Northwest Ecological Services, LLC

North Bellingham and Urban Growth Boundary Wetland, Stream, Habitat Conservation Area and Buffer Assessment

TECHNICAL MEMORANDUM

Prepared For:	City of Bellingham Planning & Community Development Department
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INTRODUCTION

The City of Bellingham is in the process of updating its 2006 Comprehensive Plan. As part of this process, the City of Bellingham Planning & Community Development Department contracted with Northwest Ecological Services, LLC (NES) to provide additional information on wetlands, streams, and habitats within the northern portion of the City, an area with limited and uneven information on critical areas. This information is intended to assist the City with long-range planning decisions.

The City has improved their critical area mapping with information from land development applications that included critical areas studies, but information gaps persist. This new inventory improves the uniformity of the wetland information within the review area and helps consolidate existing wetland data.

STUDY AREA

The study area consists of approximately 12,800 acres in the northern portion of the City of Bellingham and the surrounding Urban Growth Area (UGA) and some limited excursions outside the UGA as shown in Attachment 1. In general, the study area encompasses the area northwest of Sunset Drive (State Route 542) and south of Kelly Road.

SCOPE OF WORK AND METHODOLOGY

The project scope consisted of two distinct tasks: (1) inventory and assessment, and (2) identification of potential mitigation sites. The focus of the project was on wetlands; however, NES documented information on streams and other habitat conservation areas (HCA) when these features were observed during site visits.

Critical Area Inventory and Assessment

The inventory and assessment work began with an office review of available information. NES compiled site information from existing City geographic information system (GIS) layers and NES files. Existing information included current and historical aerial photography, LiDAR, soils, topographic layers, drainage layers, stream layers, habitat polygons and corridors, and wetland layers. Wetland layers consisted of the City's site specific wetland delineations, 2003 Wetland Inventory, and 1992 Wetland Inventory. NES reviewed existing City GIS layers and corrected existing data to match current conditions. Corrections were often associated with land use changes that resulted in the removal of critical areas. The data was also reviewed to identify missing wetland, stream, and habitat polygons. The assessment started with identifying parcels where known existing wetland delineations had occurred that were not reflected in the City's databases. For these parcels, NES staff contacted land owners and agencies and requested permission to incorporate the delineation into the City's wetland layer. Using this updated layer, NES then identified blocks of land (generally > five acres in size) that likely contain wetland, streams, or habitats not reflected in the wetland layer.

NES then worked with City staff to narrow the number of blocks to the most significant blocks for inventory and assessment purposes. Blocks were determined high priority for one or several different factors including probability of critical areas, development pressure, and extent of the data gap (size of the acreage lacking data). Once the City determined the "high priority" areas, landowners within the priority areas were mailed a letter requesting permission to access their site for critical area inventory and assessment.

For areas with landowner-approved access, City-owned property, and City-determined "high priority" public rights-of-way, NES conducted reconnaissance-level field investigations. These field visits allowed NES to observe soil, vegetation, and hydrologic conditions to more accurately locate critical area boundaries and provide a more detailed assessment. As part of their site visit, NES estimated the potential location and approximate extent of wetlands, streams, and habitats. For "high priority" areas without right-of-access, NES conducted an office review using aerial photography, topographic maps, soils maps, and LiDAR. NES mapped the location and extent of potential wetland polygons based on the US Army Corps of Engineers' Routine Determination methodology[1],[2] and documented the polygons in GIS using the QGIS 2.4.0 software. For each wetland polygon, NES documented if the information was based on a site visit or office review.

NES conducted a basic assessment for each potential wetland, documenting information on the following features: hydrology, vegetation, soils, wildlife and habitat, buffer condition, stream type, and mitigation opportunity (Table 1). An example assessment form is included as Attachment 2.

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[1] Environmental Laboratory. 1987. *Corps of Engineers Wetland Delineation Manual.* Technical Report Y-87-1, U.S. Army Engineers Waterways Experiment Station, Vicksburg, MS.

