Wetland
Studies and Solutions, Inc.

ENDANGERED AND THREATENED SPECIES HABITAT EVALUATION AND RARE PLANT SPECIES/COMMUNITY ASSESSMENT

OXFORD LANDING (±423 acres)

LOUDOUN COUNTY, VIRGINIA

Prepared For:

Daniel P. Coughlan
Tritec Real Estate Company, Inc.
2 Wisconsin Circle, Suite 700
Chevy Chase, MD 20815-7007

WSSI Project No.: 7442.01

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5300 Wellington Branch Drive • Suite 100 • Gainesville, VA 20155 • Phone 703.679.5600 • Fax 703.679.5601 • www.wetlandstudies.com

Endangered and Threatened Species Habitat Evaluation and
Rare Plant Species/Community Assessment
Oxford Landing
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I. Executive Summary

Between February 6 and 16, 2006, Wetland Studies and Solutions, Inc. (WSSI) conducted an Endangered and Threatened Species Habitat Evaluation and Rare Plant Species/Community Assessment within the Oxford Landing study area. The results of this qualitative field evaluation are described in detail in the following text. Maps and photographs depicting typical characteristics and natural resources of the study area are included as attachments.

In summary, no endangered or threatened species (ETS), rare plant species, or rare plant communities were observed within the study area and, in WSSI's opinion, there is low probability that ETS or other state-rare plant species and natural communities occur within the study area.

Correspondence from the Virginia Department of Conservation and Recreation (DCR) dated February 16, 2006 states that the six rare diabase-associated plants may occur within the study area. In addition, DCR states that the state-threatened wood turtle (*Glyptemys insculpta*) and rare mussels may occur in Broad Run. However, correspondence from the Virginia Department of Game and Inland Fisheries (VDGIF) dated February 15, 2006 states that there are "currently no known documentations of threatened or endangered species in the project area that require any coordination with the applicant," and the VDGIF's Virginia Fish and Wildlife Information Services (VFWIS) database does not list any documented occurrences of any endangered or threatened species within 2 miles of the Oxford Landing study area.

Suitable habitat for the wood turtle is present along Broad Run, which forms the western and northern boundary of the study area, and its floodplain. However, according to the VDGIF VFWIS database, this species has not been recorded within 2 miles of the project vicinity in the Broad Run watershed. Therefore, it is WSSI's opinion that there is a very low probability that this species is present in the study area due to Broad Run not being a "clear, fast-moving stream" in the study area.

The VDGIF VFWIS database does not list any occurrences of the loggerhead shrike (*Lanius ludovicianus*), Henslow's sparrow (*Ammodramus henslowii*), or the upland sandpiper (*Bartramia longicauda*) within 2 miles of the study area. Although suitable nesting and foraging habitat for the loggerhead shrike is present in the open field habitats within the study area, there is a very low probability that this species occurs due to its current rarity in northern Virginia. Additionally, the early successional fields within the study area provide suitable habitat for the Henslow's sparrow. However, given the species' current range and extremely low populations in northern Virginia, there is a low probability that this species occurs within the study area. The grasses within these fields are too dense and therefore, do not provide suitable habitat for the upland sandpiper. Although transient individuals of the above-mentioned species could utilize the study area on rare occasions, there is a very low probability that these species occur within the study area on a regular basis.

II. Introduction

WSSI has prepared an Endangered and Threatened Species Habitat Evaluation and Rare Plant Species/Community Assessment for the Oxford Landing study area. This evaluation was prepared in support of the requirements for the Loudoun County Environmental and Cultural Resources Existing Conditions Plat approval process, as specified in Loudoun County's Revised General Plan and Facilities Standards Manual. For the purpose of this evaluation, "endangered and threatened species" are defined as species that are listed as endangered or threatened on the state or federal level. This evaluation assesses the site's potential to support non-listed plant species and natural communities that are considered rare and whose occurrences are tracked by Virginia Department of Conservation and Recreation, Division of Natural Heritage (DCR)[1], as well as ETS. The results of this qualitative evaluation are graphically depicted on the Endangered and Threatened Species Habitat Evaluation and Rare Plant Species/Community Assessment Map (Attachment I) and are described in detail below.

The Oxford Landing study area is situated on approximately 423 acres and is located in the southwestern quadrant of the Sully Road (Route 28)/Harry Byrd Highway (Route 7) intersection in Loudoun County, Virginia. The site is bounded to the east by Sully Road, to the northeast by Harry Byrd Highway and to the north and west by Broad Run. Severn Way is located approximately 1,000 feet south of the site as shown on Exhibit 1. Several unnamed tributaries flow toward Broad Run.

