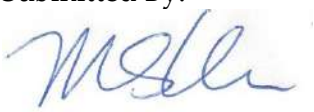
Wetland Delineation Inventory, Functional Analysis and Impact Assessment

East Industrial Road, Leetes Island Road, and East Main Street
Branford, Connecticut

Submitted To:
Costco Wholesale Corporation
In support of applications for inland wetlands permits
Town of Branford, Inland Wetlands Commission

Submitted By:



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1.0 INTRODUCTION

This report documents the results of investigations conducted by Environmental Planning Services (EPS) at a 44 acre site bounded by East Industrial Road, Leetes Island Road, and East Main Street (aka Route 1) in Branford, CT ("the site" hereinafter). The work was conducted in support of applications for three separate permits to conduct regulated activities in and adjacent to inland wetlands and watercourses associated with commercial development at the site[1].

EPS staff Michael Klein, James Cowen and Eric Davison, all of whom are Registered Soil Scientists and Certified Professional Wetland Scientists conducted multiple site surveys between November, 2013 and July 2015 in order to mark the wetland boundaries, and to survey the biotic (plant communities and wetland wildlife) and abiotic characteristics of the wetlands, watercourses and adjacent areas, in order to identify the regulated resources, and evaluate their quality and significance. Our analysis of site resources also included evaluating the significance of the site in relation to the entire watershed using GIS software (*ArcMap* v.10.0) and data obtained from the CT Department of Energy and Environmental Protection as well as other publicly available sources. This watershed-scale approach is critical to understanding the site's overall natural resource value.

We then applied this understanding of the site's resources to an assessment of the impact of the proposed development on the wetlands and watercourses potentially affected. This included the wetlands on and immediately adjacent to the site, as well as those downstream that might potentially be affected by alterations in the quantity or quality of water leaving the site during and after construction. The description of the site's wetlands, soils, and biotic resources considers the site holistically, with appropriate notations to identify resources that are confined to a particular development parcel. However, because the site will be developed by three different entities, we examined the impact of each development plan separately as well as cumulatively.

EPS also developed plans for mitigation of unavoidable impacts to the wetland resources at the site. The mitigation plans meet the Branford Inland Wetland Commission's requirements for the two development sites with direct wetland impacts individually and cumulatively. Each is totally independent of any of the work on the other two sites.

[1] A Master Plan and zone change in anticipation of this proposed development was approved by the Branford Planning and Zoning Commission on July 9, 2015.

2.0 SITE DESCRIPTION

2.1 General

The site is located north of East Industrial Road, south of East Main Street (Route 1) and east of Leetes Island Road. The site contains several parcels totaling approximately ±44 acres and contains forest, active and fallow farmland and wetlands. High-density commercial development borders the southern, southwestern and eastern portions of the site.

Site topography is flat to gently sloping in the north-central and western portions of the site. These areas are separated from a level area along East Industrial Road by a steep cut slope that runs generally in an east-west direction, approximately 320' north of East Industrial Road, which forms the southern site boundary.

2.2 Landscape Context

2.2.1 *Current*

The site lies in the Western Coastal Ecoregion as defined by Dowhan and Craig (1976). This region is characterized by coastlands including extensive tidal marshes, sand beaches and estuaries, relatively level but rolling nearshore lands and by locally rugged and rocky protrusions of upland extending to the coastline (Dowhan and Craig, 1976:38). It is approximately two miles north of Long Island Sound within two separate watersheds. The western portions of the Site drain west into the Branford River Watershed and the eastern portions of the Site drain east into Stony Creek located in the South-Central Shoreline Watershed. The Branford River Watershed is a large watershed totaling 5,174 acres, originating just above Lake Gaillard. The Stony Creek Watershed totals 1,189 acres, originating essentially at the northerly limits of the site along Route 1.

2.2.2 *Historical*

In order to better understand the historic use of the Site, we examined a series of aerial photographs sourced from the Connecticut State Library and CT DEEP Geographic Information System clearinghouse. These aerial photographs are attached in Appendix 2 and include the following years: 1934, 1951, 1965, 1970, 1986, 1990 and 2004.

In 1934, the Site was active farmland, dominated by orchards, indicated by the evenly spaced rows and dotting pattern visible on the aerial photograph. In 1951 the Site conditions remained largely the same, with orchards being the dominant land-use. Maturation of forest from 1934 to 1951 is notable in the southern portions of the Site. In 1965 the land-use remained dominated

by orchards. This is the first historic aerial in which Interstate-95 is visible, and while the overall landscape is still dominated by farmland, an increase in commercial/industrial land use is notable in the surrounding landscape. 1965 is the first year in which the three man-made ponds in the northeast corner of the Site are visible (Ponds A, B and C). From 1965 to 1970 the Site conditions appear to be unchanged. By 1986, while orchards still dominate the Site, the amount of active farmland decreases and forest cover increases. By 1990, more fallow farmland is visible, but the large central orchard remains active. By 2004, the active orchards are completely gone. Active agriculture is confined to the central, 5 acre field. The balance of the former agricultural area is increasingly dominated by invasive, non-native vegetation. A more detailed description of the current conditions is given below.

3.0 WETLAND DELINEATION

The wetland delineation was conducted by EPS soil scientists, according to the requirements of the CT Inland Wetlands and Watercourses Act (P.A. 155). Wetlands are defined as areas of poorly drained, very poorly drained, floodplain, and alluvial soils, as delineated by a soil scientist. Watercourses are defined as bogs, swamps, or marshes, as well as lakes, ponds, rivers, streams, etc., whether natural or man-made, permanent or intermittent.

The wetlands were delineated by walking across the site on February 1, 2, and March 22, 2014, during periods without snow cover, and examining the upper 20" of the soil profile with a spade and auger. Those areas meeting the requirements noted above were marked with pink plastic flagging tape. The wetlands consist of Wilbraham and Menlo extremely stony loams. The Wilbraham and Menlo extremely stony map unit contains two soil series that are so intermingled on the landscape that it is not practical or necessary to separate them. The Wilbraham series consists of poorly drained loamy soils formed in subglacial till. The soils are very deep to bedrock and moderately deep to a densic contact. They are nearly level to gently sloping soils in drainageways and low-lying positions of till hills. Wilbraham soils have a water table at or near the surface much of the year. The Menlo series consists of very poorly drained loamy soils formed in subglacial till. They are very deep to bedrock and moderately deep to a densic contact (hardpan). They are nearly level soils in depressions and drainageways of till covered plains and hills. Depth to bedrock is commonly more than 6 feet. Menlo soils have a water table at or above the surface most of the year (i.e., the soil may be ponded).

4.0 WETLAND HABITAT CHARACTERISTICS

Six wetlands occur on the overall site as shown on Figure 2. Two wetland habitat types are present, wooded swamps and ponds. Wetlands 1, 2, and 3 and 4 are wooded. Wetland 1 also contains an intermittent watercourse. Wetland 4 and the northernmost portion of Wetland 1 contain ponds. Wetland 5 is a very small, isolated, man-made depression which contains primarily woody species. Wetland 6 is a linear ditch that was excavated at the toe of the east-west cut slope noted above. It intercepts overflow from Wetlands 1 and 3. The closest classification for Wetlands 5 and 6 is sapling or scrub-shrub swamp. The basic characteristics of each wetland area are summarized in Table 1 below.

Table 1: Summary of wetland characteristics

	Wetland 1	Wetland 2	Wetland 3	Wetland 4	Wetland 5	Wetland 6
Flagging Sequence	1-50, 56-214	224-249	259-286, IWC 1-3, 296-353		363-372	
Wetland Type	Wooded swamp & pond	Wooded swamp	Wooded swamp	Pond	scrub-shrub	Scrub-shrub
Drainage Basin	South-central shoreline	Branford River	Branford River	Branford River	Branford River	Branford River
Wetland Soil Types	Wilbraham and Menlo complex and Aquents	Wilbraham and Menlo complex and Aquents	Wilbraham and Menlo complex and Aquents	Aquents	Aquents	Aquents
Wetland Hydrology	Seasonally-saturated to permanently flooded	Seasonally-flooded	Saturated	Permanently-flooded	Temporarily-flooded	Seasonally saturated
Review area within 100 feet	Forest, cropland and developed	Forest, old field	Forest, old field	Old field, forest, developed	Forest, old field, developed	variable
Parcel	Costco & Trustee	Costco & 595	595 & Costco	595	595	595

Source: CT DEEP GIS data and EPS field observations.

WETLAND HYDROPERIOD DEFINITIONS
Permanently flooded: flooded throughout the year in all years
Intermittently exposed: flooded throughout the year except in years of extreme drought
Semi-permanently flooded: flooded during the growing season in most years
Seasonally flooded: flooded for extended periods during the growing season, but usually no surface water by the end of the growing season
Saturated: substrate is saturated for extended periods during the growing season, but standing water is rarely present
Temporarily flooded: flooded for brief periods during the growing season, but water table is otherwise well below surface
Intermittently flooded: surface is usually exposed with surface water present for variable periods without detectable seasonal pattern
Source: Mitsch and Gosselink, 2007

4.1 *Wetland Vegetation*

The wetlands at the site are predominately wooded swamps. These are the most abundant wetland type in Connecticut and have a vegetational community which is characterized by a forest canopy at least 20 feet tall. The tree layer is predominantly Red Maple *(Acer rubrum)* with Green Ash *(Fraxinus pensylvanica).* The moderately open shrub layer consists mostly Spicebush *(Lindera benzoin)*, Multiflora Rose* (*Rosa multiflora)*, Winterberry *(Ilex verticillata)*, Arrowwood *(Viburnum dentatum)*, Highbush Blueberry *(Vaccinium corymbosum)*, and Silky Dogwood *(Cornus amomum)*. The herb layer is largely Skunk Cabbage *(Symplocarpus foetidus)*, Cinnamon Fern *(Osmunda cinnamomea),* Jack-in-the-pulpit *(Arisaema triphyllum)*, Sensitive Fern *(Onoclea sensibilis)*, Jewelweed *(Impatiens capensis)*, Fowl Mannagrass *(Glyceria striata)*, sedges *(Carex spp.)*, grasses (Poaceae spp.), and False Hellebore *(Veratrum viride)*. The vine layer is largely Common Greenbriar *(Smilax rotundifolia)*, wild grape *(Vitis sp.)*, Virginia Creeper *(Parthenocissus quinquefolia)*, and Asiatic Bittersweet* *(Celastrus orbiculatus)*.

There are also smaller areas of scrub-shrub wetlands. These are very similar in species composition to the wooded swamps, but are at an earlier successional stage. They are dominated by shrubs, saplings, and small trees less than 20 feet tall.

4.2 *Wetland and Watercourse Descriptions*

4.2.1 Wetland 1

Wetland 1 is the largest wetland at the site (±3.83 acres). It bisects the site in a north-south direction in the eastern portion of the site. The wetland is hydrologically connected to an offsite pond on the north side of Route 1 via a culvert, and discharges off-site to the south via a closed drainage system. Two man-made ponds are embedded within Wetland 1. The larger pond (Pond A) has a forested edge from the adjacent upland slopes. Scattered shrubs also grow along the shore including Silky Dogwood, Buttonbush *(Cephalanthus occidentalis)*, and Multiflora Rose* with Sensitive Fern. Within the pond there is a patch of Common Reed* *(Phragmites australis)* and White Waterlily *(Nymphaea odorata)*. Filamentous green algae are also present. The smaller pond (Pond B) is located a short distance east of Pond A. It has a dense edge of Silky Dogwood with Soft Rush *(Juncus effusus)* and Reed Canarygrass* *(Phalaris arundinacea)*. Patches of aquatic vegetation include waterweed *(Elodea spp.)* and smartweed *(Polygonum sp.)*.

The southern portions of Wetland 1 located below the cut slope are highly disturbed, and may be entirely anthropogenic in nature, having been created either as a result of the deep excavation of the slope that intercepted the water table, or from drainage that has been conveyed to it from other areas in closed or open systems.

* Invasive Non-native Plant

4.2.2 Wetland 2

Wetland 2 is a ±0.39 acre wooded swamp with a saturated to seasonally flooded hydrology. The wetland is situated on gently sloping terrace just north of, and bordering, the cut slope described above. The majority of the wetland maintained a saturated hydrology throughout the spring. Two small, separated depressions held standing water throughout the spring and would be classified as having a seasonally-flooded hydrology.