[2] U.S. Army Corps of Engineers. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region,* ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-08-13. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Table 1. Assessment Elements

Feature	Description
Hydrology	Hydrogeomorphic classification (HGM) based on field observations, LiDAR, and topographic maps. Dominant water regimes (saturated, occasional inundation, seasonal inundation, permanent inundation, stream channel) based on site observations. Estimated percent of wetland that is ponded based on site observations and aerial photography. Percent ponding was documented in categories with 25% increments. Outlet condition including no outlet, highly constricted, intermittently flowing, unconstricted, permanently flowing, or stream using definitions provided in 2014 Wetland Rating System[3]. Average depth of ponding as estimated from site visit. Whether the wetland is a "complex" (comprised of similar small wetlands clustered together). If yes, then estimated the percentage of area that is wetland. Additional field information would be needed to determine if area qualified as a "mosaic" defined in the 2014 Wetland Rating System[3].
Vegetation	Dominant Cowardin vegetation classes[4] and percentage cover, percentage invasive plant cover[5], and dominant species as observed during site visit.
Soils	Mapped soil unit and whether the soil is listed as hydric[6,7]
Wildlife & Habitat	Priority Habitats and Species (PHS) observed during site visit[8]. NES did not field verify all PHS polygons identified by WDFW. Documented any observed eagle nests within 660 feet of the identified wetland polygon, the bald eagle nest management area used by the US Fish and Wildlife Service. Documented general wildlife observations.
Buffer	Buffers surrounding wetlands and streams were categorized as "undisturbed," "moderate/low intensity" land use, or "high intensity" land use. NES used the definitions provided in the 2014 Wetland Rating System[3], with additional clarification for hayed fields and grazing animals. Hayed fields and areas containing < 1 animal/acre were determined to be "moderate/low intensity." Areas > animal/acre were determined to be "high intensity."
Streams	When streams were observed during site visits, documented probable stream type of the on-site reach. Stream type was estimated based on the single site observation and WDFW's mapped fish presence[9]. The probable stream type is an estimate, only pertains to the reach associated with an on site visit, and additional investigation is needed to confirm.
Mitigation Opportunity	Determined if mitigation opportunities exist. Estimated the type(s) of mitigation that may be possible including creation, rehabilitation, restoration, enhancement, buffer enhancement, and preservation. Also noted whether area had potential for additional water storage and improved salmon habitat.
Notes	Documented any unusual observations or circumstances.

[3] Hruby, T. 2014. *Washington State Wetlands Rating System for Western Washington, 2014 Update*. Washington State Department of Ecology Publication #14-06-029. Olympia, WA.

[4] Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. FWS/OBS-79/31. Fish and Wildlife Service, US Department of the Interior, Washington, D.C.

[5] Washington State Noxious Weed Control Board. *2014 Whatcom County Noxious Weed List*. Online at [http://www.co.whatcom.wa.us/publicworks/weeds/weedlist.jsp]/accessed February 2015.

[6] Soil Survey Staff, United States Department of Agriculture, Natural Resource Conservation Service. Web Soil Survey. Available online at [www.websoilsurvey.nrcs.usda.gov]/ accessed January 2015.

[7] U.S. Department of Agriculture, Natural Resource Conservation Service. 2010. *Field Indicators of Hydric Soils in the United States, Version 7.0* L.M. Vasilas, G.W. Hurt, and C. V. Noble (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils. Lincoln, Nebraska.

[8] Washington State Department of Fish and Wildlife. 2014. PHS Data on the Web Interactive Map. Online at [http://fortress.wa.gov/dfw/gispublic/prodphsontheweb/viewer.aspx?auth=JwXxUH0ngPvzOg8x0d41qRnwg0WDBo9dbRTgp7769mNhB8lgNJTKeg==]/ accessed January 2015.

[9] Washington State Department of Fish and Wildlife. 2015. SalmonScape. Online at [www.wdfw.wa.gov]/ Accessed February 2015].

Assessment results were recorded on field forms (Attachment 2) and transferred to an MS Excel spreadsheet. The final QGIS polygon layer and assessment spreadsheet was submitted to the City in digital format for integration into the City GIS system.

Due to the limited scope of the project, NES did not determine the Wetland Rating or buffer width as part of the project. This information requires a more comprehensive assessment and the results depend on up-to-date land use information and regulations. Wetland ratings are most useful when done in association with a project rather than part of a general inventory where more specific information about the wetland is available.

When viewing the results of this inventory update, the presence of a polygon indicates a high probability of a critical area being present; however the absence of a polygon does not necessarily indicate a lack of critical area. Instead, polygon absence is more indicative of insufficient data. When parcels lacking critical areas were detected we provided a separate layer that indicates the property was "dry."

