



JOSEPH R. THEROUX

~ CERTIFIED FORESTER / SOIL SCIENTIST ~
PHONE 860-428-7992 ~ FAX 860-376-6842
426 SHETUCKET TURNPIKE, VOLUNTOWN, CT. 06384
FORESTRY SERVICES ~ WETLAND IMPACT ASSESSMENTS
WETLAND DELINEATIONS AND PERMITTING ~ E&S/SITE MONITORING
WETLAND FUNCTION & VALUE ASSESSMENTS

5/1/2023

Kristen Clarke P.E.
English Harbour Capital Partners LLC
20 Risingwood Drive
Bow, NH. 03304

Attn: Kristen Clarke

Re: Wetland function & value and impact assessment report for the proposed site development for the Nehantic Highlands Subdivision, Holmes & Upper Walnut Hill Roads, East Lyme, Connecticut.

Dear Ms. Clarke,

At your request, I have reviewed the site plan by May Engineering LLC dated April 28, 2023 for the proposed 5 lot subdivision and I inspected the above referenced property for the purposes of assessing the wetland functions and values and potential impacts to the inland wetlands and watercourses in proximity to the proposed development.

The wetland delineation and function and value assessment was conducted on June 28, 2022 and 5/1/2023.

Existing Conditions

The property totals 12.4 acres in size and is located at the intersection of Holmes and Upper Walnut Hill Roads in East Lyme, CT.

The majority of the property is comprised of forested uplands with nearly level to moderate sloping topography.

Upland Review Areas

The 300-foot upland review areas adjacent to the inland wetlands and watercourses are vegetated in the overstory with mixed hardwoods in the sawtimber and polewood size classes. Species observed included: red & sugar maple, black birch, tulip poplar, scarlet oak, and black cherry.

Ex "G"

The diversely vegetated understories are comprised of polewood and saplings in these species as well as shrub species such as ironwood, spicebush, and winterberry. Vine species included poison ivy and round leaf green briar.

Herbaceous vegetation observed included numerous fern species, black raspberry, and Canada mayflower.

Invasives noted included Japanese barberry and multiflora rose.

Wetlands

Three separate palustrine forested wetlands were delineated, one in the northeast portion of the property and the other two are adjacent to Holmes Road.

The northeast wetland is associated with intermittent watercourses, which flow to the north under Holmes Road through two separate culvert pipes.

The seasonally high water tables in these wetlands break out and create shallow ponded areas in the numerous depressions in the topography. These areas drain to the north either sheet flowing downslope or they form small narrow intermittent watercourses.

The watercourses are bordered on their eastern and western sides by the large forested wetlands which contribute hydrology to the watercourses. The gently sloping topography adjacent to the stream channels allow flows from groundwater breakout and surface flows during significant storm events to enter the watercourses.

The majority of the forested wetlands are vegetated with red maple, white ash, and elm in the overstory, and in the understory saplings and typical wetland shrub species such as highbush blueberry, arrowwood, sweet pepperbush, multiflora rose, Japanese barberry, speckled alder, winterberry and spicebush. Other species included greenbrier, poison ivy and Virginia creeper.

Herbaceous vegetation included Canada mayflower, pioneer violet, sensitive, royal, lady & cinnamon ferns, sedges, rushes, skunk cabbage, jack- in- the- pulpit, jewelweed, various mosses and miscellaneous grasses.

Wildlife tracks/sign found or directly observed in and adjacent to the wetland/watercourse included mammals and bird species such as: white tailed deer, eastern coyote, red fox, raccoon, red tailed hawk, American crow, and numerous songbird species.

No amphibians were directly observed although undoubtedly, this wetland complex serves as habitat to numerous reptile and amphibian species.

The two other forested wetlands did not have any intermittent watercourses within their boundaries, however non-channelized surface flows were noted from groundwater breakout and surface runoff from significant rain events.

These forested wetlands are vegetated with red & sugar maples, white ash, white oak, and tulip poplar in the overstory, and in the understory saplings and typical wetland shrub

species such as ironwood, red osier, arrowwood, multiflora rose, Japanese barberry, speckled alder, winterberry and spicebush. Other species included greenbrier, poison ivy and Virginia creeper.

Herbaceous vegetation included Canada mayflower, sensitive, lady & cinnamon ferns, rushes, skunk cabbage, jack-in-the-pulpit, jewelweed, various mosses and miscellaneous grasses.

Wetland Functions and Values

The forested wetlands and watercourse(s), were inspected to determine wetland functions and values utilizing the Army Corps. Of Engineers methodology as outlined in "The Highway Methodology Workbook Supplement". This methodology recognizes eight categories of wetland functions and six categories of wetland values.

The 8 wetland functions include: groundwater recharge/discharge, floodflow alteration/storage, fish/shellfish habitat, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, sediment/shoreline stabilization and wildlife habitat.

The 6 wetland values include: recreational value, educational/scientific value, uniqueness/heritage value, visual quality/aesthetics, threatened/endangered species habitat and marine fish & shellfish habitat.