4.2.3 Wetland 3

The southern portion of Wetland 3 (±0.44 acres) is a wooded swamp that originates in a drainageway on a sloping hillside. A diffuse intermittent watercourse is embedded within the wetland. The wetland flows in a southerly direction, spilling over the southern cut slope via an intermittent watercourse demarcated by flags IWC 1-3. This wetland is bisected by a woods road on shallow fill. The fill is not thick enough to mark it out as a non-wetland. North of the woods road, the vegetation is primarily old field and dense brush; Mugwort, Multiflora Rose and Olive are common.

4.2.4 Wetland 4

Wetland 4 is a ±0.26 acre excavation that intercepts to the water table. It discharges to the stormwater management system of the commercial development at the corner of Leetes Island Road and East Industrial Road. The steep-sided basin is ponded and the water level fluctuates in response to seasonal and storm events. There is a narrow band of with wooded swamp vegetation growing along the shore, consisting primarily of Red Maple, Common Cottonwood *(Populus deltoides)*, Pussy Willow *(Salix discolor)*, and Multiflora Rose* (*Rosa multiflora)*.

4.2.5 Wetland 5

Wetland 5 is a very small (±0.02 acres) and highly disturbed wetland fragment that appears to be entirely anthropogenic in origin, although it is possible that the wetland is a remnant from a larger wetland that was historically present.

4.2.6 Wetland 6

This is a very narrow, east-west swale or ditch (±0.19 acres) that was apparently excavated to intercept drainage from the northern portion of the site, directing it away from developable areas and into a closed drainage system that discharges southerly toward East Industrial Road. Its hydrology is driven by overflow form Wetlands 1 and 3 to the north, although it is possible

that there is a limited component of groundwater discharge. Vegetation is largely scrub-shrub, including native species like alder (*Alnus spp.*) and red maple saplings, and willows (*Salix spp.*), as well as invasive species such as Multi-flora Rose.

4.3 *Ponds*

The site contains four ponds designated Ponds A, B, C and D (see Figure 2). Ponds A and B are embedded within Wetland 1 in the northeast corner of the Site and are connected by a culvert. Pond C is located offsite (north of Route 1) and is periodically connected to Pond A (and potentially Pond B) via the stormwater drainage system in East Main Street. Pond D (a.k.a. Wetland 4) is a steep-sided groundwater pond that discharges to the drainage system on the adjacent Stop & Shop development. All four ponds are anthropogenic in origin. Based on review of historic aerial photographs (see Appendix 2) we were able to ascertain the approximate age of these ponds. Pond C is the oldest, having been created prior to 1934. Ponds A and B were created sometime between 1951 and 1965. Pond D was constructed between 1971 and 1986.

Water quality sampling and physical surveys were conducted at all of the ponds on the Site. Ponds A, B and C were inspected by wading and kayaking on June 10th 2014. Pond D was assessed via wading on July 22nd 2015. Physical characteristics such as water depth, substrate (benthic) condition, and aquatic vegetation were noted and water samples were collected for laboratory analysis. All four ponds showed evidence of enrichment or cultural eutrophication. Total phosphorus (as P) varied from 0.04 – 0.23 mg/l and total nitrogen (as N) varied from 1.08 – 3.83 mg/l. Pond A water quality also showed some evidence of impairment with respect to its ability to support desirable fish species, with dissolved oxygen levels between 3.94 and 5.25 mg/l; 5 mg/l is considered the lower limit for support of desirable fish. All of the ponds are circumneutral, with pH between 6.6-7.76. The full set of sample results is included in the Appendix.

Pond C is located north of Route 1. The Pond is shallow and the shore is partially wooded with Red Maple, Sugar Maple, Green Ash, Black Willow, and American Elm. The shrub layer varies from open to dense thickets and consists mostly of Arrowwood Viburnum, Silky Dogwood, Multiflora Rose*, and Buttonbush. Minimal aquatic vegetation was observed and was mostly Duckweed (*Lemna minor*) and watermeal (*Wolffia sp.*). On the east side of the pond there is a water quality swale which is vegetated mostly with Common Reed*. The vine layer includes Virginia Creeper and Asiatic Bittersweet*.

Pond D had an abundance of trash and floatables (e.g., plastic shopping bags) consistent with a stormwater treatment pond. Water depth was greater than four feet. The pond substrate was

mucky (organic) over stone. Vertical visibility was approximately two feet. Odonates (dragonflies and damselflies) were observed, along with floating feathers indicative of waterfowl stopover habitat.

5.0 UPLAND (non-wetland) HABITAT CHARACTERISTICS

Three non-wetland (aka upland) habitat types occur on the site, cultivated field (corn), early-late old field, and mixed hardwood forest.

Cultivated Field

Approximately five acres of the site consists of a cultivated field currently planted with corn. The field also supports annual weeds and forbs. The portion of the site now under cultivation is considerably smaller than what was present historically. A review of aerial photographs of the site from 1990 shows more extensive cropland contiguous with the existing cornfield as well as in the area east of Wetland 1. A review of historic aerial photography from 1934 shows the entire site essentially under cultivation.

Early and Late Old Fields

In the early years after abandonment, agricultural land is characteristically vegetated with an extensive herb layer of grasses and forbs. In a matter of years, sun-loving, woody species colonize the field and eventually shade out the grasses as the vegetation develops into a young forest.

The Site contains several recently abandoned fields to the south, east and west of the currently active cornfield. These fallow fields are in various stages of regrowth and would be characterized as both "early" and "late" old field stages. Early old fields are dominated by herbaceous species with sporadic growth of young trees and shrubs. Old fields have been abandoned for a longer period of time and therefore have more extensive growth of trees and shrubs. The species composition of the early and late old field habitat is similar; they are distinguished by the relative density and maturity of the woody vegetation. The extensive herb layer in the old fields consists of Bird's Foot Trefoil *(Lotus corniculatus)*, Common Mugwort* *(Artemisia vulgaris)*, grasses *(Poaceae spp.)*, Rough-stemmed Goldenrod *(Solidago rugosa)*, and Reed Canarygrass* *(Phalaris arundinacea)*. In recent years, several invasive non-native species have come to be dominant colonizers of open land including Multiflora Rose* *(Rosa multiflora)*, Tree-of-heaven* *(Ailanthus altissima)*, Autumn Olive *(Eleaegnus umbellata)*, Wineberry* *(Rubus phoenicolasius)*, Asiatic Bittersweet* *(Celastrus orbiculatus)*. These species are all present in the old field areas on the site. Native Red Cedar *(Juniperus virginiana)*, Pussy Willow *(Salix discolor)*, Poison Ivy *(Toxicodendron radicans)*, and Alleghany Blackberry *(Rubus alleghaniensis)* are also present.

Mixed Hardwood Forest

This is the most plentiful and characteristic type of vegetation in Connecticut. Our forests are included in the Central Hardwoods-Hemlock zone in a classification of New England forests. Since most of Connecticut has been cleared in the past, forests are called second growth and usually consist of relatively young trees with a diameter at breast height (dbh) of less than one foot.

The wooded portion of the site has a nearly continuous tree canopy characterized by American Beech *(Fagus grandifolia)*, oak *(Quercus spp.)*, Sugar Maple *(Acer saccharum)*, Norway Maple* *(Acer platanoides)*, Red Maple, Shagbark Hickory *(Carya ovata)*, Black Birch *(Betula lenta),* Black Cherry *(Prunus serotina)*, Sassafras *(Sassafras albidum),* Ironwood *(Carpinus caroliniana)*, and Common Cottonwood *(Populus deltoides)*. The shrub layer varies from open to dense and includes Spicebush *(Lindera benzoin)* and Multiflora Rose*. The locally dense vine layer is composed of Asiatic Bittersweet* *(Celastrus orbiculatus)* wild grape, and Common Greenbriar. The herb layer includes Garlic Mustard* *(Alliaria petiolata)*, Christmas Fern *(Polystichum acrostichoides)*, White Wood Aster *(Eurybia divaricata)*, Enchanter's Nightshade *(Circaea lutetiana)*, Spotted Cranebill *(Geranium maculatum),* Virginia Creeper *(Parthenocissus quinquefolia)*, Ramps *(Allium tricoccum)*, and sedges *(Carex spp.)*.

6.0 WILDLIFE

6.1 *Vernal Pools*

Vernal pools are small seasonal bodies of water with a hydrologic signature that includes inundation in the spring and fall and drying or significant drawdown during the summer months. They generally lack a permanent surface water connection with other wetlands. Vernal pools most often do not support fish populations as a result of periodic drying or anoxic conditions and therefore provide breeding habitat for forest-dwelling amphibians; principally frogs and salamanders. Confirmation of breeding by vernal pool indicator species, sometimes referred to as obligate species, confirms the presence of a vernal pool.

Wetland areas with seasonally flooded and permanently flooded hydrology were surveyed for amphibians from April to June of 2014 and 2015. Survey methods included visual searches for egg masses and adults, cover searching (i.e., turning rocks, logs and debris) for adults, auditory surveys for calling frogs and toads, and dip-netting for larval amphibians. One vernal pool indicator species, the wood frog (*Rana sylvatica*), was observed on the site in 2014. One (or possibly two) adults were heard calling and a single egg mass was found in the southeast corner of Wetland 1, in a flooded depression adjacent to flag #21. During the spring 2015

survey, no chorusing or breeding wood frogs or their egg masses were present. No Ambystomid salamanders (a.k.a. mole salamanders) were observed during any of the surveys.

No egg masses or larvae of vernal pool indicator species were observed in either Pond A or B. Wetland 2 maintained standing water in two discrete pockets throughout April and May. These areas were checked repeatedly and no amphibian adults, egg masses or larvae were present. Other amphibian and reptile species observed on the site include spring peeper (*Pseudacris crucifer*), green frog (*Rana clamitans*), gray treefrog (*Hyla versicolor*), bullfrog (*Lithobates catesbeianus*) and snapping turtle (*Chelydra serpentina*).

The presence of one or two wood frogs (and a single egg mass) is not unusual, as wood frogs are capable of migrating distances of 3000 feet (or more), and often seek out new breeding pools in which to colonize. Wetland 1 is located in the southeast corner of the Site, within the migratory distance of other potential breeding pools located within a large forest block east of the Site adjacent to Towner Swamp Road. It is likely that individuals observed on the Site in 2014 originated from this area. The lack of mating or breeding activity in 2015 suggests that there was no survivorship in 2014. A major factor precluding the presence of robust populations of vernal pool wildlife is the lack of mature forest cover on as well as immediately adjacent to the site, as vernal pool species utilize forested habitat during the non-breeding season. The presence of high-density development and high-traffic roads adjacent to the site also severely limit the ability of amphibians to move into and out of site wetlands during migration.

6.2 Other Wetland and Upland Wildlife

Other amphibian and reptile species observed on the Site include spring peeper (*Pseudacris crucifer*), green frog (*Rana clamitans*), garter snake (*Thamnophis sirtalis*), gray treefrog (*Hyla versicolor*), bullfrog (*Lithobates catesbeianus*) and snapping turtle (*Chelydra serpentina*).

A number of bird species that favor fallow farmland, non-forested "edge" habitat and open water (ponds) were observed on the Site. These included: yellow-crowned night heron (*Nycticorax nycticorax*), osprey (*Pandion haliaetus*), red-winged blackbird (*Agelaius phoeniceus*), fish crow (*Corvus ossifragus*), American robin (*Turdus migratorius*), yellow warbler (*Dendroica petechia*), blue-winged warbler (*Vermivora pinus*), willow flycatcher (*Empidonax traillii*), black-capped chickadee (*Parus atricapillus*), mourning dove (*Zenaida macroura*), cardinal (*Cardinalis cardinalis*), gray catbird (*Dumetella carolinensis*), green heron (*Butorides virescens*), chimney swift (*Chaetura pelagica*), American goldfinch (*Carduelis tristis*), northern oriole (*Icterus galbula*), common grackle (*Quiscalus quiscula*), northern flicker (*Colaptes auratus*), brown-headed cowbird (*Molothrus ater*), red-bellied woodpecker (*Melanerpes carolinus*), and red-tailed hawk (*Buteo jamaicensis*),

Six of the bird species that were observed at the site (osprey, blue-winged warbler, willow flycatcher, chimney swift, northern oriole and northern flicker) are considered to be conservation priority species under the 2015 Connecticut Wildlife Action Plan[2]. With the exception of the osprey which was observed over Pond A, these species are all associated with the Site's old field habitat areas. The osprey's ability to forage for fish in the ponds at the site will not be adversely affected by the proposed development.

