

# LEVEL 1 OFF-SITE DRAINAGE ANALYSIS

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## Poulsbo Self Storage

927 Northeast Lincoln Road  
Poulsbo, Washington 98370

Prepared for:  
Poulsbo Heated Storage  
918 South Horton Street, Suite 1000  
Seattle, WA 98134

August 02, 2016

Our Job No. 16929

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CIVIL ENGINEERING, LAND PLANNING, SURVEYING  
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**TASK 1**  
**STUDY AREA DEFINITION AND MAPS**

## **TASK 1      STUDY AREA DEFINITION AND MAPS**

### **GENERAL INFORMATION**

The project site is located in the Northwest 1/4 of the Northeast 1/4 of Section 23, Township 26 North, Range 1 East, Willamette Meridian, City of Poulsbo, Kitsap County, Washington. An address for the site has not been assigned yet according to the Pierce County Parcel viewer, but will likely be 927 Northeast Lincoln Road. The site is located south of Lincoln Road NE between 10<sup>th</sup> Avenue NE and State Route 305. Exhibit A – Vicinity Map depicts the approximate location of the site. The site is bound to the north by Lincoln Road NE, to the west by a vacant commercial business lot, to the east by 10<sup>th</sup> Avenue NE and to the south by residential properties.

The proposal for this project is to construct a multi-story Self Storage Facility. The project also includes pedestrian amenities, parking, drive aisles, landscaping, stormwater conveyance, detention, and water quality facilities.

Currently, the site is undeveloped and covered in shrubs and trees. There are no existing utilities on site. The site generally slopes from the northeast to the southwest where runoff is collected in the existing stream in the southwest corner of the site. Surface runoff is conveyed to the stream via sheet and shallow channel flow. The stream discharges off-site and flows northwest.

The project site comprises a total site area of approximately 1.87 acres in size.

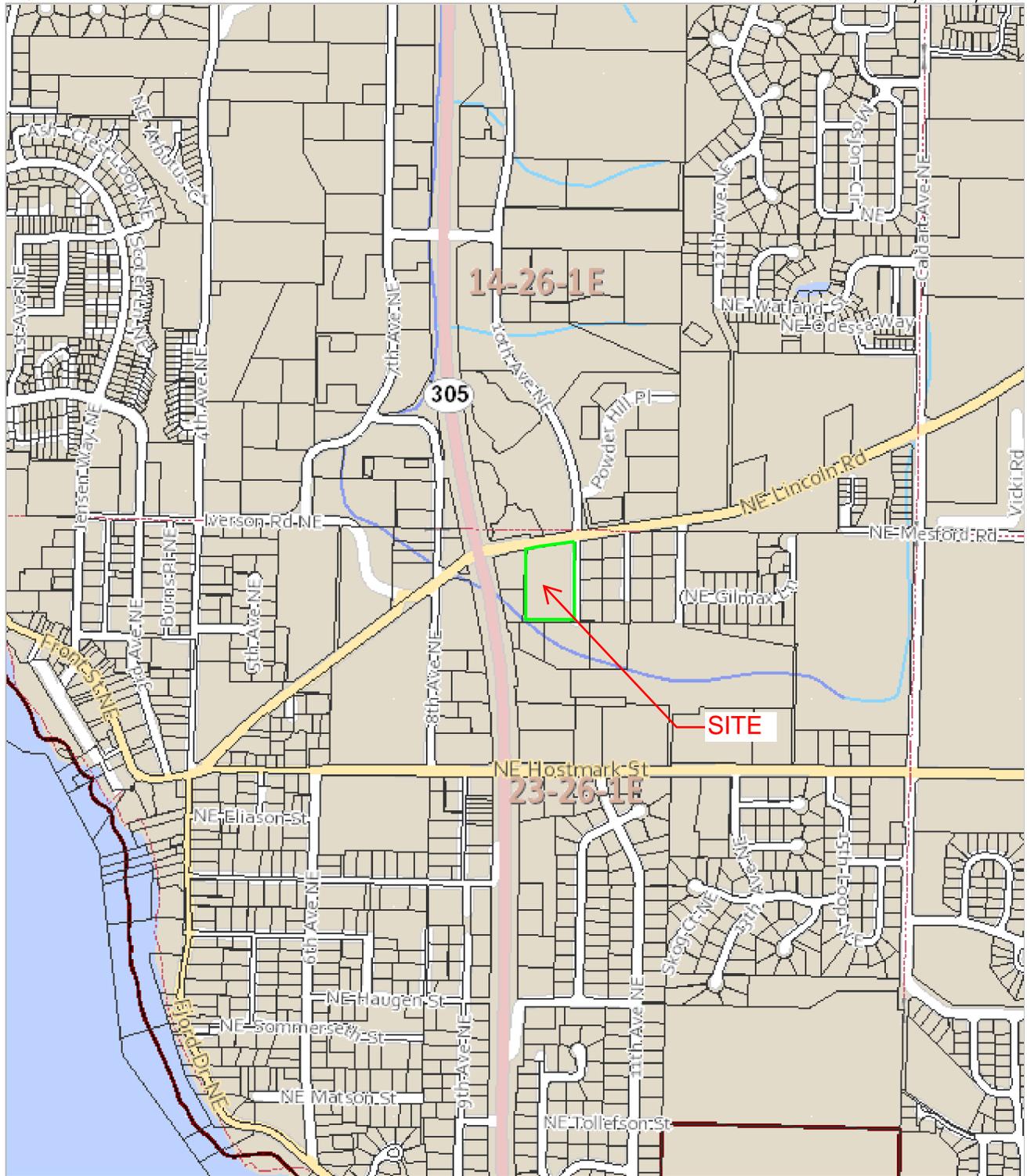
### **UPSTREAM DRAINAGE ANALYSIS**

Upstream flows sheet flow onto the site from the east. The residences to the north, between 10th Ave and 11th Ave flow towards 10th Ave. 10th Avenue is currently sloped such that flows run across it and onto the subject property. All upstream flows will be collected and conveyed to bypass the site. No other form of upstream flows enters the proposed project site.

