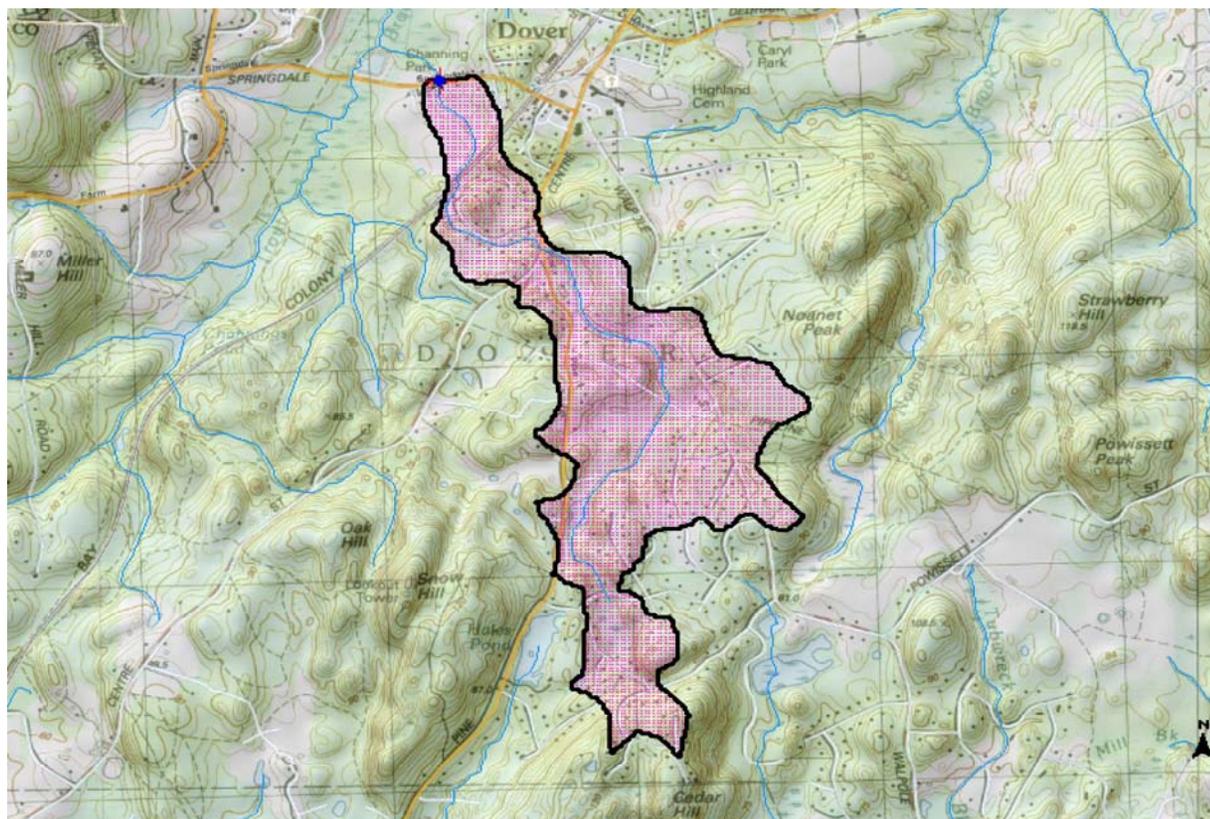
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Norfolk and Suffolk Counties, Massachusetts (MA616)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51	Swansea muck, 0 to 1 percent slopes	0.6	2.3%
245B	Hinckley sandy loam, 3 to 8 percent slopes	4.3	16.5%
253D	Hinckley loamy sand, 15 to 35 percent slopes	3.6	13.7%
255B	Windsor loamy sand, 3 to 8 percent slopes	4.5	17.1%
256B	Deerfield loamy sand, 3 to 8 percent slopes	13.2	50.5%
Totals for Area of Interest		26.2	100.0%



StreamStats Print Page



- Explanation**
- ◆ NHDHGage
 - ◆ NHDHDam
 - ▲ Gaging Station, Continuous Record
 - ▲ Low Flow, Partial Record
 - ▲ Peak Flow, Partial Record
 - ▲ Peak and Low Flow, Partial Record
 - ▲ Stage Only
 - ▲ Low Flow, Partial Record, Stage
 - ▲ Miscellaneous Record
 - ▲ Unknown
 - ★ GlobalWatershedPoint
 - Dendritic Stream Network
 - ▭ GlobalWatershed
 - ⊗ Excludepoly



