

Appendix D

Draft Environmental Assessment Memorandum: Downtown Study Area

GeoEngineers



8410 154th Avenue NE
Redmond, Washington 98052
425.861.6000

September 9, 2010

City of Redmond
c/o The Berger Partnership
1721 8th Avenue North
Seattle, Washington 98109

Attention: Dave Knight, Project Manager

Subject: Draft Preliminary Environmental Assessment
BNSF Rail Corridor Master Plan, Downtown Study Area
Redmond, Washington
GeoEngineers File No. 0500-172-00

PURPOSE AND SCOPE

GeoEngineers completed a preliminary environmental assessment study of the Downtown Study Area section of the Burlington Northern-Santa Fe (BNSF) Rail Corridor located in Redmond, Washington. The purpose of the study was to identify known or potential sources of soil or groundwater contamination in connection with the corridor.

Our scope of services included review of available and relevant prior reports, a search of agency databases of known or suspected contaminated sites, a review of agency files for sites of potential concern and a visual reconnaissance of the corridor. The key findings are summarized below. A more detailed summary of the findings, correlated to an aerial photograph of the corridor, are presented in the attached table and map. The deliverable also includes two attachments:

- A. List of Reference Documents, and
- B. July 11, 2006 Ecology Opinion Letter requiring further investigation/remediation for carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in soil on "Site 2" defined as the railroad area near the northwest corner of the intersection of 164th Avenue Northeast and the railroad (site #42 on the attached figure and table).

SUMMARY OF KEY FINDINGS

We have identified five issues of potential environmental concern for soil and groundwater that are common to the length of the corridor through the downtown area:

1. **Treated railroad ties** (creosote or other chemical preservatives) of various ages are present throughout most of the alignment. The level of deterioration of the ties varies.



Metals, carcinogenic PAHs and/or petroleum hydrocarbons from wood treatment may have impacted surrounding ballast and/or surface soil.

2. **Fill of unknown origin** is present throughout most of the corridor. The fill may include soil with contaminants such as metals, PAHs and/or petroleum hydrocarbons, or slag (metals, pH) which is common as railroad ballast in some locations.
3. Historic vegetation management practices are likely to have included application of potentially persistent **herbicides, pesticides or other chemicals** including metals and/or petroleum-related constituents that could have impacted surrounding ballast and/or surface soil.
4. The many years of railroad operations on the corridor pose a risk for prior **leaks, spills or releases of chemicals used in railroad equipment** (fuels, etc) or other hazardous substances in railroad cargo that could have spilled in a railroad incident such as derailment. The risk of impacts from spills or leaks is increased, relative to the rest of the corridor, at the location of the former railroad depot previously located near the intersection of Leary Way and the railroad corridor (site #40 on attached map).
5. Detections of **PCE and related chlorinated solvents in groundwater** at concentrations near to and greater than the MTCA Method A cleanup levels are intermittent but widespread beneath portions of the Downtown Redmond in the vicinity of the alignment suspected to originate from dry cleaner operations in the area.

Limited Phase II ESA soil sampling data along the BNSF railroad corridor obtained in 2008 by Pinnacle for King County was available for review during this study. The soil sample location from this study that was nearest to the Redmond Downtown corridor was analyzed for arsenic, lead, and cPAHs, and field screened (sheen testing only) for petroleum. The petroleum sheen test revealed a slight sheen. Metals were not detected at concentrations greater than MTCA Method A cleanup levels; however, PAHs were detected at a concentration of 0.442 milligrams per kilogram (mg/kg), greater than the MTCA Method A cleanup level of 0.1 mg/kg.

Ecology files document an area of known cPAH-soil contamination on the railroad corridor, near the intersection of 164th Avenue Northeast, where Ecology has indicated further characterization/remediation may be necessary. Carcinogenic PAHs were detected in soil (1.698 mg/kg) at this location in 2005 (see page 2 of attached figure) in connection with a soil cleanup action at the former T&D Feeds site, situated at the southwest corner of Cleveland Street and 164th Avenue Northeast (sites 40 and 42 on the attached figure and table). The July 11, 2006 Ecology Opinion Letter included in Attachment B identifies the cPAH contamination in soil at this location as “Site 2.” We are not aware of any further characterization or remedial action undertaken by the railroad or by King County in connection with “Site 2.”

In addition to the above issues of potential concern, past or current land use activities or documented soil or groundwater contamination at the following parcels located adjacent, or in close proximity, to the corridor pose a moderate risk for potential contaminant migration to the railroad corridor, in our opinion.



Please refer to Table 1 attached for more information:

- Several past or current dry cleaner operations including those at the Redmond Center Shopping Center (15800 NE Redmond Way, site #19 on attached map), Cleveland Square shopping center (16505 NE Redmond Way, sites #50 through 54 on attached map), Value Village strip mall (16771 NE Redmond Way, site #64 on attached map), the strip mall at 17181 NE Redmond Way (site #76 on attached map), and the AGM shopping Center (16651 NE Redmond Way, site #79 on attached map).
- Past or current automotive service centers, gasoline service station or a petroleum bulk plant: Redmond Auto Center service garage (7760 159th Place NE, site #35), IPM Auto Service (7800 Gilman Street, site #41), parking lot formerly with oil storage (16450 NE 77th Street, site #49), and 76 Service Station (16909 NE Redmond Way, site #78).
- The following properties located adjacent to the corridor have a history of prior land use that poses a relative increased risk for contamination potential: lumberyard activities (sites #25, 26 and #27), grain and feed storage (site #29), and farm machinery (site #31). We note that these properties are not included on agency lists of known or suspected contaminated sites.
- There is a potential for historic underground heating oil storage on many properties along the corridor. We note that no adjacent properties with possible heating oil storage are included on agency lists of known or suspected contaminated sites.

We look forward to continuing our work with you on this project. Please contact me at (425) 861 -6000 if you have questions regarding this deliverable.

Sincerely,
GeoEngineers, Inc.

Dana Carlisle for
Jessica Robertson, LG
Geologist



Dana Carlisle, PE 9.9.10
Principal

DLC:JAR:lw
sharepoint\finals\bsnf corridor environmental assessment summary cover letter.docx

- Attachments:
- Table 1 - Environmental Assessment Summary
 - Aerial Photograph Location Map
 - Attachment A - List of Reference Documents
 - Attachment B - Ecology Opinion Letter dated July 11, 2006

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Copyright© 2010 by GeoEngineers, Inc. All rights reserved.

Table 1

Environmental Assessment Summary

City of Redmond BNSF Corridor - Downtown Segment

GeoEngineers File 0500-172-00

Potential for Soil or Groundwater Contamination from Prior Railroad Maintenance and Operation Practices and Area-Wide Contaminants		
A.	Treated railroad ties	Treated railroad ties (creosote or other chemical preservatives) of various ages are present throughout most of the alignment. Level of deterioration of the ties varies. Metals, carcinogenic polycyclic aromatic hydrocarbons (PAHs) and/or petroleum hydrocarbons from wood treatment may have impacted surrounding ballast and/or surface soil. 2008 Phase II ESA soil sampling by Pinnacle of a railroad location near to but not within the subject property area did not identify metals or petroleum concentrations greater than cleanup levels; however, PAHs were detected at a concentration of 0.442 mg/kg, greater than the MTCA Method A cleanup level of 0.1.
B.	Contaminants in imported fill and railroad ballast	Fill of unknown origin is present throughout most of the corridor. The fill may include soil with contaminants such as metals, PAHs and/or petroleum hydrocarbons, or slag (metals, pH) which is common in some locations as railroad ballast. 2008 Phase II ESA soil sampling by Pinnacle of a railroad location near to but not within the subject property area did not identify metals or petroleum concentrations greater than cleanup levels; however, PAHs were detected at a concentration of 0.442 mg/kg, greater than the MTCA Method A cleanup level of 0.1.
C.	Past use of Herbicides, Pesticides or other chemicals for vegetation management	Historic vegetation management practices are likely to have included application of potentially persistent herbicides, pesticides or other chemicals including metals and/or petroleum-related constituents that could have impacted surrounding ballast and/or surface soil. 2008 Phase II ESA soil sampling by Pinnacle in areas near the subject property did not include analysis for pesticides or herbicides other than arsenic and lead. Arsenic and lead were not detected at concentrations above applicable cleanup levels in a sample from a railroad location near to but not within the subject property area.
D.	Leaks, spills or releases associated with railroad equipment	The many years of railroad operations on the corridor pose a risk for prior leaks, spills or releases of chemicals used in railroad equipment (fuels, etc) or other hazardous substances in railroad cargo that could have spilled in a railroad incident such as derailment.
E.	Chlorinated solvents (PCE) in groundwater from various dry cleaner sources in Downtown Area	Detections of PCE and related chlorinated solvents at concentrations near to and greater than the MTCA Method A cleanup levels are intermittent but widespread in groundwater beneath portions of the Downtown Redmond area in the vicinity of the alignment.

Potential for Soil or Groundwater Contamination via migration from sources on adjacent parcels or nearby properties

MAP ID	Property Name Based on Current Use	Tax Parcel Number	Address	Historical Information and/or Potential for Contamination on Parcel in Vicinity of BNSF ROW	Relative Ranking of Potential Concern for Contaminant Migration to the Corridor
Alignment (Subject Property) Parcels					
16	BNSF ROW	225059035	None	See items A through E	
17	BNSF ROW	1125059021	None	See items A through E	
20	BNSF lease area	1125059116	None	See items A through E	
46	BNSF ROW	1225059052	None	See items A through E	
74	BNSF ROW	1225059266	None	See items A through E	
75	BNSF ROW	1225059265	None	See items A through E	
Comprehensive List of Adjacent Properties and Selected Nearby Properties with Contamination Potential					
1	Office Buildings	225059189	8345 154TH AVE NE	Parcels 1 and 2 are both office building. Site was farmland prior to construction of existing office building in 1989.	Low
2		225059027			
3	West Sammamish Trail ROW	225059161	None	Greenbelt area	Low
4	Cascade Plaza Retirement Center	225059157	7950 WILLOWS RD	Parcels 4 through 6 are portions of the existing retirement center. Site was undeveloped prior to construction of existing buildings in 1966 and 1973. Some site buildings may previously have been heated by oil burning heating system.	Low
5		1125059084	7900 WILLOWS RD		Low
6		1125059135	None		Low
7	West Sammamish Trail ROW	1125059060	8099 WILLOWS RD NE	Greenbelt area	Low
8	West Sammamish Trail ROW	1125059142	None	Greenbelt area	Low
9	Westgate Office Building	1125059054	15600 NE REDMOND WAY	Site was undeveloped prior to construction of existing building in 1978.	Low
10	West Sammamish Trail ROW	225059163	158TH AVE NE	Greenbelt area	Low
11	Redmond Riverwalk Office Building	7198900050	8383 158TH AVE NE	Site was undeveloped prior to construction of existing office building in 1982.	Low
12	Vacant	7198900060	158TH AVE NE	Site appears undeveloped in all available resources.	Low

MAP ID	Property Name Based on Current Use	Tax Parcel Number	Address	Historical Information and/or Potential for Contamination on Parcel in Vicinity of BNSF ROW	Relative Ranking of Potential Concern for Contaminant Migration to the Corridor
13	Ben Franklin Crafts retail store	7198900063	15754 NE REDMOND WAY	Existing retail building constructed in 1975. Building may have previously used oil heat.	Low
14	Organic Coffee store	7198900062	15748 REDMOND WAY	Existing retail building constructed in 1975. Building may have previously used oil heat.	Low
15	Yoga Studio	7198900061	15742 NE REDMOND WAY	Existing retail building constructed in 1974. Building may have previously used oil heat.	Low
18	Canyons Restaurant	7198900070	15740 NE REDMOND WAY	Existing restaurant building constructed in 2003. A different restaurant building was previously located on this property from the 1970s.	Low
19	Redmond Center Shopping Center	7198900080	15800 NE REDMOND WAY	Existing shopping center constructed in 1966. Portions of the building may have used oil heat. City directories identify "Redmond One Hour Cleaners" as a shopping center tenant in the 1980s. This dry cleaner is a listed contaminated site and identified on city's database of dry cleaners in the downtown area.	Moderate
21	Pacific Music retail store	1125059111	15935 NE REDMOND WAY	Existing building was constructed in 1978, previously a chiropractic center and health clinic. Based on review of aerial photographs, site may have been a trailer park prior to construction of the existing building.	Low
22	Wendy's Restaurant	1125059106	15945 REDMOND WAY	Existing building has been fast food restaurant since construction in 1977. Based on review of aerial photographs, site may have been a trailer park prior to construction of the existing building.	Low
23	Red160 Apartments	1125059040	16015 CLEVELAND ST	Existing apartment building under construction. Previous building at this location was a restaurant.	Low
24	Red160 Apartments	7792400065	None	Existing apartment building under construction. Previous building at this location was a plumbing supply sales warehouse.	Low
25	ROW	7792400035	None	Existing roadway here established in 2000s with construction of adjacent condominium building. Property was formerly storage and parking area associated with adjacent lumberyard.	Low to Moderate
26	Condominiums	1624000000	16141 CLEVELAND ST	Existing condominium building constructed in 2006. Lumber yard previously located at this property from at least 1928.	Low
27	Vacant property	7792400005	16241 CLEVELAND ST	Former lumber yard, flooring warehouses and auto glass, recently demolished. Relative risk raised because details of industrial property use at this site are unknown.	Moderate
28	Redmond Western Wear retail store	7198800035	7829 LEARY WAY NE	Site has been primarily retail use since development in 1910.	Low
29	Half Price Books retail store	7198800045	7805 LEARY WAY NE	Building was used by Redmond Trading for several decades following construction in 1910. Redmond Trading used the property as a general store and grain and feed warehouse. Kustom Kraft boats also used the property.	Moderate

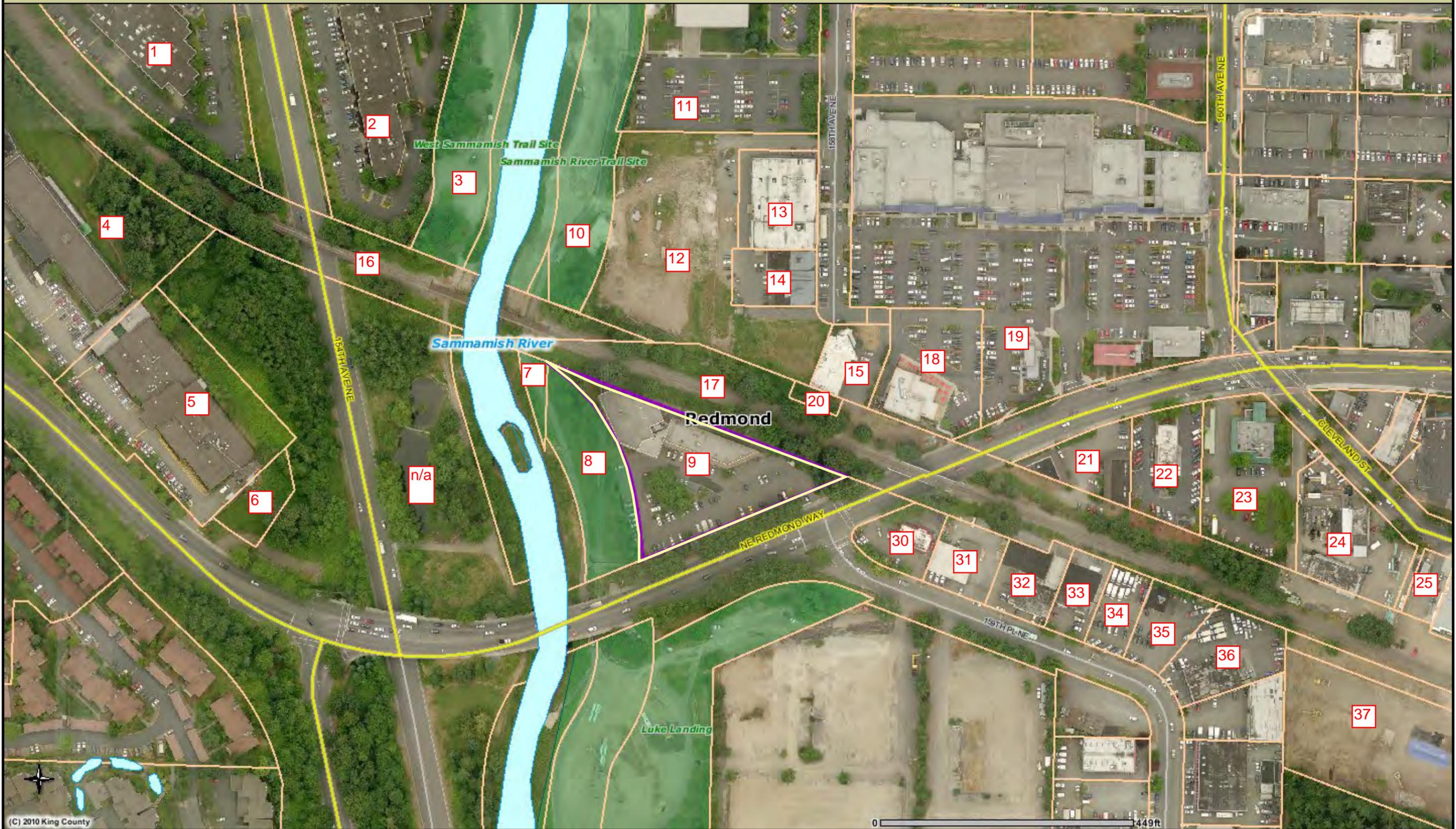
MAP ID	Property Name Based on Current Use	Tax Parcel Number	Address	Historical Information and/or Potential for Contamination on Parcel in Vicinity of BNSF ROW	Relative Ranking of Potential Concern for Contaminant Migration to the Corridor
30	KFC restaurant	9270700005	7870 159TH PL NE	Existing building has been used for fast food restaurant since construction in 1971.	Low
31	Redmond Signs	9270700010	7848 159TH PL NE	Existing building is currently used by sign painting company. Past tenants include farm machinery sales. Building was constructed in 1958 and may have used an oil-burning heating system.	Moderate
32	Floor Craft retail store	9270700020	7842 159TH PL NE	Existing building has been used for retail flooring sales and installation since construction in 1960.	Low
33	Frey Reed office building	9270700025	7840 159TH PL NE	Existing building has been used as an office building by a variety of tenants including building contractor, real estate agents, and lawyers since construction in 1978.	Low
34	Former Budget Rental parking lot	9270700030	159TH PL NE	City of Redmond currently owns this vacant parcel, which has been parking lot since 1970s. GeoEngineers completed a Phase I and II ESA of this parcel in 2007. Auto parts were formerly stored in the northeast corner of the site. PCE was detected at concentration below MTCA cleanup level in a groundwater sample from a monitoring well in the southeast corner of the property.	Low
35	Redmond Auto Center service garage	9270700035	7760 159TH PL NE	Redmond Auto Center site has contained an auto repair garage since construction in 1973. Site buildings likely use(d) an oil burning heating system. Details regarding the operation and site features is unknown.	Moderate
36	Bear Creek Parkway Extension - formerly Budget Rental property	9270700040	7740 159th Place NE	City of Redmond currently owns this vacant parcel, which is now part of Bear Creek Parkway. A building was constructed on this parcel in the 1960s, used first by a plumbing and heating company and later Budget Rental and AAA Radiators. GeoEngineers completed a Phase I and II ESA of this parcel in 2007. PCE was detected at concentration below MTCA cleanup level in a groundwater sample from a monitoring well in the southeast corner of the property, however, no contaminants of concern were encountered during recent roadway construction. Site is now an extension of Bear Creek Parkway.	Low
37	Bear Creek Parkway Extension - City of Redmond Former Shops site	1125059026	None	Site was formerly county road department maintenance facility. Site structures were demolished and cleanup action was recently completed at the site. Ecology granted NFA for the site in 2009. Site is now an extension of Bear Creek Parkway.	Low
38	Bill Brown Saloon Building	7198800025	7824 LEARY WAY NE	Site use has primarily been restaurants and retail since construction in 1913.	Low
39	Parking lot	7198800026	None	Site previously contained a retail building but has been a parking lot since the 1960s.	Low

MAP ID	Property Name Based on Current Use	Tax Parcel Number	Address	Historical Information and/or Potential for Contamination on Parcel in Vicinity of BNSF ROW	Relative Ranking of Potential Concern for Contaminant Migration to the Corridor
40	Vacant property (Former railroad depot)	1125059146	None	Former passenger railroad depot constructed before 1908. Depot building was demolished in 1972. Considered Moderate potential for contaminants based on many years of railroad equipment loading/unloading, and because site was also part of T&D feeds (site 42) cleanup area, see more detail below.	Moderate
41	IPM Auto Service and pawn shop	7198800016	7800 GILMAN ST	Site has contained an auto repair garage for several decades. Site buildings likely use(d) an oil burning heating system. Details regarding the operation and site features is unknown and the site is not listed on agency lists of known or suspect contaminated sites.	Moderate
42	Vacant property (Former T&D Feeds)	7198800005	None	Feed mill and warehouse structures (T&D Feeds) operated from this property between 1930s and 2000; structures were demolished in 2001. A remedial action was conducted on the property and resulted in a No Further Action determination from Ecology in 2006. NFA documentation includes the designation of the adjacent railroad as a listed Site with cPAHs in soil that has not been cleaned up ("Site 2" in the July 11, 2006 Ecology letter included in this submittal). Ecology's 2006 letter indicates that further remedial action is necessary to characterize and address soil contamination on the railroad property. Carcinogenic PAHs in Sample EX-S-25-3 obtained October 20, 2005 near the northwest corner where 164th Ave NE intersects the railroad corridor were 1.698 mg/kg (see attached figure).	High
43	Hobby Town retail store	1225059057	164TH AVE NE	Retail and restaurant strip mall constructed in 1984.	Low
44	Cleveland Square shopping center	1225059055	16425 CLEVELAND ST	Retail and restaurant strip mall constructed in 1984.	Low
45	Parking lot	1225059264	None	Based on review of aerial photographs and Kroll maps, this parking lot was formerly a roadway that connected 164th Ave NE with NE 77th Street, prior to the construction of the existing NE 77th Street connection to Cleveland Street in the 1980s.	Low
47	Former Unocal Bulk Plant	1225059077	None	Parcels 47 and 48 were formerly a Unocal bulk fuel facility and currently represent a portion of 166th Avenue NE and a medical/dental office building constructed in 1978. Parcel 47 formerly contained the bulk plant petroleum aboveground storage tanks (ASTs); Parcel 48 formerly contained the bulk plant warehouses and loading dock. Petroleum-contaminated soil associated with the former bulk plant was excavated and removed in 1990. Petroleum-related constituents have not been detected in site monitoring wells since at least 2004. A No Further Action letter for the former bulk plant site was issued by Ecology in 2005.	Low
48		1225059082	16701 CLEVELAND ST		

MAP ID	Property Name Based on Current Use	Tax Parcel Number	Address	Historical Information and/or Potential for Contamination on Parcel in Vicinity of BNSF ROW	Relative Ranking of Potential Concern for Contaminant Migration to the Corridor
49	Parking lot	1225059031	16450 NE 77TH ST	Site currently undeveloped. A small structure identified as "Redmond Oil Co. oil tanks" is identified on Kroll maps from the 1960s, prior to construction of NE 77th Street through the center of the parcel. Location of oil tanks unknown.	Moderate
50	Cleveland Square Shopping Center	1225059157	16505 NE REDMOND WAY	Parcels 50 through 54 are collectively a retail and restaurant strip mall constructed in 1984. Shopping center tenants have included a wide variety of retail shops and restaurants, as well as at least one dry cleaner, according to City database information. Previous buildings on these properties included a real estate office, auto sales and repair, and houses.	Moderate
51		1225059156			
52		1225059090			
53		1225059221			
54		1225059075			
55	Office Building	1225059119	16615 NE REDMOND WAY	Building has been used for office and commercial purposes since construction in 1979.	Low
56	Court Building	1225059024	16625 NE REDMOND WAY	Building has been used for office purposes by a variety of tenants since construction in 1968.	Low
57	Bear Creek Parkway extension - formerly Workshop Tavern	1225059073	None	Previous tavern/restaurant building on this property was constructed in 1982. The property is currently owned by City of Redmond. Previous building was recently demolished and the property is now a portion of Bear Creek Parkway.	Low
58	Hotel Redmond historic property	7202410210	None	Existing building is a historic structure built in 1900 that has been used primarily as a social club and hotel.	Low
59	Residence Inn Hotel	7202410060	7575 164TH AVE NE	Site was undeveloped former golf course prior to construction of existing hotel building in mid-1990s.	Low
60	Redmond Town Center shopping center	7202410010	None	Site was undeveloped former golf course prior to construction of existing shopping center in mid-1990s.	Low
61	REI retail store	7202410110	16635 NE 76TH ST	Site was undeveloped former golf course prior to construction of existing building in 1998.	Low
62	Furniture store	1225059179	16715 CLEVELAND ST	A house was located on this property in the 1960s and 1970s, prior to construction of the existing building in 1989.	Low
63	Norsk Design Build	1225059019	16725 CLEVELAND ST	Site was undeveloped prior to construction of existing building in 1978. Site was previously used as a veterinary clinic.	Low

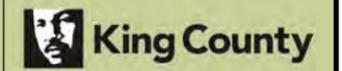
MAP ID	Property Name Based on Current Use	Tax Parcel Number	Address	Historical Information and/or Potential for Contamination on Parcel in Vicinity of BNSF ROW	Relative Ranking of Potential Concern for Contaminant Migration to the Corridor
64	Value Village retail store	1225059094	16771 REDMOND WAY	Site was undeveloped prior to construction of existing retail building in 1961, however, may have used an oil burning heating system based on King County iMAP information. According to city directories, a potential dry cleaner "Cleanbee Cleaners & Laundrymat" was formerly a tenant in this building at street number 16759.	Moderate
65	Shopping Center	1225059201	16851 NE REDMOND WAY	Site was undeveloped prior to construction of existing retail building in 1984.	Low
66	McDonald's Restaurant	1225059206	16975 REDMOND WAY	Site was undeveloped prior to construction of existing restaurant building in 1978.	Low
67	Starbucks Coffee retail	1225059222	7625 170TH AVE NE	Site was previously a courthouse prior to construction of existing retail building in 2002	Low
68	Bank of America	1225059240	7450 170TH AVE NE	Site was undeveloped prior to construction of existing bank building in 1980.	Low
69	Parking lot	7202410132	None	Site use has been limited to parking associated with adjacent shopping areas since development.	Low
70	Bed Bath & Beyond retail store	7202410163	7215 170TH AVE SE	Site was undeveloped prior to construction of existing retail building in 1998.	Low
71	Parking lot	7202410160	None	Site use has been limited to parking associated with adjacent shopping areas since development.	Low
72	Red Robin restaurant	7202410161	7597 170TH AVE NE	Site was undeveloped prior to construction of existing restaurant in 1999.	Low
73	Bartell's Drug store	1225059231	7370 170TH AVE NE	Site was undeveloped prior to construction of existing retail building in 1976.	Low
76	Strip mall shopping center	1225059253	17181 NE REDMOND WAY	Current tenants include Creekside Crossing Cleaners dry cleaner. Shopping center was constructed in 1996 and was previously undeveloped.	Moderate
77	Vacant undeveloped	7202410180	None	Undeveloped and forested green space	Low

MAP ID	Property Name Based on Current Use	Tax Parcel Number	Address	Historical Information and/or Potential for Contamination on Parcel in Vicinity of BNSF ROW	Relative Ranking of Potential Concern for Contaminant Migration to the Corridor
78	76 Service Station (aka Spears Automotive)	1225059205	16909 NE REDMOND WAY	<p>Gasoline service stations have been located on this property since 1962. The existing facility was constructed in 1993. Site was formerly a Unocal station and is included on Ecology's leaking underground storage tank (LUST) and independent cleanup report (ICR) lists. Environmental cleanup activities were completed at the site in the early 1990s following removal of previous generations of USTs and service station features. At that time, all petroleum-contaminated soil was excavated and removed from the site. Petroleum-related constituents include BETX were not detected in groundwater samples from site monitoring wells in 1994 and 1995. This site is listed as "cleaned up" in Ecology's database; however, based on continued use of the site as a service station, potential for migratory contamination to the BNSF ROW area remains a possibility.</p>	Moderate
79	AGM shopping center	1225059155	16651 NE REDMOND WAY	<p>This strip mall was constructed in 1965. According to city directories, a dry cleaner was a tenant in the early 1980s (street number 16671) "Tip Top Cleaners".</p>	Moderate



(C) 2010 King County

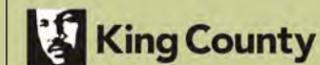
The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a survey product. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.





