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**VIA EMAIL**

July 26, 2022  
File No. 04.0191429.00

Mr. Joseph Falzone  
7B Emery Lane  
Stratham, New Hampshire 03885

Re: Wetland Delineation and Vernal Pool Assessment Report  
Tax Map 46, Lot 7  
Stevens Hill Road  
Nottingham, New Hampshire

Dear Mr. Falzone:

GZA GeoEnvironmental, Inc. (GZA) is pleased to provide this letter report detailing the completion of wetland delineation and vernal pool assessment at the property identified as Tax Map 46, Lot 7, located on Stevens Hill Road in Nottingham, New Hampshire ("Site"). The Site is approximately 60 acres and bordered by a portion of Bean River. The Site is undeveloped and predominately forested. Based on verbal communication and e-mail correspondence with you, we understand that you hold a purchase and sales agreement with the property owners (George Williams and Ann Kelley Day) and are proposing to subdivide eight frontage lots.

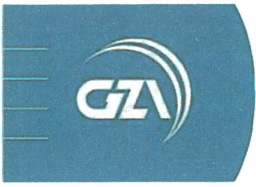
As requested, the wetland delineation fieldwork was performed by Mr. James Long, State of New Hampshire Certified Wetland Scientist (#007) and Certified Soil Scientist (#015), on May 6 & 7, 2022. The purpose of the work was to evaluate and mark the boundaries of wetlands on the Site. As you requested, GZA provided a wetland sketch to Doucet Survey for land survey purposes on May 9, 2022. The vernal pool assessment fieldwork was performed by Ms. Tracy Tarr, State of New Hampshire Certified Wetland Scientist (#081) and Certified Wildlife Biologist, on May 3, 2022, supplemented by observations completed during wetland delineation by Mr. Long. GZA understands that the data from the wetland delineation and vernal pool assessment will be used in permit applications for the proposed development of the Site, to be completed by others. This report is subject to **Appendix A - Limitations**.

The wetland delineation was conducted in accordance with the 1987 Corps of Engineers *Corps of Engineers Wetlands Delineation Manual*<sup>1</sup>, using the *Routine Determination Method*; in conjunction with the *Regional Supplement*<sup>2</sup> to the *Corps of Engineers Wetland Delineation Manual*, the National Plant List: 2018<sup>3</sup>, *Field Indicators of Hydric Soils in the*

<sup>1</sup> U.S. Army Corps of Engineers, Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

<sup>2</sup> U.S. Army Corps of Engineers, 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (Version 2.0), ed. J.S. Wakeley, R.W. Lichvar, C.V. Noble and J.F. Berkowitz. ERDC/EL TR-12-1. Vicksburg, Mississippi; U.S. Army Engineer Research and Development Center.

<sup>3</sup> U.S. Army Corps of Engineers, Engineer Research and Development Center. 2018. *National Wetland Plant List, Version 3.4*. Cold Regions Research and Engineering Laboratory, Hanover, NH.



*United States Version 8.1,*<sup>4</sup> and *Field Indicators for Identifying Hydric Soils in New England.*<sup>5</sup> Observed wetlands were classified in accordance with the *Classification of Wetlands and Deepwater Habitats of the United States.*<sup>6</sup>

The vernal pool assessment was conducted during the active vernal pool season (typically April to June). Areas with standing water were evaluated in accordance with *Identification and Documentation of Vernal Pools in New Hampshire*, third edition, 2016 and in accordance with the New Hampshire Code of Administrative Rules, Env-Wt 103.64, 104.15, and 104.44 to support local and state permitting. As required, GZA reviewed areas with standing water for amphibian egg masses. In addition, GZA completed dipnet sweeps for aquatic macroinvertebrates and larval amphibians. Areas with confined basins, standing water for at least two consecutive months, and one or more primary indicator species and/or three or more secondary indicators species are considered vernal pools. In New Hampshire, primary vernal pool indicator species include wood frog (*Lithobates sylvaticus*), spotted salamander (*Ambystoma maculatum*), blue-spotted (*Ambystoma laterale*)/Jefferson salamander (*Ambystoma jeffersonianum*) complex, and fairy shrimp (Order Anostraca). As part of the assessment, GZA also completed U.S. Army Corps of Engineers Vernal Pool Characterization forms.