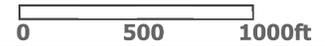
**EXHIBIT A**  
**Vicinity Map**

Map Scale: 1 : 10,000

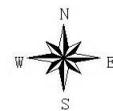
Printed: Monday, Jul 18, 2016



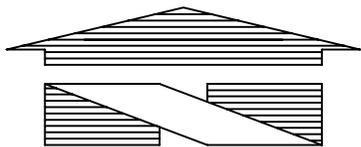
\*\* This map is not a substitute for field survey \*\*



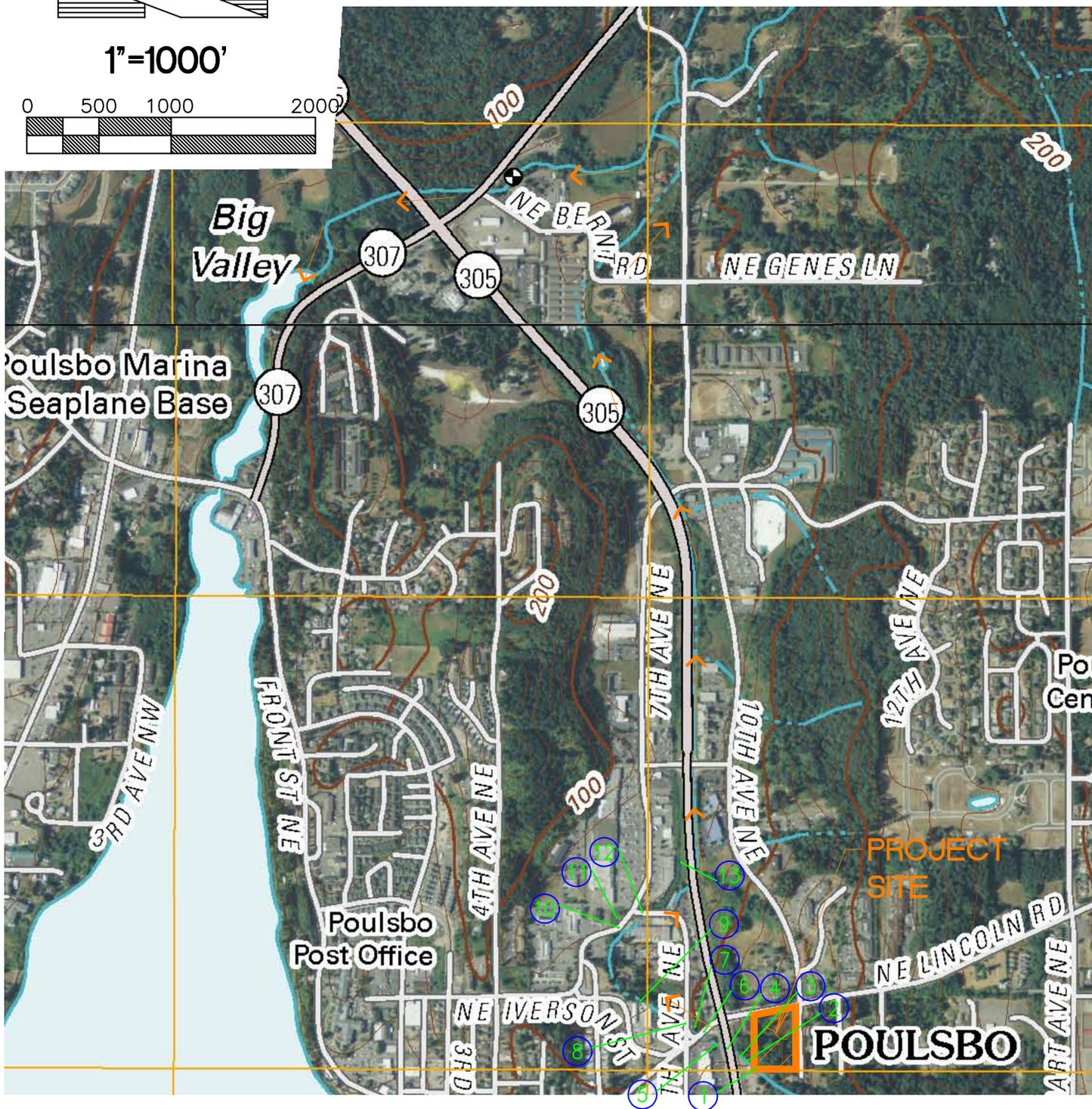
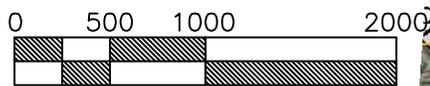
Vicinity Map



**EXHIBIT B**  
**Downstream Drainage Map**



1"=1000'



Job Number

**16929**

Designed KEH

Drawn KEH

Checked JGH

Approved JGH

Date 7/19/16

Scale:

Horizontal 1"=200' Vertical NA



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CIVIL ENGINEERING, LAND PLANNING,  
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For: **POULSBO-STORAGE**