(C) 2010 King County

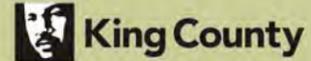
The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a survey product. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.





(C) 2010 King County

The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a survey product. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.



ATTACHMENT A
List of Reference Documents

REFERENCES

City of Redmond BNSF Corridor – Downtown Segment List of Environmental Site Assessment Reference Documents

Aerial photographs in GeoEngineers files dated 1965, 1977, 1985, and 1990.

CDM, 2002. Phase I Environmental Site Assessment, Proposed Rails to Trails Project, NE 90th Street to Bear Creek, Redmond, Washington dated September 13, 2002.

CDM, 2007. Draft Screening Level Environmental Review, Eastside Rail Corridor Preservation Project, King and Snohomish Counties, Washington, dated December 4, 2007.

City of Redmond, 2010. Promotional video regarding BNSF corridor through downtown Redmond.
<http://rctv.redmond.gov/ondemand/BNSFygovday.wmv>.

City of Redmond, 2009a. Figure of Tetrachloroethylene Concentrations, prepared by Natural Resources Division of Public Works Department, City of Redmond, dated June 16, 2009.

City of Redmond, 2009b. Figure of Dry Cleaners, Past and Present, prepared by Natural Resources Division of Public Works Department, City of Redmond, dated July 10, 2009.

Ecology, 2006a. VCP Opinion Letter to Mr. Lowell DeYoung regarding T&D Feeds at 16355 Cleveland Street “Under WAC 173-340-515(5) Opinion on Proposed Cleanup Action for Site 1/Opinion on Completed Remedial Action for Site 2/Opinion on Proposed Cleanup Action for Site 3 for the Hazardous Waste Sites associated with” the T&D Feeds site.

Ecology. 2006b. VCP Opinion Letter to GeoEngineers regarding T&D Feeds at 16355 Cleveland Street “No Further Action Determination Under WAC 173-340-515(5) for Site 3” associated with the T&D Feeds site.

Ecology 2009a. VCP Opinion Letter to City of Redmond “No Further Action Determination, Leary Way Shops Site Buildings 1 through 9, 7733 Leary Way NE,” May 22, 2009.

Ecology 2009. VCP Opinion Letter to City of Redmond “No Further Action Determination, Leary Way Shops Site Building 10, 7733 Leary Way NE” July 16, 2009.

EMCON, 1994. Remedial Action Report, Former Unocal Service Station 4870, 16909 NE Redmond Way, Redmond, Washington dated August 26, 1994.

EMCON, 1996. Independent Remedial Action Report, Former Unocal Service Station 4870, 16909 NE Redmond Way, Redmond, Washington dated June 22, 1996.

EMCON, 1997. Evaluation of Risk Using Ecology’s Interim TPH Policy, Former Unocal Service Station 4870, dated September 30, 1997.

Environmental Data Resources, Inc (EDR). 2010. EDR Radius Map report dated June 14, 2010 (comprehensive environmental database report, including Ecology and EPA databases).

GeoEngineers, 2006a. Supplemental Site Characterization and Remedial Action Summary, Former T&D Feeds, 16355 Cleveland Street, VCP No. NW1107, Redmond, Washington for Lowell De Young dated April 27, 2006.

GeoEngineers, 2006b. Groundwater Monitoring Report, Quarterly Monitoring, 2006, Former T & D Feeds Site, 16355 Cleveland Street, Redmond Washington for Lowell De Young dated November 20, 2006.

GeoEngineers, 2007a. Phase I and II Environmental Assessment, Arend Properties, Budget Rental 7740 159th Place NE and Parking lot on 159th Place NE, Redmond, Washington for City of Redmond dated August 17, 2007.

GeoEngineers, 2007b. September 2007 Supplemental Phase II ESA, Budget Rental Site, Shop Area, 7740 159th Place NE, Redmond, Washington, for City of Redmond dated November 9, 2007.

GeoEngineers, 2007c. Phase I and II ESA, Redmond Shopping Square, 16119 NE Redmond Way, Redmond, Washington, for City of Redmond dated October 26, 2007.

GeoEngineers, 2008a. Remedial Action Summary, Leary Way Shop Site, Building 1 through 9, 7733 Leary Way NE, For City Of Redmond, February 4, 2008.

GeoEngineers, 2008b. Final Cleanup Report, Leary Way Shop Site, Building 10, 7733 Leary Way NE, For City Of Redmond, December 16, 2008.

GeoEngineers, 2009. Supplemental Site Assessment, Redmond Shopping Square, Future 161st Avenue Extension between Cleveland Street and Redmond Way, for City of Redmond dated August 17, 2009.

GeoEngineers, 2010a. Draft Geotechnical Services, 161st Ave NE extension, Bear Creek Parkway to Redmond Way, for City of Redmond dated February 22, 2010.

GeoEngineers, 2010b. Winter 2010 Groundwater Monitoring Event, City of Redmond Wellhead Protection Program, for City of Redmond dated March 29, 2010.

LSI Adapt, 2005a. August 2005 Groundwater Quality Monitoring Report, Former Unocal Bulk Plant, 16631 Cleveland Street, Redmond, Washington dated September 13, 2005.

LSI Adapt, 2005b. Request for Determination of No Further Action, Former Unocal Bulk Plant, 16631 Cleveland Street, Redmond Washington dated October 5, 2005.

King County iMAP aerial photographs dated 1936, 1998, 2000, 2002, 2005, and 2007.

Kroll King County Atlas Sammamish Supplement at Puget Sound Regional Archives, dated circa 1950, 1960, and 1980.

Pinnacle Geosciences, 2008. Selected tables and figures from Eastside BNSF Rail Corridor Phase II ESA dated October 2008.

Polk City Directory listings provided by EDR in GeoEngineers files, dated 1978, 1983, and 1996.

Sanborn Fire Insurance maps provided by EDR in GeoEngineers files, dated 1908, 1926, and 1930.

Site Analysts, 1990. Phase II – Soil Remediation, Union Oil Site, 16631 Cleveland Street, Redmond, Washington, dated September 14, 1990.

Site Analysts, 1991. Independent Remedial Action Report, Union Oil Site, 16631 Cleveland Street, Redmond, Washington dated September 14, 1990.

Sound Transit, 2008. Appendix G, Hazardous Materials Sites, East Link Project, Draft EIS dated December 2008,
http://projects.soundtransit.org/Documents/pdf/projects/eastlink/deis/Append_G_Dec2008_G3.pdf.

United States Geological Survey (USGS) topographic maps for Redmond, Washington quadrangle provided by EDR in GeoEngineers files, dated 1944, 1947, 1953, 1973, and 1981.

ATTACHMENT B
Ecology Opinion Letter dated July 11, 2006



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

July 11, 2006

GeoEngineers

JUL 13 2006

Routing PRC
File

Mr. Lowell DeYoung
PO Box 227
Woodinville, WA 98072-0227

Re: Under WAC 173-340-515(5) Opinion on Proposed Cleanup Action for Site 1/Opinion on Completed Remedial Action for Site 2/Opinion on Proposed Cleanup Action for Site 3 for the Hazardous Waste Sites associated with the following location:

- Name: T&D Feeds
- Address: 16355 Cleveland Street
- Facility/Site No.: 57761264
- VCP No.: NW 1107

Dear Mr. DeYoung:

Thank you for submitting documents regarding your proposed activities for the T&D Feeds facility (Site) for review by the Washington State Department of Ecology (Ecology) under the Voluntary Cleanup Program (VCP). Ecology appreciates your initiative in pursuing this administrative option for cleaning up hazardous waste sites under the Model Toxics Control Act (MTCa), Chapter 70.105D RCW. Ecology recognizes three distinct areas of contamination at the property and will address each one separately as individual "Sites".

Site-1 consists of carcinogenic polycyclic aromatic hydrocarbon (cPAH) contaminated soils identified in samples EX-S-27-3 and EX-S-33-8 located along the eastern and western property boundaries in the northern portion of the site (see attached figure). These areas are expected to be removed during the planned site redevelopment and will be addressed in this letter with an Opinion on Proposed Cleanup Action.

Site-2 also consists of cPAH contaminated soils identified in sample EX-S-25-3 located in the southeast corner of the site, beyond the T&D Feed property boundary (see attached figure). This area of contamination appears to have originated from the adjacent rail road property and migrated onto the T&D Feed property. Site-2 contaminated soils have been removed from the T&D property but remain on the adjacent rail road property to the south. This area will be addressed with an Opinion on Remedial Action.

Mr. DeYoung
July 11, 2006
Page 3 of 5

4. Conceptual Cleanup Action Plan
Former T&D Feeds
16355 Cleveland Street
Redmond, Washington
GeoEngineers, dated April 27, 2006

The reports listed above will be kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only. Appointments can be made by calling the NWRO resource contact at (425) 649-7190.

Regarding Site-1:

Site-1 is defined by the extent of contamination caused by the following release:

- cPAHs in soil

Site-1 is more particularly described in Enclosure A to this letter, which includes a detailed Site diagram. The description of Site-1 is based solely on the information contained in the documents listed above. Ecology understands that cPAH contaminated soils were placed at the T&D property as fill. The majority of this contamination was removed during the soil cleanup action performed in 2005. Two areas of cPAH contaminated soils remain on the property and are now referred to as Site-1. These areas were not excavated in 2005 due to excavation sidewall integrity/stability concerns. A retaining wall will be built during the site redevelopment to allow access to the remaining contamination. The site redevelopment will include the removal of the remaining contamination.

Based on a review of the proposed cleanup action for Site-1 and supporting documentation listed above, **Ecology has determined that the proposed cleanup action is likely to be sufficient to meet the substantive requirements contained in MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the contamination at Site-1.**

However, please note that this opinion does not represent a determination by Ecology that no further remedial action will be required at Site-1. To obtain such a determination, you must submit an independent remedial action report to Ecology upon completion of the cleanup action and request such an opinion under the VCP.

Regarding Site-2:

Site-2 is defined by the extent of contamination caused by the following release:

- cPAHs in soil

Site-2 is more particularly described in Enclosure A to this letter, which includes a detailed Site diagram. The description of Site-2 is based solely on the information contained in the documents

Mr. DeYoung
July 11, 2006
Page 2 of 5

Site-3 consists of tetrachloroethylene (PCE) contaminated groundwater previously identified prior to the remedial actions conducted at the T&D Feeds property. Post remediation monitoring wells have been installed and the past two consecutive quarterly monitoring events have been below MTCA cleanup levels. This area will be address with an Opinion on Proposed Cleanup Action.

For Sites 1 and 3: This letter constitutes an advisory opinion regarding whether your proposed activities are likely to be sufficient to meet the substantive requirements of MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC. **For Site 2,** this letter constitutes an advisory opinion on whether the remedial action performed is sufficient to meet the specific substantive requirements of MTCA and its implementing regulations, Chapter 173-340 WAC.

For all three Sites:

Ecology is providing these advisory opinions under the specific authority of RCW 70.105D.030(1)(i) and WAC 173-340-515(5).

These opinions do not resolve a person's liability to the state under MTCA or protect a person from contribution claims by third parties for matters addressed by the opinion. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). These opinions are advisory only and not binding on Ecology.

Ecology's Toxics Cleanup Program has reviewed the following information regarding your proposed and completed cleanup actions for Sites 1 through 3:

1. Preliminary Report Environmental Assessment
Center Pointe/Former T&D Feeds Site
Redmond, WA
Terra Associates, Inc., dated July 30, 2002
2. Level I and III Environmental Assessment
T&D Feeds Site
Redmond, Washington
Golder Associates, dated November, 2002
3. Supplemental Site Characterization
And Remedial Action Summary
Former T&D Feeds
VCP No. NW 1107
GeoEngineers, dated April 27, 2006

Mr. DeYoung
July 11, 2006
Page 4 of 5

listed above. Ecology understands that this area of cPAH contaminated soils is separate and distinct from Site-1 and appears to be originating from the adjacent rail road property to the south. Ecology further understands that the cPAH contaminated soils from this Site have been removed from the T&D property but remain on the adjacent rail road property.

Based on a review of the independent remedial action reports and supporting documentation listed above, **Ecology has determined that the remedial action described in the reports are not sufficient to meet the specific substantive requirements contained in MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following release on the rail road property portion of Site-2:**

- cPAHs in soil.

Ecology understands that cPAH contaminated soils on the T&D Feed portion of the site have been removed. However, cPAH contaminated soils remain on the railroad portion of the Site and require further investigation/remediation on the railroad portion of the Site in order to support a no further action determination for Site-2.

Please note that this letter does not provide an opinion on the sufficiency of any other remedial actions conducted at Site-2 or whether further remedial action is necessary to characterize and address all contamination at Site-2. To obtain such an opinion, you must submit an independent remedial action report to Ecology upon completion of the cleanup action and request such an opinion under the VCP.

Regarding Site-3:

Site-3 is defined by the extent of contamination caused by the following release:

- Tetrachloroethylene (PCE) in groundwater

Site-3 is more particularly described in Enclosure A to this letter, which includes a detailed Site diagram. The description of Site-3 is based solely on the information contained in the documents listed above. Ecology understands that PCE contaminated groundwater above MTCA Method-A cleanup levels were detected in monitoring wells prior to the remedial actions conducted at the T&D property. Previous investigations state that the source of PCE appears to be from an off-site location. Monitoring wells were destroyed during remedial actions conducted at the T&D property and have been recently replaced. Two consecutive quarters of monitoring indicates PCE is no longer present above MTCA Method-A cleanup levels. Four consecutive quarters of monitoring indicating PCE concentrations below cleanup levels would support a No Further Action (NFA) determination. However, if PCE is detected about cleanup levels, further actions would be necessary to evaluate Site conditions and the need for additional work.

Mr. DeYoung
July 11, 2006
Page 5 of 5

Based on a review of the proposed cleanup action for Site-3 and supporting documentation listed above, Ecology has determined that, if four consecutive quarters of groundwater monitoring indicates PCE concentrations below cleanup levels the proposed cleanup action is likely to be sufficient to meet the substantive requirements contained in MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the contamination at Site-3.

However, please note that this opinion does not represent a determination by Ecology that no further remedial action will be required at Site-3. To obtain such a determination, you must submit an independent remedial action report to Ecology upon completion of the cleanup action and request such an opinion under the VCP.

For All Three Sites:

Please note that these opinions are based solely on the information contained in the documents listed above. Therefore, if any of the information contained in those documents is materially false or misleading, then these opinions will automatically be rendered null and void.

The state, Ecology, and its officers and employees make no guarantees or assurances by providing these opinions, and no cause of action against the state, Ecology, its officers or employees may arise from any act or omission in providing these opinions.

Again, Ecology appreciates your initiative in conducting independent remedial action and requesting technical consultation under the VCP. As the cleanup of these Sites progresses, you may request additional consultative services under the VCP, including assistance in identifying applicable regulatory requirements and opinions regarding whether remedial actions proposed for or conducted at the Site meet those requirements.

If you have any questions regarding these opinions, please contact me at (425) 649-7125.

Sincerely,



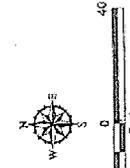
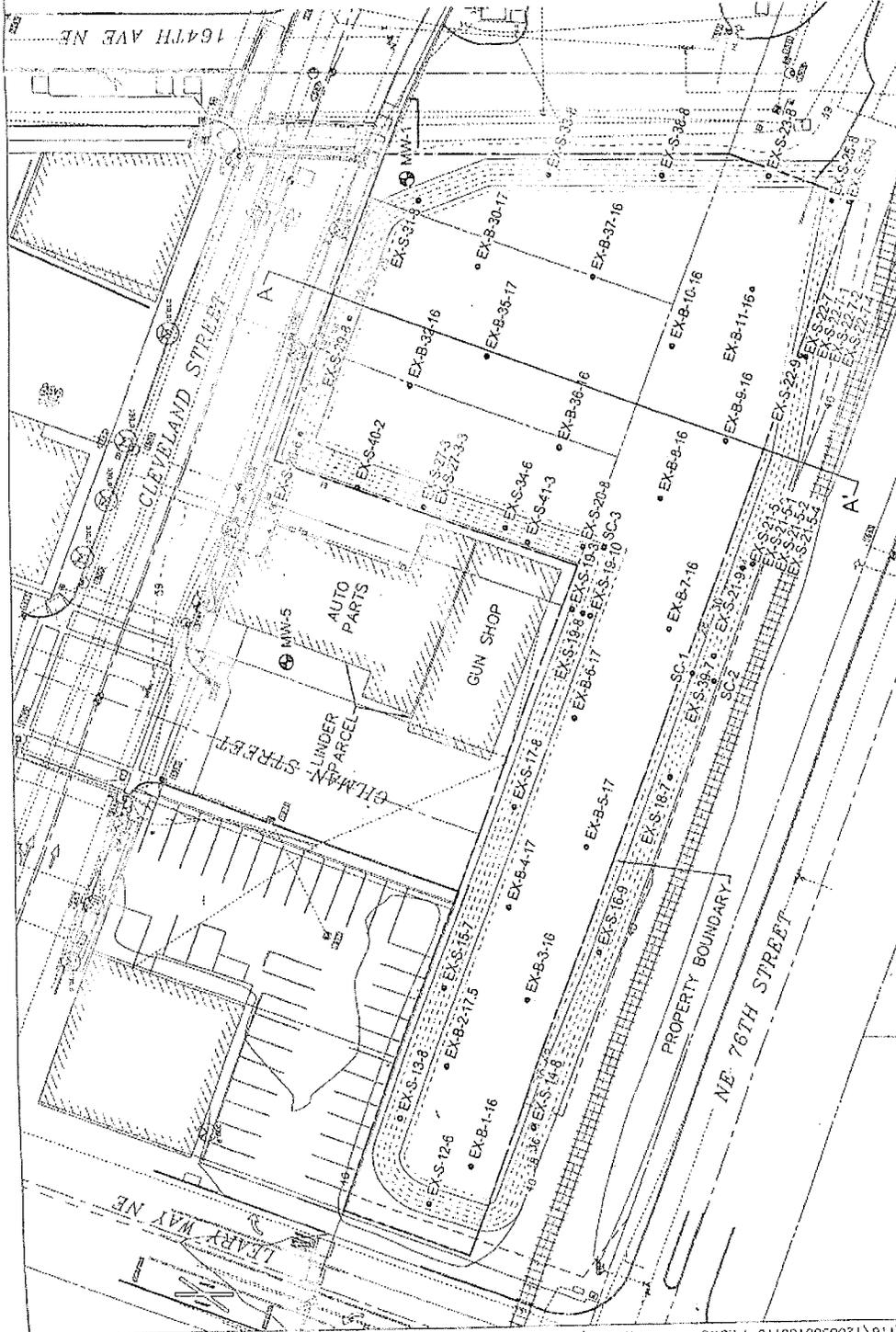
Brian S. Sato, P.E.
NWRO, Toxics Cleanup Program

BSS:bs

Enclosures

cc: Paul Craig, GeoEngineers

NOTES:
 1. The locations of all features shown are approximate.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
 3. The contour lines (filed in different surveys at the site which were generated in different surveys at the site)
 Reference: CAD drawing file "88" provided by DOWL Engineers. 03/03/05



2005 / 2006 Excavation Limits
 Soil Sample Locations
 T & D Feeds
 Redmond, WA

GEOENGINEERS

Figure 4

- Legend:**
- MW-1 Monitoring Well
 - EX-B-1-16 Soil Sample
 - EX-S-1-16 Soil Elevation Contour (feet)

Appendix E

Draft Critical Area Evaluation: Downtown Study Area

GeoEngineers

**Draft Critical Area Evaluation
Downtown Study Area**

**BNSF Rail Corridor Master Plan
Redmond, Washington**

For

The Berger Partnership

September 9, 2010



8410 154th Avenue NE
Redmond, Washington 98052
425.861.6000

Draft Critical Area Evaluation
Downtown Study Area
BNSF Rail Corridor Master Plan
Redmond, Washington

File No. 0500-172-00

September 9, 2010

Prepared for:

The Berger Partnership
1721 8th Avenue North
Seattle, Washington 98109

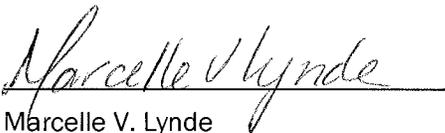
Attention: Dave Knight, Project Manager

Prepared by:

GeoEngineers, Inc.
8410 154th Avenue NE
Redmond, Washington 98052
425.861.6000



Thomas Bannister
Staff Biologist



Marcelle V. Lynde
Associate Biologist

TAB:MVL:sml:csv:iw
Sharepoint\Finals\BNSF\050017200 Draft Critical Area Evaluation Report Downtown.docx

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Copyright© 2010 by GeoEngineers, Inc. All rights reserved.

Table of Contents

INTRODUCTION	1
Critical Area Evaluation.....	1
Fish and Wildlife Conservation Areas	1
Wetlands.....	3
Frequently Flooded Areas.....	5
Critical Aquifer Recharge Protection Areas.....	6
Geologically Hazard Areas	6
CONCLUSION	7
LIMITATIONS	8
REFERENCES	8

LIST OF FIGURES

- Figure 1. Vicinity Map
- Figure 2. Aerial Image
- Figure 3. Fish and Wildlife Habitat Conservation Areas
- Figure 4. Map of Wetland A and B
- Figure 5. Map of Steep Slopes and the Sammamish River
- Figure 6. Frequently Flooded Areas
- Figure 7. Critical Aquifer Recharge Areas
- Figure 8. Seismic Hazard Areas

APPENDICES

- Appendix A. City of Redmond Habitat Assessment Forms
- Appendix B. Wetland Determination Data Forms
- Appendix C. Wetland Rating Forms

INTRODUCTION

GeoEngineers has prepared this report to document our findings during the Critical Area Evaluation performed along the Downtown Study Area corridor, located in downtown Redmond, Washington (Figure 1). We understand that the City of Redmond has acquired the Redmond section of the former Burlington Northern Santa Fe (BNSF) corridor, and is beginning a planning process to convert the 3.89-mile long BNSF right-of-way (ROW) to a regional trail. At this point, it is assumed that the existing BNSF rail prism will be paved and that this re-development will result in no direct impacts to the areas outside of the existing prism. The Redmond section of the BNSF ROW extends from the end of King County's East Lake Sammamish Trail, just west of SR 520/SR 202 Interchange and Bear Creek, to Northeast 124th Street. The Downtown Study Area corridor is defined as the approximately 5,700-foot long section of the BNSF ROW between the Sammamish River to the west and King County's East Lake Sammamish pedestrian trail to the east (Figure 2). The ROW ranges from 50 to 100 feet in width. The Downtown Study Area corridor consists primarily of the abandoned railroad corridor through the urban core of downtown Redmond. Generally, commercial development abuts the BNSF ROW for the length of the Downtown Study Area corridor.

The purpose of our work is to identify regulated Critical Areas, as defined by Redmond Municipal Code (RMC) 20D.140 (Critical Areas), within the Downtown Study Area corridor. Because of the preliminary nature of the project, many of the site-specific regulatory limitations potentially associated with these Critical Areas are not known at this time.

GeoEngineers biologists walked the length of the Downtown Study Area corridor on June 21, 2010, to determine the nature and extent of Critical Areas and their associated protective buffers observed along the corridor. We made visual observations of potential Critical Areas on adjacent parcels; however, we were not authorized to enter these parcels. As a result, regulated Critical Area buffers that are not identified in this report may project on to the Downtown Study Area corridor.

