EXHIBIT 15
PAGE 1 OF 18

WETLAND DETERMINATION

NE Woodinville-Duvall Road & 154th Ave. NE, Woodinville, WA 98072

April 2, 2013

Prepared for:

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EXHIBIT 15
PAGE 2 OF 18

EXECUTIVE SUMMARY

The DeDonato Welcome Group is proposing to develop a 14-lot subdivision on three existing parcels at NE Woodinville-Duvall Road and 154th Avenue NE, in the City of Woodinville, Washington. This report is intended to meet the requirements for a critical areas determination (Woodinville Municipal Code, Chapter 21.24).

The study area for this project is approximately 7.11 acres. The majority of the study area is undeveloped mixed forest. There are two abandoned homesites on the western and central parcels accessed from a private driveway (154th Ave. NE). The parcels border NE Woodinville-Duvall Road on the north. Existing homesites occur along the south and west boundaries.

Field investigations were performed on March 30, 2013. No wetlands or streams were observed to occur on the study area or within 100 feet. This report describes the methods used, describes the site characteristics, and provides data on vegetation, soils and hydrology that were used to make the wetland determination.

EXHIBIT 15
PAGE 3 OF 18

CONTENTS

INTRODUCTION 4
Site Location 4

METHODS 4
Office Assessment 4
Wetland Determination 4
Wetland Hydrology 5
Hydric Soil 6
Hydrophytic Vegetation 6
Streams and Habitat Conservation Areas 6

RESULTS 6
Site Description 6
Climate and Water 7
Soil Types 8
Vegetation 8
Wetland Inventories 8
Wetlands Determination 8
Drainage Features 9
Priority Habitats and Species 9

REFERENCES 10

TABLE
1 Summary of Normal and Recorded Precipitation

FIGURE
1 Study Area with Sample Plot Locations

APPENDIX
A Sample Plot Data Forms

INTRODUCTION

The DeDonato Welcome Group is proposing to develop a 14-lot subdivision on three existing parcels at NE Woodinville-Duvall Road and 154th Avenue NE, in the City of Woodinville, Washington. This report is intended to meet the requirements for a critical areas determination (Woodinville Municipal Code, Chapter 21.24). A wetland determination was conducted at the study area on March 30, 2013. This wetland determination is subject to agency verification and approval.

Site Location

The west parcel (#3244500135) is located at 15215 NE Woodinville-Duvall Road. The central parcel (#1126059156) is located at 18331 154th Avenue NE. The east parcel (#1126059152) does not have a street address. The study area is in the NW ¼ of Section 11, and the SW ¼ of Section 2, Township 26 North, Range 5 East.

METHODS

Office Assessment

The following documents were reviewed to aid identification and determination of wetlands in the project vicinity:

- National Wetlands Inventory Map (USFWS 2013)
- U.S. Geological Service (USGS)
- National Wetland Plant List (Lichvar and Kartesz 2009)
- Washington State Wetland Plant List (Lichvar 2012)
- Soil Survey of King County Area, Washington (NRCS 2013)
- Washington Department of Fish and Wildlife interactive mapper
- Aerial photographs publicly available via the internet

Wetland Determination

A wetland determination was made on-site by qualified wetland biologist following the standard protocol outlined in the following manuals:

U.S. Army Corps of Engineers (USACE) *Wetlands Delineation Manual* (USACE 1987)
USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region, Version 2.0 (hereafter referred to as the "2010 *Regional Supplement*"); (USACE 2010)

The 2010 *Regional Supplement* provides technical guidance and procedures specific to the non-arid west. To maintain consistency between the state and federal delineations of wetlands, the

EXHIBIT 15
PAGE 5 OF 18

Washington State Department of Ecology (Ecology) has repealed WAC 173-22-080 (the state delineation manual), and replaced it with a revision of WAC 173-22-035 that states delineations should be completed according to the currently approved federal manual and supplements (the 2010 *Regional Supplement*). The changes were effective March 14, 2011.

For regulatory purposes, wetlands are distinguished from uplands using hydrology, soil, and vegetative characteristics, or "indicators" as the manuals refer to them. A wetland requires "inundation or soil saturation long enough during the growing season to create an anaerobic condition sufficient to alter chemical and biological activity in the soil, soil microbes, and rooted vegetation" (USACE 1987). This anaerobic condition manifests itself via characteristics, or indicators, present in the soil profile and adaptations in the vegetative community.

