CITY OF NOOKSACK
Grant No. G1000049

CITY OF NOOKSACK
SHORELINE MASTER PROGRAM UPDATE

SHORELINE INVENTORY AND CHARACTERIZATION REPORT

TASK 2.3

December 31, 2010 Draft

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City of Nooksack Shoreline Jurisdiction Vicinity Map

APPENDIX

Shoreline Inventory Data Sheets for Reaches 1-12 including References prepared by Northwest Ecological Services

Acronyms

BOD – Biological Oxygen Demand
CMZ – Channel Migration Zone
CREP – Conservation Reserve Enhancement Program
DBH – diameter breast height
DO – Dissolved Oxygen
DOE – Washington State Department of Ecology
ESU – Evolutionarily significant unit
FEMA – Federal Emergency Management Agency
LWD – Large woody debris
NWI – National Wetlands Inventory
OHWM – ordinary high watermark
PFOC – palustrine, open water, forested, seasonally flooded wetland
PHS – Priority Habitat Species
POWH – palustrine, open water, permanently flooded wetland
PSSC – palustrine, scrub-shrub, seasonally flooded wetland
SR – State Route
SWMP – Stormwater Management Plan
TMDL – Total Maximum Daily Load
UGA – Urban Growth Areas
USFWS – United States Fish & Wildlife Services
VCA – Vegetation Conservation Area
WAC – Washington Administrative Code
WDFW – Washington State Department of Fish & Wildlife

1.0 INTRODUCTION

1.1 SETTING

The City of Nooksack is located in the north-central part of Whatcom County. The City and its designated urban growth area (UGA) include portions of the Sumas River and Breckenridge Creek, each of which has a mean annual flow of over 20 cubic feet per second. These streams, therefore, are within shoreline jurisdiction. They include over three miles of shoreline within shoreline jurisdiction. The Nooksack Slough is also identified as being within shoreline jurisdiction to the extent that it comprises wetlands located within the 100-year floodplain which are hydrologically connected to the primary shoreline water bodies identified above.

The Sumas River Watershed Management Unit (WMU) is part of the Fraser River basin. It is located north of the mainstem Nooksack River between the Lynden North and North Fork WMUs and encompasses approximately 82 square miles, roughly two thirds of which are within Whatcom County (the remainder are in Canada). The City of Nooksack is located entirely within this WMU.

Although topographically separated from the Nooksack River system (by levees), the Sumas River WMU includes a portion of the historic Nooksack floodplain. During major flood events, a portion of the Nooksack River sometimes flows north into Canada via Johnson Creek and the Sumas River. The Sumas River and portions of three of its major tributaries– Johnson Creek, Breckenridge Creek, and Saar Creek– are the only shorelines of the state in this WMU.

1.2 METHODOLOGY

This report has been prepared as part of the City of Nooksack's comprehensive update of its Shoreline Management Master Program. This document contains two main sections: the Ecosystem-wide Processes section and the Shoreline Reach Inventory and Analysis section. This report is intended to satisfy Task 2.3 of the Department of Ecology Grant Agreement No. G1000049 for the City of Nooksack.

The goal of Task 2.3 is to compile and analyze relevant data sources and information for the shoreline jurisdictional areas within the City of Nooksack and its designated UGA. The Ecosystem-wide Processes section of the report was developed primarily based on inventory work completed by Whatcom County and addresses the ecosystem-wide processes for the Sumas River watershed. This section focuses on those processes most important to the shorelines within the City of Nooksack and UGA. The final section of the report provides a detailed Reach Inventory and Analysis of the land and water areas within shoreline jurisdiction. This section not only addresses the physical features and characteristics present, but also includes an analysis of the shoreline functions provided in each reach.

2.0 ECOSYSTEM-WIDE PROCESSES

2.1 OVERVIEW

WAC 173-26-201(3(d)(i)) requires that an evaluation of ecosystem-wide processes affecting areas within shoreline jurisdiction be included in the shoreline inventory analysis and characterization report prepared in conjunction with an updated Shoreline Master Program (SMP). This evaluation provides information on the Sumas River Watershed Management Unit (WMU) and ecosystem-wide processes that have an effect on the shorelines within the City of Nooksack and the City Urban Growth Areas (UGA). Whatcom County has completed an extensive review of the Sumas River WMU. This prior work, Whatcom County Shoreline Management Program Draft Inventory and Characterization Report (2006), is referenced in this evaluation of the shorelines of the City of Nooksack. Citations and maps referenced in section 2.0 of this report are drawn from the Whatcom County Shoreline Management Program Draft Inventory and Characterization Report (2006) and the accompanying map portfolio.

The relevant ecosystem-wide processes are viewed at the watershed level to understand how natural processes work and affect the City of Nooksack shoreline areas. The City of Nooksack shoreline areas are located on the shores of the Sumas River and Breckenridge Creek. The City is located within the Sumas River watershed management unit. See the Whatcom County Aquatic Resources Map for the location of the City and aquatic resources within this WMU.

The Sumas River WMU is part of the Fraser River basin. It is located north of the mainstem Nooksack River between the Lynden North and North Fork WMUs and encompasses approximately 82 square miles, roughly two thirds of which are within Whatcom County (the remainder are in Canada). The cities of Sumas and Nooksack are located entirely within this WMU, as is the easternmost part of the City of Everson.

Although topographically separated from the Nooksack River system (by levees), the Sumas River WMU includes a portion of the historic Nooksack floodplain. During major flood events, a portion of the Nooksack River sometimes flows north into Canada via Johnson Creek and the Sumas River. The Sumas River and portions of three of its major tributaries─ Johnson Creek, Breckenridge Creek, and Saar Creek─ are the only shorelines of the state in this WMU.

2.2 LAND USE AND LAND COVER

The Sumas River WMU supports intense agricultural land uses, which occupy almost the entire land area in the lowland region. Forestry is the dominant land use in the upland area of Sumas Mountain. Most of the higher elevations are coniferous forest, with mixed and predominately deciduous forests at lower elevations.

2.3 CLIMATE

Precipitation along Sumas Mountain averages around 70 inches annually, but drops off with elevation to around 50 inches in the lowlands. Snowfall and rain-on-snow events are common on Sumas Mountain, but rainfall is the dominant form of precipitation in the

lowlands. Most precipitation falls from October through January, but snowmelt drives runoff patterns in early summer.

2.4 GEOLOGY

Underlying Geology

The Sumas River WMU has three northwest-southeast trending bands of unique surficial geology. The northwestern portion is characterized by outwash deposits with an extensive network of wetlands. The central band running from Nooksack to Sumas is located on an outwash terrace of fine-grained drift containing sporadic deposits of alluvium, undifferentiated outwash, and till. Till also forms a swath separating the terrace deposits from the Huntington sedimentary bedrock and Chilliwack sedimentary and metamorphic bedrock that comprise Sumas Mountain in the eastern portion of the WMU (Easterbrook 1973*).

Topography and Bathymetry

Topography generally follows surficial geology. The eastern part of the WMU has high relief with elevations of approximately 2,700 feet on Sumas Mountain. Moving west the landform falls off quickly to the lowlands. The Sumas River lies approximately 80 ft. above sea level in the City of Nooksack, approximately 40 feet above sea level in Sumas, and only 27 feet above sea level where it crosses into Canada.

The Sumas River gradient averages approximately 0.08 percent across all reaches and flows through an unconfined valley. The river has a high sinuosity averaging approximately 2 across all reaches, although some reaches have a noticeably lower sinuosity than other reaches. Although the channel planform is similar to that of the lower Nooksack, overall reach morphology is somewhat different. Sediment supply does not appear to be sufficiently greater than transport capacity for the Sumas River to develop an elevated meander belt that lies above the floodplain. Instead, the stream probably developed its sinuous morphology as a result of a historically equilibrated supply-transport mechanism and highly stable, well vegetated banks that limited migration, particularly avulsions. These characteristics are indicative of the Rosgen Type E channel (Rosgen 1994*) that is part of the pool-riffle process domain (Montgomery and Buffington 1994*). This type of stream also generally has a very low width:depth ratio.

While sediment supply has increased, channel morphology remains relatively intact. Areas of active bank erosion appear limited; thus sinuosity and the low width:depth ratio have been preserved. Maintaining bank stability is key to protecting sinuosity and the very low width:depth ratio and will facilitate restoration of instream habitat conditions via sediment control and increased LWD recruitment.

2.5 HYDROLOGY

Hydrologic Processes

The rain-on-snow zones in high elevations of the Sumas River tributary drainages (which flow off Sumas Mountain) are process-intensive areas for peak runoff (Map 18-2*).

Process intensity is lower in the transition from the mountain to the lowlands, although some important infiltration areas are present. The coarse outwash deposits of the lowlands support a number of hydrologic mechanisms. Johnson Creek and Saar Creek have large floodplains with high storage potential. The Pangborn Lake area in the Johnson Creek drainage contains areas important for both infiltration and storage. Johnson Creek also receives runoff from the Nooksack River during events that overtop the river's levees. Although the Sumas River has a wide floodplain, it does not support multiple mechanisms to the same extent as Johnson Creek. However, a large infiltration area lies west of the floodplain where the lowland meets the glaciomarine terrace.

Forest practices on the slopes of Sumas Mountain have altered forest cover, but there is relatively little bare land/immature vegetation in rain-on-snow zones, so the effects of forest clearing on peak flows may be less pronounced than in the high elevation areas of the Nooksack basin (e.g. North Fork WMU) (Map 18-3*).

Impervious surfaces are not very extensive in the Sumas River WMU, except locally in the municipalities of Nooksack and Sumas. These cities do not overlie areas of high infiltration/recharge potential, so effects of impervious area on baseflow and groundwater recharge are expected to be low compared to other areas where urban development occurs on important permeable deposits (e.g. City of Lynden in the Lynden North WMU).

Several mining operations, including near Pangborn Lake, northeast of Nooksack, and near the Sumas River north of Minaker Road lie on infiltration/recharge zones, but the impact of these activities on infiltration/recharge is unclear. Other infiltration/recharge areas are zoned rural residential or agriculture and are typically non-forested agricultural fields.

Surface water storage mechanisms in this WMU are highly impaired, particularly in the Johnson Creek drainage (Map 18-4*). Johnson Creek and its major tributaries, including Pangborn Creek and the North Fork Johnson Creek, have been modified along their entire length to improve drainage. This reduces storage potential and floodplain function. Ditching is evident in almost all areas mapped as historic depressional wetlands, and vast areas of these wetlands on the Johnson Creek, Sumas River, Bone Creek, and Saar Creek floodplains and in the Pangborn Lake area have been filled or drained. Wetlands just east of the Kamm Slough drainage in the Lynden North WMU have been maintained leaving the one area in the WMU that has limited alteration.

No documentation of significantly impaired peak flows was found for the Sumas WMU. However, Ecology has closed this WMU to additional water rights, which suggests that summer low flows are impaired throughout the watershed.

Sediment Transport

Outside of Sumas Mountain, slopes steep enough to be highly unstable are relatively scarce in the WMU. A relatively high percentage (16 to 23 percent) of the Swift Creek drainage contains unstable slopes, but other drainages have low frequencies of unstable slopes, so process-intensive areas for mass wasting are limited (Map 18-5*). A major slide is present adjacent to Swift Creek on the western slope of Sumas Mountain. Significant quantities of sediment containing naturally-occurring asbestos are carried by Swift Creek and deposited into the Sumas River. Samplings of bank deposits all the way

to the Canadian border have been found to contain potentially hazardous levels of asbestos.