6/13/2014 1:30:28 PM



Massachusetts StreamStats

Streamstats Ungaged Site Report

Date: Fri Jun 13 2014 13:56:53 Mountain Daylight Time

Site Location: Massachusetts

NAD27 Latitude: 42.2456 (42 14 44)

NAD27 Longitude: -71.2875 (-71 17 15)

NAD83 Latitude: 42.2457 (42 14 45)

NAD83 Longitude: -71.2870 (-71 17 13)

Drainage Area: 0.63 mi²

Percent Urban: 27.3 %

Percent Impervious: 5.02 %

Low Flows Basin Characteristics

100% Statewide Low Flow (0.63 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	0.63 (below min value 1.61)	1.61	149
Mean Basin Slope from 250K DEM (percent)	2.21	0.32	24.6
Stratified Drift per Stream Length (square mile per mile)	0.22	0	1.29
Massachusetts Region (dimensionless)	0	0	1

Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.

Probability of Perennial Flow Basin Characteristics

100% Perennial Flow Probability (0.63 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	0.63	0.01	1.99
Percent Underlain By Sand And Gravel (percent)	74.90	0	100
Percent Forest (percent)	34.05	0	100
Massachusetts Region (dimensionless)	0	0	1

Low Flows Streamflow Statistics

Statistic	Flow (ft ³ /s)	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
				Minimum	Maximum
D50	0.6				
D60	0.41				
D70	0.25				
D75	0.19				
D80	0.16				
D85	0.12				
D90	0.089				
D95	0.0469				
D98	0.0295				
D99	0.0203				
M7D2Y	0.0479				
AUGD50	0.12				
M7D10Y	0.0183				

The equation for estimating the probability of perennial flow is applicable for most areas of Massachusetts except eastern Buzzards Bay, Cape Cod, and the Island regions. The estimate obtained from the equation assumes natural flow conditions at the site. The equation also is best used for sites with drainage areas between 0.01 to 1.99 mi², as errors beyond for basins beyond these bounds are unknown.