Wetland boundaries were witnessed with pink and black flagging on vegetation at approximate 50-foot intervals. GZA delineated the wetland systems using the following flag series and noted wetland classification descriptions (see Table 1):

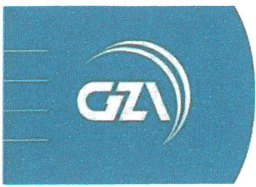
- Wetland A – Flag Series
  - A1-A32 (open)
- Wetland B – Flag Series
  - B1-B7 (connect)
- Wetland C – Flag series
  - C1-6 (connect)
- Wetland D – Flag Series
  - D1-D6 (connect)
- Wetland E – Flag Series
  - E1-E7 (connect)
- Wetland F – Flag Series
  - F1-F4 (connect)
- Wetland G – Flag Series
  - G1-G5 (connect)
- Wetland H – Flag Series
  - H1-H7 (connect)

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<sup>4</sup> United States Department of Agriculture, Natural Resource Conservation Service, 2018. *Field Indicators of Hydric Soils in the United States*, Version 8.2. L.M. Vasilas, G.W. Hurt, and J.F. Berkowitz (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

<sup>5</sup> New England Hydric Soils Technical Committee. 2020 Version 4. *Field Indicators for Identifying Hydric Soils in New England*, New England Interstate Water Pollution Control Commission, Lowell, Massachusetts.

<sup>6</sup> Federal Geographic Data Committee. 2013. *Classification of Wetlands and Deepwater Habitats of the United States*. FGDC-STD-004-2013. Federal Geographic Data Committee and U.S. Fish and Wildlife Service.



- Wetland I – Flag series
  - I1-I8 (open)
- Wetland J – Flag series
  - J1-J4 (connect)
- Wetland K – Flag Series
  - K1-K7 (connect)
- Wetland L – Flag Series
  - L1-L9 (open)
- Wetland M – Flag series
  - M1-M143 (open)
  - O1-O14 (connect upland island)
- Wetland N – Flag series
  - N1-N6 (connect)
- Wetland P – Flag series
  - P1-P4 (connect)

The Site contains 16 palustrine wetland systems (i.e., Wetland A, see **Table 1**). The wetlands on the Site are predominately classified as palustrine forested wetland systems dominated by broad-leaved deciduous/evergreen vegetation that are seasonally flooded and or saturated (PFO1/4E). Five vernal pools were identified within on-site wetlands (see **Table 2**).

**Table 1. Summary of wetland delineation**

Wetland Identification and Flag Series	Wetland Classification	Notes
Wetland A	PFO14E	Located in the southeastern portion of the Site off Stevens Hill Road. Contains two vernal pools.
Wetland B	PFO1E	Located in the southern portion of the Site along the edge of Stevens Hill Road.
Wetland C	PFO1E	Located in the southern portion of the Site along the edge of Stevens Hill Road.
Wetland D	PFO1E	Located in the southwestern portion of the Site along the edge of Stevens Hill Road.
Wetland E	PFO1E	Located in the western portion of the Site.
Wetland F	PFO1E	Located in the western portion of the Site.
Wetland G	PFO1E	Located in the center portion of the Site.
Wetland H	PFO1E	Located in the eastern portion of the Site.
Wetland I	PFO1/4E	Located in the eastern portion of the Site.
Wetland J	PFO1E	Located in the eastern portion of the Site.
Wetland K	PFO1/4E	Located in the center portion of the Site.
Wetland L	PFO1/4E	Located in the northwestern portion of the Site.
Wetland M	PEM1Fb, PFO14E, R4SB, R2UB	Located along the northern portion of the Site. Upland island within Wetland M with flag series O1-



Wetland Identification and Flag Series	Wetland Classification	Notes
		O14. Wetland M borders the Bean River. Contains three vernal pools.
Wetland N	PFO1E	Located in the northern portion of the Site.
Wetland P	PFO1/4E	Located in the center portion of the Site.

Refer to **Appendix B – Photo Log** for photographs of the Site and wetlands.