Critical Area Evaluation

Prior to the field work, we reviewed the City of Redmond Critical Area Maps (City of Redmond, 2010), the Washington Department of Natural Resources (WDNR) FPARS mapping system (WDNR, 2010), the Washington Department of Fish and Wildlife (WDFW) SalmonScape system (WDFW, 2010a), Priority Habitat and Species data from WDFW (WDFW, 2010b), the King County iMap GIS system (King County, 2010) and the National Wetlands Inventory (NWI) maps (United States Fish and Wildlife Service, 2010). These data sources indicate that regulated Critical Areas are not present within the highly developed area of downtown Redmond.

Fish and Wildlife Conservation Areas

The City of Redmond (2010) identifies a designated Open Space Easement located immediately south of the eastern terminus of the Downtown Study Area corridor (Figure 3). This area corresponds to wetlands associated with Bear Creek identified by WDFW (2010b). We observed an approximately 1-acre forested area in this location. This area is undeveloped and is dominated by mature native tree species including black cottonwood (*Populus balsamifera*) and

Oregon ash (*Fraxinus latifolia*). Commercial development abuts this roughly square Open Space Easement on the west and south perimeter of the forested area. The BNSF ROW borders the northern edge of the area. It appears that this area is associated with the riparian habitat corridor of Bear Creek; however, it is disconnected from the habitat corridor by the paved East Lake Sammamish pedestrian trail that defines the eastern edge of the Downtown Study Area corridor. We observed no direct or indirect indication that federal, state and/or locally designated species of importance maintain a primary association with this area. This Fish and Wildlife Habitat Conservation Area scored 15 of a possible 27 points on the City of Redmond Habitat Assessment forms that are included in Appendix A.

The Downtown Study Area corridor is bookended by two Class I streams identified by the City of Redmond (2010). The active channel of Bear Creek is located approximately 170 feet east of Downtown Study Area corridor and outside of the study area. Bear Creek is primary habitat for anadromous and resident fish species including: coho salmon (*Onchoryhnchus kisutch*), Chinook salmon (*O. tshawytscha*) kokanee salmon (*O. nerka*)[resident] sockeye salmon (*O. nerka*)[anadromous], steelhead (*O. mykiss*)[anadromous], rainbow trout (*O. mykiss*)[resident] and cutthroat trout (*O. clarki-clarki*) [WDFW, 2010a and 2010b] According to RMC 20D.140.20-020(3), this reach of Bear Creek is protected by a 150-foot protective buffer to be measured landward from the Ordinary High Water Mark (OHWM). GeoEngineers did not determine the OHWM of Bear Creek because it was outside of the Downtown Study Area. Based upon guidance from Olson and Stockdale (2008) and our observations in the field, it is likely that this 150-foot buffer projects into the eastern end of the Downtown Study Area corridor.

The Sammamish River defines the western border of the Downtown Study Area corridor. The Sammamish River is primary habitat for anadromous and resident fish species including: coho salmon, Chinook salmon, kokanee salmon, sockeye salmon, bull trout (*Salmo confluentus*), rainbow trout and cutthroat trout [WDFW, 2010a and 2010b] WDFW (2010b) identifies an Urban Natural Open Space associated with the Sammamish River north of the BNSF crossing. According to RMC 20D.140.20-020(3), this reach of the Sammamish River is protected by a 150-foot protective buffer to be measured landward from the Ordinary High Water Mark (OHWM). This protective buffer projects into the western end of the Downtown Study Area corridor. The City of Redmond Stream Summary Sheet is included in Appendix A.

The Washington State Department of Ecology (Ecology) [2010] identifies the Sammamish River and Bear Creek as “*Waters of the State*”. In accordance with the City of Redmond’s Shoreline Master Program (SMP), all lands extending 200 feet landward from the OHWM of Bear Creek and the Sammamish River, including wetlands and those areas within the 100-year floodplain, are subject to additional regulatory requirements of the SMP. The City of Redmond has designated approximately 120 feet of the 200-foot wide Sammamish River Shoreline Management Zone that contains the King County Sammamish River Trail as Urban Conservancy. The balance is designated High Intensity/Multi-use environment. Similarly, a 150-foot wide Urban Conservancy corridor has been designated adjacent to Bear Creek with the remaining 50 feet of the Shoreline Management Zone designated as High Intensity/Multi-use environment. According to the SMP policy SL-5, development in previously disturbed, under-utilized High Intensity/Multi-use shoreline environments, such as the BNSF corridor, should be encouraged. Based upon a review of the SMP, there does not appear to be specific limitations to converting the BNSF railroad to a

pedestrian trail. The preliminary design objectives associated with the redevelopment are consistent with the policies of the SMP. It is likely that proposed redevelopment of the Downtown Study Area corridor located within the Shoreline Management Zone adjacent to the Sammamish River and Bear Creek will undergo a case-by-case administrative review by the City of Redmond.

Wetlands

During the field investigation, we identified two seasonally flooded palustrine (Cowardin 1979) wetlands in the low-lying areas adjacent and parallel to the BNSF rail prism located at the eastern end of the Downtown Study Area. The surveyed boundaries of these depressional wetlands are mapped on Figure 4. For the purpose of this report, the emergent wetland that dominates the low lying area north of the BNSF rail prism will be referred as Wetland A. A much smaller forested wetland located south of the BNSF rail prism is identified as Wetland B. The edges of these wetlands were delineated in accordance with RMC Ordinance 2259 (Exhibit 1), following procedures outlined in the U.S. Army Corps of Engineers (USACE) *Wetlands Delineation Manual* (USACE, 1987), *The Interim Regional Supplement* (USACE, 2008) and the Washington State Department of Ecology (Ecology) *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997). We recorded our observations on wetland determination data forms that are included in Appendix B. The City of Redmond Wetland Summary Sheet is included in Appendix A.

WETLAND A

Wetland A is approximately 0.5 acres and is dominated by reed canarygrass (*Phalaris arundinacea*, FACW). Because of the intensive land use surrounding the wetland, the existing vegetated wetland buffer is very narrow (less than 15 feet) and dominated with Himalayan blackberry (*Rubus armeniacus*, FACU) and Douglas fir (*Pseudotsuga menziesii*, FACU) to the north. The BNSF rail prism abuts the southern edge of the wetland, and as such, no functional buffer exists along the rail prism.



Photo 1. Elevated timber span above Wetland A.

As illustrated in Photo 1 and mapped in Figure 4, the BNSF tracks span Wetland A on an approximately 20-foot long elevated timber bridge. Improvements to this span may result in direct impacts to Wetland A, such as temporary construction impacts and/or impacts from shade. The City of Redmond may require mitigation for these impacts once they are identified.

Positive indicators of hydric soils were observed within a 16-inch deep test pit (SP-1), including a depleted matrix, within the wetland boundary (USACE, 2008). The locations of test pits are mapped on Figure 4.

Positive hydrology was observed during the field investigation in the form of saturation and inundation within the wetland boundary. Direct precipitation, shallow ground water and runoff from the large, abutting impervious surfaces are the primary drivers for wetland conditions within Wetland A. We observed no surface water outlet from the closed depressional wetland; however we did observe two stormwater outfalls within the wetland boundary.

In accordance with RMC 20D.140.30-010, we rated and classified Wetland A based upon our assessment of its ecological functions and values using the *Western Washington Wetland Rating System* (Hruby, 2004). The wetland rating form is included in Appendix C. The wetland has potential to perform water quality functions due to its closed depressional configuration. It appears that stormwater runoff from the surrounding development is impounded in the wetland and infiltrates into the ground. For this reason, the wetland also performs substantial flood attenuation and groundwater recharge functions. Without the presence of the wetland, stormwater runoff from the large adjacent impervious surfaces would likely flow directly to Bear Creek. Because of the lack of buffers from the surrounding high intensity land use and the infestation of invasive reed canarygrass, habitat functions are poor.

The wetland scores 20 for water quality functions, 20 for hydrologic functions and 10 for habitat functions. The total score of 50 designates Wetland A as a Category III wetland. Because of the low level habitat functions that this wetland performs, the City of Redmond requires an 80-foot protective buffer for this Category III Wetland, in accordance with RMC 20D.140.30-020(2).

WETLAND B

Wetland B is located south of the BNSF rail prism, immediately opposite of Wetland A. Because of the close proximity of Wetland B to Wetland A, observed soil and hydrology of the two wetlands are very similar. However, Wetland B is much smaller (approximately 1,800 square feet) and contains forested habitat consisting of native tree species such as Oregon ash and hawthorn (*Crataegeous douglasii*, FAC). Other areas of the wetland are dominated by reed canarygrass.

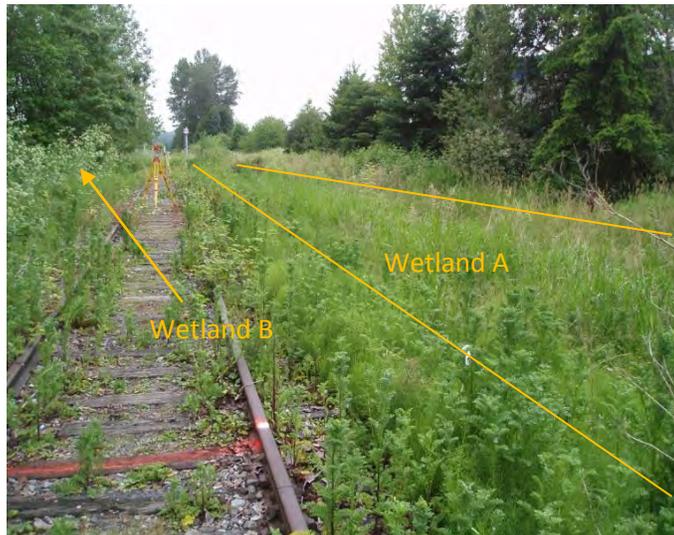


Photo 2. Photo showing the locations of Wetlands A and B relative to the BNSF Rail prism.

Like Wetland A, Wetland B is located in a closed depression that likely receives runoff from the abutting impervious surfaces. As a result, functional assessment and rating scores of Wetland B are very similar to Wetland A. Wetland B scores 16 for water quality functions, 16 for hydrologic functions and 8 for habitat functions. The total score of 40 designates Wetland B as a Category III wetland. Because of the low level habitat functions that this wetland performs, the City of Redmond requires an 80-foot protective buffer for this Category III Wetland, in accordance with RMC 20D.140.30-020(2).

WETLAND WR-12

According to the CH2M Hill (2008), a riverine scrub-shrub/forested (Cowardin, 1979) wetland associated with Bear Creek is located immediately east of the Downtown Study Area. CH2M Hill (2008) has identified this wetland as WR-12. This wetland is also mapped by the City of Redmond (2010). Because WR-12 is located outside of the Downtown Study Area corridor, GeoEngineers did not investigate this wetland. Using the Western Washington Wetland Rating System (Hruby, 2004), CH2M Hill rated WR-12 as a Category II wetland and scored "...moderate for all three parameters..." (CH2M Hill, 2008). Per RMC 20D.140.30-020(2), Category II wetlands with a moderate level of habitat function and a high intensity adjacent land use are protected by a 150-foot buffer. Similar to the 150-foot Bear Creek stream buffer, it is likely that this 150-foot wetland buffer projects into the eastern end of the Downtown Study Area corridor.

POTENTIAL OFF-SITE WETLAND

During our field investigation, we observed a closed depressional area on an undeveloped parcel (Parcel No. 7198900060) immediately north of the BNSF fill prism and approximately 200 feet east of the Sammamish River. This vegetated depressional area appears to collect water from two linear swales likely constructed to convey surface water. While GeoEngineers was not authorized to enter the parcel, we observed indicators of wetland conditions along the northern edge of the BNSF ROW. The area is dominated by grasses that have recently been mowed, and as such, performs little habitat function. This area likely receives stormwater input from the abutting development, and thus, performs water quality and flood attenuation functions. Based upon observations made from the BNSF ROW, we have classified and rated this feature as potentially a Category III depressional wetland (Hruby, 2004). If wetland conditions exist at this location, then the 80-foot wetland buffer, as required by RMC 20D.140.30-020(2), likely projects into the Downtown Study Area corridor as indicated on Figure 5. However, there are indications that this feature may have been intentionally created within a non-wetland site to manage and infiltrate stormwater runoff. Such areas are exempt from the provisions of the Critical Areas ordinance under RMC 20D.140.10-030(1)(b).

For the purpose of re-developing the BNSF ROW, the City of Redmond may allow wetland buffers to be reduced on a case-by-case basis in accordance with RMC 20D.140.30-020(5). Where a legally established, non-conforming use of the buffer exists, proposed actions in the buffers may be permitted so long as the proposed action does not increase impacts to the wetland.

Frequently Flooded Areas

According to the City of Redmond (2010), the portion of the corridor east of 170th Avenue Northeast is located within the FEMA floodway (Figure 6). This low lying portion of the corridor near Bear Creek contains Wetlands A, B and WR-12. Based upon our observations of topography and hydrology in this area, it seems reasonable that the Frequently Flooded Area mapped by the City within the Downtown Study Area corridor roughly corresponds to the delineated boundary of Wetland A mapped on Figure 4.

The City of Redmond (2010) identifies the Sammamish River as a FEMA floodway. The 100-year floodplain is mapped north and south of the BNSF ROW, east of the Sammamish River (Figure 6). Due to the height of the railroad fill prism, the BNSF ROW, immediately east of the Sammamish River is not in a regulated 100-year floodplain.

Under RMC 20D.140.40-030(4)(a), the City of Redmond prohibits development in the FEMA floodway with the exception of shoreline protective structures, bridges, roads, trails and railroads.

Proposals within these regulated Frequently Flooded Areas may require additional engineering evaluations, including but not limited to Zero Rise Flood studies. These additional evaluations must demonstrate that the proposal will not have a negative impact upon flood flow, storage capacity within the floodplain or jeopardize public safety and the environment. It is assumed that the top of the existing BNSF rail prism has been constructed to an elevation above which it would frequently flood. We assume that the City of Redmond will condition or approve redevelopment within the mapped Frequently Flooded Areas based upon submittal of any requested evaluations of flood elevations adjacent to the ROW.

Critical Aquifer Recharge Protection Areas

Critical Aquifer Recharge Protection Areas are those areas within the City of Redmond that have a critical recharge effect on aquifers used for potable water. The City of Redmond has identified the portion of the Downtown Study Area corridor east of 164th Avenue Northeast as a Wellhead Protection Zone 1 and the portion west of 164th Avenue Northeast as a Wellhead Protection Zone 2. Critical Aquifer Recharge Protection Areas are mapped on Figure 7. Zone 1 areas are lands that overlie the 6-month travel time of any water source well owned by the City of Redmond. Zone 2 areas are lands that overlie the 1-year travel time of any water source well owned by the City of Redmond.

Development restrictions associated with Wellhead Protection Zones 1 and 2 are targeted towards activities which involve storing, handling, treating, using, producing, recycling, or disposing of hazardous materials or other deleterious substances. GeoEngineers (2010) has identified numerous potential sources of contaminants in the Downtown Study Area corridor, including but not limited to, treated railroad ties and fill of unknown origin. Any proposed re-development within the Downtown Study Area corridor, including remediation of contaminants, may be required to comply with the Wellhead Protection Zone Performance Standards identified in RMC 20D.140.50-040.

Geologically Hazard Areas

RMC 20D.140.60-010(1) classifies Geologically Hazardous Areas into three sub-categories:

1. **Erosion Hazard Areas** are lands or areas underlain by soils identified by the U.S. Department of Agriculture Soil Conservation Service as having “severe” or “very severe” rill and inter-rill erosion hazards.
2. **Landslide Hazard Areas** are areas potentially subject to significant or severe risk of landslides based on a combination of geologic, topographic, and hydrogeologic factors.
3. **Seismic Hazard Areas** are lands subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, soil liquefaction, or surface faulting.

The City of Redmond (2010) does not indicate the presence of any Erosion Hazard or Landslide Hazard Areas within the Downtown Study Area corridor. The slopes along the BNSF fill prism along

the western end of the Downtown Study Area corridor are steeper than 40-percent and have a vertical relief greater than 10 feet. Under RMC 20D.140.60-010(1)(b)(vii), these areas are regulated as Landslide Hazard Areas. According to RMC 20D.140.60-020, a 50-foot buffer shall be measured from the top, toe and sides of the Landslide Hazard Area. Under RMC 20D.140.10-030(1)(d), redevelopment of the trail in the Landslide Hazard Areas may be exempt from provisions of the Critical Areas Ordinance provided that there is no increase in the amount impervious surface. Additionally, a geotechnical evaluation may be required to identify the risks of damage from the proposal, both on-site and off-site, to ascertain that the proposal will not increase the risk of occurrence of the potential geologic hazard; and to identify measures to eliminate or reduce risks.

Seismic Hazard Areas are ubiquitously mapped in the relatively level areas associated with the valleys that contain Lake Sammamish, the Sammamish River, Bear Creek and Evans Creek (Figure 8).

Because the Critical Areas Ordinance contains no specific exemptions for re-development of the Downtown Study Area corridor within Geologically Hazardous Area (i.e. Landslide Hazard Areas and Seismic Hazard Areas) the City of Redmond may approve, condition or deny proposals based upon their effective mitigation of risks to property, health and safety.

CONCLUSION

Because of the highly developed urban environment along the approximately 5,700-foot long Downtown Study Area corridor, we did not observe a substantial number of regulated Critical Areas. Three Fish and Wildlife Habitat Conservation Areas were identified near the Downtown Study Area corridor. Bear Creek and the Sammamish River, identified as Class I stream and Waters of the State, are respectively located at the east and west ends of the Downtown Study Area corridor. Their 150-foot buffers extend into the Downtown Study Area corridor.

Two on-site wetlands (Wetlands A and B) were delineated (Figure 4). One additional wetland (WR-12) is located west of the Downtown Study Area corridor (CH2M Hill, 2008) and one potential wetland was observed adjacent to the western end of the corridor (Figure 5). This potential wetland is located at the toe of a Landslide Hazard Area associated with the BNSF fill prism near the Sammamish River.

Frequently Flooded Areas, Critical Aquifer Recharge Areas and Seismic Hazard Areas are mapped within the Downtown Study Area corridor (City of Redmond, 2010). These areas are indicated on Figures 6 through 8. Because of the preliminary nature of the BNSF Rail Corridor Master Plan, it is not known how future development may be impacted by the regulatory limitations associated with these areas. It is likely that the City of Redmond will evaluate potential impacts to these areas on a case-by-case basis. The City of Redmond may condition the approval of redevelopment of the Downtown Study Area corridor within these areas based upon the findings of additional engineering evaluations and analysis.

LIMITATIONS

We have prepared this letter for The Berger Partnership, their authorized agents and regulatory agencies for Critical Area Evaluation along the Downtown Study Area portion of the BNSF rail corridor located in downtown Redmond, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for Critical Area Evaluation in this area at the time this letter was prepared. The conclusions, recommendations, and opinions presented in this letter are based on our professional knowledge, judgment and experience. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments should be considered a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

REFERENCES

City of Redmond. 2010. Critical Areas Maps.

<http://www.redmond.gov/cityservices/citymaps3.asp> Accessed June 2010.

CH2M Hill. 2008. Sound Transit East Link Project: East Link Project DRAFT EIS, Appendix H3, Ecosystem Technical Report. Dated December 2008.

Cowardin, L. M., Carter, V., Golet, F. C. and Laroe, E. T. 1979. Classification of Wetland and Deep Water Habitats of the United States. Performed for Office of Biological Services, Fish and Wildlife Service, U. S. Department of the Interior, Washington, D.C.

GeoEngineers. (2010). BNSF Corridor Environmental Assessment. Dated July 6, 2010.

Hruby, T. 2004. Washington State Wetland Rating System for Western Washington – Revised. Washington State Department of Ecology Publication # 04-06-025.

King County. 2010. iMap GIS system.

<http://www.kingcounty.gov/operations/gis/Maps/iMAP.aspx> Accessed June 2010.

Olson, P. and E. Stockdale. 2008. Determining the Ordinary High Water Mark on Streams in Washington State. Washington State Department of Ecology, Shoreland's and Environmental Assistance Program, Lacey, Washington. Ecology Publication #08-06-001.

United States Fish and Wildlife Service. 2010. National Wetlands Inventory (NWI) database.

<http://wetlandsfws.er.usgs.gov/NWI/index.html>. Accessed June 2010.

United States Army Corp of Engineers (USACE). Environmental Laboratory. 1987. "U.S. Army Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg.

United States Army Corp of Engineers (USACE). 2008. Interim Regional Supplement to The Corps of Engineers Wetland delineation Manual: Western Mountains, Valleys and Coast Region, US Army Engineer Research and Development Center, Vicksburg, Mississippi.

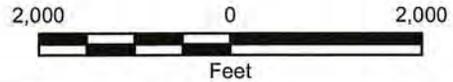
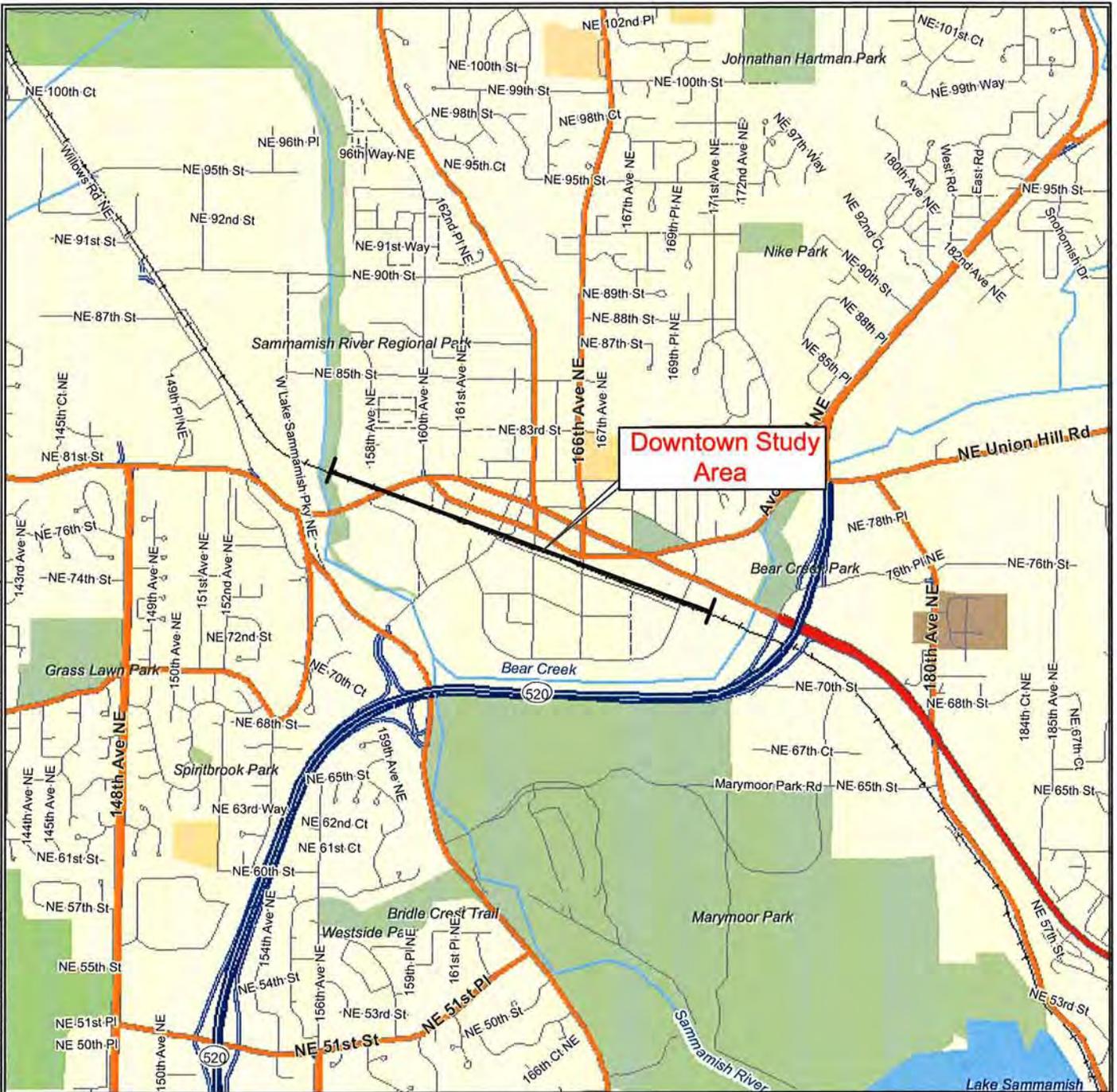
Washington State Department of Ecology (Ecology). 1997. Washington State Wetlands Identification and Delineation Manual. Publication #96-94. Olympia, Washington.

Washington State Department of Ecology (Ecology). 2010. Coastal Atlas GIS Mapping System. <https://fortress.wa.gov/ecy/coastalatlascviewer.htm> Accessed June 2010

Washington State Department of Fish and Wildlife (WDFW). 2010a. SalmonScape mapping system. <http://wdfw.wa.gov/mapping/salmonscape> (Accessed June 2010).

Washington State Department of Fish and Wildlife (WDFW). 2010b. Priority Habitat and Species data in the vicinity of Section 2, Township 25 North, Range 5 East. Production Date: June 16, 2010.

Washington State Department of Natural Resources. 2010. FPARS mapping system. <http://fortress.wa.gov/dnr/app1/fpars/viewer.htm> (Accessed June 2010).



