Appendix H: 2014-2015 Vernal Pool Assessment Report

2014-2015 Vernal Pool Assessment Report for NHDOT

March 2016

Hyrax-Pillsbury Property
East of I-93, Londonderry, NH

A vernal pool assessment was conducted from May 2014 through June 2015 on the 200-plus acre parcel of land owned by Hyrax Derry Partners LLC and Pillsbury Realty Development LLC (Hyrax-Pillsbury) located to the east of Interstate 93 in Londonderry, New Hampshire (the Property). This was a joint effort between Stable Growth Environmental LLC (SGE), Northeast Wetland Restoration (NWR) and Stoney Ridge Environmental LLC (SRE), with field work completed by Michael Parsont (NH Certified Wetland Scientist), Gerard Thomas (Wildlife Biologist), Richard Bolton (Wildlife Biologist) and Geoffrey Wilson (Urban Forester).

This assessment was performed five years after a prior study was conducted by Normandeau Associates (Normandeau) in April-May 2009. Locations of the pools identified on or immediately adjacent to the Property by Normandeau were documented in their Hyrax Wetland Delineation Report, dated September 2011, which utilized the data collected by Normandeau staff from the 2009 vernal pool survey. In June-July 2013, SGE/NWR initially visited the 2009 pool sites, as reported in 2011. These sites were further assessed in the field by SGE/SRE during the vernal pool amphibian breeding season in May 2014; by SGE towards the end of the two-month required hydroperiod in early June 2014 and to assess pool permanency in September 2014; by SGE/SRE during the vernal pool amphibian breeding season in May 2015; and by SGE in early-mid June 2015.

By definition, vernal pools are required to hold water for at least two continuous months in the spring and/or summer, and are intended to be seasonal not permanent (see enclosed State and Federal vernal pool definitions). Therefore, to designate a pool site as a “vernal pool”, a minimum of two field observations in the same year are necessary to document the wet/dry cycle, one of which must be during the vernal pool amphibian breeding season to identify the presence of indicator species and the other should occur later within two months following spring ice-out.

Enclosed with this report is a figure prepared by CLD Consulting Engineers, Inc. (CLD) that shows the locations of the 2009 vernal pools (identified by Normandeau in the September 2011 report as on or immediately adjacent to the Property) that are within the limits CLD defined for this report. A table is enclosed that identifies these 2009 vernal pools. Subsequent columns in this table include: (1) relevant information taken from Normandeau’s 2011 chart; (2) indicators present as identified on Normandeau’s 2009 data forms; (3) indicators present in May 2014; (4) if water was present in June 2014; (5) if water was present in September 2014; (6) indicators present in May 2015; (7) if water was present in June 2015; and (8) comments. The comments include: 2006 indicators data from a Woodlot Alternatives Inc. study (for ten of the 2009 vernal pools), distinctions between the Normandeau 2011 report and the 2009 data forms, additional 2014-2015 considerations and pool quality determination. The Woodlot Alternatives information was obtained from the 2006 Draft Environmental Impact Statement, which states the study was comprised of one visit to each pool in late April 2006 with no follow-up visits.

Precipitation records for Concord, New Hampshire, from 1868 to present, show that 2005 (57 inches) and 2006 (55 inches) were the second and third highest precipitation years on record to date, respectively. Additionally, 2008 (58 inches) was the highest precipitation year to date, while 2009 had 47 inches total, which was well above the average of 41 inches. Meanwhile, 2012 and 2013 were average (40 and 41 inches respectively), 2014 was above average (46 inches) and 2015 had been well below average at the time of the final pool assessments (10 inches to May 31, 2015, with the average being 16 inches through that date).

There are a total of eleven pool locations identified on the enclosed table. An SGE NH Vernal Pool Determination/Assessment Data Form is enclosed for each of these locations. Based on the information obtained during the 2014-2015 field assessments, two of these 2009 pool locations did not meet the State criteria or the Federal criteria to be considered vernal pools in 2014-15 (VP 41B and VP 43). They either had insufficient indicators present and/or an insufficient hydroperiod. Also, one of these pools (VP 41B) appeared to be isolated and not part of a wetland. The remaining nine vernal pools are identified as VP 2, 3, 4, 5, 6, 7, 8, 42 and 46.

Finally, a table is included showing all of the vernal pools in the study area.

Env-Wt 101.105 "Upland buffer" means an area of land that is contiguous to a jurisdictional resource and that contributes to the functions and values of that resource.

Source. (See Revision Notes #2 and #3 at chapter heading for Env-Wt 100) *#8340, eff 4-25-05;* renumbered by #9094 (from Env-Wt 101.96 to Env-Wt 101.97)*;* renumbered by #9131 (from Env-Wt 101.97 to Env-Wt 101.100); renumbered by #9713 (from Env-Wt 101.100 to Env-Wt 101.106)

Env- Wt 101.106 "Vernal pool" means a surface water or wetland, including an area intentionally created for purposes of compensatory mitigation, which provides breeding habitat for amphibians and invertebrates that have adapted to the unique environments provided by such pools and which:

(a) Is not the result of on-going anthropogenic activities that are not intended to provide compensatory mitigation, including but not limited to:

(1) Gravel pit operations in a pit that has been mined at least every other year; and

(2) Logging and agricultural operations conducted in accordance with all applicable New Hampshire statutes and rules; and

(b) Typically has the following characteristics:

(1) Cycles annually from flooded to dry conditions, although the hydroperiod, size, and shape of the pool might vary from year to year;

(2) Forms in a shallow depression or basin;

(3) Has no permanently flowing outlet;

(4) Holds water for at least 2 continuous months following spring ice-out;

(5) Lacks a viable fish population; and

(6) Supports one or more primary vernal pool indicators, or 3 or more secondary vernal pool indicators.

Source. *#9131, eff 4-19-08*; renumbered by #9713 (from Env-Wt 101.99 to Env-Wt 101.105)

Env-Wt 101.107 "Watercourse" means any surface water that:

(a) Develops and maintains a defined scoured channel, with evidence of sediment transport, that:

(1) Is greater than 75 feet in length; or

(2) Is of any length and connected to another jurisdictional area at either end; and

(b) Is not a drainage swale.

Source. *#9713, eff 5-12-10*

Env-Wt 101.108 "Watershed" means a geographical area in which all water drains to a given stream, lake, wetland, estuary, or ocean.

Source. (See Revision Notes #2 and #3 at chapter heading for Env-Wt 100) *#8340, eff 4-25-05;* renumbered by #9094 (from Env-Wt 101.97 to Env-Wt 101.98)*;* renumbered by #9131 (from Env-Wt 101.98 to Env-Wt 101.101);

	facilitate moorage of vessels where such areas have been established for that purpose by the U.S. Coast Guard, provided: • Placement in the area is away from vegetated shallows • If the above isn't possible, proper/eco-friendly moorings are used so chains or other connections don't rest on the bottom in veg. shallows15. • Float stops, chains, or other devices must be used to provide ≥2.5-foot clearance between the bottom of the float and the substrate during all tides Scientific measurement devices, and small weirs and flumes constructed primarily to record water quantity and velocity provided the discharge of fill is limited to 10 cubic yards. No work may restrict movement of aquatic species or potentially threaten to impact or entangle sea turtles or marine mammals in near-coastal waters. Survey activities including core sampling, seismic exploratory operations, plugging of seismic shot holes, other exploratory-type bore holes and oil and gas test wells, soil survey and sampling, and historic resources surveys. Discharges and structures associated with the recovery of historic resources are not authorized. Drilling and the discharge of excavated material from test wells for oil and gas exploration are not authorized. Fill placed for roads, pads and other similar activities is not authorized, nor is any permanent structure.		

