

Draft

# NORTHEAST REDMOND NEIGHBORHOOD PARK

Critical Areas Study

Prepared for:  
City of Redmond Parks and Recreation  
Nakano Associates LLC

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## SUMMARY

At the request of Nakano Associates, ESA Adolfson characterized wetlands, streams, and fish and wildlife habitat areas and prepared this technical report for the Northeast Redmond Neighborhood Park site, located in the City of Redmond, Washington. The City of Redmond Parks and Recreation department requested this critical areas report to assist with preparation of a Master Plan for the NE Redmond Neighborhood Park property. The Scope of Work for this project included wetlands determinations, delineations, an assessment of wetland functions, and a discussion of wildlife habitat, all of which are summarized in this technical report. A brief discussion of regulatory implications and permitting considerations is also included in this report.

The subject property is located on parcel 2526059109 between NE 122<sup>nd</sup> Street and NE 124<sup>th</sup> Street in Redmond (Figure 1). Critical areas are regulated by the City of Redmond Community Development Guide (RCDG) Title 20 (RCDG 20D.140).

Two wetlands (Wetland A and Wetland B) were delineated on the NE Redmond Neighborhood Park property. Wetland A is a mapped permanently flooded palustrine, unconsolidated bottom, diked/impounded wetland (PUBHh) and a seasonally flooded/saturated palustrine forested wetland (PFOE). This wetland is located on the east side of the property and encompasses a stream (Stream 1) and an excavated pond. Wetland B is a forested wetland located on the west side of the property.

The RCDG 140.30-010 requires that wetlands be rated using the Ecology wetland rating system (Hruby, 2004). Wetland A is rated as Category III with a standard buffer width of 75 feet. Wetland B is rated as Category III with a standard buffer of 40 feet (RCDG 20D.140.30-020).

Compensatory mitigation requirements for wetland habitat on the subject property are found in RCDG 20D.140.30-030. Restoration of Category III wetlands must occur at a 4:1 ratio and enhancement of a Category III wetland requires an 8:1 ratio.

One stream (Stream 1) was identified on the subject property during the field investigation. Stream 1 is a permanently flowing stream that flows through an open field north of the property as a channelized ditch, and continues south along the east side of the property. This stream is characterized by two segments. The north segment of Stream 1 flows into an excavated pond and the south segment drains from the pond to the south end of the property and continues off-site through a box culvert. Stream flow continues off-site and enters Bear Creek, which eventually drains into the Sammamish River. According to RCDG 20D.140.20, Stream 1 is classified as a Class II stream and requires a 100-foot inner buffer and a 50-foot outer buffer.

This site meets the criteria for Fish and Wildlife Habitat Conservation Area (RCDG 20D.140.20). Any alteration to a FWHCA requires protection of sensitive species, including species of concern as identified by WDFW. This includes the pileated woodpecker, which was observed on the property during the field investigation. Fish and Wildlife Habitat Conservation Area Performance Standards (RCDG 20D.140.20-070) require protection of retained habitat for sensitive species and preservation of significant trees. Management recommendations for the

pileated woodpecker include preservation of significant trees and preservation of contiguous habitat both on the property and off-site. General management recommendations for significant trees and retained habitat on the site are provided in RCDG (20D.140.20-070) and include the following:

1. Integrate retained habitat into open space;
2. Consolidate habitat and open space in contiguous blocks;
3. Locate habitat contiguous to other habitat; and
4. Preserve significant trees in groups.

Additional tree replacement requirements, guidelines, protection measures, mitigation, and enforcement measures are outlined in RCDG20D.80.20.

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## **1.0 PROJECT AUTHORIZATION AND SCOPE OF WORK**

At the request of Nakano Associates, ESA Adolfson characterized wetlands, streams, and fish and wildlife habitat areas and prepared this technical report for the Northeast Redmond Neighborhood Park site, located in the City of Redmond (City), Washington. The City of Redmond Parks and Recreation department requested this critical areas report to assist with preparation of a Master Plan for the NE Redmond Neighborhood Park property. The boundaries of the study area were established based on maps provided by the City of Redmond.

The Scope of Work for this project included wetlands determinations, delineations, an assessment of wetland functions, and a discussion of wildlife habitat, all of which are summarized in this technical report. A brief discussion of regulatory implications and permitting considerations is also included in this report. An analysis of potential wetlands impacts and the development of a mitigation plan were not included in this Scope of Work.

## **2.0 SITE DESCRIPTION**

The Northeast Redmond Neighborhood Park property, hereafter referred to as the subject property, is located in the City of Redmond and in King County, Washington (NW1/4 of NE1/4 of SE ¼ Section 25, Township 26N, Range 5E) (Figure 1). The Northeast Redmond Neighborhood Park (Parcel 2526059109) is located northeast of the intersection of 176<sup>th</sup> Avenue NE and NE 122<sup>nd</sup> Avenue. One existing residence is located on the adjoining parcel east of the subject property. An existing residential development is located south of the subject property, and the property west of the park is currently undeveloped. An open field is located north of the park property that appears to contain wetland characteristics. One stream flows south along the east side of the subject property; this flows through an excavated pond that straddles the subject property and the private residential property to the east. The stream eventually flows east and drains into Bear Creek. Topography at the site is relatively flat and is characterized by a mixed coniferous-deciduous forest. The project site is located in the Sammamish River Watershed subbasin, located in Water Resource Inventory Area (WRIA) 8 (Cedar-Sammamish Watershed).

## **3.0 WETLAND DEFINITION AND REGULATIONS**

The characteristics of an area that result in its classification as “wetland” have been formally defined by federal and state agencies, as described in Appendix A. Numerous federal, state, and local regulations govern development and other activities in or near wetlands; at each level, there are typically several agencies charged with such powers (Ecology, 1994). Specific regulatory implications concerning the subject property are summarized later in this report.

## 4.0 METHODS

Two levels of investigation were conducted for the analysis of wetlands on the subject property: a review of existing information and an on-site investigation.

### 4.1 Review of Existing Information

A review of existing literature, maps, and other materials was conducted to identify wetlands or site characteristics indicative of wetlands on the subject property. These sources can only indicate the likelihood of the presence of wetlands; actual wetland determinations must be based upon data obtained from field investigations.

