

APPENDIX G

VERNAL POOL STUDY

Vernal Pool Surveys

Hudson Valley Wine Village, Inc.
Blue Point Road
Town of Lloyd, New York

July 1, 2012

Prepared by:

Michael Nowicki
Ecological Solutions, LLC
1248 Southford Road
Southbury, CT 06488
(203) 910-4716

1.0 INTRODUCTION

Ecological Solutions, LLC completed a Vernal Pool Study at three (3) vernal pools identified and mapped in 2010 during the wetland delineation and natural resource assessment phase of the project as wetland "U", "Q", and "HA". The vernal pools are shown on plan entitled, "Vernal Pool Mapping." This map depicts the 3 vernal pools and acreage, the 100 foot envelope to each pool, and the 750 foot critical terrestrial habitat surrounding each pool. Vernal pools are small, shallow (<2m) ephemeral bodies of standing fresh water that are inundated in the spring (hence the name), but typically dry up by mid-summer and remain dry depressions for some period of the year. During wetter years, the pools may not dry out completely, but annual drying in most years is critical as it prevents the pools from supporting predatory fish populations. The following characteristics are commonly used as further criteria for identification of a water body as a vernal pool:

- occurs in a confined basin that may or may not have defined inlets or outlets and lacks fish populations;
- supports the complete life cycle of characteristic invertebrate and vertebrate species that rely on vernal pools for successful breeding.

Vernal pools are ecologically important because they provide functions and values that are required by amphibian populations. These functions and values include:

1. Providing breeding sites for obligate vernal pool breeding species including:
 - a. Spotted salamander (*Ambystoma maculatum*)
 - b. Jefferson's salamander (*Ambystoma jeffersonianum*)
 - c. Blue-spotted salamander (*Ambystoma laterale*)
 - d. Marbled salamander (*Ambystoma opacum*)
 - e. Wood frog (*Rana sylvatica*)
2. Providing breeding sites for invertebrate species that may provide food sources for larval or adult stages of amphibians, or are simply unique to vernal pool habitats and contribute to an areas general biodiversity, including:
 - a. Fairy shrimp (*Eubranchipus spp.*)
 - b. Fingernail clams (*Sphaeriidae*)
 - c. Clam shrimp (*Branchiopoda*)
3. Providing aquatic habitat "stepping stones" that enable the dispersal of amphibians across otherwise dry landscapes, facilitating genetic exchange.

Not all vernal pools are equally ecologically valuable. Some vernal pools dry too early in the season to support the complete life cycle of obligate pool amphibians, even though amphibians may attempt to breed in them. In such cases, they become population sinks, wasting amphibians' reproductive effort, and not contributing to local or regional populations.

Vernal pool values may also be decreased by being separated from other pools and wetland habitats by impassable barriers to wildlife movement, such as busy roads, curbs, walls, or large cleared areas that

expose migrating amphibians to desiccation from sun exposure and increased chances of predation. Such barriers to movement can also be natural, taking the form of geologic or topographic features that prevent emigration or immigration and thereby prevent genetic mixing of amphibian populations.

A Vernal Pool Study Protocol was written and sent to the New York State Department of Environmental Conservation (NYSDEC) for review and approval. The NYSDEC has recently begun to require specific vernal pool habitat assessments on properties where they occur because of the habitat value for breeding amphibians. The NYSDEC typically suggests that vernal pools be assessed in accordance with the technical paper entitled, *"Best Development Practices: Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States"*. This authoritative work explains that an encroachment into the critical upland habitat (750 foot from the edge of the vernal pool) will not significantly impact the amphibian populations occupying this area as long as the impact does not exceed 25% to 30% of the 750 foot zone surrounding the vernal pool. The publication also suggests that no impacts should occur within the 100-foot envelope surrounding the vernal pool. Once approved by the NYSDEC the Protocol was also sent to the Town of Lloyd for review and approval. The study was undertaken from March 15 to June 15, 2012 and included extensive field work to gather data from these sensitive areas. The purpose of the study was to perform a study for spring breeding herpetiles at the 3 vernal pool breeding sites and evaluate migration corridors to the pools from critical terrestrial habitat or upland areas within 750 feet of each pool. Table 1.0 indicates days, hours, and weather conditions of the study period.