The study area is situated on gently to moderately sloping topography and is undeveloped consisting of mixed coniferous-deciduous forests and successional fields. This topography can be seen in the USGS Sterling, VA-MD 1994 topographic quadrangle map included as Exhibit 2, as well as in the background topography on Attachment I. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (Exhibit 3) depicts the FEMA-mapped floodplain associated with Broad Run, which flows in a northerly direction along the western boundary of the study area. As indicated on the WSSI Spring 2004 Color Infrared aerial photograph that serves as the base for Attachment I, the study area consists of open fields and forests of mixed hardwoods and conifers. Exhibit 4 includes photographs depicting the conditions on the site.

III. Methodology

Prior to conducting field work, WSSI consulted a number of references to determine which ETS could potentially occur on, or in the immediate vicinity of, the study area boundary. These references included the following:

- A February 16, 2006 letter from DCR regarding recorded occurrences of ETS within the Oxford Landing study area, according to DCR's Biotics Data System. A copy of this letter is included as Exhibit 5.

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[1] Although these species and communities are not formally listed as Endangered or Threatened, DCR may recommend to Loudoun County that the site be surveyed for these species and communities, and that disturbance of these species and communities be avoided. Loudoun County may in turn require such surveys, and ultimately could require avoidance of any rare species or community detected on the site (Revised General Plan, pages 5-21 to 5-23, 7/23/01; Facilities Standards Manual, Section 7.700 A, page 7-42, 7/01/02).

- The DCR Natural Heritage Resources Map (Exhibit 6), which depicts the proximity of other documented Natural Heritage Resources (NHRs) (from data provided to WSSI by DCR under a license agreement) to the Oxford Landing study area;

- A letter from VDGIF dated February 15, 2006 regarding the presence of endangered, threatened, or rare species that are likely to occur within the study area and whether or not their presence will pose constraints to the proposed development. A copy of this letter is included as Exhibit 7.

- A list of NHRs documented within Loudoun County obtained from the Virginia Department of Natural Heritage's web page[2];

- A list of state and federal ETS known or expected to occur within a 2-mile radius of the site, obtained from the FWIS, an on-line computer database provided by the VDGIF[3];

- Applicable species accounts contained in the 1991 publication, *Virginia's Endangered Species: Proceedings of a Symposium*[4];

- Applicable natural community descriptions contained in *The Natural Communities of Virginia: Classification of Ecological Community Groups, Second Approximation*[5];

- Unpublished recent refinements to the Basic Oak-Hickory Forest community type description (G. Fleming, unpublished).

From these references, a list of ETS that are known to occur, or that could potentially occur, in the vicinity of the study area was compiled. These species, their regulatory statuses and habitat preferences are listed in Table 1, below.

Between February 6 and 16, 2006, WSSI environmental scientists Amy M. Connelly, WPIT[6] and Jennifer D. Feese, WPIT traversed the entire study area. The site and all immediately adjacent areas were inspected for suitable habitat for the rare species determined by the literature and database searches to potentially occur in the site vicinity. While conducting the habitat evaluation, WSSI also searched for individuals of these species in appropriate habitat, and any observations of these species were noted. Many of these species, however, are seasonal in occurrence, have limited flowering times, or exhibit levels of behavior and activity that vary with the seasons, and these species may not be readily observable throughout the year. For these reasons, exhaustive searches for these species were not conducted at the time of this habitat evaluation. More intensive surveys of suitable habitat during the appropriate season would be required to maximize the chance for locating individuals of these species.

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2 http://www.dcr.state.va.us/dnh/nhrinfo.htm

3 http://www.dgif.virginia.gov/wildlife/info_map/index.html

4 K. Terwilliger, (Coordinator). 1991. *Virginia's Endangered Species: Proceedings of a Symposium*. The McDonald and Woodward Publishing Co., Blacksburg, VA. 672 pages.

5 Fleming, G.P., P.P. Coulling, K.D. Patterson, and K.M. McCoy. 2004. The natural communities of Virginia: classification of ecological community groups. Second approximation. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. http://www.dcr.virginia.gov/dnh/ncintro.htm.

6 Wetland Professional In-Training, Society of Wetlands Scientists Certification Program, Inc.

WSSI also examined the site for the six state-rare plant species (none of which are listed as endangered or threatened) and natural communities that are considered rare by DCR, and for which DCR has recommended surveys and/or expressed concern in northern Virginia. The observers looked fairly carefully for the six diabase-associated species during the habitat evaluation, although (1) an exhaustive search of the site was not conducted and (2) identification of these plants during the timing of this investigation is difficult because many of these plants flower in the late spring or later in the summer and early fall. Additionally, the ground was snow covered during much of this investigation. WSSI also evaluated plant communities within the study area to determine if any of the communities meet the description of a Northern Hardpan Basic Oak-Hickory Forest or an Upland Depression Swamp, both of which are of conservation concern to DCR.

