



Known for excellence. Built on trust.



WILDLIFE ASSESSMENT REPORT

Meadowbrook Village

44 Meadowbrook Drive
Tax Map 273, Lot 49 and Tax Map 270, Lot 3
Barrington, New Hampshire

June 2021
File No. 04.0191175.00



PREPARED FOR:
Jones & Beach Engineers, Inc.
Stratham, New Hampshire

GZA GeoEnvironmental, Inc.
5 Commerce Park North, Suite 201 | Bedford, NH 03110-6984
603-623-3600

Offices Nationwide
www.gza.com

Copyright© 2021 GZA GeoEnvironmental, Inc.



Known for excellence.
Built on trust.

GEOTECHNICAL

ENVIRONMENTAL

ECOLOGICAL

WATER

CONSTRUCTION
MANAGEMENT

5 Commerce Park North
Suite 201
Bedford, NH 03110
T: 603.623.3600
F: 603.624.9463
www.gza.com



Via Email

June 30, 2021
File No. 04.0191175.00

Jones & Beach Engineers, Inc.
Attn: Barry Gier
85 Portsmouth Avenue
PO Box 219
Stratham, New Hampshire 03885

Re: Wildlife Assessment Report
Meadowbrook Village
44 Meadowbrook Drive
Tax Map 273, Lot 49 & Tax Map 270, Lot 3 (59 acres)
Barrington, New Hampshire

Dear Mr. Gier:

GZA GeoEnvironmental, Inc. (GZA) is pleased to submit the attached Wildlife Assessment Report in support of an Alteration of Terrain permit for proposed construction at 44 Meadowbrook Drive (i.e., Tax Map 273, Lot 49 and Tax Map 270, Lot 3) in Barrington, New Hampshire (Site). This report summarizes the results of the field work completed on December 29, 2020 to document and assess the potential for threatened, endangered, and special concern wildlife species on the Site.

Please contact Tracy Tarr at 603-235-6992 or tracy.tarr@gza.com if you have any questions or concerns.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Logan Young
Scientist I

Deborah M. Zarta Gier, CNRP
Consultant/Reviewer

Tracy L. Tarr, CWS, CESSWI
Associate Principal

LTY/TLT/DMZ

p:\04\jobs\0191100s\04.0191175.00\work\04.0191175.00 Barrington.docx

Attachment: Wildlife Assessment Report



TABLE OF CONTENTS

PART 1: SUMMARY AND FINDINGS.....1

1.1 PROPOSED PROJECT1

1.2 THREATENED AND ENDANGERED WILDLIFE AND HABITAT1

1.3 PROPOSED CONSERVATION MEASURES2

PART 2: NHB DATACHECK RESULTS LETTER AND FIGURES.....4

PART 3: DETAILED EVALUATION5

3.1 INTRODUCTION5

3.2 PROJECT DESCRIPTION6

3.2.1 SCOPE OF WORK.....6

3.2.2 DESCRIPTION OF WORK AREA AND SURROUNDING LAND USES.....6

3.3 METHODOLOGY.....6

3.3.1 WILDLIFE HABITAT MAPPING6

3.3.2 DOCUMENTATION OF WILDLIFE7

3.4 HABITAT MAPPING AND WILDLIFE DOCUMENTATION RESULTS.....8

3.4.1 UPLAND WILDLIFE HABITATS8

3.4.1.1 *Appalachian Oak-Pine*8

3.4.1.2 *Developed or Barren Land*8

3.4.2 WETLAND WILDLIFE HABITATS9

3.4.2.1 *Temperate Swamp*9

3.4.2.2 *Floodplain Forest Habitat*.....10

3.4.2.3 *Marsh/Shrub Wetland Habitat*.....11

3.4.2.4 *Stream Habitat*12

3.4.2.5 *Open Water Habitat*13

3.4.2.6 *Vernal Pool Habitat*13

3.4.3 THREATENED, ENDANGERED, AND SPECIAL CONCERN WILDLIFE SPECIES..... 14

3.4.3.1 *American Brook Lamprey*15

3.4.3.2 *American Eel*.....15

3.4.3.3 *Banded Sunfish*15

3.4.3.4 *Blanding’s Turtle*.....15

3.4.3.5 *Eastern Box Turtle*16

3.4.3.6 *Little Brown Bat*.....16

3.4.3.7 *Northern Black Racer*.....16

3.4.3.8 *Smooth Green Snake*17

3.4.3.9 *Spotted Turtle*.....17

3.4.3.10 *Swamp Darter*.....17

3.4.3.11 *Wood Turtle*18



3.4.4	POTENTIAL IMPACTS AND PROPOSED CONSERVATION MEASURES	30
3.5	FINDING AND CONCLUSIONS	31
3.6	REFERENCES	33

PART 4: APPENDICES

APPENDIX A	LIMITATIONS
APPENDIX B	NHB MEMO
APPENDIX C	WILDLIFE HABITAT ASSESSMENT FIELD DATA FORM
APPENDIX D	QUALIFIED WILDLIFE BIOLOGIST RESUMES

FIGURES

FIGURE 1	LOCUS PLAN
FIGURE 2	AERIAL OVERVIEW
FIGURE 3	COVER TYPE OVERLAY
FIGURE 4	2020 WILDLIFE ACTION PLAN LAND COVER
FIGURE 5	2020 WILDLIFE ACTION PLAN HABITAT TIERS
FIGURE 6	“OPEN SPACE CONCEPTUAL PLAN #1” – PREPARED BY JONES & BEACH ENGINEERS, INC.



PART 1: SUMMARY AND FINDINGS

1.1 PROPOSED PROJECT

This report presents the results of the wildlife assessment conducted by GZA GeoEnvironmental, Inc. (GZA) in support of the submittal of an Alteration of Terrain permit to New Hampshire Department of Environmental Services (NHDES) for proposed construction in Barrington, New Hampshire (see table below). 21 Boylston Street, LLC is seeking to permit the construction of a proposed subdivision on Tax Map 273, Lot 49 and Tax Map 270, Lot 3, located off of 44 Meadowbrook Drive. The Site is proposed to be subdivided into 11 lots and associated open space, with access from Meadowbrook Drive. The proposed project area is comprised of approximately 59 acres of Appalachian Oak-Pine, Developed or Barren land, Temperate Swamp, Floodplain Forest, Marsh/Shrub Wetland, Open Water, Stream, and potential Vernal Pool habitat.

WILDLIFE BIOLOGIST:	Tracy L. Tarr, CWS, CESSWI	NHB FILE:	NHB20-4008
COMPANY:	GZA GeoEnvironmental, Inc.	PROJECT NAME:	Meadowbrook Village
COMPANY ADDRESS:	5 Commerce Park North Suite 201 Bedford, NH 03110	PROJECT ADDRESS:	44 Meadowbrook Drive (Tax Map 273, Lot 49 and Tax Map 270, Lot 3), Barrington, NH
BIOLOGIST E-MAIL:	tracy.tarr@gza.com	APPLICANT:	21 Boylston Street, LLC
BIOLOGIST PHONE NUMBER:	603-235-6992	AoT APPLICATION:	TBD

In GZA’s opinion, the following selection describes our findings.

PHASE I Threatened and Endangered Wildlife and Habitat Assessment Findings:

Check one

- No threatened and endangered wildlife and habitat present, no threatened or endangered wildlife, habitat, or wildlife corridors likely to be impacted by project activities.
- Threatened and endangered wildlife and habitat present; HOWEVER, NO threatened or endangered wildlife, habitat, or wildlife corridors likely to be impacted by project activities. No conservation measures are proposed.
- Threatened and endangered wildlife and habitat present or wildlife corridors present. Proposed actions have the potential for impacts. Conservation measures incorporated into the proposed project or project design.

1.2 THREATENED AND ENDANGERED WILDLIFE AND HABITAT

- American brook lamprey (*Lethenteron appendix*), American eel (*Anguilla rostrata*), banded sunfish (*Enneacanthus obsesus*), Blanding’s turtle (*Emydoidea blandingii*), eastern hognose snake (*Heterodon platirhinos*), smooth green snake (*Opheodrys vernalis*), spotted turtle (*Clemmys guttata*), and vesper sparrow (*Poocetes gramineus*) are known to occur in the vicinity of the project (see NHB Memo NHB20-4008). The Site contains streams and open water that are reported to provide habitat for American eel and banded sunfish and may support American brook lamprey and swamp darter. The Site also contains areas of emergent wetlands dominated by grass and sedge species which may support smooth green snake, and wetland habitats



and exposed soils which may provide habitat and potential nesting locations for Blanding's turtle, spotted turtle, and wood turtle.

- The Site contains Appalachian Oak-Pine, Developed or Barren land, Temperate Swamp, Floodplain Forest, Marsh/Shrub Wetland, Open Water, Stream, and potential Vernal Pool habitat.
- Based on habitat evaluation, GZA ranked 11 endangered, threatened, or special concern species as having potential to occur on or immediately adjacent to the Site including American brook lamprey, American eel, banded sunfish, Blanding's turtle, eastern box turtle, little brown bat, northern black racer, smooth green snake, spotted turtle, swamp darter, and wood turtle. American eel and banded sunfish are known to occur on the property. The remaining species are not known to occur at the Site but are potential based on review of habitat types and rare species records within the municipality.

1.3 PROPOSED CONSERVATION MEASURES

1. The project design includes an approximately 48.6-acre common area which includes six habitat types. This serves to promote and maintain rare species habitat on the Site and maintains connectivity between uplands and wetlands.
2. The project includes a 50-foot wetland buffer to wetlands adjacent to proposed construction areas and a 100-foot buffer to the prime wetland complex in the central and western portions of the Site, as required by the Town of Barrington's wetland ordinance, to maintain vegetated habitat around Caldwell Brook and associated wetlands at the Site. The incorporation of this buffer will serve to preserve habitat, travel corridors, and water quality, benefitting rare wetland species (e.g. American eel, banded sunfish, and spotted turtle).
3. If possible, avoid removal of existing structures at the Site from May 15 to August 15 to minimize and prevent impacts to little brown bat maternity colonies, if present.
4. Utilize "wildlife friendly" matting consisting of coco or jute, and lacking plastic mesh, if matting is utilized for final stabilization. Welded plastic or "biodegradable plastic" netting or thread (e.g., polypropylene) should not be used, per NHFG feedback on similar projects.
5. Add Blanding's turtle, eastern box turtle, northern black racer, smooth green snake, spotted turtle, and wood turtle identification information to plans. If observed during construction, contact NHFG immediately upon observation, and safely relocate amphibians and reptiles out of construction areas if observed. Observations of threatened and endangered species should be reported to NHFG by email at RAARP@wildlife.nh.gov and Melissa.Doperalski@wildlife.nh.gov, with photographs (if available).




Printed name, date and signature of Individual that conducted the Phase I Threatened and Endangered Wildlife and Habitat Assessment.

Tracy L. Tarr, CWS, CESSWI

Name – printed

June 30, 2021

Date



Signature

Check Applicable Requested Action

- Request for NHFG Concurrence with Findings in compliance with Env. Wq. 1503.19(h)(1)a
- Request for NHFG Concurrence with Findings and Proposed Conservation Measures in compliance with Env. Wq. 1503.19(h)(1)b*
- Requests further coordination with NHFG to discuss proposed conservation measures and/or potential focused survey needs (Phase II)*
- Other



PART 2: NHB DATACHECK RESULTS LETTER AND FIGURES

See **Appendix B** in **Part 4: Appendices** for NHB Datacheck Results Letter (i.e., Memo). The following Figures, consistent with NHDES AoT requirements have been included in the **Figures** section at the end of this document:

- | | |
|----------|---|
| FIGURE 1 | LOCUS PLAN |
| FIGURE 2 | AERIAL OVERVIEW |
| FIGURE 3 | COVER TYPE OVERLAY |
| FIGURE 4 | 2020 WILDLIFE ACTION PLAN LAND COVER |
| FIGURE 5 | 2020 WILDLIFE ACTION PLAN HABITAT TIERS |
| FIGURE 6 | “OPEN SPACE CONCEPTUAL PLAN #1” – PREPARED BY JONES AND BEACH ENGINEERS, INC. |



PART 3: DETAILED EVALUATION

3.1 INTRODUCTION

This report presents the results of the wildlife assessment conducted by GZA GeoEnvironmental, Inc. (GZA) in support of the submittal of an Alteration of Terrain permit to NHDES for proposed construction at 44 Meadowbrook Drive (i.e., Tax Map 273, Lot 49 and Tax Map 270, Lot 3) in Barrington, New Hampshire. This report was prepared to address the requirements of Env-Wq 1503.19 and RSA 212-A:9, III, which requires a report to document that a project “will not appreciably jeopardize the continued existence of state or federally threatened and endangered species.” The Site totals approximately 59 acres and is located west of Meadowbrook Drive (i.e., Site, see **Figure 1 - Locus Plan**; **Figure 2 - Aerial Overview**; **Figure 3 - Cover Type Overlay**; **Figure 4 – 2020 Wildlife Action Plan Land Cover**, and **Figure 5 – 2020 Wildlife Action Plan Habitat Tiers**).

21 Boylston Street, LLC is proposing to construct an open space residential subdivision at the Site. The project includes subdivision of 11 residential lots with private drinking wells, overhead utilities, and associated paved access from Meadowbrook Drive (**Figure 6 – Open Space Conceptual Plan #1**). In addition, the project includes a 48.6-acre area of open space.

GZA was retained by Jones & Beach Engineers, Inc. (JBE), the project engineer, to prepare a wildlife assessment per Env-Wq 1503.19, and as required by RSA 212-A:9, III, wherein the applicant must demonstrate that the project will not “appreciably jeopardize the continued existence of state or federally threatened and/or endangered species” for a permit to be issued. This assessment included the following components:

- Review existing georeferenced wildlife habitat data available through the New Hampshire Wildlife Action Plan (WAP) to characterize the regional significance and landscape connectivity of the Site;
- Describe wildlife habitat types and observed wildlife species;
- Assess the potential for currently listed New Hampshire or federally threatened, endangered wildlife species, or special concern species (see “Rare Plants, Rare Animals, and Exemplary Communities in New Hampshire Towns,” published by the New Hampshire Natural Heritage Bureau [NH NHB], dated July 2020);
- Assess the potential for Species of Greatest Conservation Need (see “Species Occurring in New Hampshire,” at <https://wildlife.state.nh.us/wildlife/species-list.html>);
- Identify potential BMPs for limiting impacts to endangered, threatened, special concern, and species of greatest conservation need; and
- Prepare a report summarizing methods, observations, and findings of the field assessment, consistent with reporting requirements outlined in “Phase I Threatened and Endangered Wildlife and Habitat Assessment Outline and Template, Version 1, dated 9/25/20, published by NHFG.

GZA completed wildlife assessment field work on December 29, 2020. It is our understanding that documentation from this effort will be used by 21 Boylston Street, LLC, in their submittal of an Alteration of Terrain permit to NHDES. This report is subject to the Limitations in **Appendix A**.



3.2 PROJECT DESCRIPTION

3.2.1 SCOPE OF WORK

Professional services provided by GZA within the work area described below included:

- *Review of existing georeferenced statewide data to assess landscape context of the Site.* GZA reviewed WAP habitat mapping and habitat ranking. In addition, GZA submitted a NH NHB query (NHB20-4008) for locations of rare species to assess whether rare species are known to occur on the Site. GZA also reviewed the NH NHB document titled “Rare Plants, Rare Animals, and Exemplary Communities in New Hampshire Towns” (NH NHB 2020) to assess the potential for rare vertebrates at the Site.
- *Assessment and classification of habitat types.* GZA mapped habitat types to assess habitat rarity and predict wildlife usage on the Site. The habitat assessment was completed by Wildlife Biologists Logan Young and Nyssa Seekamp on December 29, 2020, under the direction of Wildlife Biologist Tracy Tarr. Ms. Seekamp has a B.S. in Marine, Estuarine, and Freshwater Biology, Mr. Young has a B.S. in Environmental Conservation, and Ms. Tarr has a B.S. in Wildlife Management and an M.S. in Wildlife Ecology: Natural Resources.
- *Documentation of wildlife (observed and potential).* As part of documentation, GZA completed visual observations for wildlife and wildlife sign (i.e., tracks, scat, feathers) along random traverse routes across the Site on December 29, 2020. Wildlife tracking surveys, habitat survey, and visual and acoustic species survey were completed by Mr. Young and Ms. Seekamp, under the direction of Tracy Tarr.

3.2.2 DESCRIPTION OF WORK AREA AND SURROUNDING LAND USES

Based on materials prepared by JBE and field review of current conditions, the Site contains a residential structure and associated paved areas to the east and a gravel access road from Meadowbrook Drive. Remaining cover is mixed forested habitat, forested wetlands, and emergent wetlands. Evidence of recent logging was observed in the eastern forested areas of the Site. Based on a review of historic aerial imagery available from Google Earth, the existing residential home has been in place since 1992. The Site is bordered to the north by wooded land and residences, to the east by residences and Meadowbrook Drive, to the south by residences and a wetland complex, and to the west by residences and Two Mile Road.

A portion of Caldwell Brook and several smaller tributary streams are located within the Site boundaries. The Site is located 0.7 miles northwest of Wheelwright Pond and 1.3 miles east of Little River, a tributary of the Oyster River, which is an important corridor where rare species are known to occur. The Site is also located 0.3 miles north of a 28-acre area of conserved land associated with a residential development at Steppingstones Road in the Town of Lee, and 0.4 miles south of the Tamposi Water Supply Reserve, a 15,00-acre area of land conserved by the Town of Barrington. This landscape position is considered in the following narrative.

3.3 METHODOLOGY

3.3.1 WILDLIFE HABITAT MAPPING

GZA assessed habitat conditions on December 29, 2020 by conducting vegetation assessments along random traverse routes and in random plant plot locations throughout the property. GZA identified dominant plant species along random traverse routes and plots to describe the vegetation composition of individual areas.



Habitat boundaries were determined by assessing major changes in vegetation through aerial photograph interpretation and field reconnaissance. Upland habitat classifications were based on habitats recognized in the New Hampshire WAP and further refined in DeGraaf and Yamasaki 2001. Upland habitats include Appalachian Oak-Pine, Developed or Barren land, Temperate Swamp, Floodplain Forest, Marsh/Shrub Wetland, Open Water, Stream, and potential Vernal Pools (see **Figure 3 - Cover Plan Overlay**). Wetland boundaries were delineated by GZA in 2020.

GZA utilized the WAP and Wildlife Habitat Assessment Field Data Form, developed with guidance from the NHFG, New Hampshire Audubon, and the University of New Hampshire (UNH) Cooperative Extension, to develop a datasheet for wildlife assessment required under New Hampshire Administrative Rule Env-Wq 1503.19 and RSA 212-A:9, III. The form specifically documents the presence of major wildlife habitat types, which are known to provide potential habitat to rare species based on the New Hampshire WAP (see **Appendix C**). In addition, GZA utilized the New Hampshire NHB memo for the project to determine if any rare species or exemplary natural communities are known to occur on the project Site (NHB20-4008, see **Section 2**). Additionally, the town based WAP maps developed by the NHFG were reviewed to determine the presence of any regionally significant habitat areas (e.g., highest ranked habitats or supporting landscapes).

To assess the potential impacts of the proposed project on habitats for rare species, GZA created an overlay map of the property of existing wetland and upland habitats. Approximate habitat areas were mapped and calculated in a Geographic Information System (GIS) database.

3.3.2 DOCUMENTATION OF WILDLIFE

The presence of wildlife species on the Site was assessed by identifying species through song, track, and scat identification, as well as direct observations. Birds were assessed along random traverse route using binoculars and by call survey (identifying songs). Mammals were assessed by visual observation and track survey. Amphibians were assessed by call identification and visual identification. Because wildlife species can be cryptic and seasonally active, and in consideration of the timeframe of the assessment (winter), GZA utilized known habitat preferences (see DeGraaf and Yamasaki 2001) to predict potential habitat utilization by rare wildlife species on the Site to supplement information gained from direct observations.

GZA assessed potential for presence by reviewing individual habitat requirements of each species including minimum home range size and breeding habitat requirements, as well as prior documentation in the Town of Barrington. Species considered to have limited to near zero potential to be present on Site based on habitat requirements and previous town records are ranked by GZA as “not likely” to be present. Species with some potential to be present (i.e., if they have general habitat requirements or preferred habitats are found on-site but are not recorded in Barrington as of July 2020, or habitats present are suboptimal), are ranked by GZA as “low” potential. Species that are known to occur near the Site and the Site contains or directly borders preferred habitat or have very general habitat requirements and high tolerance of development are ranked as “possible.” GZA has identified potential BMPs to reduce/eliminate impacts to “possible” potential species, based on guidance provided in the NH WAP and feedback received by the NHFG during project correspondence, as well as for similar projects.



3.4 HABITAT MAPPING AND WILDLIFE DOCUMENTATION RESULTS

3.4.1 UPLAND WILDLIFE HABITATS

The Site contains approximately 27.9% Appalachian Oak-Pine and 27.6% Developed or Barren land cover types (see **Figure 2 - Aerial Overview**; **Figure 3 - Cover Type Overlay**). The Site contains forested land and a developed area with a residential structure and associated paved, impervious surfaces. The northern and western areas of the Site contain “Highest Ranked Habitat in New Hampshire”, and the southern-central area of the Site contains “Highest Ranked Habitat in Biological Region” and “Supporting Landscapes”, as mapped by NHFG (see **Figure 5 - 2020 Wildlife Action Plan Habitat Tiers**).

3.4.1.1 Appalachian Oak-Pine

Approximately 16.9 acres of the Site is Appalachian Oak-Pine habitat. This habitat type is dominated by mid-successional forest in the eastern portion of the Site. During the assessment, evidence of previous logging activity was observed. The canopy layer is dominated by white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), red oak (*Quercus rubra*), and red maple (*Acer rubrum*). Species observed in the shrub layer include white pine, American beech (*Fagus grandifolia*), and highbush blueberry (*Vaccinium corymbosum*). The herbaceous layer contained American wintergreen (*Gaultheria procumbens*), bracken fern (*Pteridium aquilinum*), and princess pine (*Lycopodium obscurum*). GZA observed resident songbird blue jay (*Cyanocitta cristata*). GZA did not observe any threatened or endangered wildlife.



Photo 1. View of Appalachian Oak-Pine cover type.

3.4.1.2 Developed or Barren Land

Approximately 16.7 acres of the Site is classified as the Developed or Barren Land cover type. This cover type is located in the eastern area of the Site associated with the existing residential home, paved surfaces for access and parking, landscaping, and areas that have been heavily logged since 2018.



The canopy layer contains American beech, white pine, red maple, eastern hemlock, white birch (*Betula papyrifera*), black birch (*Betula lenta*), and yellow birch (*Betula alleghaniensis*). The shrub layer contains white oak (*Quercus alba*) and rhododendron (*Rhododendron maximum*). Dominant plants in the herbaceous layer include raspberry (*Rubus spp.*), aster (*Astereae spp.*), goldenrod (*Solidago spp.*), red oak, white pine, invasive glossy buckthorn (*Frangula alnus*), and grasses (*Gramineae spp.*) maintained as lawn. GZA observed common resident songbirds American goldfinch (*Spinus tristis*) and American crow (*Corvus brachyrhynchos*). GZA also observed evidence of white-tailed deer (*Odocoileus virginianus*). GZA did not observe any threatened or endangered wildlife.



Photo 2. Northerly view of Developed/Barren cover type.



Photo 3. View of residential home and associated paving.

3.4.2 WETLAND WILDLIFE HABITATS

The Site contains approximately 31.9% Marsh/Shrub Wetland 6% Temperate Swamp, 2.5% Open Water, 2.5% Stream, 1.5% Floodplain Forest, and <1% potential Vernal Pool cover types (see **Figure 2 - Aerial Overview**; **Figure 3 - Cover Type Overlay**). The Site contains six wetland habitat types field delineated by GZA. Standing water was observed in all wetland types and flow was observed in stream channels. Four unnamed tributaries and Caldwell Brook, a perennial stream, flow northerly and northeasterly through the Site to a ponded area at the northern Site boundary. Caldwell Brook continues to flow along the northern boundary and northeasterly off-Site. These watercourses are associated with emergent marsh, shrub wetland, floodplain forest, stream, and open water habitats. The wetland complex in the western portion of the Site containing Caldwell Brook is designated as a prime wetland by the Town of Barrington.