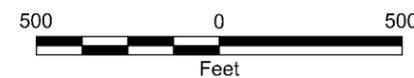
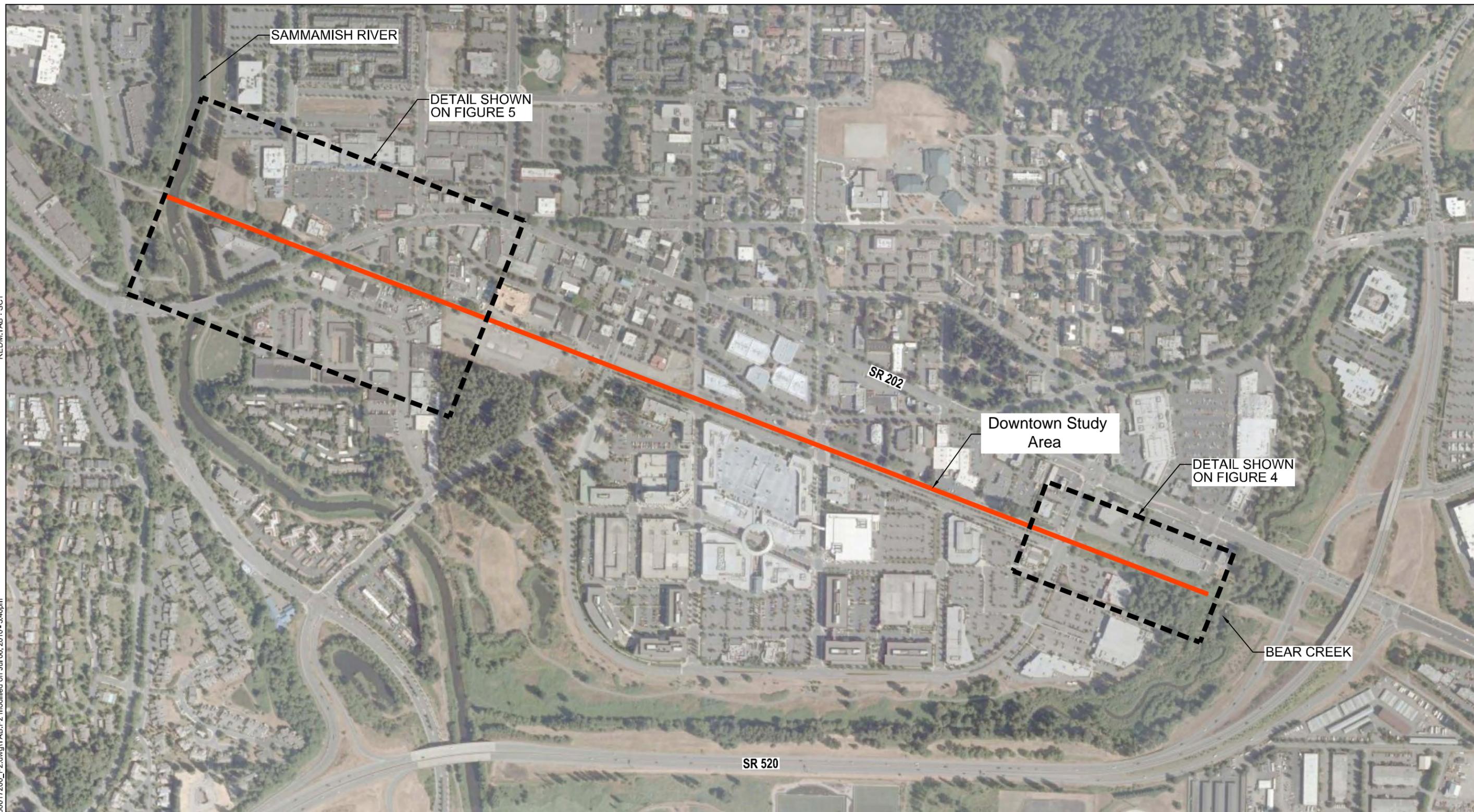
- Notes:
1. The locations of all features shown are approximate.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
 3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005
 Transverse Mercator, Zone 10 N North, North American Datum 1983
 North arrow oriented to grid north

Vicinity Map	
BNSF Rail Corridor Master Plan Downtown Study Area Redmond, Washington	
GEOENGINEERS 	Figure 1

REDM:TAB : SCY

W:\Redmond\Projects\005000172\CAD\050017200_F2.dwg\TAB:F2 modified on Jul 06, 2010 - 3:40pm

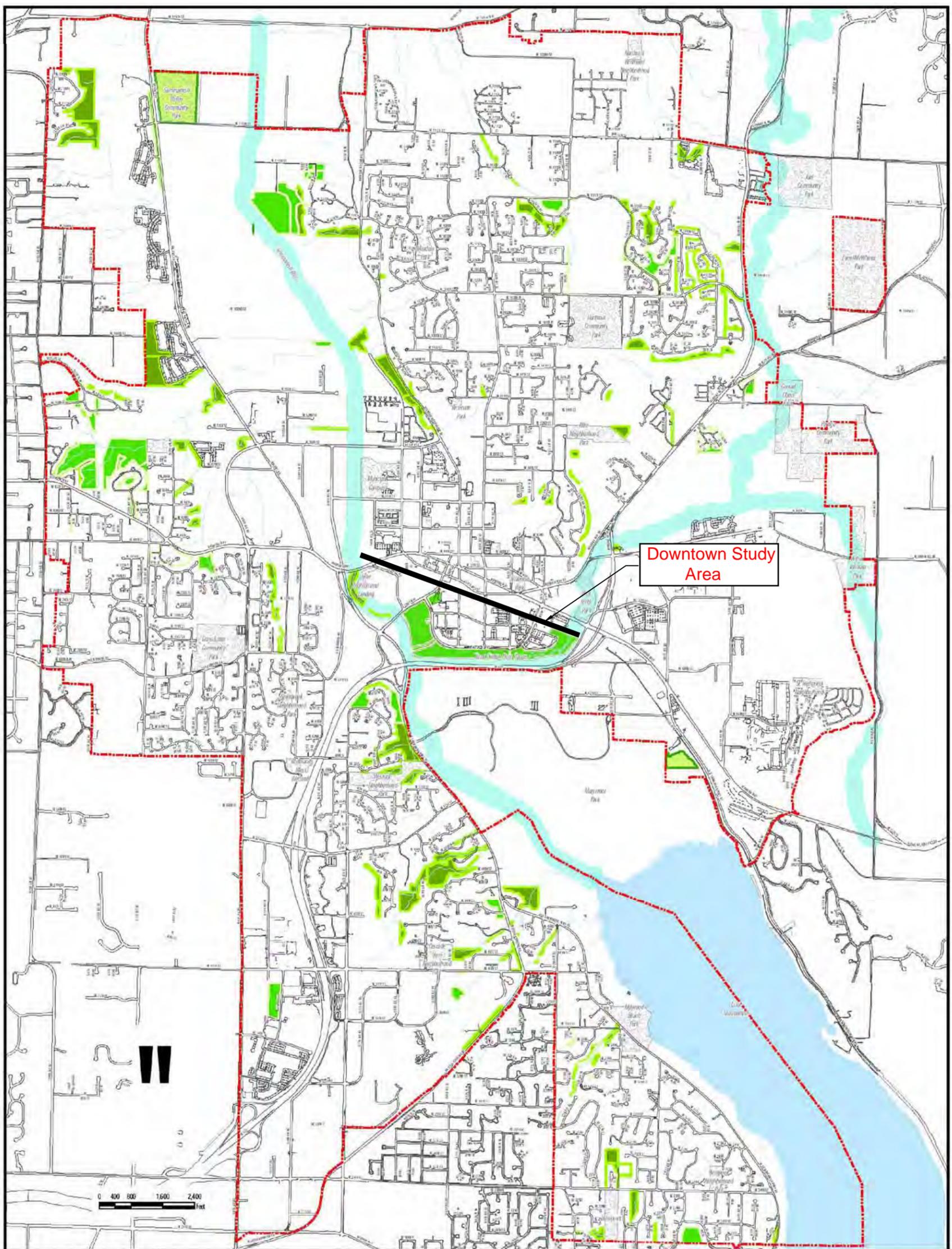


Notes:

- 1. The locations of all features shown are approximate.
- 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Aerial photo provided by ESRI GIS Bing Aerial Map.

Aerial Image	
BNSF Rail Corridor Master Plan Redmond, Washington	
GEOENGINEERS 	Figure 2



City of Redmond
Critical Areas Map
 Effective: 5/28/2005
Fish and Wildlife Habitat
Conservation Areas
(Core Preservation Areas)

Legend:

- Class 1 Streams and Buffers
- Native Growth Protection Easements
- Open Space Easements
- Transfer Development Rights Easements
- Redmond City Limits

Sources:
USGS Geologic Maps

Note:
This map shall be used as a general guide. It represents the approximate location of streams. Consult the Swaps Area Ordinance (SAO) for reporting requirements. In the event there is a conflict between the map and the criteria or standards of the SAO, the criteria shall prevail.

Produced: February 2005
 It:\gdatal\projects\SAO\Update\2004\update1\1x17.mxd

Notes

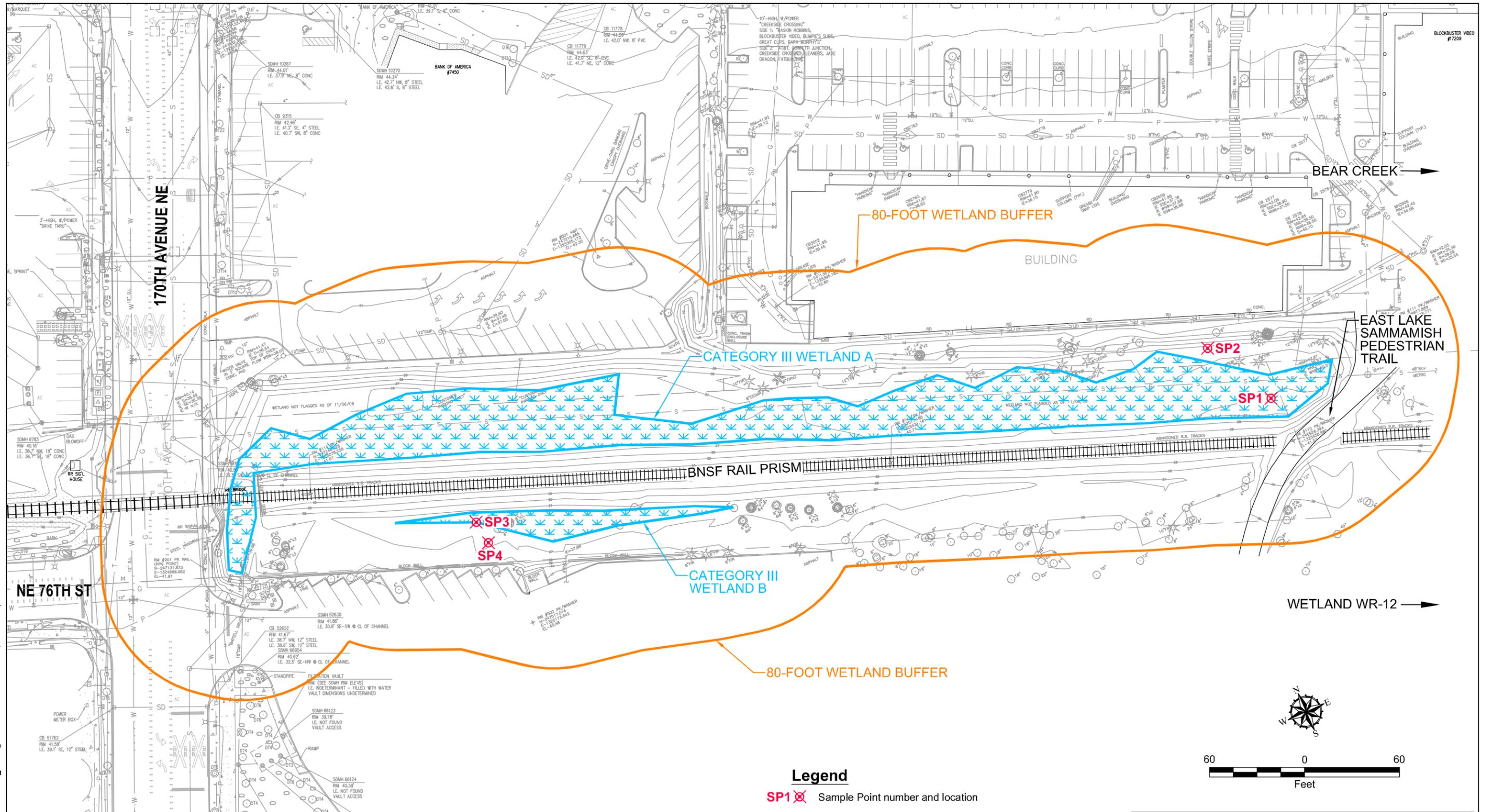
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: www.redmond.gov/cityservices/citymaps3.asp

Fish and Wildlife Habitat Conservation Areas	
BNSF Rail Corridor Master Plan Redmond, Washington	
GEOENGINEERS	Figure 3

REDM:TAB - SCY

W:\Redmond\Projects\00500172\CAD\050017200_F4.dwg\TAB:F4 modified on Jul 02, 2010 - 2:49pm



Legend

SP1 X Sample Point number and location



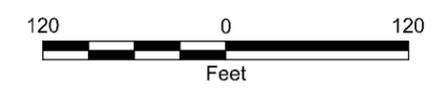
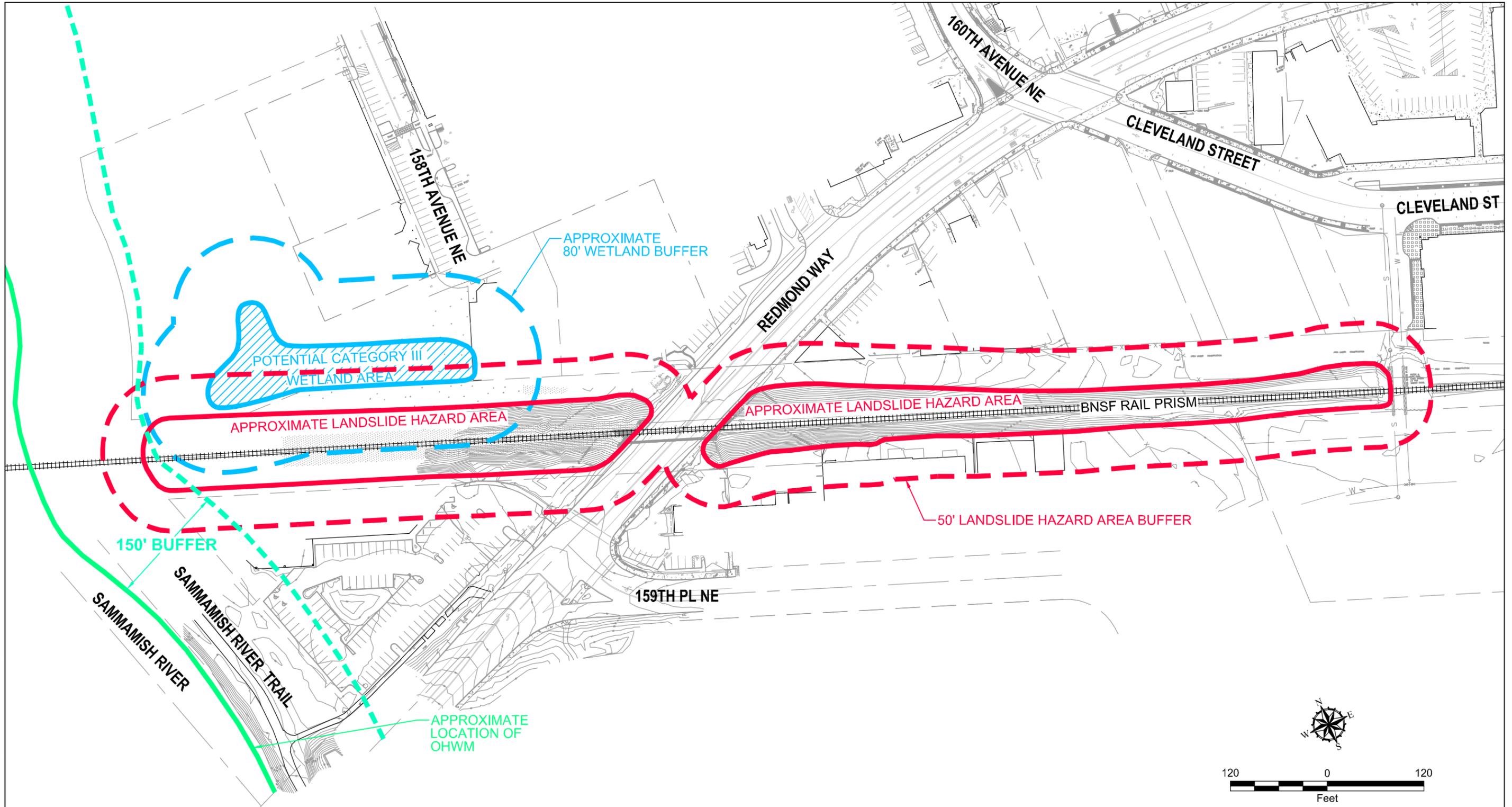
Notes:
 1. The locations of all features shown are approximate.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing provided by Berger Partnership PS.

Map of Wetland A and B	
BNSF Rail Corridor Master Plan Redmond, Washington	
GEOENGINEERS	Figure 4

REDM:TAB : SCY

W:\Redmond\Projects\00500172\CAD\050017200_F5.dwg\TAB:F5 modified on Jul 02, 2010 - 3:30pm



Map of Steep Slopes and Sammamish River

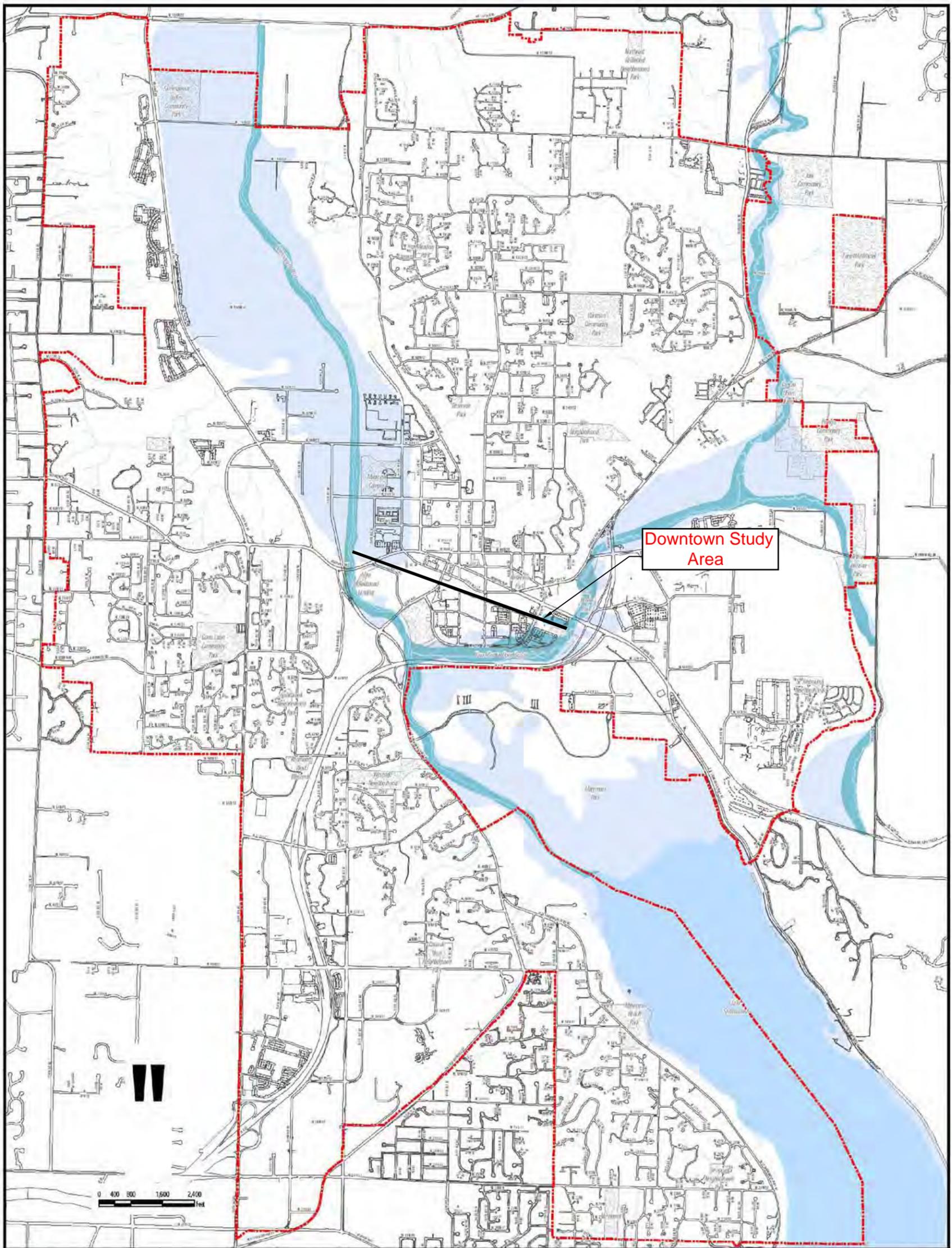
BNSF Rail Corridor Master Plan
Redmond, Washington



Figure 5

Notes:
 1. The locations of all features shown are approximate.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing provided by Berger Partnership PS.



 **City of Redmond**
Critical Areas Map
 Effective: 5/28/2005
Frequently Flooded Areas

Legend:
 100 Year Floodplain
 FEMA Floodway
 Redmond City Limits

Sources:
 FEMA Flood Insurance Rate Maps

Note:
 This map shall be used as a general guide. It represents the approximate location of streams. Consult the Sensitive Area Ordinance (SAO) for reporting requirements. In the event there is a conflict between the map and the criteria or standards of the SAO, the criteria shall prevail.

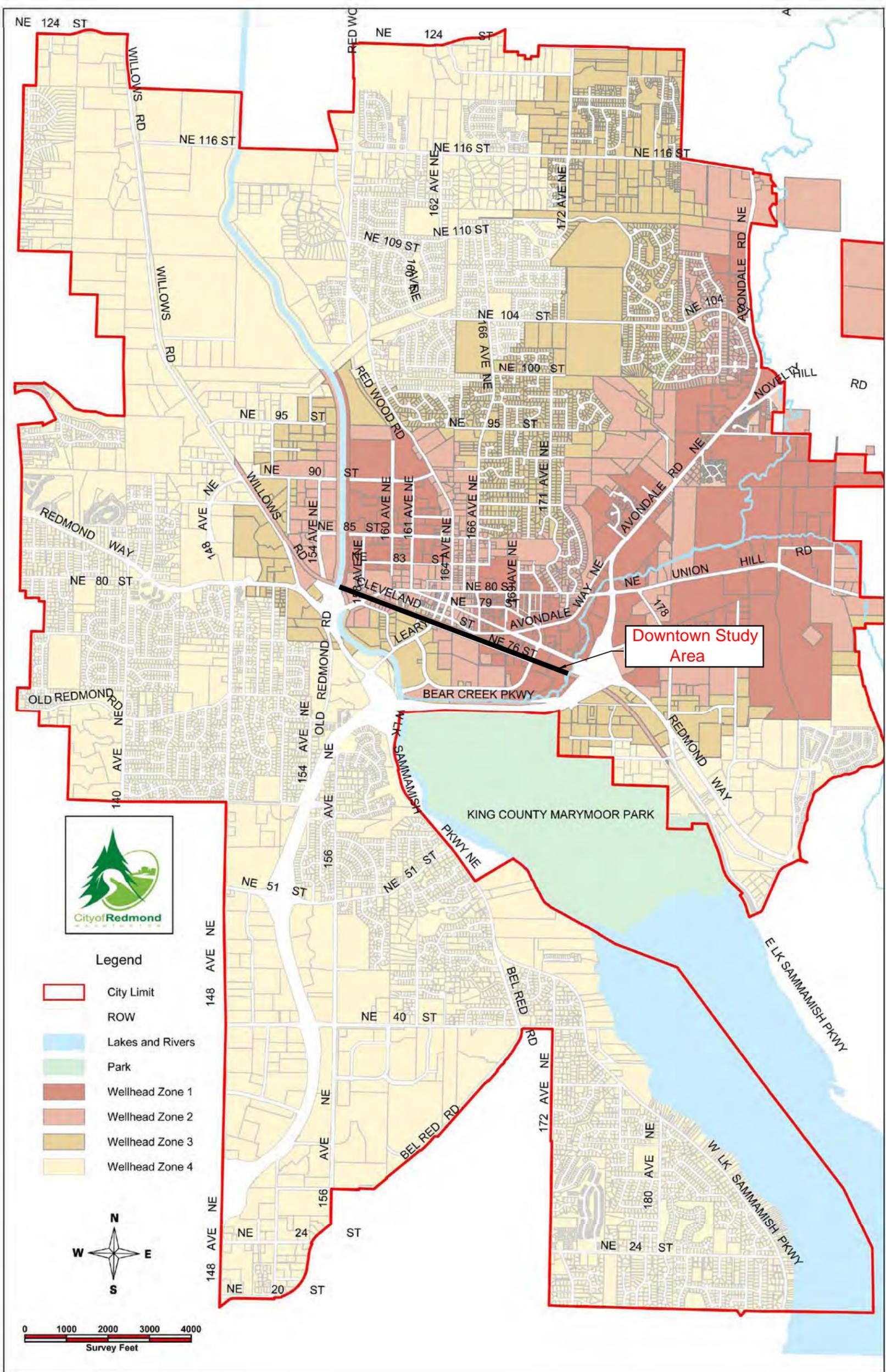
Produced February 2005
 K:\gisdata\project\SAO\101050017200\CriticalAreas\101050017200\FloodAreas\11x17.mxd

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: www.redmond.gov/cityservices/citymaps3.asp

Frequently Flooded Areas	
BNSF Rail Corridor Master Plan Redmond, Washington	
GEOENGINEERS 	Figure 6