Exhibit 8a is a Soils Map and Exhibit 8b is a Diabase Soils Map derived from Loudoun County Digital Data. According to the Loudoun County Soil Survey, the following soil series occurring on the Oxford Landing study area are derived from diabase parent material: Oakhill Gravelly Silt Loam (soil series 64D), Haymarket and Jackland (soil series 67B), Haymarket and Jackland Very Stony (soil series 68B), Haymarket and Jackland Very Stony (soil series 68C), and Elbert Silty Clay Loam (soil series 69A). As shown on Attachment I, the mapped diabase soils occur only in the forested northeastern portion the study area, with an additional small area in the southeastern portion of the study area.

IV. Results

The February 16, 2006 letter from DCR (Exhibit 6) indicated that no species listed as endangered or threatened, or proposed for listing as endangered or threatened, at either state or federal level have been recorded within the study area. Review of the other references listed above, however, indicated that several ETS could occur in the vicinity of the Oxford Landing study area if suitable habitat is present.

Table 1 below summarizes the ETS that are known to occur, or could potentially occur in southeastern Loudoun County based on the literature and database searches. The potential for each of the ETS to occur within the study area is summarized in Table 1 and discussed in more detail in the following text. The state-rare diabase-associated plant species and natural communities are also discussed below.

A. American Ginseng

American ginseng (*Panax quinquefolium*), a state-threatened plant species, occurs in deeply shaded rich deciduous forests on north- or east-facing slopes. Rich forests typically have fertile soils with high base cation levels (particularly calcium, magnesium and manganese). The pH range of soils in rich forest communities may range from moderately acidic to moderately alkaline[7]. In northern Virginia, American ginseng is typically associated with large populations of Christmas fern *(Polystichum acrostichoides*), northern maiden hair fern (*Adiantum pedatum*) and false solomon's seal (*Smilacina racemosa*), under a canopy of white oak (*Quercus alba*) and tulip poplar (*Liriodendron tulipifera*). Other associates of American ginseng include black snakeroot (*Cimicifuga racemosa*), bloodroot (*Sanguinaria canadensis*), and wild ginger (*Asarum*

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[7] Fleming, G.P., P.P. Coulling, K.D. Patterson, and K.M. McCoy. 2004. The natural communities of Virginia: classification of ecological community groups. Second approximation. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. http://www.dcr.virginia.gov/dnh/ncintro.htm.

canadensis). These conditions are not found on the Oxford Landing study area. Forests on-site generally consist of mixed coniferous-deciduous (Photo #1), mixed deciduous, and mature riparian/bottomland hardwood forests. These habitats do not provide the "rich forest" conditions favored by the American ginseng. Therefore, in WSSI's opinion, there is a very low probability that ginseng occurs in the study area.

Table 1. Listed Endangered and Threatened Species Summary Table, Oxford Landing, Loudoun County, VA.

NAME	STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
American Ginseng (*Panax quinquefolium*)	ST	Rich deciduous forests.	No suitable habitat on the site based on the lack of associated known biotic conditions; believed absent.
Wood Turtle (*Glyptemys insculpta*)	ST	Clear streams in forested floodplains and nearby fields, wet meadows, and farmlands.	Suitable habitat is present along Broad Run. However, the species has not been recorded within 2 miles of the project vicinity in the Broad Run watershed.
Bald Eagle (*Haliaeetus leucocephalus*)	FT, ST	Nests in large trees; forages primarily along rivers and coastlines, and at large lakes.	May occur within the study area. Broad Run provides potential breeding, foraging and roosting habitat. However, the species has not been recorded within 2 miles of the project vicinity.
Peregrine Falcon (*Falco peregrinus*, including *F.p. tundrius*)	ST	Nests on cliffs, and occasionally on tall bridges and buildings, and forages on birds in a variety of open habitats.	Could potentially occur in the site vicinity (rarely) during migration, but not known to nest in Loudoun County. There is no suitable breeding habitat within the study area.
Upland Sandpiper (*Bartramia longicauda*)	ST	Grassy pastures, hayfields, and early-stage old fields with medium to tall herbaceous vegetation.	No suitable habitat is present within the fields on-site due to the dense vegetation present, in addition, given the species' current range and extremely low populations in northern Virginia, there is a low probability that this species occurs within the study area.
Loggerhead Shrike (*Lanius ludovicianus ludovicianus*, *L.l. migrans*)	ST	Open habitats, such as fields, pastures, and early-stage old fields, with scattered trees and shrubs for nesting.	Suitable foraging and nesting habitat is present in the unmanaged fields and fencerows within the study area. However, given the species' current range and extremely low populations in northern Virginia, there is a low probability that this species occurs within the study area
Henslow's Sparrow (*Ammodramus henslowii*)	ST	Moist meadows and abandoned fields in early regeneration stages. Occupied habitat usually has a high percentage of grasses, some standing dead vegetation, a well-developed layer of dead herbaceous plant litter, and few shrubs.	Suitable foraging and nesting habitat is present in the unmanaged fields within the study area. However, given the species' current range and extremely low populations in northern Virginia, there is a low probability that this species occurs within the study area.