Probability of Perennial Flow Statistics

Statistic	Value	Standard Error (percent)
PROBPEREN	0.92	0.4



Massachusetts StreamStats

Basin Characteristics Report

Date: Fri Jun 13 2014 13:28:04 Mountain Daylight Time

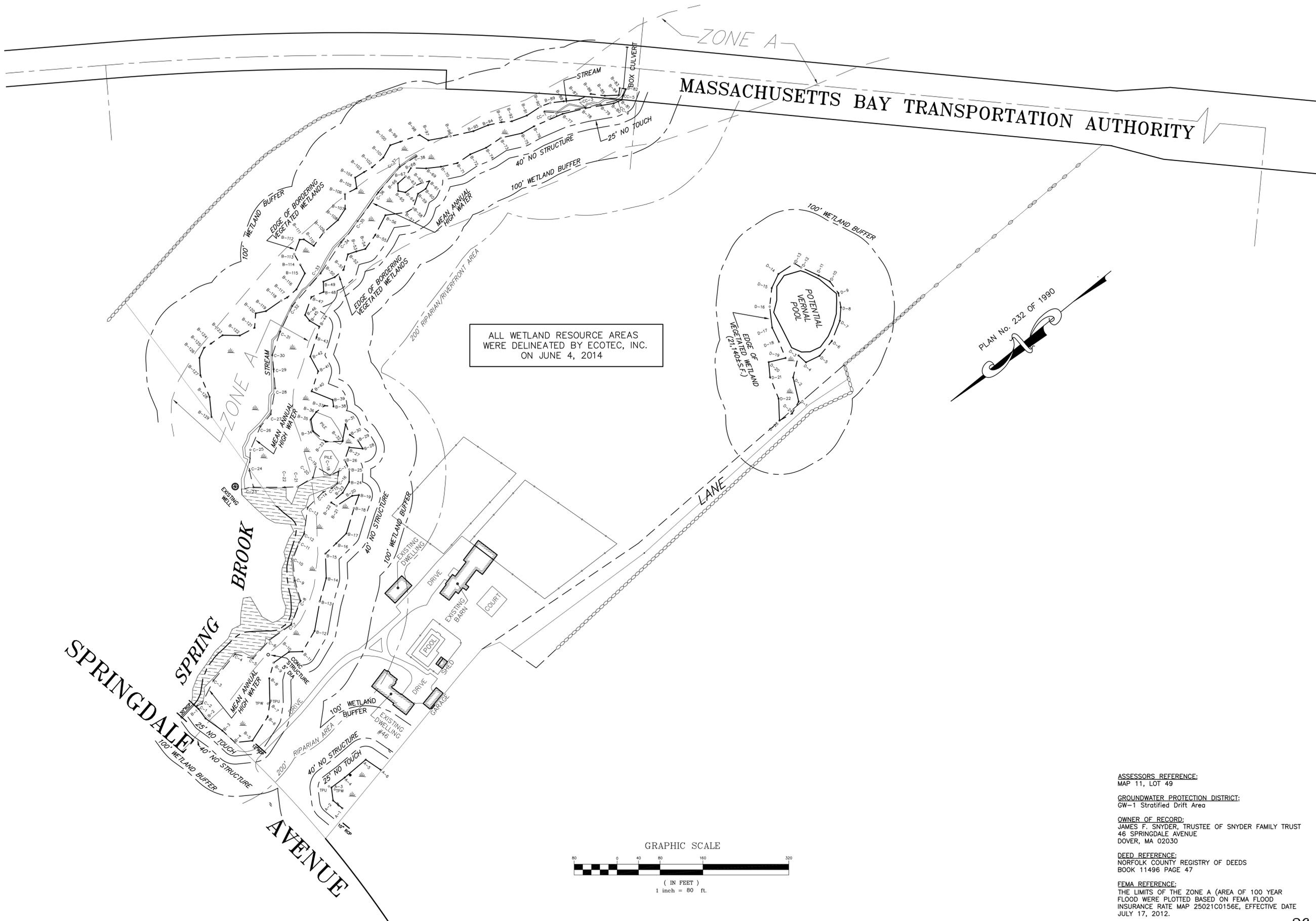
NAD27 Latitude: 42.2455 (42 14 44)

NAD27 Longitude: -71.2875 (-71 17 15)

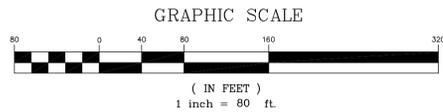
NAD83 Latitude: 42.2456 (42 14 44)

NAD83 Longitude: -71.2870 (-71 17 13)

Parameter	Value
X coordinate of the outlet in Massachusetts State Plane (meters)	217575.0
Y coordinate of the outlet in Massachusetts State Plane (meters)	888375.0
X coordinate of the centroid in Massachusetts State Plane (meters)	218287.2
Y coordinate of the centroid in Massachusetts State Plane (meters)	886815.7
Area in square miles	0.63
Mean annual precipitation in the Conn River basin, in inches	0.000
Average area slope in percent	0
square mile area covered by stratified drift	
Total stream length in miles	2.1
stratified drift per unit stream lenth	
low flow region indicator for Massachusetts	0
Area of forest land (percent)	
Area of sand and gravel deposits (percent)	
Coarse-grained stratified drift - SYE	
Percentage of impervious area determined from NLCD 2001 impervious dataset	0
Percentage of urban land cover determined from NLCD 2001 land cover dataset	



ALL WETLAND RESOURCE AREAS
WERE DELINEATED BY ECOTEC, INC.
ON JUNE 4, 2014



ASSESSORS REFERENCE:
MAP 11, LOT 49

GROUNDWATER PROTECTION DISTRICT:
GW-1 Stratified Drift Area

OWNER OF RECORD:
JAMES F. SNYDER, TRUSTEE OF SNYDER FAMILY TRUST
46 SPRINGDALE AVENUE
DOVER, MA 02030

DEED REFERENCE:
NORFOLK COUNTY REGISTRY OF DEEDS
BOOK 11496 PAGE 47

FEMA REFERENCE:
THE LIMITS OF THE ZONE A (AREA OF 100 YEAR
FLOOD WERE PLOTTED BASED ON FEMA FLOOD
INSURANCE RATE MAP 25021C0156E, EFFECTIVE DATE
JULY 17, 2012.