**WETLAND A**

Wetland A is located in the southeastern portion of the Site off of Stevens Hill Road (see **Figure 1 – Wetland Delineation Sketch**). Wetland A is classified as a palustrine forested wetland system with broad-leaved deciduous and evergreen vegetation that is seasonally flooded or saturated (PFO1/4E). Dominant vegetation in the wetland includes sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmundastrum cinnamomeum*), sphagnum moss (*Sphagnum spp.*), common winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), American witch hazel (*Hamamelis virginiana*), red maple (*Acer rubrum*), black birch (*Betula lenta*), white pine (*Pinus strobus*), and eastern hemlock (*Tsuga canadensis*). Other plant species observed on the edge of the wetland included white birch (*Betula papyrifera*) and Canada mayflower (*Maianthemum canadense*). The soils in the wetland are classified as hydric soils with a depleted matrix below a dark surface (hydric soil indicator A11). This wetland contained standing water during the assessment.

Wetland A contains two confirmed vernal pools (Vernal Pool 1 & Vernal Pool 5) in the northeasterly portion of the wetland along Stevens Hill Road. GZA observed a spotted salamander egg mass and an overwintering green frog tadpole in Vernal Pool 1. The presence of the overwintering tadpole suggests the pool contained at least some water throughout the winter. This pool is located directly adjacent to Stevens Hill Road and receives culverted drainage from across Stevens Hill Road. Other species observed in Wetland A include black and white warbler (*Mniotilta varia*), black-throated green warbler (*Setophaga virens*), broad-winged hawk (*Buteo platypterus*), and American robin (*Turdus migratorium*).

GZA observed 10 wood frog egg masses and 25 spotted salamander egg masses in Vernal Pool 5. Therefore, observed egg mass productivity was higher in Vernal Pool 5 compared to Vernal Pool 1. Vernal Pool 5 borders Stevens Hill Road but contains a narrow forested buffer between the road and the pool and does not receive direct culvert discharge across Stevens Hills Road.

**WETLANDS B, C, D, E, F, G, H, J, & N**

Wetlands B, C, D, E, F, G, H, J, & N are located throughout the Site (see **Figure 1 – Wetland Delineation Sketch**). These wetlands are isolated and are classified as palustrine forested wetland systems with broad-leaved deciduous vegetation that are seasonally flooded or saturated (PFO1E). Dominant vegetation observed in the wetlands includes sensitive fern, sphagnum moss, common winterberry, highbush blueberry, American witch hazel, red maple, black birch, and white pine. The soils in the wetland are classified as hydric soils with a depleted matrix below a dark surface (hydric soil indicator A11). Wetlands B, E, and H contained shallow standing water at the time of the assessment. However, vernal pool indicator species (one primary or three or more secondary species) were not observed. The remaining wetlands lacked standing water and did not provide potential larval habitat for vernal pool species at the time of assessment.



## WETLANDS I, K, L, & P

Wetlands I, K, L, & P are located throughout the Site (see **Figure 1 – Wetland Delineation Sketch**). These wetlands are isolated and are classified as palustrine forested wetland systems with broad-leaved deciduous and evergreen vegetation that are seasonally flooded or saturated (PFO1/4E). Dominant vegetation observed in the wetlands includes sensitive fern, sphagnum moss, common winterberry, highbush blueberry, American witch hazel, red maple, black birch, eastern hemlock, and white pine. The soils in the wetland are classified as hydric soils with a depleted matrix below a dark surface (hydric soil indicator A11).

Wetlands K, L, and P lacked standing water at the time of the assessment. Wetland I contained standing water at the time of the assessment. However, vernal pool indicator species were not observed. GZA completed follow-up evaluations on July 12 and July 25. At this time, Wetland I had seasonally dried.

## WETLAND M

Wetland M is located in the southern portion of the Site along the edge of Stevens Hill Road (see **Figure 1 – Wetland Delineation Sketch**). The exterior of Wetland M classified as a palustrine forested wetland systems with broad-leaved deciduous and evergreen vegetation that is seasonally flooded or saturated (PFO1/4E). The interior of Wetland M is classified as a palustrine emergent wetland system dominated by persistent vegetation and is permanently flooded with beaver activity (PEM1Fb). An intermittent stream is located in the northeastern portion of Wetland M and drains in a northerly direction off-Site. The intermittent stream is classified as riverine, intermittent stream bed with seasonal flooding (R4SB). The Bean River is located in the northeastern portion of the Site and is classified as riverine lower perennial with unconsolidated bottom (R2UB). Within Wetland M is an upland island that was flagged with flag series O. Dominant vegetation in the forested wetland includes sensitive fern, common winterberry, highbush blueberry, American witch hazel, red maple, black birch, eastern hemlock, and white pine. Dominant vegetation in the emergent wetland includes tussock sedge (*Carex stricta*), leatherleaf (*Chamaedaphne calyculata*), sphagnum moss, sweet pepperbush (*Clethra alnifolia*), common winterberry, highbush blueberry, and red maple. Emergent inclusions within vernal pools contained lurid sedge (*Carex lurida*), American bur-reed (*Sparganium americanus*), tussock sedge, cinnamon fern, Canada mayflower, starflower, and sphagnum moss. The soils in the exterior portion wetland are classified as hydric soils with a depleted matrix below a dark surface (hydric soil indicator A11). The soils in the interior of the wetland are classified as hydric soils that have organic soil material at or near the soil surface that are greater than 16 inches thick (hydric soil indicator A1).