FT = Federally listed Threatened
SE = State listed Endangered
ST = State listed Threatened

B. Wood Turtle

Suitable habitat for the wood turtle is present along Broad Run (Photo #2), which forms the western boundary of the study area. Suitable habitat is also present within the floodplain of Broad Run as potential summer foraging habitat. While Broad Run contains fallen wood debris and is deep enough to prevent ice freeze, it is not the preferred "clear, fast-moving stream" in the study area. Correspondence from DCR dated February 16, 2006 states that the wood turtle may occur within the Oxford Landing study area if suitable habitat is present. However, according to the VDGIF VFWIS database, the species has not been documented within 2 miles of the study area. The nearest documented occurrences, according to the VDGIF VFWIS database, are in the Sugarland Run watershed, approximately 4 miles east of the study area and along Cabin Branch, a tributary of Broad Run, located within 3 miles of the study area. The only agency record for the wood turtle associated with the Broad Run watershed is a September 1998 specimen of wood turtle collected by Tom Akre, PhD near Sterling in Loudoun County. This record is from a location that the VDGIF mapped as associated with Cabin Branch, near Sterling, Virginia (VDGIF collection record #59558, September 12, 1998)[8].

From fall into spring, the wood turtle generally occurs along clear, fast-moving streams (often within deciduous forests) where it hibernates in undercut stream banks, under root masses, and in leaf packs. In summer, it is primarily terrestrial, and many individuals over-summer in the floodplains of their wintering streams, though some disperse further overland during the summer. The wood turtle occasionally occurs in forested wetlands and marshy fields along the stream systems it inhabits, and individuals may spend considerable time in upland areas[9]. Although it is terrestrial, it requires moist soil conditions year-round to prevent dehydration and desiccation. Due to the paucity of undercut banks and reduced flow volume, the other streams (*i.e.*, the unnamed intermittent tributaries to Broad Run) within the study area provide overwintering habitat that is less than ideal for the wood turtle (Photo #3). If present on the site, the wood turtle is likely to confine its activities primarily to stream corridors where it may be able to utilize the riparian habitat and even upland areas to some extent, particularly during dispersal or for foraging.

Northern Virginia is at the southern edge of the wood turtle's range, and according to Dr. Tom Akre, who completed his doctoral research (at George Mason University 1996-2002) on the reproductive ecology of the wood turtle in Virginia[10], this turtle occurs in Virginia almost exclusively in the upper Potomac and Shenandoah River watersheds, where it was known historically from nine counties. It is most common in mountain tributaries of the Shenandoah River from Rockingham County north, becoming less common and more sparsely dispersed downstream along the Potomac River into northern Loudoun and northern/eastern Fairfax Counties. The wood turtle is now considered secure from near-term local extirpation in only three counties in Virginia, all located west of the Blue Ridge Mountains (*e.g.*, Frederick, Shenandoah and Rockingham Counties). Wood turtle population centers are known from northwestern Fairfax, particularly in

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8 WSSI investigated the source data for this collection record. Dr. Akre's record does not specifically link the turtle location with any water body, as it was collected at a point 400 meters distant from the nearest waterbody, Cabin Branch. VDGIF therefore mapped the turtle record with Cabin Branch.

9 Ernst, C.H. and J. F. McBreen. 1991. Wood Turtle. Pages 455-457 In: Virginia's Endangered Species, op.cit.

10 Growth, Maturity, and Reproduction of the Wood Turtle, *Clemmys insculpta* (LeConte, 1930) in Virginia.

Sugarland Run, Nichol's Run, and Difficult Run. Recent wood turtle records also exist for the eastern and northeastern side of Sterling, Virginia.[11]

There are no viable populations of the wood turtle documented in state agency databases, or in the literature, for areas downstream of the Oxford Landing study area. Furthermore, the September 1998 collection of a wood turtle in Sterling was made in an upland location that is separated from the Oxford Landing study area by many roads, highways and urbanized areas hindering wood turtle movement. Therefore it is very unlikely that any turtles found in 1998 in Sterling could be associated with the riparian corridors in Broad Run and its tributaries due to the many barriers impeding corridor movements. In addition, because the VDGIF VFWIS database does not list any documented occurrences of the wood turtle within 2 miles of the study area and due to the fact that Broad Run is not a clear, fast-moving stream in the study area; it is WSSI's opinion that there is a low probability that this species is present within the study area.