The proposed project incorporates the recommendations outlined in *"Best Development Practices: Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States"* and based on the field data utilizes directional buffers to each vernal pool rather than circular buffers. The plan entitled, *"Vernal Pool Impacts"* shows that there is no impact to the 100-foot vernal pool envelope of any of the vernal pools and potential encroachment into the critical upland habitat is limited to 37.6% in vernal pool "U", 0.25 % in vernal pool "Q", and 16.7 % in vernal pool "HA".

Table 1.0 Vernal Pool Study

Day	Time	Temperature	Precipitation
3/15	11:00am – 1:00pm	55	no rain
3/17	8:30am – 11:00am	67	no rain
3/20	11:00am – 1:00pm	77	no rain
3/23	9:45am – 11:00am	75	no rain
3/28	5:00pm – 7:15pm	64	¼ inch
3/30	5:00pm – 6:15pm	54	slight <1/4 inch
4/4	7:30pm – 9:30pm	65	1 inch
4/7	9:00am – 11:00am	60	no rain
4/12	9:00am – 11:00am	60	no rain
4/13	1:00pm – 2:30pm	65	no rain
4/18	8:30am – 10:00am	58	no rain
4/20	9:00am – 11:00am	76	no rain
4/25	7:30pm – 9:00pm	60	1 inch
4/27	1:00pm – 2:30pm	55	1 inch
5/2	9:00am – 11:00am	55	slight <1/4 inch
5/4	7:30am – 10:00am	80	½ inch
5/7	1:00pm – 3:00pm	68	slight <1/4 inch
5/9	9:00am – 11:00am	74	slight <1/4 inch
5/15	9:00am – 11:00am	68	¼ inch
5/17	1:00pm – 2:30pm	71	slight <1/4 inch
5/22	1:00pm – 3:00pm	72	slight <1/4 inch
5/25	8:00am – 10:00am	77	1 inch
5/29	1:00pm – 2:30pm	92	¼ inch
5/30	1:00pm – 2:30pm	82	1 inch
6/5	1:00pm – 2:30pm	66	slight <1/4 inch
6/8	1:00pm – 2:30pm	80	slight <1/4 inch
6/13	8:30am – 10:00pm	79	slight <1/4 inch
6/15	9:00am – 11:00am	81	no rain

2.0 METHOD

The study commenced on March 15, 2012 by first reviewing the wetland mapping for the project to ascertain the critical terrestrial habitat areas or areas within 750 feet of each vernal pool boundary since pool breeding amphibians depend on both aquatic and terrestrial habitats.

The March surveys began by reviewing water levels in each vernal pool, determining if any vernal pool breeders had reached a pool (herptiles detection and identification would occur by visual encounter, vocalizations, spermatophores, egg masses, and remains), and then searching out from the pool boundary to a distance of 750 feet. The terrestrial habitat searches utilized a circular pattern around each pool and consisted of log rolling (overturning logs, large stones, and other debris to reveal herptiles underneath). Aural surveys were also conducted for vocal herptiles by standing quietly and listening for calls.

The April surveys extended from each vernal pool out to approximately 450 feet since movement of amphibians toward breeding pools would be expected and the 750 foot distance was considered a maximum distance for breeding amphibians to travel and breed successfully.

The May surveys were limited to each pool and an area of approximately 200 feet surrounding each pool.

The June surveys were limited to each pool and the 100 foot vernal pool envelope.

The method for assessing functions and values of the vernal pools was a two-step process that included: (1) determination of vernal pool status; and (2) evaluation of functions. These two steps essentially confirm the existence of the pool and assess its condition as an indicator of whether it can provide its functions and values. The 3 vernal pools were identified on the site through a review of aerial photographs, topographic maps, county soils study, and in the field during 2010.