Palustrine forested wetlands & watercourse functions:

For the purposes of this report, as the three separate wetlands are very similar in their nature and characteristics, the wetland functions and values assessed apply to all three wetlands.

The following is a list of the wetland *functions* exhibited by these wetlands and watercourses and their rationale/qualifiers:

Ground water recharge/discharge: The wetlands are associated with intermittent watercourses; signs of groundwater recharge and discharge are present and the quality of the water associated with the wetlands is high.

Sediment/toxicant retention: Mineral, fine grained and organic soils are present in the wetlands, the wetland edge is broad and intermittently anerobic. (The lack of oxygen allows for the transformation and binding of toxicants). The wetlands are associated with intermittent watercourses, and no indicators of erosive forces or high water velocities are present.

Nutrient removal/retention: The wetlands are large relative to the size of its watershed, (their size allows for some storage/retention capacity), an overall potential for nutrient

removal and retention exists in the wetlands, and the wetlands are saturated for most of the season creating anerobic conditions. The slowly drained mineral and organic soils which are present in these anerobic conditions harbor nitrogen fixing bacteria which provide the opportunity for nutrient attenuation. The dense herbaceous vegetation utilizes nitrogen, phosphorus and potassium and water moves slowly through the wetlands which increases the available period of time for removal and retention.

Production export: Wildlife food sources grow within the wetlands which provide food for wildlife and humans. Detritus development is present creating fertile organic soils. There is evidence of wildlife use in the wetlands and high vegetation density is present providing food and cover for wildlife. The wetlands contain flowering plants that are used by nectar gathering insects, and indications of export are present such as deer browse.

Sediment & shoreline stabilization: Roots from herbaceous grasses and plants, shrub species and trees found in these wetlands bind and stabilize soils which helps prevent erosion from stream flows along edges of watercourses & wetlands.

Wildlife habitat: The water quality associated with the wetlands and watercourses is high because the wetland is not fragmented or polluted by development. The wetland is contiguous with other wetland systems creating an overall larger wetland habitat area. This also allows wildlife overland access to other wetlands without intrusive development encroachments. Wildlife food sources are present throughout the wetlands. The dominant wetland class includes a wooded swamp which provides a diversity of habitat and cover. Numerous animal signs such as tracks and scat were observed. Wildlife habitat is the primary function of these wetlands.

Wetland *functions* not present:

The forested wetlands and intermittent watercourses did not exhibit the wetland functions of floodflow alteration, or fish habitat due to the lack of significant flood storage capacity, the presence of the watercourses transporting potential flood flows and a lack of significant deep water habitat areas capable of sustaining fish.

Palustrine forested wetlands & watercourse values

The following wetland *values* were exhibited by this wetland/watercourse:

Educational/scientific value: Little disturbance has occurred within the wetlands, the wetlands potentially contain state listed species of concern and are considered valuable wildlife habitat.

Endangered species habitat: The western half of the property is shown within the shaded area on the natural diversity database indicating potential habitat and there are potential listed species of concern present.

Wetland values not present:

This wetland did not exhibit the wetland values of recreation, uniqueness/heritage value, visual quality/aesthetics value, or fish and shellfish habitat (marine). These values were not exhibited due to the lack of public access, fishing or hunting opportunities. There are no historic features associated with the wetland, there is a lack of open scenic views or multiple wetland systems present.

Summary:

Overall, the wetland function and value assessment indicates that the wetlands exhibit six significant wetland functions: groundwater recharge/discharge, sediment/toxicant retention, nutrient removal/retention, production export, sediment & shoreline stabilization and wildlife habitat.

Two values were exhibited, educational value & endangered species habitat value.

Potential wetland impacts

The project plans and site were reviewed to assess the potential impacts to the wetlands and watercourses from the proposed development.

On this parcel, a 5-lot residential subdivision is proposed with 4 lots which are 2+ acres in size and one which is 4+ acres in size. Each lot includes a proposed residence with associated driveway, utilities, well and septic system.

Each lot proposes a rain garden to collect and infiltrate roof runoff and lots 1 and 5 show sediment forebays and water quality berms to collect, attenuate and treat surface stormwater flows from driveway and surrounding area runoff.

Proposed E&S measures for each lot are shown as typical silt fencing.

The limits of clearing appear to be kept to a minimum, with each lot exhibiting approximately one-half acre cleared for each of the residences and yard areas.

To construct these features on each of the lots, no direct wetland disturbance is proposed. The closest disturbance to the wetlands occurs on lot #1 for the construction of the sediment forebay/water quality berm approximately 35 feet from the wetlands, and on lot #5 for the construction of the sediment forebay/water quality berm approximately 30 feet from the wetlands.

The site plan also depicts a 100-foot wetland setback line, and on both lots, #1 and #5, the clearing limits, portions of the driveways and the sediment forebays/water quality berms are shown within this zone.

Direct wetland impacts:

No direct wetland impacts are proposed with the design of the subdivision or will occur as a result of the construction of the residences and associated driveways, wells or septic systems. This is provided that the proposed clearing limits are held to, and the E&S measures are correctly implemented and maintained.