The Sumas WMU does contain a number of areas with naturally high erosion potential, the largest of which is the Nooksack overflow area in the upper Johnson Creek and Sumas River drainages. Other smaller areas on the floodplains of this stream and river also have high erosion potential.

Road density in the drainage most at-risk for mass wasting (Swift Creek) is <2 mi/mi^2. Road densities are moderate (2.1 to 3.0 mi/mi^2) in the Dale and Saar Creek drainages and over 3.1 mi/mi^2 in the lower Sumas/Breckenridge Creek drainage (Map 18-5.5*). All of these drainages extend into the lowlands and it is difficult to determine to what extent the road network impacts the portions of these upper drainages where landslides are most likely to occur.

In the lowlands, most of the areas with high risk for surface erosion have been cleared of forest cover and/or converted to agriculture land, the majority of which is cultivated (Map 18-6*). Because of the predominance of high impact land uses, surface erosion is believed to be altered throughout the WMU, but particularly so in high-risk areas.

Water Quality

Historically, wetlands in the Sumas River WMU provided substantial water quality function, storing and transforming nutrients and pathogens. Large wetland complexes in the lower Johnson Creek drainage, the Johnson Creek floodplain, Upper Squaw Creek, and near Mud Slough were particularly important for removing nutrients from both surface and groundwater. Lower Swift Creek is one area that contained wetlands with all three contaminant storage mechanisms (surface water, groundwater, and hyporheic storage).

The Nooksack River and Sumas River floodplains and the Sumas/Johnson headwaters contain areas of important hyporheic function. The largest wetland complexes are those encompassing the boundary of Johnson Creek and Kamm Slough in the Lynden North WMU, but groundwater water quality function is likely limited here. Peat deposits in the Pangborn Creek drainage likely support extensive groundwater nutrient transformations (Mitchell et al. 2005*). Sumas River riparian wetlands are still mostly intact and provide a sink for nutrients and contaminants (Map 18-7*).

As indicated in the hydrology section, a majority of the wetlands in the Sumas WMU have been filled and/or drained (see Map 18-4*). From a water quality standpoint, Saar Creek and Johnson Creek appear to have been impacted most. Although some wetlands that support surface water quality functions remain, most of the wetlands that supported groundwater quality function have been lost. In addition, channelization of the Johnson Creek drainage and tributaries likely limits hyporheic exchanges.

As the dominant land uses in the Sumas WMU lowlands, dairies and till agriculture are the primary sources of nutrients and fecal coliform (Mitchell et al. 2005*), as well as contaminants such as pesticides. The presence of shallow groundwater and loss of groundwater quality functions described above suggest that groundwater and surface

water may be contaminated with nutrient and fecal coliforms. Similar land uses in Canada also deliver nutrients via groundwater (Mitchell et al. 2005*) (Map 18-8*).

Areas of dense rural residential development are not apparent in the WMU, although sparsely scattered onsite septic systems rim the foot of Sumas Mountain and extend east along Sorenson, Alm, and Lindsay Roads. These systems are also potential sources of pathogen contamination. The Cities of Everson, Nooksack and Sumas all have sanitary wastewater collection systems. Sumas sends its wastewater to the treatment facility in Abbottsford, B.C. and sewage from the City of Nooksack system flows to the Everson wastewater treatment plant located adjacent to the Nooksack River.

Water quality functional responses in the Sumas River watershed include elevated fecal coliform and low dissolved oxygen in surface waters, both of which impair water quality across a broad array of stream reaches (Ecology 2004*). Pangborn Creek, Clearbrook Creek, Sumas River at the Canadian border and downstream of Collins Creek, three reaches of Squaw Creek, seven reaches of Johnson Creek, and Sumas Creek have impaired fecal coliform levels (Ecology 2004*). The same reaches in the Sumas River, Johnson Creek, and Sumas Creek have impaired dissolved oxygen levels (Ecology 2004*). A TMDL was established in 2000 for fecal coliform and dissolved oxygen in the Johnson Creek drainage. A TMDL was also established in 1996 for chlorine, ammonia-nitrogen, and BOD in the Sumas River drainage.

NWIC (2004*) reports that dissolved oxygen still regularly fails to meet Ecology water quality criteria. Recent evidence suggests that fecal coliform contamination in the Sumas River is declining (George Boggs, personal communication of May 11, 2005*; NWIC 2004*); however, recent monitoring suggests a mixed record in regard to meeting TMDL standards. Sampling conducted on the Sumas River and Squaw, Johnson and Pangborn Creeks all met the geometric mean standard for fecal coliform, but only Johnson Creek met the 90th percentile standard (NWIC 2005*). Pangborn Creek samples failed to meet both the geometric mean and 90th percentile TMDL standards (NWIC 2005*). Dissolved oxygen concentrations at sites on these four streams also exceeded Ecology Class A water quality criteria.

The WRIA 1 groundwater study reports that the Sumas River WMU has some of the highest nitrate concentrations in the County, exceeding EPA limits for annual maximum concentration in 8 of 11 years during the 1990s (USU 2002*; Mitchell et al. 2005*). In addition, data from groundwater wells show increased levels of the pesticide ethylene dibromide in the Johnson Creek drainage (USU 2002*). Mitchell et al. (2005*) also reports that surface water nitrate concentrations in Pangborn Creek and Johnson Creek suggest anthropogenic influence.

Organic Matter

Intensive areas for LWD recruitment in the Sumas watershed historically included areas adjacent to stream channels and bank erosion/channel migration zones. Potentially unstable slopes along Sumas Mountain also likely contributed wood via mass wasting mechanisms. Hillslope sources would have been especially important in headwater tributaries (Map 18-9*).

Most forest cover in the lowland portion of the WMU has been lost and recruitment potential is presumed to be low in most stream reaches. Most headwaters on Sumas

Mountain are in coniferous forest, although timber production has resulted in a range of seral stages. Forest cover in the transition from Sumas Mountain to the lowlands has been converted to deciduous and mixed forest stands. Coniferous forest in the Saar Creek drainage near the Canadian border has been replaced with mixed and deciduous forest along the length of the drainage.

Based on available forest cover and land use information, LWD recruitment potential is inferred to be low in lowland areas. Recruitment potential may be higher on streams draining Sumas Mountain, and hillslope sources not adjacent to the stream may contribute LWD from debris flows, but the presence of deciduous-dominated forest and forest practices indicate impairment, although perhaps not to the extent that other lowland areas (e.g., Lynden North) are impaired for LWD recruitment (Map 18-10*).

The lower reaches of lowland streams generally have low LWD densities (Smith 2002* citing David Evans and Associates 1998*). The upper reaches of tributaries like Johnson Creek and Sumas Creek have generally higher LWD densities than lowland reaches. No information is available for other Sumas Mountain drainages, but they are likely similar to conditions in Sumas Creek and potentially better, given what appears to be more extensive areas of coniferous forest.

2.6 HABITAT

Riparian habitat exists along sections of the Sumas River, and Johnson, Sumas and Bone Creeks. Emergent and scrub-shrub wetlands associated with the Sumas River provide wildlife habitat and water quality/quantity protection. Salmon have been documented in all reaches. Habitat for bull trout is presumed to be provided throughout the Sumas WMU.

*Citations and maps referenced in section 2.0 of this report are drawn from the Whatcom County Shoreline Management Program Draft Inventory and Characterization Report (2006) and the accompanying map portfolio.

3.0 REACH INVENTORY AND ANALYSIS

The Shoreline Guidelines require jurisdictions to include an inventory and analysis of current shoreline conditions of those areas within shoreline jurisdiction. The following sections of this report describe the characteristics and functions of those areas within the City of Nooksack shoreline jurisdiction, generally described as the land area within 200 feet of the ordinary high watermark (OHWM) of the Sumas River and Breckenridge Creek, plus the associated wetland areas located within the 100-year floodplain. See ***City of Nooksack Shoreline Jurisdiction Vicinity Map*** for the location of shoreline jurisdiction within the vicinity of the City. For the purposes of this inventory the shorelines within Nooksack have been divided into 12 reaches based on factors such as physical and biological characteristics, existing land use patterns and future development plans. The following analysis will characterize shoreline functions and will identify opportunities for resource protection, restoration, public access and shoreline use.

This portion of the Nooksack Shoreline Inventory Report provides a detailed inventory and analysis of the land and water resources present within the jurisdiction of the Nooksack Shoreline Management Master Program. This inventory was prepared based on a review of available data, such as City and County GIS mapping, state databases and local planning documents, and limited field verification. The primary inventory work was completed by Northwest Ecological Services (NES) during the first half of 2010. The results of the NES inventory investigation were provided in a series of tables or data sheets that presented the inventory information and analysis required by the Department of Ecology Guidelines, WAC 173-26. One data sheet was prepared for each of the 12 shoreline reaches identified by the City at the beginning of the inventory work. Copies of the data sheets have been included as an appendix to this report.

3.1 REACH 1

Reach 1 is defined as the shoreline of the Sumas River from South Pass Road north to the southern end of the Village of Nooksack subdivision. See the attached Data Sheet for Reach 1 for full inventory and analysis.

Land Use and Zoning

The current shoreline designation in Reach 1 is Urban west of the river and Rural in the UGA east of the river. Land use is agricultural (active and fallow), rural residential, and commercial with one nursery at the southeast end. The area east of the river is currently in the County and has a County zoning designation of Agriculture. This area is also in the UGA, so its future zoning will be Residential Cluster. The area west of the river is within the City limits and is primarily zoned Residential with a small area zoned Agriculture.

Physical Environment

Reach 1 consists of 10.8 acres within the City and 11.2 acres within the UGA. Nine residential/mixed structures are present. Roads include a partial residential driveway and small sections of Looten's Loop and Hertel Way; there is 1.0 acre of impervious surface.

A bridge over the Sumas River is present at South Pass Road at the southern end of the reach.

The geology of Reach 1 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soils are Mt. Vernon fine sandy loam and Oridia silt loam. Topography is at 80 to 85 feet elevation and most of the reach is within the 100-year floodplain. Floodway and floodplain areas extend along the entire reach.

There are no data regarding aquatic vegetation, and approximately one-third of the reach is characterized by mixed native trees. Few shrubs are present. The remainder of the reach is primarily fallow pasture/agricultural land – these areas are vegetated with native and non-native grasses and herbaceous species. Active agriculture (raspberries) is found on the east side of the river. Patches of invasive species (blackberry) are present. Vegetation provides little to no cover to the stream.

Potential Species Present

Swan, raptor and waterfowl species are present, as are anadromous fish species. Fall chinook presence is presumed and coho rearing and winter steelhead presence have been documented. Fall chum and resident cutthroat are also found in Reach 1. Priority fish species and priority wetlands are present, including NWI wetlands associated with the Sumas River. This area is within the ESU for coho, fall/winter chum and bull trout. There are no data regarding invasive wildlife/fish species.

Riparian Function

The aquatic substrate type of Reach 1 is silt. There are no data on the channel gradient, but it is presumed to be low, based on topography. The channel itself appears unconfined due to topography, with an unknown migration zone. There are no data on creosote or in-water structures and none were observed. There are no fish passage blockages. No large woody debris (LWD) was observed, nor is there any data on it. Tree cover along the shoreline is low to moderate, consequently recruitment potential is low.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. No toxic sites/landfills are listed. Point sources of pollution consist of asbestos contamination from the Swift Creek landslide. Non-point sources include low intensity residential uses and agriculture (cattle, raspberry farming).