End Notes/Definitions

[1] **Bordering and Contiguous Wetlands:** A bordering wetland is immediately next to its adjacent waterbody and may lie at, or below, the OHW mark (MHW in navigable waters) of that waterbody and is directly influenced by its hydrologic regime. Contiguous wetlands extend landward from their adjacent waterbody to a point where a natural or manmade discontinuity exists. Contiguous wetlands include bordering wetlands as well as wetlands that are situated immediately above the ordinary high water mark and above the normal hydrologic influence of their adjacent waterbody. Note, with respect to the Federally designated navigable rivers, the wetlands bordering and contiguous to the tidally influenced portions of those rivers are reviewed under "II. Navigable Waters."

[2] **Regulation**: Either DES or NHCP must regulate an activity for it to be eligible for authorization as a Minimum Impact Project of this NH PGP. The Minimum Impact Project category does not apply to activities exempt from State regulation. These activities must report to the Corps.

[3] **Direct, Secondary (Indirect), and Cumulative Impacts:**

Direct Impacts: The immediate loss of aquatic ecosystem within the footprint of the fill.

Secondary (Indirect) impacts: These are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. (40 CFR 230.11 (h)). Secondary impacts are those impacts outside the footprint of the fill (e.g., beyond the bounds of the disposal site) that arise from and are associated with the direct discharge of dredged or fill material. Some examples are: I) Habitat Fragmentation. This occurs when a relatively undisturbed habitat block is interrupted or broken apart by roads, ditches, disturbance of vegetation, or development of structures. II) Interruption of Travel Corridors. Travel corridors are routes that many species travel on to find food, mates, shelter, and cover. Many aquatic species follow stream channels and wetlands, and follow established routes season after season. III) Vernal Pools. These are critically important breeding habitats for amphibians. Many amphibians disperse several hundred feet from their breeding ponds into the adjacent upland habitat after the breeding season has ended. IV) Hydrology, hydrological functions and non-point source impacts: A) Interference with the migration or movement of fish and shellfish from one area to another, such as placement of a dam eliminating access to spawning grounds for anadromous fish. B) Greater amounts of sediment, nutrients, and other pollutants such as lead, oil, gas, and salt that could impact wetlands and streams. Sediment causes turbidity, which reduces aquatic life and usually transports pesticides, heavy metals and other toxins into streams. This is especially a concern in watersheds where the streams are already listed as impaired by NHDES. C) Submerged

aquatic vegetation is very dependent on light transmission and small changes in ambient turbidity can preclude it from growing in certain areas. D) Trout spawning areas are selected in areas that are well flushed and aerated, and new amounts of deposition may result in a spawning area being eliminated due to siltation of fish eggs. E) Physical effects such as erosion, accretion, entrenchment, sedimentation, embedment, channel or shoreline migration and failure to pass bedload material, organic matter and large woody debris.

Cumulative Impacts: The extent of past, present, and foreseeable developments in the area may be an important consideration in evaluating the significance of a particular project's impacts. Although the impacts associated with a particular discharge may be minor, the cumulative effect of numerous similar discharges can result in a large impact. Cumulative impacts should be estimated only to the extent that they are reasonable and practical.

[4] **Incidental Fallback:** The term "discharge of dredged or fill material" also includes certain discharges resulting from excavation.

[5] **Water Diversions:** Water diversions are activities such as bypass pumping or water withdrawals. Temporary flume pipes, culverts or cofferdams where normal flows are maintained within the stream boundary's confines aren't water diversions. "Normal flows" are defined as no change in flow from pre-project conditions. See GC 21.

[6] **Special Aquatic Sites:** These include both inland & salt marsh wetlands, mud flats, vegetated shallows[15], coral reefs, and riffle & pool complexes. (40 CFR 230).

[7] **Special Wetlands:** These include 1. enriched/calcareous seepage swamps, estuarine wetlands, floodplains, peatlands, unique basin swamps/marshes, and vernal pools, 2. all wetlands that provide habitat for threatened or endangered species, and 3. all exemplary wetland natural community occurrences as designated by the NH Natural Heritage Bureau (NHNHB). The wetland types provided in 1 above are expanded below and fully described in Natural Community Systems of New Hampshire and Natural Communities of New Hampshire, which are available at www.nhnaturalheritage.org. Note: The Corps will use the definition of vernal pools that is listed below, not the definition in the referenced Natural Heritage documents. The applicant is required to have NHNHB check the wetland types listed in 2 and 3 above by either requesting a hard copy review or using the DataCheck Tool at www.nhnaturalheritage.org.

→ **Vernal Pool (VP) and Habitat:** VPs are confined basin depressions with water for two or more continuous months in the spring and/or summer, for which evidence of one or more of the following indicator vernal pools species: wood frogs (*Rana sylvatica)*, mole salamanders (*Ambystoma* spp), and fairy shrimp (*Eubranchipus* spp) has been documented **OR** for which evidence of two or more of the following facultative organisms: caddisfly (*Trichoptera*) larvae casings, fingernail clams (*Sphaeriidae*), or amphibious snails (*Basammatophora*) and evidence that the pool does not contain an established reproducing fish population has been documented. Vernal pool habitat is the seasonal pool depression, seasonal pool envelope (100 FT radius from the VP edge) and seasonal pool terrestrial habitat (750 FT radius from the VP edge). The Corps will determine on a case-by-case basis which vernal pools are within their jurisdiction.

Enriched/Calcareous seepage swamps: Wetlands characterized by the discharge of enriched groundwater. Floristic composition is an indicator of these conditions.

- Calcareous sloping fen system
- Circumneutral seepage swamp (natural community)
- Circumneutral hardwood forest seep (natural community)
- Calcareous riverside seep (natural community)
- Red maple-black ash-swamp saxifrage swamp (natural community)
- Northern hardwood-black ash-conifer swamp (natural community)

Estuarine wetlands: Wetland communities occurring in subtidal and intertidal coastal habitats connected to the ocean but semi-enclosed by land and protected from high-energy wave action. These wetlands are periodically exposed and flooded by tides.

- Salt marsh system
- Brackish tidal riverbank marsh system
- Sparsely vegetated intertidal system
- Subtidal system

Floodplains: Areas of low land along a watercourse that are subject to periodic flooding and sediment deposition.

- Montane/near boreal floodplain system
- Major river silver maple floodplain system
- Temperate minor river floodplain system
- Swamp white oak floodplain forest (natural community)

Peatlands: Peat-accumulating wetlands, including bogs, fens, cedar swamps, which are often dominated with sphagnum moss, heath family plants and sedges.