7.0 CT DEEP NDDB REVIEW

The Connecticut Department of Energy & Environmental Protection's Natural Diversity Database program represents current documented data showing the known locations of any endangered, threatened or special concern species and significant natural communities. The most recent NDDB mapping was reviewed. No NDDB records overlap the site. The nearest record lies approximately 2400 feet southeast of the site, on the south side of Interstate 95.

8.0 WETLAND FUNCTIONS AND VALUES ASSESMENT

Over the last three decades, ecologists, wetland scientists, biologists, hydrologists, and environmental engineers have recognized not all wetlands perform the same functions, or provide the same values for their various functions. There are many methods of evaluating wetlands and these methods have often chosen different parameters to evaluate. This study uses *The Highway Methodology Workbook Supplement, Wetland Functions and Values: A Descriptive Approach* (1995) issued by the US Army Corps of Engineers New England District (ACOE NED). This evaluation provides a qualitative approach in which wetland functions can be considered principal, secondary, or unlikely to be provided at a significant level. Functions and values can be principal if they are an important physical component of a wetland ecosystem (function only), and/or are considered of special value to society, from a local, regional, and/or national perspective. The ACOE NED recommends that wetland values and functions be determined through "best professional judgment" based on a qualitative description of the physical attributes of wetlands and the functions and values exhibited.

The Highway Methodology recognizes the following 13 separate wetland functions and values: groundwater recharge/discharge, floodwater storage, fish and shellfish habitat, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production

[2] The 2015 Wildlife Action Plan, formerly Connecticut's Comprehensive Wildlife Conservation Strategy (2005) is currently in draft form on the CT DEEP website at: http://www.ct.gov/deep/cwp/view.asp?a=2723&q=329520&deepNav_GID=1719#Review

export, sediment/shoreline stabilization, wetland wildlife habitat, recreational value, educational/scientific value, uniqueness, visual/aesthetic quality and threatened and endangered species habitat.

The degree to which a wetland provides each of these functions is determined by one or more of the following factors: landscape position, substrate, hydrology, vegetation, history of disturbance, and size. Each wetland may provide one or more of the listed functions at significant levels. The determining factors that affect the level of function provided by a wetland can often be broken into two categories. The effectiveness of a wetland to provide a specified function is generally dependent on factors within the wetland whereas the opportunity to provide a function is often influenced by the wetland's position in the landscape as well as adjacent land uses. Functions and values are summarized in Table 2 and discussed in Section 8.1.

Table 2: Summary of wetland functions and values, East Industrial Road, Branford

Wetland Number	Application	Groundwater Recharge/Discharge	Sediment/Shoreline Stabilization	Floodflow Alteration	Fish & Shellfish Habitat	Sediment/Toxicant/ Pathogen Retention	Nutrient Removal/Attenuation	Production Export	Wildlife Habitat	Recreation	Educational/Scientific Value	Uniqueness/Heritage	Visual Quality/Aesthetics	Listed Species Habitat
Wetland 1	Costco	P	S	P	S	P	P	S	S	S	U	U	S	N
Wetland 2	Costco 595	P	N/A	U	N/A	S	S	S	U	U	U	U	U	N
Wetland 3	Costco 595	P	N/A	U	N/A	S	S	S	U	U	U	U	U	N
Wetland 4	595	S	N/A	P	S	P	P	U	U	U	U	U	U	N
Wetland 5	595	P	N/A	U	N/A	U	U	U	U	U	U	U	U	N
Wetland 6	Costco 595	U	S	U	N/A	U	S	U	U	U	U	U	U	N

Suitability
P = principal function
S = secondary function
U = function unlikely to be provided at a significant level
N = None present based on lack of current CT DEEP NDDB records (map date January, 2015) and lack of observations during field work 2014-2015.
N/A = not applicable

8.1 *Principal Functions and Values*

The major factor limiting the ability of all site wetlands to provide significant functions and values are their lack of ecological integrity due to the alteration of the adjacent areas by intensive agriculture or development. It is also significant that these wetlands are isolated, with no downstream connection to other wetlands or watercourse systems.

Wetland 1 is the most significant wetland on the site in terms of providing multiple functions and values. Principal functions identified include groundwater recharge/discharge, floodflow alteration, sediment/toxicant/pathogen retention and nutrient removal. These functions are attributable primarily to the larger size of the wetland, its long hydroperiod and the complexity and density of vegetation present.

Wetland 4 provides several principal functions relating to its design as a detention basin, including flood flow alteration, sediment retention and nutrient removal. It is not significant for biological or societal functions and values, such as wetland or aquatic habitat, educational/scientific uses, recreation, or uniqueness/heritage.

Wetlands 2, 3, 5 and 6 all provide limited functions and values due to their small size, short hydroperiod and the aforementioned buffer condition and lack of downstream connectivity. They have a limited capacity to recharge groundwater by capturing and holding surface runoff from the adjacent uplands and infiltrate it back into the ground. The magnitude of this function is very small due to the limited infiltration capacity of the soils at the site.

9.0 WETLAND IMPACT ASSESSMENT

The current proposal is for activities associated with commercial development of the site in conformance with the approved Master Plan. The development will proceed in at least three phases. Each phase has been designed to integrate with the development of each of the other phases and to be capable of independent construction. In order to provide an accurate assessment of all of the work proposed under the Master Plan, we have evaluated the cumulative impacts of the entire proposal. The specific impacts associated with each of the three phases are also noted. The phases are described as the Costco Phase, the 595 Phase, and the Trustee phase.

The work in the Costco Phase includes:

1. A building of approximately 158,000 square feet in size housing a discount club intended to be occupied by Costco Wholesale is proposed on the Cooke Parcel. A gasoline

fueling station associated with the discount club and for the benefit of discount club members (not to include facilities to serve large trucks), would also be developed. The fueling station canopy and operator booth would be approximately 4,000 square feet in size. Drive aisles, parking, utilities and landscaping would also be installed as part of this phase. Two lot line modifications would be completed whereby the 595 Corporate Circle Parcel would convey a strip of land to the Cooke Parcel, and the Cooke Parcel would convey a small strip of land to the Connecticut Shellfish Parcel, before a building permit for the project is issued. These conveyances are needed to comply with the conditions of approval for the PDD.

2. An access drive parcel would be created and an access drive would be built from East Industrial Road to the Cooke Parcel. This new driveway would create direct access from the Exit 56 southbound ramps to the Cooke Parcel. No buildings are proposed to be built within the Access Drive Parcel. The Connecticut Shellfish Parcel is currently developed with two buildings serving the existing wholesale shellfish processing business. The existing driveway access and parking on the Connecticut Shellfish Parcel would be modified slightly to accommodate the modified traffic signal and new access drive connecting East Industrial Road and the Cooke Parcel. No new buildings are contemplated to be built on the Connecticut Shellfish Parcel.

3. A driveway would be built westerly from the proposed main Access Drive, providing internal circulation and a secondary access to/from East Industrial Road approximately 600 feet west of the main Access Drive.

9.1 Direct Wetland Impacts

9.1.1 *Cumulative Direct Impacts*

Due to the distribution of wetlands across the site, wetland crossings are required to provide access to the local road system and safe and efficient internal circulation. Direct wetland impacts are proposed at six discrete locations necessary to construct the access roads through the site. A total of ±4960 sq. ft. (±0.11 acres) of wetlands will be directly affected. The wetland impact areas are summarized below in Table 3 and described in the following sections.

Table 3: Wetland Disturbance Areas

Area	Wetland Location	Impact (sq. ft.)[3]
A	1/6	980
B	1	1,063
C	5	241
D	3	1,492
E	5	350
F	1	834
Total		**4,960 s.f.**

Area A

Impact Area A is located adjacent to Wetland 1 at the base of the cut slope. The work is associated with the main access road leading from East Industrial Road. The crossing is located in a narrow band of wetlands that extends in an east-west direction across the entire parcel, parallel to East Industrial Road. The wetland at this location is highly altered by historic ditching, excavation and drainage works. Vegetation is moderately dense shrub thicket along the ditched wetland at the toe of the slope and a small area on the slope, comprised mostly of Common Reed*, Multiflora Rose*, Japanese Honeysuckle* *(Lonicera japonica)*, Pussy Willow, Spicebush, Arrowwood, Riverbank Grape *(Vitis riparia)*, Red Maple, and Skunk Cabbage.

The total area of wetland disturbance at this location will be approximately 980 square feet (0.02 acres). The affected area is essentially a drainage ditch that appears to have been created to convey runoff from developed areas to the northeast to closed drainage systems further down gradient. It does not provide significant wetland habitat functions. The drainage will be collected and conveyed in the designed stormwater system with no increase in peak flows. Proper sediment and erosion controls and stormwater quality treatment measures are installed and maintained. There will be no significant adverse impact from the proposed work.

Area B

Area B consists of a road crossing located at the narrowest point of Wetland 1, where the wetland is a well-defined intermittent watercourse with a very narrow band of flanking wetland soils and vegetation. The wetland varies from about 5'- 20' wide at this location. The plant community consists of Red Maple, Black Gum, Red Oak, Spicebush, Multiflora Rose*,

[3] Impact area calculations provided by BL Engineers

Arrowwood, Highbush Blueberry *(Vaccinium corymbosum)*. Asiatic Bittersweet*, Skunk Cabbage, Jewelweed, sedges, and Virginia Creeper.

The work at this location totals approximately 1,063 square feet (0.02 acres). The crossing design meets the CT DEEP and Army Corps standards for maintaining connectivity along stream corridors, with a native bottom and a low flow channel. The inlet and outlet inverts match the existing grades. Dry passage along the stream channel will be provided. The crossing should be installed in the dry season, or the flow should be temporarily shunted to a bypass channel to allow the work to be conducted in the dry. The proposed stormwater management system for the site will attenuate peak flows and provide for treatment of the water quality volume. Proper sediment and erosion controls are shown. Due to the small upstream watershed, the heavily disturbed nature of the surrounding landscape, and the location between Route 1 and the East Industrial Drive/I-95 corridor, this work will not have a significant impact on wetlands and watercourses.

Area C

This is another very small fill (241 sq. ft., ±0.006 ac.) required to provide a connection from Pad 6 to the secondary access road. The fill location consists of a machine-graded depression and is vegetated predominately with the invasive multiflora rose and autumn olive with some willow present. Due to the highly altered nature of this impact area and its very small size, we do not believe that this activity will have any adverse impact.

Area D

This is a 1,492 sq. ft. (0.03 acres) wetland crossing that is required to provide internal access between the portion of the 595 parcel that abuts East Industrial Road and the portion that abuts Leetes Island Road. It is located at the extreme western end of Wetland 6, the man-made drainage feature that collects discharge from the upper portion of the site and directs it to the piped drainage systems associated with East Industrial Road and I-95. This wetland's functions are very limited; it serves as drainage conveyance only. There will be no adverse environmental impact associated with this work.

Area E

This is a very small (350 sq. ft., 0.007 acres) area located near the eastern limit of Wetland 6. The work is required to provide the connection between the main and secondary access points to the Costco development, as well as the required internal connection among the three development areas. As noted above, this area is an excavated drainage feature; there will be no adverse environmental impact associated with the road construction.

Area F

This is a very small (834 sq. ft., 0.019 acres) area located in a narrow excavated swale that extends westerly from Wetland 1, at the toe of the cut slope. It also functions to intercept runoff from the upper portions of the site and direct it to the existing piped system. It is also required to provide the connection between the main and secondary access points to the Costco development, as well as the required internal connection among the three development areas. As noted above, this area is an excavated drainage feature; there will be no adverse environmental impact associated with the road construction.

9.1.2 Costco Application Direct Impacts

Development of the Costco parcel, including the two access points to East Industrial Drive, will require work in wetlands at Areas A, B, C, E and F. The total activity in wetlands or watercourse necessary to develop this portion of the site is 3,468 sq. ft., or 0.08 acres. The work is unavoidable in order to provide safe access to and from the site, and the required internal circulation pattern. Impacts have been avoided and minimized to the maximum extent practical.

9.1.3 595 Application Direct Impact

Development of the southwestern and northwestern portions of the Master Plan area requires a crossing of Wetland 6 at Area D, to provide internal access between the development areas. Because Wetland 6 traverses the toe of the entire cut slope parallel to East Industrial Road, this crossing is unavoidable. The total area of direct impact is 1492 sq. ft., or 0.03 acres. As noted above, this feature is essentially an open drainage ditch which is vegetated with invasive and native, early successional vegetation such as pussy willow, alders, multi-flora rose and olive. Its only function is to direct surface and groundwater flows to the east and west, to the formal drainage system associated with East Industrial Drive. This work will have no adverse effect.