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated. No parks or public access points are indicated; however, a small neighborhood park with a gravel walking trail, stream overlook, and landscaped areas was observed. Visual public access is available from the road crossing at South Pass Road.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is impaired overall, but some areas present are functioning. The majority of the reach is undeveloped pasture, but it lacks native vegetation (trees and shrubs).
- The terrestrial habitat is functioning in areas dominated by native vegetation. It is impaired in others due to development, loss of habitat, and non-native or invasive vegetation. The aquatic habitat is impaired due to fine sediment and asbestos contamination. It also lacks vegetation cover, which results in higher water temperature.

Limiting Factors

The following limiting factors have been identified:

- Asbestos contamination
- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, terrestrial (in areas) and aquatic habitat are sustainable at current levels.
- The terrestrial habitat is impaired due to adjacent land uses and may not be sustainable or improved without a change in use.

Priority Actions

- Preservation of existing riparian vegetation.
- Water quality improvement.

Current Enhancement Projects

- None known.

Preservation/Enhancement Opportunities

- Enhancement of the riparian buffer by increasing the width of native shoreline vegetation in pasture areas, adding evergreen species, adding other species for diversity, and adding vegetation along stream banks to provide shading.
- Removal of invasive species (Himalayan blackberry).

Public Access Opportunities

- A small neighborhood park with a gravel walking trail, stream overlook, and landscaped areas was observed.
- No opportunities for increased public access have been identified in this reach.
- Opportunities for expanded public access are inappropriate due to the presence of sediment from Swift Creek potentially containing naturally-occurring asbestos.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline environment designation for Reach 1 is Urban within the City and in the UGA. Based on the available inventory information it appears that this environment designation should be retained within the City; however, a Conservancy designation should be established in the UGA.

3.2 REACH 2

Reach 2 is defined as the shoreline of the Sumas River from the southern end of the Village of Nooksack subdivision to E. Madison Street. See the attached Data Sheet for Reach 2 for full inventory and analysis.

Land Use and Zoning

The current shoreline designation in Reach 2 is Urban within the City limits and Rural in the UGA. Land use is agricultural (raspberries), with some urban residential density. A berm is present along a portion of the west side of the stream. The area east of the river is currently in the County and has a County zoning designation of Agriculture. This area is also in the UGA, so its future zoning will be Residential and Residential Cluster. The area within the City limits is zoned Residential.

Physical Environment

Reach 2 consists of 7.6 acres within the City and 10.4 acres within the UGA. Four agricultural/residential structures and one bridge are present. Roads include part of one residential driveway and one farm access road at the northern terminus of the reach; there is 0.3 acre of impervious surface. A bridge is present at the crossing at E. Madison Street and a bridge or possibly a culvert occurs where the farm access road crosses the river near the northern extent of the reach.

The geology of Reach 2 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soil is Mt. Vernon fine sandy loam. Topography is at 80 to 90 feet elevation and most of the reach is within the 100-year floodplain. Floodway and floodplain areas extend along the entire reach.

There are no data regarding aquatic vegetation. The eastern side of the stream is dominated by agriculture (raspberries), while the western side of the stream is mainly fallow pasture/agricultural land mixed with patches of native mixed trees and large patches of Himalayan blackberry. Pasture areas are vegetated with native and non-native grasses and herbaceous species. Vegetation provides little to no cover to the stream.

Potential Species Present

Raptor and waterfowl species are present, as are anadromous fish species. Fall chinook presence is presumed and coho rearing and winter steelhead presence have been

documented. Fall chum presence has been documented below Breckenridge Creek. Resident cutthroat are also found in Reach 2. Priority fish species are present, and there are NWI wetlands associated with the Sumas River. This area is within the ESU for coho, fall/winter chum and bull trout. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate type or the channel gradient, but the gradient is presumed to be low, based on topography. The channel itself appears unconfined due to topography, with an unknown migration zone. There are no data on creosote or in-water structures and none were observed, nor are there any fish passage blockages. No LWD was observed. Tree cover along the shoreline is low; consequently recruitment potential is also low.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. NWI wetlands associated with the Sumas River occur in the reach. No toxic sites/landfills are listed. Point sources of pollution consist of asbestos contamination from the Swift Creek landslide. Non-point sources include low intensity residential uses and agriculture.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated and no parks or public access points exist within the reach. Visual public access is available from the road crossing at E. Madison Street.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is impaired. The majority of the reach is generally pasture, agriculture or dominated by invasive species. It is mostly undeveloped, and lacks native vegetation (trees and shrubs).
- The terrestrial habitat is impaired due to loss of habitat, non-native or invasive vegetation, and to a lesser extent, development. The aquatic habitat is impaired due to fine sediment and asbestos contamination. It also lacks vegetation cover, which results in higher water temperature.

Limiting Factors

The following limiting factors have been identified:

- Asbestos contamination
- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and aquatic habitat are sustainable at current levels.
- The terrestrial habitat is impaired due to adjacent land uses and may not be sustainable or improved without a change in use.

Priority Actions

- Water quality improvement.

Current Enhancement Projects

- None known.

Preservation/Enhancement Opportunities

- Enhancement of the riparian buffer by increasing the percentage of coverage of native shoreline vegetation in pasture areas, adding evergreen species, adding other species for diversity, and adding vegetation along stream banks to provide shading.
- Removal of invasive species (Himalayan blackberry).

Public Access Opportunities

- Visual public access is available from the road crossing at E. Madison Street.
- No opportunities for increased public access have been identified in this reach.
- Opportunities for expanded public access are inappropriate due to the presence of sediment from Swift Creek potentially containing naturally-occurring asbestos.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline environment designation for Reach 2 is Urban within the City and in the UGA. Based on the available inventory information it appears that this environment designation should be retained within the City; however, a Conservancy designation should be established in the UGA.

3.3 REACH 3 (A AND B)

Reach 3 is defined as the shoreline of the Sumas River from E. Madison Street north to the City boundary. This reach is divided into two geographically separate areas – with Reach 3A being located adjacent to E. Madison Street. See the attached Data Sheet for Reach 3 for full inventory and analysis.

Land Use and Zoning

The current shoreline designation in Reach 3 is Conservancy within the City limits. Land use is fallow agriculture (pasture) in Reach 3A and agriculture (corn) in Reach 3B. Areas within the City limits are zoned Agriculture. Part of Reach 3A is within the UGA and is zoned Agriculture by the County; its future zoning will be a combination of Agriculture and Residential.

Physical Environment

Reach 3 consists of 8.2 acres within the City and 4.8 acres within the UGA. No buildings are located within the reach. Roads include one private access road at the northern end of Reach 3B; there is no impervious surface. A bridge crossing over the river is present at E. Madison Street. No culverts were observed; however, there is an access road at the northern end of Reach 3B which crosses the river via a flat bridge.

The geology of Reach 3 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soils are Mt. Vernon fine sandy loam and riverwash. Topography is at 75 to 85 feet elevation and most of the reach is within the 100-year floodplain. Floodway and floodplain areas extend along the entire reach.

There are no data regarding aquatic vegetation. Terrestrial vegetation in Reach 3A is dominated by fallow pasture grasses. There are a limited number of native shrubs (willow) at the southern end. Approximately half of Reach 3B is fallow pasture with a limited number of deciduous native trees and shrubs; the other half is planted in crops. Pasture areas are vegetated with native and non-native herbaceous species. Vegetation provides little to no cover to the stream.

Potential Species Present

Raptor and waterfowl species are present, as are anadromous fish species. Fall chinook presence is presumed, and coho rearing and winter steelhead presence have been documented. Fall chum presence has been documented below Breckenridge Creek. Resident cutthroat are also found in Reach 3. Priority fish species and priority wetlands are present, including NWI wetlands associated with the Sumas River. This area is within the ESU for coho, fall/winter chum and bull trout. There are no data regarding invasive wildlife/fish species.

Riparian Function

The aquatic substrate type of Reach 3 is silt. There are no data on channel confinement or gradient, but the gradient is presumed to be low, based on topography. The channel migration zone is unknown. There are no data on creosote or in-water structures and none were observed. There are no fish passage blockages. No LWD was observed. Tree cover along the shoreline is low; consequently recruitment potential is also low.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. NWI wetlands associated with the Sumas River occur in Reach 3. PEM farmed wetlands observed in Reach 3B appear to drain and/or connect to the river; shoreline jurisdiction should be extended to include the adjacent wetlands. No toxic sites/landfills are listed. Point sources of pollution consist of asbestos contamination from the Swift Creek landslide. Non-point sources include low intensity agriculture (farming and pasture).

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated and no parks or public access points exist within the reach. Visual public access is available at the road crossing at E. Madison Street.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is impaired. The majority of the reach is generally pasture or agriculture. It is mostly undeveloped, but lacks native vegetation (trees and shrubs).
- The terrestrial habitat is impaired due to loss of habitat, and dominance of non-native or invasive vegetation. The aquatic habitat is impaired due to fine sediment and asbestos contamination. It also lacks vegetation cover, which results in higher water temperature.

Limiting Factors

The following limiting factors have been identified:

- Asbestos contamination
- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and aquatic habitat are sustainable at current levels.
- The terrestrial habitat is impaired due to adjacent land uses and may not be sustainable or improved without a change in use.

Priority Actions

- Restoration of wetlands associated with the Sumas River in Reach 3B.
- Water quality improvement.

Current Enhancement Projects

- None known.

Preservation/Enhancement Opportunities

- Restoration of wetlands associated with the Sumas River in Reach 3B (farmed wetlands).
- Enhancement of the riparian buffer by increasing the width of native shoreline vegetation in pasture areas, adding evergreen species, adding other species for diversity, and adding vegetation along stream banks to provide shading.
- Removal of invasive species (Himalayan blackberry).

Public Access Opportunities

- Visual public access is available at the road crossing at E. Madison Street.
- No opportunities for increased public access have been identified in this reach.
- Opportunities for expanded public access are inappropriate due to the presence of sediment from Swift Creek potentially containing naturally-occurring asbestos.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline environment designation for Reach 3 is Conservancy. Based on the available inventory information it appears that this environment designation should be retained.

3.4 REACH 4

Reach 4 is defined as Breckenridge Creek within the eastern portion of the UGA. See the attached Data Sheet for Reach 4 for full inventory and analysis.

Land Use and Zoning

The shoreline designation in Reach 4 is Conservancy under the City shoreline program (future) and Rural under the County shoreline program (current) in the UGA. The land is primarily undeveloped, with light agriculture (pasture) and agriculture to the south, and a public school to the north. The entire reach is currently in the County and has County zoning designations of Rural and Agriculture. This area is also in the UGA, so its future zoning will be Light Industrial, Public, and Residential Cluster.

Physical Environment

Reach 4 consists of 11.6 acres within the UGA. No buildings, roads, or impervious surfaces are located within the reach, and no culverts were observed. A minor bridge crossing may be present at the eastern end of the reach.

The geology of Reach 4 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soils are Everett complex, Kickerville silt loam, and Puget silt loam. Topography is at 85 to 100 feet elevation and most of the reach is within the 100-year floodplain. Floodplain areas extend along the entire reach.

There are no data regarding aquatic vegetation. The majority of the reach is characterized by undeveloped native mixed trees and shrubs. A fringe on the northern side is mowed pasture grass/school ball field, or Himalayan blackberry mixed with pasture grasses. Two small areas on the southern side are farmed. Native vegetation present provides shading over the stream and has the potential to provide good habitat.

