



- Soil & Wetland Studies
- Ecology • Application Reviews
- Listed Species Surveys • GPS
- Environmental Planning & Management
- Ecological Restoration & Habitat Mitigation
- Expert Testimony • Permitting

July 6, 2022

Town of Cromwell  
Cromwell Inland Wetlands & Watercourses Commission  
Town Hall  
41 West Street  
Cromwell, CT 06416

**RE: APPLICATION REVIEW - SUPPLEMENTAL**  
**“Proposed Warehouse Facility,”** Scannell Properties, LLC  
210 Shunpike Road, Cromwell, CT  
*REMA Job #: 22-2499-CRO49*

Dear Chairman Whitney and Commissioners:

At the request of the Intervenor, REMA ECOLOGICAL SERVICES (“REMA”) has been asked to review the plans and other supporting documentation for an application for a 1,042,849 square foot warehouse on a 250-acre property in Cromwell, in the Mattabesset River watershed.

The application materials reviewed since our last review letter of May 31, 2022 include, but are not limited to:

- 1) A 108-sheet set of plans dated 5/3/22 prepared by Langan Engineering & Environmental Services, Inc. (Langan). We note that previous plans that were reviewed, and which were available online on the Town website, only consisted of 17 pages.



## **1.0 POTENTIALLY MISSED WETLANDS**

On July 4<sup>th</sup>, 2022, the undersigned conducted a perimeter viewing of the subject site, from the edge of the adjoining Town-owned property to the east (i.e., Watrous Park). In addition to recording observed wildlife species, especially avians (see separate section of this letter/report), we viewed an area which exhibits surficial characteristics of a wetland. This is located to the north of the 46R Geer Street property, in an area proposed for truck parking, per the submitted plans (see Figure A, attached).

According to the aerial photo record (i.e., Google Earth, UConn MAGIC), this area has exhibited high moisture or wetness in the photographic signature. In fact, in past years, this area has either not been planted to corn, due to muddy conditions, or if it has, the crop may not be harvested due to surface wetness, as was the case last year. The Connecticut Web Soil Survey shows the area mapped as the moderately well drained Sudbury (23A) fine sandy loam. Moreover, at the far eastern edge of the Sudbury mapping unit, a “wet spot” symbol is shown (see attached Soil Survey). This typically denotes an isolated wetland that is too small to map. The size of such a wetland may be up to an acre or more, the size limit of mapping at this scale. During our perimeter site walk, we noted that most of the Sudbury mapping unit had not been planted to corn, and exhibited a very dark A-horizon, which is typical of wetland type soils (see Photo 1, attached). We also noted, only here, at the edge of the woods, that the dominant tree species was black gum (a.k.a. tupelo; *Nyssa sylvatica*), which is a facultative species found in moist areas and in wooded swamps. No soil borings were taken within the subject site or within the Town property.

We would highly recommend that the project soil scientists investigate this area for a potential missed wetland, provide several representative soil logs, and their locations on a plan. Alternatively, we would welcome a joint field visit to investigate this area.

In addition to the above-mentioned area of concern, a second area was identified by reviewing mapping at Town Hall (Engineering Department). As mentioned in our previous review letter of May 31<sup>st</sup>, 2022, a Town-wide Wetland Identification & Evaluation Project was conducted in the early 1990s, during which time wetlands were identified, inventoried, and evaluated throughout Cromwell. At the subject site a wetland was mapped which is not shown on the applicant's plans. The unique identification number for this wetland is 46-22-18 (see Figure B, attached). The inventory and functional evaluation of this wetland can be found at the Cromwell Engineering Department files. We would encourage the applicant to



investigate that area and explain why it was not delineated and included as a wetland, especially since it would be under the development footprint of proposed disturbance.

## **2.0 VERNAL POOL CONSERVATION**

The most common planning tool used in Connecticut, for the conservation of vernal pool habitats, is the seminal *“Best Development Practices, Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States”* (2002), authored by Drs. Aram Calhoun and Michael Klemens. What was somewhat surprising, especially with the several vernal pools identified and inventoried at the subject site, that the Calhoun and Klemens BDP, as it is often referred to, was not utilized for this site. We have seen the BDP used by the applicant’s wetlands consultants on numerous other development applications in the past few years.

The BDP, as it is often referred to, provides recommendations for the conserving of vernal pool habitats, their hydrology, their water quality, and their obligate amphibian species, such as wood frogs and spotted salamanders. Perhaps the most often used tool regards the “critical terrestrial habitat” or CTH which is the area within 100 feet and 750 feet from a vernal pool. The recommended practice is to maintain or restore a minimum of 75% of the zone in contiguous (i.e., unfragmented) habitat, preferably forest. Manicured lawns, impervious surfaces and the like are not considered CTH habitat.