Several documents were reviewed:

- U.S. Geological Survey (USGS), 2008 King County iMAP – Sensitive Area Information, King County, WA;
- *Soil Survey of King County Area, Washington* (Snyder et al., 1973)
- National Wetland Inventory, Redmond quadrangle (U.S. Fish and Wildlife Service [USFWS], 1989);
- *Wetlands Online Mapper* (USFWS, January 2008);
- *King County Wetlands Inventory, Volume I: North* (King County Environmental Division, 1991);
- *Hydric Soils of the State of Washington* (Natural Resources Conservation Service, 1995);
- *National Hydric Soil List by State: Washington* (National Resources Conservation Service [NRCS], 2008);
- *Water Quality Assessment for Washington 303(d) List* (Washington State Department of Ecology [Ecology], 2004);
- *City of Redmond Critical Areas Maps* (City of Redmond, 2005); and
- *City of Redmond Wildlife Habitat Plan* (Adolfson Associates, Inc. [Adolfson], 2002).

### 4.2 On-site Investigation

#### 4.2.1 Determining the Presence of Wetlands and Delineating Wetland Boundaries

Methods defined in the *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997) were used to determine the presence and extent of wetlands on the subject property. Washington state and all local governments must use the state delineation manual to implement the Shoreline Management Act and/or the local regulations adopted pursuant to the Growth Management Act.

The Washington state manual is consistent with the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). The Corps has been working with states, federal agencies, and others to develop supplemental regional criteria to refine the 1987 delineation manual. Two regions fall within the state of Washington: The Arid West (dry lands west of the Continental Divide, from Idaho and eastern Washington south to the U.S. - Mexico border) and the Western Mountains, Valleys, and Coast. Interim Regional Supplements to the Corps of Engineers 1987 Wetlands Delineation Manual have been completed by the Corps for both regions in Washington, and the appropriate supplement is now used, along with the Washington State Delineation Manual, when conducting delineations in those regions.

The methodology outlined in the manuals is based upon three essential characteristics of wetlands: (1) hydrophytic vegetation; (2) hydric soils; and (3) wetland hydrology. Field indicators of these three characteristics must all be present in order to determine that an area is a wetland (unless problem areas or atypical situations are encountered).

The “routine on-site determination method” was used to determine the wetland boundaries. The routine method is used for areas equal to or less than five acres in size, or for larger areas with relatively homogeneous vegetative, soil, and hydrologic properties.

Formal data plots were established where information regarding each of the three wetland parameters (vegetation, soils, and hydrology) was recorded. This information was used to distinguish wetlands from non-wetlands. If wetlands were determined to be present on the subject property, the wetland boundaries were delineated. Wetland boundaries were identified with sequentially numbered colored flagging imprinted with the words WETLAND BOUNDARY. Data plot locations were also marked with colored flagging. In addition, the ordinary high water mark (OHWM) of the stream located on the east side of the property was marked with striped, colored flagging.

The methods used to assess wetland characteristics are described in greater detail in Appendix A. Please note that common plant names are used throughout this text; the scientific names are presented in Appendix B.

#### **4.2.2 Classifying Wetlands**

Two classification systems are commonly used to describe wetlands. The hydrogeomorphic (HGM) system describes wetlands in terms of their position in the landscape and the movement of water in the wetland (Brinson, 1993). The U.S. Fish and Wildlife Service classification system (Cowardin et al., 1979) describes wetlands in terms of their vegetation communities; these include, for example, emergent, scrub-shrub, and forested community types.

#### **4.2.3 Assessing Wetland Functions**

Wetlands and buffers play important roles that provide valuable benefits to the environment and society. Because detailed scientific knowledge of wetland functions is limited, evaluations of the functions of individual wetlands are somewhat qualitative and dependent upon professional judgment.

For this project, wetland functions were assessed using the Washington State Department of Ecology's *Wetland Rating System for Western Washington* (Hruby, 2004). Although this system is designed to rate wetlands, it is based on whether a particular wetland performs a particular function and the relative level to which the function is performed. An assessment of wetland functions is inherent in the rating system. This system was developed by Ecology to differentiate wetlands based on their sensitivity to disturbance, their significance, their rarity, our ability to replace them, and the beneficial functions they provide to society. Appendix C provides additional information about the rating system wetland categories and completed rating forms for the project.

#### **4.2.4 Stream Delineation, Classification and Rating**

Paired flags were placed on the river right and river left banks at the ordinary high water mark (OHWM) of an unnamed stream (#1220902477037) identified as Stream 1 in the field investigation. The OHWM was determined by using multiple indicators, including (1) the upper elevation of alluvial features (e.g., point bars); (2) significant changes in slope; and (3) significant changes in vegetation.

Streams in the City of Redmond are classified and rated using a four-tiered system referenced in RCDG 20D.140.20-010(4). Per the requirements of this system, streams in the City are evaluated based on the water typing criteria founded on fish presence and stream flow.

## **5.0 FINDINGS**

The following sections describe the results of the field investigation conducted by Cathie Conolly, Rachel Hulscher, and Rosemary Baker on the NE Redmond Neighborhood Park site on January 12 and 13, 2009. These sections describe the two wetlands found on the site, streams, upland habitats, and wildlife observations. Five data plots were established within relatively uniform areas of vegetation on the site. Data sheets for each of the formal data plots evaluated for this project are provided in Appendix D.

### **5.1 Existing Information**

National Wetlands Inventory (NWI) data from 1989 and current data from the USFWS Wetlands Online Mapper indicate one wetland on the subject property. The inventoried wetland is a palustrine unconsolidated bottom, permanently flooded, diked/impounded wetland. The NWI wetland is located on the east portion of the site (Figure 3).

City of Redmond Critical Areas Maps do not indicate presence of any wetlands on the property. The Streams Classification map indicates the presence of one stream located on the east side of the subject property. This stream is identified as a Class III stream at the north end of the property and a Class II stream at the south end of the property and continuing off-site to the south (Figure 3).

The Soil Survey of King County Area (Snyder et al., 1973) indicates the Alderwood series occurs on the project site. Specifically, the Alderwood gravelly sandy loam, 6 to 15 percent slopes, soil type is mapped on the project site. Alderwood soils are made up of moderately well drained soils that have a weakly to strongly consolidated substratum at a depth of 24 to 40 inches. These are upland soils that formed under conifers in glacial deposits, at elevations of 100 feet to 800 feet. Annual precipitation is 35 to 60 inches, most of which is rainfall occurring between October and May. During winter months, water moves along the top of the substratum of these soils. Soil series inclusions that may occur are poorly drained Norma, Bellingham, Seattle, Tukwila, and Shalcar soils. Each of these soil inclusions is listed as a hydric soil in Washington due to their high water table and/or frequent, extended periods of ponding (NRCS, 2008) (Figure 2).