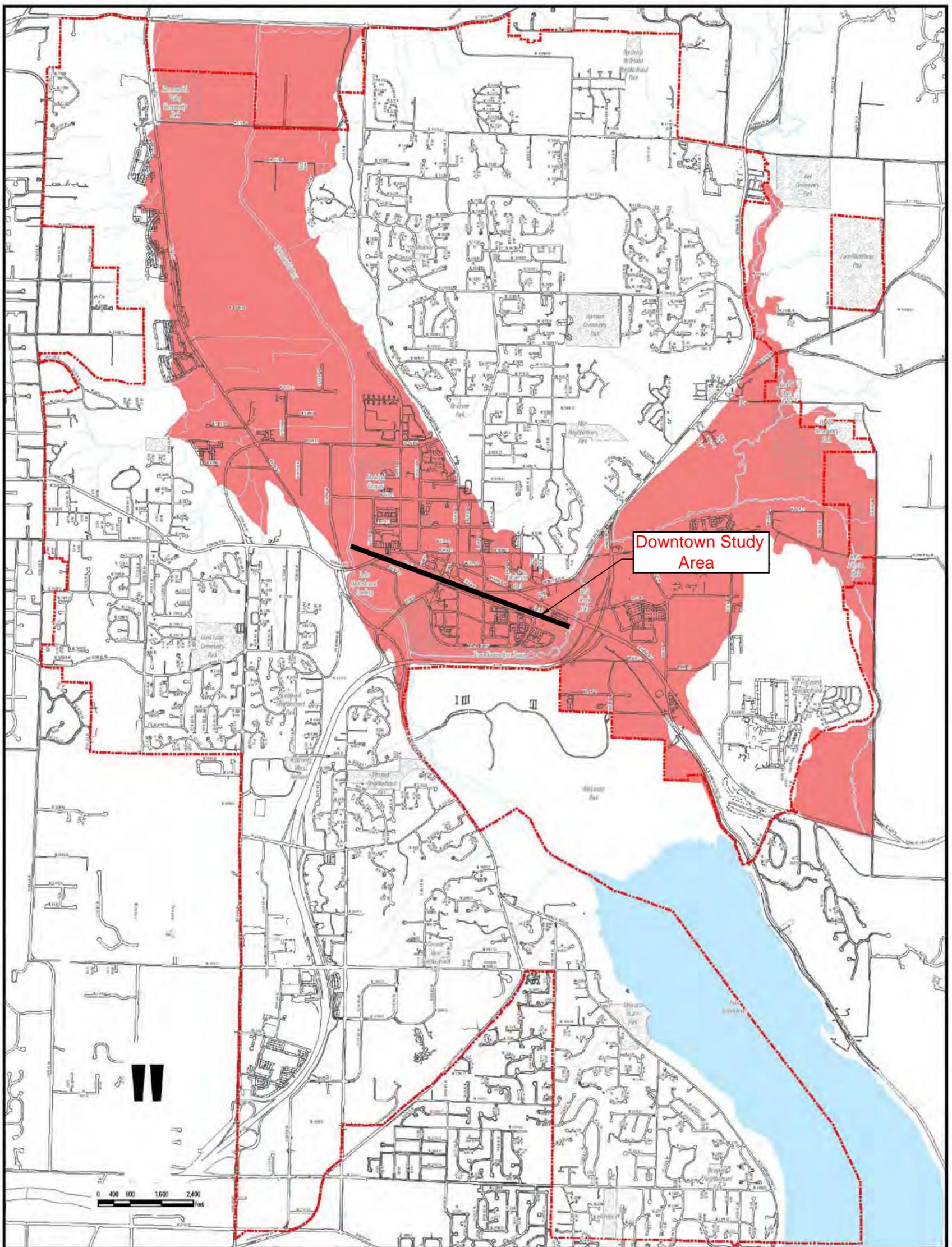


Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: www.redmond.gov/cityservices/citymaps3.asp

Critical Aquifer Recharge Areas	
BNSF Rail Corridor Master Plan Redmond, Washington	
GEOENGINEERS	Figure 7





City of Redmond
Critical Areas Map
Effective: 5/28/2005
Seismic Hazard Areas

Legend:

- Seismic Hazard Areas
- Redmond City Limits

Sources:
USGS Geologic Maps

Note:
This map shall be used as a general guide. It represents the approximate location of streams. Contact the Seismic Area Ordinance (SAO) for reporting requirements. In the event there is a conflict between the map and the criteria or standards of the SAO, the criteria shall prevail.

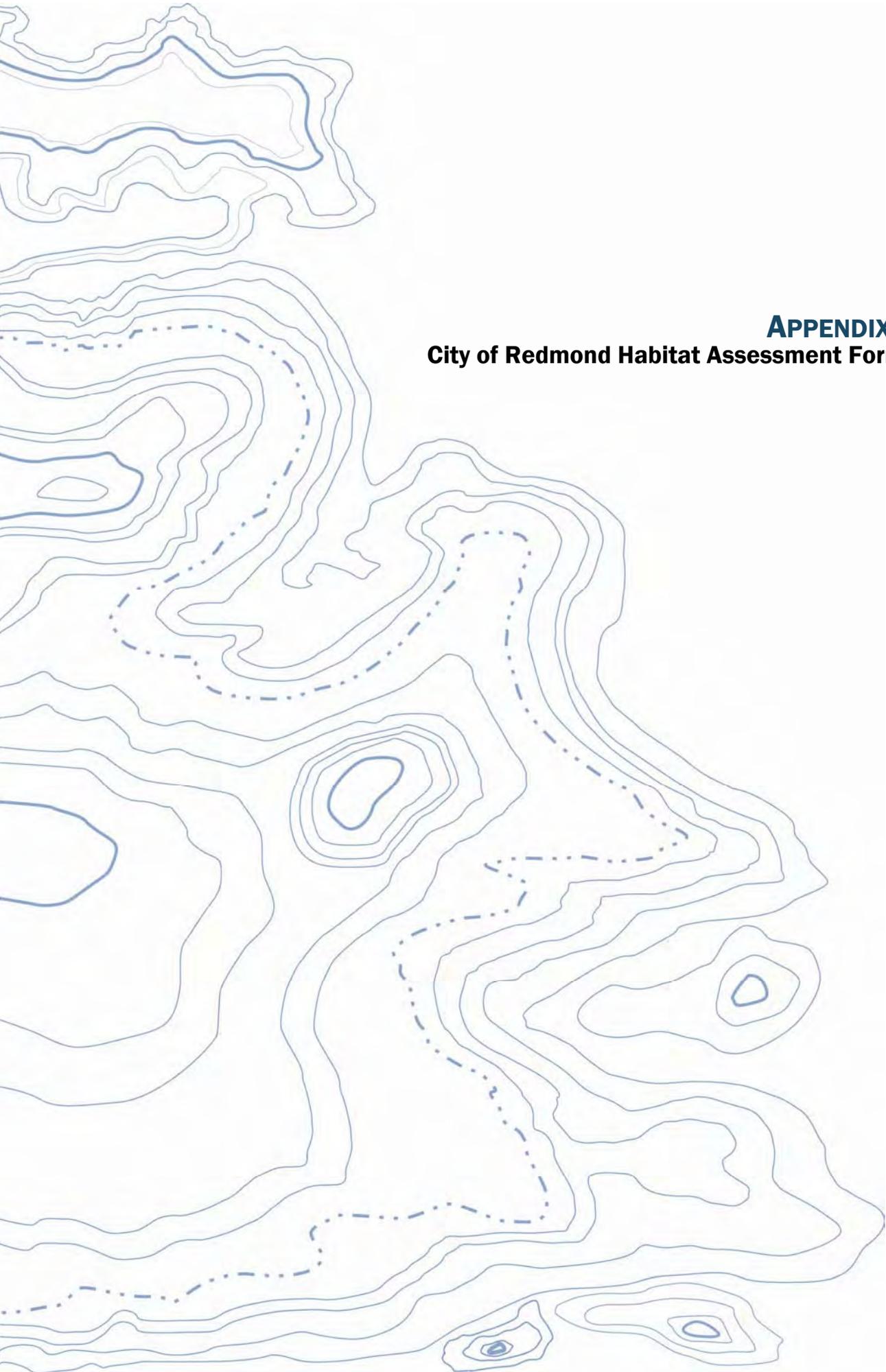
Produced: February 2005
I:\projects\SAO\Update2004\seismic1 1x17.mxd

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: www.redmond.gov/cityservices/citymaps3.asp

Seismic Hazard Areas	
BNSF Rail Corridor Master Plan Redmond, Washington	
	Figure 8



APPENDIX A
City of Redmond Habitat Assessment Forms

**CITY OF REDMOND
HABITAT UNIT ASSESSMENT FORM**

HABITAT UNIT:

Barrett's Open Space Easement

LOCATION:

East of Barrett's, West of Bear Creek

TOTAL SCORE:

15 of 27

Habitat Parameter	Scoring Criteria	Habitat Unit Score
Size	<ul style="list-style-type: none"> >50 acres = 3 points 10-50 acres = 2 points 0-10 acres = 1 point 	1
Vegetation Community Types	<ul style="list-style-type: none"> ≥ 4 types = 3 points 2-3 types = 2 points 1 type = 1 point None = 0 points 	1
Community Interspersion	<ul style="list-style-type: none"> High = 3 points Medium = 2 points Low = 1 point None = 0 points 	0
Priority Species Presence	<ul style="list-style-type: none"> Threatened & Endangered Species = 3 points Candidate Species = 2 points Monitor Species = 1 point None = 0 points 	0
Priority Species Habitat Use	<ul style="list-style-type: none"> Breeding = 3 points Roosting = 2 points Foraging = 1 point None = 0 points 	2
Habitat Continuity	<ul style="list-style-type: none"> Links protected habitats = 3 points Links unprotected habitats = 2 points Extends habitat corridor = 1 point None = 0 points 	3
Forest Vegetation Layers	<ul style="list-style-type: none"> 3 layers = 3 points 2 layers = 2 points 1 layers = 1 point None = 0 points 	3
Forest Age	<ul style="list-style-type: none"> Mature = 3 points Pole = 2 points Seedling/Shrub = 1 point None = 0 points 	3
Invasive Species Presence	<ul style="list-style-type: none"> 0-25% = 3 points 26-50% = 2 points 51-75% = 1 point 75-100% = 0 points 	2

**CITY OF REDMOND
HABITAT UNIT ASSESSMENT FORM**

VEGETATION COMMUNITY TYPES: *Forested w/ canopy, sub-canopy, shrub and herbaceous layers*

INVASIVE PLANTS: *Predominantly Himalayan Blackberry @ the fringes.*

HABITAT FEATURES (snags, perches, downed logs, etc):

WILDLIFE OBSERVATIONS (direct or indirect): *None*

THREATS TO HABITAT INTEGRITY: *Development, Daily human presence, noise, etc.*

OTHER NOTES: *Linked to the Bear Creek Riparian Corridor but severely disrupted on the South, west and north perimeter.*

WETLAND SUMMARY SHEET

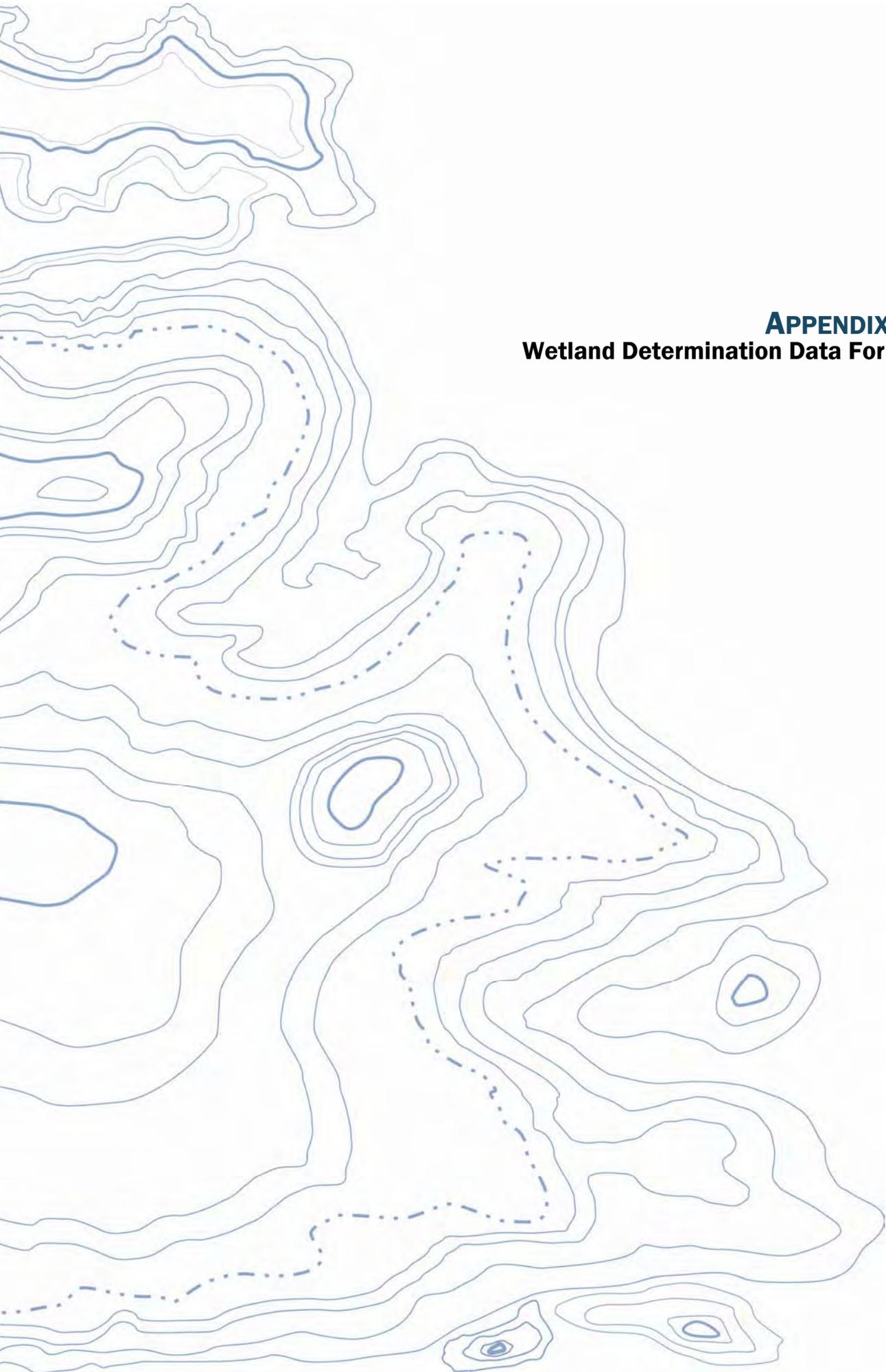
Wetland Summary			Buffer Summary				Wetland Impacts		Mitigation Summary		
Label ¹	Category ²	Size ³	Required ⁴	Proposed ⁵	Increase ⁸ Reduce ⁷	Averaging ⁹	Fill ⁹	Paper Fill ¹⁰	Ratio ¹¹	Area ¹²	Location ¹³
A	III	0.5 acres	60'								
B	III	0.4 acres	60'								
WR-12	II	?	150'								
Potential	III	0.2 acres	60'								

¹ Wetland A, B, C, etc
² Wetland category per City wetland classification system.
³ Area of wetland.
⁴ Required buffer width in feet per RCDDG
⁵ Proposed buffer width in feet
⁶ Does the uniqueness of the wetland require an increased buffer? If so, what is the width in feet.
⁷ Is there a request to reduce the buffer width? If so, what is the width in feet.
⁸ Is buffer averaging being used? If so, what is the average buffer width in feet.
⁹ Amount of wetland fill.
¹⁰ Amount of paper fill.
¹¹ Required ratio for wetland mitigation per RCDDG
¹² Size of mitigation area.
¹³ Note location of mitigation area (keyed to the mitigation map).

STREAM SUMMARY SHEET

Stream Summary			Buffer Summary			Riparian Corridor Summary		
Label ¹	Type ²	Linear Feet ³	Required ⁴	Proposed ⁵	Averaging ⁶	Disturbed Area ⁷	Filled Area ⁸	Mitigation Area ⁹
Proprietary Private Riparian	Class I	~100	150 feet					
	Class I	~100	150 feet					

¹ Stream A, B, C, etc.
² Stream type per City stream classification system.
³ Length of stream on the property.
⁴ Required buffer width in feet per RCODG.
⁵ Proposed buffer width in feet.
⁶ Note if buffer averaging is used. If so, identify minimum and maximum buffer widths in feet as well as area in square feet contained within the buffer prior to and after averaging.
⁷ Area of buffer that is disturbed in square feet.
⁸ Area of buffer to be filled in square feet, such as for a road crossing.
⁹ Location and size in square feet of riparian corridor mitigation.



APPENDIX B
Wetland Determination Data Forms

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

Project/Site: Sound Transit Light Link - Phase I City/County: Redmond Sampling Date: 6/21/2010
 Applicant/Owner: BNSF State: WA Sampling Point: 1
 Investigator(s): Thomas Bannister Section/Township/Range: Section 12, Township 25 North, Range 5 East
 Landform (hillslope, terrace, etc.): depression Local Relief (concave, convex, none:): concave Slope (%): 0%
 Subregion (LLR): NW Forests and Coast Lat: 47.66988 Long: -122.111021 Datum: _____
 Soil Map Unit Name: Indianola loamy fine sand, 0-4 percent slopes NWI Classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes No (if no, explain in Remarks.)
 Are Vegetation Soil Hydrology significantly disturbed? Are "normal circumstances" present? Yes No
 Are Vegetation Soil Hydrology naturally problematic? (if needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is the sampled area within a Wetland?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Hydric Soil Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Remarks:			

VEGETATION - Use scientific Names of plants.

Tree Stratum (Plot Size: <u>2,826 square feet</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet: Number of dominant Species That are OBL, FACW, or FAC: <u>1</u> (A)
1. <i>Pseudotsuga menziesii</i>	10	No	FACU	
2. <i>Salix sitchensis</i>	10	No	FACW	
3.				
4.				
	20	= Total Cover		Total Number of Dominant Species Across All Strata: <u>1</u> (B)
Sapling/Shurb Stratum (Plot Size: <u>78.5 square feet</u>)				Percent of dominant Species That are OBL, FACW, or FAC: <u>100.00</u> (A/B)
1.				
2.				
3.				
4.				
5.				
	0	= Total Cover		Prevalence Index Worksheet: Total % Cover of: _____ Multiply by: _____
Herb Stratum (Plot Size: <u>78.5 square feet</u>)				OBL Species _____ x 1 = <u>0</u> FACW Species <u>110</u> x 2 = <u>220</u> FAC Species _____ x 3 = <u>0</u> FACU Species <u>10</u> x 4 = <u>40</u> UPL Species _____ x 5 = <u>0</u> Column Totals: <u>120</u> (A) <u>260</u> (B) Prevalence Index = B/A = <u>2.17</u> Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance test is >50% <input checked="" type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (provide supporting data in Remarks or on a separate sheet.) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. <i>Phalaris arundinacea</i>	100	Yes	FACW	
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
	100	= Total Cover		¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Woody Vine Stratum (Plot Size: <u>2,826 square feet</u>)				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1.				
2.				
	0	= Total Cover		
% Bare Ground in Herb Stratum _____				
Remarks:				

SOIL

Sampling Point: 1

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			
0-2 inches	10 YR 3/2	100					silt loam	
2-4 inches							pea gravel	
4-16 inches	10 YR 4/1	80	2.5 YR 3/6	20	C	PL	silt loam	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histisol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Other (Explain Remarks)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
Restrictive Layer (if present): Type: _____ Depth (inches): _____		Hydric Soil Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Remarks: _____			

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)	
<input checked="" type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input checked="" type="checkbox"/> Dry-Season Water Table (C2) <input checked="" type="checkbox"/> Saturated Visible on Aerial Imagery (C9) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)	
Field Observations: Surface Water Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Depth (inches): <u>2 inches</u> Water Table Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Depth (inches): <u>8 inches</u> Saturation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Depth (inches): <u>4 inches</u> (includes capillary fringe)		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: _____			
Remarks: _____			

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

Project/Site: Sound Transit Light Link - Phase I City/County: Redmond Sampling Date: 6/21/2010
 Applicant/Owner: BNSF State: WA Sampling Point: 2
 Investigator(s): Thomas Bannister Section/Township/Range: Section 12, Township 25 North, Range 5 East
 Landform (hillslope, terrace, etc.): depression Local Relief (concave, convex, none:): concave Slope (%): 0%
 Subregion (LLR): NW Forests and Coast Lat: 47.66988 Long: -122.111021 Datum: _____
 Soil Map Unit Name: Indianola loamy fine sand, 0-4 percent slopes NWI Classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes No (if no, explain in Remarks.)
 Are Vegetation Soil Hydrology significantly disturbed? Are "normal circumstances" present? Yes No
 Are Vegetation Soil Hydrology naturally problematic? (if needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is the sampled area within a Wetland?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Hydric Soil Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Wetland Hydrology Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Remarks:			

VEGETATION - Use scientific Names of plants.

Tree Stratum (Plot Size: <u>2,826 square feet</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <i>Pseudotsuga menziesii</i>	15	No	FACU	
2. <i>Acer platanoides</i>	10	No	NI	That are OBL, FACW, or FAC: <u>1</u> (A)
3.				
4.				
	25	= Total Cover		Total Number of Dominant Species Across All Strata: <u>3</u> (B)
Sapling/Shurb Stratum (Plot Size: <u>78.5 square feet</u>)				
1. <i>Rubus armeniacus</i>	60	Yes	FACU	Percent of dominant Species
2. <i>Mahonia aquifolium</i>	20	Yes	NI	That are OBL, FACW, or FAC: <u>33.33</u> (A/B)
3.				
4.				
5.				Prevalence Index Worksheet:
	80	= Total Cover		Total % Cover of: _____ Multiply by:
Herb Stratum (Plot Size: <u>78.5 square feet</u>)				
1. <i>Phalaris arundinacea</i>	40	Yes	FACW	OBL Species _____ x 1 = <u>0</u>
2.				FACW Species <u>40</u> x 2 = <u>80</u>
3.				FAC Species _____ x 3 = <u>0</u>
4.				FACU Species <u>70</u> x 4 = <u>280</u>
5.				UPL Species _____ x 5 = <u>0</u>
6.				Column Totals: <u>110</u> (A) <u>360</u> (B)
7.				
8.				Prevalence Index = B/A = <u>3.27</u>
9.				Hydrophytic Vegetation Indicators:
10.				<input type="checkbox"/> Dominance test is >50%
11.				<input type="checkbox"/> Prevalence Index is ≤3.0 ¹
	40	= Total Cover		<input type="checkbox"/> Morphological Adaptations ¹ (provide supporting data in Remarks or on a separate sheet.)
Woody Vine Stratum (Plot Size: <u>2,826 square feet</u>)				<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1.				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2.				
	0	= Total Cover		
% Bare Ground in Herb Stratum _____				Hydrophytic Vegetation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Remarks:				

SOIL

Sampling Point: 2

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			
0-8 inches	10 YR 3/2	100					silt loam	
8-16 inches	10 YR 3/2	100	70	7.5 YR 3/4	C	PL	silt loam	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <input type="checkbox"/> Histisol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4)		Indicators for Problematic Hydric Soils³: <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)		<input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Other (Explain Remarks)	
Restrictive Layer (if present): Type: _____ Depth (inches): _____		Hydric Soil Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Remarks: _____					

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

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)	
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturated Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)	

Field Observations: Surface Water Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Water Table Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Saturation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (includes capillary fringe)		Depth (inches): _____ Depth (inches): _____ Depth (inches): _____		Wetland Hydrology Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
--	--	---	--	--	--

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

Remarks: _____

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

Project/Site: Sound Transit Light Link - Phase I City/County: Redmond Sampling Date: 6/21/2010
 Applicant/Owner: BNSF State: WA Sampling Point: 3
 Investigator(s): Thomas Bannister Section/Township/Range: Section 12, Township 25 North, Range 5 East
 Landform (hillslope, terrace, etc.): depression Local Relief (concave, convex, none:): concave Slope (%): 0%
 Subregion (LLR): NW Forests and Coast Lat: 47.66988 Long: -122.111021 Datum: _____
 Soil Map Unit Name: Earlmont silt loam NWI Classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes No (if no, explain in Remarks.)
 Are Vegetation Soil Hydrology significantly disturbed? Are "normal circumstances" present? Yes No
 Are Vegetation Soil Hydrology naturally problematic? (if needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is the sampled area within a Wetland?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Hydric Soil Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Remarks:			

VEGETATION - Use scientific Names of plants.

Tree Stratum (Plot Size: <u>2,826 square feet</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet: Number of dominant Species That are OBL, FACW, or FAC: <u>2</u> (A)
1. <i>Fraxinus latifolia</i>	50	Yes	FACW	
2. <i>Crataegeous douglasii</i>	15	No	FAC	Total Number of Dominant Species Across All Strata: <u>2</u> (B)
3.				
4.				Percent of dominant Species That are OBL, FACW, or FAC: <u>100.00</u> (A/B)
	65	= Total Cover		
Sapling/Shurb Stratum (Plot Size: <u>78.5 square feet</u>)				Prevalence Index Worksheet: Total % Cover of: <u>30</u> = Total Cover Multiply by:
1. <i>Rubus laciniatus</i>	15	No	FACU+	
2. <i>Rubus armeniacus</i>	15	No	FACU	FACW Species <u>100</u> x 2 = <u>200</u>
3.				FAC Species <u>15</u> x 3 = <u>45</u>
4.				FACU Species <u>30</u> x 4 = <u>120</u>
5.				UPL Species <u> </u> x 5 = <u>0</u>
	30	= Total Cover		Column Totals: <u>145</u> (A) <u>365</u> (B)
Herb Stratum (Plot Size: <u>78.5 square feet</u>)				Prevalence Index = B/A = <u>2.52</u>
1. <i>Phalaris arundinacea</i>	50	Yes	FACW	Hydrophytic Vegetation Indicators:
2.				<input checked="" type="checkbox"/> Dominance test is >50%
3.				<input checked="" type="checkbox"/> Prevalence Index is ≤3.0 ¹
4.				<input type="checkbox"/> Morphological Adaptations ¹ (provide supporting data in Remarks or on a separate sheet.)
5.				<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
6.				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
7.				
8.				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
9.				
10.				Remarks:
11.				
Woody Vine Stratum (Plot Size: <u>2,826 square feet</u>)				
1.				
2.				
	0	= Total Cover		
% Bare Ground in Herb Stratum _____				

SOIL

Sampling Point: 3

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			
0-6 inches	10 YR 3/2	100					sandy loam	
6-16 inches	10 YR 4/2	60	10 YR 5/6	40	C	PL	sandy loam	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histisol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input checked="" type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Other (Explain Remarks)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
Restrictive Layer (if present): Type: _____ Depth (inches): _____		Hydric Soil Present? <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Remarks: _____			

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)	
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturated Visible on Aerial Imagery (C9) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)	

Field Observations:		Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Surface Water Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Depth (inches): _____		
Water Table Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Depth (inches): <u>14 inches</u>		
Saturation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (includes capillary fringe)	Depth (inches): <u>10 inches</u>		

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

Remarks: _____

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

Project/Site: Sound Transit Light Link - Phase I City/County: Redmond Sampling Date: 6/21/2010
 Applicant/Owner: BNSF State: WA Sampling Point: 4
 Investigator(s): Thomas Bannister Section/Township/Range: Section 12, Township 25 North, Range 5 East
 Landform (hillslope, terrace, etc.): depression Local Relief (concave, convex, none:): concave Slope (%): 0%
 Subregion (LLR): NW Forests and Coast Lat: 47.66988 Long: -122.111021 Datum: _____
 Soil Map Unit Name: Earlmont silt loam NWI Classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes No (if no, explain in Remarks.)
 Are Vegetation Soil Hydrology significantly disturbed? Are "normal circumstances" present? Yes No
 Are Vegetation Soil Hydrology naturally problematic? (if needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is the sampled area within a Wetland?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Hydric Soil Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Wetland Hydrology Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Remarks:			

VEGETATION - Use scientific Names of plants.