Potential indirect impacts:

The potential short-term impacts associated with the initial land clearing, stumping, top soil stripping and construction would include potential sediment discharges during significant storm events if the E&S measures breach on lots #1 and #5.

I would recommend that the E&S measures on these lots be upgraded to silt fencing backed by staked haybales in the areas where the clearing/disturbance is within 50 feet of the wetlands. I would also suggest that the E&S measures be inspected daily and after any significant rain events.

It is my opinion, provided that the E&S measures are correctly implemented and maintained throughout the project timeframe, the E&S inspections are conducted as proposed and no significant discharges of sediments reach the wetlands or watercourses, the disturbance associated with the construction adjacent to the wetlands will not significantly impact the wetlands or their existing functions or values due to erosion or sedimentation.

Once the disturbed areas are re-vegetated and stabilized, the well- to moderately well-drained soils will allow for good infiltration of storm water runoff both during and after construction.

The quick and permanent establishment of vegetation in the disturbed areas is crucial to the prevention of post-construction erosion.

The nearly level to gently sloping topography on the lots and gentle proposed slopes adjacent to the wetlands will help prevent erosion.

Wetland Hydrology

I see no direct or indirect impacts to the wetland/watercourse hydrology as a result of the proposed subdivision. The storm water quality basins are designed to attenuate, treat, infiltrate and discharge the treated stormwater.

The impervious surfaces of the paved driveways, roof areas and pervious surface infiltration will be an input to the existing hydrology, through some minor overland flow, as ground water recharge or as direct discharge during significant storm events. It is my professional opinion that these inputs will augment and improve the existing hydrology of the wetlands and watercourses. These added inputs will allow for increased seasonal inundation in depressed areas in the wetlands and will provide a better diversity in wildlife habitat as well.

Water Quality:

The only potential direct impact to water quality in the wetlands and watercourses would be due to the direct untreated discharge of stormwater.

The submitted stormwater drainage report states the sediment forebays which collect stormwater from lots #1, #2 and #5 are designed to reduce sediment loading by 90%, (This exceeds D.E.E.P. standards), and the water quality berms will attenuate discharge velocities.

The overall distances of the lawns and residences from the wetlands, coupled with the well-drained upland soils allowing for good infiltration of surface flows will also improve overall water quality by reducing suspended sediments.

Potential nutrient loads from lawn fertilizers will be insignificant due to the overall distance of the lawns from the wetlands, the dense upland shrub and herbaceous vegetation will aid in nutrient uptake, (as well as the vegetation in the wetlands), and nitrogen fixing bacteria found in the anerobic wetland soils.

I see no significant impacts to the water quality in the wetlands and watercourses, provided that the proposed rain gardens and sediment forebays/water quality berms are constructed as designed, and are inspected and maintained. The discharge points do not directly discharge into any intermittent watercourses, or adjacent wetlands. These limited discharges will enter uplands, and infiltrate in the well- drained soil types and/or travel as sheet flow eventually into the wetlands.

Water temperature impacts:

The proposed stormwater system is primarily designed to attenuate, hold and infiltrate stormwater into the water table. Discharges will only occur during significant storm events after the "first flush" of storm water is treated, and the discharge points do not directly discharge into any intermittent watercourses, or adjacent wetlands. The impervious surface areas are minimal and the limited discharges will enter uplands, and infiltrate in the well-drained soil types and/or travel as sheet flow into the wetlands.

For these reasons, I see no significant or adverse impacts to the existing water temperatures of the watercourses from the infiltration and discharge of stormwater from the site.

Adjacent Upland Wildlife Habitat Impacts:

The clearing of vegetation and development outside the 100-foot wetland setback depicted adjacent to the wetlands and watercourses will force wildlife into the vegetated corridor in and around the adjacent wetlands and watercourses, during and after the construction timeframe, and into other areas where the uplands are not disturbed.

The existing 100 foot and greater zones in and adjacent to the wetlands will serve as an adequate wildlife corridor and riparian zone.

Natural Diversity Database and State Species of Special Concern:

I have reviewed the letter from CT. D.E.E.P. dated 3/13/2023 regarding the review of the Natural Diversity Database.

This report indicated that there are State listed species, (Eastern box turtle, Spotted turtle, Eastern ribbon snake, Whip-poor-will), that may be influenced by activities within the proposed project area.

I would recommend adhering to the recommendations listed on pages 2 and 3 regarding exclusionary practices and timing of the land clearing phases of the project.

I would also recommend the posting of the wetland boundaries or a 50,75, or 100-foot buffer zone on lots #1 and #5, with permanent signage to help prevent future encroachments or cutting of vegetation. Signs are usually attached to trees, metal or pressure treated posts, at eye level, at an approximate spacing of 25 feet for good visibility.

In summary, I see no direct or adverse impacts to the existing wetlands, watercourses or their functions and values from the proposed project.

This is provided that the recommended erosion and sedimentation control features are implemented, maintained and monitored throughout the construction and post construction timeframe.

If you have any questions concerning the site assessment or this report, please feel free to contact me.

Sincerely,

Joseph R. Theroux

Joseph R. Theroux
Certified Forester and Soil Scientist
Member SSSSNE, SSSA