As can be seen in the attached figure produced by the applicant and annotated by REMA, neither of the two remaining vernal pools in the immediate vicinity of the proposed warehouse development will be conserved and for slightly different reasons. First, we point out that our calculations are “conservative” because we included the first 100 feet (or the VPE, vernal pool envelope) in the CTH, which means that the percentages of disturbance within the CTHs would be higher, by several percentage points.

Second, Vernal Pool 4 will suffer in the long-term, with a cascade effect to other vernal pools, especially Vernal Pool 6, due to the reduction of the populations from the impediment to migration and dispersal to be realized by the access driveway, with 24-7 heavy truck traffic. Reduction of breeding amphibians in Vernal Pool 4 will affect the physical characteristics of the wetland/pool system, degrading water quality (see additional discussion below).



The elimination of Vernal Pool 7, with its robust spotted salamander population, will adversely affect the viability of Vernal Pool 6 and also Vernal Pool 4. Metapopulation dynamics play a very important role in the long-term sustainability of the vernal pool obligate amphibian populations. A metapopulation, which is the sum of the local amphibian populations that utilize the vernal pools, is very important especially since the high hydrologic variability of individual pools, some of which may dry up for several years during a sustained drought, are recolonized from those pools that remain wet during droughts.

Two factors come into play when considering metapopulation dynamics and the lost of Vernal Pool 7. One, Vernal Pool 7 is deeper, and can sustain sufficient hydrology for breeding during droughts, allowing for the recolonization of Vernal Pool 6, which has a much drier hydrologic regime. Two, with the elimination of Vernal Pool 7, and the physical barrier that would be in place due to the development, Vernal Pool 4, which has an intermediate hydrology between the other two pools, could no longer be a source pool for the recolonization of Vernal Pool 6. Over time, Vernal Pool 6 will cease to be a productive vernal pool, and just be an ecological sink. Eventually the vernal pool obligates will cease to breed here.

In conclusion, neither Vernal Pool 4, nor Vernal Pool 6 are considered “conserved” in the long-term, as the result of the proposed development. Alternatives should be sought that avoid filling Vernal Pool 7, while providing connectivity between these three vernal pools (i.e., VP4, VP6, and VP&).

### **3.0 EXPECTED INDIRECT IMPACTS FROM PAVEMENT MORTALITY**

Pavement mortality includes direct roadkill, and also desiccation, and occurs both on the approximately half-mile long entry road, and in the expanses of pavement adjacent the proposed warehouse. Since vernal pools and wetlands occur on multiple sides of the entry road, the commission is well aware that traffic mortality would kill a portion of the amphibians travelling to breeding sites, and juveniles migrating back out into terrestrial habitats. Additionally, and also significantly, from the standpoint of vernal pool health, vernal pool predators, some nocturnal and some daytime, would be vulnerable, travelling to the major, but temporary food source provided by a productive wood frog vernal pool, near the time of exit.





Dr. Michael Klemens (see discussion on PDP in previous section) clearly explained the link between significantly diminished wood frog populations and adverse physical changes in vernal pools, which supported the town's denial of the "The Preserve" application (Old Saybrook) from a legal standpoint. His reasoning was as follows: the consumption by numerous wood frog tadpoles of the prior year's leaf litter (nutritionally enriched by a coating of fungi and microbes) prevents excessive build-up of leaf litter in the pools, such that they become progressively shallower. We have encountered the odor of hydrogen sulfide released by sediments in an urban vernal pool with minimal life in it. Even a moderate drop in wood frog abundance, over a multi-year period, will cause the pool to get progressively shallower, until it no longer remains flooded long enough to support breeding of amphibians, including spotted salamanders, which need a pool that is flooded until late July to early August, in most cases.

Depletion of other vernal pool fauna, namely the predators, may also have physical impacts on a pool. Often, after a dry spring, when the pool gets very shallow the wood frog tadpole population in a productive pool with many egg masses is reduced by various predators including bullfrog, spotted newt, wood turtle, spotted turtle, snapping turtle, painted turtle, ribbon snake, water snake, garter snake, purple grackle, predaceous diving beetles, large water beetles, large fishing spiders, and river otter (personal observation). Not all, but certainly the reptiles, are highly vulnerable to road class and fall in the guild of long-lived, low fecundity. A vernal pool is like a food pantry for the forest. In the final days before metamorphosis, the thinning out process by predators benefits water quality, reducing ammonia toxicity from excess urine, disease/parasites, and food shortages in the small residual volume of water. Thinning out allows the wood frogs that do reach maturity and successfully exit to have a larger body weight, improving survival probability.

Positive effects on water quality from thinning of wood frogs and invertebrates by predators such as turtles and snakes will improve survival for some of the assorted invertebrates that also reside in vernal pools. They include not only fairy shrimp, but, for example a garter snake, which we recently observed feasting on in a very shallow residual pool. Other invertebrates are finger nail clams, and the nymphs of aquatic insects like dragonflies, damselflies, and some genera of mayflies. After aquatic insects emerge as flying insects, they become food for songbirds and tree frogs, as well as preying on smaller insects like midges and mosquitos. If the predators within a few hundred feet of a vernal pool are progressively eliminated by truck traffic mortality, not only will water chemistry deteriorate,



but the vernal pool's biotic diversity and its wetland functions, especially aquatic habitat, wildlife support, and production export function, will decline.