Wetland M contains three confirmed vernal pools (Vernal Pool 2, Vernal Pool 3, and Vernal Pool 4) in the northeasterly portion of the wetland. GZA observed spotted salamander egg masses in the vernal pools. In addition, GZA observed black-throated green warbler, tufted titmouse (*Baeolophus bicolor*), black-capped chickadee (*Poecile atricapillus*), and American goldfinch (*Spinus tristis*). The pools are located in a large wetland complex associated with the Bean River, and additional pools may be located in the larger wetland located to the east. Vernal Pools 2, 3, and 4 had the highest scores for vernal pool envelope habitat due to their location in a large wooded corridor located away from roads (see Table 2).

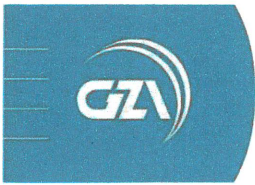


Table 2. Summary of Vernal Pools

Vernal Pool ID	Wetland ID	Spotted Salamander Egg Mass Count	Wood Frog Egg Mass Count	USACE Vernal Pool Envelope and Land Use Scores	USACE Vernal Pool Critical Habitat and Land Use Scores
Vernal Pool 1 (VP1)	Wetland A	1	-	9 of 15	10.5 of 15
Vernal Pool 2 (VP2)	Wetland M	6	-	15 of 15	9 of 15
Vernal Pool 3 (VP3)	Wetland M	7	-	15 of 15	9 of 15
Vernal Pool 4 (VP4)	Wetland M	3	-	15 of 15	9 of 15
Vernal Pool 5 (VP5)	Wetland A	25	10	7.5 of 15	9 of 15

Refer to **Appendix C – Photo Log** for photographs of Vernal Pools.

Please feel free to contact Ms. Tracy Tarr, CWS, CWB, at 603-232-8739 or [tracy.tarr@gza.com](mailto:tracy.tarr@gza.com) if you have any questions regarding this Wetland Delineation Report.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Conor Madison, CPESC, CESSWI  
 Project Manager

Deborah M. Zarta Gier, CNRP  
 Consultant / Reviewer

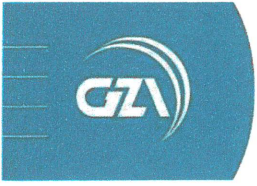
Tracy L. Tarr, CWS, CESSWI  
 Associate Principal

James Long, CWS, CSS  
 Wetland Scientist

CEM/TLT/DMZ/JHL:jkm

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- Attachments:
- Figure 1 – Wetland Delineation Sketch
  - Appendix A – Natural Resource Limitations
  - Appendix B – Wetlands Photo Log
  - Appendix C – Vernal Pool Photo Log



**Figure 1 – Wetland Delineation Sketch**



NOTES:  
1. AERIAL IMAGERY FROM ESRI WORLD IMAGERY BASEMAP.





## **Appendix A – Natural Resource Limitations**



## **USE OF REPORT**

1. GZA GeoEnvironmental, Inc. (GZA) has prepared this report on behalf of, and for the exclusive use of the Joseph Falzone ("Client") for the stated purpose(s) and location(s) identified in the report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's risk, and without any liability to GZA.

## **STANDARD OF CARE**

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the data gathered and observations made during the course of our work. Conditions other than described in this report may be found at the subject location(s).
3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

## **LIMITS TO OBSERVATIONS**

4. Natural resource characteristics are inherently variable. Biological community composition and diversity can be affected by seasonal, annual or anthropogenic influences. In addition, soil conditions are reflective of subsurface geologic materials, the composition and distribution of which vary spatially.
5. The observations described in this report were made on the dates referenced and under the conditions stated therein. Conditions observed and reported by GZA reflect the conditions that could be reasonably observed based upon the visual observations of surface conditions and/or a limited observation of subsurface conditions at the specific time of observation. Such conditions are subject to environmental and circumstantial alteration and may not reflect conditions observable at another time.
6. The conclusions and recommendations contained in this report are based upon the data obtained from a limited number of surveys performed during the course of our work on the site, as described in the Report. There may be variations between these surveys and other past or future surveys due to inherent environmental and circumstantial variability.