Title:  
**DOWNSTREAM DRAINAGE  
MAP**

Sheet

**1 of 1**

## OFF-SITE ANALYSIS DRAINAGE SYSTEM TABLE

### Surface Water Design Manual, Core Requirement #2

Basin: Dogfish Creek

Subbasin Name: South Fork Dogfish Creek

Subbasin Number: \_\_\_\_\_

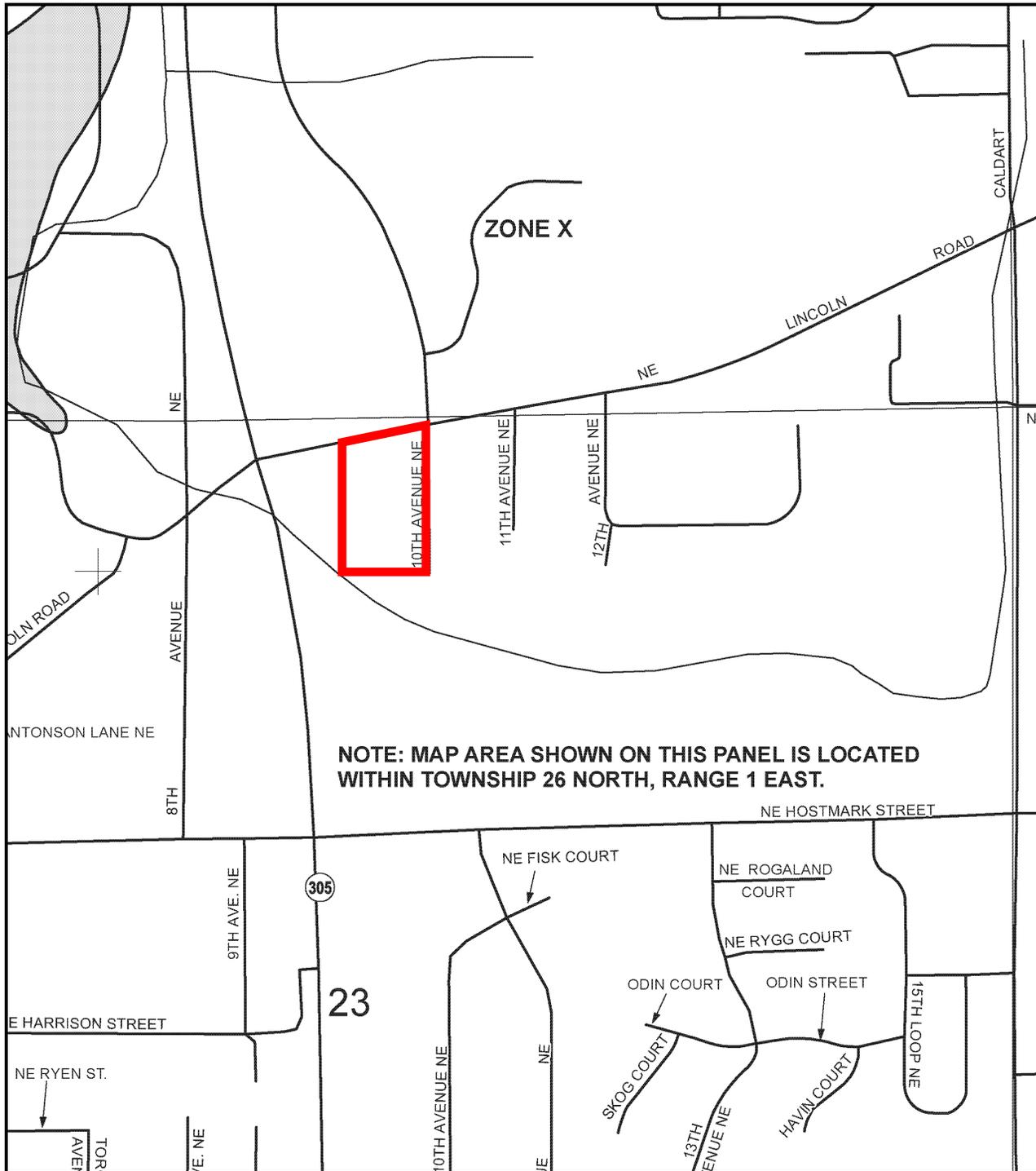
Symbol	Drainage Component Type, Name, and Size	Drainage Component Description	Slope	Distance from Site Discharge	Existing Problems	Potential Problems	Observations of Field Inspector, Resource Reviewer, or Resident
See Map	Type: sheet flow, swale, stream, channel, pipe, pond; size, diameter, surface area	Drainage basin, vegetation, cover, depth, type of sensitive area, volume	%	Ft.	Constrictions, under capacity, ponding, overtopping, flooding, habitat or organism destruction, scouring, bank sloughing, sedimentation, incision, other erosion		Tributary area, likelihood of problem, overflow pathways, potential impacts
1	Stream	3' wide x 6" deep		0	None	None	Additional higher flow capacity
2	10' CMP Culvert			75 - 95	"	"	
3	Stream	3' wide x 6" deep		95 - 207	"	"	Additional higher flow capacity
4	12' Concrete Box Culvert			207 - 312	"	"	
5	Stream	3' wide x 6" deep		312 - 383	"	"	Additional higher flow capacity
6	6' CMP Arch Culvert			383 - 463	"	"	
7	Stream	1' wide x 3" deep		463 - 515	Under Capacity	Under Capacity	Overflow to 9
8	24" Concrete Culvert			515 - 553	Under Capacity	Under Capacity	Overflow to 9
9	Stream	3' wide x 6" deep		553 - 1489	None	None	Additional higher flow capacity
10	6' CMP Arch Culvert			1489 - 1548	"	"	
11	Stream	3' wide x 6" deep		1548 - 1683	"	"	Additional higher flow capacity
12	6' CMP Arch Culvert			1683 - 1773	"	"	
13	Stream	4' wide x 1' deep		1773	"	"	Additional higher flow capacity

**TASK 2**  
**RESOURCE REVIEW**

## **TASK 2      RESOURCE REVIEW**

- *Finalized Drainage Studies:* The South Fork Dogfish Creek Restoration Master Plan (prepared by ICF International, July 2010) identifies finalized drainage studies completed in the vicinity of the subject property.
- *Floodplain and Floodway FEMA Maps:* Attached is the FEMA Map used for this analysis. As indicated by the maps, the proposed project site does not lie within a floodway or floodplain. See Exhibit D – FEMA Map.
- *United States Department of Agriculture, Natural Resources Conservation Service Soil Survey:* The soils on site consist of Poulsbo gravelly sandy loam and Ragnar fine sandy loam. The SCS Soils Guide defines the soils as Type "B" and "C". Some areas of the site may be capable of limited infiltration but due to recommendations from the Geotechnical Engineer infiltration is not deemed feasible.
- *Aquifer Critical Area Map:* Based on a review of the City of Poulsbo Aquifer Critical Area Map, the site is not within any Aquifer Critical Areas.
- *Fish and Wildlife Habitat Conservation Areas DNR Hydrology Water Type Map:* The ditch along SR-305 is a Type 3 water.
- *Wetlands Critical Area Map:* Based on a review of the City of Poulsbo Wetlands Critical Area Map, there are no wetlands on or adjacent to the site.
- *Fish and Wildlife Conservation Areas:* There is a stream along the south of the project with buffer requirements.
- *Geological Hazard Areas Map:* Based on a review of the City of Poulsbo Geological Hazard Areas Map, the site almost entirely within an area of potential geological hazard.