WETLAND DELINEATION PLAN

46 SPRINGDALE AVENUE
DOVER, MASSACHUSETTS
PREPARED FOR:
TOWN OF DOVER
5 SPRINGDALE AVENUE
DOVER, MASSACHUSETTS 02030

GLM ENGINEERING
CONSULTANTS, INC.
1750 WASHINGTON STREET
HOLLISTON, MASSACHUSETTS 01746
(508)429-1100 fax:(608)429-7160

FLD:	DES:	DWN:	CKD:
RST			

JOB No.
15250-CONCOM

SCALE: 1"=80'

DATE:
JUNE 12, 2014

SHEET No.
1 of 1

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no
title/date:
map number:
soil type mapped:
hydric soil inclusions:

Are field observations consistent with soil survey? yes no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Ap	0-6"	10YR 3/2	none
Bw	6-16"	10YR 5/6	5% 7.5YR 4/4

Remarks: Fine sandy loam textures

3. Other:

Conclusion: Is soil hydric? **no**

Other Indicators of Hydrology: (check all that apply & describe)

- Site Inundated: _____
Depth to free water in observation hole: _____
Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment Deposits: _____
- Drainage patterns in BVW: _____
Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded Data (streams, lake, or tidal gauge; aerial photo; other):

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	—	<u>X</u>
Wetland hydrology present:		
Hydric soil present	—	<u>X</u>
Other indicators of hydrology present	—	<u>X</u>
Sample location is in a BVW	—	<u>X</u>

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: _____ Prepared by: Arthur Allen, EcoTec, Inc. Project location: 46 Springdale Ave., Dover DEP File #: _____

Check all that apply:

- Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot: TP-W		Transect Number: A-3	Date of Delineation: 6/4/2014
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
TREES – None (rough-mowed area)				
SAPLINGS:				
Glossy buckthorn (<i>Rhamnus frangula</i>)	10	100	yes	FAC*
SHRUBS:				
Silky dogwood (<i>Cornus amomum</i>)	10	100	yes	FACW*
GROUND COVER				
Fringed sedge (<i>Carex crinita</i>)	25	25	Yes	OBL*
Yellow sedge (<i>Carex flava</i>)	25	25	Yes	OBL*
Jewelweed (<i>Impatiens capensis</i>)	20	20	Yes	FACW*
Fescue grass (<i>Festuca arundinacea</i>)	20	20	Yes	FACU
White clover (<i>Trifolium pretense</i>)	10	10	No	FACU

* Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum*; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion:

Number of dominant wetland indicator plants: 5 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? **yes**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no
title/date:
map number:
soil type mapped:
hydric soil inclusions:

Are field observations consistent with soil survey? yes no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Ap	0-8"	10YR 2/1	none
Bw	8-10"	10YR 5/3	10% 7.5YR 4/6
Bg	10-16	10YR 5/2 15% 5YR 4/4	

Remarks: Fine sandy loam textures

3. Other:

Conclusion: Is soil hydric? **yes**

Other Indicators of Hydrology: (check all that apply & describe)

- Site Inundated: _____
Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: 6"
- Water marks: _____
- Drift lines: _____
- Sediment Deposits: _____
- Drainage patterns in BVW: _____
Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded Data (streams, lake, or tidal gauge; aerial photo; other):

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	<u>X</u>	_____
Wetland hydrology present:		
Hydric soil present	<u>X</u>	_____
Other indicators of hydrology present	<u>X</u>	_____
Sample location is in a BVW	<u>X</u>	_____

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Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no
title/date:
map number:
soil type mapped:
hydric soil inclusions:

Are field observations consistent with soil survey? yes no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Ap	0-7"	10YR 3/2	none
Bw	7-15"	10YR 5/4	5% 7.5YR 4/6

Remarks: Fine sandy loam textures

3. Other:

Conclusion: Is soil hydric? **no**

Other Indicators of Hydrology: (check all that apply & describe)