Mitigation Site Assessment

Several partial wetland inventories have been conducted by the City, including inventories in 1992 and 2003. Prior to these studies, wetland mapping was limited the National Wetland Inventory performed by the US Fish and Wildlife Service in the 1970's. Although the City has made substantial efforts to maintain comprehensive wetland maps, not all areas within the City limits have been inventoried, including the northern portion of the UGA, an area with increased development pressure. Since the last wetland inventory, there have been significant physical changes within the review area including new development, road construction, and logging. These changes have resulted in alteration and loss of critical areas. Natural changes to wetlands also occur over time as these are dynamic systems.

The project scope also included identifying properties that could potentially be used as mitigation sites. In recent years there has been increased development pressure in the North Bellingham area. City infrastructure, such as expansion of utilities and roads, are in planning phases at this time. As the City responds to growth, associated infrastructure may require impacts to regulated critical areas, particularly wetlands. The City has requested a review and identification of potential mitigation sites so they can plan for these projects and provide sustainable, meaningful mitigation for unavoidable impacts.

NES used the City's existing wetland information, existing local studies including, but not limited to, the *Bellingham Habitat Restoration Technical Assessment*[10], *Squalicum Floodplain Management Plan*[11], the results from the inventory described above, and best professional judgment (BPJ) to identify potential mitigation sites within the review area. We also applied our professional knowledge of properties in the review area, in addition to information from field visits, existing wetland, stream and soil mapping, and aerial photograph review. When data from past delineation or reconnaissance was available, that information was utilized. Potential mitigation

[10] Environmental Science Associates. 2014. Bellingham Habitat Restoration Technical Assessment. City of Bellingham Public Works.
[11] R.W. Beck. 1994. Squalicum Creek Floodplain Management Plan and Final EIS. City of Bellingham Public Works.

sites were limited to new sites. Existing mitigation sites or sites planned for future mitigation were not included.

The principles and guidelines detailed in *Selecting Wetland Mitigation Sites Using a Watershed Approach*[12] were used to assess potential mitigation sites. NES reviewed properties in the study area that met elements outlined in the *Watershed Approach*, including suitable soils and hydrology, position in the landscape that supports sustainability, and habitat connectivity. Undeveloped land was preferred in the review, but parcels with residences were included in some cases when a property looked like a highly feasible site. Potential types of mitigation actions were indicated for the identified sites. Availability and potential acreage of mitigation was not determined in this study and would require further analysis.

RESULTS

Critical Area Inventory

This project added 224 wetland polygons to the City database. One hundred fifteen of these polygons were identified from direct observation, either from on-site or adjacent to the site. Most of the remaining wetlands were recorded from existing delineation mapping that was previously not added to the City GIS database. A limited number of polygons were added in the office from interpretation from aerial photographs, Lidar data, and soil mapping. Additionally, the pre-existing City wetland layers were updated to reflect current conditions.

Many features were difficult to determine due to limited site access and forest cover. Aerial interpretation of forested systems is not very accurate. NES avoided mapping forested wetlands unless a site visit was conducted. Although winter vegetation conditions, topographic maps, and aerial photography helped in many circumstances, sometimes there was not enough information and the feature was described as "unknown".

No additions or changes were made to HCAs in the review area. NES found the timeline and level of effort on the ground did not allow for accurate depiction of these features. A limited refinement of data on streams was added to areas where streams crossed areas where staff had field access. HCA data is best updated in studies designed to focus on specific flora or faunal species and/or taxa.

Mitigation Site Assessment

NES identified 47 parcels in the study area that have the potential to serve as mitigation sites. Mitigation opportunities were detected in each watershed within the study area. Attachment 3 indicates the locations of sites identified overlaid with watershed boundaries. Details on the potential opportunities have been included in the GIS data for each parcel identified. Most of the identified mitigation sites were associated with wetland mitigation, but stream projects were included, as well. The majority of the sites identified were 10 acres or larger. Smaller sites were also included, but only if they could be combined with adjacent sites to provide a larger final project. Generally, larger mitigation sites are more sustainable over time and can potentially encompass more than one project, making them more economical to construct and maintain.

[12] Hruby, T., K. Harper, and S. Stanley (2009). Selecting Wetland Mitigation Sites Using a Watershed Approach. Washington State Department of Ecology Publication #09-06-032

Table 2 presents a summary of the number of potential mitigation sites identified and the different mitigation actions that could occur on these sites.