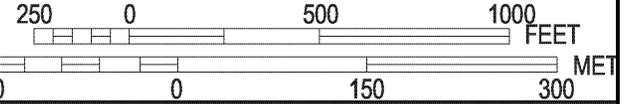
**EXHIBIT C**  
**FEMA Map**



**NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 26 NORTH, RANGE 1 EAST.**



**MAP SCALE 1" = 500'**



**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM  
FLOOD INSURANCE RATE MAP  
KITSAP COUNTY,  
WASHINGTON  
AND INCORPORATED AREAS**

**PANEL 207 OF 525**  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KITSAP COUNTY	530082	0207	E
POULSBORO, CITY OF	530241	0207	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



**MAP NUMBER  
53035C0207E**  
**MAP REVISED  
NOVEMBER 4, 2010**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)

# LEGEND

 SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A No Base Flood Elevations determined.
- ZONE AE Base Flood Elevations determined.
- ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

 FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

 OTHER FLOOD AREAS

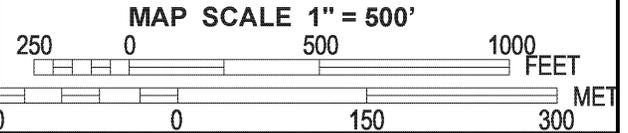
ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

 OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

 COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS



NATIONAL FLOOD INSURANCE PROGRAM

## FIRM FLOOD INSURANCE RATE MAP KITSAP COUNTY, WASHINGTON AND INCORPORATED AREAS

### PANEL 94 OF 525

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KITSAP COUNTY	530092	0094	E
POULSBO, CITY OF	530241	0094	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



**MAP NUMBER**  
**53035C0094E**  
**MAP REVISED**  
**NOVEMBER 4, 2010**

Federal Emergency Management Agency

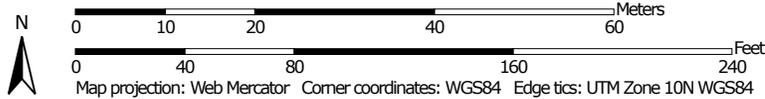
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)

**EXHIBIT D**  
**SCS Soils Map**

Soil Map—Kitsap County Area, Washington



Map Scale: 1:838 if printed on A portrait (8.5" x 11") sheet.



## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kitsap County Area, Washington  
 Survey Area Data: Version 11, Sep 14, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 9, 2010—Aug 20, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Kitsap County Area, Washington (WA635)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
40	Poulsbo gravelly sandy loam, 6 to 15 percent slopes	0.1	2.8%
41	Poulsbo gravelly sandy loam, 15 to 30 percent slopes	0.4	14.4%
44	Ragnar fine sandy loam, 0 to 6 percent slopes	2.5	82.8%
<b>Totals for Area of Interest</b>		<b>3.0</b>	<b>100.0%</b>

**EXHIBIT E**  
**Assessor's Maps**



**EXHIBIT F**  
**City of Poulsbo Sensitive Area Maps**

**CITY OF POULSBO**  
Kitsap County, Washington

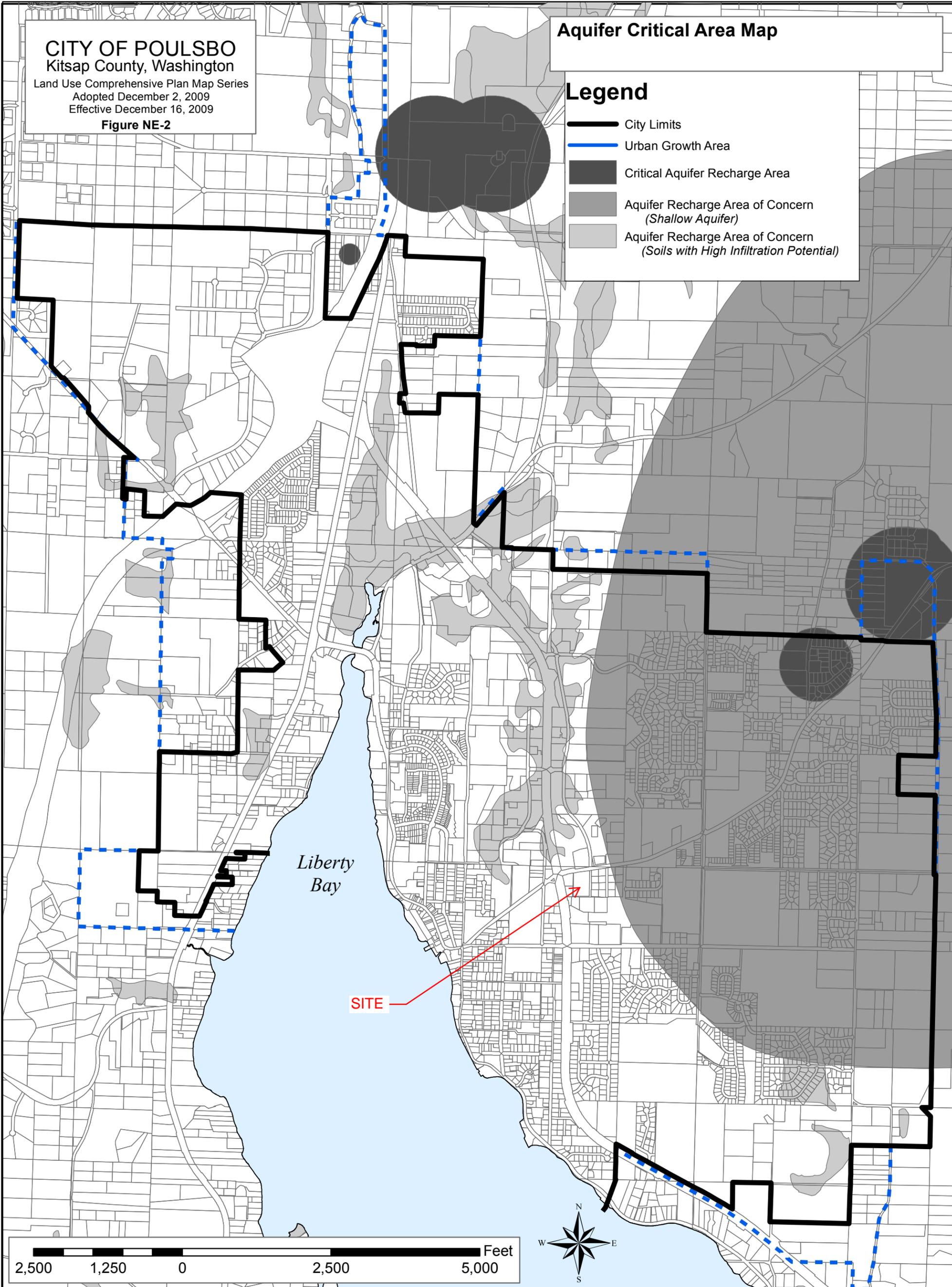
Land Use Comprehensive Plan Map Series  
Adopted December 2, 2009  
Effective December 16, 2009

