



LAND-TECH CONSULTANTS, INC.

ENVIRONMENTAL SCIENTISTS AND ENGINEERS



NATURAL RESOURCE EVALUATION

EDGEWATER HILL MASTER PLAN PROPOSED MIXED-USE DEVELOPMENT

East High Street (CT Route 66)
East Hampton, CT

Prepared for:
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1.0 EXECUTIVE SUMMARY

A master plan has been prepared for a multi-use development on property on the east side of East High Street (CT Route 66) between Lake Vista Drive and Laurel Ridge in East Hampton, CT. Along Route 66, the property supports two single-family residences, a motel complex, and associated outbuildings. The existing buildings are served by public sewer and on-site wells. The remainder of the property is largely undeveloped and consists of a relatively large area of contiguous woodland. The property is located within the DD, Design Development zone according to the East Hampton Zoning Map (9/15/1990).

The applicant is proposing a phased development of the property. Phase 1 is a mix of commercial and residential development consisting of seven sub-phases including a market square, multi-family housing, single family attached dwellings, and single family detached dwellings. Phases 2 through 5 include a mix of multi-family housing, single family attached dwellings, and single family detached dwellings.

2.0 NATURAL RESOURCES

2.1 SETTING

The 76.4 acre site is located on the east side of East High Street (CT Route 66). To the west of Route 66 is the shoreline community surrounding Lake Pocotopaug, which consists of high density residential development. The subject property is bound to the north by single family residential development along Laurel Ridge and to the southwest by Lake Vista Drive. A large undeveloped tract of forested land borders the property to the south and east.

2.2 SITE GEOLOGY

The property is underlain by Brimfield schist. Brimfield schist is gray, rusty-weathering, medium-coarse-grained interlayered schist and gneiss.

Till materials dominate the surface geology of the site. The glacial till sediments were laid down directly by glacial ice and glacial ice melt-out and are characterized by a non-sorted matrix of sand, silt, and clay with variable amounts of stones and large boulders (CTDEEP GIS Database).

Upland soils are identified as Woodbridge fine sandy loam, Canton and Charlton Soils, Charlton-Chatfield complex, Hollis-Chatfield complex, Paxton and Montauk fine sandy loams, Paxton-Urban Land complex, and Udorthents,. The wetland soils are mapped as Ridgebury, Leicester, and Whitman; poorly drained and very poorly drained soils that developed in glacial till (CTDEEP GIS).

2.3 WATERSHED

The majority of the property is located west of a ridgeline that divides the property into two sub-regional drainage basins. The larger western portion of the site lies within the Pine Brook subregional drainage basin (CTDEEP #4709). Runoff from the western portion of site drains westward to an existing 30" culvert under East High Street and then to Lake Pocotopaug.

The smaller eastern portion of the site, east of the ridgeline, drains to Cattle Lot Brook within the Dickinson Creek subregional drainage basin (CT DEEP #4708). The Pine

Brook and the Dickinson Creek subbasins are located within the Salmon River regional basin which drains to the Connecticut River.

2.4 AQUIFER PROTECTION AREA

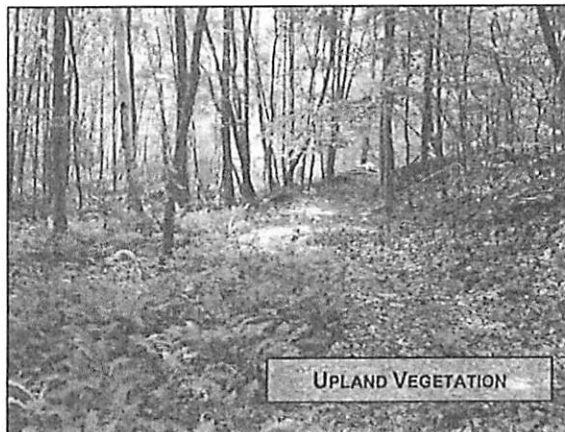
The site is not located within a designated preliminary or final Aquifer Protection Zone as mapped by the CTDEP in the revised March 2009 Aquifer Mapping.

2.5 FEMA FLOOD ZONES

There are no mapped FEMA (Federal Emergency Management Administration) flood zones or areas of special flood hazard on the property.