3.4.2.1 Temperate Swamp

Approximately 3.2 acres of the Site is classified as the Temperate Swamp cover type. The Temperate Swamp cover type is located in the eastern corner, western edge, southwestern edge of the Site and is intermittently saturated. Small areas of less than one inch of standing water were observed in the western portion of the wetland.

The canopy layer contains white pine, red maple, red oak, white oak, white birch, and yellow birch. The shrub layer includes white pine and highbush blueberry. The herbaceous layer contained sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmundastrum cinnamomeum*), bristly dewberry (*Rubus hispidus*), sheep laurel (*Kalmia*



angustifolia), and grasses. GZA observed red-tailed hawk (*Buteo jamaicensis*) foraging in this habitat. GZA did not observe any threatened or endangered species.



Photo 4. Northerly view of Temperate Swamp habitat.

3.4.2.2 Floodplain Forest Habitat

Approximately 0.97 acres of the Site is classified as the Floodplain Forest cover type. Two areas at the northern Site boundary were observed to be this cover type low elevation areas along Caldwell Brook. This area was observed to be forested and intermittently saturated.

The canopy layer is dominated by eastern hemlock, in association with white pine and red maple. The shrub layer contains American beech, eastern hemlock, and highbush blueberry. The herbaceous layer was observed to contain partridgeberry (*Mitchella repens*), peat moss (*Sphagnum spp.*), and royal fern (*Osmunda regalis*). GZA did not observe any threatened or endangered species.



Photo 5. Easterly view of floodplain forest habitat.

3.4.2.3 Marsh/Shrub Wetland Habitat

Approximately 18.4 acres of the western and central areas of the Site are classified as the Marsh/Shrub Wetland cover type. This cover type is associated with portions of intermittent and perennial stream channels, including Caldwell Brook which flows easterly and northeasterly through the Site. Areas adjoining Caldwell Brook and its southern tributary contain emergent marsh features and are fringed by scrub-shrub wetland in the transitional areas between marsh and upland habitats. Central portions of this cover type are dominated by scrub-shrub cover. Flow was observed in the vicinity of Caldwell Brook, with a water depth of approximately 12 inches observed in saturated areas.

The canopy contains white pine, red maple, and eastern hemlock. The shrub layer is dominated by highbush blueberry, broadleaf cattail (*Typha latifolia*), and maleberry (*Lyonia ligustrina*), in association with leatherleaf (*Chamaedaphne calyculata*), white meadowsweet (*Spiraea alba*), and steepleush (*Spiraea tomentosa*). The herbaceous layer is dominated by grasses and sedges (*Carex spp.*), in association with cinnamon fern and sensitive fern. GZA did not observe any threatened or endangered species.



Photo 6. Westerly view of emergent marsh wetland.



Photo 7. Northerly view of shrub wetland.

3.4.2.4 Stream Habitat

Approximately 1.4 acres of the Site is classified as the Stream cover type. Three perennial stream channels, including Caldwell Brook, and three perennial tributary stream channels are located at the Site and flow northeasterly to an area of open water and Caldwell Brook at the northern Site boundary. Water depths of approximately 3 to 12 inches was observed in stream channels. Flow was observed in all channels, originating west and south from off-site sources and flowing northeasterly to Caldwell Brook and off site.

The canopy is dominated by red maple and American beech. The shrub layer contains white pine, sweet pepperbush, highbush blueberry, and broadleaf cattail. The herbaceous layer contains sensitive fern, cinnamon fern, sheep laurel, and grasses. GZA did not observe any threatened or endangered species.



Photo 8. Northerly view of stream habitat.



3.4.2.5 Open Water Habitat

Approximately 1.4 acres of the Site is classified as the Open Water cover type. This cover type is located at the center-north of the Site and is impounded by a beaver dam to the east. Water with depths greater than 12 inches was observed. Flow was observed originating to the west from Caldwell Brook and continuing east along the northern Site boundary.

The canopy at the edge of this cover type contains white pine, eastern hemlock, and red maple. The shrub layer contains broadleaf cattail, speckled alder (*Alnus incana*), sweet pepperbush, and winterberry (*Ilex verticillata*), in association with white meadowsweet and steeplebush. The herbaceous layer contains bristly dewberry, peat moss, grasses, and sedges. GZA observed evidence of beaver (*Castor canadensis*). GZA did not observe any threatened or endangered species.



Photo 9. Northerly view of open water habitat.



Photo 10. View of beaver dam at north Site boundary.

3.4.2.6 Vernal Pool Habitat

Approximately 0.03 acres of the Site is classified as potential Vernal Pool cover type. One potential vernal pool was observed by GZA in the Appalachian Oak-Pine cover type to the northern-central area of the Site. Approximately six inches of standing water was observed.

The tree canopy is dominated by eastern hemlock and red maple. The shrub layer contains red oak. The herbaceous layer contains peat moss, sheep laurel, cinnamon fern, bristly dewberry, bracken fern (*Pteridium aquilinum*), and grasses. GZA did not observe any threatened or endangered species.



Photo 11. View of potential vernal pool.

3.4.3 THREATENED, ENDANGERED, AND SPECIAL CONCERN WILDLIFE SPECIES

According to NH NHB, American brook lamprey, American eel, banded sunfish, Blanding’s turtle, eastern hognose snake, smooth green snake, spotted turtle, and vesper sparrow are known to occur in the vicinity of the Site, and American brook lamprey and banded sunfish have been reported to occur at the Site. The Site contains Appalachian Oak-Pine, Developed or Barren land, Temperate Swamp, Floodplain Forest, Marsh/Shrub Wetland, Open Water, Stream, and potential Vernal Pool habitats that are considered to have some potential to support federally and state listed wildlife species. Pursuant to Env-Wq 1503.19, the following assessment focuses on state and federal threatened and endangered species. In addition, per NHFG guidance for AoT wildlife assessments, the assessment considers special concern species that are either listed on the NHB report and/or are known to occur in the Town of Barrington. Per NHFG guidance, GZA also provides information on Species of Greatest Conservation Need that were observed on Site or believed to be present based on available information.

As documented in the NH WAP, 67 endangered, threatened, and special concern species have potential to utilize Appalachian Oak-Pine, Developed or Barren land, Temperate Swamp, Floodplain Forest, Marsh/Shrub Wetland, Open Water, Stream, and potential Vernal Pool cover types (see **Appendix C – Field Data Form**). The specific habitat requirements of each of these species and likelihood for potential presence on the Site is discussed below to give context to the potential for these species to occur on the Site (see **Table 1**).

In GZA’s opinion, of the 67 threatened and endangered species known to use Appalachian Oak-Pine, Developed or Barren land, Temperate Swamp, Floodplain Forest, Marsh/Shrub Wetland, Open Water, Stream, and potential Vernal Pool habitats, 11 species have potential to occur on Site. Of these, American brook lamprey, American eel, banded sunfish, Blanding’s turtle, eastern box turtle, little brown bat, northern black racer, smooth green snake, spotted turtle, swamp darter, and wood turtle are ranked as “possible.”



3.4.3.1 American Brook Lamprey

The American brook lamprey is listed as State Endangered. It occupies cool, freshwater streams and small rivers in coastal regions, with known New Hampshire populations limited to the Oyster River watershed. Adults spawn at the head of riffle areas with coarse sand and gravel substrate. After hatching, larval lamprey drift downstream to waters with slow flow, such as areas where fallen, woody debris impound watercourses or beaver dams (NHFG 2015). This species is known to occur in the Site vicinity and a portion of Caldwell Brook, which flows through the Site, is one of three population areas of American brook lamprey in the state. This species is believed to be isolated in a portion of Caldwell Brook east of the Site due to barriers to stream passage up and downstream (NHFG 2015). Due to this, adjacent populations may be unable to reach the Site, however habitats that may support this species are present. The project does not propose any stream impacts and includes a 50-foot wetland buffer, as required by the Town of Barrington's wetland ordinance, to maintain vegetated habitat around Caldwell Brook and other on-site wetlands. As a result, no additional conservation measures/BMPS are recommended.

3.4.3.2 American Eel

The American eel is listed as Special Concern. It occupies a diversity of habitats during its life cycle, including marine, estuarine, and freshwater wetlands, and may be found in any freshwater habitat that can be accessed from the ocean. Larval American eel travel from the Sargasso Sea to estuarine and then freshwater rivers as their life cycle develops. After approximately 3-25 years, they metamorphose to silver eels and migrate back to the sea to spawn and die. Due to the species' single breeding event and extensive migration, eel populations are sensitive to disruptions in stream passages (NHFG 2015). This species is known to occur at the Site in Caldwell Brook, a perennial stream flowing through the Site, is a tributary of the Oyster River which empties to the Atlantic Ocean. The project does not propose any wetland impacts and includes a 100-foot prime wetland buffer to the wetland complex including Caldwell Brook in the western portion of the Site and a 50-foot wetland buffer to all other on-site wetlands, as required by the Town of Barrington's wetland ordinance, preserving vegetated habitats, travel corridors, and water quality. As a result, no additional conservation measures/BMPS are recommended.

3.4.3.3 Banded Sunfish

The banded sunfish is listed as Special Concern. This species is found in a variety of aquatic habitats with stands of submerged aquatic vegetation such as the margins of lakes, ponds, and slow flowing rivers. They may also be found in beaver ponds and small, headwater wetlands, and are highly tolerant of acidic water, allowing them to occupy areas unavailable to other species (NHFG 2015). Banded sunfish are known to occur in Barrington and have been reported at the Site in Caldwell Brook. The project does not propose any wetland impacts and includes a 100-foot prime wetland buffer to the wetland complex including Caldwell Brook in the western portion of the Site and a 50-foot wetland buffer to all other on-site wetlands, as required by the Town of Barrington's wetland ordinance, preserving vegetated habitats, travel corridors, and water quality. As a result, no additional conservation measures/BMPS are recommended.

3.4.3.4 Blanding's Turtle

The Blanding's turtle is listed as State Endangered. This species utilizes a variety of wetlands throughout the year including vernal pools, beaver flowages, marshes, scrub-shrub, and forested wetlands with standing water. Blanding's turtles are known to make routine seasonal movements to vernal pools for foraging and other activities in the spring, as well as for summer rest periods known as aestivation. In addition, Blanding's turtles make large overland movements to nest in anthropogenic habitats such as uplands with exposed, sandy soils. Habitat that



may support this species is present at the Site and Blanding's turtles are reported to occur in the vicinity. The Site contains one potential vernal pool and areas of scrub-shrub, emergent, and forested floodplain wetlands typically utilized by this species. The project does not propose any wetland impacts and includes a 100-foot prime wetland buffer to the wetland complex in the western portion of the Site and a 50-foot wetland buffer to all other on-site wetlands, as required by the Town of Barrington's wetland ordinance, preserving vegetated habitats, travel corridors, and water quality. Providing pre-made NHFG flyers for species identification, to be added to construction plans by the project contractor, is a recommended construction BMP. If Blanding's turtles are observed, turtles should be safely relocated out of the way of construction activities and immediately reported to the NHFG.

3.4.3.5 Eastern Box Turtle

The eastern box turtle is listed as State Endangered. This species is a generalist, utilizing open woodlands, old fields, thickets, and pastures. Eastern box turtles are also known to utilize wetlands and shallow streams, preferring a diversity of habitats in close proximity. Reported sightings in the state are believed to possibly be the result of released pets, with scattered reports occurring in southern and eastern New Hampshire, including Barrington. No reports of eastern box turtles are known in the immediate vicinity; however, the eastern box turtle has been recorded in Barrington and the Site contains a habitat used by this species including open woodlands in close proximity to emergent wetlands and streams, which may provide potential habitat for this species. Providing pre-made NHFG flyers for species identification, to be added to construction plans by the project contractor, is a recommended construction BMP. If eastern box turtles are observed, turtles should be safely relocated out of the way of construction activities and immediately reported to the NHFG.

3.4.3.6 Little Brown Bat

The little brown bat is listed as State Endangered. Prior to the spread of white-nose syndrome, a fungal disease, at hibernaculum (i.e., overwintering sites), the little brown bat was considered very common. It is found statewide and is not restricted to any forest type. In addition, it commonly roosts in buildings. After the rapid spread of white-nose syndrome in New Hampshire circa 2009, little brown bat populations in hibernaculum had declined by 99%. This decline is associated with the fungus, and not specifically to loss of forested habitat. Given the broad habitat use of the little brown bat and its tolerance for human habitation, the species has potential to be present in the summer. The NH WAP recommends that property owners consider avoiding exclusion of bats (e.g., evicting bats from attics) from May 15 - August 15 when maternity colonies may be present.

3.4.3.7 Northern Black Racer

The northern black racer snake (i.e., racer) is listed as State Threatened. This species is known to utilize large tracts of land consisting of mixed forest and a variety of early successional habitats including old fields, meadows, and forest/swamp/marsh edges (Kjoss and Litvaitis 2001). Racers typically occur in terrestrial sites (Ernst and Ernst 2003 in Mays and Todd 2007) but may utilize moist areas including marshes and swamps. During late fall through winter, racers hibernate in a variety of places including mammal burrows, rock crevices/caves, stone walls, cisterns/wells, and rotting logs (Ernst and Barbour 1989). No reports of northern black racers are known in the immediate vicinity; however, the areas the Site contains areas of open woodlands in the southern, central, and northwestern areas of the Site which may provide potential habitat for this species. Additionally, the western Site boundary abuts a large block of forested woodland with minimal fragmentation which may also provide a corridor through the Site to other supporting habitats. Providing pre-made NHFG flyers for species identification, to be added to construction plans by the project contractor, is a recommended construction BMP. If black racers



are observed, snakes should be safely relocated out of the way of construction activities and immediately reported to the NHFG. If matting is required for slope stabilization, the project should consider “wildlife friendly” matting (e.g., coco or jute matting) to limit and prevent mortality to snakes.

3.4.3.8 Smooth Green Snake

The smooth green snake is listed as Special Concern. This species is typically found in open habitats, typically with dense herbaceous vegetation, including grassy fields, wet meadows, marsh edges, abandoned agricultural land, shrublands, utility rights-of-way, and lightly wooded areas. Smooth green snakes are known to occur in Barrington and have been reported in the vicinity. Approximately 8.5 acres of the emergent marsh wetland are present to the west of the Site in association with Caldwell Brook. These areas contain dense, herbaceous cover which may support this species. Additionally, these areas are within the 100-foot prime wetland buffer and are >500 feet from areas of proposed construction. Providing pre-made NHFG flyers for species identification, to be added to construction plans by the project contractor, is a recommended construction BMP. If smooth green snakes are observed, snakes should be safely relocated out of the way of construction activities and immediately reported to the NHFG. If matting is required for slope stabilization, the project should consider “wildlife friendly” matting (e.g., coco or jute matting) to limit and prevent mortality to snakes.

3.4.3.9 Spotted Turtle

The spotted turtle is listed as State Threatened. This species utilizes a variety of wetlands throughout the year including vernal pools, marshes, woodland streams, and scrub-shrub and forested wetlands with standing water. Spotted turtles are known to make routine seasonal movements to vernal pools for foraging and other activities in the spring. Habitat that may support this species is present at the Site and spotted turtles are reported to occur in the vicinity. The Site contains one potential vernal pool and areas of scrub-shrub and emergent wetlands typically utilized by this species. Developed or barren land cover with exposed soils at the Site may also be utilized for spring/summer nesting habitat, although this has not been observed. The project does not propose any wetland impacts and includes a 100-foot prime wetland buffer to the wetland complex in the western portion of the Site and a 50-foot wetland buffer to all other on-site wetlands, as required by the Town of Barrington’s wetland ordinance, preserving vegetated habitats, travel corridors, and water quality. Providing pre-made NHFG flyers for species identification, to be added to construction plans by the project contractor, is a recommended construction BMP. If spotted turtles are observed, turtles should be safely relocated out of the way of construction activities and immediately reported to the NHFG.

3.4.3.10 Swamp Darter

The swamp darter is listed as Special Concern. This species occurs primarily in the coastal and Lower Merrimack River watersheds and has been recorded in Barrington. Swamp darters may occupy a variety of habitats including impounded or low gradient streams, large rivers with sandy substrate, or shallow areas of lakes and ponds containing muddy substrate, dense vegetation, and accumulated detritus (NHFG 2015). Swamp darter are reported to occur in Barrington and the Oyster River watershed, which includes Caldwell Brook. The Site contains a variety of wetlands associated with Caldwell Brook which may support this species. The project does not propose any wetland impacts and includes a 100-foot prime wetland buffer to the wetland complex including Caldwell Brook in the western portion of the Site and a 50-foot wetland buffer to all other on-site wetlands, as required by the Town of Barrington’s wetland ordinance, preserving vegetated habitats, travel corridors, and water quality. As a result, no additional conservation measures/BMPS are recommended.



3.4.3.11 Wood Turtle

The wood turtle is listed as Special Concern. This species utilizes slow-moving streams and rivers, as well as upland habitats bordering riparian zones, often within approximately 600 feet of riparian habitats. Wood turtles forage in uplands in riparian zones, and nest in open sandy and well-drained areas such as meadows, fields, and banks. Wood turtles are reported to occur in Barrington and habitat that may support this species is present at the Site, including stream channels and adjacent uplands typically utilized by this species. Developed or barren land cover with exposed soils at the Site may also be utilized for spring/summer nesting habitat, although this has not been observed. The project does not propose any wetland impacts and includes a 100-foot prime wetland buffer to the wetland complex in the western portion of the Site and a 50-foot wetland buffer to all other on-site wetlands, as required by the Town of Barrington’s wetland ordinance, preserving vegetated habitats, travel corridors, and water quality. Providing pre-made NHFG flyers for species identification, to be added to construction plans by the project contractor, is a recommended construction BMP. If wood turtles are observed, turtles should be safely relocated out of the way of construction activities and immediately reported to the NHFG.

Table 1. Summary of NH Threatened, Endangered, and Special Concern Wildlife Associated with On-site Habitat Types.

Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
American brook lamprey	Rivers and streams	Not federally listed	State Endangered	Utilizes freshwater streams and small rivers. Spawns at the head of riffle areas over coarse sand and gravel with stones. In NH, only recorded in Oyster River watershed. Reported to occur in the Site vicinity.	Possible
American bumble bee	Developed, Grassland, Shrubland	Not federally listed	Special Concern	Ground-nesting bumble bee that occurs in meadows, crop fields, orchards, and gardens. Nectar plants include thistle, bunch berry, purple coneflower, Joe-Pye-weed, sunflower, St. John’s wort, goldenrods, and clovers. The Site contains habitat that may support this species, however areas containing extensive flowering plant cover required by this species were not observed.	Low
American eel	Rivers and streams, Pond	Not federally listed	Special Concern	Relatively common in coastal rivers in New Hampshire. Spawns in the Sargasso Sea and migrates into estuaries and freshwater rivers where they mature. May be found in any freshwater wetland with access to the ocean. After approximately 3-25 years, the yellow eel stage metamorphoses into silver eels, and then migrate back to the Sargasso Sea to spawn and die. Reported to occur at the Site.	Possible
American kestrel	Developed, Grassland, Shrubland	Not federally listed	Special Concern	Occupies a diversity of habitats including forested edges, grasslands, pastures, utility ROWs, marshes, beaver	Not Likely



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
				complexes, and suburban areas. Requires nest cavities in trees (minimum 12-inch diameter at breast height) and elevated perches for hunting. Known to occur in Barrington, however the Site and surrounding landscapes do not provide critical habitat components required by this species.	
Appalachian tiger beetle	Rivers and streams	Not federally listed	Special Concern	Prefers cool, rocky rivers and streams. Not reported to occur in Barrington as of July 2020.	Not Likely
Atlantic sturgeon	Rivers and streams	Federally Threatened	State Threatened	Anadromous fish that spawns in fresh and brackish waters and returns to salt water in the fall. The Site lacks critical habitat components required by this species.	Not Likely
Bald eagle	Appalachian Oak-Pine, Spruce-Fir, Northern Hardwood-Conifer, Hemlock-Hardwood-Conifer, Floodplain Forest, Marsh-Shrub Wetland, Rivers and streams, Pond and Lake	Protected by the Bald & Golden Eagle Protection Act	Special Concern	Known to occur in Barrington. Found in association with aquatic habitats such as large lakes, rivers, and coastal estuaries. Nests often in forested areas adjacent to water bodies and avoids human disturbance. The Site is bordered by residences to the north, east, and west, and lacks critical habitat features for this species.	Not Likely
Banded sunfish	Rivers and streams, Pond	Not federally listed	Special Concern	Prefer vegetated areas of ponds, lakes, and backwaters of lowland streams. May be found in low gradient headwater streams with beaver activity. Reported to occur at the Site.	Possible
Bank swallow	Rivers and streams, Pond, Grassland, Marsh/Shrub Wetland	Not federally listed	Special Concern	Inhabits grasslands, fields, or open areas adjacent to water. Requires exposed, vertical banks along rivers, lakes, and oceans where regular erosion occurs. The Site lacks critical habitat features for this species.	Not Likely
Blanding's turtle	Temperate Swamp, Marsh/Shrub Wetland, Vernal Pool	Not federally listed	State Endangered	Utilizes a diversity of wetland types, as well as exposed, sandy anthropogenic soils for nesting. Beaver flowages, marshes, permanently flooded scrub-shrub/forested wetlands, and vernal pools are preferred summer and overwintering habitat. Females make large overland movements and may	Possible



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
				travel 1 km to reach nesting locations. Known to occur in the Site vicinity and may use exposed soils at the Site during nesting. Identification information should be added to Site plans. Contact NHFG immediately upon observation, and safely relocate reptiles outside of construction areas if observed.	
Blue-spotted/Jefferson salamander complex	Appalachian Oak-Pine, Northern Hardwood-Conifer, Hemlock-Hardwood Conifer, Floodplain Forest, Northern Swamp, Temperate Swamp, Peatland, Marsh/Shrub Wetland, Vernal Pool	Not federally listed	Special Concern	A potential vernal pool was identified at the Site which may provide required habitat features for this species. This species has not been reported to occur in Barrington but is present in surrounding towns and may be under reported.	Low
Blueback herring	Pond, Estuarine, Marine	Not federally listed	Special Concern	Inhabit coastal waters but migrate to freshwater rivers and streams to spawn, preferring waters with moderately flowing currents. Historically reported in the Oyster River watershed, which includes Caldwell Brook, however, on-Site currents were observed to be slow-moving and unlikely to provide critical habitat features required to support this species.	Not Likely
Bridle shiner	Pond	Not federally listed	State Threatened	Found in waters containing dense communities of submerged aquatic vegetation, such as shorelines and lake/pond cove wetlands associated with large river backwaters and slow-flowing streams. Historically reported in Barrington, populations in the Oyster River watershed were limited to Mill Pond, and are reported to have been extirpated in the 1970's.	Not Likely
Brook floater	Rivers and streams	Not federally listed	State Threatened	Prefer well-oxygenated streams and rivers with high to moderate flows. Often found in gravel and sand among cobble in nutrient-poor streams. Not reported to occur in Barrington as of July 2020.	Not Likely