Tree Stratum (Plot Size: <u>2,826 square feet</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:	
1. <i>Fraxinus latifolia</i>	30	Yes	FACW	Number of dominant Species	
2. <i>Crataegus spp.</i>	15	No	FACU+	That are OBL, FACW, or FAC:	1 (A)
3.					
4.					
	45	= Total Cover		Total Number of Dominant Species Across All Strata:	3 (B)
Sapling/Shrub Stratum (Plot Size: <u>78.5 square feet</u>)				Prevalence Index Worksheet:	
1. <i>Rubus armeniacus</i>	90	Yes	FACU	Total % Cover of:	Multiply by:
2. <i>Rubus laciniatus</i>	40	Yes	FACU+	OBL Species	x 1 = <u>0</u>
3.				FACW Species	x 2 = <u>60</u>
4.				FAC Species	x 3 = <u>0</u>
5.				FACU Species	x 4 = <u>580</u>
	130	= Total Cover		UPL Species	x 5 = <u>0</u>
Herb Stratum (Plot Size: <u>78.5 square feet</u>)				Column Totals:	<u>175</u> (A) <u>640</u> (B)
1.				Prevalence Index = B/A = <u>3.66</u>	
2.				Hydrophytic Vegetation Indicators:	
3.				<input type="checkbox"/> Dominance test is >50%	
4.				<input type="checkbox"/> Prevalence Index is ≤3.0 ¹	
5.				<input type="checkbox"/> Morphological Adaptations ¹ (provide supporting data in Remarks or on a separate sheet.)	
6.				<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
7.				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
8.				Hydrophytic Vegetation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
9.					
10.					
11.					
Woody Vine Stratum (Plot Size: <u>2,826 square feet</u>)					
1.					
2.					
	0	= Total Cover			
% Bare Ground in Herb Stratum					
Remarks:					

SOIL

Sampling Point: 4

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			
0-16 inches	10 YR 3/2	100					silt loam	

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histisol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Other (Explain Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present): Type: _____ Depth (inches): _____	Hydric Soil Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
--	--

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction Tilled Soils (C6)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Saturated Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Geomorphic Position (D2)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)
	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
	<input type="checkbox"/> Frost-Heave Hummocks (D7)

Field Observations:	
Surface Water Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Wetland Hydrology Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Water Table Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Saturation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
(includes capillary fringe)	Depth (inches): _____
	Depth (inches): _____
	Depth (inches): _____

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

Remarks:

A topographic map background with blue contour lines of varying thicknesses. A dashed blue line winds through the map, starting from the upper left and moving generally towards the lower right, crossing several contour lines. The map shows several peaks and valleys, with the dashed line following a path that appears to be a trail or a specific route.

APPENDIX C
Wetland Rating Forms

WETLAND RATING FORM – WESTERN WASHINGTON
Version 2 – Updated July 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): **Potential Wetland**

Date of site visit: **June 21, 2010**

Rated by: **Thomas Bannister**

Trained by Ecology? Yes No

Date of training: October 2008

SEC: 12

TWNSHP: 25N

RNGE: 5E

Is S/T/R in Appendix D? Yes No

Map of wetland unit:

Estimated size: **0.1 acres**

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland: I II III IV

Category I =	Score > 70
Category II =	Score 51 - 69
Category III =	Score 30 – 50
Category IV =	Score < 30

Score for Water Quality Functions

14

Score for Hydrologic Functions

7

Score for Habitat Functions

10

TOTAL Score for Functions

31

Category based on SPECIAL CHARACTERISTICS of Wetland I II Does not apply

Final Category (choose the “highest” category from above”) **III**

Summary of basic information about the wetland unit.

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine	<input type="checkbox"/>	Depressional	<input checked="" type="checkbox"/>
Natural Heritage Wetland	<input type="checkbox"/>	Riverine	<input type="checkbox"/>
Bog	<input type="checkbox"/>	Lake-fringe	<input type="checkbox"/>
Mature Forest	<input type="checkbox"/>	Slope	<input type="checkbox"/>
Old Growth Forest	<input type="checkbox"/>	Flats	<input type="checkbox"/>
Coastal Lagoon	<input type="checkbox"/>	Freshwater Tidal	<input type="checkbox"/>
Interdunal	<input type="checkbox"/>		
None of the above	<input checked="" type="checkbox"/>	Check if unit has multiple HGM classes present	<input type="checkbox"/>

Does the wetland being rated meet any of the criteria below? If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands that Need Additional Protection (in addition to the protection recommended for its category)	YES	NO
SP1. <i>Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered animal or plant species (T/E species)?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state or federal database.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP2. <i>Has the wetland unit been documented as habitat for any State listed Threatened or Endangered animal species?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category 1 Natural Heritage Wetlands (see p. 19 of data form).	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP3. <i>Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP4. <i>Does the wetland unit have a local significance in addition to its functions?</i> For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands in to those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Classification of Vegetated Wetlands for Western Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides (i.e. except during floods)?

NO – go to 2

YES – the wetland class is **Tidal Fringe**

If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

YES – **Freshwater Tidal Fringe**

NO – **Saltwater Tidal Fringe (Estuarine)**

If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is a Saltwater Tidal Fringe it is rated as an **Estuarine** wetland. Wetlands that were call estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term “Estuarine” wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p. ____).

2. The entire wetland unit is flat and precipitation is only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO – go to 3

YES – The wetland class is **Flats**

If your wetland can be classified as a “Flats” wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland meet both of the following criteria?

The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) where at least 20 acres (8ha) in size;

At least 30% of the open water area is deeper than 6.6 (2 m)?

NO – go to 4

YES – The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland meet all of the following criteria?

The wetland is on a slope (*slope can be very gradual*).

The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.

The water leaves the wetland **without being impounded**?

NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).*

NO – go to 5

YES – The wetland class is **Slope**

5. Does the entire wetland meet all of the following criteria?

The unit is in a valley or stream channel where it gets inundated by overbank flooding from that stream or river.

The overbank flooding occurs at least once every two years.

NOTE: *The riverine unit can contain depressions that are filled with water when the river is not flooding.*

NO – go to 6

YES – The wetland class is **Riverine**

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year. This means that any outlet, if present is higher than the interior of the wetland.

NO – go to 7

YES – The wetland class is **Depressional**

7. Is the entire wetland located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

No – go to 8

YES – The wetland class is **Depressional**

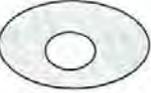
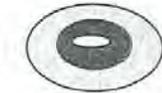
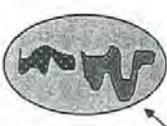
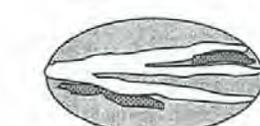
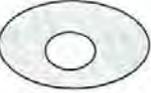
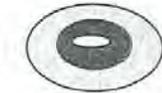
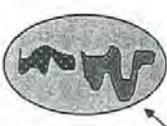
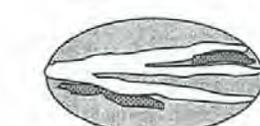
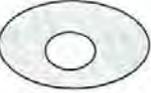
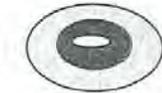
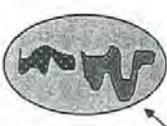
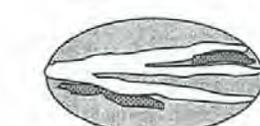
8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

HGM Classes within the wetland unit being rated	HGM Class to Use in Rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

HYDROLOGIC FUNCTIONS – Indicators that wetland unit functions to reduce flooding and stream degradation.		
D 3	Does the wetland have the <u>potential</u> to reduce flooding and erosion?	(see p.46)
	D 3.1 Characteristics of surface water flows out of the wetland unit <ul style="list-style-type: none"> • Unit is a depression with no surface water leaving it (no outlet)..... points = 4 • Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 • Unit is a “flat” depression (Q.7 on key) or in the Flats class, with permanent surface outflow and no obvious natural outlet and/or outlet is a man-made ditch..... points = 1 (If ditch is not permanently flowing treat unit as “intermittently flowing”) • Unit has an unconstricted, or slightly constricted, surface outlet (permanently flowing) points = 0 	4
	D 3.2 Depth of storage during wet periods. <i>Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).</i> <ul style="list-style-type: none"> • Marks of ponding are 3 ft. or more above the surface or bottom of the outlet points = 7 • The wetland is a “headwater” wetland..... points = 5 • Marks of ponding between 2 ft. to < 3 ft. from surface or bottom of outlet points = 5 • Marks are at least 0.5 ft. to < 2 ft. from surface or bottom of outlet points = 3 • Wetland is flat (yes to Q.2 or Q.7 on key)but has small depressions on the surface that trap water points = 1 • Marks of ponding less than 0.5 ft points = 0 	0
	D 3.3 Contribution of wetland unit to storage in the watershed: <i>Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.</i> <ul style="list-style-type: none"> • The area of the basin is less than 10 times the area of unit..... points = 5 • The area of the basin is 10 to 100 times the area of the unit points = 3 • The area of the basin is more than 100 times the area of the unit points = 0 • Entire unit is in the FLATS class points = 5 	3
Total for D 3		<i>Add the points in the boxes above</i>
		7
D 4	Does the wetland have the <u>opportunity</u> to reduce flooding and erosion?	(see p. 49)
	Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. <i>Note which of the following indicators of opportunity apply.</i> <ul style="list-style-type: none"> <input type="checkbox"/> Wetland is in a headwater of a river or stream that has flooding problems. <input type="checkbox"/> Wetland drains to a river or stream that has flooding problems <input type="checkbox"/> Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems <input type="checkbox"/> Other _____ <p style="text-align: center;">YES multiplier is 2 NO multiplier is 1</p>	Multiplier 1
◆	TOTAL – Hydrologic Functions	Multiply the score from D3 by D4; then <i>add score to table on p. 1</i>
		7

Comments:

<i>These questions apply to wetlands of all HGM classes.</i> HABITAT FUNCTIONS – Indicators that wetland functions to provide important habitat.		Points (only 1 score per box)											
H 1	Does the wetland have the <u>potential</u> to provide habitat for many species?	Figure ____											
	H 1.1 <u>Vegetation structure</u> (see P. 72): Check the types of vegetation classes present (as defined by Cowardin) – Size threshold for each class is 1/4 acre or more than 10% of the area if unit is smaller than 2.5 acres. <input type="checkbox"/> Aquatic Bed <input checked="" type="checkbox"/> Emergent plants <input type="checkbox"/> Scrub/shrub (areas where shrubs have > 30% cover) <input type="checkbox"/> Forested (areas where trees have > 30% cover) If the unit has a forested class check if: <input type="checkbox"/> The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon. Add the number of vegetation types that qualify. If you have: <table style="margin-left: 20px; border: none;"> <tr> <td style="padding-right: 20px;">4 structures or more.....</td> <td>points = 4</td> <td style="padding-left: 20px;">Map of Cowardin vegetation classes</td> </tr> <tr> <td>3 structures.....</td> <td>points = 2</td> <td>3 structures.....</td> <td>points = 2</td> </tr> <tr> <td>2 structures.....</td> <td>points = 1</td> <td>1 structure.....</td> <td>points = 0</td> </tr> </table>	4 structures or more.....	points = 4	Map of Cowardin vegetation classes	3 structures.....	points = 2	3 structures.....	points = 2	2 structures.....	points = 1	1 structure.....	points = 0	0
4 structures or more.....	points = 4	Map of Cowardin vegetation classes											
3 structures.....	points = 2	3 structures.....	points = 2										
2 structures.....	points = 1	1 structure.....	points = 0										
	H 1.2 <u>Hydroperiods</u> (see p.73): Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4 acre to count (see text for descriptions of hydroperiods). <input type="checkbox"/> Permanently flooded or inundated <input checked="" type="checkbox"/> Seasonally flooded or inundated <input type="checkbox"/> Occasionally flooded or inundated <input checked="" type="checkbox"/> Saturated only <input type="checkbox"/> Permanently flowing stream or river in, or adjacent to, the wetland <input type="checkbox"/> Seasonally flowing stream in, or adjacent to, the wetland <input type="checkbox"/> Lake-fringe wetland..... = 2 points <input type="checkbox"/> Freshwater tidal wetland..... = 2 points	Figure ____											
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; padding-right: 20px;"> 4 or more types present points = 3 3 or more types present..... points = 2 2 types present..... points = 1 1 type present points = 0 </td> <td style="width: 50%; vertical-align: top;"> Map of hydroperiods </td> </tr> </table>	4 or more types present points = 3 3 or more types present..... points = 2 2 types present..... points = 1 1 type present points = 0	Map of hydroperiods	1									
4 or more types present points = 3 3 or more types present..... points = 2 2 types present..... points = 1 1 type present points = 0	Map of hydroperiods												
	H 1.3 <u>Richness of Plant Species</u> (see p. 75): Count the number of plant species in the wetland that cover at least 10 ft ² (different patches of the same species can be combined to meet the size threshold) You do not have to name the species. Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle. If you counted: <table style="margin-left: 20px; border: none;"> <tr> <td style="padding-right: 20px;">> 19 species</td> <td>points = 2</td> </tr> <tr> <td>5 – 19 species.....</td> <td>points = 1</td> </tr> <tr> <td>< 5 species</td> <td>points = 0</td> </tr> </table> List species below if you want to: _____ _____ _____	> 19 species	points = 2	5 – 19 species.....	points = 1	< 5 species	points = 0	1					
> 19 species	points = 2												
5 – 19 species.....	points = 1												
< 5 species	points = 0												
	H 1.4 <u>Interspersion of Habitats</u> (see p. 76): Decided from the diagrams below whether interspersion between Cowardin vegetation (described in H1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.	Figure ____											
	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">  None = 0 points </td> <td style="text-align: center;">  Low = 1 point </td> <td style="text-align: center;">  Moderate = 2 points </td> <td style="text-align: center;">  High = 3 points </td> </tr> <tr> <td style="text-align: center;">    [riparian braided channels] </td> <td style="vertical-align: top; padding-left: 20px;"> Note: If you have 4 or more classes or 3 vegetation classes and open water, the rating is always “high”. Use map of Cowardin classes. </td> </tr> </table>	 None = 0 points	 Low = 1 point	 Moderate = 2 points	 High = 3 points	   [riparian braided channels]	Note: If you have 4 or more classes or 3 vegetation classes and open water, the rating is always “high”. Use map of Cowardin classes.	0					
 None = 0 points	 Low = 1 point	 Moderate = 2 points	 High = 3 points										
   [riparian braided channels]	Note: If you have 4 or more classes or 3 vegetation classes and open water, the rating is always “high”. Use map of Cowardin classes.												
	H 1.5 <u>Special Habitat Features</u> (see p. 77): Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column. <ul style="list-style-type: none"> <input type="checkbox"/> Large, downed, woody debris within the wetland (> 4 in. diameter and 6 ft. long) <input type="checkbox"/> Standing snags (diameter at the bottom > 4 inches) in the wetland <input type="checkbox"/> Undercut banks are present for at least 6.6 ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft. (10m) <input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (cut shrubs or trees that have not yet turned grey/brown) <input type="checkbox"/> At least 1/4 acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated (structures for egg-laying by amphibians) <input type="checkbox"/> Invasive plants cover less than 25% of the wetland area in each stratum of plants NOTE: The 20% stated in early printings of the manual on page 78 is an error.	0											
H 1 TOTAL Score – potential for providing habitat		Add the points in the column above											
		2											

	<p>H 2.3 Near or adjacent to other priority habitats listed by WDFW (<i>see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm</i>)</p> <p>Which of the following priority habitats are within 330ft (100m) of the wetland unit? <i>NOTE: the connections do not have to be relatively undisturbed.</i></p> <p><input type="checkbox"/> Aspen Stands: Pure or mixed stands of aspen greater than 0.4 ha (1 acre).</p> <p><input checked="" type="checkbox"/> Biodiversity Areas and Corridors: Areas of habitat that are relatively important to various species of native fish and wildlife (<i>full descriptions in WDFW PHS report p. 152</i>).</p> <p><input type="checkbox"/> Herbaceous Balds: Variable size patches of grass and forbs on shallow soils over bedrock.</p> <p><input type="checkbox"/> Old-growth/Mature forests: (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less than 100%; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest.</p> <p><input type="checkbox"/> Oregon white Oak: Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (<i>full descriptions in WDFW PHS report p. 158</i>).</p> <p><input checked="" type="checkbox"/> Riparian: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.</p> <p><input type="checkbox"/> Westside Prairies: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (<i>full descriptions in WDFW PHS report p. 161</i>).</p> <p><input checked="" type="checkbox"/> Instream: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.</p> <p><input type="checkbox"/> Nearshore: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (<i>full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A</i>).</p> <p><input type="checkbox"/> Caves: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.</p> <p><input type="checkbox"/> Cliffs: Greater than 7.6 m (25 ft) high and occurring below 5000 ft.</p> <p><input type="checkbox"/> Talus: Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.</p> <p><input type="checkbox"/> Snags and Logs: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long.</p> <p>If wetland has 3 or more priority habitats = 4 points If wetland has 2 priority habitats = 3 points If wetland has 1 priority habitat = 1 point No habitats = 0 points <i>Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)</i></p>	4
	<p>H 2.4 <u>Wetland Landscape:</u> Choose the one description of the landscape around the wetland that best fits (<i>see p. 84</i>)</p> <ul style="list-style-type: none"> • There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development.....points = 5 • The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within 1/2 milepoints = 5 • There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed.points = 3 • The wetland fringe on a lake with disturbance and there are 3 other lake-fringe wetlands within 1/2 milepoints = 3 • There is at least 1 wetland within 1/2 milepoints = 2 • There are no wetlands within 1/2 mile.....points = 0 	2
	<p>H 2 TOTAL Score – opportunity for providing habitat <i>Add the scores from H2.1, H2.2, H2.3, H2.4</i></p>	8
	<p style="text-align: right;"><i>TOTAL for H 1 from page 8</i></p>	2
◆	<p>Total Score for Habitat Functions Add the points for H 1 and H 2; then record the result on p. 1</p>	10

Comments:

<p>SC4</p>	<p>Forested Wetlands (see p. 90) Does the wetland have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife’s forests as priority habitats? <i>If you answer yes you will still need to rate the wetland based on its function.</i> <input type="checkbox"/> Old-growth forests: (west of Cascade Crest) Stands of at least two three species forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm or more). NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and “OR” so old-growth forests do not necessarily have to have trees of this diameter. <input type="checkbox"/> Mature forests: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have an average diameters (dbh) exceeding 21 inches (53 cm); crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. YES = Category I NO = <input checked="" type="checkbox"/> not a forested wetland with special characteristics</p>	<p>Cat. I</p>
<p>SC5</p>	<p>Wetlands in Coastal Lagoons (see p. 91) Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? <input type="checkbox"/> The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks. <input type="checkbox"/> The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (<i>needs to be measured near the bottom.</i>) YES = Go to SC 5.1 NO <input checked="" type="checkbox"/> not a wetland in a coastal lagoon SC 5.1 Does the wetland meet all of the following three conditions? <input type="checkbox"/> The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing) and has less than 20% cover of invasive plant species (see list of invasive species on p. 74). <input type="checkbox"/> At least 3/4 of the landward edge of the wetland has a 100 ft. buffer of shrub, forest, or un-grazed or un-mowed grassland. <input type="checkbox"/> The wetland is larger than 1/10 acre (4350 square ft.) YES = Category I NO = Category II</p>	<p>Cat. I Cat. II</p>
<p>SC6</p>	<p>Interdunal Wetlands (see p. 93) Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? YES = Go to SC 6.1 NO <input checked="" type="checkbox"/> not an interdunal wetland for rating <i>If you answer yes you will still need to rate the wetland based on its functions.</i> In practical terms that means the following geographic areas: <ul style="list-style-type: none"> • Long Beach Peninsula -- lands west of SR 103 • Grayland-Westport -- lands west of SR 105 • Ocean Shores-Copalis – lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is one acre or larger? YES = Category II NO = go to SC 6.2 SC 6.2 Is the wetland between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? YES = Category III</p>	<p>Cat. II Cat. III</p>
<p>◆</p>	<p>Category of wetland based on Special Characteristics Choose the “highest” rating if wetland falls into several categories, and record on p. 1. If you answered NO for all types enter “Not Applicable” on p. 1</p>	

Comments:

WETLAND RATING FORM – WESTERN WASHINGTON
Version 2 – Updated July 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): **Wetland A**

Date of site visit: **June 21, 2010**

Rated by: **Thomas Bannister**

Trained by Ecology? Yes No

Date of training: October 2008

SEC: 12

TWNSHP: 25N

RNGE: 5E

Is S/T/R in Appendix D? Yes No

Map of wetland unit:

Estimated size: **0.5 acres**

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland: I II III IV

Category I =	Score > 70
Category II =	Score 51 - 69
Category III =	Score 30 – 50
Category IV =	Score < 30

Score for Water Quality Functions

20

Score for Hydrologic Functions

20

Score for Habitat Functions

10

TOTAL Score for Functions

50

Category based on SPECIAL CHARACTERISTICS of Wetland I II Does not apply

Final Category (choose the “highest” category from above”) **III**

Summary of basic information about the wetland unit.