2.6 UPLAND VEGETATION

The northwestern portion of the property along Route 66, is developed containing two residences and a motel complex. These areas are surrounded by typical maintained lawn and plantings/gardens. The remainder of the on-site uplands supports a contiguous hardwood dominated canopy and shrub/sapling understory. Dominant tree species include sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), tulip tree (*Liriodendron tulipifera*), red, black and white oak (*Quercus rubra*, *Quercus vellutina*, *Quercus alba*), black and yellow birch (*Betula lenta*, *Betula alleghaniensis*), Shagbark and pignut hickory (*Carya glabra*, *Carya cordiformis*). The understory is predominately saplings of overstory species as well as numerous shrub and vine species. The sparse herbaceous community includes such species as Christmas fern (*Polystichum acrostichoides*), Virginia creeper (*Parthenocissus quinquefolia*), various sedges, and rose twisted-stalk (*Streptopus lanceolatus*).



2.7 CRITICAL HABITATS/SPECIES OF CONCERN

A review of the CTDEEP Natural Diversity Database (NDDDB) indicates that there are no mapped extant populations of endangered, threatened or special concern species or rare habitats on the property, however a shaded area associated with a protected or high interest species is located within one-half mile of the project site. An NDDDB review application has been filed with the CTDEEP's NDDDB. The response letter will be provided upon receipt.

2.8 WILDLIFE

The site contains a large area of contiguous upland and wetland habitats. The mosaic of uplands and wetlands in the interior of the site is expected to support diverse avian, mammal, reptile, and amphibian populations. During a site visit on August 3, 2011, a few wood frogs and one spotted salamander were observed in the wooded uplands in the vicinity of the vernal pools. The presence of these obligate vernal pool species in close proximity to the pools during the non-breeding season indicates the adjacent upland

woodlands contain the necessary habitat to support these species during the remainder of the year. More detail on the vernal pools is found in Section 3.2.

The property is connected to a large undisturbed wooded parcel to the east and south allowing for unobstructed daily and seasonal movements by wildlife. The subject parcel is bordered to north, west and southwest by dense residential development which restricts the movements of many species in these directions.

3.0 WETLAND EVALUATION

3.1 WETLAND DESCRIPTIONS

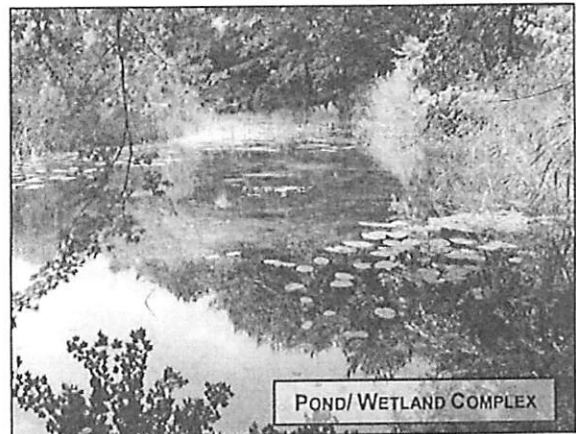
There are eight wetland systems and four vernal pools on the property. The four vernal pools are located within Wetland A. In total the wetlands comprise approximately 8.5 acres on the property. On-site wetlands consist of one very large convoluted system which is situated in the central portion of the property and seven small isolated wetlands located primarily around the property's periphery.

Wetland A

Wetland A is by far the largest wetland on the property. Wetland A is located in the central portion of the property and consists of several lobes and a highly convoluted edge which primarily follows the highly variable topography. Representative areas of the wetland were characterized in the field and discussed below.

Wetland A1 (Wetland Flags A101 to A141, B200 to B221)

The northwestern lobe of Wetland A is labeled as Wetland A1. It is pond/wetland complex consisting of a matrix of open water, emergent wetland, and wooded wetlands. The open water portions support dense mats of submerged aquatic vegetation (likely naiad), yellow pond lily (*Nuphar lutea*), various sedges, and common reed (*Phragmites australis*). The wooded wetland and riparian areas have a diverse stratified vegetative community. Common species include sassafras (*Sassafras albidum*), red maple (*Acer rubrum*), cottonwood (*Populus deltoids*), witch hazel, sweet pepper-bush (*Clethra alnifolia*), spicebush (*Lindera benzoin*), bladder sedge (*Carex*



intumescens), tussock sedge (*Carex stricta*), lurid sedge (*Carex lurida*), jack-in-the-pulpit (*Arisaema triphyllum*), halberd-leaved tearthumb (*Polygonum arifolium*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), sphagnum moss (*Sphagnum spp.*) and violets among other species.