Table 2. Number of mitigation areas by action type identified per Watershed and major tributaries in study areas

Mitigation Type*[13]	Bellingham Bay	Silver Creek		Squalicum Creek		
		Mainstem	Bear Creek	Mainstem	Baker Creek	Spring Creek
Wetland Creation	3	0	6	8	2	0
Wetland Rehabilitation	0	2	3	9	3	5
Wetland Enhancement	4	3	4	3	4	5
Wetland Preservation	1	1	9	5	1	3
Stream Rehabilitation	0	0	0	7	0	0

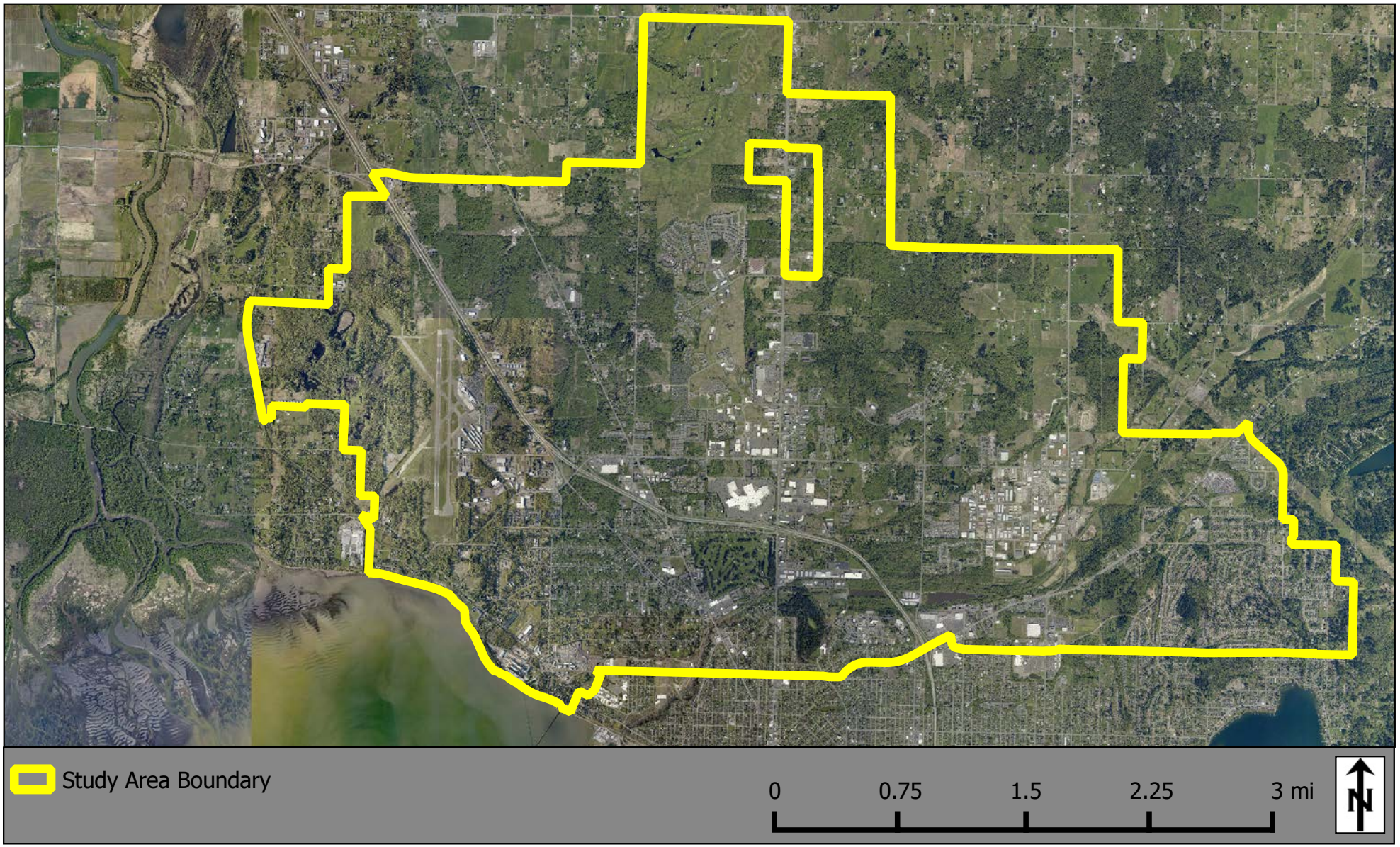
*Defined in document 12 "Wetland Mitigation in Washington State"