- Alpine/subalpine bog system
- Kettle hole bog system

Woodmont Commons

Exit 4A EIS Alternative A
Vernal Pools

Shields

Brook

VP 08
VP 46
VP 06
VP 07
VP 43
VP 41B
VP 42
VP 05
VP 04
VP 03
VP 02

Legend

- Building
- Open Water
- Stream
- Road
- Town Boundary
- Alt A
- Approximate Transmission Line
- Delineated Stream
- Field Delineated Parcel
- Wetland
- Exit 4A Alt A Data Limit

Vernal Pools

- High
- Medium
- Low

0 500 1,000 Feet

CLD CONSULTING ENGINEERS
NORMANDEAU ASSOCIATES ENVIRONMENTAL CONSULTANTS

VPDataLimits.mxd

March 23, 2016

VPool ID# (2009)	April-May 2009 Normandeau (2011 chart)	(2009 data forms)	May 2014 SGE w/SRE+	June 2014 Hydroperiod	Sept 2014 Hydroperiod	May 2015 SGE w/SRE+	June 2015 Hydroperiod	Comments
46	Semi-perm pool, linked to VP42 & 47, "med"	SS egg masses	WF egg masses (12), WF larvae (1000s), caddisfly larvae	Yes	No water present	SS egg mass (1), juv/adult WFs, caddisfly/aquatic beetle larvae	Yes	Moderate quality
***43**	Linked to intermittent stream, green frog present, "low"	caddisfly larvae, fingernail clams, flat spire snails	**caddisfly larvae**	Yes	No water present	**aquatic beetle larvae**	**No water present**	Not vernal pool
42	Perm pool, mostly in powerline ROW, bullfrog larvae, "modified", NHDES vpool??, "high"	WF/SS egg masses, caddisfly larvae, spire/flat spire snails, dragonfly larvae	WF larvae, caddisfly larvae, flat spire snails	Yes	No water present	WF larvae, aquatic beetle larvae	Yes	Semi-perm pool on 2009 data form, unclear why "question mark" regarding NHDES vpool; moderate quality
***41B**	Not natural, "not fishless", in utility ROW, linked to VP42, NHDES vpool??, "high"	WF larvae	**No indicators present**	Yes	No water present	**aquatic beetle larvae**	Yes	Only tadpoles present, no fish noted on 2009 data form, unclear why "question mark" re: NHDES vpool; large rut w/mud bottom, no veg; not vernal pool; **isolated?**
8 offsite	"modified", semi-perm pool, "med"	WF/SS egg masses, caddisfly larvae, spire snails, flat spire snails	WF larvae (1000s), caddisfly larvae	Yes	No water present	WF larvae, caddisfly larvae, aquatic beetle larvae, damselfly larvae	Yes	WF egg masses in 2006; active gravel pit/beaver flowage on 2009 data form; green frogs present (2014); impacted by adj. land use, low quality
7	Perm pool, very deep, "high"	WF/SS egg masses, WF larvae	WF egg masses (4), WF larvae, f.shrimp, caddisfly larvae	Yes	No water present	BSS/SS egg masses (2/13), WF larvae, juv WFs	Yes	SS egg masses, WF larvae in 2006; bullfrog larvae present (2014); semi-perm pool; high quality
6	Perm pool, "high"	WF/SS egg masses, caddisfly larvae, fingernail clams, spire snails, dragonfly larvae	WF egg masses (3), WF larvae, f.shrimp, caddisfly/aquatic beetle larvae, flat spire snails	Yes	No open water present (mucky soil under veg)	SS egg masses (3), WF larvae, juv/adult WFs, caddisfly/aquatic beetle larvae, fingernail clams	Yes	SS egg masses, WF larvae in 2006; only 0.17 ac on 2009 data form; semi-perm pool; portion in utility ROW w/no canopy, other portion w/buttonbush; moderate quality

VPool ID# (2009)	April-May 2009 Normandeau (2011 chart)	(2009 data forms)	May 2014 SGE w/SRE+	June 2014 Hydroperiod	Sept 2014 Hydroperiod	May 2015 SGE w/SRE+	June 2015 Hydroperiod	Comments
5	Assoc w/stream, maybe perm in/outlet/fish present, "high"	WF/SS egg masses, WF larvae, caddisfly larvae	WF egg masses (6), caddisfly larvae	Yes	No water present	SS egg masses (9), WF larvae, f.shrimp, caddisfly larvae, spire snails	Yes	SS/WF egg masses in 2006; "assoc w/stream" not on 2009 data form; linked to VP4; moderate quality
4	Perm pool, assoc w/stream, maybe perm in/outlet, "modified", maybe fish present	SS egg masses, caddisfly larvae, fingernail clams, aquatic beetle larvae, spire/flat spire snails	WF egg mass (1), WF larvae, f.shrimp, caddisfly larvae, flat spire snails	Yes	No water present	SS egg masses (3), WF larvae (1000s), f.shrimp, aquatic beetle larvae, fingernail clams, spire snails	Yes	SS/WF egg masses in 2006; semi-perm, "maybe" perm, "deep", hydrology poss. modified by I-93 on 2009 data form; assoc w/stream not on 2009 data form; affected by I-93 drainage, linked to VP5; high quality
3	Bullfrog larvae present, may be fish, semi-perm pool, assoc w/stream link to VP4, maybe perm in/outlet, "med"	SS egg masses, caddisfly larvae, spire snails, flat spire snails	WF larvae, f.shrimp, caddisfly larvae, aquatic beetle larvae	Yes	No water present	WF larvae (1000s), f.shrimp, caddisfly larvae, fingernail clams	Yes	SS egg mass in 2006; "at least portion" is perm pool and "modified" on 2009 data form; assoc w/stream and link to VP4 not on 2009 data form; bullfrogs present (2014); affected by I-93 drainage; moderate quality
2	"Modified", semi-perm pool, assoc w/stream, maybe perm in/outlet, may be fish, "med"	WF egg masses, caddisfly larvae, fingernail clams, spire snails, flat spire snails	f.shrimp, caddisfly larvae, flat spire snails	Yes	No water present	SS egg masses (3), WF larvae, f.shrimp, caddisfly/aquatic beetle larvae, fingernail clams	Yes (water present in localized areas, otherwise wet muck)	SS/WF egg masses in 2006; on 2009 data form hydrology possibly modified by I-93, connect to VP3; assoc w/stream not on 2009 data form; is affected by I-93 drainage, link to VP3?; moderate quality

+SRE = Stoney Ridge Environmental LLC, Professional Wildlife Biologist (G.Thomas in 2014, R.Bolton in 2015)

*Designated vernal pool in 2009 that does not meet the State or Federal criteria to be considered a vernal pool in 2014-15

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 46 Survey Date(s): 7/12/13, 5/8/14, 5/22/14, 6/6/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

Observer's Name: M. Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (5/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

__ Isolated Upland Depression ✓ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

✓ Forested Wetland __ Shrub Wetland __ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

✓ Natural __ Natural-Modified __ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe:

(4) POOL SIZE (approximate dimensions): 30' x 120' = 3,600 sq ft. (0.08 ac)

(5) MAX POOL DEPTH (at time of survey): __ 0-12" (0-1 ft) ✓ 12-36" (1-3 ft) __ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: __ Mineral Soil __ Leaf Litter ✓ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

__ Ephemeral (drying out completely in most years) ✓ Semi-Permanent (drying partially in all yrs & completely in drought yrs) __ Permanent Explain: No water present in 9/2014 though deep water present in May/June 2014. Water present June 2015.