The growing season is technically defined as the period when soil temperatures 12 inches below the ground surface (bgs) are greater than 5°C (41°F), according to the 2010 *Regional Supplement*. The 2010 *Regional Supplement* and the Ecology manual also state that the determination of growing season should take into account careful observations of evidence that active plant growth is occurring. This evidence can include new or recent growth such as flowers, new shoots, new leaves, or swollen buds on plants. In the absence of active plant growth observations, the length of the growing season may be approximated by the beginning and ending dates of 28° F temperatures with 50 percent probability as estimated by the Natural Resource Conservation Service (NRCS). The estimated growing season for the study area occurs from **March 13 to November 15** (a total of 248 days) using NRCS WETS data for Monroe, Washington (NRCS 2002). The study area investigations occurred during the growing season.

Two recorded sample plots and numerous unrecorded check plots were used to investigate the study area (**Appendix A**). The sample plots are located in places that adequately represent the variation in vegetation, soils, and hydrologic regimes within the site. The presence or absence of hydrophytic vegetation, hydric soil, and wetland hydrology indicators were documented for each sample plot to justify the delineated wetland boundaries.

Wetland Hydrology

To determine whether a vegetation community meets the wetland hydrology criterion, an area is examined for inundation, soil saturation, shallow groundwater tables, or other dry-season hydrology indicators defined in the 2010 *Regional Supplement*. An area in which soils are inundated or saturated within 12 inches of the soil surface continuously for at least 5 to 12.5 percent of the growing season meets the criterion for wetland hydrology per the 1987 Wetland Delineation Manual and Ecology's manual. The requirement per the 2010 *Regional Supplement* is 14 days of continuous saturation or inundation.

Seasonal changes in water levels and the effect of recent precipitation events must be considered when evaluating an area's hydrology, particularly outside of the growing season or during the dry summer months. Wetland hydrology can be determined during the summer months by documenting the presence of one primary indicator (such as watermarks on vegetation, drift

EXHIBIT 15
PAGE 6 OF 18

deposits, sediment deposits, surface-scoured areas, algal mats, and oxidized root channels) or two secondary indicators (such as water-stained leaves, drainage patterns, geomorphic position, shallow aquitard, or FAC-Neutral Test).

Hydric Soil

Soil pits were dug at sample plot centers to 20 or more inches bgs. Soil color and other characteristics were used to distinguish hydric versus non-hydric soils. The Munsell Soil Color Chart (X-Rite 2009), the *Soil Survey of King County Area Washington* (NRCS 2013), the 2010 *Regional Supplement*, and the *Field Indicators of Hydric Soils in the United States*, version 7.0 (NRCS 2010) aided in the determinations.

Hydrophytic Vegetation

Sample plot centers were situated so that the plots best represented the vegetation present within the wetland or upland near the plot location. Plant species and their percent cover were recorded for each vegetative stratum generally using a 30-foot radius for trees, a 15-foot radius for shrubs, and a 5foot radius for herbaceous plants and woody vines. Each species' wetland indicator status was recorded based on its listing in the Washington 2012 Final State Wetland Plant List (Lichvar 2012). The plot's hydrophytic vegetation status was calculated per the delineation manual methods to determine whether a sample plot met the wetland vegetation criteria.

Streams and Habitat Conservation Areas

The City of Woodinville maintains jurisdiction over natural streams and established fish and wildlife conservation areas, per their Development Standards - Critical Areas (21.24.370, 21.24.410). Habitat conservation areas are those areas identified as being of critical importance to the maintenance of certain fish, wildlife, and/or plant species. These areas are typically identified either by known point locations of specific species or by habitat area or both. Habitat conservation areas include streams regulated as shorelines of the state (WAC 173-18-310) or other fish-bearing streams that have significant use by anadromous fish species. Streams and habitat conservation areas require buffers from their edges.

RESULTS

Site Description

The study area is approximately 7.11 acres in size. The majority of the study area is undeveloped mixed forest. There is an existing house and driveway in the northeast corner of the central parcel, and a driveway, house and garage on the west parcel. These are accessed from a private drive (154th Ave. NE). Both homes are abandoned. The parcels border NE Woodinville-

EXHIBIT 15
PAGE 7 OF 18

Duvall Road on the north. Existing homesites occur along the south and west boundaries.

The study area occurs on a dissected glacial moraine with slopes to the north and northeast at a gradient of 2 to 15 percent. Elevations range from approximately 505 feet at the top of the central parcel to 440 feet at the bottom of the east parcel, adjacent to NE Woodinville-Duvall Road.