Spotted salamander larvae are more adept than wood frog tadpoles at eluding predators, even fish predators, by hiding in a structurally complex pool, or a backwater adjacent to a pond. Their larvae are less important than wood frog tadpoles, as food for the many VP predators listed above, but spotted salamanders, like dragonflies, damselflies, and tree frogs, are predators themselves of assorted invertebrates, most importantly mosquito larvae. Microscopic plant life consumed by multiple species of zooplankton and diatoms, and then by invertebrates, which are food for the spotted salamander larvae. Higher diversity of invertebrates is possible, when the spotted salamander predators are part of the ecosystem. Their presence, along with habitat complexity, helps prevent excessive build-up of metabolism waste products or decomposing algae, and allows more competing invertebrates to coexist. The positive correlation between bio-diversity and a complex food chain is a basic ecological principle that one is taught in an introductory College-level ecology course. Such complex ecosystems are also more stable and resilient.

Spotted salamanders have been known to live up to 30 years, and will return to the same pool year after year. Traffic or desiccation-related mortality of recently metamorphosed spotted salamanders, as they cross paved surfaces, will also contribute to pool degradation over the long term, as spotted salamander populations decline, aside from diminished wetland values, with loss of their mosquito control services.

A vernal pool embedded in a swamp in a Salisbury site, recently inventoried, with complex microtopography, resulting in diversity of hydrologic regimes, supporting diverse plants and fauna, with population checks and balances, that helps maintain water quality. Information on these physical features of VP's were missing from the Vernal Pool data, and are recommend as part of the aforementioned BDP, and are the type of data that are also found in the US Army Corps of Engineers Vernal Pool inventory data sheets.

#### **4.0 NEED FOR RARE PLANT SURVEYS PRIOR TO MITIGATION PLANNING**

During REMA's site perimeter bird survey, on the morning of July 4<sup>th</sup>, 2022, we observed two state-listed avian predators, both CT Species of Special Concern. The broad-winged hawk was seen only once, and from a distance of over 100 feet, so it qualifies as a possible sighting. The kestrel, however, was observed twice, and clearly enough to observe the key



field marks; we are confident of that observation though without a photo, it is conservatively deemed a probable sighting.

The forest to the east (mostly town-owned parkland) does include a number of breeding, forest interior species. The survey was conducted on July 4<sup>th</sup> during an unusually cool summer, such that breeding species would still be expected to be singing, per accepted bird survey protocols.

We heard singing wood thrush, great crested flycatcher, red-eyed vireo, and wood pewee, as well as songbirds that also use small forest fragments: e.g., blue jay, white-breasted nuthatch, catbird, mockingbird, and common crow. Multiple pairs of song sparrows and gold finches, and an uncommon shrubland species, prairie warbler, were using forest edge habitat and the vernal envelope of Vernal Pool 7 (Wetland 2). A young buck was also grazing here. The variety of textures and foliage colors in this open wetland suggested high plant diversity, and a reasonable likelihood of vulnerability in terms of water and soil chemistry to the proposed inputs of stormwater (overflow from the proposed infiltration basin to the south). If nutrient and metal levels increase, and the pH changes in this vernal pool, adverse changes in biota make-up can also be expected.

The forest edges, and the central hedgerows will produce abundant large-bodied moths and beetles. Disturbance for mitigation purposes is proposed in several of these areas, and the project will also destroy the hedgerows to the west of the vernal pool to be filled (i.e., VP-7). These areas are presumably where the kestrel hunts, and it likely breeds somewhere in the northwestern or north-central portion of the site. Cornfields themselves likely do not support many large-bodied insects, though the diverse native trees along the long northeastern forest edge provide good breeding habitat for large lepidopterans. Few non-native woody species, except for some buckthorn, were observed during the perimeter bird survey on July 4<sup>th</sup>, 2022. Note that post-construction, artificial illumination is expected to significantly diminish densities of large-bodied lepidopterans, reducing the food supply for kestrels and assorted other songbirds, including wetland species like veery, likely to be present on the west side of the site. A recent review article by S.K. Ladhani (Fall 2021) on adverse impacts to plants and insect fauna of artificial illumination is being separately entered into the record. Kestrels also capture small amphibians, which are, of course, currently abundant at this site, but their numbers are expected to diminish, for multiple reasons, especially road mortality. The cornfields do contribute the "wide open spaces" which the kestrel is programmed to prefer in its hunting territory.



Based on their published habitat preferences, suitable habitat for the CT Special Concern kestrel and also the CT Endangered adder mouth fern, and the CT Endangered yellow-fringed orchid, occurs on the site in the northern and northwestern successional plant communities.