## 5.2 Wetlands Determinations

Two wetlands and one stream were identified on the property. The following describes each of the wetlands and the upland habitats found on the site. Figure 4 shows the approximate location of the wetlands on the NE Redmond Neighborhood Park property. Wetland boundaries were professionally surveyed by PACE Engineering, Inc.

### 5.2.1 Wetland A

Overview. Wetland A is located on the east side of the property, and includes a stream and an excavated pond (Photo 1 and Photo 2). The wetland and pond extend onto the adjoining property to the east; only the portion of the wetland and pond located on the subject property was delineated for purposes of this report. Wetland A extends from an open area dominated by creeping buttercup on the east side of the stream to an open canopy forest on the west side of the stream. The wetland extends from the south side of the dirt road (NE 124<sup>th</sup> Street) to the south end of the pond. Hummocks are interspersed throughout the wetland. Wetland A contains components of both a depression and riverine wetland and is approximately 0.90 acre (39,314 square feet) in size on the site. Wetland A is categorized as a permanently flooded palustrine, unconsolidated bottom, diked/impounded wetland (PUBHh) and a seasonally flooded/saturated palustrine forested wetland (PFOE). Palustrine emergent (PEM) vegetation is located on the east side of the stream and extends off-site. The PEM area comprises less than 20 percent of Wetland A and therefore is not used for Wetland A categorization. This wetland is characterized by Data Plots DP-1 and DP-2.

Wetland A also includes a seep that drains into a channelized ditch at the south end of the property. The ditch is aligned from east to west along NE 122<sup>nd</sup> Street and also receives stormwater runoff from the road and eventually drains into the west side of Stream 1, which is described below under Streams and Other Drainage Features.

Hydrology. The primary water source for Wetland A is groundwater, with additional inputs from precipitation, and overflow from the stream. The surrounding landscape is generally flat and the subject property contains hummocks, but otherwise is generally flat (0 to 1 percent slope). Ponding and saturation were observed in Wetland A during site investigation. This was

likely due to overbank flooding along the stream, precipitation, and a high groundwater table. Free water and surface saturation were observed in the soil test pits at wetland data plots DP-1 and DP-2. The soil was saturated to the surface in the majority of the wetland except for hummocks of slightly higher elevation (approximately 1 to 2 feet).

Soils. Wetland soils were a very dark brown (10YR 2/2) loam from the surface to 13 inches in depth, above a dark grayish brown (10YR 4/2) gravelly sandy loam between 13 and 19 inches depth at DP-1. Soils at DP-2 were: very dark brown (10YR 2/2) sandy loam from the surface to 6 inches depth with dark yellowish brown (10YR 4/6) common, fine, distinct redoximorphic features; very dark grayish brown (10YR 3/2) loamy sand from 6 to 13 inches in depth with dark gray (10YR 4/1) common, fine, distinct redoximorphic features; and brown (10YR 4/3) loamy sand with some large gravel 13 inches and below with light yellowish brown (2.5Y 6/4) common, fine, distinct redoximorphic features. These soils were not consistent with the mapped Alderwood soil unit but contained characteristics similar to hydric Norma, Bellingham, and Shalcar soils.

Vegetation. Canopy cover in Wetland A is dominated by big-leaf maple and declining red alder trees. Conifer species are interspersed throughout the wetland, including western red cedar, western hemlock, and grand fir. Vine maple and salmonberry dominate the shrub stratum. Creeping buttercup, piggyback plant, and sword fern were dominant in the understory. A dense layer of humic material was present on the ground surface. Other species occurring in the wetland include black cottonwood, Himalayan blackberry, and some reed canarygrass.

Wetland Functions. The results of the functions assessment for the wetland areas are presented in Appendix C. Wetland A received moderate scores for water quality and habitat functions and a low score for hydrologic functions. The wetland has the potential to improve water quality because of its constricted outlet at the south end of the pond, where it drains through an outfall and connects to the southern portion of the stream on the subject property. This constricted outlet provides some potential for reducing flooding and erosion via water storage. Hydrologic functions are limited by the flat topography of the area. Opportunities exist to provide water quality improvement to runoff received from surrounding roads and development. In addition, the stream associated with Wetland A eventually drains into Bear Creek, approximately 0.9 mile southeast of the property. A diverse plant community, including standing snags, large woody debris (LWD), and a dominance of native vegetation, provide a moderate score for habitat functions. Wetland A is part of a relatively undisturbed corridor that extends from the Sammamish River east to Bear Creek, providing corridor connectivity and habitat for wildlife. Live trees and standing snags were observed to indicate presence of pileated woodpeckers and sapsuckers, and one pileated woodpecker was observed during the field investigation. Additional wildlife habitat and observations are discussed below in the Wildlife Habitat section.

## **5.2.2 Wetland B**

Overview. Wetland B is located on the west side of the property and is characterized by flat topography and presence of hummocks within a closed depression (Photo 3). Ponded areas observed during the site investigation were dominated by shrub species, with humic material dominating the ground surface. Hummocks were dominated by tree species and herbaceous

species generally associated with upland habitat. Wetland B is a depressional wetland and is approximately 0.43 acre (18,917 square feet) in size on the subject property, extending off-site to the west. This is categorized as a PFOE wetland and is characterized by Data Plot DP-4.

Hydrology. The primary water source for Wetland B is groundwater, with some contributing precipitation. Topography on the site and in surrounding areas is generally flat. Hummocks interspersed throughout the wetland provide some elevation changes (0 to 1 percent slope). Ponding and saturation were observed in Wetland B during the site investigation, likely because of recent precipitation and a high groundwater table. Surface saturation and free water (2 inches below ground surface) were observed at wetland data plot DP-4. Soils were saturated to the surface in most areas of Wetland B except for hummocks.

Soils. Wetland soils were a very dark grayish brown (10YR 3/2) gravelly sandy loam with dark yellowish brown (10YR 4/6) few, medium, distinct redoximorphic features from the ground surface to 12 inches depth; and a dark grayish brown (10YR 4/2) gravelly sandy loam between 12 inches and 20 inches depth. Charcoal fragments were observed throughout the soil sample. These soils were not consistent with the mapped Alderwood soil unit.