3.0 RESULTS

The following table contains observations of individuals from each field visit to the 3 vernal pools on the property. Each vernal pool contained only two obligate vernal pool breeders the spotted salamander and wood frog. Vernal pool Q and U also contained green frogs during several May visits when water levels peaked. There were no special concern salamanders (Jefferson, blue-spot, marbled) identified utilizing the vernal pools or in critical terrestrial habitat areas. Several herpetiles that do not use vernal pools for breeding were observed in the critical terrestrial habitat including red eft, red backed salamander, slimy salamander, grey tree frog, spring peeper, and American toad. The vernal pools were dry until late April.

Table 3.0 Vernal Pools – Individuals Encountered¹

Day	Spotted Salamander	Wood Frog
3/15	0	0
3/17	0	0
3/20	0	0
3/23	0	0
3/28	0	0
3/30	0	0
4/4	0	0
4/7	0	0
4/12	0	0
4/13	0	0
4/18	0	0
4/20	0	0
4/25	4(Q), 2(U)	8(Q), 3(HA), 4(U)
4/27	3(Q), 1(U)	4(Q), 4(U)
5/2	1(Q)	0
5/4	2(Q), 2(U)	0
5/7	0	0
5/9	0	0
5/15	0	0
5/17	0	0
5/22	0	0
5/25	0	0
5/29	0	0
5/30	0	0
6/5	0	0
6/8	0	0
6/13	0	0
6/15	0	0

¹ Individuals were counted in total on each visit and may reflect recounts.

Table 3.1 Vernal Pools – Egg Masses Encountered²

Day	Spotted Salamander	Wood Frog
3/15	0	0
3/17	0	0
3/20	0	0
3/23	0	0
3/28	0	0
3/30	0	0
4/4	0	0
4/7	0	0
4/12	0	0
4/13	0	0
4/18	0	0
4/20	0	0
4/25	0	0
4/27	0	6(Q), 2(HA), 4(U)
5/2	4(Q), 4(U)	8(Q), 2(HA), 4(U)
5/4	2(Q), 2(U)	8(Q), 2(HA), 4(U)
5/7	2(Q), 2(U)	0
5/9	4(Q)	0
5/15	0	0
5/17	0	0
5/22	0	0
5/25	0	0
5/29	0	0
5/30	0	0
6/5	0	0
6/8	0	0
6/13	0	0
6/15	0	0

² Egg Masses were counted in total on each visit and may reflect recounts.

Table 3.2 Vernal Pool Envelope/Upland Critical Terrestrial Habitat³

Day	Spotted Salamander
3/15	0
3/17	0
3/20	0
3/23	0
3/28	0
3/30	0
4/4	0
4/7	4(Q), 2(HA), 2(U)
4/12	2(Q), 2(U)
4/13	1(Q), 1 (HA), 2(U)
4/18	2(Q)
4/20	0
4/25	0
4/27	0
5/2	1(HA), 4(U)
5/4	2(Q), 3(U)
5/7	2(Q), 2(U)
5/9	0
5/15	0
5/17	1(U)
5/22	0
5/25	1 (Q), 2(HA), 3(U)
5/29	4(Q), 4(HA), 4(U)
5/30	0
6/5	0
6/8	0
6/13	0
6/15	0

Spotted salamanders were the most frequently observed obligate vernal pool breeder found in the critical terrestrial habitat shown on maps VP-01 and VP-02. All of the specimens observed were found circa 60 meters or 200 feet of vernal pools HA, Q, and U. The locations of these specimens in uplands were treated as potential migration points and small valleys and low points or drainages associated with the observation were considered the most likely travel corridors. Wood frogs were seldom observed outside the 3 vernal pools.

³ Specimens encountered in total on each visit and may reflect recounts.