East of pond is a meadow/ shrub community with some standing water. The wetland is densely vegetated. Species include red maple saplings, sweet pepper-bush, high-bush blueberry (*Vaccinium corymbosum*), rubus, steeplebush (*Spiraea tomentosa*), skunk

cabbage (*Symplocarpus foetidus*), spicebush, dewberry, cinnamon fern, and hay scented fern (*Dennstaedtia punctilobula*).

The south side of wetland A-1 is an emergent marsh dominated by *Juncus* sp., various sedges, and Common reed.

Wetland Corridor between Wetland A1 & A2 (Wetland Flags A141 to 147, B221 to B226)

The narrow constriction between Wetlands A1 and A2 consists of a hillside intermittent watercourse with boulder and cobble substrate. Evidence of erosion and undercutting is



common. The stream is well shaded during the growing season. Vegetation along the banks of the stream is dominated by yellow birch (*Betula alleghaniensis*), black birch (*Betula lenta*), and red maple (*Acer rubrum*) saplings, winged euonymus (*Euonymus alatus*), Japanese barberry (*Berberis thunbergii*), poison ivy (*Toxicodendron radicans*), witch hazel (*Hamamelis virginiana*), jack-and-a-pulpit (*Arisaema triphyllum*), skunk cabbage (*Symplocarpus*

foetidus), spicebush (*Lindera benzoin*), Christmas fern (*Polystichum acrostichoides*), cinnamon fern (*Osmunda cinnamomea*), and hay scented fern (*Dennstaedtia punctilobula*).

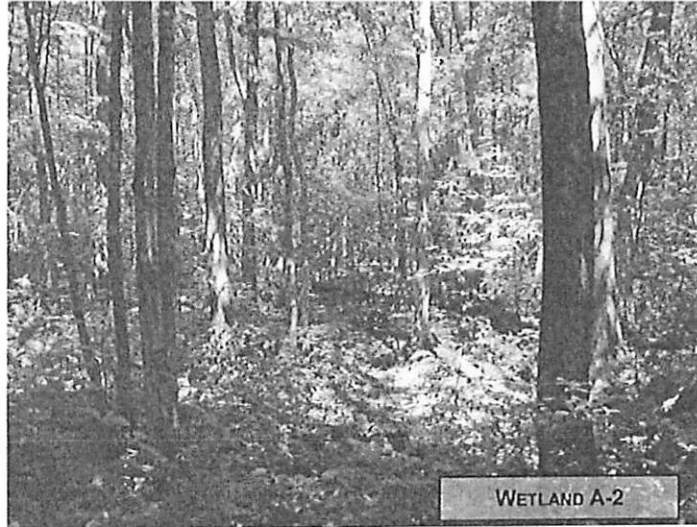
Wetland A2 (Wetland Flags A147 to A233, B226 to B290)

Wetland A2 is a three lobed wooded wetland in the south central portion of the property. Dominant overstory species throughout the wetland include red maple, American beech (*Fagus grandifolia*), tulip tree (*Liriodendron tulipifera*), yellow birch, black birch, white ash (*Fraxinus Americana*), and American elm (*Ulmus Americana*). Photograph to the right shows typical vegetation strata in the western lobe. The photograph was taken on August 3, 2011.



Understory species in the northern lobes include witch hazel, sweet pepper-bush, spicebush, ironwood, Japanese barberry, poison ivy, skunk cabbage, cinnamon fern, sensitive fern, sphagnum moss and violet (*Viola sp.*).

The dominant overstory canopy species in the eastern lobe include red maple, American beech, black birch, white oak, red oak, hickory, black cherry (*Prunus serotina*), and American elm. The understory is dominated by witch hazel, high-bush blueberry, ironwood, green briar, sweet pepper-bush, and cinnamon fern. The photograph to the right (taken August 3, 2011) shows a representative area within the eastern lobe.