Climate and Water

Climatic conditions for this portion of King County are characterized by 49 inches of average annual rainfall, 40°F average winter air temperature, 63°F average summer air temperature, and typically about 193 frost-free days per year (NRCS 2002). As with most of western Washington, the highest monthly precipitation occurs between October 1 and March 31, with April through September rainfall accounting for only about 30 percent of annual precipitation.

Table 2 provides antecedent rainfall recorded near the study area for the 3 months prior to the field investigations, as well as monthly averages and normal rainfall (30 and 70 percentiles). Monthly rainfall was normal for January, significantly below normal for February, and slightly below normal for March. Rainfall for the current water year (beginning October 1), however, was well within normal.

Table 2. Summary of Normal and Recorded Precipitation (inches)

Category[1]	January	February	March	Total Water Year to Date[2]
Recorded Precipitation	4.62	1.63	3.12	29.68
Precipitation Average	6.14	4.59	5.09	33.37
Monthly Normal				
30% Chance Less Than	4.35	3.42	3.99	24.45
30% Chance More Than	7.28	5.37	5.87	39.17

[1]Data is for Monroe, WA (approximately 8 miles north of the study area).
[2]October 1, 2012 to March 31, 2013

No saturation or free water was observed within 20 inches of the soil surface on the study area. Although hydrologic conditions are slightly drier than normal, the site investigation occurred close to when water tables would be expected to be at their highest at the beginning of the growing season. The lack of saturation within 20 inches, especially at water-receiving locations on the landscape, is strong evidence that wetland hydrology is not present in the study area.

Soil Types

According to the *Soil Survey of the King County Area Washington* (NRCS 2013), one soil map unit is mapped for the study area—(AgC) Alderwood gravelly sandy loam, 6 to 15 percent slopes. Alderwood is not a listed hydric soil. However, hydric soil inclusions may make up approximately 5 percent of a map unit.

Alderwod gravelly sandy loam consists of deep, moderately well drained soils formed in basal till with a mantle of volcanic ash. They occur on glacial moraines and till plains. Typically they have an ash-influenced gravelly sandy loam surface layer that is 12 inches thick. The subsoil is very gravelly sandy loam. The substratum begins at 24 to 40 inches below the surface and is typically dense and/or cemented very gravelly sandy loam. Permeability of this layer is very low to moderately low. Water perches on this layer during the wet season, creating a seasonal high water table that is 18 to 37 inches below the surface.

The soils in the study area appeared to be similar to the Alderwood series. It is expected that any water restrictive layer is deep in the soil profile, based on the lack of saturation within 20 inches, as well as the lack of any redoximorphic features indicating a fluctuating water table.

Vegetation

Dominant tree species in the forested uplands include Douglas fir (*Pseudotsuga menziesii*) (12 to 30" DBH), big leaf maple (*Acer macrophylum*) (18 to 30" DBH), and western redcedar (*Thuja plicata*). Common shrubs include Indian plum (*Oemleria cerasiformis*), Oregon grape (*Mahonia nervosa*), salmonberry (*Rubus spectabilis*), trailing blackberry (*Rubus ursinus*), red huckleberry (*Vaccinium parvifolium*), red elderberry (*Sambucus racemosa*), and salal (*Gaultheria shallon*). Herbaceous species in the understory include sword fern (*Polystichum munitum*), stinging nettle (*Urtica dioica*), and bleeding heart (*Dicentra Formosa*).

None of the vegetative communities on the study area meet the criteria for hydrophytic vegetation.

Wetland Inventories

No wetlands are identified onsite or within 200 feet on either the National Wetland Inventory or the King County wetland inventory.

Wetland Determination

Sample plots and check plots were observed in water-receiving locations on the landscape, such as toe slope positions and depressions. Data forms are provided in **Appendix A**. Sample plot locations are indicated on **Figure 1**. Based on the lack of wetland hydrology, hydric soils, and hydrophytic vegetation in these areas, no wetlands were determined to be present on the study area.

EXHIBIT 15
PAGE 9 OF 18

Drainage Features

The USGS topographic map and the King County GIS do not indicate any streams occurring in the study area. This was confirmed during the site visit. The only drainage feature onsite is a discontinuous swale along the east property boundary. An 8" pipe outfall is located near the head of the swale near the south property boundary. Water from this pipe has scoured a shallow 1' wide channel through the steeper section of the swale. The channel disappears approximately 200' downslope where the slope becomes less steep. Runoff at this point likely infiltrates into the highly permeable sandy soils. There is no culverted flow across NE Woodinville-Duvall Road. This drainage feature is likely the result of concentrated runoff from the home and yard just upslope of the pipe. It is not considered a natural stream.