4.0 DISCUSSION/POTENTIAL IMPACTS/MITIGATION

As stated, there was no special concern salamanders (Jefferson, blue-spot, or marbled salamander) observed within the three vernal pools or in the surrounding critical terrestrial habitat. The most common species observed in association with the vernal pools was the obligate spotted salamander of which all specimens located on the property were discovered within 60 meters of each vernal pool (HA, U, and Q). Spotted salamanders associated with vernal pool HA were located on a wooded rise east of the pool approximately 200 feet directly east. I did not go onto the neighboring properties during the surveys. Spotted salamanders associated with vernal Pool Q were located mainly west and north of the vernal pool also a maximum of 200 feet on wooded ridges. Spotted salamanders associated with vernal pool U were all located north of the pool also on a wooded ridge within 200 feet of the pool. In ranking these pools based on productivity it was observed that vernal pool U is the most productive in specimens recorded in and around the pool with vernal pool Q almost as productive and vernal pool HA slightly less productive. Vernal pools Q and HA are a cryptic variety of vernal pool meaning each is within a larger wetland complex or closely linked to adjacent wetlands whereas vernal pool U is more the classic vernal pool as it is a defined depression that is deep and beyond the influence of any other wetland or waterbody.

According to map VP-02 there are no impacts to any of the 3 vernal pools or to any of the associated 100 foot vernal pool envelopes. Vernal pool HA has a total of 53.18 acres of critical terrestrial habitat or wooded upland area within 750 feet of its boundary. Approximately 8.87 acres or 16.7 percent of this habitat will be impacted by the project. Vernal pool Q has a total of 62.82 acres of critical terrestrial habitat within 750 feet of its boundary. Approximately 0.16 acres or 0.25 percent of this habitat will be impacted by the project. Vernal pool U has a total of 59.14 acres of critical terrestrial habitat within 750 feet of its boundary. Approximately 22.28 acres or 37.6 percent of this habitat will be impacted by the project.

Development guidelines and precautions outlined in the publication *"Best Development Practices: Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States"* coupled with the field data gathered during 2012 was used to incorporate directional buffers to each vernal pool rather than circular buffers. The publication states, "We identify pools with 25% or less developed area in the critical terrestrial habitat as having high priority. The few studies that have been conducted on this topic suggest that development pressures (buildings, impermeable surfaces, roads, lawns) higher than 25-30% cause declines in breeding populations". The proposed project incorporated the recommendations outlined by in this publication except for a slightly larger critical terrestrial impact area associated with vernal pool U. There is no impact to the 100-foot vernal pool envelope and potential encroachment into the critical upland habitat is limited to 16.7%, 0.25% and 37.6% in each of the 3 pools. The encroachments in the critical upland habitats are beyond the 200 foot area where obligate species were observed so that the most productive portions of the 750 foot critical upland habitat are preserved.

Mitigation is not required for vernal pool HA or Q since impacts to surrounding critical terrestrial habitat is below thresholds discussed in the literature and since there will be no obstructions placed in supposed travel corridors. Three amphibian tunnels or crossings will be utilized under the internal road located north of vernal pool U to allow directional salamander dispersal and migration based on the data gathered at the site in 2012. The critical terrestrial habitat impact is slightly larger than the recommended 25-30%. The crossings will utilize natural low points/drainage corridors which are the most likely dispersal route to vernal

pool U and back. The crossings will be provided even though the road is more than 200 feet from vernal pool U to allow for potential travel. The use of permanent barriers in the areas on both sides of the road crossings and the use of curbs on the road could potentially funnel amphibians to the crossing locations and minimize travel impacts over the new road. These features coupled with the remaining tracts of forested critical terrestrial habitat will maintain the vernal pool ecology on the property.

5.0 REFERENCES

Amphibians and Reptiles:

Calhoun, A. J. K. and M. W. Klemens. 2002. Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York.

Collins, J.T. 1990. Standard Common and Current Scientific Names for North American Amphibians and Reptiles. Third edition. Society for the Study of Amphibians and Reptiles. Herpetological circular no. 19. Lawrence, KS.