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine	<input type="checkbox"/>	Depressional	<input checked="" type="checkbox"/>
Natural Heritage Wetland	<input type="checkbox"/>	Riverine	<input type="checkbox"/>
Bog	<input type="checkbox"/>	Lake-fringe	<input type="checkbox"/>
Mature Forest	<input type="checkbox"/>	Slope	<input type="checkbox"/>
Old Growth Forest	<input type="checkbox"/>	Flats	<input type="checkbox"/>
Coastal Lagoon	<input type="checkbox"/>	Freshwater Tidal	<input type="checkbox"/>
Interdunal	<input type="checkbox"/>		
None of the above	<input checked="" type="checkbox"/>	Check if unit has multiple HGM classes present	<input type="checkbox"/>

Does the wetland being rated meet any of the criteria below? If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands that Need Additional Protection (in addition to the protection recommended for its category)	YES	NO
SP1. <i>Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered animal or plant species (T/E species)?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state or federal database.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP2. <i>Has the wetland unit been documented as habitat for any State listed Threatened or Endangered animal species?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category 1 Natural Heritage Wetlands (see p. 19 of data form).	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP3. <i>Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP4. <i>Does the wetland unit have a local significance in addition to its functions?</i> For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands in to those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Classification of Vegetated Wetlands for Western Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides (i.e. except during floods)?
 NO – go to 2 YES – the wetland class is **Tidal Fringe**
 If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?
 YES – **Freshwater Tidal Fringe** NO – **Saltwater Tidal Fringe (Estuarine)**
*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is a Saltwater Tidal Fringe it is rated as an **Estuarine** wetland. Wetlands that were call estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term “Estuarine” wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p. ____).*

2. The entire wetland unit is flat and precipitation is only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.
 NO – go to 3 YES – The wetland class is **Flats**
 If your wetland can be classified as a “Flats” wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland meet both of the following criteria?
 The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) where at least 20 acres (8ha) in size;
 At least 30% of the open water area is deeper than 6.6 (2 m)?
 NO – go to 4 YES – The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland meet all of the following criteria?
 The wetland is on a slope (*slope can be very gradual*).
 The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
 The water leaves the wetland **without being impounded?**
 NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).*
 NO – go to 5 YES – The wetland class is **Slope**

5. Does the entire wetland meet all of the following criteria?
 The unit is in a valley or stream channel where it gets inundated by overbank flooding from that stream or river.
 The overbank flooding occurs at least once every two years.
 NOTE: *The riverine unit can contain depressions that are filled with water when the river is not flooding.*
 NO – go to 6 YES – The wetland class is **Riverine**

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year. This means that any outlet, if present is higher than the interior of the wetland.
 NO – go to 7 YES – The wetland class is **Depressional**

7. Is the entire wetland located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.
 No – go to 8 YES – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

HGM Classes within the wetland unit being rated	HGM Class to Use in Rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

D Depressional and Flat Wetlands		Points
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		(only 1 score per box) (see p.38)
D 1	Does the wetland have the <u>potential</u> to improve water quality?	
	D 1.1 Characteristics of surface water flows out of the wetland: <ul style="list-style-type: none"> • Unit is a depression with no surface water leaving it (no outlet)..... points = 3 • Unit has an intermittently flowing, OR highly constricted, permanently flowing outlet points = 2 • Unit has an unconstricted, or slightly constricted, surface outlet (<i>permanently flowing</i>) points = 1 • Unit is a “flat” depression (Q.7 on key), or in the Flats class, with permanent surface outflow and no obvious natural outlet and/or outlet is a man-made ditch..... points = 1 (If ditch is not permanently flowing treat unit as “intermittently flowing”) Provide photo or drawing 	Figure ___ 3
	D 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic (<i>use NRCS definitions</i>) YES points = 4 NO points = 0	0
	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class): <ul style="list-style-type: none"> • Wetland has persistent, ungrazed vegetation > = 95% of area..... points = 5 • Wetland has persistent, ungrazed vegetation > = 1/2 of area..... points = 3 • Wetland has persistent, ungrazed vegetation > = 1/10 of area..... points = 1 • Wetland has persistent, ungrazed vegetation < 1/10 of area..... points = 0 Map of Cowardin vegetation classes	Figure ____ 5
	D 1.4 Characteristics of seasonal ponding or inundation: <i>This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 years.</i> <ul style="list-style-type: none"> • Area seasonally ponded is > 1/2 total area of wetland points = 4 • Area seasonally ponded is > 1/4 total area of wetland points = 2 • Area seasonally ponded is < 1/4 total area of wetland points = 0 Map of Hydroperiods	Figure ____ 2
Total for D 1		<i>Add the points in the boxes above</i> 10
D 2	Does the wetland have the <u>opportunity</u> to improve water quality?	(see p. 44)
	Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <ul style="list-style-type: none"> <input type="checkbox"/> Grazing in the wetland or within 150 ft <input checked="" type="checkbox"/> Untreated stormwater discharges to wetland <input type="checkbox"/> Tilled fields or orchards within 150 ft. of wetland <input checked="" type="checkbox"/> A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging <input checked="" type="checkbox"/> Residential, urban areas, golf courses are within 150 ft. of wetland <input type="checkbox"/> Wetland is fed by groundwater high in phosphorus or nitrogen <input type="checkbox"/> Other _____ YES multiplier is 2 NO multiplier is 1	Multiplier 2
◆	TOTAL – Water Quality Functions	Multiply the score from D1 by D2; then <i>add score to table on p. 1</i> 20

HYDROLOGIC FUNCTIONS – Indicators that wetland unit functions to reduce flooding and stream degradation.		
D 3	Does the wetland have the <u>potential</u> to reduce flooding and erosion?	(see p.46)
	D 3.1 Characteristics of surface water flows out of the wetland unit <ul style="list-style-type: none"> • Unit is a depression with no surface water leaving it (no outlet)..... points = 4 • Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 • Unit is a “flat” depression (Q.7 on key) or in the Flats class, with permanent surface outflow and no obvious natural outlet and/or outlet is a man-made ditch..... points = 1 (If ditch is not permanently flowing treat unit as “intermittently flowing”) • Unit has an unconstricted, or slightly constricted, surface outlet (permanently flowing) points = 0 	4
	D 3.2 Depth of storage during wet periods. <i>Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).</i> <ul style="list-style-type: none"> • Marks of ponding are 3 ft. or more above the surface or bottom of the outlet points = 7 • The wetland is a “headwater” wetland..... points = 5 • Marks of ponding between 2 ft. to < 3 ft. from surface or bottom of outlet points = 5 • Marks are at least 0.5 ft. to < 2 ft. from surface or bottom of outlet points = 3 • Wetland is flat (yes to Q.2 or Q.7 on key)but has small depressions on the surface that trap water points = 1 • Marks of ponding less than 0.5 ft points = 0 	3
	D 3.3 Contribution of wetland unit to storage in the watershed: <i>Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.</i> <ul style="list-style-type: none"> • The area of the basin is less than 10 times the area of unit..... points = 5 • The area of the basin is 10 to 100 times the area of the unit points = 3 • The area of the basin is more than 100 times the area of the unit points = 0 • Entire unit is in the FLATS class points = 5 	3
Total for D 3		<i>Add the points in the boxes above</i>
		10
D 4	Does the wetland have the <u>opportunity</u> to reduce flooding and erosion?	(see p. 49)
	Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. <i>Note which of the following indicators of opportunity apply.</i> <ul style="list-style-type: none"> <input type="checkbox"/> Wetland is in a headwater of a river or stream that has flooding problems. <input type="checkbox"/> Wetland drains to a river or stream that has flooding problems <input checked="" type="checkbox"/> Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems <input type="checkbox"/> Other _____ <p style="text-align: center;">YES multiplier is 2 NO multiplier is 1</p>	Multiplier 2
◆	TOTAL – Hydrologic Functions	Multiply the score from D3 by D4; then <i>add score to table on p. 1</i>
		20

Comments:

	<p>H 2.3 Near or adjacent to other priority habitats listed by WDFW (<i>see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm</i>)</p> <p>Which of the following priority habitats are within 330ft (100m) of the wetland unit? <i>NOTE: the connections do not have to be relatively undisturbed.</i></p> <p><input type="checkbox"/> Aspen Stands: Pure or mixed stands of aspen greater than 0.4 ha (1 acre).</p> <p><input checked="" type="checkbox"/> Biodiversity Areas and Corridors: Areas of habitat that are relatively important to various species of native fish and wildlife (<i>full descriptions in WDFW PHS report p. 152</i>).</p> <p><input type="checkbox"/> Herbaceous Balds: Variable size patches of grass and forbs on shallow soils over bedrock.</p> <p><input type="checkbox"/> Old-growth/Mature forests: (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less than 100%; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest.</p> <p><input type="checkbox"/> Oregon white Oak: Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (<i>full descriptions in WDFW PHS report p. 158</i>).</p> <p><input checked="" type="checkbox"/> Riparian: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.</p> <p><input type="checkbox"/> Westside Prairies: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (<i>full descriptions in WDFW PHS report p. 161</i>).</p> <p><input checked="" type="checkbox"/> Instream: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.</p> <p><input type="checkbox"/> Nearshore: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (<i>full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A</i>).</p> <p><input type="checkbox"/> Caves: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.</p> <p><input type="checkbox"/> Cliffs: Greater than 7.6 m (25 ft) high and occurring below 5000 ft.</p> <p><input type="checkbox"/> Talus: Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.</p> <p><input type="checkbox"/> Snags and Logs: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long.</p> <p>If wetland has 3 or more priority habitats = 4 points If wetland has 2 priority habitats = 3 points If wetland has 1 priority habitat = 1 point No habitats = 0 points <i>Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)</i></p>	4
	<p>H 2.4 <u>Wetland Landscape:</u> Choose the one description of the landscape around the wetland that best fits (<i>see p. 84</i>)</p> <ul style="list-style-type: none"> • There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development.....points = 5 • The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within 1/2 milepoints = 5 • There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed.points = 3 • The wetland fringe on a lake with disturbance and there are 3 other lake-fringe wetlands within 1/2 milepoints = 3 • There is at least 1 wetland within 1/2 milepoints = 2 • There are no wetlands within 1/2 mile.....points = 0 	2
	<p>H 2 TOTAL Score – opportunity for providing habitat <i>Add the scores from H2.1, H2.2, H2.3, H2.4</i></p>	7
	<p><i>TOTAL for H 1 from page 8</i></p>	3
◆	<p>Total Score for Habitat Functions Add the points for H 1 and H 2; then record the result on p. 1</p>	10

Comments:

<p>SC4</p>	<p>Forested Wetlands (see p. 90) Does the wetland have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife’s forests as priority habitats? <i>If you answer yes you will still need to rate the wetland based on its function.</i> <input type="checkbox"/> Old-growth forests: (west of Cascade Crest) Stands of at least two three species forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm or more). NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and “OR” so old-growth forests do not necessarily have to have trees of this diameter. <input type="checkbox"/> Mature forests: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have an average diameters (dbh) exceeding 21 inches (53 cm); crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. YES = Category I NO = <input checked="" type="checkbox"/> not a forested wetland with special characteristics</p>	<p>Cat. I</p>
<p>SC5</p>	<p>Wetlands in Coastal Lagoons (see p. 91) Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? <input type="checkbox"/> The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks. <input type="checkbox"/> The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (<i>needs to be measured near the bottom.</i>) YES = Go to SC 5.1 NO <input checked="" type="checkbox"/> not a wetland in a coastal lagoon SC 5.1 Does the wetland meet all of the following three conditions? <input type="checkbox"/> The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing) and has less than 20% cover of invasive plant species (see list of invasive species on p. 74). <input type="checkbox"/> At least 3/4 of the landward edge of the wetland has a 100 ft. buffer of shrub, forest, or un-grazed or un-mowed grassland. <input type="checkbox"/> The wetland is larger than 1/10 acre (4350 square ft.) YES = Category I NO = Category II</p>	<p>Cat. I Cat. II</p>
<p>SC6</p>	<p>Interdunal Wetlands (see p. 93) Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? YES = Go to SC 6.1 NO <input checked="" type="checkbox"/> not an interdunal wetland for rating <i>If you answer yes you will still need to rate the wetland based on its functions.</i> In practical terms that means the following geographic areas: <ul style="list-style-type: none"> • Long Beach Peninsula -- lands west of SR 103 • Grayland-Westport -- lands west of SR 105 • Ocean Shores-Copalis – lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is one acre or larger? YES = Category II NO = go to SC 6.2 SC 6.2 Is the wetland between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? YES = Category III</p>	<p>Cat. II Cat. III</p>
<p>◆</p>	<p>Category of wetland based on Special Characteristics Choose the “highest” rating if wetland falls into several categories, and record on p. 1. If you answered NO for all types enter “Not Applicable” on p. 1</p>	

Comments:

WETLAND RATING FORM – WESTERN WASHINGTON
Version 2 – Updated July 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): **Wetland B**

Date of site visit: **June 21, 2010**

Rated by: **Thomas Bannister**

Trained by Ecology? Yes No

Date of training: October 2008

SEC: 12

TWNSHP: 25N

RNGE: 5E

Is S/T/R in Appendix D? Yes No

Map of wetland unit:

Estimated size: **0.5 acres**

SUMMARY OF RATING

Category based on **FUNCTIONS** provided by wetland: I II III IV

Category I =	Score > 70
Category II =	Score 51 - 69
Category III =	Score 30 – 50
Category IV =	Score < 30

Score for Water Quality Functions

16

Score for Hydrologic Functions

16

Score for Habitat Functions

8

TOTAL Score for Functions

40

Category based on **SPECIAL CHARACTERISTICS** of Wetland I II Does not apply

Final Category (choose the “highest” category from above”) **III**

Summary of basic information about the wetland unit.

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine	<input type="checkbox"/>	Depressional	<input checked="" type="checkbox"/>
Natural Heritage Wetland	<input type="checkbox"/>	Riverine	<input type="checkbox"/>
Bog	<input type="checkbox"/>	Lake-fringe	<input type="checkbox"/>
Mature Forest	<input type="checkbox"/>	Slope	<input type="checkbox"/>
Old Growth Forest	<input type="checkbox"/>	Flats	<input type="checkbox"/>
Coastal Lagoon	<input type="checkbox"/>	Freshwater Tidal	<input type="checkbox"/>
Interdunal	<input type="checkbox"/>		
None of the above	<input checked="" type="checkbox"/>	Check if unit has multiple HGM classes present	<input type="checkbox"/>

Does the wetland being rated meet any of the criteria below? If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands that Need Additional Protection (in addition to the protection recommended for its category)	YES	NO
SP1. <i>Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered animal or plant species (T/E species)?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state or federal database.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP2. <i>Has the wetland unit been documented as habitat for any State listed Threatened or Endangered animal species?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category 1 Natural Heritage Wetlands (see p. 19 of data form).	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP3. <i>Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP4. <i>Does the wetland unit have a local significance in addition to its functions?</i> For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands in to those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Classification of Vegetated Wetlands for Western Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides (i.e. except during floods)?
 NO – go to 2 YES – the wetland class is **Tidal Fringe**
 If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?
 YES – **Freshwater Tidal Fringe** NO – **Saltwater Tidal Fringe (Estuarine)**
*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is a Saltwater Tidal Fringe it is rated as an **Estuarine** wetland. Wetlands that were call estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term “Estuarine” wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p. ____).*

2. The entire wetland unit is flat and precipitation is only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.
 NO – go to 3 YES – The wetland class is **Flats**
 If your wetland can be classified as a “Flats” wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland meet both of the following criteria?
 The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) where at least 20 acres (8ha) in size;
 At least 30% of the open water area is deeper than 6.6 (2 m)?
 NO – go to 4 YES – The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland meet all of the following criteria?
 The wetland is on a slope (*slope can be very gradual*).
 The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
 The water leaves the wetland **without being impounded?**
 NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).*
 NO – go to 5 YES – The wetland class is **Slope**

5. Does the entire wetland meet all of the following criteria?
 The unit is in a valley or stream channel where it gets inundated by overbank flooding from that stream or river.
 The overbank flooding occurs at least once every two years.
 NOTE: *The riverine unit can contain depressions that are filled with water when the river is not flooding.*
 NO – go to 6 YES – The wetland class is **Riverine**

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year. This means that any outlet, if present is higher than the interior of the wetland.
 NO – go to 7 YES – The wetland class is **Depressional**

7. Is the entire wetland located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.
 No – go to 8 YES – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

HGM Classes within the wetland unit being rated	HGM Class to Use in Rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

HYDROLOGIC FUNCTIONS – Indicators that wetland unit functions to reduce flooding and stream degradation.		
D 3	Does the wetland have the <u>potential</u> to reduce flooding and erosion?	(see p.46)
	D 3.1 Characteristics of surface water flows out of the wetland unit <ul style="list-style-type: none"> • Unit is a depression with no surface water leaving it (no outlet)..... points = 4 • Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 • Unit is a “flat” depression (Q.7 on key) or in the Flats class, with permanent surface outflow and no obvious natural outlet and/or outlet is a man-made ditch..... points = 1 (If ditch is not permanently flowing treat unit as “intermittently flowing”) • Unit has an unconstricted, or slightly constricted, surface outlet (permanently flowing) points = 0 	4
	D 3.2 Depth of storage during wet periods. <i>Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).</i> <ul style="list-style-type: none"> • Marks of ponding are 3 ft. or more above the surface or bottom of the outlet points = 7 • The wetland is a “headwater” wetland..... points = 5 • Marks of ponding between 2 ft. to < 3 ft. from surface or bottom of outlet points = 5 • Marks are at least 0.5 ft. to < 2 ft. from surface or bottom of outlet points = 3 • Wetland is flat (yes to Q.2 or Q.7 on key)but has small depressions on the surface that trap water points = 1 • Marks of ponding less than 0.5 ft points = 0 	1
	D 3.3 Contribution of wetland unit to storage in the watershed: <i>Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.</i> <ul style="list-style-type: none"> • The area of the basin is less than 10 times the area of unit..... points = 5 • The area of the basin is 10 to 100 times the area of the unit points = 3 • The area of the basin is more than 100 times the area of the unit points = 0 • Entire unit is in the FLATS class points = 5 	3
Total for D 3		<i>Add the points in the boxes above</i>
		8
D 4	Does the wetland have the <u>opportunity</u> to reduce flooding and erosion?	(see p. 49)
	Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. <i>Note which of the following indicators of opportunity apply.</i> <ul style="list-style-type: none"> <input type="checkbox"/> Wetland is in a headwater of a river or stream that has flooding problems. <input type="checkbox"/> Wetland drains to a river or stream that has flooding problems <input checked="" type="checkbox"/> Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems <input type="checkbox"/> Other _____ <p style="text-align: center;">YES multiplier is 2 NO multiplier is 1</p>	Multiplier 2
◆	TOTAL – Hydrologic Functions	Multiply the score from D3 by D4; then <i>add score to table on p. 1</i>
		16

Comments:

	<p>H 2.3 Near or adjacent to other priority habitats listed by WDFW (<i>see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm</i>)</p> <p>Which of the following priority habitats are within 330ft (100m) of the wetland unit? <i>NOTE: the connections do not have to be relatively undisturbed.</i></p> <p><input type="checkbox"/> Aspen Stands: Pure or mixed stands of aspen greater than 0.4 ha (1 acre).</p> <p><input checked="" type="checkbox"/> Biodiversity Areas and Corridors: Areas of habitat that are relatively important to various species of native fish and wildlife (<i>full descriptions in WDFW PHS report p. 152</i>).</p> <p><input type="checkbox"/> Herbaceous Balds: Variable size patches of grass and forbs on shallow soils over bedrock.</p> <p><input type="checkbox"/> Old-growth/Mature forests: (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less than 100%; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest.</p> <p><input type="checkbox"/> Oregon white Oak: Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (<i>full descriptions in WDFW PHS report p. 158</i>).</p> <p><input type="checkbox"/> Riparian: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.</p> <p><input type="checkbox"/> Westside Prairies: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (<i>full descriptions in WDFW PHS report p. 161</i>).</p> <p><input type="checkbox"/> Instream: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.</p> <p><input type="checkbox"/> Nearshore: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (<i>full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A</i>).</p> <p><input type="checkbox"/> Caves: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.</p> <p><input type="checkbox"/> Cliffs: Greater than 7.6 m (25 ft) high and occurring below 5000 ft.</p> <p><input type="checkbox"/> Talus: Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.</p> <p><input type="checkbox"/> Snags and Logs: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long.</p> <p>If wetland has 3 or more priority habitats = 4 points If wetland has 2 priority habitats = 3 points If wetland has 1 priority habitat = 1 point No habitats = 0 points <i>Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)</i></p>	1
	<p>H 2.4 <u>Wetland Landscape:</u> Choose the one description of the landscape around the wetland that best fits (<i>see p. 84</i>)</p> <ul style="list-style-type: none"> • There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development.....points = 5 • The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within 1/2 milepoints = 5 • There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed.points = 3 • The wetland fringe on a lake with disturbance and there are 3 other lake-fringe wetlands within 1/2 milepoints = 3 • There is at least 1 wetland within 1/2 milepoints = 2 • There are no wetlands within 1/2 mile.....points = 0 	2
	<p>H 2 TOTAL Score – opportunity for providing habitat <i>Add the scores from H2.1, H2.2, H2.3, H2.4</i></p>	4
	<p style="text-align: right;"><i>TOTAL for H 1 from page 8</i></p>	4
◆	<p>Total Score for Habitat Functions Add the points for H 1 and H 2; then record the result on p. 1</p>	8

Comments:

<p>SC4</p>	<p>Forested Wetlands (see p. 90) Does the wetland have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife’s forests as priority habitats? <i>If you answer yes you will still need to rate the wetland based on its function.</i> <input type="checkbox"/> Old-growth forests: (west of Cascade Crest) Stands of at least two three species forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm or more). NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and “OR” so old-growth forests do not necessarily have to have trees of this diameter. <input type="checkbox"/> Mature forests: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have an average diameters (dbh) exceeding 21 inches (53 cm); crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. YES = Category I NO = <input checked="" type="checkbox"/> not a forested wetland with special characteristics</p>	<p>Cat. I</p>
<p>SC5</p>	<p>Wetlands in Coastal Lagoons (see p. 91) Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? <input type="checkbox"/> The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks. <input type="checkbox"/> The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (<i>needs to be measured near the bottom.</i>) YES = Go to SC 5.1 NO <input checked="" type="checkbox"/> not a wetland in a coastal lagoon SC 5.1 Does the wetland meet all of the following three conditions? <input type="checkbox"/> The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing) and has less than 20% cover of invasive plant species (see list of invasive species on p. 74). <input type="checkbox"/> At least 3/4 of the landward edge of the wetland has a 100 ft. buffer of shrub, forest, or un-grazed or un-mowed grassland. <input type="checkbox"/> The wetland is larger than 1/10 acre (4350 square ft.) YES = Category I NO = Category II</p>	<p>Cat. I Cat. II</p>
<p>SC6</p>	<p>Interdunal Wetlands (see p. 93) Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? YES = Go to SC 6.1 NO <input checked="" type="checkbox"/> not an interdunal wetland for rating <i>If you answer yes you will still need to rate the wetland based on its functions.</i> In practical terms that means the following geographic areas: <ul style="list-style-type: none"> • Long Beach Peninsula -- lands west of SR 103 • Grayland-Westport -- lands west of SR 105 • Ocean Shores-Copalis – lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is one acre or larger? YES = Category II NO = go to SC 6.2 SC 6.2 Is the wetland between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? YES = Category III</p>	<p>Cat. II Cat. III</p>
<p>◆</p>	<p>Category of wetland based on Special Characteristics Choose the “highest” rating if wetland falls into several categories, and record on p. 1. If you answered NO for all types enter “Not Applicable” on p. 1</p>	

Comments:

Appendix F

Draft Critical Area Evaluation: Sammamish Valley Study Area

GeoEngineers

To: Dave Knight, The Berger Partnership
From: Marcelle V. Lynde and Thomas Bannister, GeoEngineers
Date: September 9, 2010
File: 0500-172-00
Subject: BNSF Rail Corridor Master Plan, Sammamish Valley Study Area – Critical Area Reconnaissance

GeoEngineers has prepared this memorandum to document our observations during the Critical Area Reconnaissance performed along the Redmond- Sammamish Valley Study Area located in Redmond, Washington. We understand that the City of Redmond has acquired the Redmond section of the former Burlington Northern Santa Fe (BNSF) railroad corridor. The City is beginning a planning process to convert 3.89 miles of the BNSF right-of-way (ROW) to a regional trail, from just west of SR 520/SR 202 Interchange and Bear Creek, to Northeast 124th Street. The Sammamish Valley Study Area is defined as the approximately 2.8-mile long section of the BNSF ROW between the Sammamish River and Northeast 124th Street (Figure 1). The ROW ranges from fifty feet to one hundred feet in width and parallels the east side of the Willows Road ROW through the majority of the Sammamish Valley Study Area. Generally, commercial development abuts the eastern side BNSF ROW through the southern portion of the Sammamish Valley Study Area. The Willows Run golf course abuts the east side of the ROW south of 116th Street. Pastureland is located east of the ROW between 166th Street and 124th Street.

The purpose of our reconnaissance was to visually assess the Sammamish Valley Study Area for the potential presence regulated Critical Areas, as defined by Redmond Municipal Code (RMC) 20D.140 (Critical Areas). This memo identifies the approximate locations of potential existing Critical Areas so that the City of Redmond may develop preliminary plans for the trail conversion. Due to the preliminary nature of the project, many of the site-specific regulatory limitations associated with these Critical Areas are not known at this time.

A GeoEngineers biologist walked the length of the Sammamish Valley Study Area on July 14, 2010, to identify Critical Areas observed along the corridor. The approximate locations of Critical Areas observed during this site reconnaissance are mapped on Figures 2 - 8. The biologist made observations of potential Critical Areas on adjacent parcels; however, was not authorized to enter these parcels. Therefore, there may be regulated Critical Area buffers that are not identified in this memo that may project on to the Sammamish Valley Study Area.

Prior to the field work, we reviewed the City of Redmond Critical Area Maps (City of Redmond, 2010), the Washington Department of Natural Resources (WDNR) FPARS mapping system (WDNR, 2010), the Washington Department of Fish and Wildlife (WDFW) SalmonScape system (WDFW, 2010a), Priority Habitat and Species (PHS) data from WDFW (WDFW, 2010b), the King County iMap GIS system (King County, 2010) and the National Wetlands Inventory (NWI) maps (United States Fish and Wildlife Service, 2010).

Fish and Wildlife Conservation Areas

According to RMC 20D.140, Fish and Wildlife Conservation Areas include, but are not limited to, Native Growth Protection Easements (NGPE) and Riparian Stream Corridors (streams). The City of Redmond (2010) identifies 3 NGPEs near the western edge of the ROW. All of these NGPEs are located within private

commercial developments located west of Willows Road. We observed no direct or indirect indication that federal, state and/or locally designated species of importance maintain a primary association with these NGPEs.

According to the City of Redmond (2010), one Transfer Development Rights Easement is located in the 32-acre Sammamish Valley Community Park located immediately east of the ROW and north of 116th Street (Figure 8). This undeveloped pastureland, owned by the city of Redmond, contains one stream (Stream 7) and wetland (The Watershed Company, 2009).

The City of Redmond (2010) has mapped 6 streams that cross the ROW. During the field reconnaissance, GeoEngineers observed 10 streams within or adjacent to the ROW (Figures 2-8). Except for Stream 7 (Figure 8), we observed flow and defined channels in all of the streams during the July 14, 2010 field visit. Our observations of flow at this time of the year indicate that these streams, with the exception of Stream 7, are perennial and are driven by groundwater discharge. The biologist did not observe flow in the defined channel of Stream 7 at the time of the field reconnaissance, therefore, flow within Stream 7 is intermittent.



Photo 1. Typical conditions west of the BNSF ROW.

Because of the adjacent land use, these open stream sections have been channelized and, generally, parallel the BNSF rail prism in maintained ditches. Stream crossings through the rail prism are via concrete box culverts, corrugated metal pipes and/or concrete pipes. As a result, riparian habitat is heavily degraded.

WDFW (2010a and 2010b) indicates the presence of coho salmon (*Oncorhynchus kisutch*) in 2 streams that cross the ROW within the Sammamish Valley Study Area. We have identified these streams as Stream 1 (Figure 4) and Stream 3 (Figure 5). During the field reconnaissance, the biologist observed fish in Stream 3. WDFW (2010b) does not indicate the presence of any other PHS occurrence in the vicinity of the Sammamish Valley Study Area.

A list of streams observed in and adjacent to the ROW is presented in Table 1.

TABLE 1. BNSF ROW PHASE II STREAM INVENTORY

Stream	Estimated Channel Width	Mapped by City of Redmond?	Class*	Hydrology/Notes
Sammamish River	80 Feet	Yes	I	Water of the State.
Stream 1	10 feet	Yes	II	Crosses ROW in box culvert.
Stream 2	10 feet	No	II	Crosses ROW in concrete pipe.
Stream 3	10 feet	Yes	II	Fish observed.
Stream 4	10 feet	Yes	III	Flow from Wetland west of Willows Road.
Stream 5	12 feet	No	III	Flow from constructed pond west of Willows Rd.
Stream 6	8 feet	No	III	Flow from constructed pond west of Willows Rd.
Stream 7	4 feet	Yes	III	Described by the Watershed Company (2009).
Stream 8	4 feet	Yes	IV	Ditched channel west of rail prism.
Stream 9	4 feet	No	IV	Flows from box culvert under Willows Rd.