## **RELIANCE ON INFORMATION FROM OTHERS**

7. Preparation of this Report may have relied upon information made available by Federal, state and local authorities; and/or work products prepared by other professionals as specified in the report. Unless specifically stated, GZA did not attempt to independently verify the accuracy or completeness of that information.

## **COMPLIANCE WITH REGULATIONS AND CODES**

8. GZA's services were performed to render an opinion on the presence and/or condition of natural resources as described in the Report. Standards used to identify or assess these resources as well as regulatory jurisdiction, if any, are stated in the Report. Standards for identification of jurisdictional resources and regulatory control over them may vary between governmental agencies at Federal, state and local levels and are subject to change over time which may affect the conclusions and findings of this report.



#### **NEW INFORMATION**

9. In the event that the Client or others authorized to use this report obtain information on environmental regulatory compliance issues at the site not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this work, may modify the conclusions stated in this report.

#### **ADDITIONAL SERVICES**

10. GZA recommends that we be retained to provide further investigation, if necessary, which would allow GZA to (1) observe compliance with the concepts and recommendations contained herein; (2) evaluate whether the manner of implementation creates a potential new finding; and (3) evaluate whether the manner of implementation affects or changes the conditions on which our opinions were made.



## **Appendix B – Wetlands Photo Log**

**WETLANDS PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 5 & 6, 2022**



**Photograph No. 1: Looking at Wetland A from flag A48.**



**Photograph No. 2: Looking at Wetland B from flag B3.**

**WETLANDS PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 5 & 6, 2022**



Photograph No. 3: Looking at Wetland C from flag C6.



Photograph No. 4: Looking into Wetland D.

**WETLANDS PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 5 & 6, 2022**



Photograph No. 5: Looking into Wetland E from flag E7.



Photograph No. 6: Looking into Wetland F.

**WETLANDS PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 5 & 6, 2022**



Photograph No. 7: Looking into Wetland G near flag G5.



Photograph No. 8: Looking into Wetland H from flag H7.



**WETLANDS PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 5 & 6, 2022**



Photograph No. 9: Looking into Wetland I.



Photograph No. 10: Looking into Wetland J.

**WETLANDS PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 5 & 6, 2022**



Photograph No. 11: Looking into Wetland K near flag K7.



Photograph No. 12: Looking into Wetland L.

**WETLANDS PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 5 & 6, 2022**



Photograph No. 13: Looking into a forested portion of Wetland M.



Photograph No. 14: Looking into the emergent wetland within Wetland M.

**WETLANDS PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 5 & 6, 2022**



Photograph No. 15: Looking at the intermittent stream in Wetland M.



Photograph No. 16: Looking into Wetland N.

**WETLANDS PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 5 & 6, 2022**



Photograph No. 17: Looking into Wetland P.



## **Appendix C – Vernal Pool Photo Log**

**VERNAL POOL PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 3, 2022**



Photograph No. 1: Looking at Vernal Pool 1.



Photograph No. 2: Looking at spotted salamander egg mass in Vernal Pool 1.

**VERNAL POOL PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 3, 2022**



Photograph No. 3: Looking at Vernal Pool 2.



Photograph No. 4: Looking at a spotted salamander egg mass in Vernal Pool 2.



**VERNAL POOL PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 3, 2022**



Photograph No. 5: Looking at Vernal Pool 3.



Photograph No. 6: Looking at spotted salamander egg masses in Vernal Pool 3.

**VERNAL POOL PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 3, 2022**



Photograph No. 7: Looking at Vernal Pool 4.



Photograph No. 8: Looking at spotted salamander egg masses in Vernal Pool 4.

**VERNAL POOL PHOTO LOG**  
**Stevens Hill Road**  
**Nottingham, New Hampshire**  
**Photos Taken: May 3, 2022**



Photograph No. 9: Looking at Vernal Pool 5



Photograph No. 10: Looking at wood frog egg masses in Vernal Pool 5.