9.1.4 Trustee Parcel Direct Impact

No work in a wetland or watercourse will be required to develop the Trustee parcel.

9.2 Cumulative Indirect Wetland Impacts

Generally speaking, indirect or secondary impacts to a wetland or watercourse occur as a result of activity outside of the wetlands or watercourses that has an adverse impact on the wetland or watercourse. These impacts potentially include:

- Soil erosion and subsequent sediment deposition in wetlands or watercourses (from non-wetland activities);

- Removal or alteration of bordering native vegetation and wildlife habitat which then has an impact on the wetlands or watercourses themselves;
- Alteration of wetland hydrology or watercourse flow regime; and
- Discharge of degraded surface water or groundwater which then has an adverse impact on a wetland or watercourse .

The potential for each of these indirect impacts to occur on the site as a result of the overall proposed commercial development is addressed below. Because these potential impacts occur at some distance from the actual work, they cannot be apportioned to the different applications.

9.2.1 Erosion and sedimentation

The potential for soil erosion and subsequent deposition in wetlands or watercourses exists at any construction project that involves soil disturbance. The potential for an adverse impact on wetlands or watercourses from erosion and sedimentation at this site is considered very low for several reasons:

1. A detailed erosion and sediment control plan has been prepared that provides for independent construction and BMPs for each phase of the project.
2. The soils are not highly erodible.
3. The immediately downstream areas are not highly susceptible to adverse impacts from erosion or sedimentation.

9.2.2 Removal of native vegetation and habitat loss

Land clearing and habitat loss are unavoidable consequences of land development. In some cases, this loss of habitat has the potential to cause an impact to wetlands or watercourses. At this site, the largest single habitat unit at the site is a cultivated field. Other portions of the site are largely rough lawn, nearly barren waste areas, excavated ponds, utility right of way, and old fields with significant invasive components. The stream, wetland corridor and ponds that make up Wetland 1 will remain largely intact. The only large area of mature vegetation to be removed is in the western portion of the site. This area of mixed hardwood forest is a 5-6 acre forest fragment located between a major arterial roadway (U.S. Route 1) and Interstate 95. The surrounding properties to the northwest, west, south and southeast, and east are intensively developed with commercial and industrial uses. There are no rare or uncommon habitat types at the site, which can be expected to support disturbance-tolerant ecological generalists. Based on two seasons of field data, the wetlands little if any amphibian breeding habitat and there will be no impact on vernal pool species. In our judgment, there will not be a significant indirect impact from loss of vegetation or habitat.

9.2.3 Alteration of wetland hydrology or watercourse flow regime

The historical site context analysis shows that, over time, the wetland hydrology and streamflow regimes at the site have also been significantly and irreversibly altered by several factors:

- The impoundment of Ponds A, B, and C.
- The excavation of Pond D.
- The construction of Route 1.
- The development of the surrounding areas.
- The steep cut/fill slopes north of East Industrial Road.

Nevertheless, the stormwater management system has been designed to minimize any further alteration of these systems. The proposed drainage system for the roads, drives, and parking lots will preserve the existing drainage patterns to the maximum extent possible. Peak storm flows will be attenuated below existing levels prior to discharge to the streams and wetlands (see Table 4.)

Table 4: Existing vs. Proposed Peak Rates of Runoff (Point of Analysis)[4]

	Peak Flow Rate in Cubic Feet per Second (c.f.s.)			
Drainage Area	**2-Year**	**10-Year**	**25-year**	**100-Year**
POI-1000				
Existing	15.37	33.24	39.99	56.30
Proposed	15.30	30.23	35.80	49.08
Percent Change	-0.4%	-8.9%	-10.3%	-12.7%
POI-2000				
Existing	16.93	34.67	45.94	73.81
Proposed	16.68	33.09	39.60	63.08
Percent Change	-0.2%	-4.5%	-13.8%	-14.6%

Extensive on-site testing showed that the surficial soils are underlain by compact fill, clayey sand, or sandy silt. Therefore, attenuation of volume increases is not feasible on the site due to the very limited infiltration capacity of the soils. A portion of the clean stormwater runoff from the development will be discharged into the upland review areas of the wetlands to provide buffer treatment of stormwater and to support wetland hydrology. Overall, there will be an unavoidable increase in the duration of storm flows, but no increase in peak flows. However, the drainage systems at the site have been highly altered to direct flows very quickly to closed drainage systems. There will be no adverse impacts to wetland hydrology or watercourse flow regimes.

[4] As determined by BL Companies, Engineers

9.2.4 Discharge of degraded surface or ground waters

As noted above, extensive environmental testing has been completed to determine if historical pesticide application had affected the soils or groundwater at the site. Although shallow soils showed the presence of dieldrin and elevated levels of arsenic and lead, these compounds were not detected in groundwater from monitoring wells. The site plans were developed to insure that all soils with elevated levels of pesticides would be isolated from the environment, so that no surface or groundwater pollution will occur during the site grading and development.

Stormwater runoff from commercial sites has the potential to be degraded with automotive fluids, litter and suspended solids. The CT DEEP General Permit for discharge of stormwater from this site requires a detailed stormwater pollution prevention plan, which will be reviewed and approved the DEEP prior to the start of construction. The stormwater management design consists of a multi-element treatment train with the following components:

- Routine pavement seeping
- Deep sump catch basins with hooded outlets
- Hydrodynamic separators
- Oil/water separator
- Sediment forebays
- Filter strip
- Seven extended detention basins with aerobic and anaerobic cells.

These elements will function together to remove substantially more than 80% of the total suspended solids (TSS) from the stormwater. The Connecticut DEEP has adopted an 80% TSS removal goal because other stormwater contaminants, including heavy metals, bacteria and organic chemicals adsorb to sediment particles and because it is the most frequent and consistent sampled stormwater constituent. There is a very strong correlation between suspended solids removal and removal of other stormwater-related contaminants. Further polishing and removal of nutrients, metals, and non-TSS constituents will occur in the wetland elements of the stormwater basins. The extended detention basins have been designed to include aerobic and anaerobic elements to maximize physical, chemical, and biological treatment. In addition to high levels of treatment for sediment, nutrients, and heavy metals, these measures also provide for attenuation and removal of pathogens and dissolved pollutants. The site will be served by sanitary sewers, so there will be no discharge of nutrient-enriched treated effluent to the groundwater or surface water at the site.

As noted above, the site has a long history of agricultural use. Pesticides were reportedly applied to the site as part of normal farming operations and an extensive soil testing program

was completed. As is typical for sites such as this, dieldrin and elevated levels of arsenic and lead are present in the shallow soils beneath the cultivated areas of the site. A soil management plan has been developed to insure that these soils are managed in a manner that complies with the CT DEEP's "General Guidance on Development of Former Agricultural Properties." The topsoil and deeper soils that contain elevated levels of dieldrin, arsenic or lead will be consolidated and capped by poly-sheet membrane, clean fill, and clean topsoil. These areas will be graded to promote run-off and vegetated. Petroleum compounds were also detected in a small, isolated area in the northeast corner of the site. These soils will be excavated and transported off-site for disposal in accordance with CT DEEP Spill Remediation Requirements.

The soil management plan has been coordinated with and is consistent with the Sediment and Erosion Control Plans. When managed accordingly, there will be no adverse impacts to wetlands or watercourses from eroded or managed soils at the site.

10.0 MITIGATION

As noted in Section 8.1, direct impacts to wetlands are associated with work on the Costco and 595 parcels. These direct impacts will occur at six locations, totaling 4,960 sq. ft. (0.11 acres). EPS has developed plans to mitigate for these unavoidable impacts. As with the site development plans, the mitigation areas can be constructed independently of each other. The mitigation planning has also been coordinated to be consistent across parcel boundaries. We developed these plans based on soils, test pit, and hydrologic data we collected at the site; supplemented by additional information provided by the engineers and groundwater specialists. The designed final vegetation classes for these areas are wet meadow and emergent marsh, with a native shrub transition zone. The construction of this area will be overseen by the owner's wetland scientist, with 5 years of monitoring and reporting, as required by the regulations.

The mitigation plans include wetland compensation and enhancement. They also include additional measures designed to enhance the wetland features and conservation values at the site over the long term. These measures include the following:

- Invasive species control in wetland and non-wetland areas.
- Use of native plant materials and seed mixes in disturbed areas that abut wetlands.
- Modification of the stormwater treatment basins to provide wetland and non-wetland wildlife habitat.

Compensatory wetland mitigation will occur at two locations adjacent to Wetland 1. Wetland Enhancement will occur in Wetland 3. A total of 9,900 sq. ft. of wetlands will be created and

12,050 sq. ft. of wetlands will be enhanced (see Table 4). The overall mitigation ratio for the Master Plan is 4.5:1, exceeding the 2:1 mitigation ratio required under the Branford Inland Wetlands and Watercourses regulations. The ratio of compensatory mitigation (wetland creation) to wetland loss is also greater than 2:1. The mitigation ratios for the Costco and 595 parcels are 3.7:1 and 6.4:1, respectively. There are no direct impacts on the Trustee parcel.

Table 5. Summary of Wetland Impact and Mitigation Activities

Application	Wetland Impact	Wetland Creation	Wetland Enhancement	Mitigation Area	Mitigation Ratio	Review Area Enhancement	Stormwater Wetlands
Costco	3468	9900	2650	12,550	3.6:1	32,300	
595	1492	0	9,500	9,500	6.4:1	7200	
Trustee	0	0	0	0	0	0	
Master Plan Area	4960	9900	12150	22,050	4.4:1	39,500	65,200

The proposed wetland creation areas are contiguous with Wetland 1, the most significant wetland resource at the site. The plans also include enhancement of the upper portion of Wetland 3. This 12,050 sq. ft. mitigation area includes is located 9,500 sq. ft. on the 595 parcel and 2650 sq. ft. on the Costco parcel. This is an area of old field and scrub vegetation that is primarily vegetated with invasive herbaceous and woody species. The invasives in the wetlands and upland review area will be removed. Native seed mixes, shrubs, and trees will be installed in this area.

11.0 ALTERNATIVES ANALYSIS

During the course of development of the Master Plan, many alternative site layouts were considered. Four were selected for detailed analysis. The primary criteria against which the alternatives were evaluated were impact avoidance and minimization of unavoidable wetland impacts. These alternatives are illustrated in the appendix and described below. The permit application represents the layout with the least direct impact and, in our professional opinion, also has less potential for indirect impacts.

11.1 Alternative A

Alternative A provides access from East Industrial Drive at one location and access from East Main Street at one location. It requires direct wetland impacts at nine locations, totaling 11,287 sq. ft. (0.26 acres). This alternative required two east-west crossings of Wetland 1 and two other smaller impact areas, totaling 7396 sq. ft. of direct impact to Wetland 1. There are also direct

impacts to Wetlands 2 and 3. The eastern limit of the parking lot for the Costco is substantially closer to Wetland 1 than in the preferred alternative.

11.2 Alternative B

Alternative B includes an additional access point across from the southbound I-95 ramps, which eliminated the largest single impact area on the site (5,536 sq. ft.) for a crossing of Wetland 1. Direct wetland impacts are required at 8 locations, totaling 7,772 sq. ft, (0.18 acres), with 4,737 sq. ft. total at four locations in Wetland 1. The impact to Wetland 2 has been eliminated.

11.3 Alternative C

Alternative C was developed based on the same three access points as Alternative B, with a refinement in the geometry to cross Wetland A at narrower points. The parking lot layout was further refined to eliminate two areas of direct impact, but a substantial portion of the Costco parking field was within 15-30′ of the western limit of Wetland 1. The internal circulation was revised because the Brown property was no longer available. Additional direct impacts to Wetland 6 were therefore required. Direct wetland impacts under this alternative would occur at eight locations, totaling 4,971 sq. ft. (0.11 acres). Other than the crossing to access the Costco parking field from the main southern access point, direct impacts are largely confined to the drainage ditch wetland which traverses the entire southern limit of the property at the slope break.

11.4 Preferred Alternative

The site layout in Alternative C was further refined by rotating the Costco store 90° clockwise. Although the long axis of the store is now oriented in an east-west direction, a more efficient parking layout allows for a further reduction in the overall direct wetland impact (4,960 sq. ft.). The separating distance between the work and east side of Wetland 1 has also been substantially increased. The direct impact to Wetland 1 is confined to a single, 1,063 sq. ft. location.