Vegetation. Dominant vegetation in the canopy stratum includes big-leaf maple, red alder, and western red cedar. The shrub stratum is dominated by salmonberry. Dominant herbaceous vegetation includes piggyback plant, with some stinging nettle and sword fern. Other species observed in Wetland B include Douglas-fir, big-leaf maple saplings, red elderberry, and sedge species. A dense layer of humic material dominated open areas of the ground surface.

Wetland Functions. Wetland B received moderate scores for water quality and habitat functions, and a low score for hydrologic functions. Lack of a visible outlet, presence of persistent, woody vegetation, and tendency for untreated stormwater to discharge into the wetland provide some potential and opportunity for Wetland B to improve water quality and to reduce flooding and erosion. Limited water storage and flat topography limit hydrologic functions. Presence of LWD and standing snags, along with low presence of invasive species, provides habitat functions. In addition, Wetland A and Wetland B are part of a relatively undisturbed habitat corridor extending from the Sammamish River to Bear Creek. This combination of wetland and upland habitat provides corridor connections and habitat for wildlife. One pileated woodpecker was observed in Wetland B during the field investigation. Additional wildlife habitat and observations are discussed below in the Wildlife Habitat section.

### 5.3 Off-site Wetlands

Several mapped wetlands occur in the vicinity of the park property. Data sources for these inventories include NWI, King County iMAP, City of Redmond Critical Areas Maps, and the *King County Wetlands Inventory, Volume 1: North* (King County Environmental Division, 1991). One temporarily flooded PSS wetland is located west of the park property. Stream 1 flows off-site to the south and east, draining into Bear Creek. This stream flows past one small PHBHh wetland near NE 116<sup>th</sup> Street and 178<sup>th</sup> Avenue NE and through a large wetland complex located north and south of NE 116<sup>th</sup> Street west of Avondale Road. The wetland complex is listed as a Category II, 64-acre persistent PEM (PEM1), deciduous (willow) PSS

(PSS5), and a deciduous PFO (PFO6). Stream 1 is identified as a small channel with low flow passing through this wetland mosaic, and the wetland site crosses beneath NE 116<sup>th</sup> Street via a channelized ditch and culvert. Additional mapped wetlands are located east and west of the property, including a large PEM wetland along the Sammamish River. These wetlands are associated with contiguous forested habitat, which provide opportunities for wildlife.

## 5.4 Streams and Other Drainage Features

One stream (Stream 1) was identified on the subject property during the field investigation (Figure 4) (Photos 4 through 6). Stream 1 is a permanently flowing stream that flows through an open field north of the property as a channelized ditch and passes through a culvert beneath a dirt road that separates the two properties. Stream 1 flows south along the east side of the property and is described in two segments. The north segment of Stream 1 flows into an excavated pond and the south segment drains from the pond to the south end of the property and continues off-site through a box culvert. Stream flow continues off-site and connects to Bear Creek 0.9 mile downstream, which eventually drains into the Sammamish River.

Stream 1 is associated with Wetland A, as described in Section 5.2.1. Stream 1 varies from two to six feet in width and between two and twelve inches in depth on the subject property. Substrate in the north segment of the stream is dominated by silt and cobble along with some sand. Dominant substrate in the south segment of the stream includes cobble, sand, and some silt. Stream banks reach approximately four feet in height along the south stream segment. The riparian area is vegetated with mature cottonwood, red alder, and salmonberry. Additional species include reed canarygrass, creeping buttercup, and piggyback plant. The east side of the stream is more open and adjoins a maintained lawn on the neighboring property.

Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) data are available for the downstream portion of Stream 1 at its confluence with Bear Creek (approximately 0.9 mile southeast of the park property) and for Bear Creek. The downstream section of Stream 1 (1220902477037) contains documented presence and migration of coast resident cutthroat trout.

Ecology identifies Stream 1 as an unclassified stream. This stream is on the 2004 303(d) list for fecal coliform between river mile (RM) 0 and 0.7, located southeast of the subject property. Stream 1 drains into Bear Creek, which is currently on the 303(d) list for fecal coliform and temperature between RM 3.9 and 6.9. This section of Bear Creek includes the confluence with Stream (Ecology, 2004).

The City of Redmond identifies the north segment of Stream 1 as a Class III stream and the south segment as a Class II stream. According to the Redmond Community Development Guide (RCMD) 20D.140.20-010(4), when more than one stream classification is present on a property, the stream will be classified using the more restrictive class. Therefore, Stream 1 on the subject property is classified as a Class II stream. The RCDG defines Class II streams as “those natural streams that are not Class I and are either perennial or intermittent and have salmonid fish use or the potential for salmonid fish use” (RCDG 20D.140.20-010(4b)). Stream I is a permanently flowing stream with no documented fish passage barriers (WDFW, 2009). According to WDFW

PHS data, salmonid presence is documented downstream in Bear Creek. Therefore, salmonid presence is likely along the south segment of Stream 1. The north segment of Stream 1 is not likely accessible to salmonids because of the drainage pipe located at the south end of the pond. The north segment of Stream 1 meets the qualifications for a Class III stream because it is a permanently flowing stream with the potential for non-salmonid fish use. Regulations are discussed below in Regulatory Implications.

## 5.5 Upland Description

Upland areas at the NE Redmond Neighborhood Park site are characterized primarily by mixed forest. Hummocks are present throughout the site west of the stream and provide minor elevation changes across the site. Dominant vegetation in the tree canopy includes big-leaf maple, red alder, and black cottonwood. Dominant shrubs include vine maple and tree saplings. Herbaceous vegetation is dominated by sword fern, bleeding heart, and stinging nettle. Upland areas located off-site east of the pond are comprised of maintained lawn and creeping buttercup, with a sparse tree canopy containing mostly western hemlock and western red cedar.