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
Burbot	Rivers and streams, Pond	Not federally listed	Special Concern	A native cold-water fish found in medium and large lakes with deep water in NH. Also found in cold water rivers and streams in the Connecticut, upper Merrimack Saco, and Androscoggin River drainages. Not reported to occur in Barrington as of July 2020.	Not Likely
Cerulean warbler	Appalachian Oak-Pine, Floodplain forest	Not federally listed	Special Concern	Requires extensive (>250 ha) mature deciduous forests. Not reported to occur in Barrington as of July 2020.	Not Likely
Cliff swallow	Developed, Grassland	Not federally listed	State Threatened	Requires vertical substrates with overhangs for nesting, a mud supply for nest construction, a water source, and open foraging areas, such as fields, near nest sites. Not reported to occur in Barrington as of July 2020.	Not Likely
Cobblestone tiger beetle	Rivers and streams	Not federally listed	State Endangered	Inhabits sandy cobble beaches on the upstream ends of island and along the banks of rivers. Five populations known in NH, all within the Connecticut River watershed. Not reported to occur in Barrington as of July 2020.	Not Likely
Common gallinule	Marsh/Shrub Wetland	Not federally listed	Special Concern	Breeds in freshwater wetlands containing dense mixes of emergent and floating vegetation. Only recorded in three sites since 1990 and believed to possibly be extirpated from NH. Not reported to occur in Barrington as of July 2020.	Not Likely
Common loon	Pond and Lake, Rivers and streams	Not federally listed	State Threatened	Widely distributed to freshwater lakes and large rivers, preferring open water >2 acres. Prefers nesting areas in marshes, islands, and shorelines. Reported to occur in Barrington, however the Site lacks habitat features critical to this species.	Not Likely
Common nighthawk	Appalachian Oak-Pine, Hemlock-Hardwood-Conifer, Developed, Pine Barren, Rocky Ridge/Cliff/Talus	Not federally listed	State Endangered	Prefers open areas including grasslands, cultivated fields, woodland clearings, beaches, railroad rights-of-way, and flat gravel roofs. Not reported to occur in Barrington as of July 2020.	Not Likely
Coppery Emerald	Appalachian Oak-Pine, Temperate Swamp	Not federally listed	Special Concern	Only NH population reported to occur in Kingston. Usually occurs in forested peatlands, such as cedar swamps, not present at the Site. Not reported to occur in Barrington as of July 2020.	Not Likely
Dwarf wedgemussel	Rivers and streams	Federally Endangered	Federally Endangered	Inhabits small streams and large rivers with moderate flow. Prefer hydrologically stable areas with a variety of substrates.	Not Likely



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
				NH populations are associated with the Connecticut River watershed. Not reported to occur in Barrington as of July 2020.	
Eastern box turtle	Appalachian Oak-Pine, Hemlock-Hardwood-Conifer, Temperate Swamp, Marsh/Shrub Wetland, Grassland, Shrubland	Not federally listed	State Endangered	Utilizes open woodlands but is generally close to water such as marshes, bogs, ponds, and stream banks. Prefers old fields and clearings with sandy soils for nesting. Reported to occur in Barrington.	Possible
Eastern hognose snake	Appalachian Oak-Pine, Hemlock-Hardwood-Conifer, Marsh/Shrub Wetland, Vernal Pool, Pine Barren, Shrubland	Not federally listed	State Endangered	Utilizes beaches, fields, and dry open pine or deciduous woodlands. Prefers areas with sandy soils such as former sand or gravel quarries. Reported to occur in the vicinity, however has not been reported in the vicinity within the past 20 years. The Site contains extensive wetlands habitats and lacks sandy upland soils required by this species.	Not Likely
Eastern pondmussel	Pond	Not federally listed	State Endangered	Inhabits ponds, lakes, and low velocity segments of streams and rivers containing fine sands or other soft sediments. Not reported to occur in Barrington as of July 2020.	Not Likely
Eastern red bat	Appalachian Oak-Pine, Spruce-Fir, Hemlock-Hardwood-Conifer, Northern Hardwood-Conifer, Floodplain Forest, Northern Swamp, Temperate Swamp	Not federally listed	Special Concern	Uses a variety of hardwood and softwood habitats, especially with still water, along roads/trails, and in regenerating and older age classes. Most active over water in early evening. Summer roosts in dense foliage and tree crowns. Similar to other bats, decimated by white-nose syndrome. Not reported to occur in Barrington as of July 2020.	Not Likely
Eastern small-footed bat	Appalachian Oak-Pine, Hemlock-Hardwood-Conifer, Northern	Not federally listed	State Endangered	Females form small maternity colonies, often in rocky crevices of cliffs and sometimes in crevices in buildings. Favors drafty, cool, and dry hibernacula such as entrances of mines and caves.	Not Likely



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
	Hardwood-Conifer, Caves and Mines, Rocky Ridge/Cliff/Talus			Not reported to occur in Barrington as of July 2020.	
Eastern whip-poor-will	Hemlock-Hardwood-Pine, Appalachian Oak-Pine, Pine Barren, Shrubland	Not federally listed	Special Concern	Prefers open woodland near early successional forests, large clearings, or fields. Species is ground nesting and prefers dry substrate out of flood-prone areas. Not reported to occur in Barrington as of July 2020.	Not Likely
Finescale dace	Rivers and streams, Pond	Not federally threatened	Special Concern	Prefers lower gradient, cool headwater streams and small ponds with cover and aquatic vegetation. NH populations only known in Coos and Sullivan counties. Not reported to occur in Barrington as of July 2020.	Not Likely
Fowler's toad	Appalachian Oak-Pine, Marsh/Shrub Wetland, Vernal Pool, Rivers and streams, Pond, Shrubland, Pine Barren, Dune	Not federally listed	State Threatened	Occurs mainly in sandy, alluvial soils, dune systems, and scrubby woodlands. Occupies shallow margins of permanent wetlands such as lakes and slow-moving streams. Not reported to occur in Barrington as of July 2020.	Not Likely
Golden eagle	Appalachian Oak-Pine, Spruce-Fir, Northern Hardwood-Conifer, Hemlock-Hardwood-Conifer, Rocky Ridge/Cliff/Talus	Protected by the Bald & Golden Eagle Protection Act	State Endangered	Utilizes a variety of open habitats, especially in mountainous terrain. Typically nests on mountain cliffs associated with coniferous forest. Hunts over open areas and prefers remote locations with low human disturbance. Not reported to occur in Barrington as of July 2020.	Not Likely
Hoary Bat	Appalachian Oak-Pine, Spruce-Fir, Hemlock-Hardwood-Conifer, Northern Hardwood-Conifer, Floodplain Forest, Northern Swamp, Temperate Swamp	Not federally listed	Special Concern	Prefers coniferous forests but also utilizes deciduous forests. Roosts in foliage, hollow trees, and woodpecker cavities in the summer. Uncommon and not reported to occur in Barrington as of July 2020.	Not Likely



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
Kennedy's emerald	Temperate Swamp, Marsh/Shrub Wetland	Not federally listed	Special Concern	Occurs in bogs, fens, and swamps with flowing water not found in the vicinity of the Site. NH populations only recorded in northern regions of the state. Not reported to occur in Barrington as of July 2020.	Not Likely
Lake whitefish	Pond	Not federally listed	Special Concern	Pelagic, cool water species requiring large rivers or deep, cold lakes. Spawn in shallow water reefs or tributaries with rocky substrates. NH populations only recorded in central NH. Not reported to occur in Barrington as of July 2020.	Not Likely
Least bittern	Marsh/Shrub Wetland	Not federally listed	Special Concern	Found in freshwater and brackish marshes containing dense vegetation. Prefers wetland habitats >12.5 acres in size containing tall, emergent vegetation dispersed with open water (summarized in DeGraaf and Yamasaki 2001). Not reported to occur in Barrington as of July 2020.	Not Likely
Little brown bat	Appalachian Oak-Pine, Spruce-Fir, Hemlock-Hardwood-Conifer, Northern Hardwood-Conifer, Floodplain Forest, Temperate Swamp, Pine Barren, Caves and Mines	Not federally listed	State Endangered	Found statewide in all forest types and utilize buildings and caves. Forages over wetlands, streams, and open areas. Previously very common but impacted by white-nose syndrome like many other NH bats, with a 99% decline in numbers at hibernaculum sites. Not recorded formally in Barrington as of July 2020 but previously very common prior to white-nose syndrome. Per the WAP, primary protection strategy in NH is to protect summer colonies by prohibiting exclusion of bats from buildings from May 15-Aug 15.	Possible
Marbled salamander	Appalachian Oak-Pine	Not federally listed	State Endangered	Requires temporary, fishless ponds (i.e., vernal pools) for breeding. Utilizes forested habitat near palustrine wetlands, with a preference for uplands containing drier substrates than tolerated by most other salamanders. Not reported to occur in Barrington as of July 2020.	Not Likely
Northern harrier	Peatland, Marsh/Shrub Wetland, Grassland, Shrubland, Salt Marsh	Not federally listed	State Endangered	Found in a variety of large, open habitats year-round, such as fields and marshes. Maintains a winter range of predominantly coastal wetlands and a breeding range confined largely to northern portions of the State. Nests on the ground in dense stands of vegetation	Not Likely



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
				near grasslands. Not reported to occur in Barrington as of July 2020.	
Northern black racer	Appalachian Oak-Pine, Hemlock-Hardwood-Conifer, Rocky Ridge/Cliff/Talus, Grassland, Shrubland	Not federally listed	State Threatened	Utilize large tracts of land consisting of mixed forest and openings such as fields. Has high affinity to early successional habitat. Mean home range size in NH is approximately 36 acres. Black racer is known to occur in Barrington. A typical BMP for this species is to add identification information to plans, contact NHFG immediately upon observation, and safely relocate snakes outside of construction areas if observed.	Possible
Northern leopard frog	Rivers and streams, Grassland, Shrubland, Floodplain Forest, Marsh/Shrub Wetland, Pond and Lake	Not federally listed	Special Concern	Utilizes wet meadows and breeds in ponds, marshes, slow shallow streams, and weedy lake shores. Not reported to occur in Barrington as of July 2020.	Not Likely
Northern long-eared bat	Appalachian Oak-Pine, Spruce-Fir, Hemlock-Hardwood-Conifer, Northern Hardwood-Conifer, Caves and Mines	Federally Threatened	State Endangered	Forages over ponds, clearings, and in forests. Requires specific hibernaculum conditions, typically found in mines/caves in winter, and to a lesser degree in man-made features that maintain temperatures between 2 and 7 degrees Celsius during the winter. Dead hardwoods with cavities and/or loose bark are considered important for summer maternity colonies. Similar to other bats, decimated by white-nosed syndrome at hibernaculum sites. Not recorded in Barrington as of July 2020. Where considered present, the USFWS/USACE typically requires protection of known roost trees, protection of hibernaculum, and may request limitation of cutting from June to July during the pup season. No maternity roost trees or hibernaculum are known to occur on or near the Site. Restricting clearing outside of the pup season (June 1 to July 30) is considering a BMP to reduce impacts.	Not Likely
Northern redbelly dace	Rivers and streams, Pond	Not federally threatened	Special Concern	Utilizes lower gradient, cool headwater streams and small ponds with minimal flow and overhanging vegetative cover.	Not Likely



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
				Not reported to occur in Barrington as of July 2020.	
Peregrine falcon	Developed, Rocky Ridge/Cliff/Talus	Not federally listed	State Threatened	Utilizes open habitats and open forested regions typically where there are rocky cliffs with ledges, near water and abundant prey. Sometimes breeds in cities on tall buildings. Not reported to occur in Barrington as of July 2020.	Not Likely
Pied-billed grebe	Peatland, Marsh/Shrub Wetland	Not federally listed	State Threatened	Inhabits ponds or slow portions of streams with dense stands of emergent vegetation with some woody vegetation. Requires habitats between 5 and 12 acres for breeding. Habitat types used by pied-billed grebes are present at the Site, but are not likely to be large enough to support this species. Not reported to occur in Barrington as of July 2020.	Low
Puritan tiger beetle	Rivers and streams	Federally Threatened	State Endangered	Only NH populations are reported along the Connecticut River, where it utilizes sandy riverine beaches, including islands. Larvae burrow between sparse herbaceous vegetation in fine to medium sand particles at the upper margins of beaches. Not reported to occur in Barrington as of July 2020.	Not Likely
Purple martin	Developed, Grassland, Salt Marsh	Not federally listed	Special Concern	Found near salt marshes, fields, and other open, vegetated areas near water sources. Species is almost entirely reliant on man-made housing structures which are absent from the Site. Not reported to occur in Barrington as of July 2020.	Not Likely
Rapids clubtail	Appalachian Oak-Pine, Northern Hardwood-Conifer, Hemlock-Hardwood-Conifer, Floodplain Forest, Rivers and streams	Not federally listed	Special Concern	Found in moderate to large rivers with muddy or silty bottoms, sometimes with interspersed riffles. Adults forage in adjacent forests. NH populations are only reported near the Connecticut River, Merrimack River, and some tributaries. Not reported to occur in Barrington as of July 2020.	Not Likely
Redfin pickerel	Ponds	Not federally listed	Special Concern	Inhabits slow-moving, acidic, tea-colored streams with dense vegetation. Commonly found in brush piles and in low gradient streams flowing through abandoned beaver ponds. Known to occur in Barrington. On-site waters may support this species, however flow, stream gradient, and water quality	Low



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
				required by this species were not observed.	
Ringed boghaunter	Appalachian Oak-Pine, Hemlock-Hardwood-Conifer, Peatland, Temperate Swamp, Marsh/Shrub Wetland	Not federally listed	State Threatened	Requires bogs/wetlands with extensive floating or suspended sphagnum. Known to occur in Barrington, however the Site lacks habitat features required by this species.	Not Likely
Round whitefish	Rivers and streams	Not federally listed	State Threatened	In NH, utilizes medium to large lakes with deep, cold water habitat, and rivers. Spawns in shallow water over cobble and gravel. Not reported to occur in Barrington as of July 2020.	Not Likely
Rusty blackbird	Spruce-Fir, Peatland, Marsh/Shrub Wetland	Not federally listed	Special Concern	Breeds in stunted or regenerating spruce-fir-hardwood forest within 500 meters of a water source, such as streams, ponds, or fens. Not reported to occur in Barrington as of July 2020.	Not Likely
Rusty-patched bumble bee	Developed, Shrubland, Grassland	Endangered	Endangered	Utilizes meadows, crop fields, orchards, gardens and other locations with flowering plants. Nectar plants include sunflowers, asters, goldenrods, honeysuckles, and <i>Vaccinium</i> varieties. The Site contains habitat that may support this species, however areas containing extensive flowering plant cover required by this species were not observed.	Low
Sea lamprey	Rivers and streams	Not federally listed	Special Concern	Spend adult lives in the ocean and return to large or coastal rivers to spawn in freshwater gravel substrate riffles and pond headwaters. Occur in the Connecticut River, Merrimack River, and coastal rivers up to first barriers. Historically reported in Barrington in the Lamprey River. On-site waters do not connect to this watercourse and are therefore not anticipated to support this species.	Not Likely
Shortnose sturgeon	Rivers and streams	Federally Endangered	State Endangered	Spawns in freshwater and utilizes freshwater rivers, estuaries, and nearshore coastal habitat. Not reported to occur in Barrington as of July 2020.	Not Likely
Silver-haired bat	Appalachian Oak-Pine, Spruce-Fir,	Not federally listed	Special Concern	Found in NH in summer. Forages in hardwood clear-cuts, and coniferous or mixed forest near lakes, streams, or	Not Likely



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
	Hemlock-Hardwood-Conifer, Northern Hardwood-Conifer, Northern Swamp, Temperate Swamp			ponds. Typically roosts in tree hollows. Not reported to occur in Barrington as of July 2020.	
Skillet clubtail	Appalachian Oak-Pine, Hemlock-Hardwood-Conifer, Floodplain Forest, Rivers and streams	Not federally listed	Special Concern	Utilizes habitat adjacent to large, slow moving rivers. Not reported to occur in Barrington as of July 2020.	Not Likely
Smooth green snake	Peatland, Marsh/Shrub Wetland, Grassland, Shrubland, Rocky Ridge/Cliff/Talus	Not federally listed	Special Concern	Favors varying types open or lightly forested areas and grassland habitats. Utilizes rotting logs and animal burrows for breeding, as well as rock crevices during hibernation. Reported to occur in Barrington. Consider adding identification information to plans, contact NHFG immediately upon observation, and safely relocate snakes outside of construction areas if observed.	Possible
Sora	Marsh/Shrub Wetland	Not federally listed	Special Concern	Breeds in large marshes containing shallow or intermediate-depth water levels, and dominated by emergent cattails, sedges, and bulrushes. On-site wetlands may support this species, however dominant woody/shrub vegetative cover is not preferred by this species. Not reported to occur in Barrington as of July 2020.	Low
Spotted turtle	Marsh/Shrub Wetland, Temperate Swamp, Vernal Pool	Not federally listed	State Threatened	Utilizes a variety of wetlands including vernal pools, marshes, sedge meadows, streams, and forested/scrub shrub wetlands with standing water. Like all NH turtles, requires well-drained soil for nesting. Known to occur in Barrington. Consider adding identification information to plans, contact NHFG immediately upon observation, and safely relocate reptiles outside of construction areas if observed.	Possible



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
Swamp darter	Pond, Rivers and streams	Not federally listed	Special Concern	Utilizes small, vegetated ponds, impounded areas, low gradient streams, and large rivers. Prefer shallow areas with soft, muddy substrate, dense vegetation, and accumulated detritus. Known to occur in Barrington.	Possible
Timber rattlesnake	Appalachian Oak-Pine, Hemlock-Hardwood-Conifer, Shrubland, Rocky Ridge/Cliff/Talus	Not federally listed	State Endangered	Utilizes forested areas with rocky outcroppings, often in remote settings. Individual snakes have large home ranges and are susceptible to road mortality and newly emerged fungal diseases. Not reported to occur in Barrington as of July 2020.	Not Likely
Tricolored bat	Appalachian Oak-Pine, Spruce-Fir, Hemlock-Hardwood-Conifer, Northern Hardwood-Conifer, Floodplain Forest, Northern Swamp, Temperate Swamp, Caves and Mines	Not federally listed	State Endangered	Hibernate in caves and mines, and occasionally in other structures. Like other bats, this species has been decimated by white-nosed syndrome. Protection of hibernaculum is considered of primary importance to this species. Data on summer habitat use is limited although there is data to suggest that maternity colonies are foliage roosters, and may prefer deciduous trees in the summer, possibly selecting oak and maple. Not known to occur in Barrington as of July 2020. Per the WAP, primary protection strategies in NH are to protect summer colonies by prohibiting exclusion of bats from buildings from May 15 - Aug 15, prevent occupied trees from being cut down, and protect qualities of mine hibernacula.	Not Likely
Vesper sparrow	Pine Barren, Grassland	Not federally listed	Special Concern	Breeds in pine barrens or dry, open, grassy areas with patches of bare ground and elevated perches. Species is area sensitive and requires habitats >50 acres in size. Known to occur in Barrington but critical habitat features required to support this species are not present.	Not Likely
Wood turtle	Rivers and streams, Floodplain Forest, Grassland, Shrubland	Not federally listed	Special Concern	Utilizes slow-moving streams and adjacent uplands (often within 600 feet of streams). Like all NH turtles, requires well-drained soil for nesting such as open sandy areas, banks, and meadows. Known to occur in Barrington. Consider adding identification information to plans, contact NHFG immediately upon observation, and safely relocate reptiles outside of construction areas if observed.	Possible



Species (common name)	Broad Habitat Association	Federal Listing	State Listing	Minimum/Special habitat requirements	Likelihood of Presence on Site Based on Minimum/Special Habitat Requirements
Yellow bumble bee	Developed, Grassland, Shrubland	Not federally listed	Special Concern	Utilizes meadows, crop fields, orchards, gardens and other locations with flowering plants. Nectar plants include honeysuckles, thistles, clovers, loosestrifes, vetches, and bee balms. The Site contains habitat that may support this species, however areas containing extensive flowering plant cover required by this species were not observed.	Low
Yellow-banded bumble bee	Developed, Grassland, Shrubland	Not federally listed	Special Concern	Utilizes meadows, crop fields, orchards, gardens and other locations with flowering plants. Nectar plants include <i>Vaccinium</i> varieties, willows, roses, <i>Rubus</i> varieties, honeysuckles, asters, and goldenrods. The Site contains habitat that may support this species, however areas containing extensive flowering plant cover required by this species were not observed.	Low

3.4.4 POTENTIAL IMPACTS AND PROPOSED CONSERVATION MEASURES

The project includes the construction of an 11-lot residential subdivision at 44 Meadowbrook Drive in Developed, Appalachian Oak-Pine, and Marsh/Shrub Wetland cover types. The current Site features include one residential structure with associated paved access. Proposed construction includes grading for lot development, paved drives, installation of private wells, and associated utilities (see **Figure 6 - Open Space Conceptual Plan #1** prepared by JBE, dated 5/17/21).

Based on a GIS analysis overlaying the Site Plan prepared by JBE onto the cover type plan prepared by GZA, the current project design proposes construction in approximately 10.1 acres of Developed/Barren Land, maintaining this cover type, and converting approximately 0.3 acres of vegetated upland Appalachian Oak-Pine habitat. The remaining 48.6 acres are proposed to remain as open space with the existing natural cover and will maintain Appalachian Oak-Pine, Developed, Temperate Swamp, Floodplain Forest, Marsh/Shrub Wetland, Stream, Open Water, and potential Vernal Pool habitat types along the eastern Site boundaries and throughout the central and western areas of the Site. The project maintains potential for connectivity to surrounding landscapes and adjoins forested land to the west and a marsh/shrub wetland system to the south. Additionally, Caldwell Brook, a tributary of the Oyster River, flows northeasterly through the Site. The current design includes a 100-foot buffer along the perimeter of the Site, a 100-foot buffer to the wetland complex in the central and western areas of the Site, designated as a prime wetland by the Town of Barrington, and a 50-foot buffer to all other wetlands to maintain vegetated habitat around Caldwell Brook and associated wetlands at the Site. Based on GZA’s assessment, the Site has some potential to support 11 rare species including American brook lamprey, American eel, banded sunfish, Blanding’s turtle, eastern box turtle, little brown bat, northern black racer, smooth green snake, spotted turtle, swamp darter, and wood turtle.



Based on a review of habitats, GZA offers the following BMP recommendations, as recommended in the WAP and/or typically requested by NHFG:

1. The project design includes an approximately 48.6-acre common area which includes six habitat types. This serves to promote and maintain rare species habitat on the Site and maintains connectivity between uplands and wetlands.
2. The project includes a 50-foot wetland buffer to wetlands adjacent to proposed construction areas and a 100-foot buffer to the prime wetland complex in the central and western portions of the Site, as required by the Town of Barrington's wetland ordinance, to maintain vegetated habitat around Caldwell Brook and associated wetlands at the Site. The incorporation of this buffer will serve to preserve habitat, travel corridors, and water quality, benefitting rare wetland species (e.g. American eel, banded sunfish, and spotted turtle).
3. If possible, avoid removal of existing structures at the Site from May 15 to August 15 to minimize and prevent impacts to little brown bat maternity colonies, if present.
4. Utilize "wildlife friendly" matting consisting of coco or jute, and lacking plastic mesh, if matting is utilized for final stabilization. Welded plastic or "biodegradable plastic" netting or thread (e.g., polypropylene) should not be used, per NHFG feedback on similar projects.
5. Add Blanding's turtle, eastern box turtle, northern black racer, smooth green snake, spotted turtle, and wood turtle identification information to plans. If observed during construction, contact NHFG immediately upon observation, and safely relocate amphibians and reptiles out of construction areas if observed. Observations of threatened and endangered species should be reported to NHFG by email at RAARP@wildlife.nh.gov and Melissa.Doperalski@wildlife.nh.gov, with photographs (if available).

In GZA's opinion, if the BMPs identified above are followed, the project design "will not appreciably jeopardize the continued existence of state or federally threatened and endangered species."