C. Bald Eagle

Suitable foraging and nesting habitat and potential roost sites for the bald eagle (*Haliaeetus leucocephalus*) are present along Broad Run (Photo #4), but no bald eagles are currently known to nest in the vicinity of the study area. Bald eagles typically nest in large trees along the shores of large rivers and other water bodies or near the edges of large forested areas adjacent to marshes. Bald eagles may nest in other open areas or in logged over areas where scattered seed trees remain. Most bald eagle nests are within 1.6 kilometers (km) of foraging sites, though some nests may be placed as far as 3.2 km from feeding areas[12]. Bald eagles forage along the Potomac River and at Beaverdam Reservoir and other large bodies of water in Loudoun County, and WSSI is aware of two bald eagle nests within Loudoun County (northeast of Lucketts and along Goose Creek near Oatlands Plantation) in recent years. Trees sufficiently tall, and with high branches sufficiently large and sturdy to support a bald eagle nest are present within the study area, however due to the close proximity to the Potomac River (approximately 1.5 miles to the north), it is unlikely that the bald eagle would nest within the project study area.

Typical foraging habitat includes coasts, rivers, and large lakes.[13] Foraging habitat along Broad Run is present due to the tree canopy and nature of the streams. Additionally, bald eagles may occasionally fly over the study area during migration or on trips between foraging areas, therefore, the species may occur within the Oxford Landing study area. No bald eagles or bald eagle nests were observed in the study area at the time of this ETS habitat evaluation field work.

D. Peregrine Falcon

Small numbers of peregrine falcons (*Falco peregrinus*) may be expected to forage on or near the study area during migration, although such migrants are expected to occur

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11 Ms. Shelly Miller, VDGIF Wildlife Diversity Division Biologist, (pers. comm. June 3, 2005 with a WSSI senior environmental scientist, R. Wright. via email.)

12 Mitchell A. Byrd. 1991. Bald Eagle. Pages 497-499 in K. Terwilliger (editor). Virginia's Endangered Species. Nongame and Endangered Species Program, Virginia Department of Game and Inland Fisheries. The McDonald and Woodward Publishing Co., Blacksburg, VA. 672 pp.

13 Mitchell A. Byrd. 1991. Bald Eagle. Pages 497-499 in K. Terwilliger (editor). Virginia's Endangered Species. Nongame and Endangered Species Program, Virginia Department of Game and Inland Fisheries. The McDonald and Woodward Publishing Co., Blacksburg, VA. 672 pp.

fairly rarely. Peregrine falcons nest on cliffs and occasionally tall buildings and bridges. No such habitat is present within the study area, and this species is not known to nest anywhere in Loudoun County.

E. Upland Sandpiper

Upland sandpipers nest in extensive grassy fields and pastures with moderately tall herbaceous vegetation but may also forage in fields with shorter grassy vegetation. Upland sandpipers prefer habitats that combine areas of short grass for foraging and courtship interspersed with taller grasses for nesting. Nests are most often located in moderately to lightly grazed pastures or grassy fields such as those found at airports. Upland sandpipers may successfully nest in hayfields, provided the fields are not mowed during the breeding season. Breeding territories often contain telephone poles, fence posts or a few scattered small trees or shrubs, which are used as perches.

Suitable nesting and foraging habitat for the upland sandpiper is not present within the study area due to the height and density of the vegetation (Photo #5). Breeding populations of the upland sandpiper have declined precipitously in Virginia, and this species is now a very rare and irregular breeder in the state. Even if suitable nesting habitat is present adjacent to the study area, the species is no longer expected to breed regularly even in areas where it historically occurred. Furthermore, this species is expected to occur in the study area only on rare occasions during migration, if it occurs here at all. Therefore, it is WSSI's opinion that there is a very low probability that the upland sandpiper occurs within the Oxford Landing study area.

F. Loggerhead Shrike

Habitats used by loggerhead shrikes, a state threatened species, are typically characterized by well-spaced, often spiny, shrubs and low trees, usually interspersed with short grasses, forbs and bare ground. Fencerows of shrubs and trees between fields are often used for nesting, perching and roosting. Loggerhead shrikes favor fence lines and utility lines and poles as perches from which to hunt, so they are frequently found along roadways. However, throughout its range, the loggerhead shrike may be found in a wide variety of habitats, including pastures, abandoned orchards, mowed roadsides, cemeteries, golf courses, agricultural fields, riparian areas, and open woodlands. In Virginia, eastern red cedar (*Juniperus virginiana*) is used most frequently for nesting, though the degree of cover provided by the nest site is probably more important than the particular tree or shrub species. In addition, the highest quality breeding habitat consists of areas of short grasses, particularly active pastures, with many perches.

Suitable nesting and foraging habitat for the loggerhead shrike is present in the old-field communities found throughout the study area (Photos #5, #6 and #7). The fields within the study area are large enough, however the southern portion of the study area lacks clumps of trees that would provide potential perches. Due to precipitous declines in loggerhead shrike populations throughout much of North America[14], and in Virginia specifically, this species no longer occurs as a regular breeder in the vicinity of the site and very few pairs nest anywhere in Loudoun County. The species is no longer expected to breed regularly even in areas where it historically occurred.