(8) INLET/OUTLET FLOW:

Inlet: __ None ✓ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: __ None ✓ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: Mixed uplands/wetlands

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

✓ Developed: residential to northwest

✓ Other: powerline ROW

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 46 Survey Date(s): 7/12/13, 5/8/14, 5/22/14, 6/6/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 2: 5/22/14	1: 2: twelve	Few / Common / Many Few / Common / (Many)
Spotted Salamander (*Ambystoma maculatum*)	1: 5/19/15 2:	1: one 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 2:	Present? Y (N) Present? Y (N)	Few / Common / Many Few / Common / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ___ Flat-Spire Snails/Shells

State Only:
- ___ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY:

5/19/15: SS egg mass (1)
adult/juv. WFs
caddisfly larvae
aq beetle larvae
6/12/15: water present

POOL STATUS

Primary Indicators Present? (Y) N

2 or more Federal Secondary Indicators? Y (N)

3 or more State Secondary Indicators? Y (N)

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

✓ FEDERAL VERNAL POOL? (Y) N

STATE OF NH VERNAL POOL? (Y) N

COMMENTS Numerous WF egg masses/tadpoles present in late May 2014.
SS egg mass present in May 2015.

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 43 Survey Date(s): 7/12/13, 5/8/14, 5/22/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93-Exit 4A Location: Londonderry, NH

Observer's Name: M Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (5/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

__ Isolated Upland Depression ✓ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

✓ Forested Wetland __ Shrub Wetland __ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

✓ Natural __ Natural-Modified __ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe:

(4) POOL SIZE (approximate dimensions): 15'x 40' = 600 sq ft. (0.01 ac)

(5) MAX POOL DEPTH (at time of survey): ✓ 0-12" (0-1 ft) __ 12-36" (1-3 ft) __ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: ✓ Mineral Soil __ Leaf Litter __ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

✓ Ephemeral (drying out completely in most years) __ Semi-Permanent (drying partially in all yrs & completely in drought yrs) __ Permanent Explain: Shallow, no water present Sept. 2014. No water present June 2015.

(8) INLET/OUTLET FLOW:

Inlet: __ None ✓ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: __ None ✓ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: mixed uplands/wetlands

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

✓ Other: cleared ROW immed. adjacent (southeast), ATV usage, highway to southwest

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 43 Survey Date(s): 7/12/13, 5/8/14, 5/22/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Spotted Salamander (*Ambystoma maculatum*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 2:	Present? Y (N) Present? Y (N)	Few / Common / Many Few / Common / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ___ Flat-Spire Snails/Shells

State Only:
- ___ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY:

5/19/15: aquatic beetle larvae
6/12/15: no water present

POOL STATUS

Primary Indicators Present? Y (N)

2 or more Federal Secondary Indicators? Y (N)

3 or more State Secondary Indicators? Y (N)

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

FEDERAL VERNAL POOL? Y (N)

STATE OF NH VERNAL POOL? Y (N)

COMMENTS

Not sufficient indicators present.

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 42 Survey Date(s): 7/12/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

Observer's Name: M. Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (6/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

__ Isolated Upland Depression ✓ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

__ Forested Wetland __ Shrub Wetland ✓ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

__ Natural ✓ Natural-Modified ✓ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe: within powerline ROW clearing

(4) POOL SIZE (approximate dimensions): 40'x120' = 4,800 sq ft. (0.11 ac.)

(5) MAX POOL DEPTH (at time of survey): __ 0-12" (0-1 ft) ✓ 12-36" (1-3 ft) __ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: ✓ Mineral Soil __ Leaf Litter __ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

✓ Ephemeral (drying out completely in most years) ? Semi-Permanent (drying partially in all yrs & completely in drought yrs) __ Permanent Explain: No water present Sept. 2014, through water present June 2014 and deep in May 2014. Water present in June 2015.

(8) INLET/OUTLET FLOW:

Inlet: __ None ✓ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: __ None ✓ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: mixed wetlands/uplands

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

✓ Other: powerline ROW, highway to southwest

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 42 Survey Date(s): 7/12/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 5/9/14 2: 5/23/14	1: None 2: None	(Few) / Common / Many Few / (Common) / Many
Spotted Salamander (*Ambystoma maculatum*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 2:	Present? Y (N) Present? Y (N)	Few / Common / Many Few / Common / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ✓ Flat-Spire Snails/Shells

State Only:
- ___ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY:

5/19/15: WF larvae (few)
aq beetle larvae
6/12/15: water present

POOL STATUS

Primary Indicators Present? (Y) N

2 or more Federal Secondary Indicators? (Y) N (2014 → 2015)

3 or more State Secondary Indicators? Y (N)

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

✓ FEDERAL VERNAL POOL? (Y) N

STATE OF NH VERNAL POOL? (Y) N

COMMENTS WF tadpoles present May 2014, no egg masses observed. (same in May 2015)

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 41B Survey Date(s): 7/12/13, 5/8/14, 5/22/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

Observer's Name: M. Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (5/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

√ Isolated Upland Depression __ Within Larger Wetland System __ Within Floodplain

√ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

__ Forested Wetland __ Shrub Wetland __ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) √ Other: skidder rut, no vegetation

(3) POOL ORIGIN:

__ Natural __ Natural-Modified √ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe: within powerline ROW road

(4) POOL SIZE (approximate dimensions): 10' x 30' = 300 sq ft.

(5) MAX POOL DEPTH (at time of survey): √ 0-12" (0-1 ft) __ 12-36" (1-3 ft) __ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: √ Mineral Soil __ Leaf Litter __ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

√ Ephemeral (drying out completely in most years) __ Semi-Permanent (drying partially in all yrs & completely in drought yrs) __ Permanent Explain: shallow; no water present Sept. 2014. Water present June 2015.

(8) INLET/OUTLET FLOW:

Inlet: √ None __ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: __ None √ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

√ Forested: mixed uplands/wetlands

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

√ Other: within powerline ROW (totally cleared of vegetation), highway to west + south

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 41B Survey Date(s): 7/12/13, 5/8/14, 5/22/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Spotted Salamander (*Ambystoma maculatum*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 2:	Present? Y (N) Present? Y (N)	Few / Common / Many Few / Common / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ___ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ___ Flat-Spire Snails/Shells

State Only:
- ___ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY:

5/19/15: aquatic beetle larvae
6/12/15: water present

POOL STATUS

Primary Indicators Present? Y (N)

2 or more Federal Secondary Indicators? Y (N)

3 or more State Secondary Indicators? Y (N)

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

FEDERAL VERNAL POOL? Y (N)

STATE OF NH VERNAL POOL? Y (N)

COMMENTS

No indicators present 2014; one State secondary indicator present May 2015.

→ [Also, isolated pool that is not part of wetland (no federal jurisdiction?)?]

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 8 (offsite) Survey Date(s): 5/8/14, 5/22/14, 6/6/14, 9/3/14, 5/21/15, 6/12/15

Project Name: I93-Exit 4A Location: Londonderry, NH

Observer's Name: M. Parsons Credentials: NHCWS

Observer's Name: G. Thomas (2014) Credentials: Prof. Wildlife Biologist
R. Bolton (2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

__ Isolated Upland Depression ✓ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

✓ Forested Wetland __ Shrub Wetland __ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

✓ Natural __ Natural-Modified __ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe: may have been impacted by adj. gravel pit operation

(4) POOL SIZE (approximate dimensions): 75' x 250' = 18,750 sq ft. (0.43 ac.)