Potential Species Present

Raptor and waterfowl species are present. Reach 4 provides fish rearing habitat, and coho rearing presence has been documented. Fall chinook and winter steelhead presence is presumed, while fall chum presence has been documented. Resident cutthroat are also found in Reach 4. Priority fish species are present, as are NWI wetlands associated with the Sumas River. This area is within the ESU for coho, fall/winter chum and bull trout. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate, channel confinement or gradient, and the channel migration zone is unknown. There are no data on creosote or in-water structures and none were observed. There are no fish passage blockages. LWD presence is unknown and there are no data. Tree cover along the shoreline is moderate to high; consequently recruitment potential is moderate.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. NWI wetlands associated with the Sumas River occur in Reach 4. No toxic sites/landfills are listed. No point sources of pollution are known. Non-point sources include small areas of low intensity school-related uses (ball fields) and agriculture.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density and development associated with the school. There are no archeological or historic sites indicated and no parks or public access points exist within the reach.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is functioning overall. The majority of the reach is undeveloped and contains native vegetation (trees and shrubs), while the edges of the reach are lawn or agriculture.
- The terrestrial habitat is functioning in areas dominated by native vegetation. It is impaired along the edge of the reach due to loss of habitat and non-native or invasive vegetation. The aquatic habitat is functioning.

Limiting Factors

The following limiting factors have been identified:

- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and terrestrial and aquatic habitat are sustainable at current levels.

Priority Actions

- Preservation of existing riparian vegetation.
- Water quality improvement.

Current Enhancement Projects

- None known.

Preservation/Enhancement Opportunities

- Preservation of terrestrial vegetation, habitat and the associated riparian corridor.
- Enhancement of the riparian buffer by increasing the width of native shoreline vegetation in pasture or agriculture areas, to the full extent of shoreline jurisdiction.
- Removal of invasive species (Himalayan blackberry).

Public Access Opportunities

- No opportunities for increased public access have been identified in this reach.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline environment designation for Reach 4 is Conservancy. Based on the available inventory information it appears that this environment designation should be retained.

3.5 REACH 5

Reach 5 is defined as Breckenridge Creek within the western half of the UGA. See the attached Data Sheet for Reach 5 for full inventory and analysis.

Land Use and Zoning

The shoreline designation in Reach 5 is Conservancy under the City shoreline program (future) and Rural under the County shoreline program (current) in the UGA. Current land use consists of light to moderate agriculture (raspberries) to the south and a cemetery and some undeveloped areas to the north. The entire reach is currently in the County and has County zoning designations of Rural and Agriculture. This area is also in the UGA, so its future zoning will be Public, Residential, and Residential Cluster.

Physical Environment

Reach 5 consists of 19.1 acres within the UGA. No buildings are located within the reach. Roads include a farm access road south of the river and cemetery access roads north of the river; there is 0.15 acre of impervious surface. No culverts were observed.

The geology of Reach 5 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to

high liquefaction hazard are listed by Whatcom County. Soils are Kickerville silt loam, Oridia silt loam, and Mt. Vernon fine sandy loam. Topography is at 85 to 100 feet elevation and most of the reach is within the 100-year floodplain. Floodplain areas extend along the entire reach.

There are no data regarding aquatic vegetation. Approximately half of the reach on either side of the stream is undeveloped and characterized by native deciduous trees and shrubs. The native vegetation present has the potential to provide good habitat. Himalayan blackberry is dominant in portions of the understory. The remainder of the reach is pasture/agricultural land. To the north, these areas are vegetated with native and non-native herbaceous species; this area is mainly within the cemetery and always mowed. To the south, the remaining areas are planted in raspberries.

Potential Species Present

Raptor and waterfowl species are present. Reach 5 provides fish rearing habitat and coho rearing presence has been documented. Fall chinook and winter steelhead presence is presumed, while fall chum presence has been documented. Resident cutthroat are also found in Reach 5. Priority fish species are present, as are NWI wetlands associated with the Sumas River. This area is within the ESU for coho, fall/winter chum and bull trout. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate, channel confinement or gradient, and the channel migration zone is unknown. There are no data on creosote or in-water structures and none were observed. There are no fish passage blockages. LWD presence is unknown. Tree cover along the shoreline is moderate to high; consequently recruitment potential is moderate to high.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. NWI wetlands associated with the Sumas River occur in Reach 5. No toxic sites/landfills are listed. No point sources of pollution are known. Non-point sources include low intensity agriculture (raspberry farming) to the south.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated and no parks or public access points exist within the reach.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.

- Shoreline vegetation is functioning with some impairment. Approximately half of the reach contains native vegetation (trees and shrubs) and is functioning. The other half is lawn (cemetery) or agriculture and is impaired.
- The terrestrial habitat is functioning in areas dominated by native vegetation. It is impaired in other areas, due to loss of habitat and non-native or invasive vegetation. The aquatic habitat is functioning.

Limiting Factors

The following limiting factors have been identified:

- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and terrestrial and aquatic habitat are sustainable at current levels.
- Terrestrial habitat is impaired due to adjacent land uses and may not be sustainable or improved without a change in use.

Priority Actions

- Preservation of existing riparian vegetation.
- Water quality improvement.

Current Enhancement Projects

- None known.

Preservation/Enhancement Opportunities

- Preservation of terrestrial vegetation, habitat and the associated riparian corridor.
- Enhancement of the riparian buffer by increasing the width of native shoreline vegetation in pasture or agriculture areas.
- Removal of invasive species (Himalayan blackberry).

Public Access Opportunities

- No opportunities for increased public access have been identified in this reach.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline environment designation for Reach 5 is Conservancy. Based on the available inventory information it appears that this environment designation should be retained.

3.6 REACH 6

Reach 6 is defined as the Nooksack Slough, east of Nooksack Avenue. See the attached Data Sheet for Reach 6 for full inventory and analysis.

Land Use and Zoning

The shoreline of Reach 6 is designated as a wetland in the 100-year floodplain and the area is undeveloped. The reach is within the city limits and is zoned Commercial and Residential.

Physical Environment

Reach 6 consists of 0.73 acre. No buildings are located within the reach. Roads/transportation include Nooksack Avenue at the western edge of the reach and the railroad at the eastern edge; there is 0.1 acre of impervious surface. A culvert is present under Nooksack Avenue.

The geology of Reach 6 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soil is Mt. Vernon fine sandy loam. Topography is at 75 to 85 feet elevation and most of the reach is within the 100-year floodplain. Floodplain areas extend along the entire reach.

There are no data regarding aquatic vegetation. The entire reach is undeveloped and characterized by native deciduous trees and shrubs. The native vegetation present has the potential to provide good habitat. Small patches of Himalayan blackberry are present along the outer edges of the reach.

Potential Species Present

Reach 6 has no wildlife or fish species indicated. There are no NWI wetlands indicated, nor are any threatened or endangered species. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate, channel confinement or gradient, and the channel migration zone is unknown. There are no data on creosote or in-water structures and none were observed. There are no fish passage blockages. LWD presence is unknown. Tree cover along the shoreline is moderate to high; consequently recruitment potential is moderate.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. The Slough is PFO/PSS wetland, but no NWI wetlands are indicated. No toxic sites/landfills are listed. No point sources of pollution are known. Non-point sources include low to moderate intensity residential uses and industry/railroad presence.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated and no parks or public access points exist within the reach.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, ditching, and impervious surfaces.
- Shoreline vegetation is functioning. The majority of the reach is undeveloped and contains native vegetation (trees and shrubs).
- The terrestrial habitat is functioning, although the area is isolated for certain species due to railroad tracks and roads. The aquatic habitat is functioning.

Limiting Factors

The following limiting factors have been identified:

- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and aquatic habitat are sustainable at current levels.
- Terrestrial habitat may not be sustainable if the land use changes to allow development of the currently undeveloped buffer.

Priority Actions

- Preservation of existing riparian vegetation.
- Water quality improvement.

Current Enhancement Projects

- None known.

Preservation/Enhancement Opportunities

- Preservation of terrestrial vegetation, habitat and the associated riparian corridor.
- Removal of invasive species (Himalayan blackberry).

Public Access Opportunities

- No opportunities for increased public access have been identified in this reach.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline of Reach 6 is undesignated. Based on the available inventory information it appears that a Conservancy designation should be established.

3.7 REACH 7

Reach 7 is defined as the Nooksack Slough from Nooksack Avenue to Jackson Street. See the attached Data Sheet for Reach 7 for full inventory and analysis.

Land Use and Zoning

The shoreline of Reach 7 is designated as a wetland in the 100-year floodplain and is primarily undeveloped, with some residential land use. The reach is within the city limits and is zoned Residential.

Physical Environment

Reach 7 consists of 2.6 acres. A portion of one residence is located within the reach. Jackson Street runs through the northern end of the reach, and there is 0.1 acre of impervious surface. A culvert is present under Jackson Street.

The geology of Reach 7 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soil is Mt. Vernon fine sandy loam. Topography is at 75 to 85 feet elevation and most of the reach is within the 100-year floodplain. The reach is not mapped as a floodway or floodplain.

There are no data regarding aquatic vegetation. The majority of the reach is undeveloped and characterized by native deciduous trees and shrubs. Native vegetation provides cover and has the potential to provide good habitat. A few patches of invasive species were observed (Himalayan blackberry and field bind weed). In a few small areas adjacent residential lawns encroach into the reach.

Potential Species Present

Reach 7 has no wildlife or fish species indicated. There are no NWI wetlands indicated, nor are any TSE species. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate, channel confinement or gradient, and the channel migration zone is unknown. The channel gradient is presumed to be low, due to topography. There are no data on creosote or in-water structures and none were observed. There are no fish passage blockages. LWD presence is unknown. Tree cover along the shoreline is moderate; consequently recruitment potential is also moderate.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. The Slough is PFO/PSS wetland, but no NWI wetlands are indicated. No toxic sites/landfills are listed. No point sources of pollution are known. Non-point sources include low intensity residential uses.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological sites indicated and no parks or public access points exist within the reach. Bible Camp Tabernacle is listed as an historic site in the vicinity; however, this site no longer exists.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is functioning overall, but some very small areas are present that are impaired. The majority of Reach 7 is undeveloped, and contains native vegetation (trees and shrubs). Small areas are impaired where vegetation is lawn from adjacent residences or invasive species occur; these areas cover a very small percentage of the reach.
- The terrestrial habitat is functioning in areas dominated by native vegetation. It is impaired in others due to loss of habitat, non-native or invasive vegetation, and human influence. The aquatic habitat is functioning, but likely impaired to some extent due to adjacent residential uses.

Limiting Factors

The following limiting factors have been identified:

- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and aquatic habitat are sustainable at current levels; however, residential ownership may reduce sustainability.
- Terrestrial habitat is not sustainable, due to residential development.

Priority Actions

- Preservation of existing riparian vegetation.
- Water quality improvement.

Current Enhancement Projects

- None known.

Preservation/Enhancement Opportunities

- Preservation of terrestrial vegetation, habitat and the associated riparian corridor.
- Enhancement of the riparian buffer by increasing the width of native shoreline vegetation in areas that are currently lawn and by adding evergreen trees for species diversity.
- Removal of invasive species (Himalayan blackberry, field bind weed).

Public Access Opportunities

- No opportunities for increased public access have been identified in this reach.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline of Reach 7 is undesignated. Based on the available inventory information it appears that either a Shoreline Residential or Urban Conservancy environment designation should be established.