The project team also conducted detailed analyses of alternative stormwater management and mitigation options. A deep test pit and soil boring program was conducted across the entire site to attempt to identify locations suitable for stormwater infiltration and areas that had suitable hydrology to support wetland creation areas. The results of the infiltration testing are attached to the Stormwater Report. The results of the deep test pits and the groundwater monitoring for wetland mitigation are attached in the Appendix. The results of both test programs are consistent. The soils underlying the site are very dense, fine till and are deep to groundwater in most areas outside of the wetlands. This testing program also determined that Stormwater

Basin B, can be constructed as designed to accommodate the required volume and provide wetland conditions, without an adverse impact on the nearby portions of Wetland 1.

12.0 SUMMARY AND CONCLUSIONS

Environmental Planning Services was retained to assist in the development of an environmentally sound Master Plan for a ±44 acre assemblage of parcels in Branford, CT. The wetland boundaries were flagged in the field in 2014. Biological, soils, hydrologic, and historical data were collected in 2014 and 2015. We reviewed alternative Master Plans to identify the layout that avoided impacts to wetlands and watercourses, and minimized those that could not be avoided.

The site is bounded by East Industrial Road, Leetes Island Road and East Main Street (Route 1) and is surrounded by existing high intensity commercial and light industrial land uses. The total area of wetlands and watercourses at the site is ±5.13 acres, in six discrete wetland units, ranging in size from 0.02 acres to 3.83 acres. All of the wetlands and watercourses have been subject to long-term alteration due to agricultural, earth excavation, drainage, and development activities on and adjacent to the site. Due to the lack of ecological integrity and connectivity, the functions and values the wetlands and watercourses provide are limited. Wetland 1, the largest and most significant at the site contains two man-made impoundments and an intermittent watercourse that drains to a closed drainage system. Wetlands 2 and 3 have been isolated by the earthwork and development along East Industrial and Leetes Island Road. Wetland 4 is a small, isolated, steep sided excavation that intercepts the water table. Wetland 4 discharges to the closed drainage system on an abutting developed parcel. Wetland 5 is a very small, isolated depression with a very short hydroperiod. Wetland 6 is an excavated drainage ditch that was installed to intercept drainage from the north and direct it around developable portions of the site abutting East Industrial Road.

The Master Plan that was approved by the Branford Planning and Zoning Commission on July 9, 2015 requires unavoidable impacts to Wetlands 1, 5, and 6, totaling 3,468 sq. ft., in order to develop the Costco parcel. These impacts, which are associated with road crossings to obtain safe access and internal circulation, have been minimized to the maximum extent practical and will be mitigated by creation of 9,900 square feet of new wetlands, and enhancement of 2,650 square feet of existing wetlands. Development of the 595 parcel requires a single wetland crossing, affecting 1,492 square feet of Wetland 6. This impact has also been minimized to the maximum extent practical and will be mitigated by enhancement of 9,500 square feet of degraded wetland.

The plans also include enhancement of 31,300 square feet adjacent to the existing wetlands by removal of non-native invasive species and replacement with low maintenance native herbs, shrubs, and trees. All eight stormwater management areas have also been designed to provide diverse wetland and non-wetland habitat, totaling 150,000 square feet. The fine grading and revegetation of the wetland mitigation areas, the areas adjacent to the wetlands, and stormwater management basins, will all be under the direction of a wetland scientist. The total area subject to these additional conservation measures is ±4.16 acres.

Detailed erosion and sediment control plans and stormwater management plans have been developed that allow development of the entire Master Plan in three coordinated, but independent phases. There will be no increase in the peak rate of discharge from the site during any of the design storms. A stormwater treatment train has been provided. Multiple secondary measures and primary treatment in extended wetland detention basins will provide a very high level of attenuation of all stormwater-related contaminants. In our professional opinion, there will be no adverse impacts on wetlands or watercourses at or downstream of the site.

13.0 REFERENCES

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Klemens, M.W. 2000. Amphibians and reptiles of Connecticut, a checklist with notes on conservation status, identification and distribution. CT Department of Environmental Protection, bulletin 32.

Mitsch, W.J. and Gosselink, J.G. 2007. Wetlands, fourth edition. John Wiley and Sons, Inc.

U.S. Army Corp of Engineers. 1995. The Highway Methodology Workbook – Wetland Functions and Values: A Descriptive Approach.

APPENDICES

(1) Figures 1-2

(2) Historical aerial photographs

(3) Property Access Photographs

(4) Habitat Photographs

(5) Water Quality Testing Results

(6) Soil Test Pit Data

(7) Project Alternatives

FIGURES 1 and 2

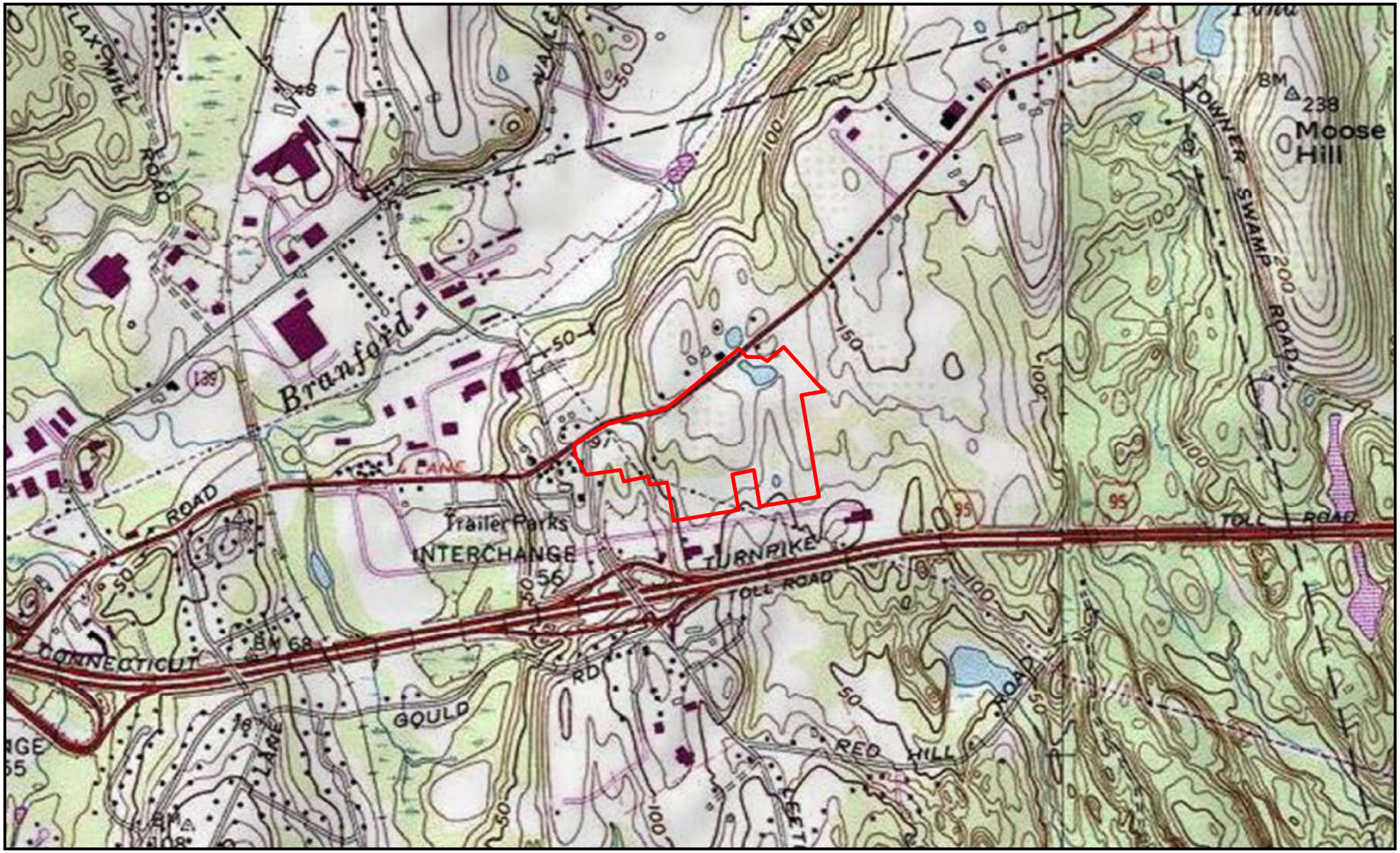

FIGURE 1
LOCATION MAP
East Industrial Road
Branford

Legend

BOUNDARY

Map Description
USGS topographic map illustrating the site boundary, This map is intended for illustrative purposes and contains no authoritative data.

SCALE

0 300 600 1,200 Feet

N

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August 2015

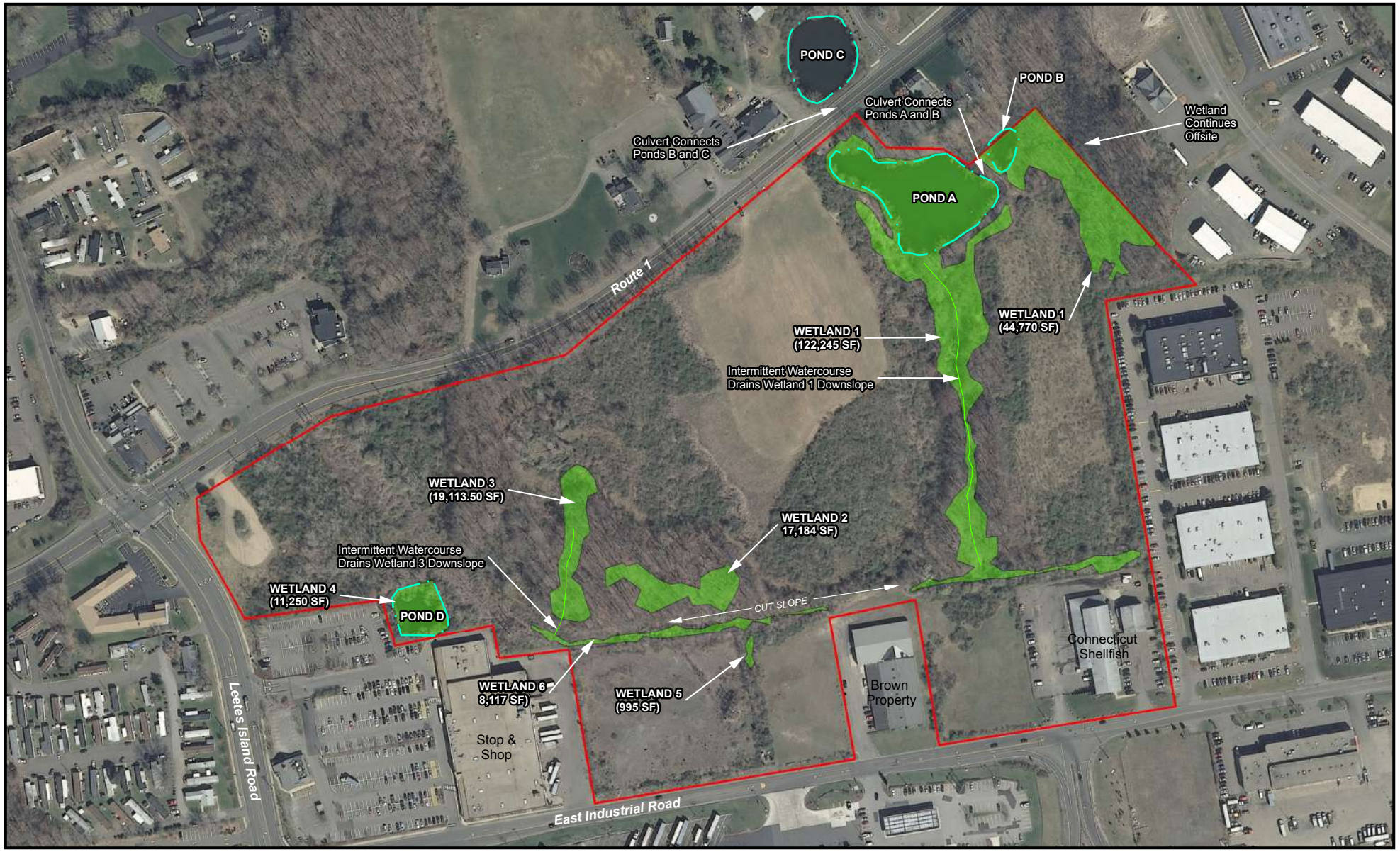

FIGURE 2
AERIAL MAP
East Industrial Road
Branford

Legend

- BOUNDARY
- PONDS
- WETLANDS
- INTERMITTENT STREAM

Map Description
Aerial photograph (USGS, 2012) illustrating the site boundary, wetlands 1 though 5 and Ponds A through C. Wetlands georeferenced from site survey prepared by BL Companies. This map is intended for illustrative purposes and contains no authoritative data.