- Site Inundated: _____
Depth to free water in observation hole: _____
Depth to soil saturation in observation hole: _____
- Water marks: _____
- Drift lines: _____
- Sediment Deposits: _____
- Drainage patterns in BVW: _____
Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded Data (streams, lake, or tidal gauge; aerial photo; other):

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	—	<u>X</u>
Wetland hydrology present:		
Hydric soil present	—	<u>X</u>
Other indicators of hydrology present	—	<u>X</u>
Sample location is in a BVW	—	<u>X</u>

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Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no
title/date:
map number:
soil type mapped:
hydric soil inclusions:

Are field observations consistent with soil survey? yes no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Ap	0-8"	10YR 2/2	none
Bg	8-16"	10YR 5/2	30% 7.5YR 4/4 10% 10YR 6/2

Remarks: Fine sandy loam textures

3. Other:

Conclusion: Is soil hydric? **yes**

Other Indicators of Hydrology: (check all that apply & describe)

- Site Inundated: _____
Depth to free water in observation hole: _____
- Depth to soil saturation in observation hole: 8"
- Water marks: _____
- Drift lines: _____
- Sediment Deposits: _____
- Drainage patterns in BVW: _____
Oxidized rhizospheres: _____
- Water-stained leaves: _____
- Recorded Data (streams, lake, or tidal gauge; aerial photo; other):

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	___	n/a (disturbed) ___
Wetland hydrology present:		
Hydric soil present	<input checked="" type="checkbox"/>	
Other indicators of hydrology present	<input checked="" type="checkbox"/>	
Sample location is in a BVW	<input checked="" type="checkbox"/>	

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EcoTec, Inc.

ENVIRONMENTAL CONSULTING SERVICES

102 Grove Street

Worcester, MA 01605-2629

508-752-9666 – Fax: 508-752-9494

Paul J. McManus, LSP, PWS President

Paul McManus is the President and owner of EcoTec, Inc., which he founded in 1990. He has received certification as a Professional Wetlands Scientist (PWS) from the International Society of Wetlands Scientists (SWS), the leading professional organization in the field. He was elected President of the New England Chapter of SWS, and represented the Chapter on the International Board of Directors for several years, and currently serves as Chapter Past President and Treasurer. Mr. McManus is also a Massachusetts-certified Licensed Site Professional with experience that has included a wide range of site assessment and remediation projects, focused on the field of ecological risk assessment at contaminated sites. Prior to the founding of EcoTec, Mr. McManus was employed as the Senior Scientist at Harborline Engineering Inc. of New Bedford, MA and served for several years as a project manager at the Gulf of Maine Research Center Inc. in Salem, MA. His experience also includes employment as an aquatic ecologist at the Massachusetts Division of Water Pollution Control. Mr. McManus brings a wide variety of environmental consulting experience to EcoTec, including wetland evaluation and delineation, lake and stream assessment, wildlife habitat evaluation, oil and hazardous materials assessment and ecological risk assessment, as well as a variety of other types of environmental impact assessment. Included among the major wetland projects he has completed are detailed wetland community surveys and impact restoration specifications for lengthy pipeline crossings of the Fowl Meadow "Area of Critical Environmental Concern" (ACEC). At the MWRA's Norumbega Reservoir property in Weston, he conducted the state and federal wetland delineations, was project manager for the related town-wide off-site vernal pool mitigation evaluation, and authored the project's wetland mitigation program, including vernal pool replication in support of a Wetlands Protection Act Variance and other environmental permits. He has directed hundreds of other wetlands projects at sites including large and small residential and commercial developments. He has completed all phases of environmental permitting work, including wetland delineation, replication and mitigation design, implementation, and monitoring in freshwater wetlands and salt marsh, as well as general wildlife and rare species assessments and trapping, including marbled salamander, 4-toed salamander, spotted turtle, and eastern box turtle, under the MA Wetlands and Endangered Species Act Regulations. Permitting efforts regularly include federal, local and state permitting, including filings under the Massachusetts Environmental Policy Act (MEPA) regulations. Additional projects he has directed include major biological and chemical marine sampling programs; he has been involved in a variety of freshwater system evaluations, and conducted evaluations and sampling for proposed fresh water and marine dredging projects. He has conducted ecological risk assessments for aquatic and terrestrial biota, including state-listed species, at numerous locations of contamination by oil and hazardous materials. Mr. McManus serves as a consultant on behalf of government, business, major utility companies, the development community, conservation commissions, and concerned citizens' groups. He presently serves on a regular basis as technical wetlands consultant for the Town of Dover Conservation Commission, and works regularly for other Commissions providing peer review expertise on a wide variety of projects.