3.8 REACH 8

Reach 8 is defined as the Nooksack Slough from Jackson Street to the western terminus of W. Lincoln Street. See the attached Data Sheet for Reach 8 for full inventory and analysis.

Land Use and Zoning

The shoreline of Reach 8 is designated as a wetland in the 100-year floodplain and is primarily undeveloped, with some residential land use. The reach is within the city limits and is zoned Residential.

Physical Environment

Reach 8 consists of 3.2 acres. Two residential buildings are located within the reach. Roads include all or part of three residential driveways, W. Madison Street, which bisects the reach, and W. Second Street along the western edge. There is 0.3 acre of impervious surface. A culvert is present under W. Madison Street.

The geology of Reach 8 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soil is Mt. Vernon fine sandy loam. Topography is at 75 to 85 feet elevation and most of the reach is within the 100-year floodplain. The reach is not mapped as a floodway or floodplain.

There are no data regarding aquatic vegetation. The majority of the reach is characterized by deciduous trees and shrubs-mostly native, but some non-native. Vegetation provides shading to the Slough, and native vegetation present has the potential to provide good habitat. Patches of invasive species (Himalayan blackberry, field bind weed) are present. Residential lawns encroach in a number of areas.

Potential Species Present

Reach 8 has no wildlife or fish species indicated. There are no NWI wetlands indicated, nor are any threatened or endangered species. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate, channel confinement or gradient, and the channel migration zone is unknown. The channel gradient is presumed to be low, due to topography. There are no data on creosote or in-water structures and none were observed. There are no fish passage blockages. LWD presence is unknown. Tree cover along the shoreline is moderate to high; consequently recruitment potential is moderate to high.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. The Slough is PFO/PSS wetland, but no NWI wetlands are indicated.

No toxic sites/landfills are listed. No point sources of pollution are known. Non-point sources include low intensity residential uses.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated and no parks or public access points exist within the reach. Physical and visual public access is available from W. Second Street.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is functioning overall, but some areas are present that are impaired. The majority of Reach 8 is undeveloped, and contains native vegetation (trees and shrubs). The reach is impaired where invasive species occur or lawns are present.
- The terrestrial habitat is functioning in areas dominated by native vegetation. It is impaired in others due to development, loss of habitat, non-native or invasive vegetation, and human influence. The aquatic habitat is functioning, but likely impaired to some extent due to adjacent residential uses.

Limiting Factors

The following limiting factors have been identified:

- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and aquatic habitat are sustainable at current levels; however, residential ownership may reduce sustainability.
- Terrestrial habitat is not sustainable, due to residential development.

Priority Actions

- Preservation of existing riparian vegetation.
- Water quality improvement.

Current Enhancement Projects

- Riparian buffer enhancement project located just north of Jackson Street.

Preservation/Enhancement Opportunities

- Preservation of terrestrial vegetation, habitat and the associated riparian corridor.
- Enhancement of the riparian buffer by increasing the width of native shoreline vegetation in areas that are currently lawn and by adding evergreen trees to increase diversity.
- Removal of invasive species (Himalayan blackberry, field bind weed).

Public Access Opportunities

- Physical and visual public access is available from W. Second Street.
- No opportunities for increased public access have been identified in this reach.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline of Reach 8 is undesignated. Based on the available inventory information it appears that either a Shoreline Residential or Urban Conservancy environment designation should be established.

3.9 REACH 9 (A AND B)

Reach 9 is defined as the two segments of the Nooksack Slough lying west of the western terminus of W. Lincoln Street. See the attached Data Sheet for Reach 9 for full inventory and analysis.

Land Use and Zoning

The shoreline of Reach 9 is designated as a wetland in the 100-year floodplain and land use is agriculture (pasture, hay) and grazing cattle. The reach is within the city limits and is zoned primarily Residential, with a small amount of Agriculture.

Physical Environment

Reach 9 consists of 5.3 acres. A portion of one agricultural building is located within the reach. Private access roads appear to cross the Slough in two locations in Reach 9A. There is 0.02 acre of impervious surface. It is unknown whether culverts/stormwater utilities exist; however, there are two crossings in Reach 9A, at least one of which appears to be a culvert.

The geology of Reach 9 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soil is Mt. Vernon fine sandy loam. Topography is at 75 to 85 feet elevation and most of the reach is within the 100-year floodplain. The reach is not mapped as a floodway.

There are no data regarding aquatic vegetation. The majority of the reach is characterized by pasture/agricultural land – these areas are vegetated with native and non-native herbaceous species. A very limited number of shrubs are present along the reach.

Potential Species Present

Reach 9 includes priority wetlands, including NWI wetlands associated with the Slough. There are no wildlife or fish species indicated, nor are any threatened or endangered species. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate, channel confinement or gradient, and the channel migration zone is unknown. The channel gradient is presumed to be low, due to topography. There are no data on creosote structures and none were observed; however, a culvert or some other kind of crossing was observed in aerial photos of Reach 9A. There are no fish passage blockages. LWD presence is unknown, but unlikely. Tree cover along the shoreline is low; consequently recruitment potential is also low.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. There are NWI wetlands associated with the Slough, as well as PEM wetlands. No toxic sites/landfills are listed. No point sources of pollution are known. Non-point sources include low to moderate intensity agricultural use (cattle) within the reach.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated and no parks or public access points exist within the reach.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is impaired. The majority of Reach 9 is undeveloped, but lacks native vegetation (trees and shrubs). The reach is primarily pasture and grazing cattle.
- The terrestrial habitat is impaired due to loss of habitat, and non-native or invasive vegetation. The aquatic habitat is impaired because the reach lacks vegetation cover, which results in higher water temperature; water quality may be impaired due to livestock.

Limiting Factors

The following limiting factors have been identified:

- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and aquatic habitat are sustainable at current levels.
- Terrestrial habitat is impaired due to adjacent land uses and is not sustainable. It may be improved with a change in use.

Priority Actions

- Establishment of riparian vegetation.
- Water quality improvement.

Current Enhancement Projects

- None known.

Preservation/Enhancement Opportunities

- Enhancement of the riparian buffer by planting native trees and shrubs in pasture areas.

Public Access Opportunities

- No opportunities for increased public access have been identified in this reach.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline of Reach 9 is undesignated. Based on the available inventory information it appears that either a Shoreline Residential or Urban Conservancy environment designation should be established.

3.10 REACH 10

Reach 10 is defined as the Nooksack Slough from the western terminus of Hayes Street to Nooksack Avenue. See the attached Data Sheet for Reach 10 for full inventory and analysis.

Land Use and Zoning

The shoreline of Reach 10 is designated as a wetland in the 100-year floodplain. Land use includes undeveloped parcels, urban and rural residential, and light agriculture (pasture, hay). The reach is within the city limits and is zoned primarily Residential, with a small amount of Agriculture and Central Market.

Physical Environment

Reach 10 consists of 4.4 acres. There are no buildings located within the reach. Roads include Nooksack Avenue and portions of two residential driveways; there is 0.1 acre of impervious surface. No culverts were observed in aerial photos; however, a culvert is present at Nooksack Avenue.

The geology of Reach 10 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soils are Mt. Vernon fine sandy loam and Oridia silt loam. Topography is at 75 to 85 feet elevation and most of the reach is within the 100-year floodplain. The reach is not mapped as a floodway or floodplain.

There are no data regarding aquatic vegetation. The majority of the reach is characterized by native deciduous shrubs mixed with patches of emergent vegetation. Emergent areas are dominated by reed canarygrass, an invasive species. Patches of Himalayan blackberry are also present. Residential lawns or landscaped areas encroach slightly in a number of locations.

Potential Species Present

Reach 10 includes priority wetlands, including NWI wetlands associated with the Slough. There are no wildlife or fish species indicated, nor are any threatened or endangered species. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate, channel confinement or gradient, and the channel migration zone is unknown. There are no data on creosote or in-water structures and none were observed. There is a culvert (non-barrier to fish passage) mapped under Nooksack Avenue. LWD presence is unknown. Tree cover along the shoreline is low; consequently recruitment potential is also low.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. There are NWI wetlands associated with the Slough, and the Slough is a PSS/PEM wetland. No toxic sites/landfills are listed. No point sources of pollution are known. Non-point sources include low intensity residential uses.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated and no parks or public access points exist within the reach.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is functioning in approximately half of the reach, in areas which contain native vegetation (trees and shrubs). It is impaired in the other half, in areas generally dominated by invasive grasses, other non-native or invasive vegetation, or lawn.
- The terrestrial habitat is functioning in areas dominated by native vegetation, and impaired in others, due to loss of habitat and non-native or invasive vegetation. The aquatic habitat is functioning with some impairment, due to areas which lack vegetation cover, which likely results in higher water temperature.

Limiting Factors

The following limiting factors have been identified:

- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and aquatic habitat are sustainable at current levels.

- Terrestrial habitat is impaired due to adjacent land uses and may not be sustainable or improved without a change in use.

Priority Actions
- Preservation of existing riparian vegetation.
- Water quality improvement.

Current Enhancement Projects
- None known.

Preservation/Enhancement Opportunities
- Preservation of terrestrial vegetation, habitat, and the associated riparian corridor.
- Enhancement of the riparian buffer by increasing the width of native shoreline vegetation and the species diversity of existing vegetation.
- Removal of invasive species (Himalayan blackberry, reed canarygrass).

Public Access Opportunities
- No opportunities for increased public access have been identified in this reach.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline of Reach 10 is undesignated. Based on the available inventory information it appears that either a Shoreline Residential or Urban Conservancy environment designation should be established.

3.11 REACH 11

Reach 11 is defined as the Nooksack Slough from Nooksack Avenue to the northern terminus of E. Third Street. See the attached Data Sheet for Reach 11 for full inventory and analysis.

Land Use and Zoning

The shoreline of Reach 11 is designated as a wetland in the 100-year floodplain. Land use includes undeveloped parcels, urban and rural residential, and light agriculture (pasture, hay). The reach is within the city limits and is zoned Residential.

Physical Environment

Reach 11 consists of 3.9 acres. A portion of a residential building and one bridge are within the reach. Roads include Nooksack Avenue at the western extent and E. Third Street at the eastern extent; the railroad bisects the reach. There is 0.3 acre of impervious surface. No culverts were observed; however, culverts are present under Nooksack Avenue and at the railroad crossing.

The geology of Reach 11 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to

high liquefaction hazard are listed by Whatcom County. Soils are Mt. Vernon fine sandy loam and Oridia silt loam. Topography is at 75 to 85 feet elevation and most of the reach is within the 100-year floodplain. The reach is not mapped as a floodway or floodplain.

There are no data regarding aquatic vegetation. The majority of the reach is characterized by palustrine emergent wetlands, and the Slough is dominated by reed canarygrass, an invasive species. Patches of native shrubs are also present, mainly at the northern and southernmost ends. Overall, vegetation provides little shading to the Slough. Himalayan blackberry were also observed in patches along the Slough.

Potential Species Present

Reach 11 includes priority wetlands, including NWI wetlands associated with the Slough. There are no wildlife or fish species indicated, nor are any threatened or endangered species. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate, channel confinement or gradient, and the channel migration zone is unknown. There are no data on creosote or in-water structures and none were observed. There are no fish passage blockages. LWD presence is unknown, with none observed or likely. Tree cover along the shoreline is low; consequently recruitment potential is also low.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. There are NWI wetlands associated with the Slough, and the Slough is a PSS/PEM wetland. No toxic sites/landfills are listed. No point sources of pollution are known. Non-point sources include low intensity residential uses.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated and no parks or public access points exist within the reach.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is impaired overall, but there are some areas present that are functioning. The majority of the reach is undeveloped, but lacks native vegetation (trees and shrubs) and is dominated by an invasive grass species.
- The terrestrial habitat is functioning in smaller areas dominated by native vegetation, and impaired in others, due to loss of habitat, and non-native or invasive vegetation. The aquatic habitat is impaired, due to lack of vegetation cover, which results in higher water temperature.