*Per the definitions of Redmond Municipal Code 20D.140.20-010(4) and as identified by the City of Redmond (2010).

The Sammamish River flows under the ROW on a steel span bridge supported on creosote piles driven in the river and its banks. The river defines the eastern border of the Sammamish Valley Study Area (Figure 2). The Sammamish River is primary habitat for anadromous and resident fish species including: including: coho salmon, Chinook salmon (*O. tshawytscha*) kokanee salmon (*O. nerka*) [resident] sockeye salmon (*O. nerka*) [anadromous], steelhead (*O. mykiss*) [anadromous], rainbow trout (*O. mykiss*) [resident], cutthroat trout (*O. clarki-clarki*) and bull trout (*Salmo confluentus*) [WDFW, 2010a and 2010b]. According to RMC 20D.140.20-020(3), this reach of the Sammamish River is to be protected by a 150-foot protective buffer to be measured landward from the Ordinary High Water Mark (OHWM). This protective buffer projects into the eastern end of the Sammamish Valley Study Area.

The Washington State Department of Ecology (Ecology) [2010] identifies the Sammamish River as “*Waters of the State*”. In accordance with the City of Redmond’s Shoreline Master Program (SMP), all lands extending 150 feet landward from the OHWM of the Sammamish River, including wetlands and those areas within the 100-year floodplain, are subject to additional regulatory requirements of the SMP. Given the preliminary nature of the BNSF Rail Corridor Master Plan, it is not known how limitations associated with the SMP will impact allowed development within the Sammamish Valley Study Area.

Wetlands

During the field investigation, we identified a number of potential wetlands within the vicinity of the ROW. Wetlands are present on the forested portions of the hillslope located west of Willows Road and the ROW (Figures 6-8). Many of these wetland areas appear to be constructed stormwater facilities associated with the development west of Willows Road. We observed flow from some of these wetlands across the ROW during our field reconnaissance. The presence of flow at the time of the field reconnaissance indicates that these wetlands are driven by groundwater discharge on the hillslope west of the ROW. Most likely, the constructed wetlands were created from wetland areas that existed prior to commercial development west of Willows Road.

In the northern portion of the corridor, we observed wetlands in the low-lying areas east of ROW. This area includes the pastureland between Northeast 124th Street and Northeast 116th Street; and the Willows Run golf course (Figures 7 and 8). Depressional wetland conditions are primarily driven by shallow groundwater found throughout the Sammamish River Valley. One wetland located immediately east of the ROW and north of 116th Street (Figure 8) was identified and delineated by The Watershed Company (2009). We identified one potential wetland feature that abuts the ROW west of the Willows Run golf course (Figure 7). The regulated buffers of these wetlands will project into the ROW.

We observed indicators of wetland hydrology and vegetation (USACE, 2008) in the ditches that abut the rail prism. The locations of these ditches are shown as red lines on Figures 2-6 and 8. Some of these ditches may have been intentionally created within non-wetland sites to convey surface water, such as, stormwater runoff. Such areas are exempt from the provisions of the City of Redmond Critical Areas ordinance under RMC 20D.140.10-030(1)(b); however, additional state and federal regulatory restrictions may apply to these ditches.

Frequently Flooded Areas

According to the City of Redmond (2010), the FEMA 100-year floodplain is ubiquitously mapped in the Sammamish River valley north of downtown Redmond. This regulated area abuts the eastern side of the rail prism in the northern portion of the corridor for approximately 1.5 miles.

Critical Aquifer Recharge Protection Areas

Critical Aquifer Recharge Protection Areas are those areas within the City of Redmond that have a critical recharge effect on aquifers used for potable water. The City of Redmond (2010) has identified the portion of the Sammamish Valley Study Area between the Sammamish River and Northeast 91st Street as a Wellhead Protection Zone 2. The remainder of the Sammamish Valley Study Area has been identified as a Wellhead Protection Zone 4 (City of Redmond, 2010). Zone 2 areas are lands that overlie the 1-year travel time of any water source well owned by the City of Redmond. Zone 4 areas are defined as all lands within the City of Redmond that are not included in Wellhead Protection Zones 1, 2 or 3.

Development restrictions associated with Wellhead Protection Zones 1 and 2 are targeted towards activities which involve storing, handling, treating, using, producing, recycling, or disposing of hazardous materials or other deleterious substances. Given the preliminary nature of the BNSF Rail Corridor Master Plan, it is not known how limitations associated with Critical Aquifer Recharge Protection Areas will impact development within the Sammamish Valley Study Area. Any proposed development within the Sammamish Valley Study Area will be required to comply with the Wellhead Protection Zone Performance Standards identified in RMC 20D.140.50-040.

Geologically Hazard Areas

RMC 20D.140.60-010(1) classifies Geologically Hazardous Areas into three sub-categories:

1. **Erosion Hazard Areas** are lands or areas underlain by soils identified by the U.S. Department of Agriculture Soil Conservation Service (SCS) as having “severe” or “very severe” rill and inter-rill erosion hazards.

2. **Landslide Hazard Areas** are areas potentially subject to significant or severe risk of landslides based on a combination of geologic, topographic, and hydrogeologic factors.
3. **Seismic Hazard Areas** are lands subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, soil liquefaction, or surface faulting.

The City of Redmond (2010) does not indicate the presence of any Erosion Hazard or Landslide Hazard Areas within the Sammamish Valley Study Area. However, the slopes along the BNSF fill prism along the eastern end of the Sammamish Valley Study Area, near the Sammamish River are steeper than 40-percent and have a vertical relief greater than 10 feet. Under RMC 20D.140.60-010(1)(b)(vii), these areas are defined as Landslide Hazard Areas. The approximate locations of these Landslide Hazard Areas are mapped on Figures 2 and 3. According to RMC 20D.140.60-020, a 50-foot buffer shall be measured from the top, toe and sides of the Landslide Hazard Area. Per RMC 20D.140.60-040(2) development applicants are required to evaluate alternative locations that avoid impacts to Landslide Hazard Areas. If impacts cannot be avoided, then the applicant must demonstrate there is no reasonable alternative to developing in Landslide Hazard Areas. Additionally, a geotechnical evaluation will be required to identify the risks of damage from the proposal, both on-site and off-site, to ascertain that the proposal will not increase the risk of occurrence of the potential geologic hazard; and to identify measures to eliminate or reduce risks.

Seismic Hazard Areas are ubiquitously mapped in the relatively level areas associated with the valley that contain Lake Sammamish, the Sammamish River, Bear Creek and Evans Creek (City of Redmond, 2010). The majority of the Sammamish Valley Study Area is mapped as a Seismic Hazard Area and may be subject to the regulations of RMC 20D.140.60-040(4).

CONCLUSION

During the July 14, 2010 field reconnaissance, we observed 10 streams that are located within the ROW. Several wetlands were observed in the vicinity of the ROW, primarily west of Willows Road and the ROW. Two potential wetlands were observed within the ROW in the northern portion of the Sammamish Valley Study Area. The locations of the wetlands observed within the ROW are mapped on Figures 7 and 8. Two additional wetlands were observed south of the ROW near the Sammamish River (Figure 2). It is not known if the regulated buffers of these wetland project into the ROW.

According to the City of Redmond (2010), the FEMA 100-year floodplain abuts the eastern side of the rail prism in the northern portion of the corridor for approximately 1.5 miles.

The City of Redmond (2010) has identified the portion of the Sammamish Valley Study Area between the Sammamish River and Northeast 91st Street as a Wellhead Protection Zone 2 and the remainder of the Sammamish Valley Study Area as a Wellhead Protection Zone 4.

No geologically hazardous areas are mapped within the ROW except for the Seismic Hazard Area that is mapped throughout the Sammamish River Valley (City of Redmond, 2010). Landslide Hazard Areas as defined by RMC 20D.140.60-010(1)(b)(vii), were observed along the rail fill prism in the southern portion of the ROW (Figures 2 and 3).

LIMITATIONS

We have prepared this memorandum for The Berger Partnership, their authorized agents and regulatory agencies for Critical Area Evaluation along the Phase II portion of the BNSF rail corridor located in Redmond, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for Critical Area Evaluation in this area at the time this Memorandum was prepared. The conclusions, recommendations, and opinions presented in this letter are based on our professional knowledge, judgment and experience. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments should be considered a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

REFERENCES

- City of Redmond. 2010. Critical Areas Maps. <http://www.redmond.gov/cityservices/citymaps3.asp>
Accessed June 2010.
- King County. 2010. iMap Online GIS property Information system.
<http://www.kingcounty.gov/operations/gis/Maps/iMAP.aspx> Accessed June 2010.
- United States Fish and Wildlife Service. 2010. National Wetlands Inventory database.
<http://wetlandsfws.er.usgs.gov/NWI/index.html>. Accessed June 2010.
- United States Army Corp of Engineers (USACE). 2008. Interim Regional Supplement to The Corps of Engineers Wetland delineation Manual: Western Mountains, Valleys and Coast Region, US Army Engineer Research and Development Center, Vicksburg, MS.
- Washington State Department of Ecology (Ecology). 1997. Washington State Wetlands Identification and Delineation Manual. Publication #96-94. Olympia, Washington.
- Washington State Department of Ecology (Ecology). 2010. Coastal Atlas GIS Mapping System.
<https://fortress.wa.gov/ecy/coastalatlascviewer.htm> Accessed June 2010
- Washington State Department of Fish and Wildlife (WDFW). 2010a. SalmonScape mapping system.
<http://wdfw.wa.gov/mapping/salmonscape> (Accessed June 2010).
- Washington State Department of Fish and Wildlife (WDFW). 2010b. Priority Habitat and Species data in the vicinity of Section 2, Township 25 North, Range 5 East. Production Date: June 16, 2010.
- Washington State Department of Natural Resources. 2010. FPARS mapping system.
<http://fortress.wa.gov/dnr/app1/fpars/viewer.htm> (Accessed June 2010).
- The Watershed Company. 2009. Sammamish Valley Park Wetland Delineation Report. Dated June 9, 2009.

Map Revised: July 15, 2010 EL

Path: W:\Redmond\Projects\0\0500172\GIS\050017200_Phase2_F1.mxd

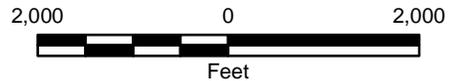
Office: Port Orchard



Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005
 Transverse Mercator, Zone 10 N North, North American Datum 1983
 North arrow oriented to grid north



Vicinity Map

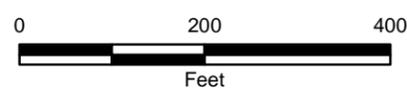
BNSF Rail Corridor Master Plan
 Sammamish Valley Study Area
 Redmond, Washington



Figure 1



- +— BNSF Rail Corridor
- Ditch
- Stream [per RMC 20D.140.20-010(u)]
- Landslide Hazard [per RMC 20D.140.60-010(1)(b)(vii)]
- Wetland observed by GeoEngineers
- Native Growth Protection Easement



**BNSF Rail Corridor
Critical Areas Reconnaissance**

Redmond, Washington

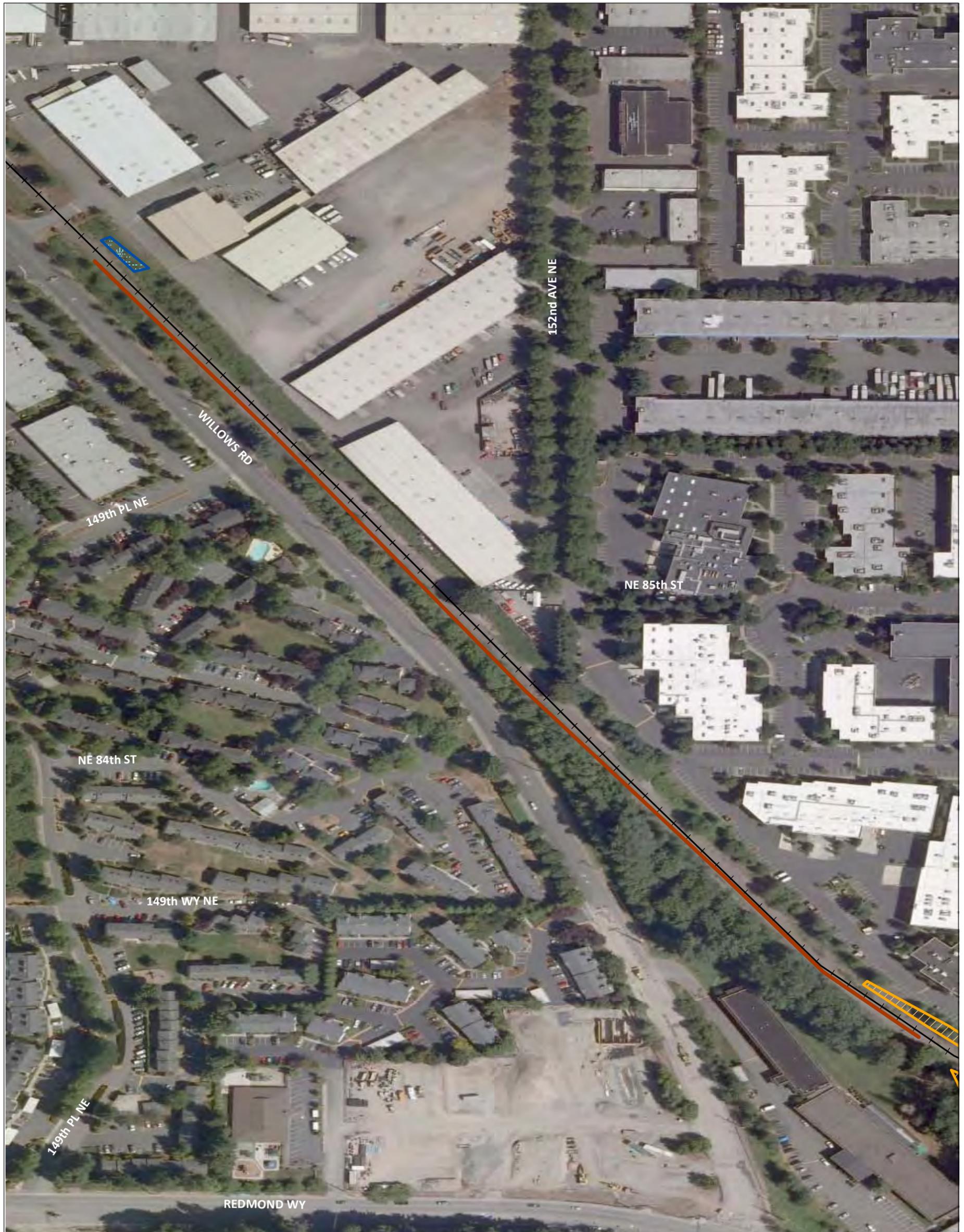


Figure 2

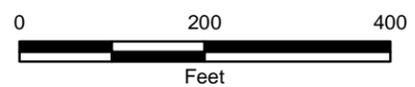
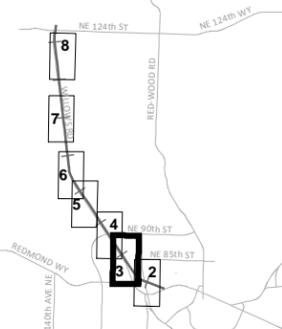
Reference: Aerial from Microsoft Bing.

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.



- +— BNSF Rail Corridor
- Ditch
- Stream [per RMC 20D.140.20-010(u)]
- Landslide Hazard [per RMC 20D.140.60-010(1)(b)(vii)]
- Wetland observed by GeoEngineers
- Native Growth Protection Easement



**BNSF Rail Corridor
Critical Areas Reconnaissance**

Redmond, Washington



Figure 3

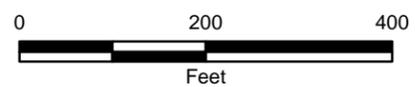
Reference: Aerial from Microsoft Bing.

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.



- +— BNSF Rail Corridor
- Ditch
- Stream [per RMC 20D.140.20-010(u)]
- Landslide Hazard [per RMC 20D.140.60-010(1)(b)(vii)]
- Wetland observed by GeoEngineers
- Native Growth Protection Easement



Reference: Aerial from Microsoft Bing.

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

**BNSF Rail Corridor
Critical Areas Reconnaissance**

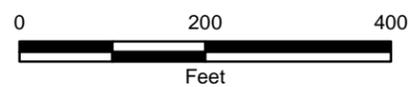
Redmond, Washington



Figure 4



- +— BNSF Rail Corridor
- Ditch
- Stream [per RMC 20D.140.20-010(u)]
- Landslide Hazard [per RMC 20D.140.60-010(1)(b)(vii)]
- Wetland observed by GeoEngineers
- Native Growth Protection Easement



Reference: Aerial from Microsoft Bing.

Notes:

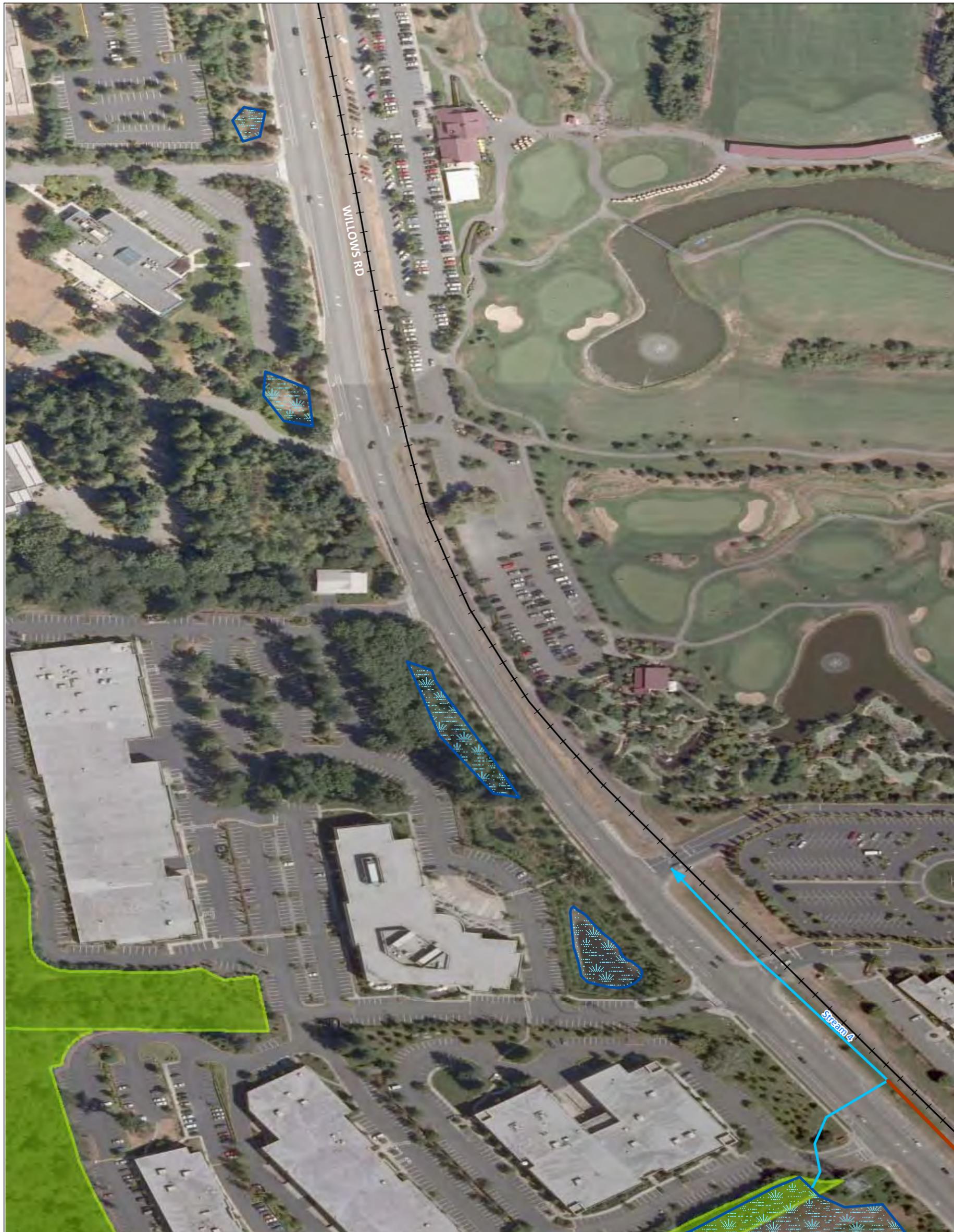
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

**BNSF Rail Corridor
Critical Areas Reconnaissance**

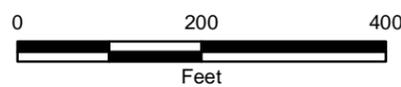
Redmond, Washington



Figure 5



- +— BNSF Rail Corridor
- Ditch
- Stream [per RMC 20D.140.20-010(u)]
- ⊗ Landslide Hazard [per RMC 20D.140.60-010(1)(b)(vii)]
- ⊗ Wetland observed by GeoEngineers
- ⊗ Native Growth Protection Easement



**BNSF Rail Corridor
Critical Areas Reconnaissance**

Redmond, Washington



Figure 6

Reference: Aerial from Microsoft Bing.

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.



- +— BNSF Rail Corridor
- Ditch
- Stream [per RMC 20D.140.20-010(u)]
- 👉 Landslide Hazard [per RMC 20D.140.60-010(1)(b)(vii)]
- 🌿 Wetland observed by GeoEngineers
- 🌱 Native Growth Protection Easement



BNSF Rail Corridor Critical Areas Reconnaissance	
Redmond, Washington	
GEOENGINEERS	Figure 7

Reference: Aerial from Microsoft Bing.

Notes:

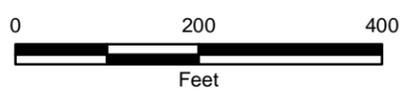
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.



- BNSF Rail Corridor
 - Ditch
 - Stream observed by GeoEngineers
 - Landslide Hazard [per RMC 20D.140.60-010(1)(b)(viii)]
 - Wetland observed by GeoEngineers
 - Native Growth Protection Easement
- Redmond Streams**
- Class 2
 - Class 3
 - Class 4

Reference: Aerial from Microsoft Bing.

Notes:
 1. The locations of all features shown are approximate.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.



BNSF Rail Corridor Critical Areas Evaluation - Phase II	
Redmond, Washington	
	Revised Figure 8

Appendix G

Sound Transit Letter of Support
City of Redmond & Sound Transit



October 5, 2010

Craig Larsen
Parks & Recreation Director
City of Redmond
PO Box 97010, MS 4NPK
Redmond, WA 98073

RECEIVED
OCT 08 2010
CITY OF REDMOND
PARKS PLANNING

Dear Mr. Larsen:

I am writing regarding the City of Redmond's first deliverable of the BNSF Rail Corridor Master Plan, the Infrastructure Alignment Plan, and the pending City Council action on implementing the stormwater pipeline project in downtown Redmond.

Sound Transit and the City of Redmond have been working cooperatively on the potential use of the corridor for light rail since the Redmond Downtown High Capacity Transit Preferred Alignment Technical Report (January 2006). The City's Master Plan incorporates light rail and seeks to maximize the public benefits of the BNSF corridor by including multiple other uses: a city stormwater trunk line; downtown east/west corridor improvements; a regional trail; and a King County utility easement.

One of the key issues with the downtown section of the former BNSF right-of-way is that it varies in width from approximately 50 feet to 100 feet through the downtown Redmond section. To accommodate all uses, the City has proposed expanding the available area for all users by combing the NE 76th Street right-of-way with BNSF rail corridor right-of-way, providing between 110 feet and 160 feet of right-of-way for infrastructure projects. The City has suggested that this combined right-of-way now be referred to as "the corridor" for the various infrastructure projects.

Meeting the standards of each of the proposed projects requires:

- 25 feet to 29 feet for the regional trail
- Stormwater setbacks of 20 feet from private development and 10 feet from light rail
- At least two lanes of traffic, on-street parking and a 13-foot sidewalk on the south side of the NE 76th Street.
- Space for a 24 inch diameter wastewater utility easement; and

CHAIR

Aaron Reardon
Snohomish County Executive

VICE CHAIRS

Fred Butler
Issaquah Deputy Council President

Claudia Thomas
Lakewood Councilmember

BOARD MEMBERS

Claudia Balducci
Bellevue Councilmember

Richard Conlin
Seattle Council President

Dow Constantine
King County Executive

Jan Drago
King County Councilmember

Dave Enslow
Sumner Mayor

Jake Fey
Tacoma Deputy Mayor

Paula J. Hammond, P.E.
Washington State Secretary of Transportation

John Marchione
Redmond Mayor

Joe Marine
Mukilteo Mayor

Pat McCarthy
Pierce County Executive

Mike McGinn
Seattle Mayor

Julia Patterson
King County Councilmember

Larry Phillips
King County Councilmember

Paul Roberts
Everett Council President

Peter von Reichbauer
King County Councilmember

CHIEF EXECUTIVE OFFICER

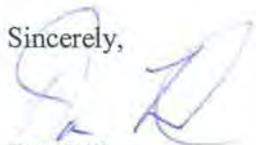
Joni Earl

- Approximately 30 feet wide trackway and up to 60 feet wide center platform terminal light rail station including, storage tracks, a light maintenance facility and a up 20 parking spaces due to its permanent terminus status.

Analysis by the City's Master Plan consultant makes it clear that even with the use of NE 76th Street not all of the planned uses fit within the corridor in the vicinity of Leary Way – barring significant design deviations. In our September 17, 2010 meeting, Sound Transit and the City agreed to continue working on solutions to accommodate the proposed uses within the corridor including expanding available right-of-way within the corridor.

I appreciate the City's continued willingness to collaborate on creative solutions in planning for light rail in downtown Redmond. Please let me know if I can be of assistance as you continue to develop the corridor for public benefit.

Sincerely,



Don Billen
Light Rail Development Manager
East Corridor