**Figure NE-2**

**Aquifer Critical Area Map**

**Legend**

-  City Limits
-  Urban Growth Area
-  Critical Aquifer Recharge Area
-  Aquifer Recharge Area of Concern (Shallow Aquifer)
-  Aquifer Recharge Area of Concern (Soils with High Infiltration Potential)



2,500 1,250 0 2,500 5,000 Feet



Critical Area Map Series Primary Map Sources and Original Scales:  
 Delineated Wetlands compiled using Plat Maps from the City of Poulsbo Planning Department.  
 Hydric Soils United States Department of Agriculture, Soil Conservation Service in cooperation with the Washington State Department of Natural Resources and Washington State University Agricultural Research Center 1977 1:24,000  
 W.S.D.N.R. Hydrography, Washington State Department of Fish and Wildlife 1:24,000  
 Deeter, J. 1979, Quaternary Stratigraphy of Kitsap County Appendix III, p 149-159 and Plate 9  
 Shallow Aquifer and Wellhead, Kitsap Public Utility District  
 Kitsap County Assessor's Tax Maps 1:12,000 (Kitsap County IT, GIS Division)  
 \* Note: Saltwater wetlands are not represented on this map, however, they are of concern within the Shoreline Management Act.

This critical area map series is intended for general critical area planning. These maps are schematic representations of physical features, infrastructure and land ownership boundaries. The map information was derived from available public records and existing sources, not from surveys. Studies may be necessary with project review to verify information.

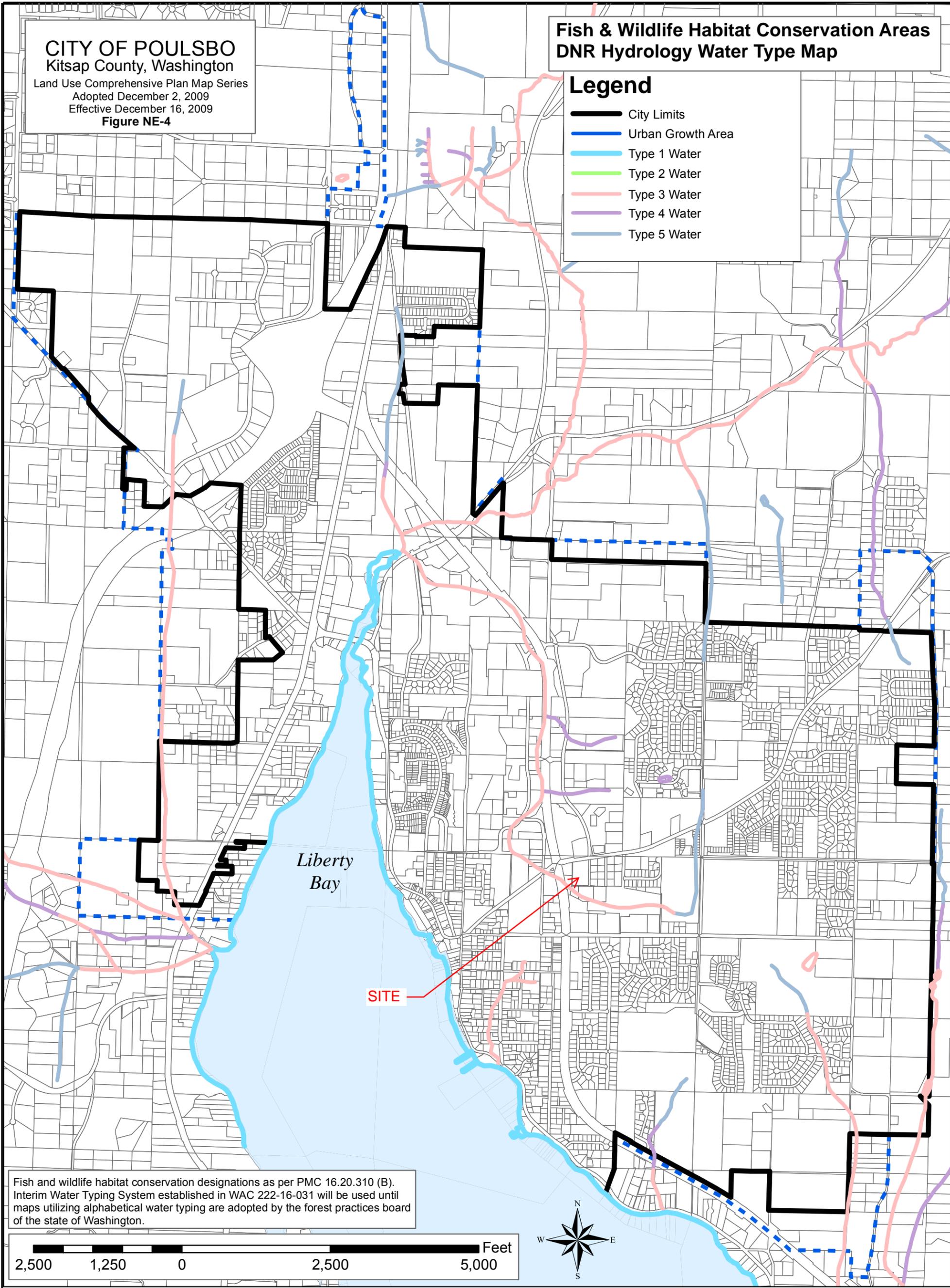
**CITY OF POULSBO**  
Kitsap County, Washington

Land Use Comprehensive Plan Map Series  
Adopted December 2, 2009  
Effective December 16, 2009  
**Figure NE-4**

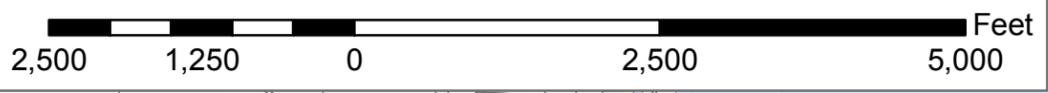
**Fish & Wildlife Habitat Conservation Areas  
DNR Hydrology Water Type Map**

**Legend**

-  City Limits
-  Urban Growth Area
-  Type 1 Water
-  Type 2 Water
-  Type 3 Water
-  Type 4 Water
-  Type 5 Water



Fish and wildlife habitat conservation designations as per PMC 16.20.310 (B). Interim Water Typing System established in WAC 222-16-031 will be used until maps utilizing alphabetical water typing are adopted by the forest practices board of the state of Washington.