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14 Sauer, J. R., J. E. Hines, I. Thomas, J. Fallon and G. Gough. 2000. *The North American Breeding Bird Survey, Results and Analysis 1966-1999.* Version 98.1, USGS Patuxent Wildlife Research Center, Laurel, MD.

Therefore, due to the species' current range and extremely low populations in northern Virginia, it is WSSI's opinion that there is a low probability that this species occurs within the study area.

G. Henslow's Sparrow

Suitable nesting and foraging habitat for the Henslow's sparrow is present on the site. Henslow's sparrows nest in moist meadows and abandoned fields in early successional stages. Occupied habitats usually have a high percentage of grasses, some standing dead vegetation, a well-developed layer of dead herbaceous plant litter, and few shrubs. Habitat for the Henslow's sparrow is present in the successional fields found throughout the study area (Photos #5, #6 and #7).

In Virginia, the Henslow's sparrow was historically much more abundant than it is currently. In 1987, Kain[15] indicated that declines had occurred statewide since the 1940s and considered the species rare everywhere in the state except Loudoun County, where it was considered locally uncommon. Even in Loudoun County, the species' occurrence has been very local in recent decades; on a county-wide Breeding Bird Foray in 1978, Henslow's sparrows were found at only one location, Dulles International Airport[16]. Over the past two decades, a few breeding-season records from Prince William, Fairfax, and Loudoun counties suggest that local breeding by a small numbers of birds may have occurred in these areas[17]. However, the Henslow's sparrow is no longer recorded annually in northern Virginia during the breeding season, suggesting that this species is, at best, a very rare and sporadic breeder in this part of the state.

This extreme rarity, coupled with the lack of high-quality habitat on the site, makes it highly improbable that the Henslow's sparrow occurs on the Oxford Landing study area.

H. Rare Bivalves

The February 16, 2006 letter from DCR indicated that rare bivalves may occur in Broad Run. However, according to the VDGIF VFWIS database, no rare mussel species have been documented within 2 miles of the study area. Additionally, due to the lack of high-quality riffles and fast-moving currents within Broad Run (Photo #8), it is WSSI's opinion that none of the rare bivalves are present within the Oxford Landing study area.

I. State-Rare Diabase-Associated Plants

The February 16, 2006 letter from the DCR indicates that the six "rare" diabase-associated plant species may occur within the study area provided suitable habitat is present. These six plants include earleaf foxglove (*Agalinis auriculata*), blue-hearts (*Buchnera americana*), downy phlox (*Phlox pilosa*), purple milkweed (*Asclepias purpurascens*), stiff goldenrod (*Oligoneuron rigidum* var. *rigidum*), and marsh hedgenettle (*Stachys pilosa* var. *arenicola*). None of these species are listed as endangered or threatened at either the state or Federal level. Nevertheless, Loudoun County may require surveys for these species, and could require avoidance of any rare

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15 Kain, T. 1987. *Virginia's Birdlife: An Annotated Checklist.* Virginia Society of Ornithology, Virginia Avifauna Number 3.

16 Scott, F. R. 1980. The Loudoun County Foray of June 1978. *Raven* 51:43-52.

17 Virginia Society of Ornithology. 1989. *Virginia's Breeding Birds: An Atlas Workbook.* William Byrd Press, Richmond, Virginia.

species detected on the site, according to the Revised General Plan (pp. 5-32 and 5-33) and Facilities Standards Manual (Section 7.700 A) requirements.

These "rare" plant species of concern to DCR generally occur in grassy, semi-open diabase glades or prairie-like plant communities, usually dominated by the grasses little bluestem (*Schizachyrium scoparium*) and Indian grass (*Sorghastrum nutans*) [18, 19] and not otherwise heavily dominated by non-native plants.

Because most of the rare diabase-associated species flower in the late spring or later in the summer or early fall and because of the recent snow event, it is unlikely that these species would have been detected at the time of this Rare Species Habitat Evaluation, even if they were present. Mapped diabase soils are present only in the forested northeastern portion of the study area, with an additional small area in the southeastern portion of the study area (Exhibit 8b). The northeastern portion of the study area mapped as diabase soils consists of mixed hardwood and conifer forest (Photo #9), rather than the open and semi-open areas in which the diabase-associated plants are typically found. Additionally, the small area mapped as diabase soils in the southeastern portion of the study area is a dirt road, which provides access to the site. For these reasons, it is WSSI's opinion that high-quality habitat for diabase-associated plants is not present within the Oxford Landing study area.