Upland portions of the property are characterized by Data Plots DP-3 and DP-5. Dominant plant species are listed above. Additional species observed in the upland plots included Douglas fir, salmonberry, licorice fern, and piggyback plant. Upland soils adjacent to Wetland A were very dark grayish brown (10YR 3/2) sandy loam from the surface to 5 inches depth, above a brown (7.5YR 4/3) loamy sand with iron deposits, charcoal, and pieces of gravel extending from 5 to 18 inches depth. Upland soils adjacent to Wetland B were: very dark grayish brown (10YR 3/2) sandy loam from the ground surface to 2 inches in depth; dark brown (10YR 3/3) loam from 2 to 8 inches in depth; very dark brown (10YR 2/2) between 8 and 12 inches in depth; and dark brown (10YR 3/3) gravelly sandy loam between 12 and 16 inches in depth. Free water was observed at DP-5 and was likely due to recent heavy rainfall. Approximately 2.3 inches of precipitation fell on January 7, 2009. As a result, a high water table was present in both wetland and upland areas of the property during the field investigation.

The majority of trees occurring on the property consist of deciduous trees, including red alder, bigleaf maple, and black cottonwood (Photo 4, Photo 7, and Photo 8). These are concentrated in the center of the property and vary in diameter, ranging from approximately 5 inches diameter at breast height (dbh) to 40 inches dbh. Bigleaf maple trees were observed to be generally healthier than red alders at the time of the field survey. Many red alder trees appeared stressed, which was likely a result of the high water table present throughout the site (Photo 4 and Photo 6).

Coniferous trees on the property are dominated by western red cedar and Douglas-fir, and range from approximately 6 inches dbh to 36 inches dbh (Photo 4). Conifers are generally located along the perimeter of the park, with approximately 12 conifers (approximately one-third of the total conifers on the site) occurring in the center of the property, surrounded by mature red alder and some bigleaf maple. The coniferous trees appeared in good health across the site. Snags and LWD are scattered throughout the park property. Many snags indicated presence of woodpecker activity (Photo 3).

## 5.6 Wildlife Habitats

Fish and Wildlife Habitat Conservation Areas (FWHCA) are discussed in RCDG 20D.140.20. These areas are identified by the Growth Management Act and include state designated endangered, threatened, sensitive, and candidate species listed by WDFW. Wildlife observations during the field study included pileated woodpecker, a state candidate species. Waters of the state, including streams, are also considered FWHCAs. Stream 1 meets the conditions for a Class II stream as discussed in 5.4. Therefore, the subject property satisfies two criteria for a FWHCA in the City of Redmond.

### 5.6.1 Site Observations

Palustrine forested wetland habitat is present on the subject property. Invasive species observed at the site include small amounts of Himalayan blackberry, reed canarygrass, tansy ragwort, and Scot's broom. Patches of Himalayan blackberry were located primarily in the central portion of the site west of Stream 1 and on the south edge of Wetland A along NE 122<sup>nd</sup> Street. Small patches of reed canarygrass were observed on the west bank of Stream 1. Overall, invasive vegetation presence on the property is low. Standing snags and LWD were observed across the site. Habitat quality is generally high on the site, although this may be limited by existing residential developments surrounding the park. Existing residential developments are located south of the park and a future residential development is proposed adjacent to the west side of the property. Open forest canopy habitat extends off-site to the west and southwest, providing a habitat corridor for wildlife species.

Stream 1 provides riparian habitat on the east side of the site, extending onto the adjoining residential property to the east. The open forest canopy contains a combination of coniferous and deciduous trees, located primarily on the west side of the stream. Salmonberry provides some overhanging vegetation along the stream, and both shrub and tree species provide shade. The east side of the stream is generally open along the north segment, containing mostly maintained lawn and creeping buttercup. However, the south segment of the stream contains a diverse native plant community including salal, salmonberry and vine maple, and various tree species, including big leaf maple, red alder, black cottonwood, western hemlock, and grand fir.

The forested habitat that characterizes the majority of the property is dominated by red alder, bigleaf maple, western red cedar, and Douglas-fir trees (Photos 4 through 8). Coniferous trees occur throughout the site, with fewer along the east side and south-central portion of the park. Red alder and bigleaf maple trees are concentrated in the center of the property. Bigleaf maples appeared healthier than red alders during the site visit. Many of the red alders were failing, likely due to wet conditions and were converting to standing snags. Woodpecker workings were observed on many snags across the site (Photo 3).

Wildlife observed during the site investigation included: cottontail (scat), black-tailed deer (tracks, scat), pileated woodpecker, Canada goose, black-capped chickadee, red-tail hawk, red-breasted nuthatch, downy woodpecker, hairy woodpecker, kinglet species, spotted towhee, song sparrow, Steller's jay, American robin, American crow, and Bewick's wren. Live and decaying snags with evidence of pileated woodpecker, downy woodpecker, and red-breasted sapsucker

workings were observed across the site. The pileated woodpecker is currently listed by WDFW as a species of concern.

Other species of birds, mammals, reptiles, and amphibians in addition to those observed are expected to use habitat on the project site. For example, nocturnal species may be present that were not active during the site visit, or other species may only be highly visible or present in this area during certain seasons.

## 5.6.2 Previously Identified Species and Habitats in Project Area

ESA Adolfson developed a wildlife habitat plan for the City in 2002 (Adolfson, 2002). The report identified existing wildlife habitat in the City and proposed measures for protecting these habitat areas and connecting them with surrounding jurisdictions as well as areas within the City. Habitat cover types were mapped using wildlife habitat surveys and analysis of aerial photographs. The NE Redmond Neighborhood Park property was included in the study and was designated as forested, primary habitat (Figure 5). The subject property and adjacent areas of contiguous habitat in North Redmond were given a high rating based on community interspersion, priority species presence and habitat use, proximity to protected habitat (e.g., wetlands and streams), habitat connectivity, forest age, and low presence of invasive species. Wildlife observations during the study included pileated woodpecker. The report proposed future management considerations, including the protection of habitat on the subject property for wildlife corridors.

The City of Redmond has provided Critical Areas Maps for Wetlands, Streams, and FWHCAs (RCDG Title 20), within the Redmond Municipal Code (RMC). Mapped wetlands and streams are discussed in 5.1 and previously identified off-site wetlands are discussed in 5.3 above.

There are no priority species mapped by WDFW within one mile of the subject property. Priority habitats in the vicinity of the property include identified wetland habitat (PUBHh, PFO, palustrine emergent [PEM], and palustrine scrub-shrub [PSS]).

The USFWS has identified Endangered Species Act listed species for the King County area. This list applies to the entire county and includes species that are likely to occur only in remote wilderness areas. None of the listed species identified by the USFWS were observed during the field investigation. A pileated woodpecker was observed on the property during the study. This species is not currently listed by USFWS but is listed as a species of concern by WDFW.