Critical Area Map Series Primary Map Sources and Original Scales:  
 Delineated Wetlands compiled using Plat Maps from the City of Poulsbo Planning Department.  
 Hydric Soils United States Department of Agriculture, Soil Conservation Service in cooperation with the Washington State Department of Natural Resources and Washington State University Agricultural Research Center 1977 1:24,000  
 W.S.D.N.R. Hydrography, Washington State Department of Fish and Wildlife 1:24,000  
 Deeter, J. 1979, Quaternary Stratigraphy of Kitsap County Appendix III, p 149-159 and Plate 9  
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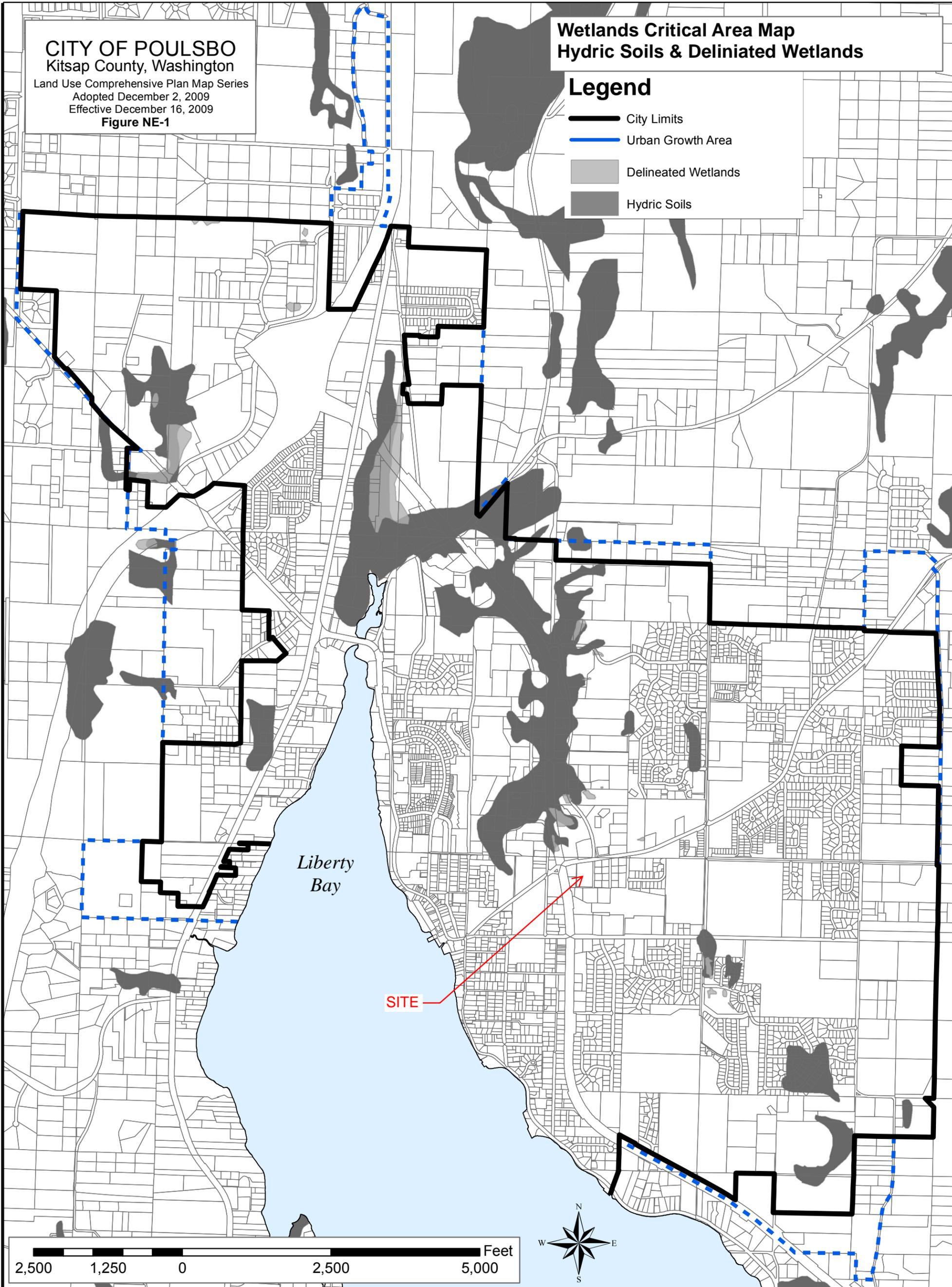
**CITY OF POULSBO**  
Kitsap County, Washington

Land Use Comprehensive Plan Map Series  
Adopted December 2, 2009  
Effective December 16, 2009  
**Figure NE-1**