J. Northern Hardpan Basic Oak – Hickory Forest

As defined in *The Natural Communities of Virginia: Classification of Ecological Community Groups, Second Approximation*[20] and in other materials provided to WSSI by Gary Fleming of DCR, Northern Hardpan Basic Oak-Hickory Forests are mixed hardwood forests of submesic to subxeric upland habitats underlain by basic rocks such as diabase, gabbro, amphibolite, and metabasalt. Soils in these communities range from moderately acidic to circumneutral with high levels of base saturation. The largest patches of this vegetation type occur in the Piedmont Triassic basins (the largest of which occurs in northern Virginia), on the more extensive intrusions of mafic (magnesium-rich) and ultramafic formations elsewhere in the Piedmont, and on soils derived from greenstone in the Blue Ridge and foothills. The composition of overstory trees varies regionally, but is generally characterized by mixtures of white oak (*Quercus alba*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), chestnut oak (*Quercus montana*), post oak (*Quercus stellata*), pignut hickory (*Carya glabra*), red hickory (*Carya ovalis*), shagbark hickory (*Carya ovata*), mockernut hickory (*Carya alba*), and white ash (*Fraxinus americana*). Hickories are especially abundant and may dominate

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18 Fleming, G.P., P.P. Coulling, K.D. Patterson, and K.M. McCoy. 2004. The natural communities of Virginia: classification of ecological community groups. Second approximation. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. http://www.dcr.virginia.gov/dnh/ncintro.htm.

19 Nancy E. Van Alstine (Field Botanist for DCR's Division of Natural Heritage), personal communication to WSSI senior environmental scientist Steve Rottenborn, Ph.D., September 5, 2001.

20 Fleming, G.P., P.P. Coulling, K.D. Patterson, and K.M. McCoy. 2004. The natural communities of Virginia: classification of ecological community groups. Second approximation. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. http://www.dcr.virginia.gov/dnh/ncintro.htm.

some stands. Northern Hardpan Basic Oak-Hickory Forests often have more hickories than oak-hickory forests growing on more acidic soils.[21]

Eastern redbud (*Cercis canadensis* var. *canadensis*), eastern red cedar (*Juniperus virginiana*), slippery elm (*Ulmus rubra*), hackberry (*Celtis occidentalis*), eastern hophornbeam (*Ostrya virginiana*), and flowering dogwood (*Cornus florida*) are common understory species in Northern Hardpan Basic Oak-Hickory Forests. This community also differs from acidic oak-hickory forests in having few ericaceous shrubs such as blueberries (*Vaccinium* spp.) and huckleberries (*Gaylussacia* spp.). The herbaceous layers of the Northern Hardpan Basic Oak-Hickory Forest are generally species rich, and often contain species that are confined to basic or calcareous soils. Examples of such species include Bosc's panic grass (*Dichanthelium boscii)*, whorled milkweed (*Asclepias quadrifolia*), cliff muhly (*Muhlenbergia sobolifera*), elm-leaved goldenrod (*Solidago ulmifolia*), dwarf skullcap (*Scutellaria parvula* var. *leonardii*), bottlebrush grass (*Hystrix patula*), and curly-heads (*Clematis ochroleuca*).[22] Other characteristic forbs of the rare Basic Oak-Hickory Forest community include Dutchman's pipe (*Aristolochia serpentaria*) and hog peanut (*Amphicarpa bracteata*).

The oak-hickory forests (Photo #10) that are found in the central portion of the site were examined to determine whether they meet the definition of the rare Northern Hardpan Basic Oak-Hickory Forest community. The soils in this area are not diabase-derived soils (Exhibit 8b). A number of species associated with basic oak-hickory forests are common in this forest, including white oak, mockernut hickory, and pignut hickory in the canopy and flowering dogwood in the understory. However, differences in the species composition, relative abundance of certain species, and existing forest structure suggest that the rare Basic Oak-Hickory forest community is not present at the site. The most notable differences are as follows:

1. The Oak-Hickory Forests found within the study area do not occur on diabase or diabase derived soils;
2. Woodlands investigated generally lack a well-developed, patchy, graminoid community; and specifically, lacked any of the associate grass species for the type including cliff muhly, Bosc's panic grass, poverty grass (*Danthonia spicata*), and bottlebrush grass;
3. Other characteristic forbs of the rare Basic Oak-Hickory Forest community including Dutchman's pipe (*Aristolochia serpentaria*) and hog peanut (*Amphicarpa bracteata*), are also not present;
4. Species typical of mesic habitats, including muscle wood (*Carpinus caroliniana*), and tulip poplar (*Liriodendron tulipifera*), which are not typically associated with Northern Hardpan Basic Oak-Hickory Forests, are common within the forest community; and
5. Exotic species, such as Japanese honeysuckle (*Lonicera japonica*) and joint-head arthraxon (*Arthaxon hispidus*) are common within the forest community. These species are not typically associated with high-quality examples of the Basic Oak-Hickory Forest community.