Priority Habitat and Species

Based on a review of existing documentation from the Washington Department of Fish and Wildlife interactive mapper program, no federal or state listed threatened or endangered animal species are known to occur on the study area. A comprehensive wildlife survey has not been conducted.

EXHIBIT 15
PAGE 10 OF 18

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EXHIBIT 15
PAGE 11 OF 18

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EXHIBIT 15
PAGE 12 OF 18

FIGURE 1

STUDY AREA WITH SAMPLE PLOT LOCATIONS

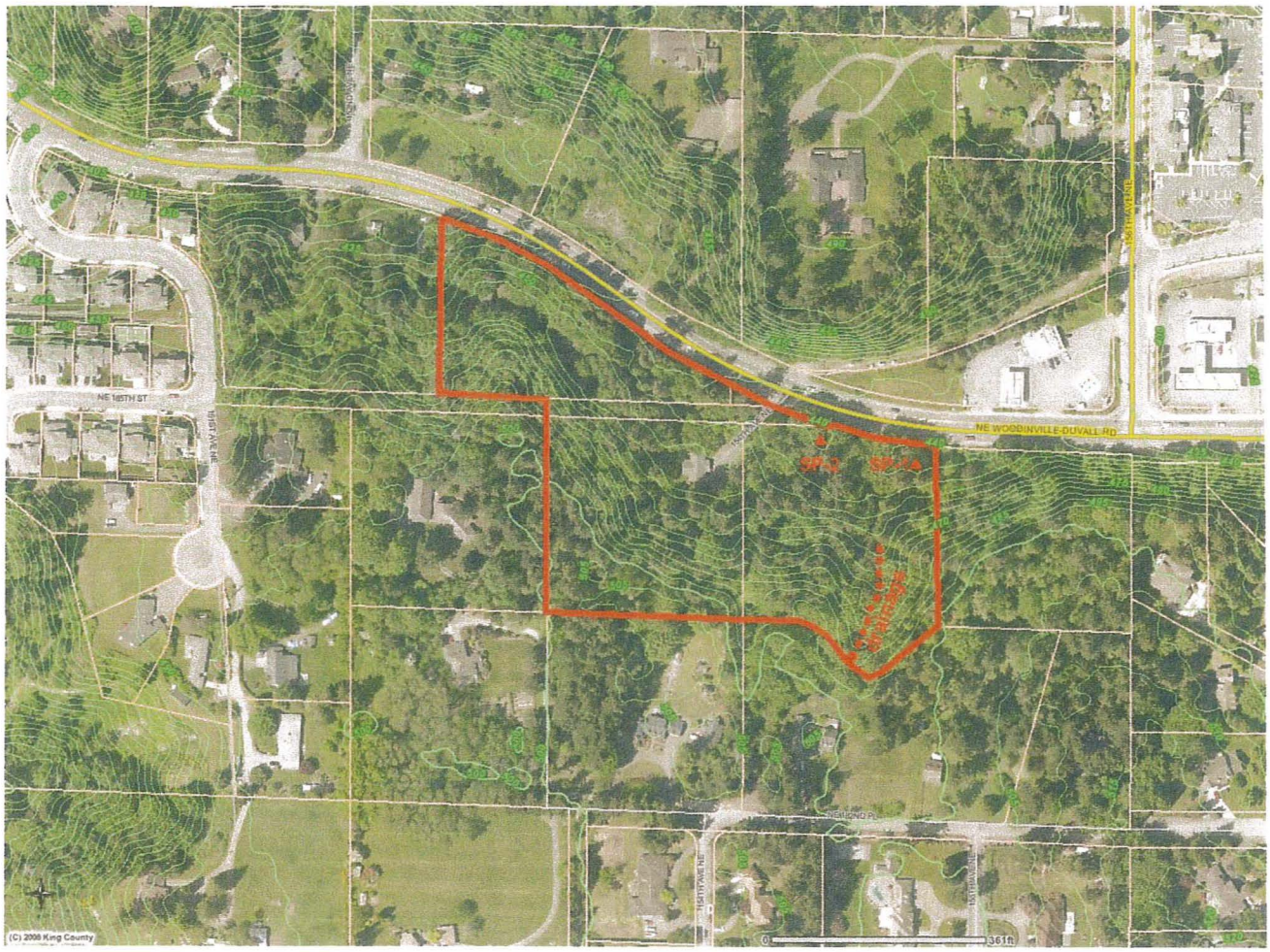

EXHIBIT 15
PAGE 13 OF 18

EXHIBIT 15
PAGE 14 OF 18

APPENDIX A

SAMPLE PLOT DATA FORMS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

EXHIBIT 15
PAGE 15 OF 18

Project/Site: NE Woodinville - Duvall Rd City/County: Woodinville Sampling Date: 5-30-13
Applicant/Owner: Tom DeDonato State: WA Sampling Point: SP
Investigator(s): Hamidi Section, Township, Range: S. 2, T. 26N, R. 5E
Landform (hillslope, terrace, etc.): depression/toe slope Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): A Lat: Long: Datum:
Soil Map Unit Name: Alderwood gravelly sandy loam, 6-15% slopes NWI classification: upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: NE Property corner approx 10' from Road embankment
Photos 577 to 585

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer macrophyllum	35	✓	FACU
2. Pseudotsuga menziesii	40	✓	FACU
3.			
4.			
	75 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15')			
1. Rubus spectabilis	30	✓	FAC
2. Vaccinium parvifolium	4		FACU
3. Oemleria cerasiformis	15	✓	FACU
4. Mahonia nervosa	3		FACU
5.			
	52 = Total Cover		

Herb Stratum (Plot size: 5')			
1. Dicentra formosa	3		FACU
2. Polystichum munitum	5	✓	FACU
3. Urtica dioica	8	✓	FAC
4. Herb robert	3		
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	19 = Total Cover		

Woody Vine Stratum (Plot size: 15')			
1. Rubus ursinus	3	✓	FACU
2.			
	3 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 17 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	38	x 3 = 114
FACU species	108	x 4 = 432
UPL species		x 5 =
Column Totals:	146 (A)	546 (B)

Prevalence Index = B/A = 3.74

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:
D. fir ~ 16" DBH
BL maple ~ 18" DBH

SOIL

Sampling Point: SP-2

EXHIBIT 15
PAGE 16 OF 18