3.5 FINDING AND CONCLUSIONS

GZA has completed a wildlife assessment, as required by NHDES to support the submittal of an Alteration of Terrain permit by 21 Boylston Street, LLC. The assessment included a review of state-wide wildlife data, classification and mapping of habitat types, wildlife documentation, and impact assessment for the proposed construction of a cluster subdivision. The following is a summary of our findings and conclusions:

- GZA created a wildlife habitat database using GIS to create an aerial habitat overlay of the project, and to identify wildlife habitats of regional significance near or on the Site. In addition, GZA completed a survey for wildlife during December 2020 to document mammals, birds, amphibians, and reptiles.
- Two major upland habitats and six wetland habitats totaling 59 acres were identified on the Site including Appalachian Oak-Pine, Developed or Barren land, Temperate Swamp, Floodplain Forest, Marsh/Shrub Wetland, Open Water, Stream, and potential Vernal Pool habitat.
- American brook lamprey (*Lethenteron appendix*), American eel (*Anguilla rostrata*), banded sunfish (*Enneacanthus obsesus*), Blanding's turtle (*Emydoidea blandingii*), eastern hognose snake (*Heterodon platirhinos*), smooth green snake (*Opheodrys vernalis*), spotted turtle (*Clemmys guttata*), and vesper sparrow



June 30, 2021

Meadowbrook Village - Wildlife Assessment Report

44 Meadowbrook Drive – NHB20-4008

04.0191175.00

Page | 32

(*Poecetes gramineus*) are known to occur in the vicinity of the project (see NHB Memo NHB20-4008). The Site contains streams and open water that are reported to provide habitat for American eel and banded sunfish and may support American brook lamprey and swamp darter. The Site also contains areas of emergent wetlands dominated by grass and sedge species which may support smooth green snake, and wetland habitats and exposed soils which may provide habitat and potential nesting locations for Blanding's turtle, spotted turtle, and wood turtle.

- Based on habitat evaluation, GZA ranked 11 endangered, threatened, and special concern species as having potential to occur on or immediately adjacent to the Site, including American brook lamprey, American eel, banded sunfish, Blanding's turtle, eastern box turtle, little brown bat, northern black racer, smooth green snake, spotted turtle, swamp darter, and wood turtle. American eel and banded sunfish are known to occur at the property. The remaining species are not known to occur on the Site but have potential to occur based on review of habitat types and rare species records in Barrington.
- In GZA's opinion, if conservation measures/BMPs are followed, the project design "will not appreciably jeopardize the continued existence of state or federally threatened and endangered species."



3.6 REFERENCES

- DeGraaf, R. M., and Yamasaki. 2001. *New England Wildlife: Habitat, Natural History, and Distribution*. University Press of New England. Hanover and London.
- DeGraaf, R. M., Yamasaki, M., Leak, W. B., and Lester, A. M. 2006. *Technical Guide to Forest Wildlife Habitat Management in New England*. University Press of New England, Lebanon, NH.
- Ernest, C. H. and R. W. Barbour. 1989. *Snakes of eastern North America*. George Mason University Press, Fairfax, VA. 282pp.
- Kjoss, V.A. and J.A. Litvaitis. 2001. Community structure of snakes in a human dominated landscape. *Biological Conservation* 98:285-292.
- Mays, J.D. and Todd, C.S. 2007. *Northern Black Racer Assessment*. Maine Department of Inland Fisheries and Bird Wildlife, Wildlife Division, Resource Assessment Section.
- National Geographic Society. 2002. *Field Guide to the Birds of North America*, 4th edition. National Geographic, Washington, D.C.
- New Hampshire Fish and Game Department. 2015. *New Hampshire Wildlife Action Plan*.
- New Hampshire Fish and Game Department. 2020. *New Hampshire Wildlife Action Plan "Habitat Land Cover Map and Highest Ranked Habitat by Ecological Condition" dataset*. UNH GRANIT Clearinghouse.
- New Hampshire Natural Heritage Bureau. 2020. *Rare Plants, Animals, and Exemplary Communities in New Hampshire Towns*. DNCR – Division of Forests and Lands. 306 pages.
- Peterson, R.T. 1980. *A Field Guide to the Birds of Eastern and Central North America*, 4th edition. Houghton Mifflin Company, Boston, MA.
- Petson, R.T. and M. McKenny. 1968. *A Field guide to Wildflowers: Northeastern and Northcentral North America*. Houghton Mifflin Company, Boston, MA.
- Petrides, G.A. 1996. *A Field Guide to Trees and Shrubs: Northeastern and northcentral United States and southeastern and south-central Canada*, 2nd edition. Houghton Mifflin Company, Boston, MA.
- Sperduto, D. D. and W. F. Nichols. 2012. *Natural Communities of New Hampshire*, 2nd edition. The New Hampshire Natural Heritage Bureau, Concord, NH. Pub. UNH Cooperative Extension, Durham, NH.
- U.S. Fish and Wildlife Service. 2007. *National Bald Eagle Management Guidelines*.



Appendix A – Limitations



USE OF REPORT

1. GZA GeoEnvironmental, Inc. (GZA) has prepared this report on behalf of, and for the exclusive use of 21 Boylston Street, LLC (“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 – NHB Memo

CONFIDENTIAL – NH Dept. of Environmental Services review

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

To: Logan Young
5 Commerce Park North
Suite 201
Bedford, NH 03110

From: Amy Lamb, NH Natural Heritage Bureau

Date: 1/7/2021 (valid until 01/07/2022)

Re: Review by NH Natural Heritage Bureau

Permits: NHDES - Alteration of Terrain Permit

NHB ID: NHB20-4008 Town: Barrington Location: Meadowbrook Drive
Description: 21 Boylston Street, LLC intends to utilize this approximately 57-acre parcel for the construction of a 12-lot residential subdivision. cc: Kim Tuttle

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

Comments NHB: No Comments At This Time
F&G: No Comments At This Time

Vertebrate species	State ¹	Federal	Notes
American Brook Lamprey (<i>Lethenteron appendix</i>)	E	--	Contact the NH Fish & Game Dept (see below).
American Eel (<i>Anguilla rostrata</i>)	SC	--	Contact the NH Fish & Game Dept (see below).
Banded Sunfish (<i>Enneacanthus obesus</i>)	SC	--	Contact the NH Fish & Game Dept (see below).
Blanding's Turtle (<i>Emydoidea blandingii</i>)	E	--	Contact the NH Fish & Game Dept (see below).
Eastern Hognose Snake (<i>Heterodon platirhinos</i>)*	E	--	Contact the NH Fish & Game Dept (see below).
Smooth Green Snake (<i>Opheodrys vernalis</i>)	SC	--	Contact the NH Fish & Game Dept (see below).
Spotted Turtle (<i>Clemmys guttata</i>)	T	--	Contact the NH Fish & Game Dept (see below).
Vesper Sparrow (<i>Pooecetes gramineus</i>)	SC	--	Contact the NH Fish & Game Dept (see below).

¹Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (*) indicates that the most recent report for that occurrence was more than 20 years ago.

CONFIDENTIAL – NH Dept. of Environmental Services review

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

Contact for all animal reviews: Kim Tuttle, NHF&G, (603) 271-6544.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.



Appendix C - Wildlife Habitat Assessment Field Data Form



Wildlife Habitat Assessment Field Data Form

Person Completing Form: Logan Young & Nyssa Seekamp Date(s) of Assessment: December 29, 2020

Project Name: Habitat Assessment – Proposed Residential Subdivision

I. SITE DESCRIPTION

Project Location: Tax Map 273, Lot 49 & Tax Map 270, Lot 3, Meadowbrook Drive, Barrington

Site size: 59 acres Street: Meadowbrook Drive Town: Barrington County: Strafford

Nearest Road: On Site Adjacent to Site mi from Site

Type of Road: Dirt 2-Lane Paved 4-Lane Paved Interstate

Existing Structures on Site: Single family home with paved driveway

Adjacent Land Uses (check all that apply):

- Forest Shrubland Grassland Cropland
Wetland Open Water Residential Pasture
Industrial/Commercial Utility right-of-way Quarry
Other:

Habitat Types Present:

- Forest Shrub/Old Field Grass/Forb Cultivated Pine Barren
Pasture Wetland Open Water Dunes Marine
Sand/Gravel Rocky Ridge/Cliff Alpine Developed
Other:

Streams:

- None Intermittent Perennial
Stream Order: 1 2 3 4 5 6

Water Bodies:

- None Small pond - natural Small pond - constructed Great pond Estuary
Lake Stormwater feature

Wetlands:

- Forested Sedge Meadow Shallow Marsh Deep Marsh
Shrub Swamp Peatland/Bog Vernal pool Salt Marsh
Other: Forested, emergent marsh, scrub-shrub, and floodplain forest wetlands observed, by GZA, in addition to streams, an open water area, and a potential vernal pool.

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Dominant Forest Types:

- Aspen-Birch Spruce-Fir Red Oak Northern Hardwood
 Hemlock Oak-Pine Other: _____

Forest Age Class:

- Regeneration-Seedling Sapling-Pole Mature Older Growth

II. HABITATS AND ASSOCIATED POTENTIAL RARE WILDLIFE

Develop List of Potential Wildlife Species Present Based on the Site Description

This information, derived from the NH Wildlife Action Plan, provides insight into which species listed as threatened or endangered in NH have potential to inhabit an area. Since this is a potential list, fieldwork and judgement when assessing the impacts of a project are still essential.

Avoid or Minimize Impacts to the Following Habitats:

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
High elevation spruce-fir forest	<input type="checkbox"/>		American marten (<i>Martes americana</i>) American three toed-woodpecker (<i>Picoides dorsalis</i>) Bald eagle (<i>Haliaeetus leucocephalus</i>) Bicknell's Thrush (<i>Catharus bicknelli</i>) Canada lynx (<i>Lynx canadensis</i>) Eastern wolf (<i>Canis lupus</i>) Golden eagle (<i>Aquila chrysaetos</i>) Northern bog lemming (<i>Synaptomys borealis sphagnicola</i>) Spruce grouse (<i>Falcapennis canadensis</i>) <u>SGCN Species</u> Long-tailed shrew (<i>Sorex dispar</i>) Moose (<i>Alces alces</i>) Purple finch (<i>Haemorhous purpureus</i>) Ringed emerald (<i>Somatochlora albicincta</i>) Rock vole (<i>Microtus chrotorrhinus</i>) Sedge darner (<i>Aeshna juncea</i>)	
Low elevation spruce-fir forest	<input type="checkbox"/>		American three-toed woodpecker (<i>Picoides dorsalis</i>) Bald eagle (<i>Haliaeetus leucocephalus</i>) Canada lynx (<i>Lynx canadensis</i>) Canada warbler (<i>Cardellina canadensis</i>) Eastern red bat (<i>Lasiurus borealis</i>) Golden eagle (<i>Aquila chrysaetos</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Hoary bat (<i>Lasiurus cinereus</i>) Little brown bat (<i>Myotis lucifugus</i>) Northern bog lemming (<i>Synaptomys borealis sphagnicola</i>) Northern long-eared bat (<i>Myotis septentrionalis</i>) Rusty blackbird (<i>Euphagus carolinus</i>) Silver-haired bat (<i>Lasionycteris noctivagans</i>) Spruce grouse (<i>Falcapennis canadensis</i>) Tricolored bat (<i>Perimyotis subflavus</i>) <u>SGCN Species</u> Big brown bat (<i>Eptesicus fuscus</i>) Cape May warbler (<i>Setophaga tigrina</i>) Chimney swift (<i>Chaetura pelagica</i>) Moose (<i>Alces alces</i>) Northern goshawk (<i>Accipiter gentilis</i>) Ocellated emerald (<i>Somatochlora minor</i>) Olive-sided flycatcher (<i>Contopus cooperi</i>) Purple finch (<i>Haemorhous purpureus</i>) Ruffed grouse (<i>Bonsai umbrellas</i>)	
Northern hardwood-conifer forest	<input type="checkbox"/>		American marten (<i>Martes americana</i>) Bald eagle (<i>Haliaeetus leucocephalus</i>) Blue-spotted/Jefferson complex (<i>Ambystoma laterale/jeffersonianum</i>) Eastern red bat (<i>Lasiurus borealis</i>) Eastern small-footed bat (<i>Myotis leibii</i>) Eastern wolf (<i>Canis lupus</i>) Golden eagle (<i>Aquila chrysaetos</i>) Hoary bat (<i>Lasiurus cinereus</i>) Little brown bat (<i>Myotis lucifugus</i>) Northern bog lemming (<i>Synaptomys borealis sphagnicola</i>) Northern long-eared bat (<i>Myotis septentrionalis</i>) Rapids clubtail (<i>Gomphus quadricolor</i>) Silver-haired bat (<i>Lasionycteris noctivagans</i>) Tricolored bat (<i>Perimyotis subflavus</i>) <u>SGCN Species</u> Big brown bat (<i>Eptesicus fuscus</i>) Canada warbler (<i>Cardellina canadensis</i>) Chimney swift (<i>Chaetura pelagica</i>) Long-tailed shrew (<i>Sorex dispar</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Moose (<i>Alces alces</i>) Northern goshawk (<i>Accipiter gentilis</i>) Olive-sided flycatcher (<i>Contopus cooperi</i>) Purple finch (<i>Haemorhous purpureus</i>) Ringed emerald (<i>Somatochlora albicincta</i>) Rock vole (<i>Microtus chrotorrhinus</i>) Ruffed grouse (<i>Bonsai umbrellas</i>) Scarlet tanager (<i>Piranga olivacea</i>) Sedge darner (<i>Aeshna juncea</i>) Southern bog lemming (<i>Synaptomys cooperi</i>) Veery (<i>Catharus fuscescens</i>) Wood thrush (<i>Hylocichla mustelina</i>)	
Hemlock-hardwood-conifer forest	<input type="checkbox"/>		Bald eagle (<i>Haliaeetus leucocephalus</i>) Blue-spotted/Jefferson complex (<i>Ambystoma laterale/jeffersonianum</i>) Common nighthawk (<i>Chordeiles minor</i>) Eastern box turtle (<i>Terrapene carolina carolina</i>) Eastern hognose snake (<i>Heterodon platirhinos</i>) Eastern red bat (<i>Lasiurus borealis</i>) Eastern small-footed bat (<i>Myotis leibii</i>) Eastern whip-poor-will (<i>Antrastomus vociferus</i>) Golden eagle (<i>Aquila chrysaetos</i>) Hoary bat (<i>Lasiurus cinereus</i>) Little brown bat (<i>Myotis lucifugus</i>) Northern black racer (<i>Coluber constrictor</i>) Northern long-eared bat (<i>Myotis septentrionalis</i>) Rapids clubtail (<i>Gomphus quadricolor</i>) Ringed boghaunter (<i>Gomphus quadricolor</i>) Silver-haired bat (<i>Lasionycteris noctivagans</i>) Skillet clubtail (<i>Gomphus ventricosus</i>) Timber rattlesnake (<i>Crotalus horridus</i>) Tricolored bat (<i>Perimyotis subflavus</i>) <u>SGCN Species</u> American woodcock (<i>Scolopax minor</i>) Big brown bat (<i>Eptesicus fuscus</i>) Black-billed cuckoo (<i>Coccyzus erythrophthalmus</i>) Canada warbler (<i>Cardellina canadensis</i>) Chimney swift (<i>Chaetura pelagica</i>) Moose (<i>Alces alces</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Northern goshawk (<i>Accipiter gentilis</i>) Purple finch (<i>Haemorhous purpureus</i>) Ruffed grouse (<i>Bonasa umbellus</i>) Scarlet tanager (<i>Piranga olivacea</i>) Veery (<i>Catharus fuscescens</i>) Wood thrush (<i>Hylocichla mustelina</i>)	
Appalachian oak-pine forest	<input checked="" type="checkbox"/>	16.9	Bald eagle (<i>Haliaeetus leucocephalus</i>) Blue-spotted/Jefferson complex (<i>Ambystoma laterale/jeffersonianum</i>) Cerulean warbler (<i>Setophaga cerulea</i>) Common nighthawk (<i>Chordeiles minor</i>) Coppery emerald (<i>Somatochlora georgiana</i>) Eastern box turtle (<i>Terrapene carolina carolina</i>) Eastern hognose snake (<i>Heterodon platirhinos</i>) Eastern red bat (<i>Lasiurus borealis</i>) Eastern small-footed bat (<i>Myotis leibii</i>) Eastern whip-poor-will (<i>Antrostomus vociferus</i>) Fowler's toad (<i>Anaxyrus fowleri</i>) Golden eagle (<i>Aquila chrysaetos</i>) Hoary bat (<i>Lasiurus cinereus</i>) Little brown bat (<i>Myotis lucifugus</i>) Marbled salamander (<i>Ambystoma opacum</i>) Northern black racer (<i>Coluber constrictor</i>) Northern long-eared bat (<i>Myotis septentrionalis</i>) Rapids clubtail (<i>Gomphus quadricolor</i>) Ringed boghaunter (<i>Gomphus quadricolor</i>) Silver-haired bat (<i>Lasionycteris noctivagans</i>) Skillet clubtail (<i>Gomphus ventricosus</i>) Timber rattlesnake (<i>Crotalus horridus</i>) Tricolored bat (<i>Perimyotis subflavus</i>) <u>SGCN Species</u> American woodcock (<i>Scolopax minor</i>) Big brown bat (<i>Eptesicus fuscus</i>) Black-billed cuckoo (<i>Coccyzus erythrophthalmus</i>) Chimney swift (<i>Chaetura pelagica</i>) Eastern towhee (<i>Pipilo erythrophthalmus</i>) Moose (<i>Alces alces</i>) Northern goshawk (<i>Accipiter gentilis</i>) Purple finch (<i>Haemorhous purpureus</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Ruffed grouse (<i>Bonsai umbrellas</i>) Scarlet tanager (<i>Piranga olivacea</i>) Veery (<i>Catharus fuscescens</i>) Wood thrush (<i>Hylocichla mustelina</i>)	
Floodplain forest	<input checked="" type="checkbox"/>	0.97	Bald eagle (<i>Haliaeetus leucocephalus</i>) Blanding’s turtle (<i>Emydoidea blandingii</i>) Blue-spotted/Jefferson complex (<i>Ambystoma laterale/jeffersonianum</i>) Cerulean warbler (<i>Setophaga cerulea</i>) Eastern red bat (<i>Lasiurus borealis</i>) Hoary bat (<i>Lasiurus cinereus</i>) Northern leopard frog (<i>Lithobates pipiens</i>) Rapids clubtail (<i>Gomphus quadricolor</i>) Skillet clubtail (<i>Gomphus ventricosus</i>) Spotted turtle (<i>Clemmys guttata</i>) Tricolored bat (<i>Perimyotis subflavus</i>) Wood turtle (<i>Glyptemys insculpta</i>) <u>SGCN Species</u> Big brown bat (<i>Eptesicus fuscus</i>) Eastern ribbonsnake (<i>Thamnophis sauritus</i>) Moose (<i>Alces alces</i>) Purple finch (<i>Haemorhous purpureus</i>) Veery (<i>Catharus fuscescens</i>) Wood thrush (<i>Hylocichla mustelina</i>)	
Northern swamp	<input type="checkbox"/>		Blue-spotted/Jefferson complex (<i>Ambystoma laterale/jeffersonianum</i>) Eastern red bat (<i>Lasiurus borealis</i>) Hoary bat (<i>Lasiurus cinereus</i>) Kennedy’s emerald (<i>Somatochlora kennedyi</i>) Little brown bat (<i>Myotis lucifugus</i>) Silver-haired bat (<i>Lasionycteris noctivagans</i>) Tricolored bat (<i>Perimyotis subflavus</i>) <u>SGCN Species</u> American water shrew (<i>Sorex palustris albibarbis</i>) American woodcock (<i>Scolopax minor</i>) Big brown bat (<i>Eptesicus fuscus</i>) Canada warbler (<i>Cardellina canadensis</i>) Cape May warbler (<i>Setophaga tigrina</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Lyre-tipped spreadwing (<i>Lestes unguiculatus</i>) Mink frog (<i>Lithobates septentrionalis</i>) Moose (<i>Alces alces</i>) Ocellated emerald (<i>Somatochlora minor</i>) Olive-sided flycatcher (<i>Contopus cooperi</i>) Purple finch (<i>Haemorhous purpureus</i>) Veery (<i>Catharus fuscescens</i>)	
Temperate swamp	<input checked="" type="checkbox"/>	3.2	Blanding's turtle (<i>Emydoidea blandingii</i>) Blue-spotted/Jefferson complex (<i>Ambystoma laterale/jeffersonianum</i>) Coppery Emerald (<i>Somatochlora georgiana</i>) Eastern box turtle (<i>Terrapene carolina carolina</i>) Eastern red bat (<i>Lasiurus borealis</i>) Hoary bat (<i>Lasiurus cinereus</i>) Kennedy's emerald (<i>Somatochlora kennedyi</i>) Little brown bat (<i>Myotis lucifugus</i>) Ringed boghaunter (<i>Gomphus quadricolor</i>) Silver-haired bat (<i>Lasionycteris noctivagans</i>) Spotted turtle (<i>Clemmys guttata</i>) Tricolored bat (<i>Perimyotis subflavus</i>) <u>SGCN Species</u> American woodcock (<i>Scolopax minor</i>) Big brown bat (<i>Eptesicus fuscus</i>) Canada warbler (<i>Cardellina canadensis</i>) Moose (<i>Alces alces</i>) Olive-sided flycatcher (<i>Contopus cooperi</i>) Veery (<i>Catharus fuscescens</i>)	
Peatland	<input type="checkbox"/>		Blanding's turtle (<i>Emydoidea blandingii</i>) Blue-spotted/Jefferson complex (<i>Ambystoma laterale/jeffersonianum</i>) Kennedy's emerald (<i>Somatochlora kennedyi</i>) Northern harrier (<i>Circus cyaneus</i>) Pied-billed grebe (<i>Podilymbus podiceps</i>) Pine barrens bluet (<i>Enallagma recurvatum</i>) Ringed boghaunter (<i>Gomphus quadricolor</i>) Rusty blackbird (<i>Euphagus carolinus</i>) Smooth green snake (<i>Liochlorophis vernalis</i>) Spotted turtle (<i>Clemmys guttata</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			<u>SGCN Species</u> Eastern ribbonsnake (<i>Thamnophis sauritus</i>) Eastern towhee (<i>Pipilo erythrophthalmus</i>) Mink frog (<i>Lithobates septentrionalis</i>) Ocellated emerald (<i>Somatochlora minor</i>) Olive-sided flycatcher (<i>Contopus cooperi</i>) Sedge darner (<i>Aeshna juncea</i>)	
Permanently flooded marsh and/or naturally occurring shrub wetland	<input checked="" type="checkbox"/>	18.4	Bald eagle (<i>Haliaeetus leucocephalus</i>) Bank swallow (<i>Riparia riparia</i>) Blanding's turtle (<i>Emydoidea blandingii</i>) Blue-spotted/Jefferson complex (<i>Ambystoma laterale/jeffersonianum</i>) Common gallinule (<i>Gallinula galeata</i>) Eastern box turtle (<i>Terrapene carolina carolina</i>) Eastern hognose snake (<i>Heterodon platirhinos</i>) Fowler's toad (<i>Anaxyrus fowleri</i>) Kennedy's emerald (<i>Somatochlora kennedyi</i>) Least bittern (<i>Ixobrychus exilis</i>) Northern harrier* (<i>Circus cyaneus</i>) Northern leopard frog (<i>Lithobates pipiens</i>) Pied-billed grebe (<i>Podilymbus podiceps</i>) Ringed boghaunter (<i>Gomphus quadricolor</i>) Rusty blackbird (<i>Euphagus carolinus</i>) Smooth green snake (<i>Liochlorophis vernalis</i>) Sora (<i>Porzana carolina</i>) Spotted turtle (<i>Clemmys guttata</i>) <u>SGCN Species</u> American black duck (<i>Anas rubripes</i>) American woodcock (<i>Scolopax minor</i>) Eastern ribbonsnake (<i>Thamnophis sauritus</i>) Lyre-tipped spreadwing (<i>Lestes unguiculatus</i>) Marsh wren (<i>Cistothorus palustris</i>) Mink frog (<i>Lithobates septentrionalis</i>) Moose (<i>Alces alces</i>) Olive-sided flycatcher (<i>Contopus cooperi</i>) Ruffed grouse (<i>Bonasa umbellus</i>) Sedge wren (<i>Cistothorus platensis</i>)	
Vernal pool	<input checked="" type="checkbox"/>	0.03	Blanding's turtle (<i>Emydoidea blandingii</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Blue-spotted/Jefferson complex (<i>Ambystoma laterale/jeffersonianum</i>) Eastern hognose snake (<i>Heterodon platirhinos</i>) Fowler's toad (<i>Anaxyrus fowleri</i>) Marbled salamander (<i>Ambystoma opacum</i>) Spotted turtle (<i>Clemmys guttata</i>) <u>SGCN Species</u> Eastern ribbonsnake (<i>Thamnophis sauritus</i>) Lyre-tipped spreadwing (<i>Lestes unguiculatus</i>)	
Rivers and Streams	<input checked="" type="checkbox"/>	1.4	American brook lamprey (<i>Lethenteron appendix</i>) American eel (<i>Anguilla rostrata</i>) American shad+ (<i>Alosa sapidissima</i>) Appalachian tiger beetle (<i>Cicindela ancocisconensis</i>) Atlantic sturgeon+ (<i>Acipenser oxyrinchus</i>) Bald eagle (<i>Haliaeetus leucocephalus</i>) Banded sunfish+ (<i>Enneacanthus obesus</i>) Bank swallow (<i>Riparia riparia</i>) Brook floater+ (<i>Alasmidonta varicosa</i>) Burbot (<i>Lota lota</i>) Cobblestone tiger beetle+ (<i>Cicindela marginipennis</i>) Common loon+ (<i>Gavia immer</i>) Dwarf wedgemussel+ (<i>Alasmidonta heterodon</i>) Finescale dace (<i>Phoxinus neogaeus</i>) Fowler's toad+ (<i>Anaxyrus fowleri</i>) Northern leopard frog+ (<i>Lithobates pipiens</i>) Northern redbelly dace (<i>Chrosomus eos</i>) Puritan tiger beetle+ (<i>Cicindela puritana</i>) Rapids clubtail+ (<i>Gomphus quadricolor</i>) Round whitefish (<i>Prosopium cylindraceum</i>) Sea lamprey (<i>Petromyzon marinus</i>) Shortnose sturgeon+ (<i>Acipenser brevirostrum</i>) Skillet clubtail+ (<i>Gomphus ventricosus</i>) Swamp darter (<i>Etheostoma fusiforme</i>) Wood turtle (<i>Glyptemys insculpta</i>) <u>SGCN Species</u> Alewife floater+ (<i>Anodonta implicata</i>) Alewife+ (<i>Alosa pseudoharengus</i>) Brook trout (<i>Salvelinus fontinalis</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Creeper (<i>Strophitus undulatus</i>) Eastern pearlshell (<i>Margaritifera margaritifera</i>) Rainbow smelt (<i>Osmerus mordax</i>) Triangle floater (<i>Alasmidonta undulata</i>)	
Ponds and lakes	<input checked="" type="checkbox"/>	1.4	American eel (<i>Anguilla rostrata</i>) Bald eagle+ (<i>Haliaeetus leucocephalus</i>) Banded sunfish+ (<i>Enneacanthus obesus</i>) Bank swallow (<i>Riparia riparia</i>) Blueback herring+ (<i>Alosa aestivalis</i>) Bridle shiner+ (<i>Notropis bifrenatus</i>) Burbot (<i>Lota lota</i>) Common loon (<i>Gavia immer</i>) Eastern pondmussel+ (<i>Ligumia nasuta</i>) Finescale dace+ (<i>Phoxinus neogaeus</i>) Fowler's toad+ (<i>Anaxyrus fowleri</i>) Lake whitefish (<i>Coregonus clupeaformis</i>) Northern leopard frog (<i>Lithobates pipiens</i>) Northern redbelly dace (<i>Chrosomus eos</i>) Redfin pickerel+ (<i>Esox americanus</i>) Round whitefish (<i>Prosopium cylindraceum</i>) Swamp darter+ (<i>Etheostoma fusiforme</i>) <u>SGCN Species</u> Alewife floater+ (<i>Anodonta implicata</i>) Alewife+ (<i>Alosa pseudoharengus</i>) American black duck+ (<i>Anas rubripes</i>) Brook trout (<i>Salvelinus fontinalis</i>) Creeper (<i>Strophitus undulatus</i>) Lake trout (<i>Salvelinus namaycush</i>) Mink frog (<i>Lithobates septentrionalis</i>) Rainbow smelt (<i>Osmerus mordax</i>) Ringed emerald (<i>Somatochlora albicincta</i>) Sedge darner (<i>Aeshna juncea</i>) Triangle floater+ (<i>Alasmidonta undulata</i>)	
Developed	<input checked="" type="checkbox"/>	16.7	American bumble bee (<i>Bombus pensylvanicus</i>) American kestrel (<i>Falco sparverius</i>) Cliff swallow (<i>Petrochelidon pyrrhonota</i>) Common nighthawk (<i>Chordeiles minor</i>) Peregrine falcon (<i>Falco peregrinus</i>) Purple martin (<i>Progne subis</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Rusty-patched bumble bee (<i>Bombus affinis</i>) Yellow bumble bee (<i>Bombus fervidus</i>) Yellow banded bumble bee (<i>Bombus terricola</i>) <u>SGCN Species</u> Chimney swift (<i>Chaetura pelagica</i>)	
Pine barren	<input type="checkbox"/>		Barrens Itame (<i>Speranza exonerata</i>) Barrens xylotype (<i>Xylotype capax</i>) Common nighthawk (<i>Chordeiles minor</i>) Cora moth (<i>Cerma cora</i>) Eastern hognose snake (<i>Heterodon platirhinos</i>) Eastern whip-poor-will (<i>Anrostomus vociferus</i>) Edward’s hairstreak (<i>Satyrium edwardsii</i>) Fowler’s toad (<i>Anaxyrus fowleri</i>) Frosted elfin butterfly (<i>Callophrys iris</i>) Karner blue butterfly (<i>Lycæides Melissa samuelis</i>) Little brown bat (<i>Myotis lucifugus</i>) Phyllira tiger moth (<i>Grammia phyllira</i>) Pine pinion moth (<i>Lithophane lepida lepida</i>) Vesper sparrow (<i>Pooecetes gramineus</i>) <u>SGCN Species</u> Black-billed cuckoo (<i>Coccyzus erythrophthalmus</i>) Blue-winged warbler (<i>Vermivora cyanoptera</i>) Broad-lined catopyrrha (<i>Catopyrrha coloraria</i>) Brown thrasher (<i>Toxostoma rufum</i>) Eastern towhee (<i>Pipilo erythrophthalmus</i>) Field sparrow (<i>Spizella pusilla</i>) Graceful clearwing (<i>Hemaris gracilis</i>) New Jersey tea spanworm (<i>Apodrepanulatrix liberaria</i>) Noctuid Moth (<i>Mesogona olivata</i>) Persius duskywing skipper (<i>Erynnis persius</i>) Pinion moth (<i>Lithophane lepida lepida</i>) Prairie warbler (<i>Setophaga discolor</i>) Sleepy duskywing (<i>Erynnis brizo</i>) Twilight moth (<i>Lycia rachelae</i>) Zale sp. 1 nr. Lunifera (<i>Zale lunifera</i>)	
Grassland	<input type="checkbox"/>		American bumble bee (<i>Bombus pensylvanicus</i>) American kestrel (<i>Falco sparverius</i>) American pipit (<i>Anthus rubescens</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Bank swallow (<i>Riparia riparia</i>) Cliff swallow (<i>Petrochelidon pyrrhonota</i>) Eastern box turtle (<i>Terrapene carolina carolina</i>) Eastern meadowlark (<i>Sturnella magna</i>) Grasshopper sparrow (<i>Ammodramus savannarum</i>) Horned lark (<i>Eremophila alpestris</i>) Northern black racer (<i>Coluber constrictor</i>) Northern harrier* (<i>Circus cyaneus</i>) Northern leopard frog (<i>Lithobates pipiens</i>) Purple martin (<i>Progne subis</i>) Rusty-patched bumble bee (<i>Bombus affinis</i>) Smooth green snake (<i>Liochlorophis vernalis</i>) Upland sandpiper (<i>Bartramia longicauda</i>) Vesper sparrow (<i>Pooecetes gramineus</i>) Wood turtle (<i>Glyptemys insculpta</i>) Yellow banded bumble bee (<i>Bombus terricola</i>) Yellow bumble bee (<i>Bombus fervidus</i>) <u>SGCN Species</u> Bobolink (<i>Dolichonyx oryzivorus</i>) Monarch (<i>Danaus plexippus</i>) Ruffed grouse (<i>Bonsai umbrellas</i>)	
Shrubland	<input type="checkbox"/>		American bumble bee (<i>Bombus pensylvanicus</i>) American kestrel (<i>Falco sparverius</i>) Eastern box turtle (<i>Terrapene carolina carolina</i>) Eastern hognose snake (<i>Heterodon platirhinos</i>) Eastern whip-poor-will (<i>Antrastomus vociferus</i>) Fowler's toad (<i>Anaxyrus fowleri</i>) New England cottontail (<i>Sylvilagus transitionalis</i>) Northern black racer (<i>Coluber constrictor</i>) Northern harrier (<i>Circus cyaneus</i>) Northern leopard frog (<i>Lithobates pipiens</i>) Rusty-patched bumble bee (<i>Bombus affinis</i>) Smooth green snake (<i>Liochlorophis vernalis</i>) Timber rattlesnake (<i>Crotalus horridus</i>) Wood turtle (<i>Glyptemys insculpta</i>) Yellow banded bumble bee (<i>Bombus terricola</i>) Yellow bumble bee (<i>Bombus fervidus</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			<u>SGCN Species</u> American woodcock (<i>Scolopax minor</i>) Black-billed cuckoo (<i>Coccyzus erythrophthalmus</i>) Blue-winged warbler (<i>Vermivora cyanoptera</i>) Brown thrasher (<i>Toxostoma rufum</i>) Eastern towhee (<i>Pipilo erythrophthalmus</i>) Field sparrow (<i>Spizella pusilla</i>) Golden-winged warbler (<i>Vermivora chrysoptera</i>) Moose (<i>Alces alces</i>) Prairie warbler (<i>Setophaga discolor</i>) Ruffed grouse (<i>Bonasa umbellus</i>)	
Southern NH sandy habitat	<input type="checkbox"/>		Eastern hognose snake (<i>Heterodon platirhinos</i>)	
Alpine	<input type="checkbox"/>		American pipit (<i>Anthus rubescens</i>) White mountain arctic (<i>Oeneis melissa semidea</i>) White mountain fritillary (<i>Boloria titania montinus</i>) <u>SGCN Species</u> Ringed emerald (<i>Somatochlora albicincta</i>)	
Caves and Mines	<input type="checkbox"/>		Eastern small-footed bat (<i>Myotis leibii</i>) Little brown bat (<i>Myotis lucifugus</i>) Northern long-eared bat (<i>Myotis septentrionalis</i>) Tricolored bat (<i>Perimyotis subflavus</i>) <u>SGCN Species</u> Big brown bat (<i>Eptesicus fuscus</i>)	
Rocky Ridge/Cliff/Talus	<input type="checkbox"/>		Common nighthawk (<i>Chordeiles minor</i>) Eastern small-footed bat (<i>Myotis leibii</i>) Golden eagle (<i>Aquila chrysaetos</i>) Northern black racer (<i>Coluber constrictor</i>) Peregrine falcon (<i>Falco peregrinus</i>) Smooth green snake (<i>Liochlorophis vernalis</i>) Timber rattlesnake (<i>Crotalus horridus</i>) <u>SGCN Species</u> Eastern towhee (<i>Pipilo erythrophthalmus</i>)	
Salt marsh	<input type="checkbox"/>		Common tern (<i>Sterna hirundo</i>) Northern harrier (<i>Circus cyaneus</i>) Purple martin (<i>Progne subis</i>) Red knot (<i>Calidris canutus</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Roseate tern (<i>Sterna dougallii</i>) Saltmarsh sparrow (<i>Ammodramus caudacutus</i>) Seaside sparrow (<i>Ammodramus maritimus</i>) Willet (<i>Tringa semipalmata</i>) <u>SGCN Species</u> Marsh wren (<i>Cistothorus palustris</i>) Nelson's sparrow (<i>Ammodramus nelsoni</i>) Sanderling (<i>Calidris alba</i>) Semipalmated sandpiper (<i>Calidris pusilla</i>) Whimbrel (<i>Numenius phaeopus</i>)	
Dune	<input type="checkbox"/>		American pipit (<i>Anthus rubescens</i>) Fowler's toad (<i>Anaxyrus fowleri</i>) Horned lark (<i>Eremophila alpestris</i>) Least tern (<i>Sterna antillarum</i>) Piping plover (<i>Charadrius melodus</i>) Red knot (<i>Calidris canutus</i>) Saltmarsh tiger beetle (<i>Cicindela marginata</i>) Willet (<i>Tringa semipalmata</i>) <u>SGCN Species</u> Ruddy turnstone (<i>Arenaria interpres</i>) Sanderling (<i>Calidris alba</i>) Semipalmated sandpiper (<i>Calidris pusilla</i>) Whimbrel (<i>Numenius phaeopus</i>)	
Coastal island	<input type="checkbox"/>		Common tern (<i>Sterna hirundo</i>) Red knot (<i>Calidris canutus</i>) Roseate tern (<i>Sterna dougallii</i>) <u>SGCN Species</u> Purple sandpiper (<i>Calidris maritima</i>) Ruddy Turnstone (<i>Arenaria interpres</i>) Sanderling (<i>Calidris alba</i>) Semipalmated sandpiper (<i>Calidris pusilla</i>) Whimbrel (<i>Numenius phaeopus</i>)	
Estuarine	<input type="checkbox"/>		American shad (<i>Alosa sapidissima</i>) Atlantic sturgeon (<i>Acipenser oxyrinchus</i>) Blueback herring (<i>Alosa aestivalis</i>) Red knot (<i>Calidris canutus</i>) Sea lamprey (<i>Petromyzon marinus</i>)	