(5) MAX POOL DEPTH (at time of survey): __ 0-12" (0-1 ft) ✓ 12-36" (1-3 ft) __ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: __ Mineral Soil __ Leaf Litter ✓ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

__ Ephemeral (drying out completely in most years) ✓ Semi-Permanent (drying partially in all yrs & completely in drought yrs) __ Permanent Explain: No water present 9/2014, but deep water present 5-6/2014. Water present June 2015.

(8) INLET/OUTLET FLOW:

Inlet: ✓ None __ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: ✓ None __ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: mostly uplands (west)

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

✓ Other: active gravel pit operation adjacent to northeast.

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 8 (offsite) Survey Date(s): 5/8/14, 5/22/14, 6/6/14, 9/3/14, 5/21/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 2: 5/22/14	1: 2: None	Few / Common / Many Few / Common / (Many)
Spotted Salamander (*Ambystoma maculatum*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 2:	Present? Y (N) Present? Y (N)	Few / Common / Many Few / Common / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ___ Flat-Spire Snails/Shells

State Only:
- ✓ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY: green frogs

5/21/15: WF larvae
caddisfly larvae
aquatic beetle larvae
damselfly larvae
6/12/15: water present

POOL STATUS

Primary Indicators Present? (Y) N

2 or more Federal Secondary Indicators? Y (N)

3 or more State Secondary Indicators? (Y) (N) → 2014 → 2015

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

FEDERAL VERNAL POOL? (Y) N

STATE OF NH VERNAL POOL? (Y) N

COMMENTS WF larvae present late May. 2014 + 2015.

[* very limited populations present - believed to be polluted by adjacent activities]

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 7 Survey Date(s): 7/12/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

Observer's Name: M. Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (5/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

✓ Isolated Upland Depression __ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

✓ Forested Wetland __ Shrub Wetland __ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

✓ Natural __ Natural-Modified __ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe:

(4) POOL SIZE (approximate dimensions): 40' x 100' = 4,000 sqft. (0.09 ac.)

(5) MAX POOL DEPTH (at time of survey): __ 0-12" (0-1 ft) ✓ 12-36" (1-3 ft) ✓ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: __ Mineral Soil __ Leaf Litter ✓ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

__ Ephemeral (drying out completely in most years) ✓ Semi-Permanent (drying partially in all yrs & completely in drought yrs) __ Permanent

Explain: No water present Sept. 2014, though water present June 2014 and deep in May ~June 2014. Water present in ~~late~~ June 2015.

(8) INLET/OUTLET FLOW:

Inlet: ✓ None __ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: ✓ None __ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: mostly uplands

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

✓ Other: powerline ROW

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 7 Survey Date(s): 7/12/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 2: 5/23/14	1: 2: four	Few / Common / Many Few / (Common) / Many
Spotted Salamander (*Ambystoma maculatum*)	1: 5/19/15 2:	1: 13 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 5/19/15 2:	1: two 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 5/9/14 2: 5/23/14	Present? (Y) N Present? (Y) N	(Few) / Common / Many Few / (Common) / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ___ Flat-Spire Snails/Shells

State Only:
- ___ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY: bullfrog larvae (2014)

5/19/15: BSS/SS egg masses (2/13)
WF larvae
juv. WFs

6/12/15: water present

POOL STATUS

Primary Indicators Present? (Y) N

2 or more Federal Secondary Indicators? Y (N)

3 or more State Secondary Indicators? Y (N)

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

FEDERAL VERNAL POOL? (Y) N

STATE OF NH VERNAL POOL? (Y) N

COMMENTS Some WF egg masses + tadpoles present in late May 2014, fairy shrimp present in 2014.
BSS/SS egg masses + WF larvae present in May 2015.

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 6 Survey Date(s): 7/12/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93-Exit 4A Location: Londonderry, NH

Observer's Name: M Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (5/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

✓ Isolated Upland Depression __ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

__ Forested Wetland ✓ Shrub Wetland __ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

✓ Natural __ Natural-Modified __ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe:

(4) POOL SIZE (approximate dimensions): ~ 50' x 200' = 10,000 sq ft (0.23 ac.)

(5) MAX POOL DEPTH (at time of survey): __ 0-12" (0-1 ft) ✓ 12-36" (1-3 ft) __ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: __ Mineral Soil __ Leaf Litter ✓ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

__ Ephemeral (drying out completely in most years) ✓ Semi-Permanent (drying partially in all yrs & completely in drought yrs) ? Permanent

Explain: No open water present in Sept. 2014, though ~~muck~~ saturated soils present under dense vegetation; significant water present May-June 2014. Water present June 2015.

(8) INLET/OUTLET FLOW:

Inlet: ✓ None __ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: ✓ None __ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: mostly uplands

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

✓ Other: Half of wetland is within cleared powerline ROW (dense herbaceous/shrub vegetation is present in the wetland portion).

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 6 Survey Date(s): 7/12/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 2: 5/23/14	1: 2: three	Few / Common / Many Few / (Common) / Many
Spotted Salamander (*Ambystoma maculatum*)	1: 5/19/15 2:	1: three 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 5/9/14 2: 5/23/14	Present? Y (N) Present? (Y) N	Few / Common / Many Few / (Common) / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ✓ Flat-Spire Snails/Shells

State Only:
- ✓ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY:

5/19/15: 55 egg masses (3)
WF larvae/juv/adults
caddisfly/aq beetle larvae
fingernail clams
6/12/15: water present

POOL STATUS

Primary Indicators Present? (Y) N

2 or more Federal Secondary Indicators? (Y) N

3 or more State Secondary Indicators? (Y) N

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

FEDERAL VERNAL POOL? (Y) N

STATE OF NH VERNAL POOL? (Y) N

COMMENTS Fairy shrimp, WF egg masses and WF tadpoles present late May 2014.
55 egg masses + WF larvae present in May 2015.

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 5 Survey Date(s): 6/24/13, 5/8/14, 5/22/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

Observer's Name: M. Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (5/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

__ Isolated Upland Depression ✓ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

✓ Forested Wetland __ Shrub Wetland __ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

✓ Natural __ Natural-Modified __ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe:

(4) POOL SIZE (approximate dimensions): 50' x 80' = 4,000 sq ft. (0.09 ac.)

(5) MAX POOL DEPTH (at time of survey): __ 0-12" (0-1 ft) ✓ 12-36" (1-3 ft) __ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: __ Mineral Soil __ Leaf Litter ✓ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

✓ Ephemeral (drying out completely in most years) ? Semi-Permanent (drying partially in all yrs & completely in drought yrs) __ Permanent Explain: No water present Sept. 2014, though water present June 2014 and fairly deep in May 2014. Water present June 2015.

(8) INLET/OUTLET FLOW:

Inlet: __ None ✓ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: __ None ✓ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: mostly uplands

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

✓ Other: I93 highway located to southwest

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 5 Survey Date(s): 6/24/13, 5/8/14, 5/22/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93-Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 5/8/14 2:	1: six 2:	Few / Common / Many Few / Common / Many
Spotted Salamander (*Ambystoma maculatum*)	1: 5/19/15 2:	1: nine 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 2:	Present? Y (N) Present? Y (N)	Few / Common / Many Few / Common / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ___ Flat-Spire Snails/Shells

State Only:
- ___ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY:

5/19/15: 55 egg masses (9)
WF larvae
fi shrimp
caddisfly larvae
spire snails
6/12/15: water present

POOL STATUS

Primary Indicators Present? (Y) N

2 or more Federal Secondary Indicators? (Y) (N) 2015 → 2014

3 or more State Secondary Indicators? Y (N)

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

✓ FEDERAL VERNAL POOL? (Y) N

STATE OF NH VERNAL POOL? (Y) N

COMMENTS WF egg masses present early May 2014.
SS egg masses + WF larvae + fi shrimp present in May 2015.