Another concern is the likelihood of destroying two endangered orchids and one endangered fern, based on their published, early successional habitats (See Table A, in Attachment A). Their loss or substantial population reductions could well result from the proposed mitigation activities, and perhaps also during destruction of the vernal pool and its forested buffer of Vernal Pool in Wetland 1. The applicant has stated that the NDDDB surveys are being postponed until later. That means the data is not available for planning purposes, and to help avoid rare and listed species impacts, by adjusting locations of proposed activities. Loss of these rare plants could occur while planting/clearing/grading anthropogenically altered areas for planned habitat "restoration" and wetland habitat creation. This group of orchids and a rare fern are listed in the NDDDB letter from the CTDEEP Wildlife Division, from CT Botanist William Moorhead. Reliable past records of these orchids exist from the site vicinity.

The CTDEEP letter is dated 1-2-2021, and is attached to this report (Attachment B). The five plant species in Table A s are in the rarest category: "endangered." Four of these grow in meadow or successional habitats disturbed by man - and/or in low-nutrient peat bog/swamp habitats. Of the remaining eight rare plant species, two are threatened, and six are Species of Special Concern. Of these eight species, four are known to grow in open disturbed, early-successional habitats, and the other four in shaded forests. Two of the forest species grow in peat bog-type wetlands, such that they are especially vulnerable to changes in pH and nutrient status. Not that bog-type habitat may be less extensive than in the past based on changes evident in the aerial photo record of the north end of the site.

Peat bog-type wetlands are unusual in Central Connecticut, with elevated Uniqueness and Heritage and Educational-Scientific Value; they are also much more sensitive than the more common wetlands with a loamy substrate, to nutrient inputs from stormwater and/or settled particulate air pollution. Some of them may no longer be present, due to nitrogen leaching from fertilizer applied to corn fields, with a high requirement for nitrogen, into the regional groundwater table, or due to substantial hydrological changes, perhaps, resulting from logging. The orchids may no longer be present in some of the wetlands where they formerly grew, but the application does not even inform the commission as to which forested wetland are sphagnum bogs and which are mesotrophic or even eutrophic wooded swamps - all



information that is available from town hall., and that could be made available to the applicant after the July 6th meeting.

Furthermore, vernal pool/wetland investigations did not include basic water quality parameters, or information as to the levels of sphagnum mosses.

REMA took a conductivity reading on the morning of July 4th (just after the bird survey) in the west-flowing water course that is piped under Greer Road, just south of the site. The specific conductivity reading was very high for such a small stream (over 400 u mS/cm), and salinity was 2 ppt, indicative of some dissolved nitrogen salts. The town-wide wetland study may not have detected the NDDDB orchids if surveys were not done during bloom time (July and August for most of them, per the 2-1-21 CTDEEP letter).

To summarize, the large number of rare NDDDB plant species found in open, anthropogenically altered sites supports our argument in the first REMA report, that selection of mitigation sites, should have been preceded by thorough data collection on potential sites. This data should have included findings and species lists from the NDDDB survey (presence or absence of target rare species and their abundance/distribution, if present. Also required is a full list of the vascular species that are present in each ecological community.

Though updating would have been necessary, the applicant should also have made use of the thorough botanical data and rationale-based functions and values assessments for all the wetlands in the Town of Cromwell done for the town by then Cheshire-based Soil Science and Environmental Services in the late 1980s and early 1990s. This comprehensive data should have been used for the wetland's functions and values assessment, and for selection wetland mitigation and upland enhancement sites.

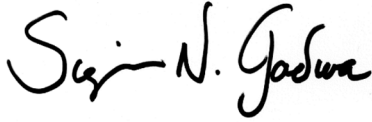
## **5.0 CONCLUSION**

We continue to maintain the proposed plan before the Commission fails to, at a minimum, provide substantive alternatives which would reduce or eliminate direct and indirect impacts to wetlands and watercourses. Eliminating a Tier I, productive vernal pool habitat is unprecedented, in our professional opinion, and should be avoided. As currently constituted there is a reasonable likelihood that the proposal will result in unreasonable impacts to regulated wetlands and watercourses.



Respectfully submitted,

**Rema Ecological Services, LLC**



Sigrun N. Gadwa, MS, PWS  
Ecologist, Professional Wetland Scientist  
Registered Soil Scientist



George T. Logan, MS, PWS, CSE  
Professional Wetland Scientist  
Registered Soil Scientist  
Certified Senior Ecologist