VERNAL POOL BUFFER LEGEND:

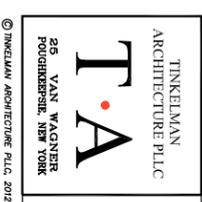
VERNAL POOL IDENTIFICATION	HA	Q	U
AREA OF VERNAL POOL	0.21	0.59	0.48
TOTAL AREA OF VERNAL POOL ENVELOPE	1.91	2.24	1.98
AREA OF VERNAL POOL ENVELOPE ON SITE	1.52	2.24	1.98
TOTAL AREA OF TERRESTRIAL HABITAT	51.05	60.0	56.68
AREA OF TERRESTRIAL HABITAT ON SITE	27.39	49.96	56.68
TOTAL AREA OF BUFFER AROUND VERNAL POOL	53.18	62.82	59.14
AREA OF BUFFER AROUND VERNAL POOL ON SITE	29.72	52.79	59.14

-  VERNAL POOL ENVELOPE - 100'-0" FROM EDGE OF VERNAL POOL
-  TERRESTRIAL HABITAT - 750'-0" FROM THE EDGE OF VERNAL POOL
-  PROPERTY LINE
-  BLUFF LINE
-  100' WATERFRONT BLUFF OVERLAY DISTRICT
-  WETLAND BOUNDARY & HATCHING



CLIENT:
Hudson Valley Wine Village, Inc.
 191-200 Blue Point Road
 Town of Lloyd, Ulster County New York

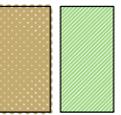
PROJECT NAME:
Draft Generic Environmental Impact Statement
Blue Point Overlay District



VERNAL POOL MAPPING	
DATE: 07/11/13	Figure 3.5.2
JOB NO. 130701	
DATE: 07/11/13	

VERNAL POOL BUFFER LEGEND:			
VERNAL POOL IDENTIFICATION	HA	Q	U
AREA OF VERNAL POOL	0.21 acres	0.59 acres	0.48 acres
TOTAL AREA OF VERNAL POOL ENVELOPE	1.91 acres	2.24 acres	1.98 acres
AREA OF VERNAL POOL ENVELOPE ON SITE	1.52 acres	2.24 acres	1.98 acres
TOTAL AREA OF TERRESTRIAL HABITAT	51.05 acres	60.0 acres	56.88 acres
AREA OF TERRESTRIAL HABITAT ON SITE	27.99 acres	49.96 acres	56.88 acres
TOTAL AREA OF BUFFER AROUND VERNAL POOL	53.18 acres	62.82 acres	59.14 acres
AREA OF BUFFER AROUND VERNAL POOL ON SITE	29.72 acres	52.79 acres	59.14 acres
AREA OF DISTURBANCE	8.87 acres	0.16 acres	22.28 acres
PERCENT OF AREA OF DISTURBANCE VERSUS TOTAL TERRESTRIAL HABITAT	16.7%	0.25%	37.6%
PERCENT OF AREA OF DISTURBANCE VERSUS TOTAL TERRESTRIAL HABITAT ON SITE	30%	0.30%	37.6%