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 4 Survey Date(s): 6/24/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93-Exit 4A Location: Londonderry, NH

Observer's Name: M. Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (5/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

__ Isolated Upland Depression ✓ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

✓ Forested Wetland __ Shrub Wetland __ Herbaceous Wetland ✓ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

✓ Natural __ Natural-Modified __ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe: pool extends to toe of slope of I93

(4) POOL SIZE (approximate dimensions): 100'x150' = 15,000 sq ft. (0.34 ac.)

(5) MAX POOL DEPTH (at time of survey): __ 0-12" (0-1 ft) __ 12-36" (1-3 ft) ✓ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: __ Mineral Soil __ Leaf Litter ✓ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

__ Ephemeral (drying out completely in most years) ✓ Semi-Permanent (drying partially in all yrs & completely in drought yrs) ? Permanent

Explain: No water present Sept. 2014, though deep water present May-June 2014. Water present June 2015.

(8) INLET/OUTLET FLOW:

Inlet: __ None ✓ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: __ None ✓ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: mostly uplands

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

✓ Other: I93 highway immediately adjacent (southwest)

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 4 Survey Date(s): 6/24/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 2: 5/23/14	1: 2: one	Few / Common / Many Few / (Common) / Many
Spotted Salamander (*Ambystoma maculatum*)	1: 5/19/15 2:	1: three 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 5/9/14 2: 5/23/14	Present? (Y) N Present? Y (N)	(Few) / Common / Many Few / Common / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ✓ Flat-Spire Snails/Shells

State Only:
- ___ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY:

5/19/15: SS egg masses (3)
WF larvae (1000s)
f. shrimp
ag beetle larvae
fingernail clams, spire snails
6/12/15: water present

POOL STATUS

Primary Indicators Present? (Y) N

2 or more Federal Secondary Indicators? (Y) N

3 or more State Secondary Indicators? (Y) N → 2014; → 2015

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

✓ FEDERAL VERNAL POOL? (Y) N

STATE OF NH VERNAL POOL? (Y) N

COMMENTS Fairy shrimp present early May 2014, WF egg mass/larvae present late May 2014.
SS egg masses + WF larvae + f. shrimp present in May 2015.

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 3 Survey Date(s): 6/24/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

Observer's Name: M. Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (5/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

✓ Isolated Upland Depression __ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

__ Forested Wetland ✓ Shrub Wetland __ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

✓ Natural __ Natural-Modified __ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe: pool extends to toe of slope of I-93

(4) POOL SIZE (approximate dimensions): 150' x 200' = 30,000 sqft (0.69 ac.)

(5) MAX POOL DEPTH (at time of survey): __ 0-12" (0-1 ft) ✓ 12-36" (1-3 ft) __ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: __ Mineral Soil __ Leaf Litter ✓ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

__ Ephemeral (drying out completely in most years) ✓ Semi-Permanent (drying partially in all yrs & completely in drought yrs) ? Permanent

Explain: No water present Sept. 2014, very deep water present May-June 2014. Water present June 2015.

(8) INLET/OUTLET FLOW:

Inlet: __ None ✓ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: __ None ✓ Intermittent (seasonal) ? Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: mixed uplands + wetlands

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

✓ Other: I93 highway immediately adjacent (southwest)

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 3 Survey Date(s): 6/24/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 2: 5/23/14	1: 2: None	Few / Common / Many Few / (Common) / Many
Spotted Salamander (*Ambystoma maculatum*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 5/9/14 2: 5/23/14	Present? (Y) N Present? Y (N)	Few / (Common) / Many Few / Common / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ___ Flat-Spire Snails/Shells

State Only:
- ✓ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY: bullfrogs

5/19/15: F. shrimp
WF larvae (1000s)
caddisfly larvae
fingernail clams
6/12/15: water present.

POOL STATUS

Primary Indicators Present? (Y) N

2 or more Federal Secondary Indicators? (Y) N → 2015, 2014

3 or more State Secondary Indicators? Y (N)

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

FEDERAL VERNAL POOL? (Y) N

STATE OF NH VERNAL POOL? (Y) N

COMMENTS Fairy shrimp present early May 2014, WF larvae present late May 2014.
Fairy shrimp + WF larvae present May 2015.

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 2 Survey Date(s): 6/24/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93 - Exit 4A Location: Londonderry, NH

Observer's Name: M. Parsons Credentials: NH CWS

Observer's Name: G. Thomas (5/2014) Credentials: Prof. Wildlife Biologist
R. Bolton (5/2015) " "

POOL CHARACTERISTICS

(1) LANDSCAPE SETTING (check all that apply):

__ Isolated Upland Depression ✓ Within Larger Wetland System __ Within Floodplain

✓ Part of a Pool Complex (within 1000 ft of one/more vernal pools) __ Other:

(2) WETLAND TYPE (choose dominant):

✓ Forested Wetland __ Shrub Wetland __ Herbaceous Wetland __ Open Water

__ Floodplain __ Peatland (fen or bog) __ Other:

(3) POOL ORIGIN:

✓ Natural __ Natural-Modified __ Manmade __ Manmade for Mitigation

__ Unknown If not natural, describe: pool extends to toe of slope of I93

(4) POOL SIZE (approximate dimensions): 100' x 150' = 15,000 sqft (0.34 ac.)

(5) MAX POOL DEPTH (at time of survey): ✓ 0-12" (0-1 ft) __ 12-36" (1-3 ft) __ 36-60" (3-5 ft) __ >60" (>5 ft)

(6) PREDOMINANT SUBSTRATE: __ Mineral Soil __ Leaf Litter ✓ Organic (peat/muck) __ Other:

(7) ESTIMATED HYDROPERIOD (provide rationale):

__ Ephemeral (drying out completely in most years) ✓ Semi-Permanent (drying partially in all yrs & completely in drought yrs) __ Permanent

Explain: No water present Sept. 2014; though shallow, significant water present May-June 2014. Water present in localized areas June 2015.