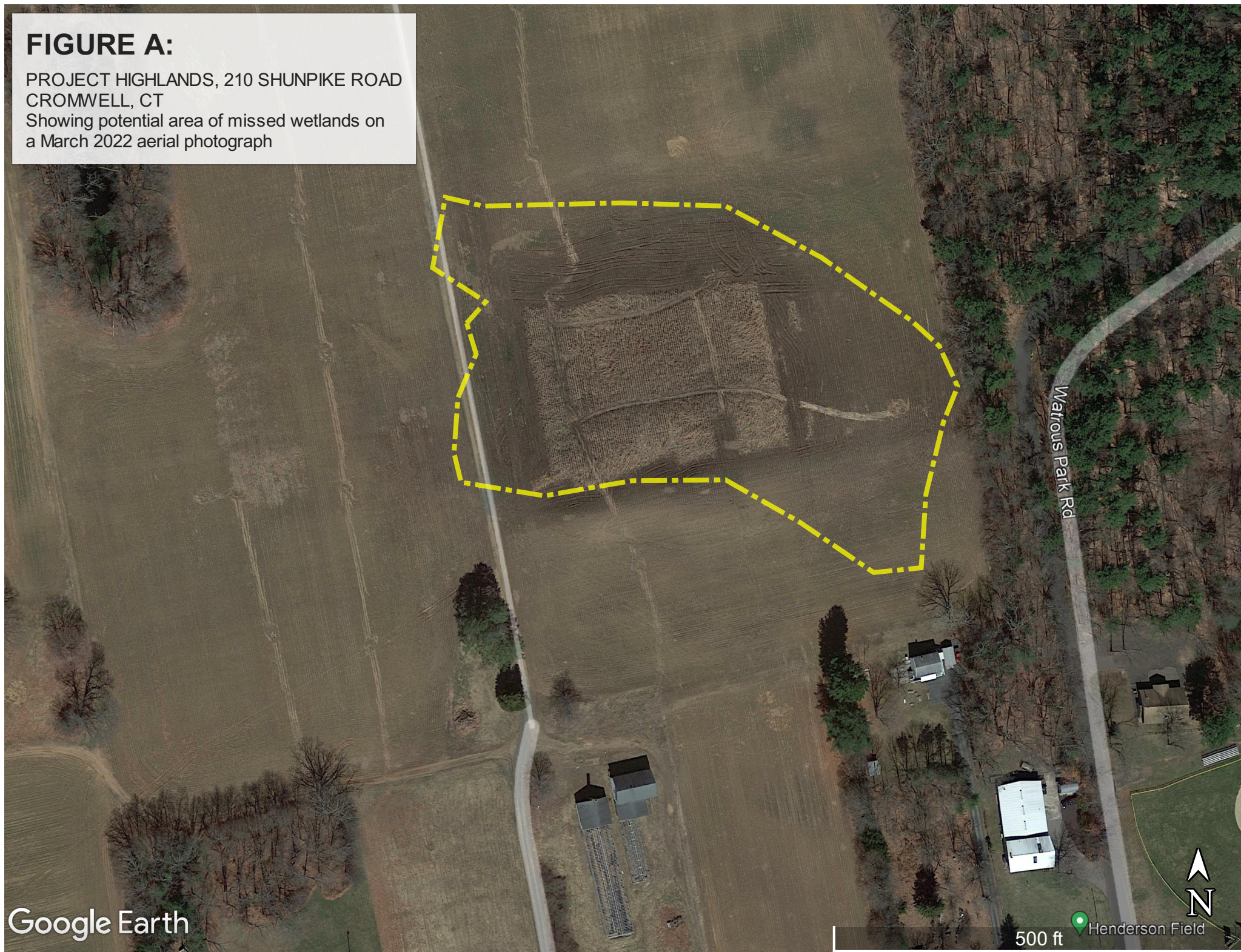
Attachments: Figures A and B, Vernal Pool Conservation Figure; Photo 1, CT Web Soil Survey;  
Table A and B.



## FIGURE A:

PROJECT HIGHLANDS, 210 SHUNPIKE ROAD  
CROMWELL, CT

Showing potential area of missed wetlands on  
a March 2022 aerial photograph





## FIGURE B:

Area of Wetland Mapped during the  
Town Wide Wetland Identification  
and Evaluation Project  
(ID: 46-22-18)



*Previously Mapped  
Wetland (approx.)  
(ID: 46-22-18)*

*Vernal Pool 6*

*Vernal Pool 7  
(to be removed)*

*Vernal Pool 4*



#### VP4:

CTH: 59.1 acres

Post-Development CTH Disturbance: 14.9 acres or 25.2%

VERNAL POOL **NOT** CONSERVED

#### Notes:

- in the short-term pool breeding will be impacted until habitat to north is restored, which may take several years.
- in the long-term impact of roadway with 24-7 truck traffic will have a detrimental effect on amphibian migration.