Many of the identified sites are wetland mitigation opportunities targeting traditional mitigation actions such as wetland *creation*, *rehabilitation* and *enhancement*. However, in this assessment, we present a notable number of sites that fit primarily into a *preservation* action. Preservation has not traditionally been the preferred way to mitigate for wetland loss. This mindset may be shifting with preservation being a more favored choice, at least in combination with other mitigation actions. The City of Bellingham Public Works Department recently presented preservation of aquatic and upland habitats as the preferred action in many cases, providing long-term protection of overall ecological function in the City watersheds (Environmental Science Associates[11]).

In all cases, the potential mitigation sites would require a rigorous review of the extent of existing wetlands, soils, hydrology and surrounding connections before any final decision on their use or application should be applied to projects.

[13] Washington State Department of Ecology, U.S. Army Corps of Engineers Seattle District, and U.S. Environmental Protection Agency Region 10. March 2006. Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1). Washington State Department of Ecology Publication #06-06-011b. Olympia, WA

Attachments 1-3



ECOLOGICAL NORTHWEST	**Study Area Map** **City of Bellingham** **North Bellingham and UGA Wetland, Stream, and Buffer Assessment**	**Attachment 1** **March 2015**

City of Bellingham

2015 Wetland Inventory Data Form

Date:	Parcel:	Wetland ID:
Investigators:	Owner:	Watershed/Sub-basin:
	Phone:	
	Location:	HUC: ☐ 17110002 ☐ 17110004
Photos?		
Results to owner?		Field Verified ☐
	NWI: ☐ Yes ☐ No	Viewed from off-site ☐
	COB Inven.: ☐ Yes ☐ No	Office Assessment ☐

Hydrology

HGM:
- ☐ Depressional
- ☐ Riverine
- ☐ Slope
- ☐ Lacustrine fringe
- ☐ Estuarine fringe
- ☐ Unknown

Water Regime:
- ☐ Saturation
- ☐ Occasional inundation
- ☐ Season inundation
- ☐ Permanent inundation
- ☐ Stream
- ☐ Unknown

Depth of ponding: _____
Wetland Complex: ☐ Yes ☐ No
% Wetland in Complex:

Percentage of Ponding:
- ☐ 0-25
- ☐ 25-50
- ☐ 50-75
- ☐ 75-100
- ☐ Unknown

Outlet:
- ☐ None
- ☐ Highly constricted
- ☐ Intermittently flowing
- ☐ Un-constricted
- ☐ Permanently flowing
- ☐ Stream
- ☐ Unknown

Notes:

Vegetation

Cowardin Veg. Class Percentage:

	>30	30-50	50-75	75-100
PEM				
PSS				
PFO				

Veg. class unknown ☐
Dominant Species: _____

Invasive Percent Cover:
- ☐ None
- ☐ <25
- ☐ 25-50
- ☐ 50-75
- ☐ 75-100
- ☐ Unknown

Species:

Notes:

Soils

NRCS Unit(s):

Mapped Hydric: ☐ Yes ☐ No

Notes:

Wildlife & Habitat

PHS mapped on-site: ☐ Yes ☐ No (other than wetland) If yes, what type:	PHS mapped within 330 ft: ☐ Yes ☐ No (other than wetland) If yes, what type:
Eagle nest indicated within 660 ft: : ☐ Yes ☐ No Wildlife observed during site visit:	

Buffer

Describe the surrounding (100ft) buffer: Notes:

Undisturbed ☐ >50% ☐< 50%

Moderate/ low Intensity Use (residential <1unit/ acre, park, moderate agriculture, trails, utility corridor)
☐ >50% ☐ < 50%

High Intensity Use (commercial, urban, residential >1 unit/acre), high intensity agriculture including >1 animal/acre, high intensity recreation)
☐ >50% ☐< 50%