Limiting Factors

The following limiting factors have been identified:

- Water quality
- Existing land uses and zoning

Functions

- Hydrologic, shoreline vegetation, and aquatic habitat are sustainable at current levels.
- Terrestrial habitat is impaired due to adjacent land uses and may not be sustainable or improved without a change in use.

Priority Actions

- Water quality improvement.

Current Enhancement Projects

- Some removal of invasive species has occurred along the southern bank of the Slough.

Preservation/Enhancement Opportunities

- Enhancement of the wetlands/slough and riparian buffer by increasing the width and species diversity of native vegetation.
- Removal of invasive species (Himalayan blackberry, reed canarygrass).

Public Access Opportunities

- No opportunities for increased public access have been identified in this reach.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline of Reach 11 is undesignated. Based on the available inventory information it appears that either a Shoreline Residential or Urban Conservancy environment designation should be established.

3.12 REACH 12

Reach 12 is defined as the Nooksack Slough from the northern terminus of E. Third Street to the city boundary near Gilies Road. See the attached Data Sheet for Reach 12 for full inventory and analysis.

Land Use and Zoning

The shoreline of Reach 12 is designated as a wetland in the 100-year floodplain. Current land use is agriculture (corn) and zoning is Residential.

Physical Environment

Reach 12 consists of 4.7 acres. One bridge is within the reach. A private access road crosses the Slough at the northern end; there is 0.04 acre of impervious surface. A culvert is present at the access road.

The geology of Reach 12 is glacial outwash terrace with alluvium and undifferentiated outwash and till. There are no slope data listed by DOE, but site class and moderate to high liquefaction hazard are listed by Whatcom County. Soil is Mt. Vernon fine sandy loam. Topography is at 75 to 85 feet elevation and most of the reach is within the 100-year floodplain.

There are no data regarding aquatic vegetation. The majority of the reach is farmed (corn crops) or pasture (reed canarygrass). Native deciduous trees and shrubs are present, but are patchy or in a very narrow band just along the banks of the Slough, with the exception of the very southern extent. Himalayan blackberry dominates the banks in other areas. Vegetation provides little shade along the majority of the Slough.

Potential Species Present

Reach 12 includes priority wetlands, including NWI wetlands associated with the Slough. There are no wildlife or fish species indicated, nor are any threatened or endangered species. There are no data regarding invasive wildlife/fish species.

Riparian Function

There are no data on aquatic substrate, channel confinement or gradient, and the channel migration zone is unknown. There are no data on creosote structures and none were observed. A culvert crosses the reach near the northern extent. There are no fish passage blockages. LWD presence is unknown. Tree cover along the shoreline is low to moderate; consequently recruitment potential is also low.

There are no data on riffles or pool presence, nor are there any designations on the DOE 303(d) list. There are NWI wetlands associated with the Slough, and the Slough is a PSS/PEM (farmed) wetland. PEM wetlands observed adjacent to the reach appear to drain and/or connect to the Slough. Shoreline jurisdiction should extend to include the adjacent wetland. No toxic sites/landfills are listed. No point sources of pollution are known. Non-point sources include low intensity agricultural (corn) use.

Historic and Cultural

No significant changes have been observed between 1976 and 2006 other than increased residential density. There are no archeological or historic sites indicated and no parks or public access points exist within the reach.

Functional Analysis

Reach Function

- Hydrologically, the reach is functioning with some impairment. It is precipitation dominated (snow and rain), with flashy winter and early spring peaks, low summer, and variable spring and fall flows. Impairment in the basin is due to loss of wetland area, draining, filling, and ditching.
- Shoreline vegetation is impaired overall, but there are some areas present that are functioning. The majority of the reach is generally pasture or agriculture with

the exception of a small band along the Slough and localized areas at the southern extent of the reach.
- The terrestrial habitat is functioning in smaller areas dominated by native vegetation, and impaired in others, due to loss of habitat and non-native or invasive vegetation. The aquatic habitat is impaired, due to an overall lack of vegetation cover, which results in higher water temperature.

Limiting Factors
The following limiting factors have been identified:
- Water quality
- Existing land uses and zoning

Functions
- Hydrologic, shoreline vegetation, and aquatic habitat are sustainable at current levels.
- Terrestrial habitat is impaired due to adjacent land uses and may not be sustainable or improved without a change in use.

Priority Actions
- Restoration of adjacent wetland.
- Water quality improvement.

Current Enhancement Projects
- None known.

Preservation/Enhancement Opportunities
- Restoration of adjacent wetland.
- Preservation of existing terrestrial vegetation and habitat.
- Enhancement of the wetlands/slough and riparian buffer by increasing the width and species diversity of native vegetation.
- Removal of invasive species (Himalayan blackberry, reed canarygrass).

Public Access Opportunities
- No opportunities for increased public access have been identified in this reach.

Shoreline Environment Designation

Under the 2001 Nooksack Shoreline Management Master Program the shoreline of Reach 12 is undesignated. Based on the available inventory information it appears that either a Shoreline Residential or Urban Conservancy environment designation should be established.

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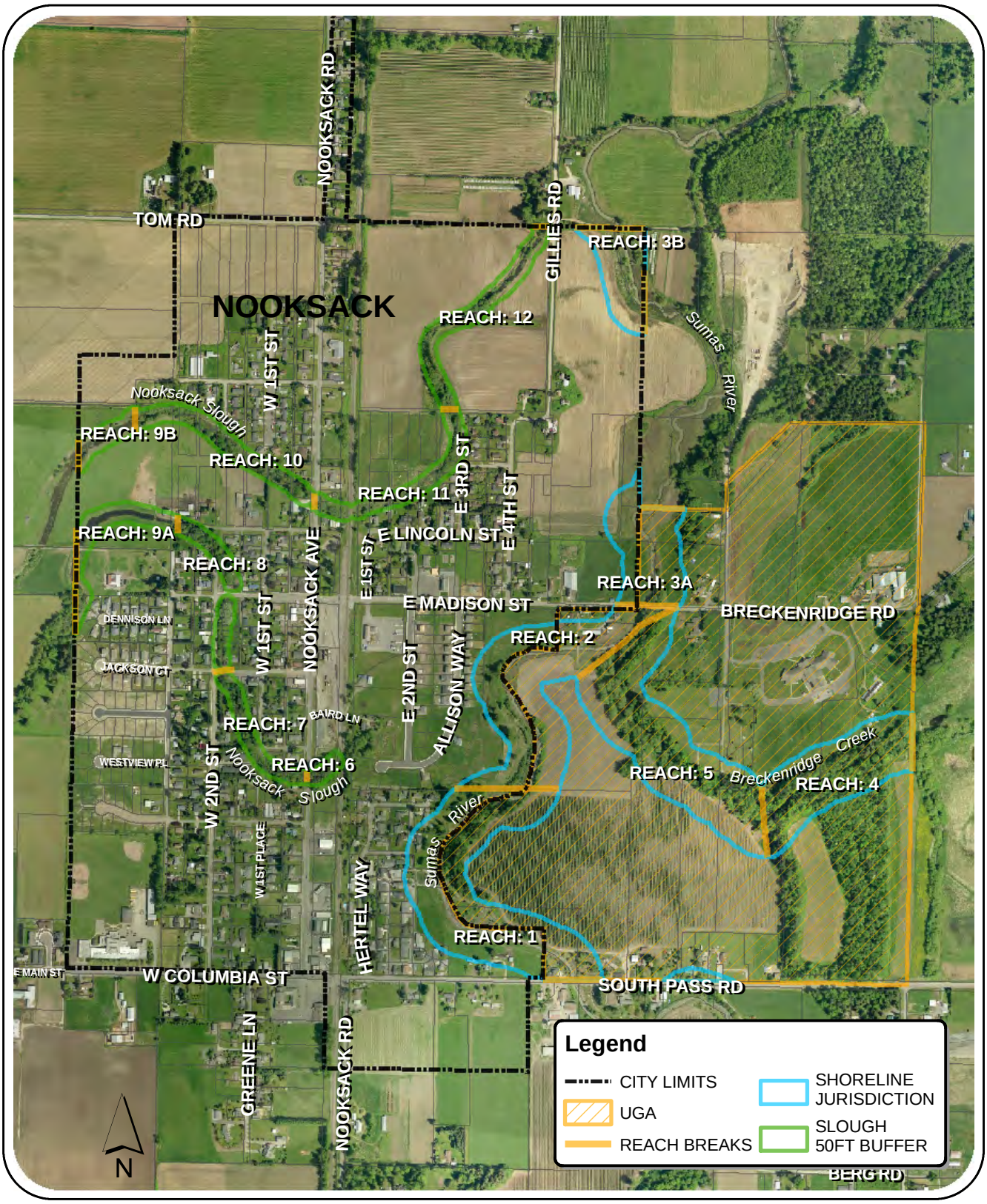

Disclaimer: These maps are for planning purposes only. Property lines are approximate.

1 inch = 1,000 feet

PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, & Whatcom County Planning/Assessor's

Sehome Planning & Development

city of Nooksack
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Shoreline Jurisdiction Vicinity Map

Wilson SURVEY/ENGINEERING

SHORELINE AREA: Sumas River, South Pass Road north to southern end of Allison Way subdivision.

REACH NUMBER: # 1

Land Use	Current Shoreline Designation		UGA east of river: Whatcom County: Rural. (Ref # 16) West of river: City: Urban. (Ref # 1)
	Current Land Use		Agriculture (active and fallow), rural residential, commercial (nursery) at SE end. (Ref # 3, 7)
	Zoning		UGA east of river: Agriculture. Future City: residential cluster (11.2), recreation along shoreline. In City: AG (6.1 ac) and residential (4.7 ac). (Ref # 2)
Potential Species Present	Wildlife species		Swan, raptor, waterfowl. (Ref # 2)
	Fish species		Anadromous fish presence. (Ref # 2) Fall Chinook presence presumed; Coho documented rearing; and winter steelhead presence documented. (Ref # 13) Fall chum and resident cutthroat. (Ref #12).
	PHS species/habitat		Priority fish presence. Priority wetlands. (Ref # 12) NWI wetlands associated with Sumas River. (Ref # 2)
	TSE species		ESU for coho, fall/winter chum, bull trout. (Ref # 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 10.8 ac in city; 11.2 ac in UGA.(Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE. (Ref #6) Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		Nine (9) – residential/mixed. (Ref # 1)
	Culverts/stormwater utilities		Culvert under South Pass Road at southern end of reach. (Ref # 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref #9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 1.0 ac (9%) (Ref # 1)
	Roads/transportation		Part of one residential driveway; small sections of Looten's Loop and Hertel Way. (Ref # 7)
	Soils		Mt Vernon fine sandy loam; Oridia silt loam. (Ref # 4)
	Topography		80 to 85 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Floodway and Floodplain areas along entire reach. (Ref # 2)
	Terrestrial Vegetation		Approximately one-third of the reach is characterized by mixed native trees. Few shrubs are present. The remainder of the reach is primarily fallow pasture/agricultural land – these areas are vegetated with native and non-native grasses and herbaceous species. Active agriculture (raspberries) on east side. Patches of invasive species (blackberry) present along the stream. Vegetation provides little to no cover to the stream. (Ref # 3)
Riparian Function	Aquatic substrate type		Silt. (Ref # 3)
	Channel confinement		Channel appears unconfined due to topography. (Ref # 3, 6)
	Channel gradient		No data. (Ref # 13) Presumed low due to topography.
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None observed/ no data. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		None observed/ no data. Tree cover along the shoreline is low moderate. Recruitment potential is low. (Ref # 3, 7)

SHORELINE AREA: Sumas River, South Pass Road north to southern end of Allison Way subdivision.