## 6.0 REGULATORY IMPLICATIONS

Wetlands are regulated at the federal, state, and local levels. Agencies with jurisdiction include the U.S. Army Corps of Engineers (Corps), Washington State Department of Ecology (Ecology), and the City of Redmond. The Washington Department of Fish and Wildlife regulates work within streams. Regulatory implications associated with development in wetlands include, but may not be limited to, those discussed in this section. All applicable permits should be obtained prior to developing or otherwise altering streams or wetlands.

## 6.1 Federal Regulations

The Corps regulates discharges of dredged or fill materials into waters of the United States, including wetlands, under Section 404 of the Clean Water Act. The purpose of the Clean Water Act is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” A Section 404 permit may be required if a proposed project involves filling wetlands or altering streambeds or other waters of the U.S. The Corps will determine if wetlands are jurisdictional under Section 404 based upon the presence of a “significant nexus” to navigable waters (EPA and Corps, June 5, 2007).

The Corps has established two types of permit programs under Section 404: nationwide and individual. Nationwide permits are issued when a proposed activity will have minimal adverse impacts to wetlands. All other projects are evaluated under the individual permitting process. The Corps determines which permitting process is used for a proposed project. The Corps will require that wetland impacts be avoided or minimized to the extent practicable, and mitigation will likely be required for unavoidable wetland impacts.

## 6.2 State Regulations

The state certification process under Section 401 of the federal Clean Water Act is usually triggered through a Section 404 permit application. Section 401 directs each state to certify that proposed in-water activities will not adversely affect water quality or violate state aquatic protection laws. In Washington State, Ecology is responsible for administering the state certification program. Ecology may issue approval, approval with conditions, denial, or a request for delay due to lack of information. Any conditions attached to the 401 certification become part of the Section 404 permit.

King County is one of the 15 coastal counties in Washington regulated under the Washington State Coastal Zone Management (CZM) Program. Activities that would affect coastal resources and involve approvals from the federal government (such as a Section 404 permit) must be evaluated for CZM compliance through a process called “federal consistency.” The Washington State Department of Ecology administers the CZM program in this state.

If relocation or alteration of stream culverts or other in-stream work is proposed as part of the project, a Hydraulic Project Approval (HPA) would be required from the Washington Department of Fish and Wildlife under the state Hydraulic Code (RCW 77.55, WAC 220-110).

## 6.3 Local Regulations

The NE Redmond Neighborhood Park property is located within regulatory jurisdiction of the City of Redmond. Critical Areas are discussed in the RCDG under Title 20 of the RMC. Critical Areas include FWHCAs, wetlands, and streams (RCDG 20A.20.030). Fish and Wildlife Conservation Areas include priority habitats and species as well as streams (RCDG 20A.20.060). The FWHCA Performance Standards requires the preservation of significant trees (RCDG 20D.140.20-070). Tree protection standards are provided in RCDG 20D.80.20. Regulations regarding wetlands are provided in RCDG 20D.140.30.

Wetland and stream classifications and buffer requirements for critical areas on the subject property are summarized in Table 1.

**Table 1. Wetland and Stream Classifications and Ratings**

Critical Area	On-site size in square feet (acres)	HGM Class / Cowardin Class <sup>A</sup>	Ecology Rating Score / Habitat Function Score	City of Redmond Rating and Buffer (feet)
Wetland A	39,314 (0.90)	Depressional Palustrine Unconsolidated Bottom, Palustrine Forested	42 (Total) 24 (Habitat)	Category III 75' buffer
Wetland B	18,917 (0.43)	Depressional Palustrine Forested	39 (Total) 15 (Habitat)	Category III 40' buffer
Stream 1	N/A	N/A	N/A	Class II 100' inner buffer 50' outer buffer

<sup>A</sup>Wetland Classifications (Cowardin et al., 1979 and Brinson 1993).

The RCDG 20D.140.30-010 requires that wetlands be rated using the Ecology wetland rating system (Hruby, 2004). Using this system, Wetland A and Wetland B meet the criteria for a Category III (RCDG.140.30-010[1c]). The standard buffer width for a Category III wetland receiving a habitat score between 20 and 28 points, and receiving a low level of impacts is 75 feet. Low impact land uses include low-intensity open space (e.g., passive recreation) and unpaved trails (RCDG 20D.140.30-020). Wetland A requires a 75-foot buffer using this requirement. A Category III wetland with a habitat score below 20 points associated with low impact land use requires a 40-foot buffer; this applies to Wetland B. Buffer widths may be reduced by buffer width reduction or buffer width averaging, as long as the resulting buffer width is no less than 75 percent of the standard (75-foot or 40-foot, respectively) buffer for that wetland (RCDG 20D.140.30-020).

Compensatory mitigation requirements for impacts to wetland habitat on the subject property are found in RCDG 20D.140.30-030. These mitigation measures apply to adverse impacts to temporary and permanent loss of wetland habitat. Impacts to Category III wetlands require the replacement ratios provided in Table 2.

**Table 2. City of Redmond Wetland Replacement Ratios for a Category III Wetland<sup>A</sup>**

Creation or Re-establishment	Rehabilitation (Restoration)	Re-establishment or Creation (R/C) and Enhancement (E)	Enhancement Only
2:1	4:1	1:1 R/C and 2:1 E	8:1

<sup>A</sup>RCDG 20D.140.30-030[7].

According to the City of Redmond *Critical Areas Map: Streams Classification* (RMC Title 20, Community Development Guide: List of Maps), Stream 1 is classified as a Class III stream along the north segment and a Class II stream along the south segment that continues off-site toward Bear Creek. The RCDG 20D.140.20-010(4) states that streams receiving more than one classification on the same property shall be classified according to the more restrictive classification. Stream 1 is therefore classified as a Class II stream. The RCDG designates two buffers to Class I and Class II streams: a more restrictive inner buffer and an outer buffer. These buffers combine to provide protection of instream fish habitat; preservation of fish and wildlife habitat; and riparian corridor connections. According to RCDG 20D.140.20-020, Stream 1 requires a 100-foot inner buffer and a 50-foot outer buffer. Stream buffer width reduction and buffer width averaging are permitted under certain restrictions. Stream buffer averaging requires that the buffer width not be reduced to less than 25 percent of the standard stream buffer width or 25 feet, whichever is greater. For Class II streams, maximum clearing and grading located in the outer 50-foot buffer must be no less than 35 percent of the outer buffer area. Permitted structures and improvements within a stream buffer include permeable trails, footbridges, and educational signage (RCDG 20D.140.20-020).