☐ Unknown

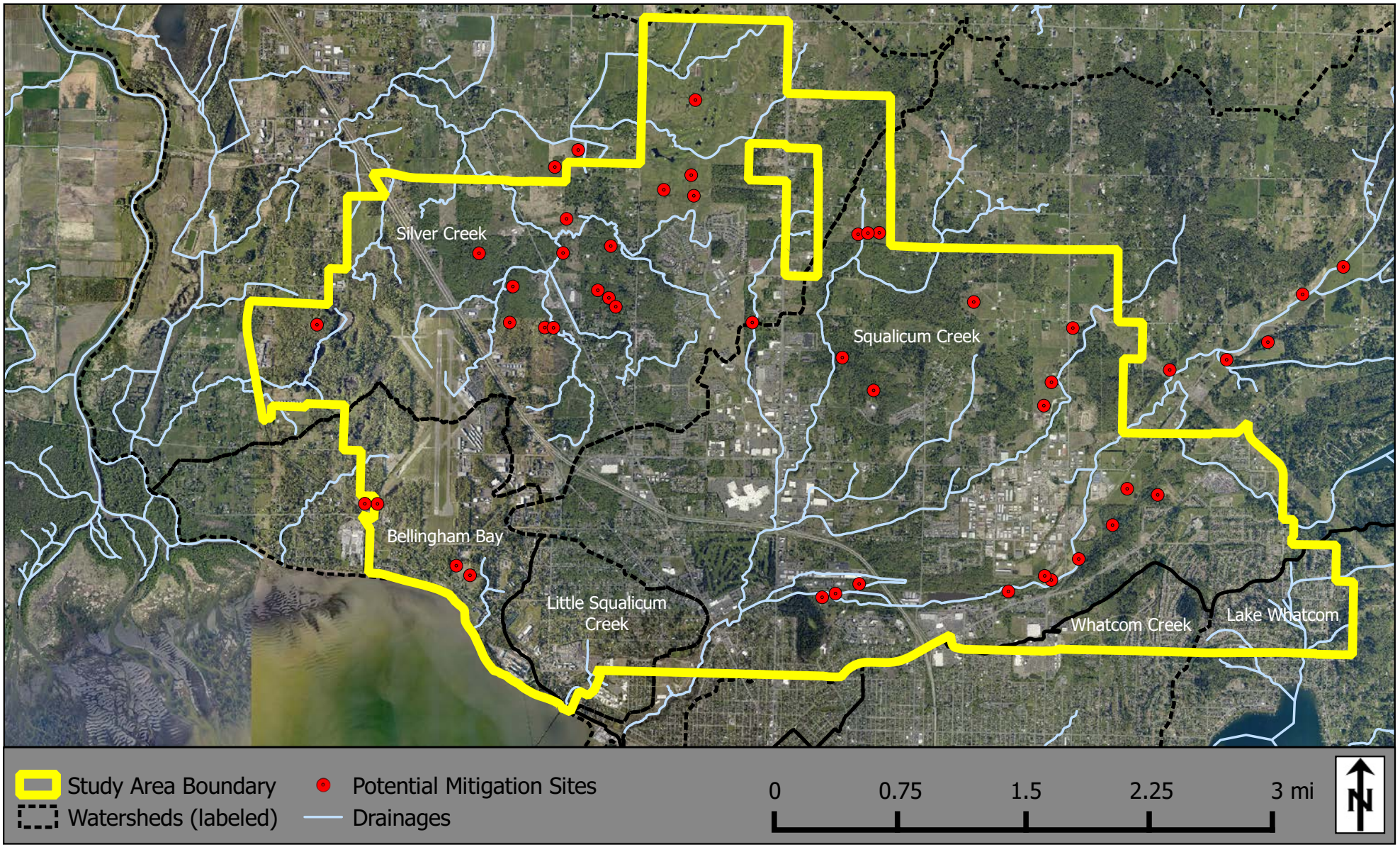
Mitigation Opportunity

Mitigation Opportunity:	Mitigation Type:	Notes:
☐ Yes ☐ No	☐ Creation ☐ Rehab/Restoration ☐ Wetland Enhancement ☐ Buffer Enhancement ☐ Preservation ☐ Water storage ☐ Salmonid Habitat	

Streams

Stream Present:	Stream Type:	Notes:
☐ Yes ☐ No	☐ Type S ☐ Type F ☐ Type Np ☐ Type Ns	

Notes:



ECOLOGICAL NORTHWEST	**Potential Mitigation Sites** **City of Bellingham** **North Bellingham and UGA Wetland, Stream, and Buffer Assessment**	**Attachment 3** **March 2015**