REACH NUMBER: # 1

	Riffle/pool analysis	No data.
	Associated wetlands	NWI wetlands associated with Sumas River. (Ref # 2)
	DOE 303(d)	None. (Ref # 10)
	Toxic sites/land fills	None listed. (Ref # 8)
	Point source pollution	Asbestos contamination from Swift Creek landslide. (Ref #15) Non-Point source: low intensity from residential uses and agriculture (cattle, raspberry farming). (Ref # 3, 7)
Historic & Cultural	Historic aerials	No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)
	Archeological & Historic sites	None indicated. (Ref # 5)
	Parks & public access	None indicated (Ref # 2). Small neighborhood park, gravel walking trail and stream overlook, landscaped areas observed. (Ref # 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat	Functioning with some impairment. Precipitation dominated (snow & rain); flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Impaired overall, but some areas present that are functioning. Majority of reach is undeveloped, but lacks native vegetation (trees and shrubs). Majority of the reach is pasture. Terrestrial: Functioning in areas dominated by native vegetation, impaired in others due to development, loss of habitat, and non-native or invasive vegetation. Aquatic: Impaired due to fine sediment and asbestos contamination; lacks vegetation cover which results in higher water temperature.
	Limiting Factors	▪ Asbestos contamination ▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable	Sustainable at current levels: Hydrologic, shoreline vegetation, terrestrial (in areas) and aquatic habitat. Terrestrial habitat impaired due to adjacent land uses and may not be sustainable or improved without a change in use.
	Priority Actions	▪ Preservation of existing riparian vegetation. ▪ Water quality improvement.
	Current Enhancement Projects	None known
	Preservation/Enhancement Opportunities	▪ Enhance riparian buffer: increase width of native shoreline vegetation in pasture areas; add evergreen species, other species for diversity; add vegetation along stream banks to provide shading. ▪ Remove invasive species (Himalayan blackberry).

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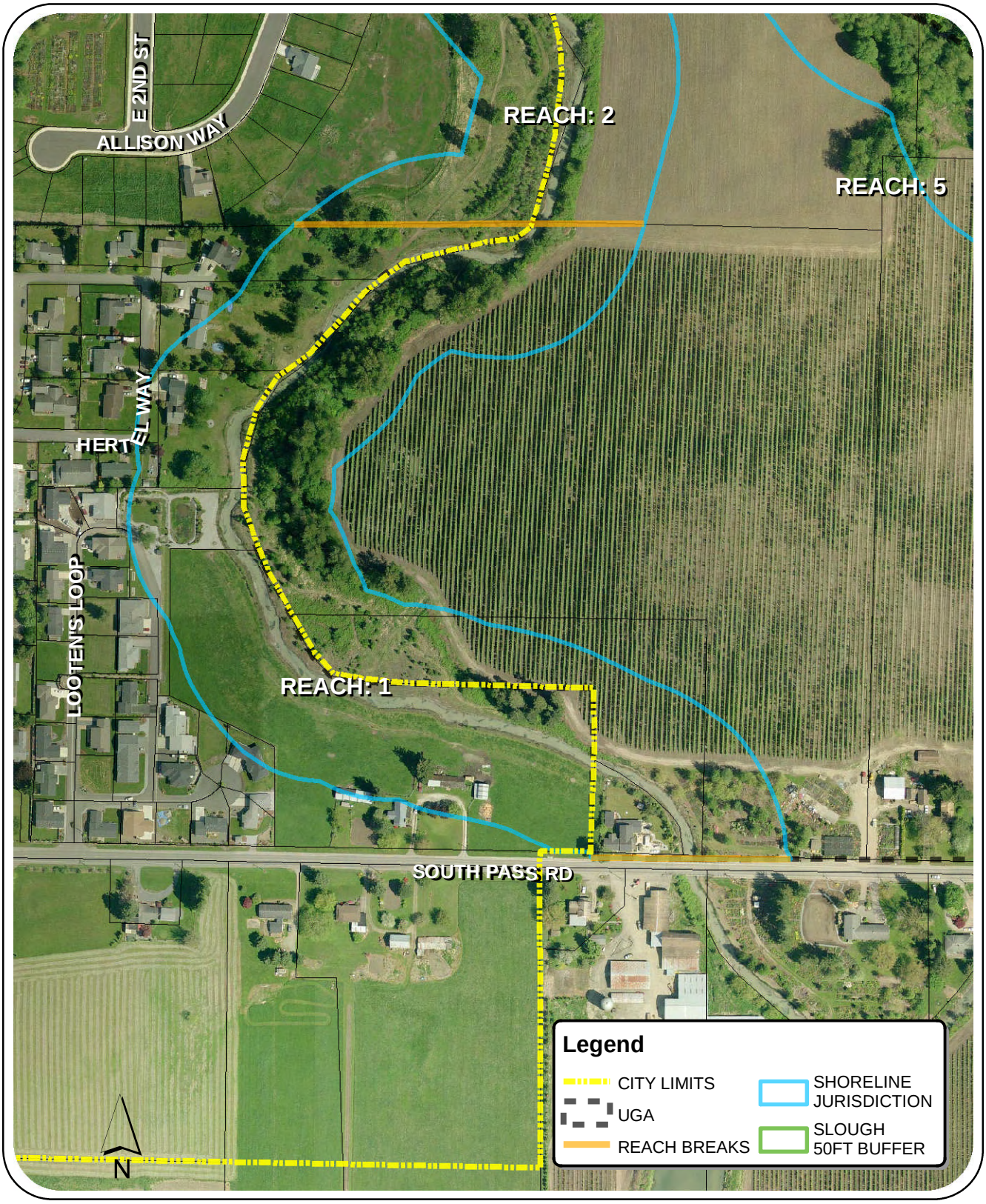

Disclaimer: These maps are for planning purposes only. Property lines are approximate.

1 inch = 300 feet

PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, Whatcom County Planning/Assessor's, & 2008 Pictometry

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Shoreline Jurisdiction
Reach 1

Sehome Planning & Development
Wilson SURVEY/ENGINEERING

SHORELINE AREA: Sumas River, southern end of Allison Way subdivision to E Madison Street.

REACH NUMBER: # 2

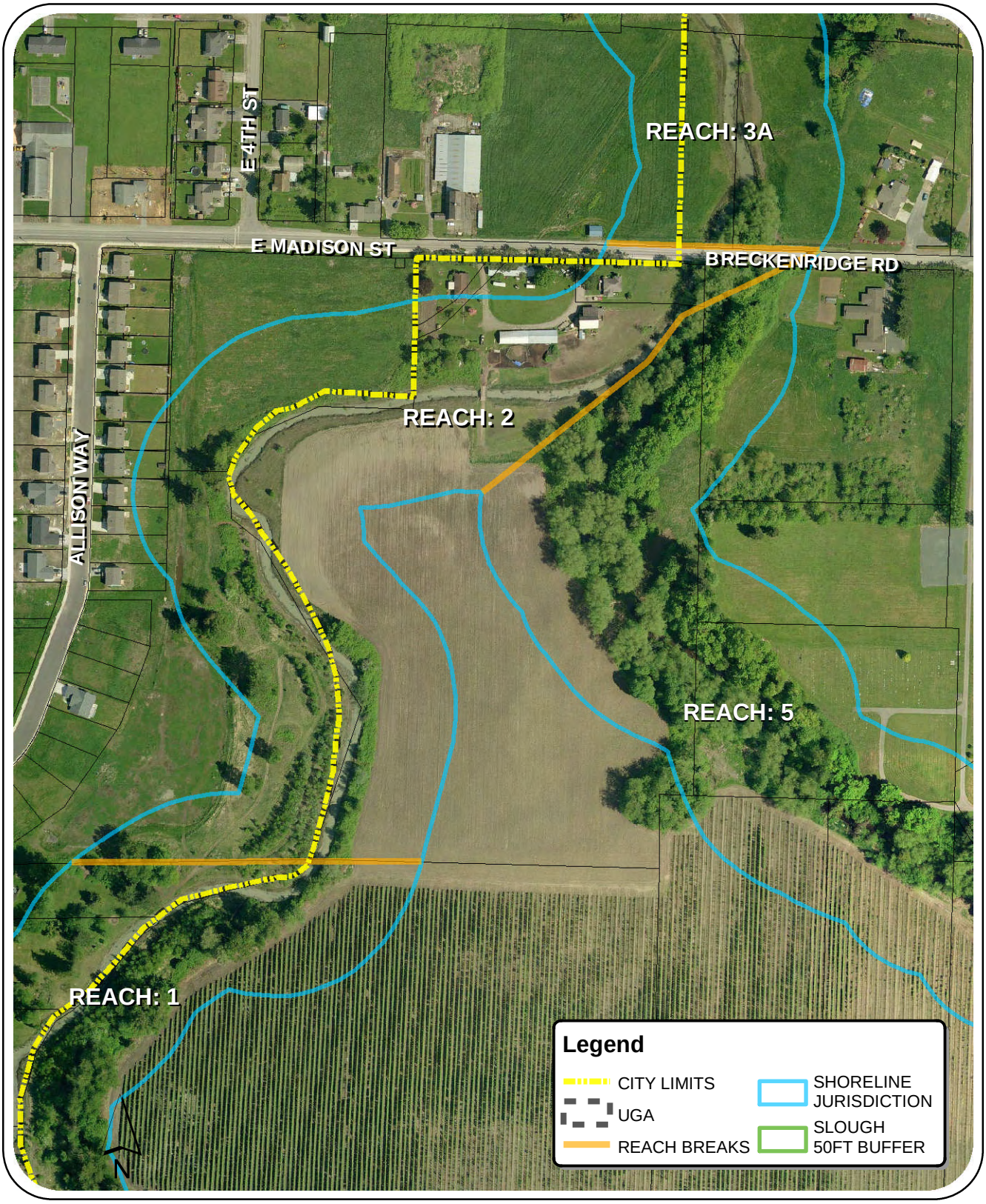
Land Use	Current Shoreline Designation		UGA east of river: Whatcom County: Rural. (Ref # 16) City: Urban. (Ref # 1)
	Current Land Use		Agriculture (raspberries), some urban residential density. A berm is present along a portion of the west side of the stream. (Ref # 3, 7)
	Zoning		UGA east of river: Agriculture. Future City: residential (3.2 ac), residential cluster (7.2 ac), recreation along shoreline. City: residential (7.6 ac). (Ref # 2)
Potential Species Present	Wildlife species		Raptor, waterfowl. (Ref # 2)
	Fish species		Anadromous fish presence. (Ref # 2) Fall Chinook presence presumed; fall chum presence documented below Breckenridge Creek; Coho documented rearing; and winter steelhead presence documented. (Ref # 13) Resident cutthroat. (Ref # 12)
	PHS species/habitat		Priority fish presence. (Ref # 12) NWI wetlands associated with Sumas River. (Ref # 2)
	TSE species		ESU for coho, fall/winter chum, bull trout. (Ref # 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 7.6 ac in city; 10.4 ac in UGA. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE. (Ref # 6) Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		Four (4) – agricultural/residence, one bridge. (Ref # 1)
	Culverts/stormwater utilities		Culvert under E Madison Street. Bridge or possibly culvert where farm access road crosses the river near the northern extent. (Ref # 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 0.3 ac (4%) (Ref # 1)
	Roads/transportation		Part of one residential driveway and one farm access road at northern terminus of reach. (Ref # 7)
	Soils		Mt Vernon fine sandy loam. (Ref # 4)
	Topography		80 to 90 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Floodway and floodplain areas along entire reach. (Ref # 2)
	Terrestrial Vegetation		Eastern side of stream is dominated by agriculture (raspberries). Western side of stream is mainly fallow pasture/agricultural land mixed with patches of native mixed trees and large patches of Himalayan blackberry. Pasture areas are vegetated with native and non-native grasses and herbaceous species. Vegetation provides little to no cover to the stream. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		Channel appears unconfined due to topography. (Ref # 3, 6)
	Channel gradient		No data. (Ref # 13) Presumed low due to topography.
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None observed/ no data. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		None observed. Tree cover along the shoreline is low. Recruitment potential is low. (Ref # 3, 7)

SHORELINE AREA: Sumas River, southern end of Allison Way subdivision to E Madison Street.