The overstory of the southern lobe is consistent with the rest of the wetland. The herbaceous species in the

southern lobe consists of Virginia creeper (*Parthenocissus quinquefolia*), stinging nettle (*Urtica dioica*), Japanese stilt grass (*Microstegium vimineum*), violet, poison ivy, skunk cabbage, smartweed (*Polygonum hydropiperoides*), various sedges, Christmas fern, cinnamon fern, hay scented fern, and sensitive fern.

Three vernal pools area clustered in the center of Wetland A2. A discussion of the vernal pools is provided in Section 3.2. A variable width channel (6 foot wide typical) carries seasonal water from the southern lobe through the western lobe of Wetland A2 and into the wetland corridor and into the southern portion of Wetland A1.

Wetland A3 (Wetland Flags A232 to A253, B290 to B304)



The proposed road crossing between wetlands A2 and A3 is a hillside drainage way with no defined channel or bank. Surface water flows easterly towards the central portion of the property. The photograph to the left was taken August 3, 2011 and faces southwest. This wetland supports an overstory canopy of black birch, tulip tree, red oak, ash, and American beech. The understory is comprised of

spice bush, Japanese barberry, Christmas fern, and cinnamon fern. Vernal pool 3 is located in this wetland.

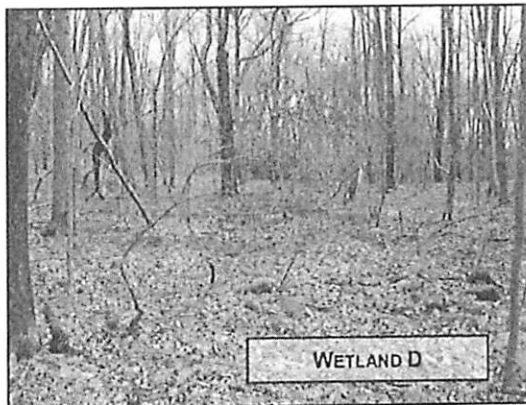
Wetland C (*Roadside Wetland*)

The roadside wetland is a typical drainage ditch, located in a low area parallel to East High Street, designed to transport stormwater. The extended presence of stormwater in the ditch has led to the development of wetland soils. The wetland receives storm flows from the existing developed areas of the property discharging the flows from the north end of the ditch, to the west under Route 66. The wetland is densely vegetated within the ditch and the adjacent uplands. Species include oriental bittersweet, cattail, jewelweed, skunk cabbage, elderberry, joe-pyc weed, queen Anne's lace, wormwood, ragweed, nettle, and rugosa rose.



Wetland D (*Wetland Flags D400 to D408*)

Wetland D is a forested wetland within a shallow depression adjacent to Wetland A-2. This wetland has characteristics and vegetation similar to Wetland A-2 and is separated from the larger wetland by a narrow band of moderately well drained soils.



Wetland E (*Wetland Flags E500 to E504*)

Wetland E is a small valley depression between two bedrock ridges in the southeast corner of the site. It is separated from the larger Wetland F by a narrow band of non-wetland soil (possibly fill for an old road bed). Wetland E contains saturated soils with no standing water. It is vegetated with

red maple, white ash, ironwood, Japanese barberry and Christmas fern

Wetland F (*Wetland Flags F600 to F611*)

Wetland F straddles the southern property boundary in the southeast corner of the site. Wetland F is the northern tip of a much larger wetland that extends off-site to the south. Similar to Wetland E it lies within a valley depression between two bedrock ridges. Wetland F contains seasonal standing water and is vegetated with red maple, black and yellow birch, high bush blueberry, mountain laurel, and wild grape. Off-site portions of this wetland contain areas of standing water with the characteristics of a vernal pool.



Wetland G (*Wetland Flags G700 to G706*) and **Wetland H** (*Wetland Flags H800 to H807*)

Wetlands G and H are hillside seep wetlands located on the north facing slope of the hill along the southern property boundary. These wetlands are shaded by red maple, American beech, black birch, and American elm. Understory species include, sweet pepper-bush, Japanese barberry, poison ivy, violets, Virginia creeper, Christmas fern, jack-and-a-pulpit, rubus, bittersweet, and asters.