Education: Master of Science: Applied Marine Ecology - University of Massachusetts/Boston, 1988
Bachelor of Arts: Biology (Ecology emphasis) – College of the Holy Cross, Worcester, MA, 1984
U.S. Fish and Wildlife Service: Habitat Evaluation Procedure (HEP) Certification
Massachusetts Division of Water Pollution Control: Algal Assay (eutrophication) Short Course

Professional Affiliations: Massachusetts Association of Conservation Commissioners
(Partial list) Society of Wetland Scientists (Past President of the New England Chapter)
Association of Massachusetts Wetlands Scientists
Society of Environmental Toxicology and Chemistry

Certifications: Society of Wetlands Scientists Professional Wetlands Scientist # 962
Commonwealth of Massachusetts Licensed Site Professional # 5711
OSHA Health & Safety Hazardous Waste Safety Training, 29 CFR 1910.120 (40 hr & refresher)

EcoTec, Inc.

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Arthur Allen, CPSS

Vice President

Senior Soil & Wetland Scientist

Arthur Allen is a senior environmental scientist with certifications in soil and wetland science and a strong background in geology, forestry, hydrology and ecology. Since 1995, his work with EcoTec has involved wetland delineation, wildlife habitat evaluation, environmental permitting (federal, state and local), environmental monitoring and peer reviews for private landowners, developers, major corporations and regulatory agencies in addition to contaminated site assessment and the description, mapping and interpretation of soils. Prior to joining EcoTec, Mr. Allen mapped and interpreted soils in Franklin County, MA for the U.S.D.A. Natural Resources Conservation Service (formerly Soil Conservation Service) and was a research soil scientist at Harvard University's Harvard Forest. Since 1994, Mr. Allen has been assisting the Massachusetts Department of Environmental Protection and the Massachusetts Association of Conservation Commissions as an instructor in the interpretation of soils for wetland delineation and for the Title V Soil Evaluator program.

Mr. Allen has a civil service rating as a soil scientist, an undergraduate degree in Natural Resource Studies and a graduate certificate in Soil Studies. His work on the Franklin County soil survey involved interpretation of landscape-soil-water relationships, classifying soils and drainage, and determining use and limitation of the soil units that he delineated. As a soil scientist at the Harvard Forest, Mr. Allen was involved in identifying the legacies of historical land-use in modern soil and vegetation at a number of study sites across southern New England. He has a working knowledge of the chemical and physical properties of soil and water and how these properties interact with the plants that grow on a given site. While at Harvard Forest he authored and presented several papers describing his research results which were later published. In addition to his aforementioned experience, Mr. Allen was previously employed by the Trustees of Reservations as a land manager and by the Town of North Andover, MA as a conservation commission intern.

Education:

1993-Graduate Certificate in Soil Studies, University of New Hampshire

1982-Bachelor of Science in Natural Resource Studies, University of Massachusetts

Professional Affiliations:

Certified Professional Soil Scientist (ARCPACS CPSS #22529)

New Hampshire Certified Wetland Scientist (#019)

Registered Professional Soil Scientist & Board Member - SSS of SNE

Massachusetts Arborists Association-Certified Arborist (1982 – 1998)

Massachusetts Association of Conservation Commissions - Member

Society of Wetland Scientists - Member

Refereed Publications:

Soil Science and Survey at Harvard Forest. A.Allen. In: Soil Survey Horizons. Vol. 36, No. 4, 1995, pp. 133-142.

Controlling Site to Evaluate History: Vegetation Patterns of a New England Sand Plain. G.Motzkin, D.Foster, A.Allen, J.Harrod, & R.Boone. In: Ecological Monographs 66(3), 1996, pp. 345-365.

Vegetation Patterns in Heterogeneous Landscapes: The Importance of History and Environment.

G.Motzkin, P.Wilson, D.R.Foster & A.Allen. In: Journal of Vegetation Science 10, 1999, pp. 903-920.