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21 Source: Letter report written to Mr. Noel Kaplan, Fairfax County Department of Planning and Zoning, from Gary Fleming, Vegetation Ecologist, Virginia Department of Conservation and recreation, Division of Natural Heritage, summarizing results of site visit to basic oak-hickory forest at "The Hacor Site", dated November 4, 1999

22 Fleming *et al.* 2001. *Op cit.*

Therefore, in WSSI's opinion, the oak-hickory woodlands in the central portion of the site do not match DCR's description of the rare Northern Hardpan Basic Oak-Hickory Forest.

K. Upland Depression Swamp

Upland Depression Swamp communities generally occur on nearly level Piedmont uplands with clay hardpans or shallow bedrock, from northern Virginia to South Carolina. In Virginia, these wetlands are scattered throughout the eastern and central Piedmont. They are most numerous in Mesozoic basins and areas underlain by mafic rock or acidic slates. Habitats include shallow, seasonally flooded upland basins, as well as elongate bottoms along small streams. Because of low relief, headwater drainages in parts of the Piedmont are diffuse, with sluggish, usually intermittent flows and little or no active alluvial deposition. These communities experience shallow seasonal flooding induced by perched water tables during the winter and spring months.

According to DCR, canopy cover within Upland Depression Swamps ranges from complete to very open. In northern Virginia, pin oak (*Quercus palustris*), swamp white oak (*Q. bicolor*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), and to a lesser extent, willow oak (*Q. phellos*) and American elm (*Ulmus americana*) are characteristic. Shrub composition is variable but usually includes climbing common greenbriar (*Smilax rotundifolia*) and blackhaw (*Viburnum prunifolium*). The herb layer is usually open and consists of diverse graminoids. Locally common species include meadow sedge (*Carex granularis*), woolly sedge (*Carex pellita*), squarrose sedge (*Carex squarrosa*), slender spikerush (*Eleocharis tenuis* var. *tenuis*), fowl manna-grass (*Glyceria striata*), Virginia cut-grass (*Leersia virginica*), and green bulrush (*Scirpus atrovirens*). Jack-in-the-pulpit (*Arisaema triphyllum*) and spotted jewelweed (*Impatiens capensis*) are often the most abundant forbs and may dominate some areas. Other minor but characteristic herbs include slender sedge *(Carex gracilescens*), fox sedge (*Carex vulpinoidea*), tapered panic grass (*Dichanthelium acuminatum* var. *lindheimeri*), bluntleaf bedstraw (*Galium obtusum*), narrow-leaved mountain-mint (*Pycnanthemum tenuifolium*), and reddish bulrush (*Scirpus pendulus*). Sphagnum mosses (*Sphagnum* spp.) frequently form large patches on slightly raised hummocks.

Wetlands are found on the site (Photo #11), but are generally associated with the streams and do not meet DCR's criteria for the Upland Depression Swamp community. Based on our field observations, WSSI concludes that this community is not present within the Oxford Landing study area.

V. Limitations

This study is based on examination of the conditions on the study site at the time of our review and does not address conditions in the future. Such conditions change over time. Therefore, our conclusions may vary from future observations. Our ETS Habitat Evaluation and Rare Species/Community Assessment and report have been prepared in accordance with generally accepted guidelines for the conduct of such evaluations. We make no other warranties, either expressed or implied, and our report is not a recommendation to buy, sell or develop the property.

We offer no opinion and do not purport to opine on the possible application of various building codes, zoning ordinances, other land use or platting regulations, environmental or health laws and other similar statutes, laws, ordinances, code and regulations affecting the possible use and occupancy of the Property for the purpose for which it is being used, except as specifically provided above. The opinions set forth herein are rendered only and exclusively for the benefit of the addressees and no other parties, successors or assigns. The foregoing opinions are based on applicable laws, ordinances, and regulations in effect as of the date hereof and should not be construed to be an opinion as to the matters set out herein should such laws, ordinances or regulations be modified, repealed or amended.

This document is solely for your benefit and is not to be quoted in whole or in part or otherwise referred to in any statement or document (except for purposes of identification) nor is it to be filed with any governmental agency or other person (except with respect to the proposed rezoning), without the prior written consent of this firm, unless required by law. If you have any questions regarding this report, please call our office at (703) 679-5600.

Sincerely,

WETLAND STUDIES AND SOLUTIONS, INC.

Amy M. Connelly, WPIT
Environmental Scientist

Laura A. B. Giese, PhD, CF, PWS, PWD[23]
Principal Environmental Scientist

Mark Headly, PWS, PWD[24]
Vice President

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23 Society of American Foresters Certified Forester #801; Professional Wetland Scientist #001363, Society of Wetlands Scientists Certification Program, Inc.; VA Certified Professional Wetland Delineator #3402-000012.

24 U.S. Army Corps of Engineers Wetland Delineator Certification WDCP94MD0310114B; Professional Wetland Scientist #000462, Society of Wetlands Scientists Certification Program, Inc.; VA Certified Professional Wetland Delineator #3402-000031