**RESULT:** Vernal Pool Habitat will not be conserved.

#### VP6:

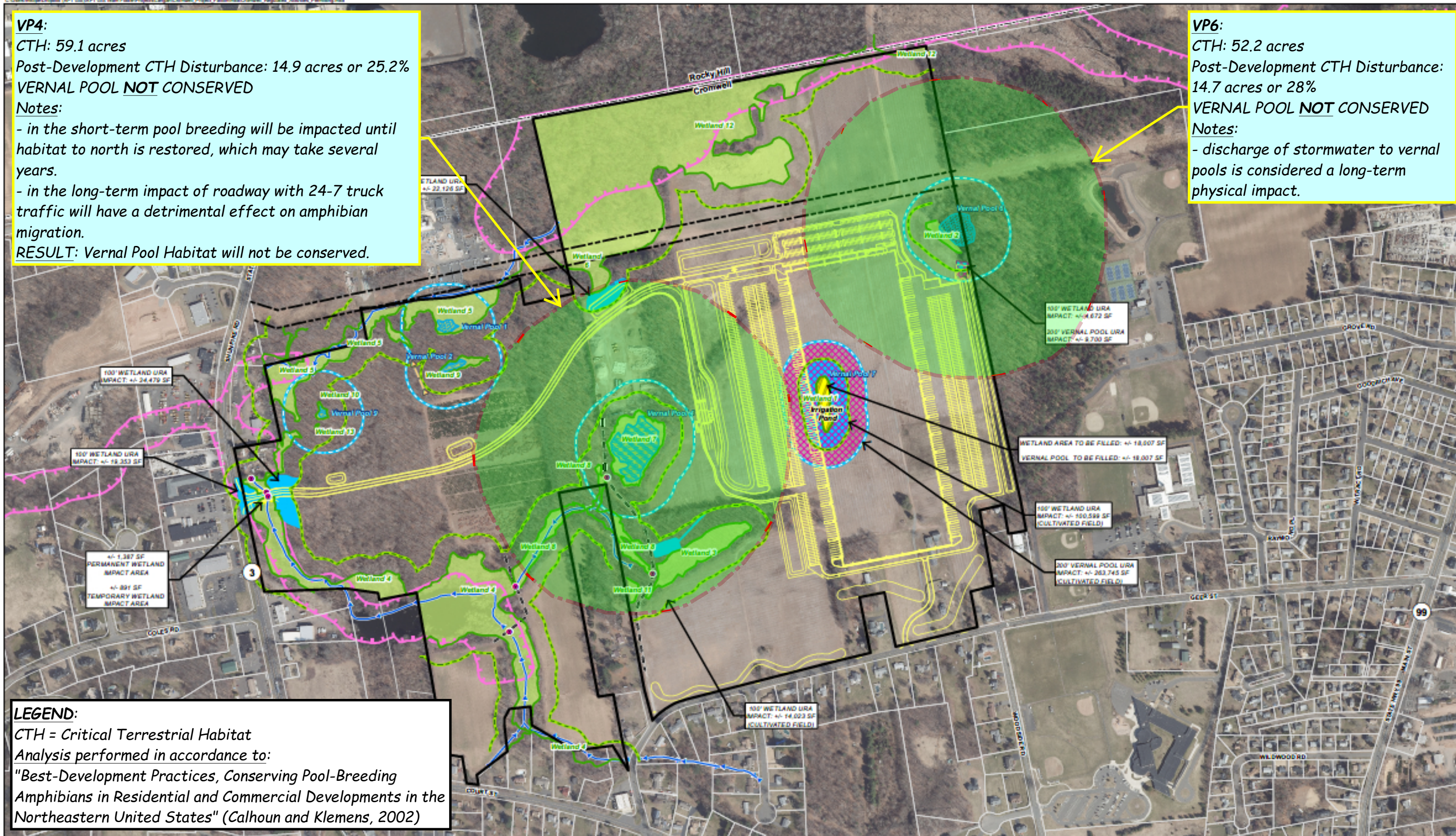
CTH: 52.2 acres

Post-Development CTH Disturbance: 14.7 acres or 28%

VERNAL POOL **NOT** CONSERVED

#### Notes:

- discharge of stormwater to vernal pools is considered a long-term physical impact.

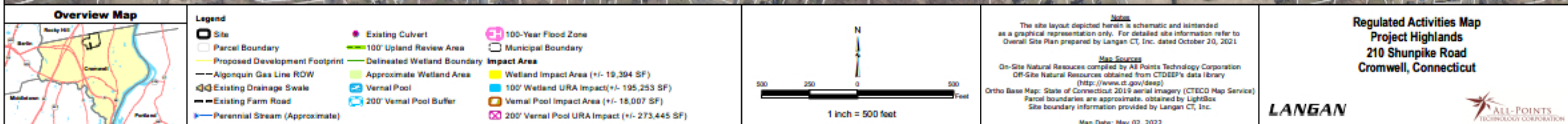


#### LEGEND:

CTH = Critical Terrestrial Habitat

Analysis performed in accordance to:

"Best-Development Practices, Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States" (Calhoun and Klemens, 2002)