SCALE
0 75 150 300 Feet

N

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September 2015

HISTORIC AERIAL PHOTOGRAPHS

HISTORIC AERIAL
1934
East Industrial Road
Branford

Legend

SITE BOUNDARY

Map Description
1934 aerial photograph source UCONN MAGIC. This map is intended for illustrative purposes and contains no authoritative data.

SCALE

0 150 300 600 Feet

N

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Prepared July 2015

HISTORIC AERIAL
1951
East Industrial Road
Branford

Legend

SITE BOUNDARY

Map Description
1951 aerial photograph source CT State Library. This map is intended for illustrative purposes and contains no authoritative data.

SCALE
0 150 300 600 Feet

N

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Prepared July 2015

HISTORIC AERIAL
1965
East Industrial Road
Branford

Legend

SITE BOUNDARY

Map Description
1965 aerial photograph source CT State Library. This map is intended for illustrative purposes and contains no authoritative data.

SCALE

0 150 300 600 Feet

N

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Prepared July 2015

HISTORIC AERIAL
1970
East Industrial Road
Branford

Legend

SITE BOUNDARY

Map Description
1970 aerial photograph source CT State Library. This map is intended for illustrative purposes and contains no authoritative data.

SCALE
0 150 300 600 Feet

N

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Prepared July 2015

HISTORIC AERIAL
1986
East Industrial Road
Branford

Legend

SITE BOUNDARY

Map Description
1986 aerial photograph source CT State Library. This map is intended for illustrative purposes and contains no authoritative data.

SCALE
0 150 300 600 Feet

N

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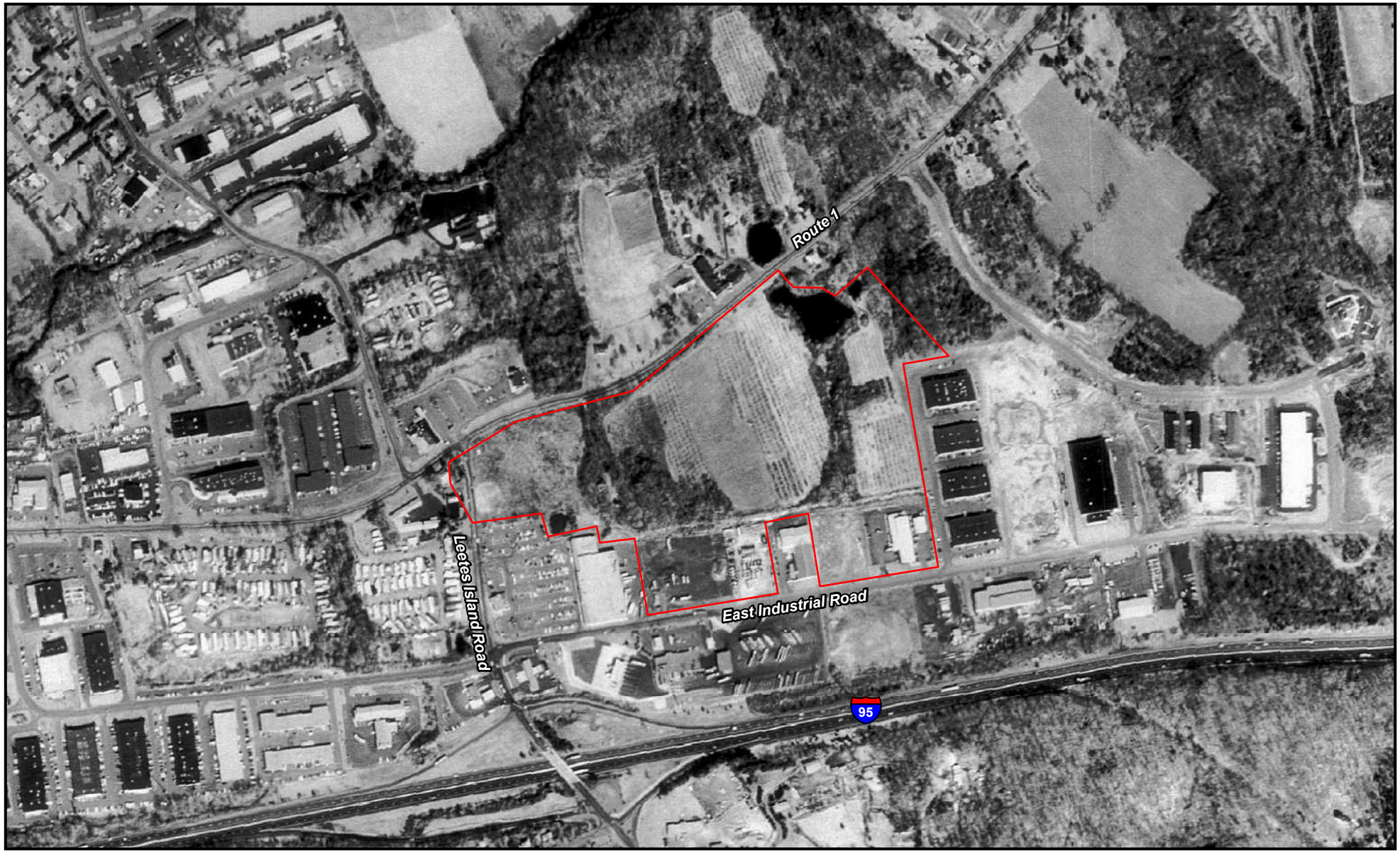
Prepared July 2015



HISTORIC AERIAL
1990
East Industrial Road
Branford

Legend

SITE BOUNDARY

Map Description
1990 aerial photograph source UCONN MAGIC. This map is intended for illustrative purposes and contains no authoritative data.

SCALE

0 150 300 600 Feet

N

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Prepared July 2015

HISTORIC AERIAL
2004
East Industrial Road
Branford

Legend

SITE BOUNDARY

Map Description
2004 aerial photograph source CT DEEP. This map is intended for illustrative purposes and contains no authoritative data.

SCALE
0 100 200 400 Feet

N

Environmental Planning Services
89 Belknap Road
West Hartford, CT 06117
860-236-1578
www.epsct.com

Prepared July 2015

PROPERTY ACCESS PHOTOS

Branford, Route 1 and East Industrial Road
Site Photos Taken Spring and Summer, 2014-2015

Photo 1: Looking east along Route 1 at northwest corner of property.

Photo 2: Central portion of property looking south across Route 1.

Branford, Route 1 and East Industrial Road
Site Photos Taken Spring and Summer, 2014-2015

Photo 3: Central portion of property looking west along Route 1.

Photo 4: View north from East Industrial Park Road.

HABITAT PHOTOS

Branford, Route 1 and East Industrial Road
Site Photos Taken Spring and Summer, 2014-2015

Photo 5: Mixed hardwood forest area in spring prior to leaf out, western side of Site.

Photo 6: Autumn olive infested field east side of Site in early spring.

Branford, Route 1 and East Industrial Road
Site Photos Taken Spring and Summer, 2014-2015

Photo 7: Wetland 2 in early spring prior to leaf-out, looking west.

Photo 8: Wetland 2 in early spring prior to leaf-out, looking east.

Branford, Route 1 and East Industrial Road
Site Photos Taken Spring and Summer, 2014-2015

Photo 9: crop field (looking east) after spring plowing and prior to corn planting.

Photo 10: Old field vegetation north of Pond D, eastern side of Site.

Branford, Route 1 and East Industrial Road
Site Photos Taken Spring and Summer, 2014-2015

Photo 11: Scarified area in northwest corner of Site.

Photo 12: photo showing autumn olive infested field; east side of Site.

Branford, Route 1 and East Industrial Road
Site Photos Taken Spring and Summer, 2014-2015

Photo 13: northeast portion of Wetland 1 showing dense ground and shrub cover vegetation.

Photo 14: Southeast corner of Wetland 1.

Branford, Route 1 and East Industrial Road
Site Photos Taken Spring and Summer, 2014-2015

Photo 15: Pond A in early spring.

Photo 16: Pond B in early spring.

Photo 17: Pond C looking north.

Photo 18: Pond D (Wetland 4) looking south towards Stop & Shop Supermarket.

Branford, Route 1 and East Industrial Road
Site Photos Taken Spring and Summer, 2014-2015

Photo 19: Wetland 1 southeast of Pond B.

Photo 20: Area of Wetland 1 where wood frog were observed breeding in 2014.

WATER QUALITY TESTING RESULTS

1005 BOSTON POST ROAD
MADISON, CT 06443

ENVIRONMENTAL
CONSULTING LABORATORIES, INC.

CT TOLL-FREE
1-800-246-9624 / 203-245-0568
Fax 203-318-0830
Connecticut Certification PH-0535

Report of Analysis

Name: Enviornmental Planning Services
89 Belknap Rd.
West Hartford, CT 06110
Attn: Michael Klein

Sample Date: 6/10/2014
Receipt Date: 6/10/2014
Report Date: 6/19/2014
Sample Site: Pond A1

Sample ID#: 93847
Sample Type: Water
Sample Source: Route 1 - Branford
Sampler: Client

Parameter	Sample Result	Units	Method	MDL	Analysis Date	Analyst
Chemical						
Alkalinity	22.7	mg/L	SM2320-B	20	6/12/2014	KC
Ammonia as N	0.30	mg/L	ASTM D6919-03	0.05	6/18/2014	KC
Dissolved Oxygen	5.25	mg/L	SM4500-0-G	0.1	6/10/2014	JB
Nitrate as N	0.34	mg/L	EPA300.0	0.1	6/12/2014	JB
Nitrite as N	ND	mg/L	353.2	0.01	6/10/2014	DB
Phosphorous -Total as P	0.05	mg/L	EPA 200.7	0.04	6/17/2014	JM
TKN as N	1.08	mg/L	4500NorgC	0.5	6/13/2014	KC
Total Nitrogen as N	1.42	mg/L	CALC	1	6/19/2014	KC
Total Suspended Solids	3.00	mg/L	SM2540D	1	6/16/2014	JB
Physical						
PH	6.86	pH	EPA 150.2	1	6/10/2014	DB

DAVID BARRIS - LABORATORY DIRECTOR

ND = Not Detected

1005 BOSTON POST ROAD
MADISON, CT 06443

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Report of Analysis

Name: Enviornmental Planning Services
89 Belknap Rd.
West Hartford, CT 06110
Attn: Michael Klein

Sample Date: 6/10/2014
Receipt Date: 6/10/2014
Report Date: 6/19/2014
Sample Site: Pond A2

Sample ID#: 93848
Sample Type: Water
Sample Source: Route 1 - Branford
Sampler: Client

Parameter	Sample Result	Units	Method	MDL	Analysis Date	Analyst
Chemical						
Alkalinity	24.0	mg/L	SM2320-B	20	6/12/2014	KC
Ammonia as N	0.29	mg/L	ASTM D6919-03	0.05	6/18/2014	KC
Dissolved Oxygen	3.94	mg/L	SM4500-0-G	0.1	6/10/2014	JB
Nitrate as N	<0.10	mg/L	EPA300.0	0.1	6/12/2014	DB
Nitrite as N	ND	mg/L	353.2	0.01	6/10/2014	DB
Phosphorous -Total as P	0.04	mg/L	EPA 200.7	0.04	6/17/2014	JM
TKN as N	1.08	mg/L	4500NorgC	0.5	6/13/2014	KC
Total Nitrogen as N	1.08	mg/L	CALC	1	6/19/2014	KC
Total Suspended Solids	6.00	mg/L	SM2540D	1	6/16/2014	JB
Physical						
PH	6.85	pH	EPA 150.2	1	6/10/2014	DB

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Report of Analysis

Name: Enviornmental Planning Services
89 Belknap Rd.
West Hartford, CT 06110
Attn: Michael Klein

Sample Date: 6/10/2014
Receipt Date: 6/10/2014
Report Date: 6/19/2014
Sample Site: Pond B1

Sample ID#: 93849
Sample Type: Water
Sample Source: Route 1 - Branford
Sampler: Client