**Wetlands Critical Area Map**  
**Hydric Soils & Delineated Wetlands**

**Legend**

-  City Limits
-  Urban Growth Area
-  Delineated Wetlands
-  Hydric Soils



2,500 1,250 0 2,500 5,000 Feet



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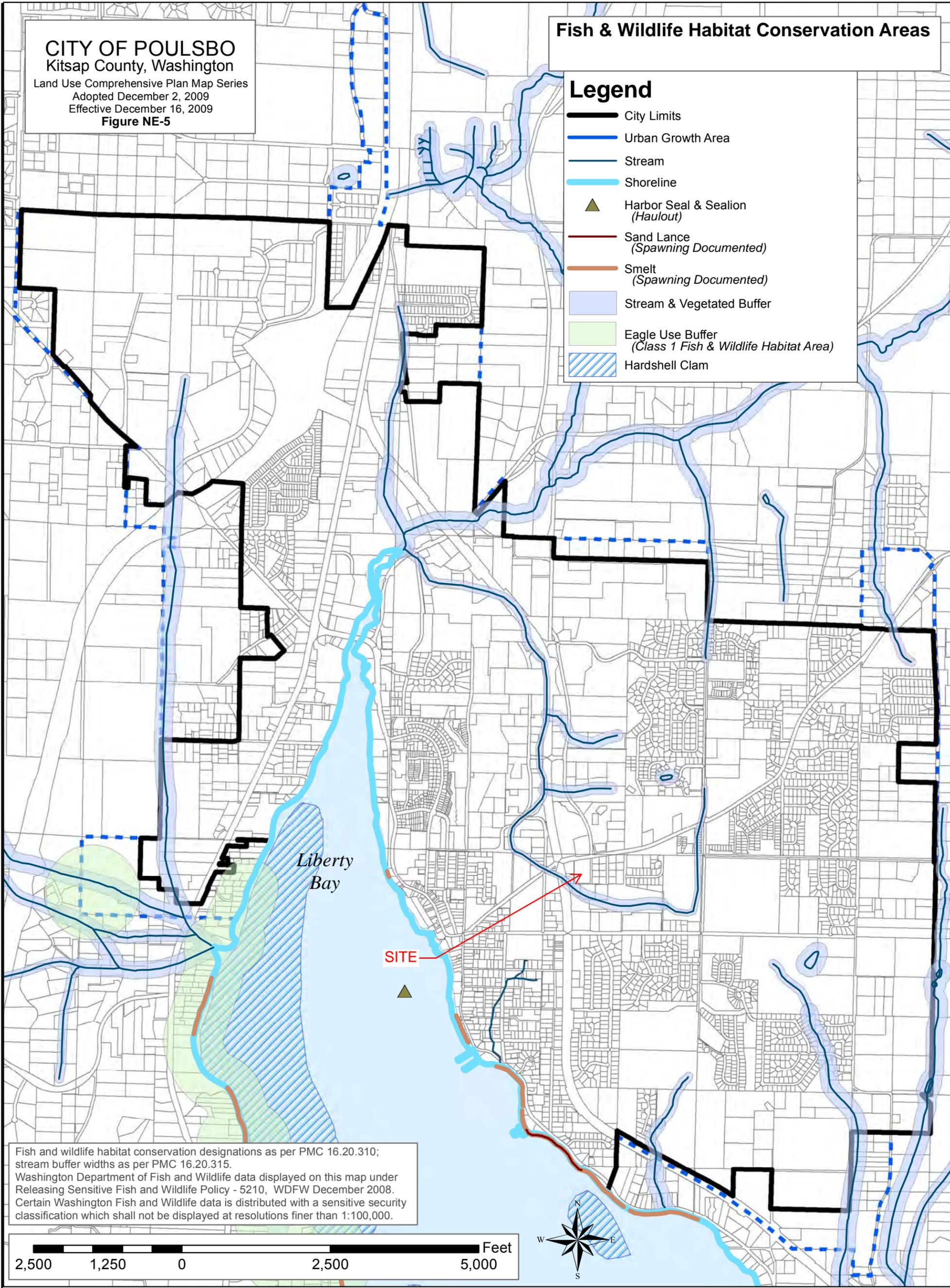
**CITY OF POULSBO**  
Kitsap County, Washington

Land Use Comprehensive Plan Map Series  
Adopted December 2, 2009  
Effective December 16, 2009  
**Figure NE-5**

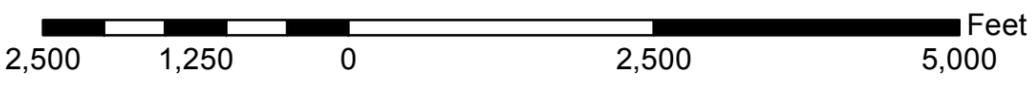
**Fish & Wildlife Habitat Conservation Areas**

**Legend**

-  City Limits
-  Urban Growth Area
-  Stream
-  Shoreline
-  Harbor Seal & Sealion  
(Haulout)
-  Sand Lance  
(Spawning Documented)
-  Smelt  
(Spawning Documented)
-  Stream & Vegetated Buffer
-  Eagle Use Buffer  
(Class 1 Fish & Wildlife Habitat Area)
-  Hardshell Clam



Fish and wildlife habitat conservation designations as per PMC 16.20.310; stream buffer widths as per PMC 16.20.315. Washington Department of Fish and Wildlife data displayed on this map under Releasing Sensitive Fish and Wildlife Policy - 5210, WDFW December 2008. Certain Washington Fish and Wildlife data is distributed with a sensitive security classification which shall not be displayed at resolutions finer than 1:100,000.