This form was developed based on the draft created this form was developed based on the draft "Wildlife Habitat Assessment Field Data Form" developed by the NH Fish and Game Department (NHFG), NH Audubon, and UNH Cooperative Extension. GZA updated the list of habitats based on information in the 2020 NHFG Wildlife Action Plan and habitat associations reported in New England Wildlife: Habitat, Natural History, and Distribution (DeGraaf and Yamasaki 2001).



Wildlife Habitat Assessment Field Data Form

Wildlife Habitat ¹	Habitat Present	Size (acres)	Associated Listed Wildlife ² (change to BOLD if present)	Comments
			Shortnose sturgeon (<i>Acipenser brevirostrum</i>) Willet (<i>Tringa semipalmata</i>) <u>SGCN Species</u> American black duck (<i>Anas rubripes</i>) American oyster (<i>Crassostrea virginica</i>) Rainbow smelt (<i>Osmerus mordax</i>) Ruddy turnstone (<i>Arenaria interpres</i>) Sanderling (<i>Calidris alba</i>) Semipalmated sandpiper (<i>Calidris pusilla</i>) Whimbrel (<i>Numenius phaeopus</i>)	
Marine	<input type="checkbox"/>		American shad (<i>Alosa sapidissima</i>) Atlantic sturgeon (<i>Acipenser oxyrinchus</i>) Blueback herring (<i>Alosa aestivalis</i>) Fin whale (<i>Balaenoptera physalus</i>) North Atlantic right whale (<i>Eubalaena glacialis</i>) Sea lamprey (<i>Petromyzon marinus</i>) Shortnose sturgeon (<i>Acipenser brevirostrum</i>) <u>SGCN Species</u> Atlantic sea scallop (<i>Placopecten magellanicus</i>) Horseshoe crab (<i>Limulus polyphemus</i>) Humpback whale (<i>Megaptera novaeangliae</i>) Northern shrimp (<i>Pandalus borealis</i>) Rainbow smelt (<i>Osmerus mordax</i>) Softshell clam (<i>Mya arenaria</i>)	

¹Wildlife habitat classifications and associations are derived from the NH Wildlife Action Plan, published by NH Fish & Game (2015).

²Listed wildlife species are federally threatened (FT), federally endangered (FE), state threatened (SC), state endangered (SE), state special concern (SC), or Species of Greatest Conservation Need (SGCN).

*Northern harrier maintains a winter range of predominantly coastal wetlands and a breeding range confined to the northern and coastal portions of the state.

+Also present in large warmwater rivers



Appendix D – Qualified Wildlife Biologist Resume



Tracy L. Tarr, CWS, CESSWI

Associate Principal

Summary of Experience

Tracy is an environmental consultant that specializes in wildlife assessment, natural resource identification, and permitting. She manages field teams and oversees complex natural resource data collection and permitting efforts. She specializes in a variety of ecological assessment services including protected species surveys, wetland function-value assessment, vernal pool assessments, wetland delineation, natural community mapping, wildlife habitat assessments, watershed planning, mitigation design, and construction monitoring. She has permitted a diversity of projects at the local, state, and federal level including residential projects, commercial developments, municipal infrastructure projects, and utility corridors. Tracy also specializes in municipal projects that integrate natural resource assessment and planning. Tracy previously served as the Chair of the Gilmanton Conservation Commission and as the Secretary of the NH Association of Conservation Commissions. She is currently a member of the NH Association of Natural Resource Scientists Legislative Committee and serves as the northern New England technical practice lead for ecological services at GZA.

Relevant Project Experience

WILDLIFE AND RARE SPECIES ASSESSMENT

Wildlife Biologist, HSR, Illinois. Completed meander surveys for ornate box turtle and trapping surveys for Blanding's turtle. Led multi-state field team.

Wildlife Biologist/Wetland Scientist, Project Manager, Round Pond Dam Expansion Project, New Hampshire. Completed a multi-year trapping and radio-telemetry study of Blanding's turtle (*Emydoidea blandingii*), a State Endangered species, to model and predict impacts of a proposed reservoir expansion project. Ms. Tarr provided wildlife evaluations, rare species documentation, habitat mapping, wetland delineation, function-value assessments, and impact analysis for a proposed water reservoir expansion project at Round Pond. The project was specifically designed to assess the potential impacts of raising the outlet elevation of Round Pond by approximately 10 feet.

Wildlife Biologist, Mike Eon Associates, Biddeford, Maine. Completed wildlife habitat mapping field work and impact assessment evaluations for Blanding's turtle.

Wildlife Biologist, Groundwater Exploration, Bethel, Connecticut. Completed construction surveys for eastern box turtle (*Terrapene Carolina carolina*), bog turtle (*Glyptemys muhlenbergii*), spotted turtle (*Clemmys guttata*), and wood turtle (*Glyptemys insculpta*). Oversaw electrofishing effort to characterize fisheries on Site.

Wildlife Biologist, South Coast Rail, Berkeley, Massachusetts. Sub-permittee for construction surveys for eastern box turtle. Oversaw implementation of turtle monitoring.

Erosion Control Monitor for the P145 Transmission Line, Concord, New Hampshire. Provided construction monitoring services and assessed drill locations for the State Endangered Blanding's turtle.

Education

B.S., Wildlife Management
University of New Hampshire, 1997
M.S., Natural Resources: Wildlife Ecology
University of New Hampshire, 2000

Licenses & Registrations

New Hampshire Certified Wetland
Scientist, CWS #281)
Certified Erosion, Sediment and
Stormwater Inspector, #388

Affiliations

- New Hampshire Association of Natural Resource Scientists
- Gilmanton Conservation Commission, Past Chair

Areas of Specialization

- Wildlife Habitat Evaluation
- Wetland Permitting
- Invasive Species Mapping
- Mitigation Design
- Rare Species Assessment
- Vernal Pool Identification & Evaluation
- Construction Monitoring
- G.I.S. Mapping



Tracy L. Tarr, CWS, CESSWI

Associate Principal

Wildlife Biologist/Associate Principal, Winchester Economic Development Authority, Winchester, New Hampshire. Completed a multi-season survey for black racer (*Coluber constrictor*) as part of Alteration of Terrain permitting for the project. Responsible for developing methods and coordination with the New Hampshire Fish and Game Department.

Project Manager, Eastman Development, LLC, Brookline, New Hampshire. Completed a survey for eastern hognose snake (*Heterodon platirhinos*) and black racer on a 40-acre Site.

Wetland Scientist/Associate Principal, Town of Exeter, Exeter, New Hampshire. Completed a peer review of rare species, exemplary community and vernal pool surveys.

Wildlife Biologist, Battis Farm, Amesbury, Massachusetts. Completed a survey for bobolink (*Dolichonyx oryzivorus*) and prepared a grassland bird management plan for the Battis Farm Conservation Property.

Project Manager, Riverwoods at Durham, Durham, New Hampshire. Oversaw and completed a winter pellet survey for New England cottontail (*Sylvilagus transitionalis*).

Wildlife Biologist/Associate Principal, Commercial Development, Seabrook, New Hampshire. Responsible for the development of wetland mitigation enhancement plan and overseeing wildlife relocation measures during construction including relocation of turtles, amphibians and fish. Documented new location of a special concern fish species.

Wildlife Biologist, BlueWave, Naples, Maine. Completed a deer wintering habitat survey, amphibian egg mass counts, and talus rock survey for bats.

Wildlife Biologist/Project Manager, Substation, New Hampshire. Assessed common raven (*Corvus corax*) habitat use and behavior over approximately five square miles, and developed a management plan for reducing power outages caused by ravens.

Wildlife Biologist, Waste Management of New Hampshire, Inc., Rochester, New Hampshire. Completed a Phase 1 bat assessment on a 598 acre commercial property to evaluate habitat suitability for the northern log-eared bat (*Myotis septentrionalis*), a federally Threatened species. Ms. Tarr completed all field work, report preparation, and coordination with the U.S. Fish and Wildlife Service.

Wildlife Biologist, Thermogen Industries, Eastport, Maine. Completed wildlife habitat assessment, rare species documentation, natural community mapping, intertidal and subtidal field surveys, wetland delineation, shoreland/surface water delineation, wetland functions and values assessment, and preliminary natural resource impact evaluation for a proposed 200- to 300-thousand metric-ton-per-year torrefied wood production facility on the site. Ms. Tarr worked directly with State regulators including fisheries biologists to identify permitting needs and options for the proposed facility.

Wildlife Biologist, Pats Peak, Henniker, New Hampshire. Completed biomonitoring evaluations spanning the course of 10 years in Cascade Brook to assess the potential impacts of water withdrawal for snowmaking. Ms. Tarr completed biomonitoring evaluations including macroinvertebrate sampling, electrofishing evaluations, and habitat assessments. Ms. Tarr worked directly with the New Hampshire Department of Environmental Services (NHDES) to properly identify the implications of the data and highlight other contributing landscape factors to the data.

Project Manager, Town of Merrimack, New Hampshire. Prepared the first documented town-wide Comprehensive Beaver Management Plan in New Hampshire. The Plan was designed to minimize flood impacts caused by beaver, maintain important natural resources associated with beaver ponds, and minimize long-term municipal infrastructure maintenance costs. As part of this work, Ms. Tarr evaluated beaver activity at over 35 locations, developed a Beaver Habitat Suitability Model, identified appropriate best management practices for water level control, obtained cost estimates and bids, and completed construction monitoring.

Wildlife Biologist, Sunningdale Residential Development, Somersworth, New Hampshire. Completed a wildlife assessment to document wildlife habitats and species, and identify best management practices to maintain and manage wildlife habitats.



Tracy L. Tarr, CWS, CESSWI

Associate Principal

Coordinated a review for grassland birds and New England cottontail. Developed a Conservation Easement Baseline Documentation report.

Wildlife Biologist, North Keene Substation, Keene, New Hampshire. Prepared a wildlife assessment to document wildlife habitats, species, and best management practices.

RARE PLANT SURVEYS

Project Manager, 340 and 386 Distribution Line Project, Rochester, New Hampshire. Completed natural resource evaluation and permitting for the reconstruction of two distribution lines. Also completed survey for six State Threatened/Endangered species including button sedge (*Carex bullata*), clustered sedge (*Carex cumulata*), dwarf huckleberry (*Gaylussacia bigeloviana*), long's bulrush (*Scirpus longii*), nuttall's reed grass (*Calamagrostis cinnoides*), and variable sedge (*Carex polymorpha*). Flagged populations and monitored during construction.

Project Manager, 324 Distribution Line Project, Bedford and Manchester, New Hampshire. Completed surveys for river birch (*Betula nigra*) and long-leaved bluet (*Houstonia longifolia*). Coordinated survey data with the Natural Heritage Bureau.