Wetland J (*Wetland Flags J1000 to J1010*)

Wetland J is a forested wetland that is located in the northeast corner of the property within a bedrock controlled depression. Dominant vegetation includes: red maple, iron wood, black birch, yellow birch, spicebush, cinnamon fern, sensitive fern, Japanese barberry, high-bush blueberry, Virginia creeper, and Christmas fern. Mayflower, poison ivy, and white oak, and tulip tree saplings are located around the wetland edge. Boulders and exposed bedrock are common throughout the wetland. Water stained leaves were present in August 2011.



3.2 VERNAL POOLS

A vernal pool is a small, isolated body of standing freshwater that provides breeding habitat for certain species of wildlife. There are no applicable local or state regulations defining or protecting vernal pools in East Hampton, CT, however, the criteria of a vernal pool generally accepted in the State of Connecticut is that outlined in *A Guide to the Identification and Protection of Vernal Pool Wetlands of Connecticut* published by the University of Connecticut, Cooperative Extension System. Using these criteria, a vernal pool:

- ❑ Contains water for approximately two months during the growing season;
- ❑ Occurs within a confined depression or basin that lacks a permanent outlet stream. (It is the opinion of many biologists that many vernal pools can function very well with a permanent outlet and therefore this criterion is used on a case by case basis.)
- ❑ Lacks any fish population; and
- ❑ Dries out most years, usually by late summer.

In addition to these physical characteristics, the presence of certain animal species is used to confirm the existence of a vernal pool. Some species are considered obligate (or indicator) vernal pool species meaning that they rely on vernal pools for breeding and early development. The presence of obligate species is also used to evaluate the functionality and quality of the vernal pool. These species include: spotted salamander (*Ambystoma maculatum*), Jefferson salamander (*Ambystoma jeffersonianum*), marbled salamander (*Ambystoma opacum*), wood frog (*Rana sylvatica*), eastern spadefoot toad (*Scaphiopus h. holbrookii*) and fairy shrimp (*Eubranchipus spp.*). The presence of one or more of these obligate species in a pool that meets the physical criteria, confirms the pool as a “vernal pool” and, therefore, increases the relative function or value of the pool.

Our evaluation of the vernal pools is based on two investigations. The first investigation was conducted by Fuss & O’Neill in March of 2008. Potential vernal pools were investigated using generally accepted methods to identify the presence and abundance of obligate or facultative species in the form of deposited egg masses, developing larvae or adults. Land-Tech Consultants, Inc. conducted a follow up field investigation of the pools on August 3, 2011. The focus of this investigation was to gather physical and biological data on the previously identified wetlands and vernal pools and the adjacent uplands on the property. During this ecological investigation, Land-Tech inspected the physical conditions of the identified vernal pools and noted any evidence of wetland dependant wildlife species. The following descriptions of the vernal pools incorporate the findings of both Fuss & O’Neill’s and Land-Tech’s investigations.

Vernal pools 1, 2 and 4 are clustered in the southern portion of the property within 350± feet of each other. Vernal pool 3 is located approximately 450’ south of vernal pool 2. All are within the same contiguous forest and well within the documented seasonal migration ranges for most vernal pools species, therefore, it is likely that genetic material is being shared between the four vernal pools either by the same population or by different populations that interbreed.

Vernal Pool 1



Vernal pool #1 is situated in a 1,490 ± s.f. basin located in Wetland A2. The basin is shaded by red oak, red maple, American beech, and iron wood. A small watercourse runs through the southwestern portion of the basin, therefore the vernal pool has both an inlet and outlet. During the March 2008 investigation, F&O observed five (5) spotted salamander (*Ambystoma maculatum*), and six (6) wood frog (*Rana sylvaticus*) egg masses. In addition, two adult wood frogs were observed

in amplexus. An extensive dip netting effort of the pool did not result in the identification of any marbled salamander larvae or fairy shrimp. A single four-toed salamander (*Hemidactylum scutatum*) and one spotted turtle (*Clemmys guttata*) were also observed utilizing the pool in March 2008. The pool contained approximately 10 s.f. of standing water in August 2011.