As discussed in 5.6 above, the subject property meets the definition of a FWHCA based on the presence of a state candidate species (pileated woodpecker) and a water of the state (Stream 1). Any alteration to a FWHCA requires protection of sensitive species, including species of concern as identified by WDFW. This includes the pileated woodpecker, which was observed on the property during the field investigation. The RCDG 20D.140.20-050 requires that management recommendations be implemented in the event a FWHCA is altered. Performance Standards for FWHCAs (RCDG 20D.140.20-070) require preservation of retained habitat and significant trees. Management recommendations for the pileated woodpecker and tree protection are provided below.

## **7.0 MANAGEMENT RECOMMENDATIONS**

Alteration of Fish and Wildlife Habitat Conservation Areas (RCDG 20D.140.20-050) requires protection for species of concern. The subject property contains presence of pileated woodpeckers based on observations of this species and its habitat during field investigations. Standing live and decaying snags showed evidence of pileated woodpecker activity and presence of pileated woodpeckers was observed visually and audibly during the site investigation. Management recommendations for this species include preservation of significant trees (discussed below) and preservation of contiguous habitat both on the property and off-site. A contiguous, vegetated corridor extends generally west, east, and south of the park property and provides an existing habitat corridor for wildlife. We recommend that mature trees and snags on the property be retained in contiguous blocks and that a corridor connection be retained between the park and surrounding properties. A residential development is proposed west of the park; this will result in the elimination of some contiguous forested habitat on the east side of the development.

The FWHCA Performance Standards (RCDG 20D.140.20-070) require protection of sensitive species and preservation of significant trees. A significant tree is defined as “any healthy tree six

inches or greater in dbh; or any tree four inches dbh that, after considering its age, height, value, or function, the tree or tree stand is determined to be significant”. A tree stand is defined as “a group of three or more trees of any size or species, whose driplines touch” (RCDG 20A.20). PACE Engineering, Inc. is conducting a tree survey on the subject property, which will provide an estimate of the number and dbh of significant trees on the property. General management recommendations for significant trees and retained habitat on the site include the following:

1. Integrate retained habitat into open space;
2. Consolidate habitat and open space in contiguous blocks;
3. Locate habitat contiguous to other habitat; and
4. Preserve significant trees in groups.

These recommendations are provided in RCDG 20D.140.20-070(2), FWHCA Performance Standards. Removal of any significant trees, or stands of trees, requires a Tree Removal Permit. Removal of more than 10 significant trees requires approval for clearing and grading (RCDG 20D.80.20.020). One replacement tree must be planted for each significant tree removed on a site. Options for tree replacement include on-site replacement, off-site replacement, a fee in lieu of tree replacement, and landscape restoration. Additional tree replacement requirements, guidelines, protection measures, mitigation, and enforcement measures are outlined in RCDG20D.80.20.

## **8.0 LIMITATIONS**

Within the limitations of schedule, budget, scope-of-work, and seasonal constraints, we warrant that this study was conducted in accordance with generally accepted environmental science practices, including the technical guidelines and criteria in effect at the time this study was performed, as outlined in the Methods section. The results and conclusions of this report represent the authors’ best professional judgment, based upon information provided by the project proponent in addition to that obtained during the course of this study. No other warranty, expressed or implied, is made.

## 9.0 GLOSSARY

**agricultural wetland** - Areas where wetland soils and hydrology remain, but hydrophytic vegetation has been removed to allow a crop to be grown.

**anaerobic** - A situation in which molecular oxygen is absent (or effectively so) from the environment.

**atypical situation** - Areas in which one or more wetland parameters (vegetation, soil, and/or hydrology) have been sufficiently altered by recent human activities or natural events to preclude the presence of wetland indicators of the parameter. “Recent” is intended to mean that period of time since legal jurisdiction of an applicable law began.

**best management practices (BMPs)** – The physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollutant discharges.

**buffer** - A designated area along the edge of a stream or wetland that is regulated to control the negative effects of adjacent development from intruding into the aquatic resource.

**concretion** - A local concentration of chemical compounds such as calcium carbonate or iron oxide in the soil that forms a grain or nodule of varying size, shape, hardness, and color. Concretions of significance in hydric soil are usually iron and/or manganese oxides occurring at or near the soil surface that develop under conditions of prolonged soil saturation.

**dominant species** – Plant species that define the character of a vegetation community. In wetland delineation, this is typically measured using percent areal cover. For each stratum in the plant community (trees, shrubs, and herbs), dominant species are the most abundant plant species that when ranked in descending order of abundance and cumulatively totaled immediately exceed 50 percent cover for the stratum, plus any additional species that individually compose 20 percent or more of the total cover in the stratum. The list of dominant plant species is then combined across strata. (Corps of Engineers Wetland Delineation Manual, 1987)

**emergent** - A plant that grows rooted in shallow water, the bulk of which emerges from the water and stands vertically. Usually applied to non-woody vegetation.

**emergent wetland** - In the USFWS classification system (Cowardin et al., 1979), a wetland characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens.

**enhancement** - An improvement in the functions and values of an existing wetland, typically through native plantings.

**fill material** - Any material placed in an area to increase the surface elevation.

**forested wetland** - In the USFWS classification system (Cowardin et al., 1979), a wetland characterized by woody vegetation that is six meters (20 feet) tall or taller.

**gleyed** - A soil condition resulting from prolonged soil saturation, manifested by the presence of bluish or greenish colors throughout the soil or in mottles (spots or streaks) among other colors.

**herbaceous** - Having the characteristics of an herb; a plant with no persistent woody stem above the ground.

**hydric soil** – A soil that formed under conditions of saturation, flooding, or ponding long enough to develop anaerobic conditions in the upper part.

**hydrogeomorphic (HGM) classification** – A system of classifying wetlands based on their position in the landscape and the movement of water within the wetland.

**hydrology** – The science dealing with the properties, distribution, and circulation of water.

**hydrophyte** - Any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. The sum total of hydrophytes in an area is known as “hydrophytic vegetation.”