Wetland Scientist, H141/R193 Transmission Line Uprate Project, Danville, Sandown, Chester, Fremont, and Exeter, New Hampshire. Completed survey for fringed gentian (*Gentianopsis crinita*), a State Threatened plant species. Mapped rare plant locations, completed local permitting, and completed construction monitoring. Documented wood turtle in the utility corridor.

Project Manager, BCS Environmental & Land Law, LLC, New Durham, New Hampshire. Completed survey for small-whorled pogonia.

Wetland Scientist, BlueWave, Naples, Maine. Completed and oversaw surveys for small-whorled pogonia.

Wetland Scientist, E194/U181 Transmission Line, Greenland and Portsmouth, New Hampshire. Oversaw surveys for great bur-reed (*Sparganium eurycarpum*), and development of best management practices to protect plants during construction.

WETLAND DELINEATION, ASSESSMENT & PERMITTING

Wetland Scientist, Town of Webster Wetland Assessment, Webster, New Hampshire. Developed a town-wide wetland assessment and ranked 25 wetlands using the NH Method to assist the Town in the development of a wetland ordinance template and town-wide wetland maps.

Wetland Scientist, Various Utility Corridors (e.g., L163 Transmission Line, W185 Distribution Line), New Hampshire. Completed wetland delineation field work and mapping. Oversaw the development of wetland permitting and access plans.

Wetland Scientist, Martin Meadow Dam, Lancaster, New Hampshire. Completed shoreland assessment and wetland function-value assessment field work in support of the upgrades to Martin Meadow Dam. Coordinated reviews with federal and state agencies, and permitted the reconstruction of the dam.

Project Manager, City of Portsmouth Athletic Fields, Portsmouth, New Hampshire. Completed wetland function-value assessment, vernal pool surveys, and permitting for the construction of three new municipal athletic fields. Coordinated local, state, and federal permitting, completed agency and municipal permitting meetings, and developed the mitigation plan for the project.

Wetland Scientist, James Pond, Exeter/Richmond, Rhode Island. Completed wetland delineation field work and documentation on approximately 900 acres of predominantly wooded and remote terrain. Prepared a beaver management plan and modeled habitat suitability of the Site.

Wetland Scientist, Plymouth Village Water & Sewer District, Plymouth, New Hampshire. Completed wetland delineation, assessment, and permitting for the replacement of a force main sewer line and access culverts along approximately 3,600 linear feet bordering the Baker River.



Tracy L. Tarr, CWS, CESSWI

Associate Principal

Wetland Scientist, Marsh Property, Greenland, New Hampshire. Completed wetland assessment field work and permitting for a bank stabilization project on Great Bay. Designed a joint planting stabilization plan.

Wetland Scientist, Albacore Park, Portsmouth, New Hampshire. Completed wetland delineation and wetland function-value assessment field work in support of the upgrades to the Albacore Park facility and associated submarine basin.

Project Manager, Town of Merrimack, New Hampshire. Completed wetland delineation on town conservation property in support of a trail parking lot project. Also, prepared the first documented town-wide Comprehensive Beaver Management Plan in New Hampshire. The Plan was designed to minimize flood impacts caused by beaver, maintain important natural resources associated with beaver ponds, and minimize long-term municipal infrastructure maintenance costs. As part of this work, Ms. Tarr evaluated beaver activity at over 35 locations, developed a Beaver Habitat Suitability Model, identified appropriate best management practices for water level control, obtained cost estimates and bids, and completed construction monitoring.

Wetland Scientist, Dartmouth College, New Hampshire. Completed wetland function-value assessment field work along 1.25-miles of a proposed alternative energy pipeline route. Wetlands were assessed utilizing the U.S. Army Corps of Engineers' Highway Methodology Workbook Supplement (ACOE, September 1999). Ms. Tarr also prepared GIS overlays of wetlands, conservation lands, wildlife habitats, and recreation areas to identify ecologically sensitive areas and assist with project scoping and impact minimization.

Wetland Scientist, Lomastro Property, Dover, New Hampshire. Completed state and local permitting for a permeable paver and retaining wall project on the Bellamy River. Successfully obtained state wetlands permit and local conditional use permit for work within 50-feet of saltmarsh habitat.

Wetland Scientist, Island Path Property, Hampton, New Hampshire. Completed wetland assessment field work, as well as local, state, and federal permitting for a residential project located in the tidal buffer zone of Great Bay.

Wetland Scientist, Public Service Company of New Hampshire. Completed wetland delineation and natural resources assessment on a 75-acre mitigation property. Wetland boundaries were delineated in accordance with the 1987 ACOE Wetlands Delineation Manual and the January 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region. A global positioning system (GPS) was used to locate and map wetlands on the site. Ms. Tarr also identified potential vernal pools and rare species habitats, and completed wetland function-value assessment field work. Ms. Tarr prepared the project report and completed GIS overlays to document the natural resource values of the targeted mitigation property.

WETLAND RESTORATION DESIGN AND MONITORING

Wetland Scientist, South Coast Rail, Berkeley, Massachusetts. Prepared an invasive species management plan for four wetland mitigation areas, and oversaw wetland mitigation construction monitoring and remedial measures.

Wildlife Biologist, Maverick Development, Auburn, New Hampshire. Completed vernal pool assessment field work and prepared a Vernal Pool Creation Plan as part of project mitigation.

Wetland Scientist, Ball Hill Wind Energy, Hanover, New York. Developed mitigation plans for a wetland mitigation site. Completed wetland delineation, wildlife documentation, and plan preparation.

Wetland Scientist, City of Keene, New Hampshire. Developed stream and wetland restoration plans to improve wetland functions including flood protection, sediment retention, nutrient removal and wildlife habitat. Completed wetland permitting and construction monitoring for a one-acre wetland restoration area. Oversaw plant selection and installation in the restoration area.

Wetland Scientist, Portsmouth Development Authority, Portsmouth, New Hampshire. Completed wetland mitigation monitoring for a wetland buffer enhancement project associated with the South Entrance Multi-use Path project. Responsible for native plant selection, and planting plan development and contractor oversight.



Tracy L. Tarr, CWS, CESSWI

Associate Principal

UTILITY CORRIDOR ASSESSMENT AND PERMITTING

Project Manager, L176 Transmission Line Rebuild Project, Franklin, Tilton, Belmont, and Laconia, New Hampshire.

Completed natural resource data collection, as well as local, state, and federal permitting for the rebuild of a 13.5-mile transmission line. Presented the project at local River Advisory Committee, Conservation Commission, Planning Board, and Zoning Board of Adjustment hearings. Successfully acquired state wetland permit, shoreland permits, PUC water crossing permit, DOT permits, and conditional use permits.

Senior Project Manager, H123 Transmission Line, Merrimack and Litchfield, New Hampshire. Oversaw data collection and local, state, and federal permitting for the rebuild of the transmission line.

Project Manager, Y151 Transmission Line, Hudson, New Hampshire. Completed data collection, wetland assessment, and local, state, and federal permitting for the rebuild of the Y151 Transmission Line.

Project Manager, 381 Transmission Line, Winchester, New Hampshire. Completed wetland assessments and local, state, and federal permitting for the rebuild of the 381 Transmission Line and construction of culverts for a permanent access road. Oversaw construction monitoring.

Project Manager, 379 Transmission Line, Hinsdale, Winchester, Richmond, and Troy, New Hampshire. Oversaw permitting, archeological assessment, and construction monitoring for structure and ground wire replacement work.

Associate Principal, M127 Transmission Line, Sunapee, Springfield, New London, Wilmot, Andover, and Franklin, New Hampshire. Oversaw data collection, vernal pool assessment, permitting, tree clearing, and construction monitoring for the project.

Project Manager, 346X2 Distribution Line Project, Tuftonboro, New Hampshire. Completed vernal pool assessment, wetland function value assessment, permitting, and construction monitoring for the construction of a new distribution line.

Project Manager, Q166 Transmission Line, Fitzwilliam and Troy, New Hampshire. Completed natural resource data collection, as well as local, state, and federal permitting for the construction of a new transmission line. Also, completed construction monitoring.

Project Manager, L163 and K174 Transmission Line TRRP Projects, New Hampshire. Completed natural resource data collection and permitting review for multiple Transmission ROW Reliability Projects. Oversaw field oversight during project implementation.

Project Manager, J147 Transmission Line, Danville and Kingston, New Hampshire. Completed data collection, local/state/federal permitting, and construction monitoring for structure and davit arm replacement work.

Wetland Scientist, Peaslee Tap, Danville, New Hampshire. Completed local permitting for the construction of the Peaslee Tap.

Project Manager, South Peterborough Substation, Peterborough, New Hampshire. Completed wetland function-value assessment, state permitting, and construction monitoring for the re-construction of a distribution line at the substation.

WATERSHED MANAGEMENT

Project Manager, City of Biddeford, Biddeford, Maine. Worked directly with the City of Biddeford and Maine Department of Environmental Protection (DEP) to prepare a Watershed Management Plan for Thatcher Brook. The brook is listed on DEP's Impaired Water Bodies list for primary and secondary contact recreation impairment (bacteria) and aquatic life use violations due to macroinvertebrate impairments. Previous studies of the brook yielded limited macroinvertebrate samples. Ms. Tarr developed a specific macroinvertebrate and habitat evaluation for Thatcher Brook to enhance and supplement existing biomonitoring data. These data were used to develop habitat restoration recommendations and structural retrofit recommendations with the goal of improving the water quality of the brook to meet Class B water quality criteria.

Project Manager, Long Creek Watershed Management District, Maine. Hired as a sole-source contractor to review the Long Creek Watershed Management Plan and recommend possible changes in data collection, monitoring, and habitat/retrofit implementation in the watershed.



Tracy L. Tarr, CWS, CESSWI

Associate Principal

INVASIVE SPECIES MANAGEMENT PLAN DEVELOPMENT & MONITORING

Wetland Scientist for the Whittier Bridge, I-95 Improvement Project, Newburyport, Amesbury, and Salisbury, Massachusetts. Mapped invasive plants along 4-miles of highway and prepared GIS and map overlaps for invasive species management. Worked with the MassDOT and the contractor to develop an Invasive Plant Management Plan.

Wetland Scientist, Swanzey Roundabout Construction, Swanzey, New Hampshire. Developed the invasive species management plan for the project and completed construction monitoring.

Wetland Scientist, Essential Power, Newington, New Hampshire. Oversaw wetland delineation and the development of special permits to support vegetation and invasive species management.

CONSTRUCTION MONITORING

Erosion Control Inspector, Y170 Transmission Line and 386/386A/340 Distribution Line Project, Farmington, Milton, and Rochester, New Hampshire. Provided full-time construction monitoring services over the course of six months for an 8-mile power line project involving four overlapping existing and new lines. Ms. Tarr prepared the Stormwater Pollution Prevention Plan (SWPPP) and provided SWPPP monitoring services, erosion control inspections, wetland delineation, and rare species and exemplary community mapping. Ms. Tarr worked daily with contractors to address local, state, and federal environmental permitting requirements.

Erosion Control Inspector, Merrimack Valley Reliability Project, Tewksbury and Dracut Massachusetts and Hudson, New Hampshire. Completed erosion control monitoring and contractor training on behalf of the contractor. During construction, completed sweeps for rare turtles and snakes including wood turtle and black racer.

Erosion Control Inspector, H137 Transmission Line, Bow, New Hampshire. Provided construction monitoring services and environmental compliance oversight. Conducted weekly and post-storm inspections and interacted with construction managers and operators to implement Best Management Practices (BMPs) for erosion control and sensitive archaeological resources.

Assistant Project Manager, Public Service Company of New Hampshire. Prepared Stormwater Pollution Prevention Plans and Notice of Termination documents for multiple transmission line projects.

Relevant Experience Prior to GZA

Senior Project Manager/Wildlife Biologist, Stoney Ridge Environmental, LLC (2007 – 2012)

NHSC, Inc. (a.k.a. NH Soil Consultants, Inc.) (2000-2002, 2003-2007)

Wetland Systems Biologist, New Hampshire Fish & Game Department (2002/2003)

Research Technician, University of New Hampshire (1994-1997, 1999-2000)

- Lead field technician for southern New Hampshire Blanding's turtle study
- UNH Deer Research Facility
- UNH Animal Research Laboratory
- Technician for Impacts of a Watchable Wildlife Site (completed avian point count surveys, small mammal trapping, and moose behavior assessments)

Research Technician, NEIWPCC/EPA, Deformed frog survey (1997)



Tracy L. Tarr, CWS, CESSWI

Associate Principal

Publications

Stone, A.L., Mitchell F., Van de Poll, R., Rendall, N., Leo, M., West, M., Ammann, A., Andrews, C., Tarr, T., Tilton, M.A., Adams, C., et al., "Method for Inventorying and Evaluating Freshwater Wetlands in New Hampshire (NH Method; June 2011 Update)," University of New Hampshire Cooperative Extension, June 2011

Baber, M.J., Fleishman, E., and Babbitt, K.J., and Tarr, T.L. "The relationship between wetland hydroperiod and nestedness patterns in assemblages of larval amphibians and predatory macroinvertebrates," *Oikos*, 2004

Tarr, T.L., Baber, M.J., and Babbitt, K.J., "Patterns of larval amphibian distribution along a wetland hydroperiod gradient," *Canadian Journal of Zoology*, 2003

Tarr, T. and Babbitt, K.J., "Effects of habitat complexity and predator identity on predation of *Rana clamitans* larvae," *Amphibian-Reptilia*, 2002

Tarr, T. and Babbitt, K.J., "First record of *Dibolocelus ovatus* (Coleoptera:Hydrophilidae) in New Hampshire," *Entomological News*, 2001



Logan Young

Scientist I

Summary of Experience

Mr. Young is an environmental scientist specializing in wildlife and habitat assessment, natural resource identification, field data collection, and construction monitoring. Additional areas of experience include natural resource permitting, landscape mitigation, and geospatial analysis. He regularly reviews best management practices for wildlife assessments, listed species, and construction erosion controls, and assists in all aspects of permitting at a state and local level. Mr. Young has experience prior to GZA in managing volunteer-based wildlife conservation programs, as well as managing stakeholder relationships through outreach for large-scale utility projects.

Relevant Project Experience

GZA WILDLIFE AND RARE SPECIES SURVEY

Wildlife Biologist, HSR, Will County, Reptile Survey, Illinois, 2020. Conducted presence/absence surveys for turtle species in existing high-speed rail corridor. Field work consisted of meander surveys for ornate box turtle (*Terrapene ornata ornata*) in national prairie preserve, aquatic trapping surveys for Blanding's turtle (*Emydoidea blandingii*), and evaluation of survey areas based on historic presence reports and habitat features to predict potential utilization of target species in rail corridor.

Wildlife Biologist, BJ's Wholesale Club, Aquatic Wildlife Relocation, Seabrook, New Hampshire, 2020. Conducted aquatic wildlife surveys during wetland dredge and fill activity for new construction of a retail warehouse. Aquatic wildlife was captured using electrofishing equipment and relocated on site. Special concern species American eel (*Anguilla rostrata*) were identified and relocated off-site with coordination from NH Fish and Game. Post-construction mitigation requirements include expansion of an existing pond and monitoring establishment of wildlife and native vegetation on site.

Wildlife Biologist, Town of Winchester, Northern Black Racer Survey, Winchester, New Hampshire, 2020. Conducted a presence/absence survey for NH State Threatened northern black racer (*Coluber constrictor constrictor*) within a 63-acre parcel prior to construction of a proposed commercial development. Visual assessments for reptiles were completed along random traverse routes throughout all habitat types within the property, as well as identifying locations of greater potential habitat capable of supporting the species. Survey included coordination with NH Fish and Game to temporarily collect target species, if encountered, and conduct additional biomonitoring survey.

WILDLIFE AND RARE SPECIES ASSESSMENT

Wildlife Biologist, Bedford RLG Properties, LLC, Wildlife Assessment, Bedford, New Hampshire. Identified and documented the presence of wildlife species within a 27-acre parcel to support permitting of a proposed commercial development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Education

B.S., Ecology and Spatial Analysis,
University of New Hampshire, 2012

Licenses & Registrations

40-hour HAZWOPER

Affiliations

- New Hampshire Association of Natural Resource Scientists

Areas of Specialization

- Wildlife Habitat Evaluation
- Rare Species Assessment
- Construction Monitoring
- Environmental Permitting
- GIS Mapping and Analysis
- Public Outreach and Involvement
- Tree and Shrub Identification
- Avian Surveys
- Reptile Surveys



Logan Young

Scientist I

Wildlife Biologist, Bowers Landing of Merrimack II, Wildlife Assessment, Merrimack, New Hampshire. Identified and documented the presence of wildlife species within an 8-acre parcel to support permitting of a proposed residential subdivision, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, BJ's Wholesale Club, Wildlife Assessment, Seabrook, New Hampshire. Identified and documented the presence of wildlife species within a 24-acre parcel to support permitting of proposed additions to new construction of a retail warehouse, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Ducal Development, LLC, Wildlife Assessment, Hollis, New Hampshire. Identified and documented the presence of wildlife species within a 55-acre parcel to support permitting of a proposed commercial development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Dwarkamai Temple, Wildlife Assessment, Hudson, New Hampshire. Identified and documented the presence of wildlife and botanical species within a 10-acre parcel to support permitting of a proposed religious temple, with an emphasis on use by endangered, threatened, special concern species and species of greatest conservation need. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, FedEx Distribution Center, Wildlife Assessment, Chesterfield, New Hampshire. Identified and documented the presence of wildlife species within a 24-acre parcel to support permitting of a proposed improvements to a distribution center, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Proposed Cluster Subdivision, Wildlife Assessment, Spofford, New Hampshire. Identified and documented the presence of wildlife species within a 29-acre parcel to support permitting of a proposed residential subdivision, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Proposed Residential Subdivision, Wildlife & Deer Wintering Area Assessment, Newbury, New Hampshire. Identified and documented the presence of wildlife species and potential deer wintering areas within a 50-acre parcel to support permitting of a proposed residential development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Potential deer wintering areas were assessed by habitat characterization, canopy density, and presence/absence survey of white-tailed deer. Findings included recommendations on best management practices for proposed construction and future land use.



Logan Young

Scientist I

Wildlife Biologist, Proposed Tradesman Shops, Wildlife Assessment, Manchester, New Hampshire. Identified and documented the presence of wildlife species within a 4-acre parcel to support permitting of a proposed commercial development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Roscommon Investments, LLC, Wildlife Assessment, Nashua, New Hampshire. Identified and documented the presence of wildlife species within a 5-acre parcel to support permitting of a proposed commercial development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Shepherd's Hill Subdivision, Wildlife Assessment, Hudson, New Hampshire. Identified and documented the presence of wildlife species within a 17-acre parcel to support permitting of a proposed residential subdivision, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Waste Management of New Hampshire, Wildlife Assessment, Rochester, New Hampshire. Identified and documented the presence of wildlife species within a 5-acre parcel to support permitting of a proposed materials recovery facility, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Olson Development, Wildlife Assessment, Hollis, New Hampshire. Identified and documented the presence of wildlife species within a 17-acre parcel to support permitting of a proposed residential subdivision. Visual and audio assessments for avian and mammal species were conducted along random traverse routes throughout the property in order to characterize utilization of the parcel by local fauna.

NON-GZA WILDLIFE AND RARE SPECIES SURVEY

Field Monitor & Program Manager - NH Audubon, Massabesic Center, Cavity Nesting Survey, Auburn, New Hampshire, 2016-2021. Manager and field lead for annual surveys of cavity nesting bird species at Massabesic Lake. Survey focuses on population dynamics of species in decline including eastern bluebird (*Sialia sialis*), tree swallow (*Tachycineta bicolor*), and house wren (*Troglodytes aedon*). Surveys include visual identification of breeding species, recording fledgling success, and managing habitat for introduced and invasive species. Program also employs and assesses techniques for management of house sparrow (*Passer domesticus*).

Field Observer - NH Audubon, Carter Hill Orchard, Seasonal Hawk Watch, Concord, New Hampshire, 2016-2020. Annual field observer during fall migration survey in the Merrimack River Valley. Surveys include identification of species in flight, recording presence, relative abundance, and seasonal timing of avian species with a focus on raptors.

Field Observer - NH Audubon & Harris Center, Pack Monadnock Raptor Observatory, Seasonal Hawk Watch, Warner, New Hampshire, 2016-2020. Annual field observer during fall migration survey in the Monadnock region. Surveys include identification of species in flight, recording presence, relative abundance, and seasonal timing of avian species with a focus on raptors.



Logan Young

Scientist I

Field Observer – NH Audubon, Massabesic Center, Summer Bat Colony Survey, Auburn, New Hampshire, 2016. Field observer for NH State Endangered little brown bat (*Myotis lucifugus*). Survey included species identification via acoustic survey and visual count of bats leaving maternity roost. Counts were conducted at beginning and end of pupping season to assess reproductive success.

Field Observer - Baltimore Bird Club, Cromwell Valley Park, Seasonal Hawk Watch, Parkville, Maryland, 2015. Field observer during fall migration survey in the Chesapeake Bay Basin region. Surveys include identification of species in flight, recording presence, relative abundance, and seasonal timing of avian species with a focus on raptors.

Field Observer – NH Audubon, McLane Center, Chimney Swift Survey, Concord & Manchester, New Hampshire, 2014. Field observer for NH State Special Concern species chimney swift (*Chaetura pelagica*) during roost count surveys in Concord and Manchester, NH. Surveys included presence/absence in urban environments, identification of night roosts, and relative abundance in documented roost sites.

LANDSCAPE PLANNING AND RESTORATION

Environmental Scientist I, Eversource Energy, K105 Restoration Monitoring, Goffstown, New Hampshire. Post-construction monitoring for landscape restoration efforts to stabilize and prevent erosion of a sensitive property. Conducted quarterly site assessment, provided best management recommendations, and generated quarterly inspection reports of restoration progress for stakeholders from 2018-2020.

Environmental Scientist I, Eversource Energy, Seacoast Reliability Project Landscape Mitigation, Madbury, Durham, Newington, and Portsmouth, New Hampshire. Designed landscape plans for 47 properties following construction of the F107 Transmission Line. Plans designed to mitigate the view of new construction throughout the corridor in collaboration with landowners, representatives of the general public and historic resources, and utility vegetation maintenance requirements. Oversaw implementation of landscape plans by contractors, maintained schedule of work, and performed QA/QC evaluations.

INVASIVE SPECIES MANAGEMENT

Environmental Scientist I, Eversource Energy, Seacoast Reliability Project Landscape Mitigation, Durham, New Hampshire. Designed management plan for removal of Japanese Knotweed (*Reynoutria japonica*) at University of New Hampshire campus to support landscape mitigation following construction of underground segments of F107 Transmission Line.

NATURAL RESOURCE ASSESSMENTS

Environmental Scientist I, Eversource Energy, M127 Transmission Line Structure Replacement Project, Sunapee, New London, Springfield, Andover, Franklin, New Hampshire. Completed vegetative inventory and assessment of functions and values of delineated wetlands to assist permitting of proposed work areas for utility structure replacements.

Environmental Scientist I, Eversource Energy, E194/U181 Transmission Line Structure Replacement Project, Newington and Portsmouth, New Hampshire. Completed vegetation inventory and assessment of functions of delineated wetlands to assist permitting of proposed work areas for utility structure replacements.

Environmental Scientist I, Rennie Farm Remediation System, Hanover, New Hampshire. Completed vegetative inventory and assessment of functions and values of delineated wetlands to assist permitting of proposed work areas for utility structure replacements.

Experience Prior to GZA

Public Outreach Specialist, Eversource Energy, Transmission Line ROW Reliability Project, Various Towns, New Hampshire. Maintained relationship between client and project stakeholders during comprehensive vegetation removal throughout utility rights-of-way in New Hampshire. Managed all stakeholder needs, landowner communications and site reviews, and facilitated resolution of all stakeholder concerns during each project phase.



Logan Young

Scientist I

Coordinator of Volunteers, NH Audubon, Auburn and Concord, New Hampshire. Coordinated all volunteer-staffed programs throughout NH including natural resource education programs and research initiatives for imperiled species in NH. Led stewardship efforts for NH Audubon conserved lands and conducted training for wildlife surveys. Participated in research initiatives for bald eagle (*Haliaeetus leucocephalus*), bobolink (*Dolichonyx oryzivorus*), chimney swift, common nighthawk (*Chordeiles minor*), eastern bluebird, tree swallow, and peregrine falcon (*Falco peregrinus*).