(8) INLET/OUTLET FLOW:

Inlet: __ None ✓ Intermittent __ Permanent (channel with well-defined banks, permanent flow)

Outlet: __ None ✓ Intermittent (seasonal) __ Permanent

(9) SURROUNDING HABITAT (check all that apply and provide percentages/descriptions as applicable):

✓ Forested: mostly wetlands, uplands to east

__ Shrub:

__ Open (e.g. meadow, agriculture, golf course):

__ Developed:

✓ Other: I93 highway immediately adjacent to southwest

NH Vernal Pool Determination/Assessment Data Form

Pool ID #: 2 Survey Date(s): 6/24/13, 5/9/14, 5/23/14, 6/6/14, 9/3/14, 5/19/15, 6/12/15

Project Name: I93-Exit 4A Location: Londonderry, NH

POOL INDICATOR SPECIES

PRIMARY INDICATORS	SURVEY DATE(S)	EGG MASSES (#)	TADPOLES/LARVAE
Wood Frog (*Lithobates sylvatica*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Spotted Salamander (*Ambystoma maculatum*)	1: 5/19/15 2:	1: three 2:	Few / Common / Many Few / Common / Many
Blue-spotted Salamander (*Ambystoma laterale*)	1: 2:	1: 2:	Few / Common / Many Few / Common / Many
Fairy Shrimp (*Eubranchipus* spp.)	1: 5/9/14 2: 5/23/14	Present? (Y) N Present? (Y) N	Few / (Common) / Many (Few) / Common / Many

SECONDARY INDICATORS (check all observed):

State & Federal:
- ✓ Caddisfly Larvae/Casings
- ___ Fingernail Clams/Shells
- ___ Spire-Shaped Snails/Shells
- ✓ Flat-Spire Snails/Shells

State Only:
- ___ Aquatic Beetle Larvae
- ___ Damselfly Larvae/Exuviae
- ___ True Fly Larvae/Pupae
- ___ Dragonfly Larvae/Exuviae
- ___ Clam Shrimp/Shells

OTHER SPECIES/RARITY:

5/19/15: 55 egg masses (3)
WF larvae, fairy shrimp
caddisfly/aq beetle larvae
fingernail clams
6/12/15: water present in localized areas

POOL STATUS

Primary Indicators Present? (Y) N

2 or more Federal Secondary Indicators? (Y) N

3 or more State Secondary Indicators? (Y) (N) → 2014 → 2015

Water Present for 2 or more Continuous Months in Spring/Summer? (Y) N

Seasonal Pool? (Y) N Lacks a Viable Fish Population? (Y) N

FEDERAL VERNAL POOL? (Y) N

✓ STATE OF NH VERNAL POOL? (Y) N

COMMENTS Fairy shrimp present early and late May 2014.
55 egg masses + WF larvae + fairy shrimp present in May 2015.

Exit 4A Project Vernal Pool Survey Summary

				April 2006 Survey - Primary Indicator[b]		2009 Survey - 1st visit / 2nd visit [a]											Additional information - Rows in *bold italics* indicate pools surveyed in 2014-2015.							
						Primary Indicator[b]					Secondary Indicator[b]														
Pool ID[g]	Relative Value	Pool Attri-butes	Size (acres)	SS egg masses	WF egg masses	WF egg mass-es	WF larvae	SS egg masses	Blue ss egg mass-es	Fairy Shrimp	Caddis-fly Larvae[c]	Finger-nail Clams[c]	Aqua-tic beetle larvae	Spire Shap-ed snails[c]	Flat spire snails[c]	True Fly larvae	Drag-onfly larvae	Pool fishless	Perm. Inlet/ Outlet	Perm. pool	Natural[3]	Phys-ical set-ting[d]	Notes	NHDES Vernal Pool[e]	USACE Vernal Pool[f]
2	***m***		***0.42***	***15***	***8***	***18***					***y***	***y***		***y***	***y***			***maybe***	***maybe***	***semi***	***modified***	***2***	***2009 - I93 may impact hydrology; assoc. with stream May 2014 - f. shrimp, caddisfly, flat spire snails May 2015 - SS egg masses, WF larvae, f. shrimp, caddisfly & aquatic beetle larvae, fingernail clams***	***y***	***y***
3	***m***		***0.52***	***1***	***0***			***13***			***y***			***y***	***y***			***maybe***	***maybe***	***semi***	***y***	***2***	***2009 - bull frog larvae present, linked to 17; associated with a stream May 2104 - WF larvae, fairy shrimp, caddisfly larvae, aquatic beetle larvae May 2015 - WF larvae (1000s), fairy shrimp, caddisfly larvae, fingernail clams***	***y***	***y***
4	***h***	****#***	***0.21***	***50***	***50***			***88***			***y***	***y***	***y***	***y***	***y***			***maybe***	***maybe***	***perm***	***modified***	***2***	***2009 - I93 may impact hydrology; assoc. with a stream May 2014 - WF egg mass (1), WF larvae, f. shrimp, caddisfly larvae, flat spire snails May 2015 - SS egg masses (3), WF larvae (1000s), f. shrimp, aquatic beetle larvae, fingernail clams, spire snails***	***y***	***y***

				April 2006 Survey - Primary Indicator[b]		2009 Survey - 1st visit / 2nd visit [a]												Additional information - Rows in *bold italics* indicate pools surveyed in 2014-2015.							
						Primary Indicator[b]					Secondary Indicator[b]														
Pool ID[g]	Relative Value	Pool Attri-butes	Size (acres)	SS egg masses	WF egg masses	WF egg mass-es	WF larvae	SS egg masses	Blue ss egg mass-es	Fairy Shrimp	Caddis-fly Larvae[c]	Finger-nail Clams[c]	Aqua-tic beetle larvae	Spire Shap-ed snails[c]	Flat spire snails[c]	True Fly larvae	Drag-onfly larvae	Pool fishless	Perm. Inlet/ Outlet	Perm. pool	Natural[3]	Phys-ical set-ting[d]	Notes	NHDES Vernal Pool[e]	USACE Vernal Pool[f]
5	***h (2009) m (2016)***	****#***	***0.12***	***32***	***20***	***11***	***0/y***	***27/21***			***y***							***maybe***	***maybe***	***n***	***y***	***2***	***2009 - associated with a stream May 2014 - WF egg masses (6), caddisfly larvae May 2015 - SS egg masses (9), WF larvae, f. shrimp, caddisfly larvae, spire snails***	***y***	***y***
6	***h (2009) m (2016)***	****#***	***0.41***	***39***	***>100 tp's***	***33***		***29***			***y***	***0/y***		***0/y***			***0/y***	***y***	***n***	***y***	***y***	***1***	***May 2014 - WF egg masses (3), WF larvae, f.shrimp, caddisfly/aquatic beetle larvae, flat spire snails May 2015 - SS egg masses (3), WF larvae, juv/adult WFs, caddisfly/aquatic beetle larvae, fingernail clams***	***y***	***y***
7	***h***	****#***	***0.09***	***63***	***>1000 tp's***	***35/1***	***0/y***	***6/29***			***y***							***y***	***n***	***y***	***y***	***1***	***2009 - very deep May 2014 - WF egg masses (4), WF larvae, f.shrimp, caddisfly larvae May 2015- BSS/SS egg masses (2/13), WF larvae, juv WFs***	***y***	***y***
8	***m (2009) l (2016)***		***0.44***	***0***	***3***	***1***		***10/13***			***y***			***0/y***				***y***	***n***	***semi***	***modified***	***2***	***May 2014 - WF larvae (1000s), caddisfly larvae May 2015 - WF larvae, caddisfly larvae, aquatic beetle larvae, damselfly larvae***	***y***	***y***
9	m		0.08	0	34	15					y/y							y	n	semi	y	1		y	y
11	l		NR	5	0													y	n	n	NR	2		y	y
12	l		0.15	0	5	0	0											y	n	ephem	n	2		y	y
13	h	*#	0.13	10	12	28/0	5/7	50/6			y/y	0/y		0/y				y	n	n	y	2	within intermittent stream corridor	y	y
14	l		0.08	6	0													y	NR	n	NR	2		y	y
15	l		0.07	0	3													y	NR	n	NR	2		y	y
16	l		0.15	1	2													y	NR	n	NR	2		y	y