Parameter	Sample Result	Units	Method	MDL	Analysis Date	Analyst
Chemical						
Alkalinity	<20.0	mg/L	SM2320-B	20	6/12/2014	KC
Ammonia as N	0.46	mg/L	ASTM D6919-03	0.05	6/18/2014	KC
Dissolved Oxygen	8.47	mg/L	SM4500-0-G	0.1	6/10/2014	JB
Nitrate as N	0.21	mg/L	EPA300.0	0.1	6/12/2014	JB
Nitrite as N	ND	mg/L	353.2	0.01	6/10/2014	DB
Phosphorous -Total as P	0.08	mg/L	EPA 200.7	0.04	6/17/2014	JM
TKN as N	2.39	mg/L	4500NorgC	0.5	6/13/2014	KC
Total Nitrogen as N	2.60	mg/L	CALC	1	6/19/2014	KC
Total Suspended Solids	7.00	mg/L	SM2540D	1	6/16/2014	JB
Physical						
PH	6.70	pH	EPA 150.2	1	6/10/2014	DB

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Report of Analysis

Name: Enviornmental Planning Services
89 Belknap Rd.
West Hartford, CT 06110
Attn: Michael Klein

Sample Date: 6/10/2014
Receipt Date: 6/10/2014
Report Date: 6/19/2014
Sample Site: Pond C1

Sample ID#: 93850
Sample Type: Water
Sample Source: Route 1 - Branford
Sampler: Client

Parameter	Sample Result	Units	Method	MDL	Analysis Date	Analyst
Chemical						
Alkalinity	23.3	mg/L	SM2320-B	20	6/12/2014	KC
Ammonia as N	0.09	mg/L	ASTM D6919-03	0.05	6/18/2014	KC
Dissolved Oxygen	9.24	mg/L	SM4500-0-G	0.1	6/10/2014	JB
Nitrate as N	0.42	mg/L	EPA300.0	0.1	6/12/2014	JB
Nitrite as N	ND	mg/L	353.2	0.01	6/10/2014	DB
Phosphorous -Total as P	0.10	mg/L	EPA 200.7	0.04	6/17/2014	JM
TKN as N	0.94	mg/L	4500NorgC	0.5	6/13/2014	KC
Total Nitrogen as N	1.36	mg/L	CALC	1	6/19/2014	KC
Total Suspended Solids	6.00	mg/L	SM2540D	1	6/16/2014	JB
Physical						
PH	7.76	pH	EPA 150.2	1	6/10/2014	DB

DAVID BARRIS - LABORATORY DIRECTOR

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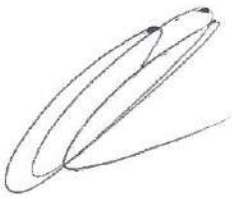
Report of Analysis

Name: Enviornmental Planning Services
89 Belknap Rd.
West Hartford, CT 06110
Attn: Michael Klein

Sample Date: 6/10/2014
Receipt Date: 6/10/2014
Report Date: 6/19/2014
Sample Site: Pond C2

Sample ID#: 93851
Sample Type: Water
Sample Source: Route 1 - Branford
Sampler: Client

Parameter	Sample Result	Units	Method	MDL	Analysis Date	Analyst
Chemical						
Alkalinity	24.4	mg/L	SM2320-B	20	6/12/2014	KC
Ammonia as N	0.11	mg/L	ASTM D6919-03	0.05	6/18/2014	KC
Dissolved Oxygen	5.84	mg/L	SM4500-0-G	0.1	6/10/2014	JB
Nitrate as N	0.52	mg/L	EPA300.0	0.1	6/12/2014	JB
Nitrite as N	ND	mg/L	353.2	0.01	6/10/2014	DB
Phosphorous -Total as P	0.23	mg/L	EPA 200.7	0.04	6/17/2014	JM
TKN as N	3.31	mg/L	4500NorgC	0.5	6/13/2014	KC
Total Nitrogen as N	3.83	mg/L	CALC	1	6/19/2014	KC
Total Suspended Solids	44.0	mg/L	SM2540D	1	6/16/2014	JB
Physical						
PH	6.98	pH	EPA 150.2	1	6/10/2014	DB



DAVID BARRIS - LABORATORY DIRECTOR

ND = Not Detected

1005 BOSTON POST ROAD
MADISON, CT 06443

ENVIRONMENTAL
CONSULTING LABORATORIES, INC.

CT TOLL-FREE
1-800-246-9624 / 203-245-0568
Fax 203-318-0830
Connecticut Certification PH-0535

Report of Analysis

Name: Enviornmental Planning Services
89 Belknap Rd.
West Hartford, CT 06110
Attn: Michael Klein

Sample Date: 7/22/2015
Receipt Date: 7/22/2015
Report Date: 7/29/2015
Sample Site: Pond D

Sample ID#: 100047
Sample Type: Water
Sample Source: Route 1 - Branford
Sampler: Client

Parameter	Sample Result	Units	Method	MDL	Analysis Date	Analyst
Chemical						
Alkalinity	28.3	mg/L	SM2320-B	20	7/22/2015	KC
Ammonia as N	0.28	mg/L	ASTM D6919-03	0.05	7/23/2015	KC
Dissolved Oxygen	2.60	mg/L	SM4500-0-G	0.1	7/22/2015	KC
Nitrate as N	ND	mg/L	EPA300.0	0.1	7/22/2015	JB
Nitrite as N	ND	mg/L	EPA300.0	0.01	7/22/2015	JB
Phosphorous -Total as P	0.10	mg/L	EPA 200.7	0.04	7/28/2015	JM
TKN as N	3.16	mg/L	4500NorgC	0.5	7/28/2015	KC
Total Nitrogen as N	3.16	mg/L	CALC	1	7/29/2015	KC
Total Suspended Solids	29.0	mg/L	SM2540D	1	7/24/2015	JB
Physical						
PH	6.59	pH	EPA 150.2	1	7/22/2015	KC

DAVID HARRIS - LABORATORY DIRECTOR

ND = Not Detected

SOIL TEST PIT DATA

Branford COSTCO

Test Pit Data Collected 6-13, 17, 20-2014 by Environmental Planning Services Soil Scientist James Cowen

TP 100 collected on 6/17/14				
Depth	Matrix Color	Redoximorphic Features	Texture	Notes
0-12	7.5YR 3/3	None	fill	Soils friable
12-20	7.5YR 4/6	concentrations	Silt loam	Soils friable
20-32	2.5Y5/1	Large reduction @ 20”	Silt loam	compacted
32-46	10YR 2/2	None	Fine sandy loam	Buried A horizon
46				Refusal/large boulder or ledge
NOTES: Rooting depth 36”, **no groundwater**, soils moist but not saturated				
TP 101 collected on 6/17/14				
Depth	Matrix Color	Redoximorphic Features	Texture	Notes
0-3	10YR 2/2	None	Fine sandy loam	Soils friable
3-17	10YR 3/3	None	Fine sandy loam	Soils friable
17-32	10YR 5/4	Concentrations @ 24”	Fine sandy loam	Compact
32-44	7.5YR4/4 & 7/5YR3/4	None	Sandy loam	Cemented
44-81			Rotten Rock	
NOTES: Groundwater @ 44”, rooting depth 77”				

TP 102 collected on 6/20/14				
Depth	Matrix Color	Redoximorphic Features	Texture	Notes
0-20	10YR3/3	None	Fine sandy loam	Soils moist
20	7.5YR 5/6	None	sandy loam	Refusal @ 20”
NOTES: Soils moist, **no groundwater**				
TP 103A collected on 6/13/14				
Depth	Matrix Color	Redoximorphic Features	Texture	Notes
0-5	7.5YR 4/3	None	Sandy loam	Soils moist
5-16	7.5YR 5/8	None	Sandy loam	Soils moist
16-34	7.5YR 5/8	None	Rotten rock	Soils moist, Refusal @ 34”
34				Refusal
NOTES: Soils moist, **no groundwater**				
TP 103B collected on 6/13/14				
Depth	Matrix Color	Redoximorphic Features	Texture	Notes
0-7	7.5YR 4/3	None	Sandy loam	
7-58	7.5YR 4/4	None	Sandy loam	Compact layer @ 25”
58-70			Rotten rock & rock	
NOTES: Soils moist not saturated				

TP 104 collected on 6/13/14				
Depth	Matrix Color	Redoximorphic Features	Texture	Notes
0-6	7.5YR3/2	None	Fine sandy loam	
0-56	7.5YR 4/4	None	Sandy loam	Stony, compact @ 24”
56-84+	7.5YR4/3	Small concentrations	Silt loam	Rooting depth @ 56”
NOTES: Soils moist not saturated				

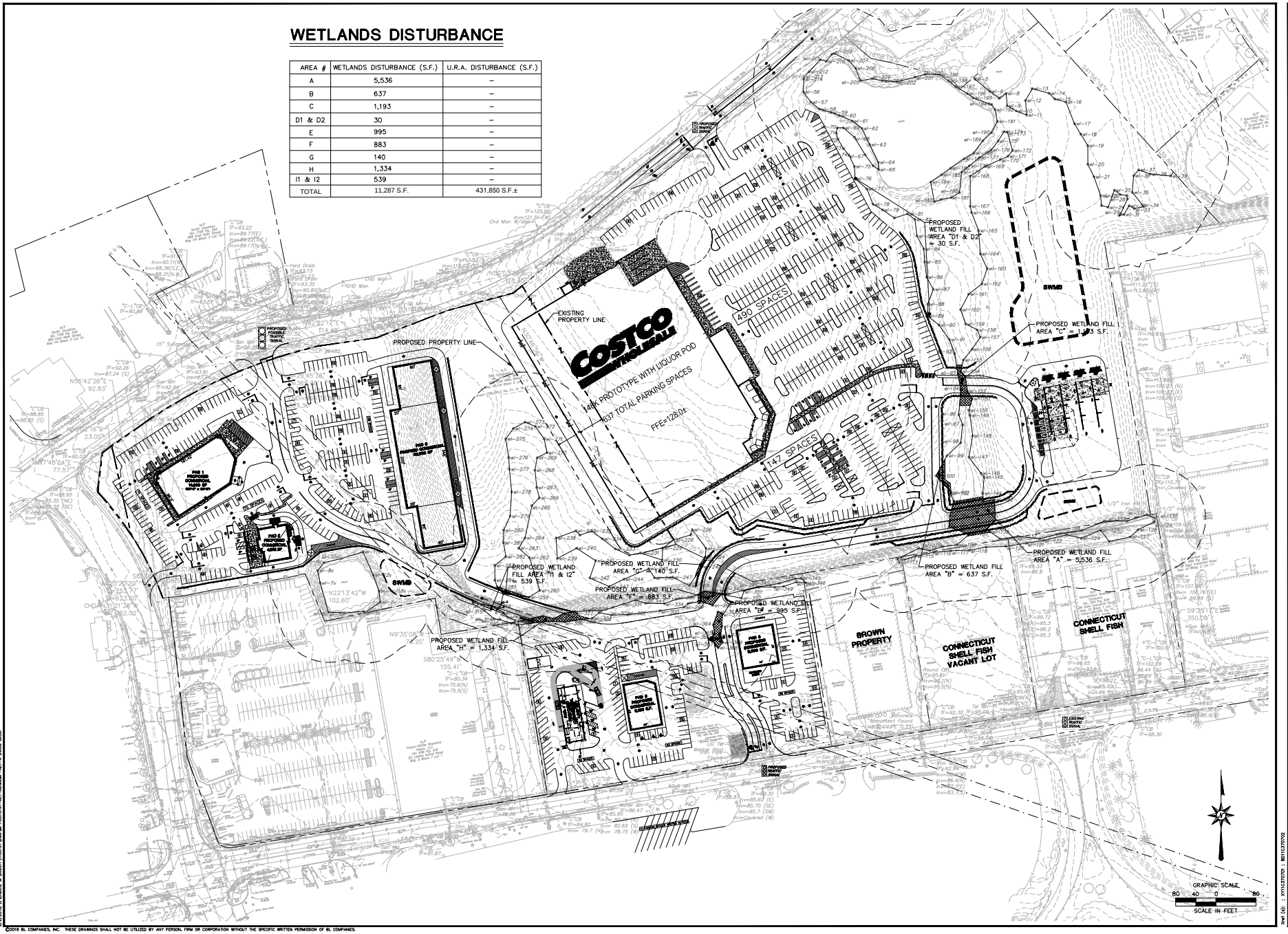
TP 105 collected on 6/17/14				
Depth	Matrix Color	Redoximorphic Features	Texture	Notes
0-8	10YR 4/2	None	Very fine sandy loam	Soils friable
8-28	7.5YR 4/6	None	Fine sandy loam	Soils friable
28-35	7.5YR 7/2	Abundant Concentrations	Rotten rock & sandy loam	Compact
58-84	10YR8/1	Concentrations	Silt loam	Compact, platy structure
NOTES: Groundwater @ 40”, rooting depth 34”				