Certifications/Training

- OSHA 10-Hour Construction Certification
- HAZWOPER 40-hour Certification

Volunteer Activities

- NH Audubon



Nyssa Seekamp

Scientist I

Summary of Experience

Nyssa is an environmental scientist specializing in wildlife and habitat assessment, natural resource identification, and field data collection. Additional areas of experience include avian monitoring, underwater SCUBA research, environmental permitting, and invasive species management. She regularly performs wildlife assessments and assists in all aspects of permitting at a state and local level. Prior to GZA, Ms. Seekamp was involved in the protection, monitoring, and collection of biological data on rare shorebirds, as well as leading field teams, working in a biological laboratory, assisting in wetland delineation and mitigation projects, and conducting public outreach and education. She is currently a member of the NH Association of Natural Resource Scientists and the Association of MA Wetland Scientists. She is actively working towards her Certified Wetland Scientist (CWS) and Certified Wildlife Biologist (CWB) and has goals of obtaining a Federal Bird Banding and Marking Permit.

Education

B.S., Marine, Estuarine and Freshwater Biology, University of New Hampshire, 2018

Licenses & Registrations

AAUS Scientific Diver
Open Water SCUBA Diver

Affiliations

- New Hampshire Association of Natural Resource Scientists
- Association of Massachusetts Wetland Scientists

Areas of Specialization

- Wildlife Habitat Evaluation
- Rare Species Assessment
- Environmental Permitting
- GIS Mapping and Analysis
- Biological Data Analysis
- Wetland Delineation & Mitigation
- Public Outreach and Involvement
- Tree and Shrub Identification
- Invasive Species Mapping & Mitigation
- Shorebird, Coastal & Aquatic Species Identification
- Avian & Reptile Surveys
- Limnological & Underwater Data Collection

Relevant Project Experience

WILDLIFE AND RARE SPECIES ASSESSMENT

Wildlife Biologist, Ducal Development, Wildlife Assessment, Hollis, New Hampshire. Assisted in identifying and documenting the presence of wildlife species to support the permitting of a proposed 14-lot residential subdivision, with an emphasis on use by endangered, threatened and special concern species in NH. Visual and audio assessments for avian and mammal species were conducted along random traverse routes throughout the property to characterize utilization of the parcel by local fauna.

Wildlife Biologist, Meadowbrook Drive Site Development, Wildlife Assessment, Barrington, New Hampshire. Assisted in identifying and documenting the presence of wildlife species to support the permitting of a proposed residential subdivision containing 12 lots, with an emphasis on use by endangered, threatened and special concern species in NH. Visual and audio assessments for avian and mammal species were conducted along random traverse routes throughout the property to characterize utilization of the parcel by local fauna.

Wildlife Biologist, Mountain Road Site Development, Deer Wintering Areas & Wildlife Assessment, Newbury, New Hampshire. Assisted in identifying and documenting the presence of wildlife species to support the permitting of a proposed four-lot residential subdivision, with an emphasis on use by endangered, threatened and special concern species in NH. Conducted a deer wintering area survey and identified potential deer wintering areas based on a minimum of 50% canopy closure of softwood vegetation. Visual and audio assessments for avian and mammal species were conducted along random traverse routes throughout the property to characterize utilization of the parcel by local fauna.

Wildlife Biologist, Key Auto Group, Wildlife Assessment, Rochester, New Hampshire. Identified and documented wildlife species to support the permitting of a proposed auto dealership, with an emphasis on use by endangered, threatened and special concern species in NH. Visual and audio assessments for avian and mammal species were conducted along random traverse routes throughout the property to



Nyssa Seekamp

Scientist I

characterize utilization of the parcel by local fauna. Recommended BMP's for proposed construction and future land use.

Wildlife Biologist, Belle Isle Utility Line Connection Project, Wildlife Assessment, Portsmouth, New Hampshire. Identified and documented wildlife species to support the permitting of proposed island re-development and underwater utility line beneath the Piscataqua River, with an emphasis on use by endangered, threatened, and special concern species in NH. Visual and audio assessments for avian and mammal species were conducted along random traverse routes throughout the property to characterize utilization of the parcel by local fauna. Recommended BMP's for proposed construction and future land use.

NATURAL RESOURCE ASSESSMENT

Scientist I, Eversource Energy, L163 & X104 Transmission Line Structure Replacement Project, Keene, Antrim, Nelson, Stoddard and Sullivan New Hampshire. Assisted in peatland review and vegetation inventory of delineated wetlands to assist permitting requirements of proposed work areas of structure and copperweld wire replacements.

NATURAL RESOURCE PERMITTING

Scientist I, Eversource Energy, L163/X104/373/D108/K174/379/367/D121 Transmission Line OPGW & Structure Replacement Projects, New Hampshire. Assisted in the preparation of federal, state, and local permitting efforts including Federal Avian Administration (FAA) notification and Statutory Permit by Notification (SPN) prior to optical ground wire and structure replacement.

Scientist I, Dorchester Yacht Club, Harbor Dredging Project, Dorchester, Massachusetts. Prepared federal, state and local permitting including Environmental Notification Form (ENF), Chapter 91, U.S. Army Corps of Engineers' (USACE), Notice of Intent (NOI), and Massachusetts Environmental Policy Act (MEPA).

Experience Prior to GZA

RARE SPECIES SURVEYS

Conservation Biologist I, Shorebird Monitor, MA Department of Conservation and Recreation, Salisbury, Newburyport and Ipswich Massachusetts. Monitored and collected biological data on endangered and threatened shorebird species, including piping plover (*Charadrius melodus*), least tern (*Sternula antillarum*) and American oystercatcher (*Haematopus palliatus*). Supervisory experience training and managing field assistants on shorebird monitoring practices in the field. Working knowledge of the Endangered Species Act (ESA), MA Endangered Species Act (MESA), and the Marine Mammal Protection Act (MMPA). Proper coordination with wildlife rehabilitators and regulatory agencies in the area for hazardous or toxic marine life and distressed mammals and migratory birds. Educated the public about environmental stewardship, conservation and protecting rare species.

Associate Wetland Scientist, Turtle Monitoring, Seekamp Environmental Consulting, Inc., Georgetown, Massachusetts. Conducted Blanding's and Wood turtle sweeps within the erosion control boundaries of an active construction site for a residential subdivision in Georgetown, MA. Prepared and provided informational brochure and educational packet on rare species protocol for both contractors working on Site and for homeowners living in the new subdivision. Worked under supervisor with Natural Heritage Scientific Collection Permit to ensure proper removal of turtles if found within Site boundary.

Scientist Aide/Laboratory Technician, Mya Clam Survey, Normandeau Associates, Hampton, New Hampshire. Collection and identification of adult and spat *Mya* clams in Hampton, NH.



Nyssa Seekamp

Scientist I

HABITAT CONSERVATION MANAGEMENT

Conservation Biologist I, Salisbury Beach State Reservation, Operations and Maintenance Plan, MA Department of Conservation and Recreation, Salisbury, Massachusetts. Prepared the operations and maintenance plan (OMP) for Salisbury Beach State Reservation in concurrence with Massachusetts and federal guidelines for coastal wetland resource areas and rare species habitat protection.

Conservation Biologist I, MA Statewide Operations and Maintenance Plan, MA Department of Conservation and Recreation, Massachusetts. Prepared the statewide OMP for all Massachusetts beaches in concurrence with Massachusetts and federal guidelines for coastal wetland resource areas and rare species habitat protection.

Conservation Biologist I, MA Habitat Conservation Plan, MA Department of Conservation and Recreation, Salisbury, Massachusetts. Expanded the MA Habitat Conservation Plan (HCP) with Certificates of Inclusion (COI) for Revere, Nahant, Winthrop, Salisbury, Newburyport-Plum Island and Sandy Point State Reservation. Plans in concurrence with Massachusetts and federal guidelines for coastal wetland resource areas and rare species habitat protection.

Associate Wetland Scientist, Open Meadow Pollinator Habitat Plan, Seekamp Environmental Consulting, Inc., Newburyport, Massachusetts. Prepared an open meadow pollinator habitat plan to preserve approximately 11 acres to develop and maintain pollinator meadows and develop early successional rabbit habitat in Newburyport, MA.

INVASIVE SPECIES MANAGEMENT

Conservation Biologist I, Nahant Beach Reservation, Invasive Species Management, MA Department of Conservation and Recreation, Nahant, Massachusetts. Designed and proposed management plan to remove Japanese knotweed (*Reynoutria japonica*), spotted knapweed (*Centaurea maculosa*) and pepperweed (*Lepidium latifolium*) on Nahant Beach Reservation.

WETLAND PROJECTS

Associate Wetland Scientist, Wetland Delineation & Mitigation, Seekamp Environmental Consulting, Inc., New Hampshire & Massachusetts. Performed wetland delineations in the field under the direction of a CWS. Defended wetland line to conservation commissions in MA and NH. Completed multiple wetland mitigation/restoration design projects from the planning and design phase to the execution of field work (tree and shrub planting) and follow-up monitoring.

Associate Wetland Scientist, Wetland Permitting, Seekamp Environmental Consulting, Inc., New Hampshire & Massachusetts. Prepared Stormwater Prevention Pollution Plans (SWPPP), NOI's, Abbreviated Notice of Resource Area Delineation (ANRAD), and Shoreland Permit by Notification (PBN) forms. Interpreted federal, state and local regulations in MA and NH.

LABORATORY EXPERIENCE

Scientist Aide/Laboratory Technician, Sample Sorting, Normandeau Associates, Seabrook, New Hampshire. Experience sorting marine and freshwater planktonic samples from four sample locations in Seabrook, NH. Proper handling, labeling and storage of scientific samples. Worked closely with project managers to solve complex problems involving the standard of protocol for changes to laboratory techniques to accommodate an influx of non-native, invasive algal species. Identified marine algae by scientific name.

Volunteer Activities

- Blue Ocean Society – Trash cleanup at Odiorne Point State Park, Rye, NH.
- Ocean Discovery Day, UNH – Explain health benefits of seaweed and the importance of protecting seaweed aquaculture.

Nyssa Seekamp

Scientist I

University of New Hampshire – B.S., Marine, Estuarine and Freshwater Biology

RELATED COURSEWORK

- Marine Biology, Aquatic Botany, Animal Physiology, Ecology, Evolution, Applied Biostatistics, Molecular and Cellular Biology, Evolutionary Biology, Microbiology, Genetics, General Chemistry, Biological Chemistry, Organic Chemistry, Physics.

ACADEMIC PROJECTS

Underwater Research, *Comparing Ascidian Settlement on Multiple Substrates in Bab's Cove: The Isles of Shoals, New Hampshire*. Conducted preliminary underwater research to formulate a project proposal for studying the substrate preference and substrate orientation of two invasive colonial ascidians (*Botrylloides violaceus* & *Didemnum vexillum*) in the Gulf of Maine. Completed a technical report and written proposal on preliminary research.

- Instruments used: SCUBA, dive flashlight, transect, quadrat, underwater field notebook.

Aquaculture, *Arctic Char (*Salvelinus alpinus*) Enterprise Report, New Hampshire*. Developed mock aquaculture business plan for Arctic Char farming. Performed water quality testing (salinity, temperature, dissolved oxygen, pH, ammonia, nitrite, alkalinity, carbon dioxide, hardness), fin clip analysis, and observed culture methods (strip spawning). Completed a written proposal for my business plan.

- Instruments used: Salinometer, thermometer, ODO sensor, pH meter, nitrite colorimeter, water hardness monitor.

Biological Oceanography, *The Recruitment of Barnacle Nauplii (*Semibalanus balanoides*) in Response to Changes in Temperature and Salinity in Portsmouth Harbor, New Hampshire*. Studied biological processes of the ocean, trophodynamics, plankton diversity and ecology, ecosystems, and global ocean dynamics. Conducted marine zooplankton counts and temperature and salinity measurements in the Gulf of ME to determine community recruitment of fouling species and compared 2018 results with previous years data. Completed an extensive technical report on my research.

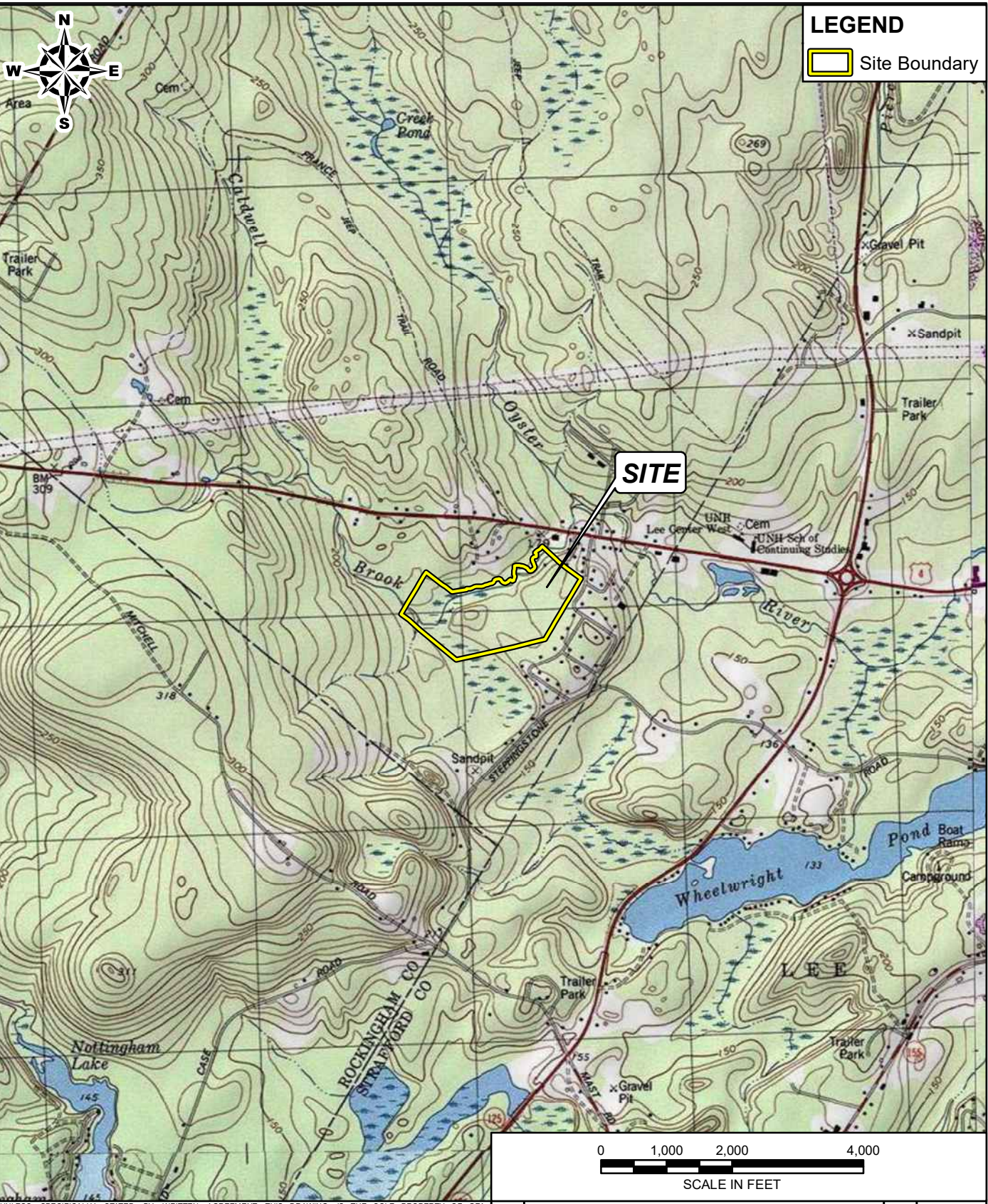
- Instruments used: bongo net tow, Henson-stemple piston sampler, compound microscope.

Limnology, *Plankton trophic structure, eutrophication and crepuscular vertical migration of phantom midge larvae (*Chaoborus*) in York Pond causes shifts in cyanobacterial toxins, New Hampshire*. Investigated eutrophication, acidification, biodiversity, trophic structure and biotoxins in multiple NH lakes. Completed an independent limnology study of York Pond, in Berlin, NH and submitted a written manuscript for publication. Used modern field and lab methods for lake studies, analysis and interpretation of data.

- Instruments used: Lowrance HDS-5 Gen 2 Lake Insight Transducer, Multiparameter probe (YSI model EXO 2), Integrated tube vertical net tow, Zooplankton and Phytoplankton Phototactic response (LIMTEX), Secchi disk, LI-COR Quantum DataLogger LI-1400, Schindler-Patalis trap (Aquatic Research Instruments), plankton vertical net tow, Henson-stemple piston sampler, compound microscope.



Figures



SCALE IN FEET

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR THE USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

NO.	ISSUE / DESCRIPTION	BY	DATE

MEADOWBROOK VILLAGE
TAX MAP 273, LOT 49 & TAX MAP 270, LOT 3
BARRINGTON, NEW HAMPSHIRE

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
21 BOYLSTON STREET, LLC

LOCUS PLAN

PROJ MGR: LTY	REVIEWED BY: TLT
DESIGNED BY: MJD	DRAWN BY: LTY
DATE: 06/30/2021	PROJECT NO: 04.0191175.00





CHECKED BY: DMZ	FIG
SCALE: 1 in = 2,083 ft	1
REVISION NO:	
SHEET NO: 1 OF 5	

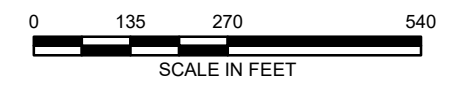
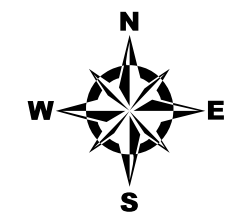
© 2021 - GZA GeoEnvironmental, Inc. C:\Users\logan.young\Desktop\ArcGIS\AoT\Barrington\Figure 1 - Locus.mxd, February 19, 2021 - 5:46:38 PM, Logan.Young

© 2021 - GZA GeoEnvironmental, Inc. C:\Users\logana_young\Desktop\ArcGIS\Ac\T\Barrington\Figure 2 - Aerial Overview.mxd, June 30, 2021 - 10:53:56 AM, Logan, Young



LEGEND

-  NHDOT ROADS
-  NHD FLOWLINE
-  TOWN BOUNDARY
-  PARCEL BOUNDARY




- NOTES:
1. AERIAL IMAGERY FROM ESRI WORLD IMAGERY BASEMAP.
 2. DOT ROADS WERE OBTAINED FROM THE UNH GRANIT GIS CLEARINGHOUSE AND SHOULD BE CONSIDERED APPROXIMATE.
 3. SITE BOUNDARY DATA WAS PROVIDED BY JONES & BEACH ENGINEERS, INC.

NO.	ISSUE / DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEORENVIROMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THIS DRAWING IS SOLELY FOR THE USE BY GZA'S CLIENT OR THE CLIENTS DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

MEADOWBROOK VILLAGE
TAX MAP 273, LOT 49 & TAX MAP 270, LOT 3
BARRINGTON, NEW HAMPSHIRE

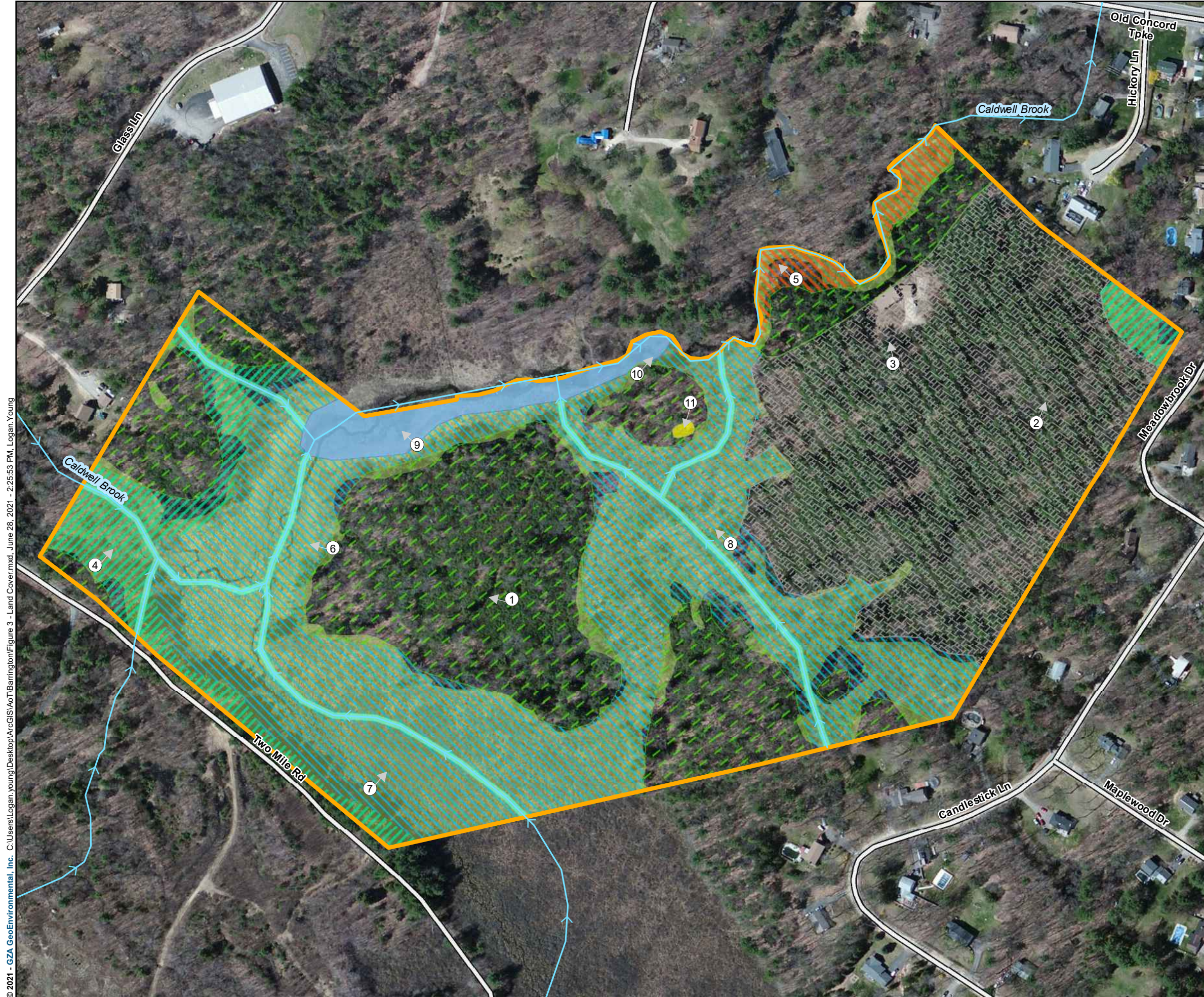
AERIAL OVERVIEW

PREPARED BY:  **GZA GeoEnvironmental, Inc.**
Engineers and Scientists
www.gza.com

PREPARED FOR: **21 BOYLSTON STREET, LLC**

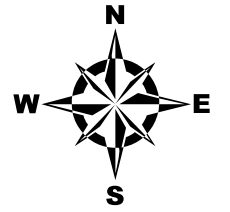
PROJ MGR: LTY	REVIEWED BY: TLT	CHECKED BY: DMZ	FIG
DESIGNED BY: MJD	DRAWN BY: LTY	SCALE: 1 in = 267 ft	2
DATE: 06/30/2021	PROJECT NO: 04.0191175.00	REVISION NO:	

SHEET NO: 2 OF 5



LEGEND

- SITE BOUNDARY
 - 1 PHOTO POINT
 - ADJUSTED FLOWLINE
 - FIELD DELINEATED WETLANDS
 - NHDOT ROADS
- Land Cover Type**
- Appalachian Oak-Pine
 - Developed or Barren Land
 - Marsh/Shrub Wetland
 - Floodplain Forest
 - Temperate Swamp
 - Potential Vernal Pool
 - Open Water
 - Stream



- NOTES:**
1. AERIAL IMAGERY FROM ESRI WORLD IMAGERY BASEMAP.
 2. DOT ROADS WERE OBTAINED FROM THE UNH GRANIT GIS CLEARINGHOUSE AND SHOULD BE CONSIDERED APPROXIMATE.
 3. SITE BOUNDARY DATA WAS PROVIDED BY JONES & BEACH ENGINEERS, INC.
 4. WETLAND DELINEATION WAS COMPLETED BY GZA IN 2020.
 5. ADJUSTED FLOWLINE AND LAND COVER TYPES BASED ON FIELD OBSERVATIONS BY GZA.