Vernal Pool 2



This vernal pool is located within a 2,430 ± s.f. basin in the southern lobe of Wetland A2. In August 2011, the pool contained stained leaves and no rooted vegetation. Vegetation surrounding the basin includes red oak, red maple and American beech. The basin contains an outlet. F&O identified three (3) spotted salamander and 17 wood frog egg masses in March 2008. An adult spotted salamander was found a couple hundred feet southwest of this pool and a wood frog was found between this pool and VP 4 during the August 2011 inspection.

Vernal Pool 3



Vernal pool #3 is approximately 1,820 ± s.f. in size and is located south of the cluster of the other three vernal pools in wetland A3. This pool shows the same characteristics as vernal pool number 2 as it is being shaded by overstory trees of red oak and red maple, and contains an outlet. F&O observed three (3) spotted salamander and over 30 wood frog egg masses in March 2008.

Vernal Pool 4

Vernal pool number four is the largest of the vernal pools at 17,020 ± s.f. and is situated within the eastern lobe of wetland A2. The depression receives water from an upland stream but contains no outlet and contains abundant microtopography. The pool contains numerous attachments sites. A small portion of the pool contained approximately 1 foot of water during the August 2011 inspection. F&O identified three (3) spotted salamander and over 160 wood frog egg masses. This suggests that this is a well established breeding pool. The borders of the pool support red maples, elderberry, high-bush blueberry, and sweet pepper-bush. Dragonflies and green frogs were present near the basin in August 2011, indicating that this pool stays moist and supports an abundant insect population which is a primary food source for the amphibian species. The following table summarizes the observed wildlife species associated with the vernal pools.

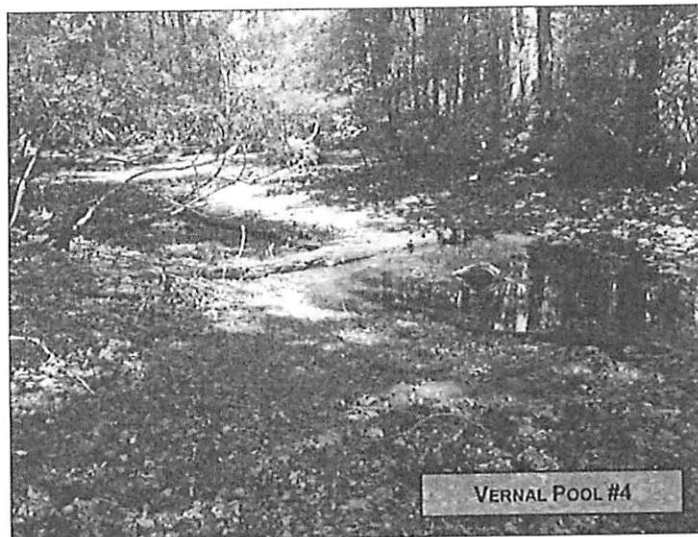














Table 1 – Vernal Pool Functions and Rating Category.

Vernal Pool	Observed Species in pool	Total Number of Egg Masses from Obligate Species	Notable Species Observed in the vicinity	Category according to Calhoun and Klemens
1	2 obligate 1 facultative	11		Tier 1
2	2 obligate	20		Tier 1
3	2 obligate	33+		Tier 1
4	2 obligate 1 facultative	163+		Tier 1

3.3 WETLAND EVALUATION / FUNCTION AND VALUE ASSESSMENT

The following table summarizes the principal functions and values of the site's wetlands using the US Army Corps of Engineers Highway Methodology Workbook. The evaluation is based on thirteen (13) categories established by the Corps. Wetland functions are defined as "...self-sustaining properties of a wetland ecosystem that exist in the absence of society". Values, on the other hand are defined as "...benefits that derive from either one or more functions and the physical characteristics associated with a wetland". Table 2, below describes of each of the categories of function and value. A summary of the site's wetland functions and values is presented in Table #3.