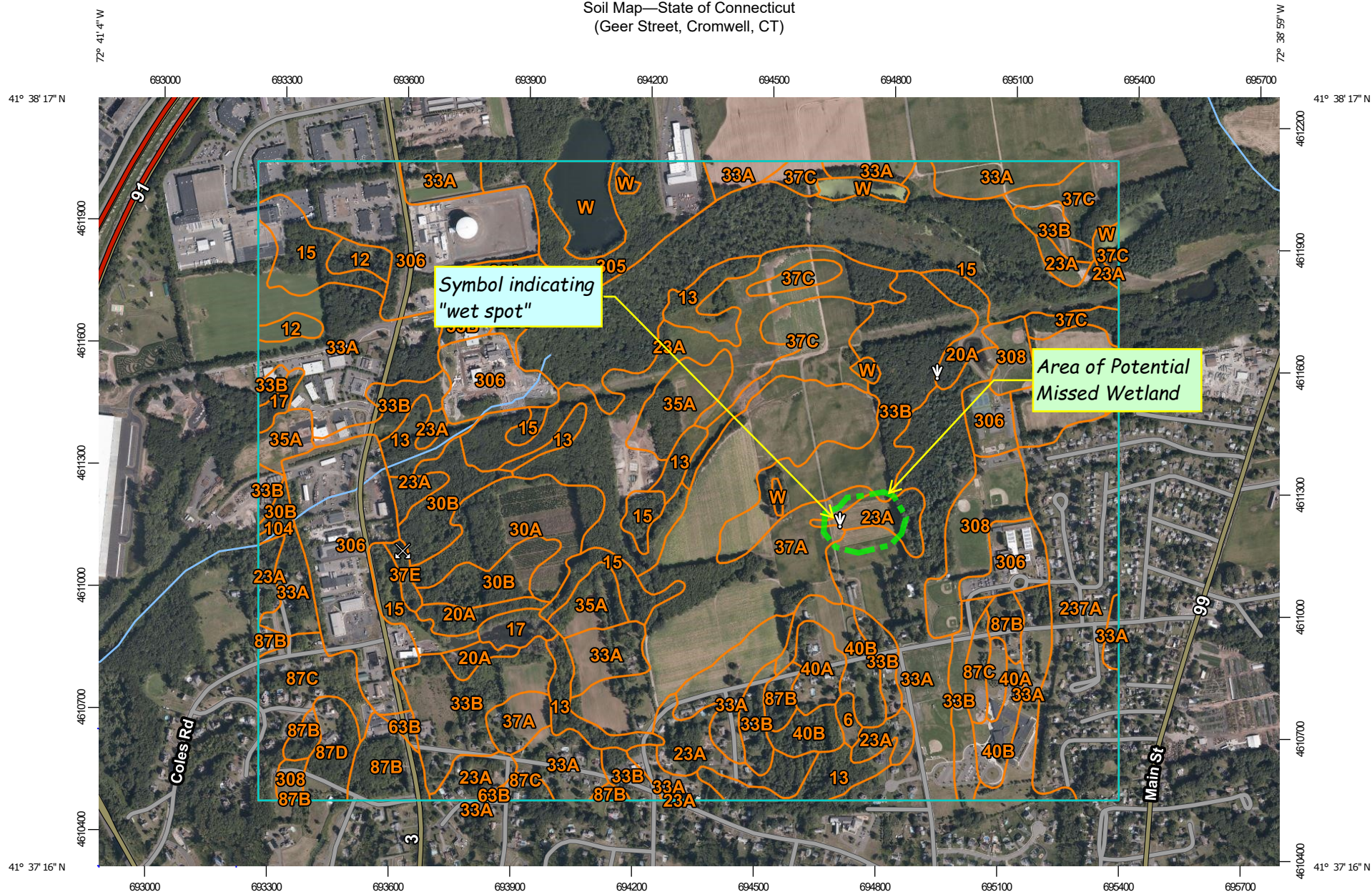




*Photo 1: Dark, organic rich, topsoil horizon in wet/moist area not planted to corn; potential missed wetland is embedded here; facing northwesterly*



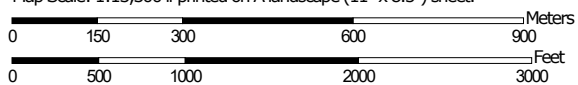
Soil Map—State of Connecticut  
(Geer Street, Cromwell, CT)



Symbol indicating  
"wet spot"

Area of Potential  
Missed Wetland

Map Scale: 1:13,300 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84



Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

7/5/2022  
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## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut

Survey Area Data: Version 21, Sep 7, 2021

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

Date(s) aerial images were photographed: Aug 30, 2019—Oct 15, 2019

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



## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6	Wilbraham and Menlo soils, 0 to 8 percent slopes, extremely stony	1.3	0.2%
12	Raypol silt loam	6.7	0.8%
13	Walpole sandy loam, 0 to 3 percent slopes	25.7	3.1%
15	Scarboro muck, 0 to 3 percent slopes	90.5	11.0%
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	4.9	0.6%
20A	Ellington silt loam, 0 to 5 percent slopes	10.5	1.3%
23A	Sudbury sandy loam, 0 to 5 percent slopes	75.5	9.1%
30A	Branford silt loam, 0 to 3 percent slopes	18.1	2.2%
30B	Branford silt loam, 3 to 8 percent slopes	16.5	2.0%
33A	Hartford sandy loam, 0 to 3 percent slopes	128.6	15.6%
33B	Hartford sandy loam, 3 to 8 percent slopes	74.5	9.0%
35A	Penwood loamy sand, 0 to 3 percent slopes	17.3	2.1%
37A	Manchester gravelly sandy loam, 0 to 3 percent slopes	77.2	9.3%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	29.0	3.5%
37E	Manchester gravelly sandy loam, 15 to 45 percent slopes	1.6	0.2%
40A	Ludlow silt loam, 0 to 3 percent slopes	7.5	0.9%
40B	Ludlow silt loam, 3 to 8 percent slopes	16.8	2.0%
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	1.2	0.1%
87B	Wethersfield loam, 3 to 8 percent slopes	15.9	1.9%
87C	Wethersfield loam, 8 to 15 percent slopes	18.2	2.2%
87D	Wethersfield loam, 15 to 25 percent slopes	6.4	0.8%
104	Bash silt loam	0.8	0.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
237A	Manchester-Urban land complex, 0 to 3 percent slopes	42.9	5.2%
305	Udorthents-Pits complex, gravelly	18.5	2.2%
306	Udorthents-Urban land complex	87.3	10.6%
308	Udorthents, smoothed	18.6	2.3%
W	Water	13.9	1.7%
<b>Totals for Area of Interest</b>		<b>826.0</b>	<b>100.0%</b>

**TABLE B: HABITATS IN WHICH THE SITE'S FIVE POTENTIAL ENDANGERED PLANTS MAY OCCUR. THESE ARE THE ENDANGERED PLANT SPECIES LISTED IN THE IN LETTER FROM CT DEEP (WILLIAM MOORHEAD III), DATED 2-1-21, AT THE SITE OF THE PROPOSED MEGA WAREHOUSE OFF GEER STREET, IN CROMWELL, CT**

(FULL CTDEEP LETTER INCLUDING CT-THREATENED & CT SPECIAL CONCERN PLANT SPECIES MAY BE FOUND IN ATTACHMENT C.)

**1. OPHIOGLOSSUM PUSILLUM RAF. NC, NORTHERN ADDER'S-TONGUE FERN.**

*Aka Ophioglossum vulgatum L. var. pseudopodium (Blake) Farw*

**Habitat per CTNDDDB letter:** Moderately well-drained to hydric drainage regimes, including man-altered open areas, meadows, fields, pastures, and ditches

**Habitat per dichotomous key of *Flora Novae Angliae*:** Wet-mesic to hydric open areas such as swales, meadows, boggy fields, and ditches, only rarely in shade.

**Habitat per www.GoBotany:** Anthropogenic (man-made or disturbed habitats), marshes, meadows and fields, wetland margins (edges of wetlands)

Identifiable from spring through early September.

**2. MALAXIS UNIFOLIA MICHX. GREEN ADDER'S-MOUTH (AN ORCHID)**

**Habitat per CTNDDDB letter:** acidic sandy habitats (e.g borrow pits), sphagnum bogs, wooded swamps (often growing in moss, moist or dry rich rocky woods, wetland borders, moist shrub thickets, dry shrubby pastures, dry traprock summits. Blooms July and August.

**Habitat, from the dichotomous key of *Flora Novae Angliae*:** *Microstylis unifolia* (Michx.) B.S.P. • Swamps, wetland borders, forest cuts & openings, cleared ROW's.

**Habitat:** from GoBotany: Wet-mesic to hydric open areas such as swales, meadows, boggy fields, and ditches, only rarely in shade.

Blooms July and August.

**3. PLATANThERA BLEPHARIGLOTTIS— WHITE FRINGED BOG-ORCHID**

**Habitat, from NDDDB letter:** wet peat bogs

Blooms in late June

#### **4. *PLATANThERA CILIARIS*— ORANGE FRINGED BOG-ORCHID**

**Habitat:** from NDDb letter acidic, hydric to moderately well drained; wet thickets, open swampy woods, various open habitats maintained by mowing or fire..

**Habitat,** from the dichotomous key of Flora Novae Angliae: Sandy and peaty meadows, wetland borders, lawns, sandy soils of swamps,

**Habitat:** from Gobotany: Anthropogenic (man-made or disturbed habitats), meadows and fields, swamps, wetland margins (edges of wetlands). Since this species apparently prefers moist, sunny, open areas, it is vulnerable to natural succession, and shading by woody *vegetation*. Pollinated by swallowtail butterflies.

Blooms July to early September

#### **5. *LINNEAEA BOREALIS*— TWIN FLOWER**

**Habitat, from NDDb letter:** Dry to moist woods, swamps, and bogs.

**Habitat, personal observation in Northern Middletown, west side of Mt. Higby:** open slope at edge of powerline ROW

Blooms in June

Blooms late July – early September