Critical Area Map Series Primary Map Sources and Original Scales:  
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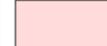
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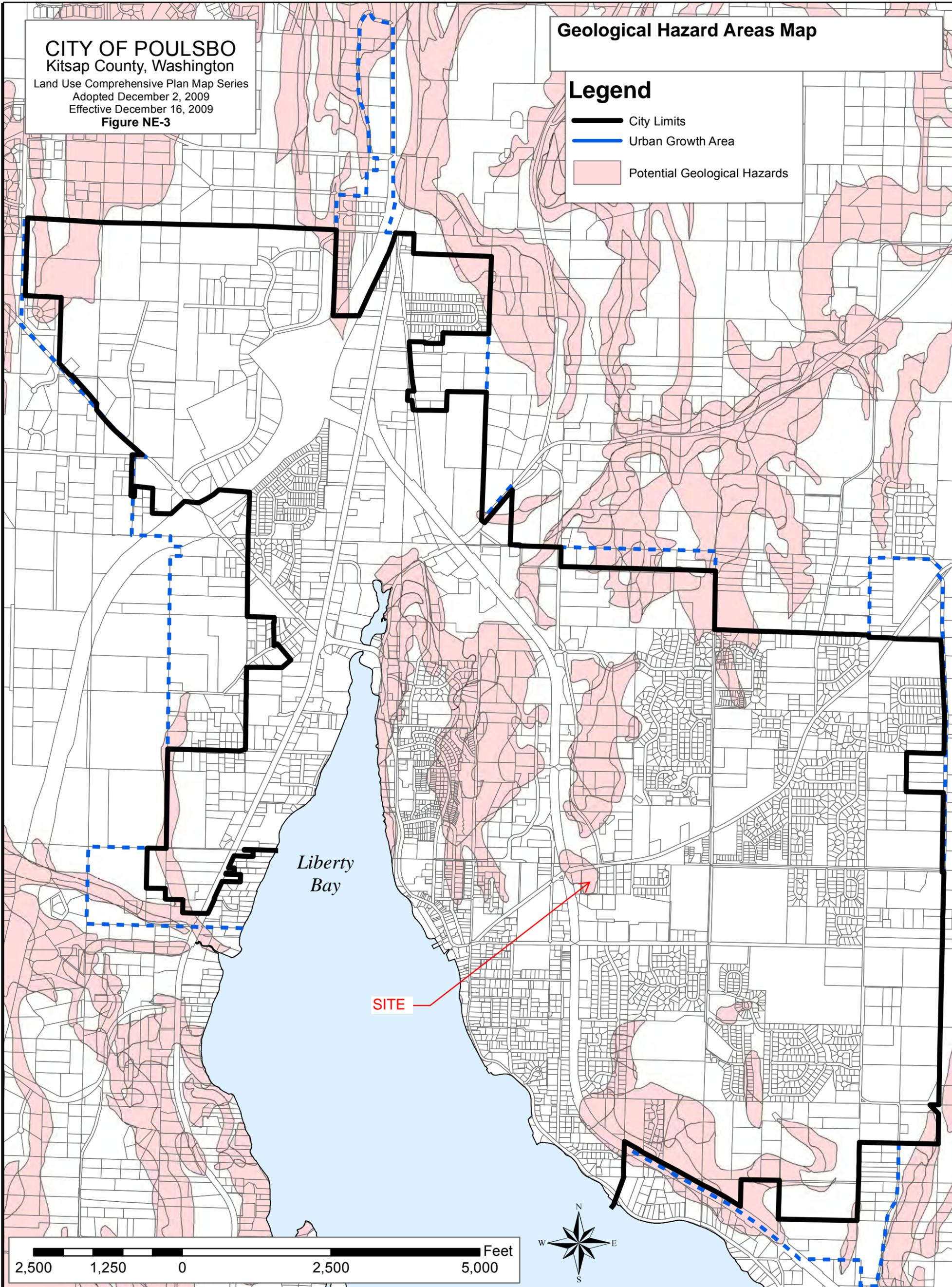
**CITY OF POULSBO**  
Kitsap County, Washington

Land Use Comprehensive Plan Map Series  
Adopted December 2, 2009  
Effective December 16, 2009  
**Figure NE-3**

**Geological Hazard Areas Map**

**Legend**

-  City Limits
-  Urban Growth Area
-  Potential Geological Hazards



2,500 1,250 0 2,500 5,000 Feet



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City of Poulsbo Planning Department GIS  
Printed on July 11, 2012

**TASK 3**  
**FIELD INSPECTION**

## **TASK 3      FIELD INSPECTION**

Resource review indicates that there are no flooding problems in the immediate vicinity of the subject property, but downstream of the site near 8th Avenue Northeast there is evidence of past flooding due to failures of the 8th Avenue Northeast culvert. Runoff will leave the project site at a rate less than or equal to the predeveloped condition. This will reduce any potential impacts of the proposed project on the downstream drainage course. The downstream drainage path is fully developed and vegetation is established so the chance of erosion problems is minimized.

### **3.1      Conveyance System Nuisance Problems (Type 1)**

Conveyance system nuisance problems, in general, are defined as any existing or predicted flooding or erosion that does not constitute a severe flooding or erosion problem. Conveyance system nuisance problems are defined as flooding or erosion that results in the overflow of the constructed conveyance system for runoff events less than or equal to a 10-year event. Examples include inundation of a shoulder or lane of a roadway. Examples include overflows collecting in yards or pastures, shallow flows across driveways, minor flooding in crawlspaces or unheated garages/outbuildings, and minor erosion.

There is no evidence of conveyance system nuisance problems occurring.

### **3.2      Severe Erosion Problems (Type 2)**

Severe erosion problems are defined as downstream channels, ravines, or slopes with evidence of or potential for erosion/incision, sufficient to pose a sedimentation hazard to downstream conveyance systems or propose a landslide hazard by undercutting adjacent slopes. Severe erosion problems do not include roadway or minor ditch erosion.

There was no evidence of or potential for erosion sufficient to pose a sedimentation hazard to downstream drainage courses. If the on-site soils are disturbed, runoff could potentially pick up sediments; however, silt fence will be used along the property line to stop the sediment transport. Discharge to the existing on-site stream in the developed conditions will be done via an outfall pipe to a riprap pad, thereby greatly reducing the potential for erosion.

### **3.3      Severe Flooding Problems (Type 3)**

Severe flooding problems can be caused by conveyance system overflows or the elevated water surfaces of ponds, lakes, wetlands, or closed depressions. Severe flooding problems warrant additional attention because they pose a significant threat either to health and safety or to public or private property.

There is no evidence of flooding on this site. The subject property will release stormwater runoff to the downstream system at a rate that is less than the pre-developed runoff rate. Therefore, it is not anticipated that the proposed project will create any new flooding problems.

**TASK 4**  
**DRAINAGE SYSTEM DESCRIPTION**  
**AND PROBLEM DESCRIPTIONS**

#### **TASK 4          DRAINAGE SYSTEM DESCRIPTION AND PROBLEM DESCRIPTIONS**

Refer to Exhibit B – Downstream Drainage Map. Runoff from the proposed project site leaves the project site near the southwest corner of the property. All flows leaving and passing through the project site ultimately discharge into the Liberty Bay via Dogfish Creek.

Stormwater runoff sheet flows toward the southwest corner of the proposed project site where it is collected in a stream. The stream continues northwest to a 10 foot culvert crossing an existing driveway. From here the stream continues northwest until reaching SR-305 and crossing under via a 12' box culvert. From here it travels further in the same direction until reaching a 6' culvert crossing NE Lincoln RD. The stream and 24" culvert past here, near 8th Ave NE show evidence of overflow. There is evidence that overflows reach almost to 7th Avenue NE. The remainder of the 1/4 mile downstream study path consists of stream sections and 6' culverts that show no evidence of drainage problems.

The stream continues north for approximately 3/4 of a mile where it joins the main branch of Dogfish Creek near Bond Road NE. Dogfish Creek discharges into to Liberty Bay less than a mile downstream from there.