TP 106 collected on 6/13/14				
Depth	Matrix Color	Redoximorphic Features	Texture	Notes
0-8	7.5YR 3/2	None	Very fine sandy loam	Soils friable, possibly soils excavated from pond
8-16	7.5YR5/4	Concentrations	Silt loam	
16-24	7.5YR 6/3	Concentrations	Silt loam	
24-90	7.5YR4/4	Concentrations	Silt loam	
NOTES: **Groundwater @ 24",** rooting depth 24"				
TP 107 collected on 6/13/14				
Depth	Matrix Color	Redoximorphic Features	Texture	Notes
0-10	7.5YR 3/3	None	Sandy loam	Soils friable
10-16	7.5YR 4/3	None	Sandy loam	Soils friable
16-108	7.5YR3/3	Concentrations, Reductions begin @ 45"	Sandy loam	Compacted @ 45"
NOTES: Rooting depth 20", **no groundwater**, soils moist but not saturated				

PROJECT ALTERNATIVES

WETLANDS DISTURBANCE

AREA #	WETLANDS DISTURBANCE (S.F.)	U.R.A. DISTURBANCE (S.F.)
A	5,536	–
B	637	–
C	1,193	–
D1 & D2	30	–
E	995	–
F	883	–
G	140	–
H	1,334	–
I1 & I2	539	–
TOTAL	11,287 S.F.	431,850 S.F.±



BL Companies
ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING

355 Research Parkway
Meriden, CT 06450
(203) 630-1406
(203) 630-2615 Fax

PROPOSED DEVELOPMENT

569 & 573 EAST MAIN STREET & 20 EAST INDUSTRIAL ROAD
BRANFORD, CONNECTICUT

NOT FOR CONSTRUCTION- FOR PERMITTING PURPOSES ONLY

REVISIONS
No. Date Desc.

Designed	X.X.X.
Drawn	T.A.M./E.L.Z.
Checked	
Approved	
Scale	1"=80'
Project No.	11C3707
Date	08/11/15

CAD File: MP11C3707701–ALT–A

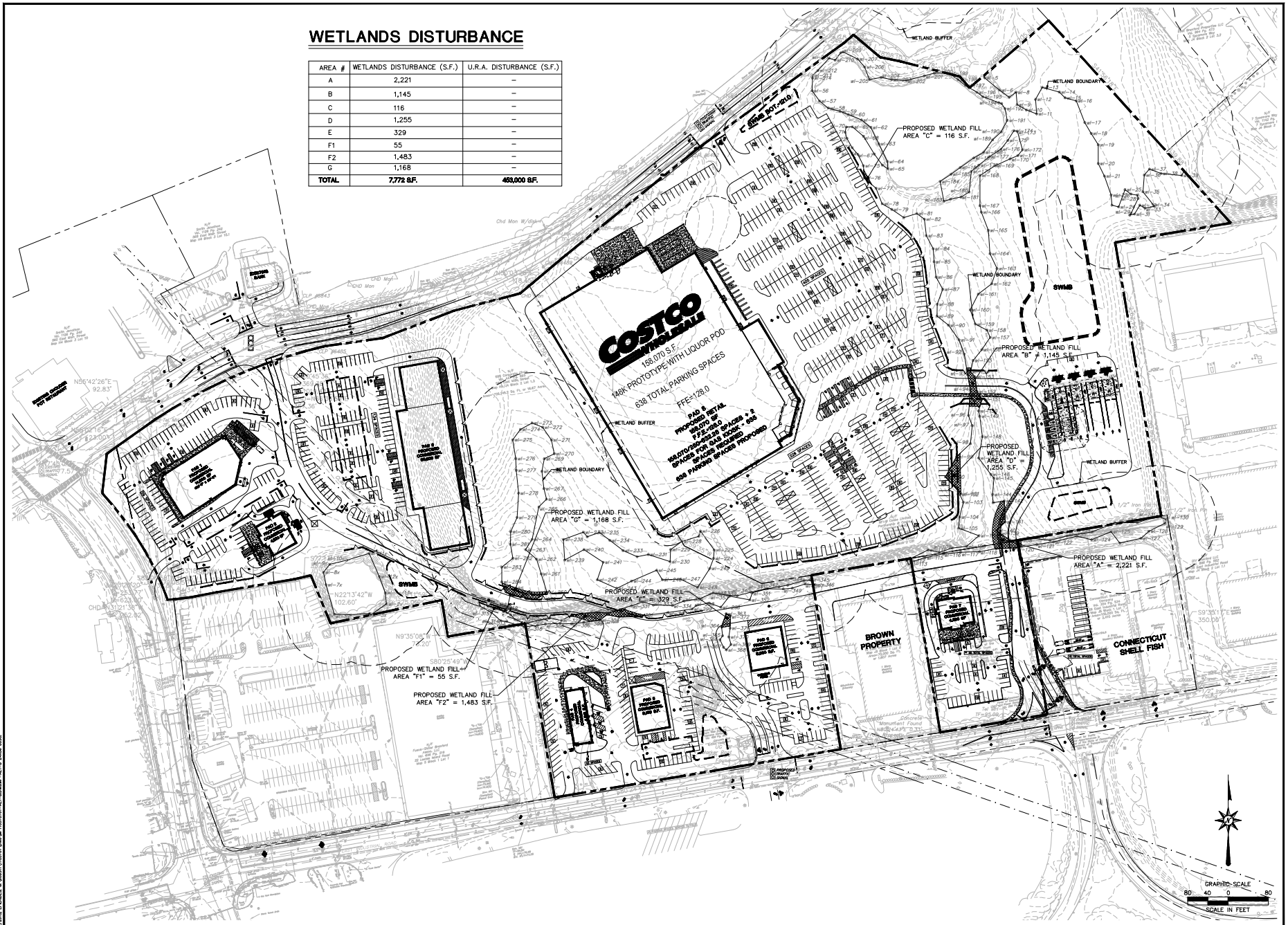
Title
MASTER PLAN - ALTERNATIVE A

Sheet No.
MP-ALT-A

Ref (s): I:\11C3707\01 - BD\11C3707\02

WETLANDS DISTURBANCE

AREA #	WETLANDS DISTURBANCE (S.F.)	U.R.A. DISTURBANCE (S.F.)
A	2,221	–
B	1,145	–
C	116	–
D	1,255	–
E	329	–
F1	55	–
F2	1,483	–
G	1,168	–
TOTAL	**7,772 S.F.**	**483,000 S.F.**



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ENVIRONMENTAL
LAND SURVEYING

355 Research Parkway
Meriden, CT 06450
(203) 630-1406
(203) 630-2615 Fax

PROPOSED DEVELOPMENT

569 & 573 EAST MAIN STREET & 20 EAST INDUSTRIAL ROAD
BRANFORD, CONNECTICUT

NOT FOR CONSTRUCTION- FOR PERMITTING PURPOSES ONLY

REVISIONS
No. Date Desc.

Designed	J.O.M.
Drawn	E.C.P.
Checked	
Approved	
Scale	1"=80'
Project No.	11C3707
Date	08/11/15

CAD File: MP11C370701-ALT-B

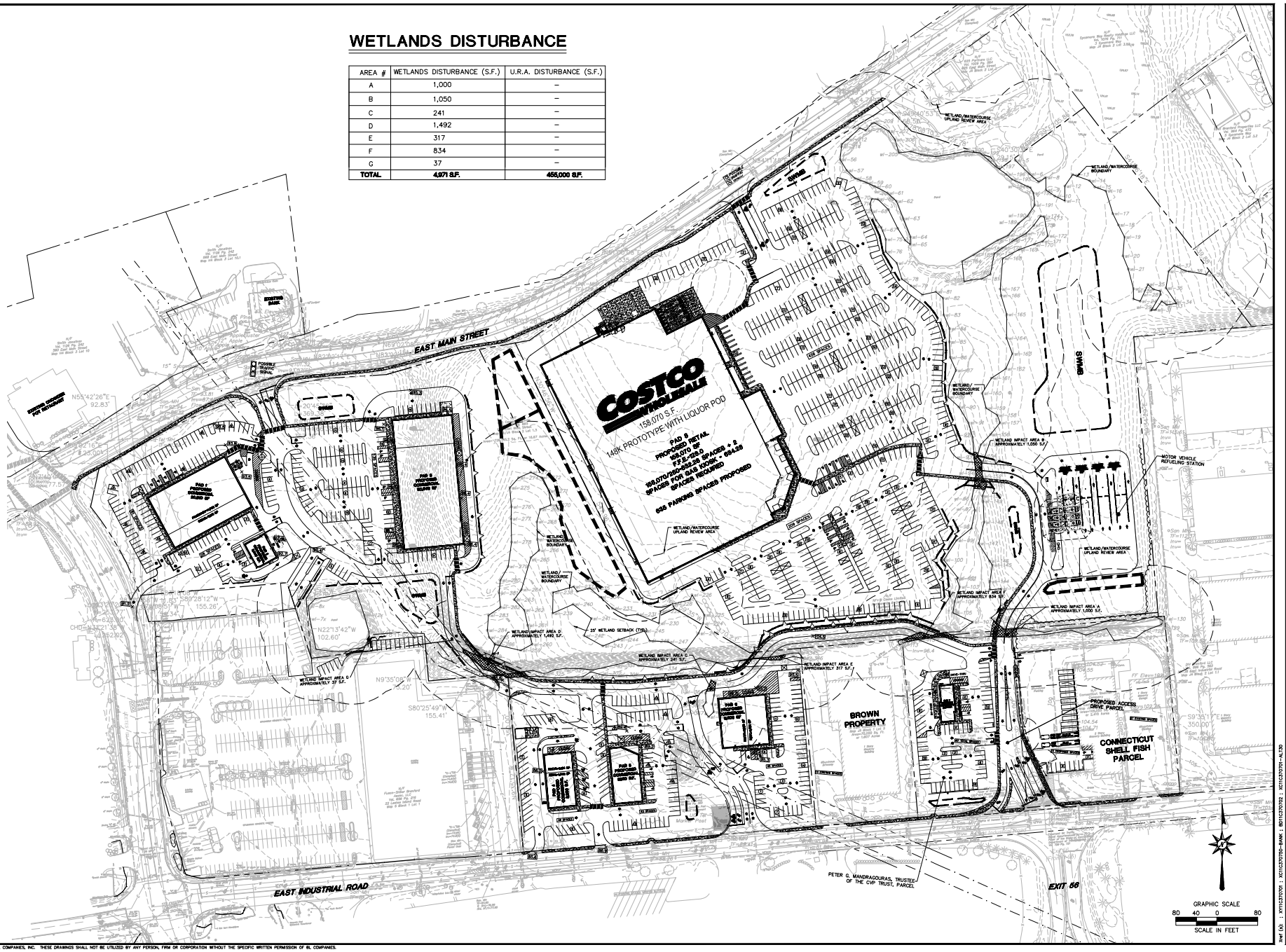
Title
MASTER PLAN - ALTERNATIVE B

Sheet No.
MP-ALT-B

Ref (s): I:\11C3707\01 ; I:\11C3707\02

WETLANDS DISTURBANCE

AREA #	WETLANDS DISTURBANCE (S.F.)	U.R.A. DISTURBANCE (S.F.)
A	1,000	–
B	1,050	–
C	241	–
D	1,492	–
E	317	–
F	834	–
G	37	–
TOTAL	**4,971 S.F.**	**455,000 S.F.**



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LAND SURVEYING

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Meriden, CT 06450
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(203) 630-2615 Fax

PROPOSED DEVELOPMENT

569 & 573 EAST MAIN STREET & 20 EAST INDUSTRIAL ROAD
BRANFORD, CONNECTICUT

NOT FOR CONSTRUCTION- FOR PERMITTING PURPOSES ONLY

REVISIONS
No. Date Desc.

Designed	J.G.M.
Drawn	E.C.P.
Checked	
Approved	
Scale	1"=80'
Project No.	11C3707
Date	08/11/15

CAD File: MP11C370701-ALT-C

Title
MASTER PLAN - ALTERNATIVE C

Sheet No.
MP-ALT-C

Ref (s): X:\11C3707\01 - BASE\11C370701-ALT.DWG ; X:\11C3707\05-BASE\11C370702 ; X:\11C3707\01 - BASE\11C370701-ALT.DWG