				April 2006 Survey - Primary Indicator[b]		2009 Survey - 1st visit / 2nd visit [a]												Additional information - Rows in *bold italics* indicate pools surveyed in 2014-2015.							
						Primary Indicator[b]					Secondary Indicator[b]														
Pool ID[g]	Relative Value	Pool Attri-butes	Size (acres)	SS egg masses	WF egg masses	WF egg mass-es	WF larvae	SS egg masses	Blue ss egg mass-es	Fairy Shrimp	Caddis-fly Larvae[c]	Finger-nail Clams[c]	Aqua-tic beetle larvae	Spire Shap-ed snails[c]	Flat spire snails[c]	True Fly larvae	Drag-onfly larvae	Pool fishless	Perm. Inlet/ Outlet	Perm. pool	Natural[3]	Phys-ical set-ting[d]	Notes	NHDES Vernal Pool[e]	USACE Vernal Pool[f]
17	h	#	0.26	3	42													y	NR	n	NR	2		y	y
18	l		0.13	0	7													y	NR	n	NR	2	Many tadpoles present in 2006.	y	y
19	l		0.16	5	0													y	NR	n	NR	2		y	y
20	h	*#	0.12	71	20													y	NR	n	NR	2		y	y
21	m		0.05	14	7													y	NR	n	NR	2		y	y
22	h	#	0.78	NS	NS			42/21			y	y						y	n	y	y	1	painted turtle in pool	y	y
23	h	#	0.05	NS	NS			23/19										y	n	maybe	y	2	ephemeral link to 22	y	y
25	l		0.02	NS	NS			2			y					y		y	n	n	y	1	ephemeral link to 26	y	y
26	h	+	0.09	NS	NS			5		4/y				0/y		y		y	n	n	y	1		y	y
27	h	#	0.01	NS	NS			30/2			y	y		y	y	y		y	n	y	y	2	bullfrog larvae present	y	y
28	h	#	0.45	NS	NS			6/9	>50		y	y			y			y	n	semi	y	1		y	y
29	l		0.04	NS	NS						y	y		y	y			y	n	n	modified	2		y	y
31	l		0.04	NS	NS			5			y			y				y	n	semi	gp	2	ephemeral outlet to 32	n	y
32	l		0.04	NS	NS	8		5			y			y		y		y	n	semi	modified	1	old gravel pit or beaver flowage, green frog present	y	y
35	h	+	0.07	NS	NS					>10						y		y	n	n	y	2	ephemeral outlet to 36	y	y
36	l		0.02								y				y			y	n	n	y	2	ephemeral link to 22	n	y
38	l		0.02				0/y				y/y							y	n	n	y	2	Green frog present, ephemeral link to 37	y	y
41A	h	+	0.003	NS	NS					y						y		y	n	n	y	1		y	y
42	***h (2009) m (2016)***	*****	***0.12***	***NS***	***NS***	***>50***		***1/1***			***y***			***y***	***y***		***y***	***y***	***n***	***y***	***modified***	***2***	***2009 - Portion of pool within powerline ROW, bullfrog larvae May 2014 - WF larvae, caddisfly larvae, flat spire snails May 2015 - WF larvae, aquatic beetle larvae***	***?***	***y***
44	h	+	0.01	NS	NS	1	y			y	y					y		y	n	semi	y	1		y	y

				April 2006 Survey - Primary Indicator[b]		2009 Survey - 1st visit / 2nd visit [a]												Additional information - Rows in *bold italics* indicate pools surveyed in 2014-2015.							
						Primary Indicator[b]					Secondary Indicator[b]														
Pool ID[g]	Relative Value	Pool Attri-butes	Size (acres)	SS egg masses	WF egg masses	WF egg mass-es	WF larvae	SS egg masses	Blue ss egg mass-es	Fairy Shrimp	Caddis-fly Larvae[c]	Finger-nail Clams[c]	Aqua-tic beetle larvae	Spire Shap-ed snails[c]	Flat spire snails[c]	True Fly larvae	Drag-onfly larvae	Pool fishless	Perm. Inlet/ Outlet	Perm. pool	Natural[3]	Phys-ical set-ting[d]	Notes	NHDES Vernal Pool[e]	USACE Vernal Pool[f]
46	***m***		***0.07***	***NS***	***NS***			***11/8***										***y***	***n***	***semi***	***y***	***2***	***2009 - linked to 42 & 47 May 2014 - WF egg masses (12), WF larvae (1000s), caddisfly larvae May 2015- SS egg mass (1), juv/adult WFs, caddisfly/aquatic beetle larvae***	***y***	***y***
47	l		0.03	NS	NS		y											y	n	n	y	2	linked to 46	y	y
48	h	*	0.08	NS	NS	4	y	32/19			y/y				y	y		y	n	semi	y	2	adult wood frog observed, linked to 47	y	y
49	h	+	0.15	NS	NS	0/y	y/y			y/y	y					y		y	n	y	y	2	hundreds of wood frog larvae, linked to 50	y	y
50	h	*	0.11	NS	NS			90/79			y	y						y	n	y	y	2		y	y
51	l		0.13	NS	NS		0/y											y	n	n	n	2	pool in woods road	y	y
54	h	*#	0.57	NS	NS	50		92/42			y					y		y	n	y	y	1	lots of bull frog larvae, deep pool	y	y
56	h	#	0.08	NS	NS	1		0/20			y/y	y		y				y	n	n	y	2		y	y
57	h	*#	0.08	NS	NS	38	0/y	40/13			y	y			y			y	n	semi	y	2	outlets to 61	y	y
58	h	#	0.03	NS	NS	8		23/18			y/y	y						y	n	semi	y	1	linked to 2	y	y
59	h	* # +	0.18	NS	NS	23	0/y		50-100	1/y				0/y				y	n	n	y	1	trash in pool	y	y
60	l		0.01	NS	NS						y/y	y/-			y/y			y	n	n	n	2		n	y
63	h	+	0.01	NS	NS					>10/y						y		y	n	n	y	1	Possible ribbon snake sighted	y	y
64	h		0.01	NS	NS				>20		0/y			0/y				y	n	n	y	1	GP within 100'	n	y

[a] First survey April 22 to 28; second visit May 7 and 8, 2009.

[b] NH Env-Wt. 101.86 and 101.87.

[c] USACE, NH PGP vernal pool facultative indicators.

[d] 1- Isolated depression 2- associated with wetland complex.

[e] Supports one or more primary vernal pool indicators, or 3 or more secondary vernal pool indicators (Env-Wt. 101.108).

[f] Evidence of one or more indicator vernal pool species (primary) or evidence of two or more facultative species (footnote b), (USACE, 2012).

[g] Gaps in vernal pool IDs indicate pools eliminated from consideration as vernal pools under both USACE and NHDES criteria.

Qualitative Values:

h=high productivity (20 or more WF, SS or BS egg masses; or fairy shrimp present

m=medium productivity (10 to 19 WF, SS, or BS egg masses)

l=low productivity (<10 WF, BS, or SS egg masses)

Pool Attributes:

+ = fairy shrimp present

BS=blue-spotted salamander

SS=spotted salamander

WF=wood frog

NR=Not Recorded

= 20 or more wood frog egg masses present

* = 20 or more spotted salamander or blue-spotted salamander egg masses present

tp = tadpole