VERNAL POOL ENVELOPE - 100'-0" FROM EDGE OF VERNAL POOL
 TERRESTRIAL HABITAT - 750'-0" FROM THE EDGE OF VERNAL POOL



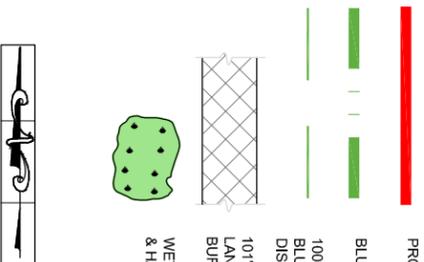
PROPERTY LINE

BLUFF LINE

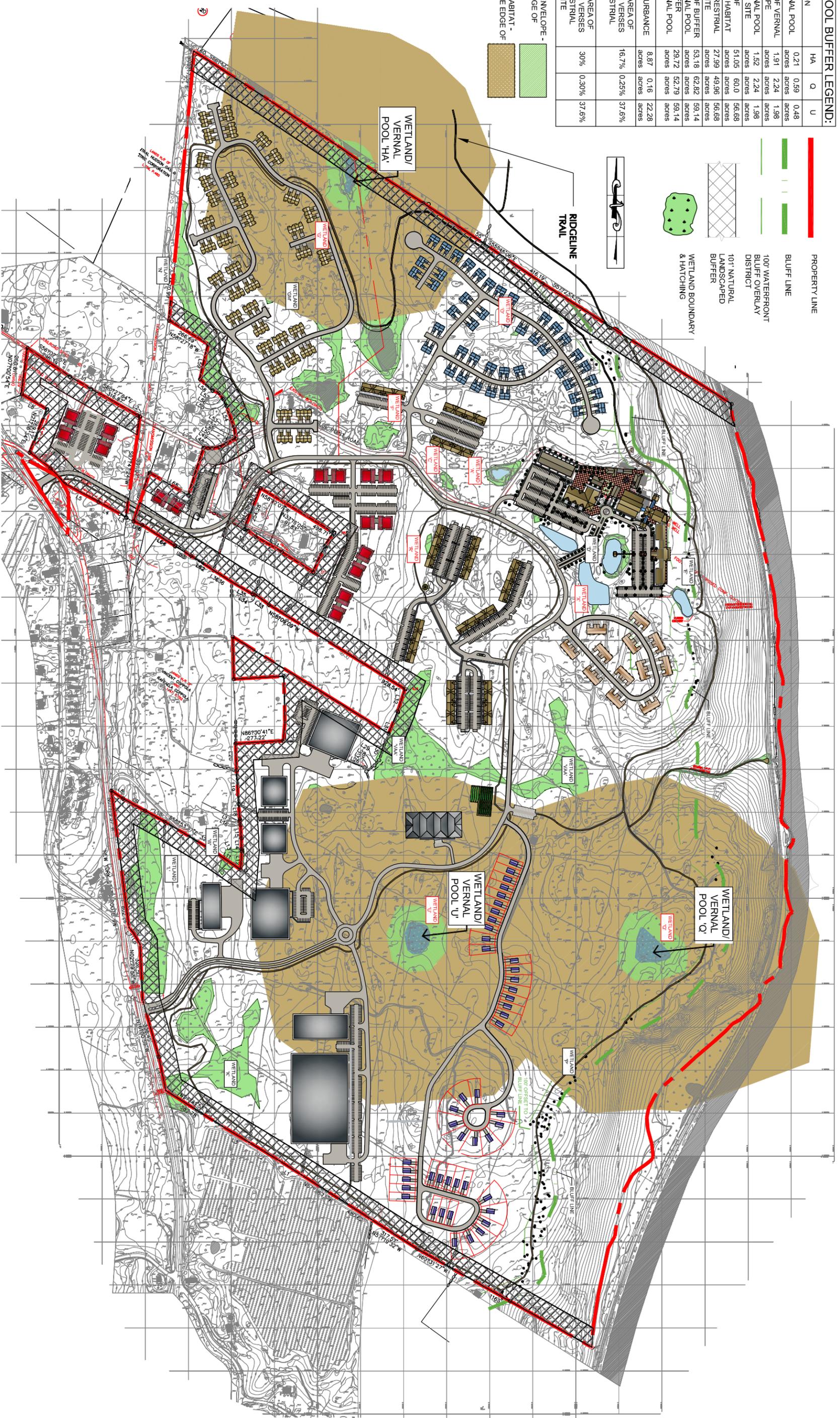
100' WATERFRONT BLUFF OVERLAY DISTRICT

101' NATURAL LANDSCAPED BUFFER

WETLAND BOUNDARY & HATCHING



RIDGELINE TRAIL



CLIENT:

Hudson Valley Wine Village, Inc.
 191-200 Blue Point Road
 Town of Lloyd, Ulster County New York

PROJECT NAME:

Draft Generic Environmental Impact Statement
 Blue Point Overlay District



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Vernal Pool Impacts

DRAWN BY: [blank]
 JOB No. 10811
 DATE: 02/13/13
 Figure 3.5.4

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Red eft in Rich Mesophytic Forest on the property



Vernal pool "U" – May 2012



Red backed salamander



Slimy salamander within 200 feet of vernal pool "U"



Spotted salamander within 50 feet of vernal pool "U"



Spotted salamander entering vernal pool "U"



Spotted salamander egg mass vernal pool "Q"