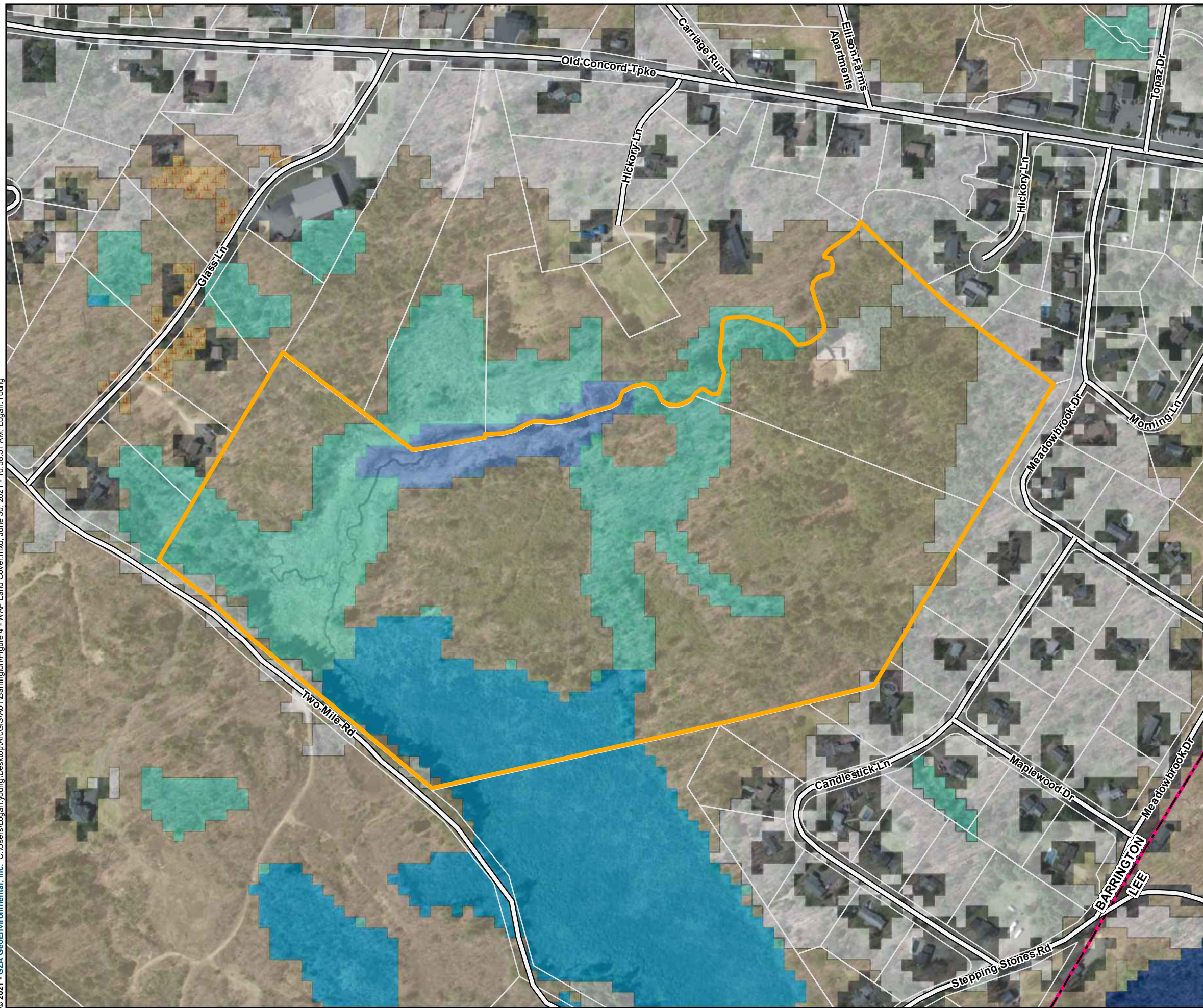
NO.	ISSUE / DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR THE USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.














MEADOWBROOK VILLAGE
TAX MAP 273, LOT 49 & TAX MAP 270, LOT 3
BARRINGTON, NEW HAMPSHIRE

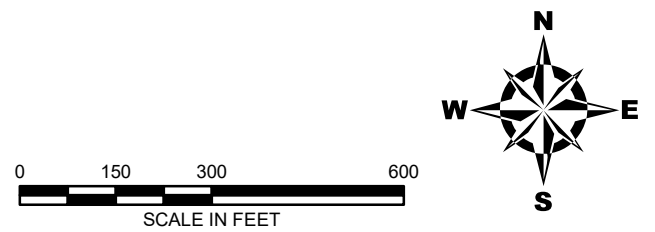
LAND COVER OVERLAY

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: 21 BOYLSTON STREET, LLC	
PROJ MGR: LTY	REVIEWED BY: TLT	CHECKED BY: DMZ	FIG
DESIGNED BY: MJD	DRAWN BY: LTY	SCALE: 1 in = 233 ft	5
DATE: 06/30/2021	PROJECT NO: 04.0191175.00	REVISION NO:	



LEGEND

-  SITE BOUNDARY
 -  NHDOT ROADS
 -  TOWN BOUNDARY
 -  PARCEL BOUNDARY
- Wildlife Action Plan (WAP) 2020 Land Cover**
-  Appalachian Oak-Pine
 -  Developed Impervious
 -  Developed or Barren land
 -  Grassland
 -  Hemlock-Hardwood-Pine
 -  Open Water
 -  Peatland
 -  Temperate swamp
 -  Wet Meadow/Shrub Wetland




NOTES:
 1. AERIAL IMAGERY FROM ESRI WORLD IMAGERY BASEMAP.
 2. DOT ROADS WERE OBTAINED FROM THE UNH GRANIT GIS CLEARINGHOUSE AND SHOULD BE CONSIDERED APPROXIMATE.
 3. SITE BOUNDARY DATA WAS PROVIDED BY JONES & BEACH ENGINEERS, INC.

NO.	ISSUE / DESCRIPTION	BY	DATE

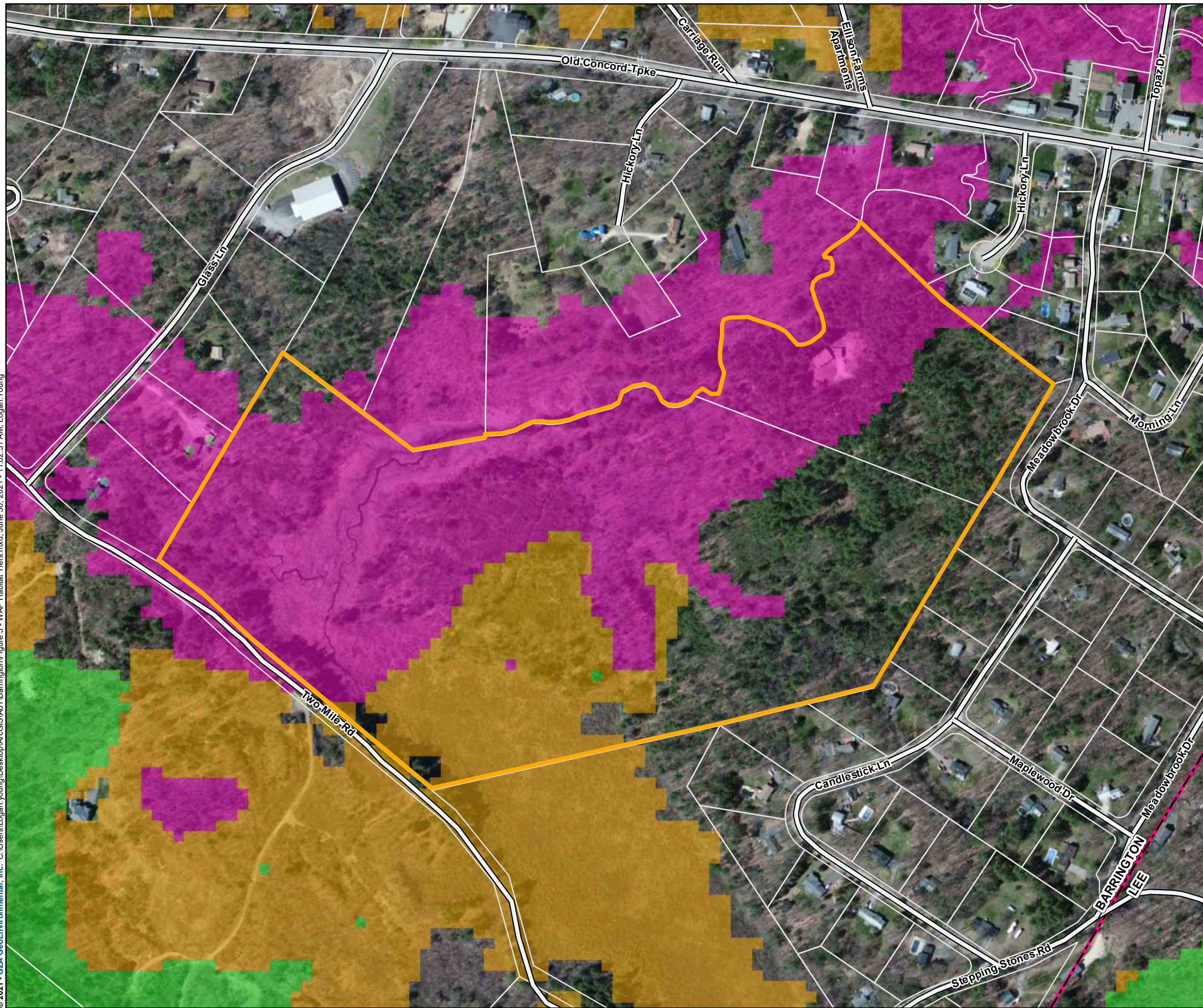
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR THE USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

MEADOWBROOK VILLAGE
 TAX MAP 273, LOT 49 & TAX MAP 270, LOT 3
 BARRINGTON, NEW HAMPSHIRE





WILDLIFE ACTION PLAN (WAP) 2020
LAND COVER

PREPARED BY:  GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: 21 BOYLSTON STREET, LLC	
PROJ MGR: LTY	REVIEWED BY: TLT	CHECKED BY: DMZ	FIG
DESIGNED BY: MJD	DRAWN BY: LTY	SCALE: 1 in = 300 ft	4
DATE: 06/30/2021	PROJECT NO: 04.0191175.00	REVISION NO:	

© 2021 - GZA GeoEnvironmental, Inc. C:\Users\logan.young\Desktop\ArcGIS\Ac\TBarrington\Figure 5 - WAP Habitat Tiers.mxd, June 30, 2021 - 11:02:51 AM, Logan, Young

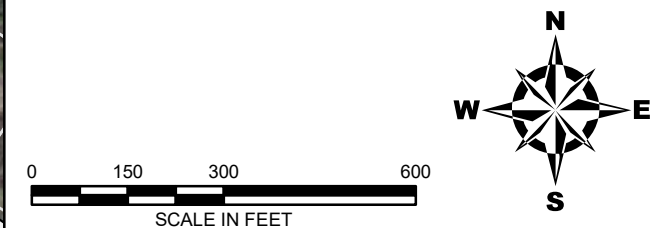


LEGEND

-  SITE BOUNDARY
-  NHDOT ROADS
-  TOWN BOUNDARY
-  PARCEL BOUNDARY

Wildlife Action Plan (WAP) 2020 Habitat Tiers

-  1 Highest Ranked Habitat in New Hampshire
-  2 Highest Ranked Habitat in Biological Region
-  3 Supporting Landscapes




NOTES:
 1. AERIAL IMAGERY FROM ESRI WORLD IMAGERY BASEMAP.
 2. DOT ROADS WERE OBTAINED FROM THE UNH GRANIT GIS CLEARINGHOUSE AND SHOULD BE CONSIDERED APPROXIMATE.
 3. SITE BOUNDARY DATA WAS PROVIDED BY JONES & BEACH ENGINEERS, INC.

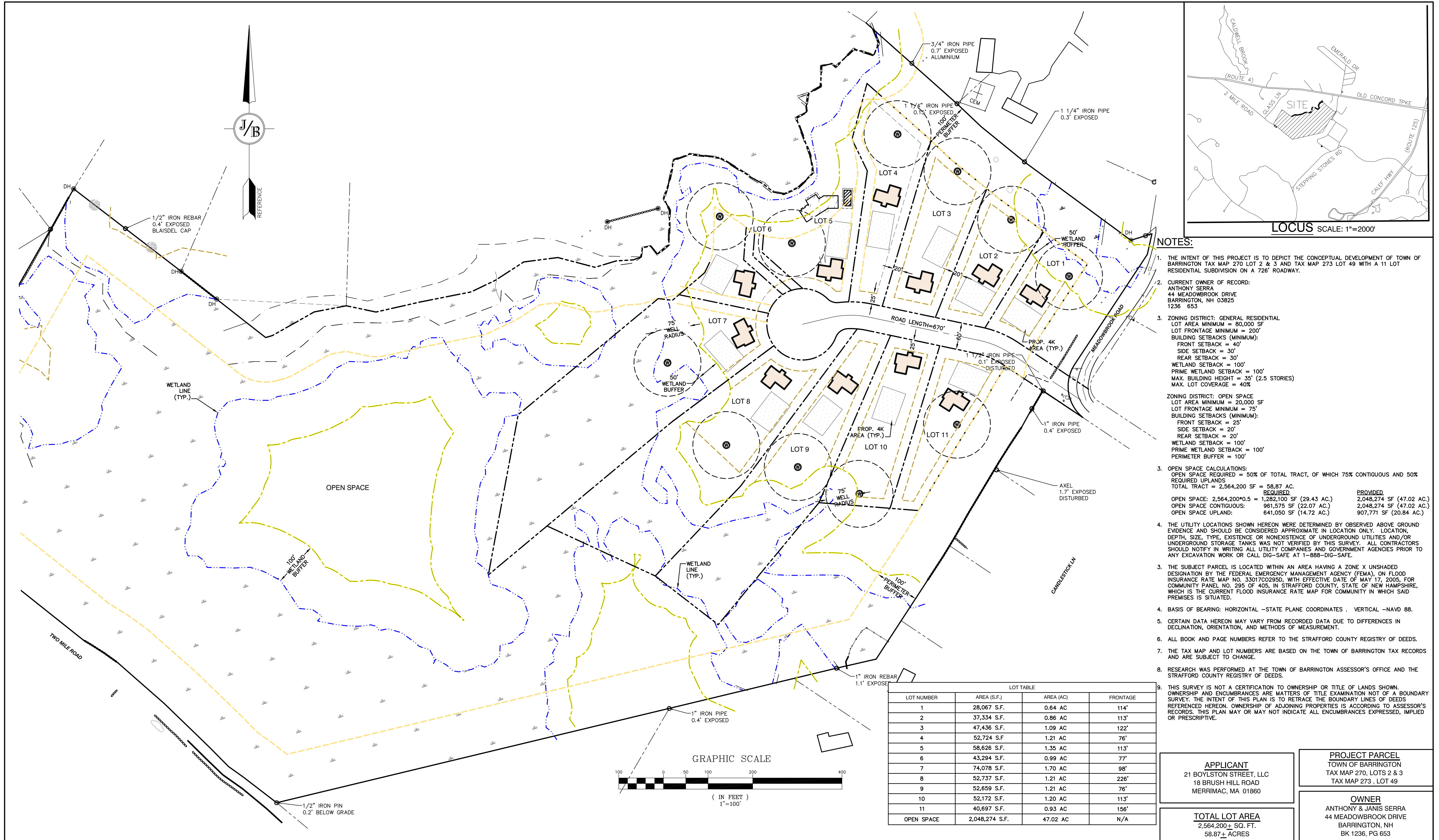
NO.	ISSUE / DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR THE USE BY GZA'S CLIENT OR THE CLIENTS DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

MEADOWBROOK VILLAGE
 TAX MAP 273, LOT 49 & TAX MAP 270, LOT 3
 BARRINGTON, NEW HAMPSHIRE

WILDLIFE ACTION PLAN (WAP) 2020
HABITAT TIERS

PREPARED BY:  GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: 21 BOYLSTON STREET, LLC	
PROJ MGR: LTY	REVIEWED BY: TLT	CHECKED BY: DMZ	FIG
DESIGNED BY: MJD	DRAWN BY: LTY	SCALE: 1 in = 300 ft	5
DATE: 06/30/2021	PROJECT NO: 04.0191175.00	REVISION NO:	



- NOTES:**
- THE INTENT OF THIS PROJECT IS TO DEPICT THE CONCEPTUAL DEVELOPMENT OF TOWN OF BARRINGTON TAX MAP 270 LOT 2 & 3 AND TAX MAP 273 LOT 49 WITH A 11 LOT RESIDENTIAL SUBDIVISION ON A 726' ROADWAY.
 - CURRENT OWNER OF RECORD:
ANTHONY SERRA
44 MEADOWBROOK DRIVE
BARRINGTON, NH 03825
1236 653
 - ZONING DISTRICT: GENERAL RESIDENTIAL
LOT AREA MINIMUM = 80,000 SF
LOT FRONTAGE MINIMUM = 200'
BUILDING SETBACKS (MINIMUM):
FRONT SETBACK = 40'
SIDE SETBACK = 30'
REAR SETBACK = 30'
WETLAND SETBACK = 100'
PRIME WETLAND SETBACK = 100'
MAX. BUILDING HEIGHT = 35' (2.5 STORIES)
MAX. LOT COVERAGE = 40%
 - ZONING DISTRICT: OPEN SPACE
LOT AREA MINIMUM = 20,000 SF
LOT FRONTAGE MINIMUM = 75'
BUILDING SETBACKS (MINIMUM):
FRONT SETBACK = 25'
SIDE SETBACK = 20'
REAR SETBACK = 20'
WETLAND SETBACK = 100'
PRIME WETLAND SETBACK = 100'
PERIMETER BUFFER = 100'
 - OPEN SPACE CALCULATIONS:
OPEN SPACE REQUIRED = 50% OF TOTAL TRACT, OF WHICH 75% CONTIGUOUS AND 50% REQUIRED UPLANDS
TOTAL TRACT = 2,564,200 SF = 58.87 AC.
OPEN SPACE: 2,564,200*0.5 = 1,282,100 SF (29.43 AC.)
OPEN SPACE CONTIGUOUS: 961,575 SF (22.07 AC.)
OPEN SPACE UPLAND: 641,050 SF (14.72 AC.)
 - THE UTILITY LOCATIONS SHOWN HEREON WERE DETERMINED BY OBSERVED ABOVE GROUND EVIDENCE AND SHOULD BE CONSIDERED APPROXIMATE IN LOCATION ONLY. LOCATION, DEPTH, SIZE, TYPE, EXISTENCE OR NONEXISTENCE OF UNDERGROUND UTILITIES AND/OR UNDERGROUND STORAGE TANKS WAS NOT VERIFIED BY THIS SURVEY. ALL CONTRACTORS SHOULD NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES PRIOR TO ANY EXCAVATION WORK OR CALL DIG-SAFE AT 1-888-DIG-SAFE.
 - THE SUBJECT PARCEL IS LOCATED WITHIN AN AREA HAVING A ZONE X UNSHADED DESIGNATION BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA), ON FLOOD INSURANCE RATE MAP NO. 33017C02950, WITH EFFECTIVE DATE OF MAY 17, 2005, FOR COMMUNITY PANEL NO. 295 OF 405, IN STRAFFORD COUNTY, STATE OF NEW HAMPSHIRE, WHICH IS THE CURRENT FLOOD INSURANCE RATE MAP FOR COMMUNITY IN WHICH SAID PREMISES IS SITUATED.
 - BASIS OF BEARING: HORIZONTAL - STATE PLANE COORDINATES . VERTICAL - NAVD 88.
 - CERTAIN DATA HEREON MAY VARY FROM RECORDED DATA DUE TO DIFFERENCES IN DECLINATION, ORIENTATION, AND METHODS OF MEASUREMENT.
 - ALL BOOK AND PAGE NUMBERS REFER TO THE STRAFFORD COUNTY REGISTRY OF DEEDS.
 - THE TAX MAP AND LOT NUMBERS ARE BASED ON THE TOWN OF BARRINGTON TAX RECORDS AND ARE SUBJECT TO CHANGE.
 - RESEARCH WAS PERFORMED AT THE TOWN OF BARRINGTON ASSESSOR'S OFFICE AND THE STRAFFORD COUNTY REGISTRY OF DEEDS.
 - THIS SURVEY IS NOT A CERTIFICATION TO OWNERSHIP OR TITLE OF LANDS SHOWN. OWNERSHIP AND ENCUMBRANCES ARE MATTERS OF TITLE EXAMINATION NOT OF A BOUNDARY SURVEY. THE INTENT OF THIS PLAN IS TO RETRACE THE BOUNDARY LINES OF DEEDS REFERENCED HEREON. OWNERSHIP OF ADJOINING PROPERTIES IS ACCORDING TO ASSESSOR'S RECORDS. THIS PLAN MAY OR MAY NOT INDICATE ALL ENCUMBRANCES EXPRESSED, IMPLIED OR PRESCRIPTIVE.

LOT TABLE			
LOT NUMBER	AREA (S.F.)	AREA (AC)	FRONTAGE
1	28,067 S.F.	0.64 AC	114'
2	37,334 S.F.	0.86 AC	113'
3	47,436 S.F.	1.09 AC	122'
4	52,724 S.F.	1.21 AC	76'
5	58,626 S.F.	1.35 AC	113'
6	43,294 S.F.	0.99 AC	77'
7	74,078 S.F.	1.70 AC	98'
8	52,737 S.F.	1.21 AC	226'
9	52,659 S.F.	1.21 AC	76'
10	52,172 S.F.	1.20 AC	113'
11	40,697 S.F.	0.93 AC	156'
OPEN SPACE	2,048,274 S.F.	47.02 AC	N/A

APPLICANT
21 BOYLSTON STREET, LLC
18 BRUSH HILL ROAD
MERRIMAC, MA 01860

PROJECT PARCEL
TOWN OF BARRINGTON
TAX MAP 270, LOTS 2 & 3
TAX MAP 273, LOT 49

OWNER
ANTHONY & JANIS SERRA
44 MEADOWBROOK DRIVE
BARRINGTON, NH
BK 1236, PG 653

TOTAL LOT AREA
2,564,200± SQ. FT.
58.87± ACRES

Design: BWG Draft: CWW Date: 05/17/21
Checked: DMC Scale: AS-NOTED Project No.: 20747
Drawing Name: 20747-PLAN.dwg
THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM JONES & BEACH ENGINEERS, INC. (JBE). ANY ALTERATIONS, AUTHORIZED OR OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO JBE.

REV.	DATE	REVISION	BY
0	05/17/21	ISSUED FOR REVIEW	BWG

Designed and Produced in NH
J/B Jones & Beach Engineers, Inc.
85 Portsmouth Ave. Stratham, NH 03885
Civil Engineering Services
603-772-4746
FAX: 603-772-0227
E-MAIL: JBE@JONESANDBEACH.COM

Plan Name: **OPEN SPACE CONCEPTUAL PLAN #1**
Project: **MEADOWBROOK VILLAGE
MEADOWBROOK DRIVE BARRINGTON, NH**
Owner of Record: **ANTHONY L. & JANIS SERRA
44 MEADOWBROOK DR, BARRINGTON, NH BK. 1236 PG. 653**

DRAWING No.
OSS
SHEET 1 OF 1
JBE PROJECT NO. 20747



GZA GeoEnvironmental, Inc.