Table 2. Wetland Functions and Values

	FUNCTION	VALUE	DESCRIPTION
	GROUNDWATER RECHARGE/DISCHARGE		This function considers the potential for a wetland to serve as a groundwater recharge and/ or discharge area. Recharge should relate to the potential for the wetland to contribute water to an aquifer. Discharge should relate to the potential for the wetland to serve as an area where groundwater can be discharged to the surface.
	FLOODFLOW ALTERATION		This function considers the effectiveness of the wetland in reducing food damage by attenuation of floodwaters for prolonged periods following precipitation events.
	FISH AND SHELLFISH HABITAT		This function considers the effectiveness of seasonal or permanent water bodies associated with the wetland in question for fish and shellfish habitat.
	SEDIMENT/TOXICANT/ PATHOGEN RETENTION		This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens.
	NUTRIENT REMOVAL/RETENTION/ TRANSFORMATION		This function relates to the effectiveness of the wetland to prevent adverse effects of excess nutrients entering aquifers or surface waters such as ponds, lakes streams, rivers or estuaries.
	PRODUCTION EXPORT		This function relates to the effectiveness of a wetland to produce food or usable products for humans or other living organisms.
	SEDIMENT / SHORELINE STABILIZATION		This function relates to the effectiveness of a wetland to stabilize streambanks.
	WILDLIFE HABITAT		This function considers the effectiveness of the wetland to provide for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.
	RECREATION (CONSUMPTIVE AND NON-CONSUMPTIVE)		This value considers the effectiveness of the wetland and associated watercourses to provide recreational opportunities such as canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive activities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland, whereas non-consumptive activities do not.
	EDUCATIONAL / SCIENTIFIC VALUE		This value considers the effectiveness of the wetland as a site for an "outdoor classroom" or as a location for scientific study or research.
	UNIQUENESS / HERITAGE		This value relates to the effectiveness of the wetland or its associated waterbodies to produce certain special values. Special values may include such things as archeological sites, unusual aesthetic quality, historical events, or unique plants, animals, or geologic features.
	VISUAL QUALITY / AESTHETICS		This value relates to the visual and aesthetics of the wetland.
ES	THREATENED OR ENDANGERED SPECIES HABITAT		This value relates to the effectiveness of the wetland or associated waterbodies to support threatened or endangered species.

Wetland A - Pond/Wetland/Vernal Pool Complex

The pond/wetland/vernal complex is a very large wetland system with diverse habitats and vegetative communities, thereby providing many functions and values to the surrounding landscape. The large expansive system provides both groundwater recharge during low flow periods and serves to discharge groundwater. As a large wetland system in a low-lying area, with an open water component, the complex serves to store flood flows. Sediment trapping and nutrient attenuation functions are provided by the wetland due to the large contact area and dense vegetation. The wetland provides abundant wildlife habitat in its open water, vernal pool and diverse vegetative communities. Open water areas and a large frog population provides food source for stalking birds such as herons and egrets, and occasionally hawks, and mammals such as fox, skunk, and coyote. The large wetland and associated fruit and nut bearing vegetation provides foraging and primary habitat for many bird and small and large mammal species as well as amphibians and reptiles.

Wetland C

The roadside wetland, though small, provides some limited functions. Sediments and nutrients may be trapped and attenuated in the dense vegetation of the system but the wetlands small size relative to the watershed, short contact times, and limited storage potential limits these functions. The vegetation also provides limited function for production export through the production of fruits and seeds which serve as food sources for transient wildlife, however landscape position, next to a busy roadway, limits this function as well.

Wetland D, E, F & J

These small isolated wetland systems have similar characteristics and wetlands functions. The wetlands provide both groundwater recharge during dry periods and serves to discharge groundwater during wet periods. These wetlands have a limited ability to trap sediments and attenuate nutrients as they capture upland runoff from surrounding areas. These wetlands provide wildlife habitat in association with large contiguous surrounding forested areas. Fruit and nut bearing vegetation provides foraging and habitat for bird and small and large mammal species.

Wetland G and H

These hillside seep wetlands have limited functions due to their small size and hillside landscape position. The primary functions of these hillside seeps is groundwater discharge.

4.0 REFERENCES

U.S. Army Corps of Engineers, New England Division. November 1995. The Highway Methodology Workbook Supplement: Wetland Functions and Values, A Descriptive Approach.

Calhoun, A. J. K. and M. W. Klemens. 2002. Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York.

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