**in-kind compensation** - Compensation for lost wetland habitat with a replacement wetland of the same habitat type.

**inundation** – A condition in which water from any source temporarily or permanently covers a land surface.

**invasive plant species** - Plant species that become established easily in disturbed conditions, reproduce readily, and often establish monocultures. Most invasive plants are non-native species; they were introduced to the Northwest intentionally or unintentionally by humans. Examples of common invasive species in the Pacific Northwest are Scot’s broom, Canada thistle, hedge bindweed, English ivy, reed canarygrass, and purple loosestrife.

**lacustrine** - In the USFWS classification system (Cowardin et al., 1979), lacustrine refers to a freshwater area that has all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) has less than 30% coverage of trees, shrubs, persistent emergent plants, mosses, or lichens; and (3) total area exceeds 20 acres. For areas less than 20 acres, an area is considered lacustrine if it has an active wave-formed or bedrock shoreline or is deeper than 6.6 feet in the deepest part. “Freshwater” means less than 0.5 parts per thousand ocean-derived salts.

**mitigation** – Defined in WAC 197-11-766 as:

- (1) Avoiding the impact altogether by not taking a certain action or parts of an action;
- (2) Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;
- (3) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

- (4) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;
- (5) Compensating for the impact by replacing, enhancing or providing substitute resources or environments: and/or
- (6) Monitoring the impact and taking appropriate corrective measures.

**mottles** - Spots or blotches of different color or shades of color interspersed within the dominant color in a soil layer. This usually results from periodic anaerobic conditions in the soil.

**100-year floodplain** - The flood with a 100-year recurrence interval; those areas identified as Zones A, A1-30, AE, AH, AO, A99, V, V1-30, and VE on most current Federal Emergency Management Agency (FEMA) Flood Rate Insurance Maps, or areas identified as 100-year floodplain on applicable local Flood Management Program maps.

**ordinary high-water mark** - The line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; changes in the character of soil or vegetation; topographic shelves; or the presence of a line of litter or debris.

**out-of-kind compensation** - Compensation for lost wetland habitat with a replacement wetland of a different habitat type.

**palustrine** - In the USFWS classification system (Cowardin et al., 1979), palustrine refers to freshwater areas dominated by trees, shrubs, persistent emergent plants, mosses, or lichens. They can be non-tidal or tidal. Palustrine also includes wetlands lacking this vegetation but with the following characteristics: (1) area less than 20 acres; (2) no active wave-formed or bedrock shoreline; (3) water depth in the deepest part is less than 6.6 feet at low water. "Freshwater" means having less than 0.5 parts per thousand ocean-derived salts.

**persistent emergents** – Emergent plants that remain standing at least until the beginning of the next growing season.

**reach** - A length of stream channel with uniform characteristics.

**redoximorphic soil characteristics** – Features of the soil such as masses, nodules, or mottles formed through reduction and oxidation of iron and manganese in seasonally saturated soils.

**restoration** - To improve a disturbed or altered wetland by returning wetland parameters that may be missing.

**rhizosphere** - The zone of soil surrounding a plant root in which interactions between the living root and microorganisms occur.

**riverine** - In the USFWS classification system (Cowardin et al., 1979), riverine refers to freshwater areas that are contained within a channel and are not dominated by trees, shrubs, and

persistent emergent plants. Examples include rivers and streams. “Freshwater” means having less than 0.5 parts per thousand ocean-derived salts.

**saturated soil conditions** - A condition in which all easily drained spaces between soil particles in the root zone are temporarily or permanently filled with water.

**scrub-shrub** - In the USFWS classification system (Cowardin et al., 1979), areas dominated by woody vegetation less than 6 meters (20 feet) tall. The species include tree shrubs, young trees, and trees or shrubs that are stunted because of environmental conditions.

**Section 404 permit** - A permit issued by the U.S. Army Corps of Engineers under Section 404 of the federal Clean Water Act that allows an activity (filling) within a wetland. A 404 permit usually requires compensation or mitigation for the wetland impacts.

**soil matrix** - The portion of a given soil that has the dominant color. In most cases, the matrix is the portion of the soil having more than 50% of the same color.

**synonymy** - Different scientific names for the same species.

**waters of the United States** - As defined in 33 CFR Part 328, the term “waters of the United States” means:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
  - i. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
  - ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
  - iii. Which are used or could be used for industrial purpose by industries in interstate commerce;
4. All impoundments of waters otherwise defined as waters of the United States under the definition;
5. Tributaries of waters identified in paragraphs 1-4;
6. The territorial seas;

7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs 1-6.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.

8. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.

**wetlands** - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (Federal Register, 1982, 1986).

**wetland boundary** – The point on the ground at which a shift from wetlands to non-wetlands or aquatic habitat occurs.

**wetland hydrology** - Wetland hydrology is considered to be present when there is permanent or periodic inundation or soil saturation at or near the soil surface for more than 12.5% of the growing season (typically two weeks in lowland Pacific Northwest areas). Areas that are inundated or saturated for between 5% and 12.5% of the growing season in most years may or may not be wetlands. Areas inundated or saturated for less than 5% of the growing season are non-wetlands (Ecology, 1997).

**wetland indicator status (WIS)** - Categories assigned to plant species based upon the estimated probabilities (expressed as a frequency of occurrence) of the species occurring in a wetland or a non-wetland. Wetland indicator status categories include the following:

- Obligate (OBL): species that almost always occur in wetlands under natural conditions (estimated probability >99%).
- Facultative wetland (FACW): species that usually occur in wetlands (estimated probability 67 to 99%), but are occasionally found in non-wetland areas.
- Facultative (FAC): species that are equally likely to occur in wetlands (estimated probability 34 to 66%) or non-wetland areas.
- Facultative upland (FACU): species that usually occur in non-wetland areas (estimated probability 67 to 99%), but are occasionally found in wetlands.
- Upland (UPL): species that almost always occur in non-wetland areas under normal conditions (estimated probability >99%).

A (+) or (-) following the WIS signifies a greater or lesser likelihood, respectively, of the species being found in wetland conditions. Plant species can also be designated “No indicator” or NI,

which includes species for which insufficient information is available to determine status, or which were not evaluated by USFWS in compiling the WIS listings. Plant species that are not listed on the USFWS list of WIS ratings are designated “NL” and are presumed to be upland species.

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