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3							Litter Layer	
0-6	10YR 3/2	100	—	—	—	—	Sandy loam	10% gravels
6-17	10YR 4/4	100	—	—	—	—	Sandy loam	15% gravels
17-20	10YR 4/4	100	—	—	—	—	Sandy loam	25% gravels

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks: no redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: no saturation w/in 20"

EXHIBIT 15
PAGE 17 OF 18

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: NE Woodinville-Duvall Rd City/County: Woodinville Sampling Date: 5-30-13
Applicant/Owner: Tom DeDonato State: WA Sampling Point: SP-2
Investigator(s): Hamidi Section, Township, Range: S. 2, T. 26N, R. 5E
Landform (hillslope, terrace, etc.): Depression/Toe slope Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): A Lat: Long: Datum:
Soil Map Unit Name: Alderwood gravelly sandy loam, 6-15% slopes NWI classification: Upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: East of 154th Ave NE, ~25' from NE Wdnvl - Duvall Rd.
Photos 599-601

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Pseudotsuga Menziesii	50	✓	FACU
2. Acer macrophylum	40	✓	FACU
3. Thuja Plicata	10		FAC
4.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15')			
1. Thuja Plicata	5		FAC
2. Oemleria Cerasiformis	15	✓	FACU
3. Mahonia nervosa	15	✓	FACU
4. Gaultheria Shallon	5		FACU
5. Vaccinium Parvifolium	5		FACU
	45	= Total Cover	

Herb Stratum (Plot size: 5')			
1. Polystichum munitum	10	✓	FACU
2. Polypodium glycyrrhiza	1		FACU
3. Urtica dioica	5	✓	FAC
4. Herb robert	3		
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	19	= Total Cover	

Woody Vine Stratum (Plot size: 15')			
1. Rubus ursinus	8	✓	FACU
2.			
	8	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 17 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species	15	x 3 =	45
FACU species	149	x 4 =	596
UPL species		x 5 =	
Column Totals:	164 (A)		641 (B)

Prevalence Index = B/A = 3.91

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: D. fir ~ 12 to 30" DBH
BL maple ~ 18-30" DBH

SOIL

Sampling Point: SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
3-0							Leaf Litter	
0-6	10YR 3/2	100	—	—	—	—	Sandy loam	
6-20	10YR 4/4	100	—	—	—	—	Sandy loam	10% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

EXHIBIT 15
PAGE 16 OF 18

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks: no redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: no saturation w/in 20"