REACH NUMBER: # 2

	Riffle/pool analysis	No data.
	Associated wetlands	NWI wetlands associated with Sumas River. (Ref # 2)
	DOE 303(d)	None. (Ref # 10)
	Toxic sites/land fills	None listed. (Ref # 8)
	Point source pollution	Asbestos contamination from Swift Creek landslide. (Ref #15) Non-Point source: low intensity from residential uses and agriculture. (Ref # 3, 7)
Historic & Cultural	Historic aerials	No significant changes observed between 1976 and 20006 other than increased residential density. (Ref # 14)
	Archeological & historic sites	None indicated. (Ref # 5)
	Parks & public access	None (Ref # 2, 3)
Function Analysis	**Reach Function**	
	• Hydrologic	Functioning with some impairment. Precipitation dominated (snow and rain); flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching.
	• Shoreline Vegetation	Impaired. Majority of reach is undeveloped, and lacks native vegetation (trees and shrubs). Majority of the reach is pasture, agriculture or dominated by invasive species.
	• Habitat	Terrestrial: Impaired due to loss of habitat, non-native or invasive vegetation, and a lesser extent development. Aquatic: Impaired due to fine sediment and asbestos contamination; lacks vegetation cover which results in higher water temperature.
	Limiting Factors	▪ Asbestos contamination ▪ Water quality ▪ Existing land use/ Zoning
	Functions	
	• Sustainable	Sustainable at current levels: Hydrologic, shoreline vegetation, terrestrial and aquatic habitat.
	• Not Sustainable	Terrestrial habitat impaired due to adjacent land uses and may not be sustainable or improved without a change in use.
	Priority Actions	▪ Water quality improvement.
	Current Enhancement Projects	None known
	Preservation/Enhancement Opportunities	▪ Enhance riparian buffer: increase percent cover of native shoreline vegetation in pasture areas; add evergreen species, other species for diversity; add vegetation along stream banks to provide shading. ▪ Remove invasive species (Himalayan blackberry).

CITY OF NOOKSACK, WA



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PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
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Shoreline Jurisdiction
Reach 2

Sehome Planning & Development
Wilson SURVEY/ENGINEERING

SHORELINE AREA: Sumas River, north of E Madison Street to northern city boundary. | **REACH NUMBER: # 3**

Land Use	Current Shoreline Designation		City: Conservancy. (Ref # 1)
	Current Land Use		3A- fallow agriculture (pasture). 3B- Agriculture (corn). (Ref # 3, 7)
	Zoning		Future City (3A): agriculture (1.0 ac), residential (3.8 ac) City: agriculture (8.2 ac). (Ref # 2)
Potential Species Present	Wildlife species		Raptor, waterfowl. (Ref # 2)
	Fish species		Anadromous fish presence. (Ref # 2) Fall Chinook presence presumed; fall chum presence documented below Breckenridge Creek; Coho documented rearing; and winter steelhead presence documented. (Ref # 13). Resident cutthroat. (Ref # 12)
	PHS species/habitat		Priority fish presence (Ref # 12). Priority wetlands (Ref # 12). NWI wetlands associated with Sumas River. (Ref # 2)
	TSE species		ESU for coho, fall/winter chum, bull trout. (Ref # 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 8.2 ac in city; 4.8 ac in UGA. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE. (Ref #6) Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		None. (Ref # 1)
	Culverts/stormwater utilities		None observed. Access road at northern end of 3B crossed river with flat bridge. (Ref # 3, 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious zero acres. (Ref # 1)
	Roads/transportation		Private access road at northern end of 3B. (Ref # 3, 7)
	Soils		Mt Vernon fine sandy loam; riverwash. (Ref # 4)
	Topography		75 to 85 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach. (Ref # 6) Floodway and floodplain areas along entire reach. (Ref # 2)
	Terrestrial Vegetation		3A: dominated by fallow pasture grasses. A limited number of native shrubs (willow) at southern end. 3B: approximately half is fallow pasture with limited number of deciduous native trees and shrubs, and half is planted in crops. Pasture areas are vegetated with native and non-native herbaceous species. Vegetation provides little to no cover to the stream. (Ref # 3)
Riparian Function	Aquatic substrate type		Silt. (Ref # 3)
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13) Presumed low due to topography.
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None observed/ no data. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		None observed. Tree cover along the shoreline is low. Recruitment potential is low. (Ref # 3)
	Riffle/pool analysis		No data.
	Associated wetlands		NWI wetlands associated with Sumas River (Ref # 2). PEM farmed wetlands observed in 3B that appear to drain and/or connect to the river; shoreline jurisdiction should be extended to include adjacent wetlands. (Ref # 3)

SHORELINE AREA: Sumas River, north of E Madison Street to northern city boundary. | **REACH NUMBER: # 3**

	DOE 303(d)	None. (Ref # 10)
	Toxic sites/land fills	None listed. (Ref # 8)
	Point source pollution	Asbestos contamination from Swift Creek landslide. (Ref #15) Non-Point source: low intensity from agriculture (farming and pasture). (Ref # 3, 7)
Historic & Cultural	Historic aerials	No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)
	Archeological & historic sites	None indicated. (Ref # 5)
	Parks & public access	None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat	 Functioning with some impairment. Precipitation dominated (snow and rain); flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Impaired. Majority of reach is undeveloped, but lacks native vegetation (trees and shrubs). Majority of the reach is generally pasture or agriculture. Terrestrial: Impaired in others due to loss of habitat, and dominance of non-native or invasive vegetation. Aquatic: Impaired due to fine sediment and asbestos contamination; lacks vegetation cover which results in higher water temperature.
	Limiting Factors	▪ Asbestos contamination ▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable	 Sustainable at current levels: Hydrologic, shoreline vegetation, terrestrial and aquatic habitat. Terrestrial habitat impaired due to adjacent land uses and may not be sustainable or improved without a change in use.
	Priority Actions	▪ Restoration of wetlands associated with Sumas River in 3B. ▪ Water quality improvement.
	Current Enhancement Projects	None known
	Preservation/Enhancement Opportunities	▪ Restoration of wetlands associated with Sumas River in reach 3B (farmed wetlands). ▪ Enhance riparian buffer: increase width of native shoreline vegetation in pasture areas; add evergreen species, other species for diversity; add vegetation along stream banks to provide shading. ▪ Remove invasive species (Himalayan blackberry).

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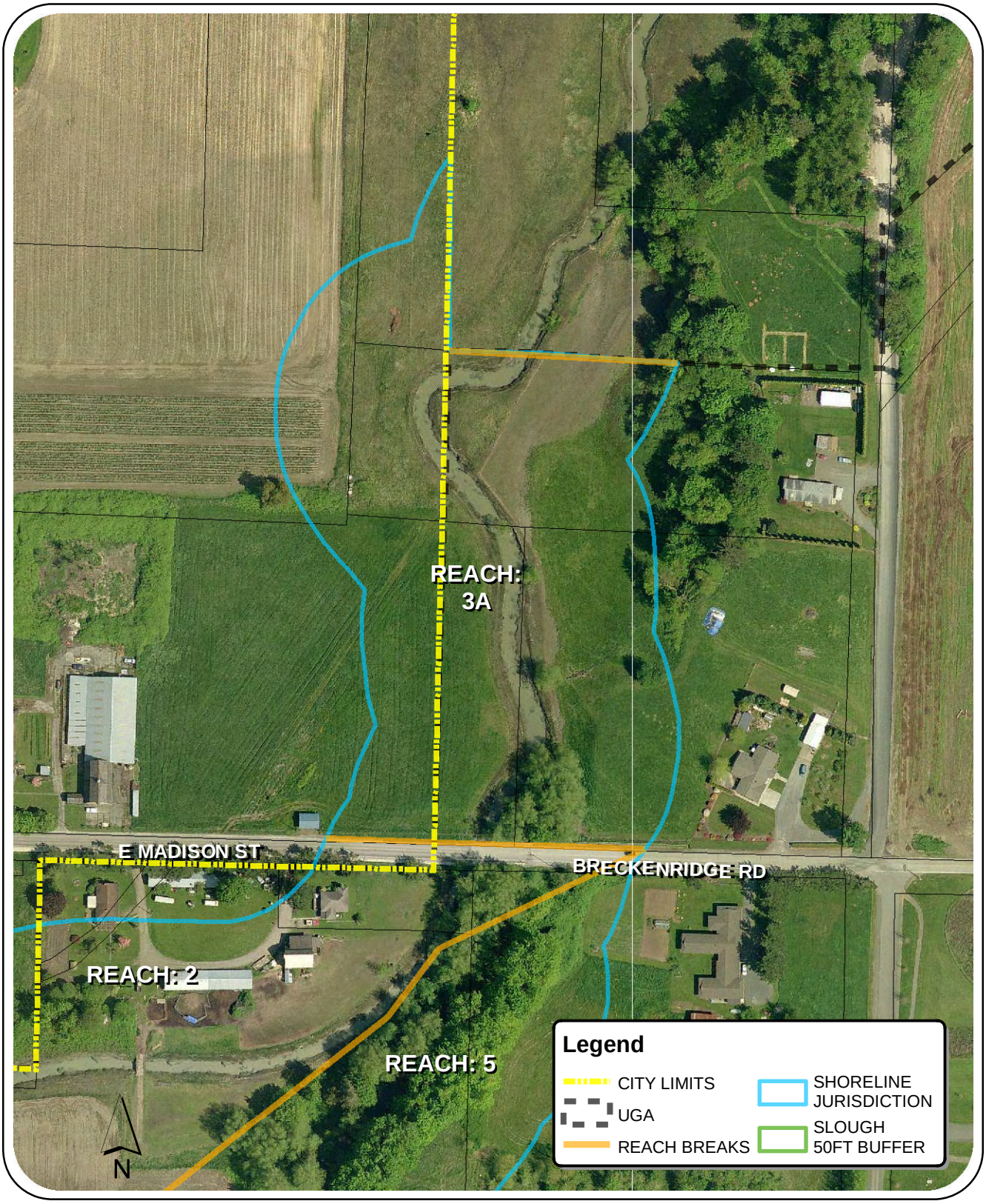

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Shoreline Jurisdiction
Reach 3A

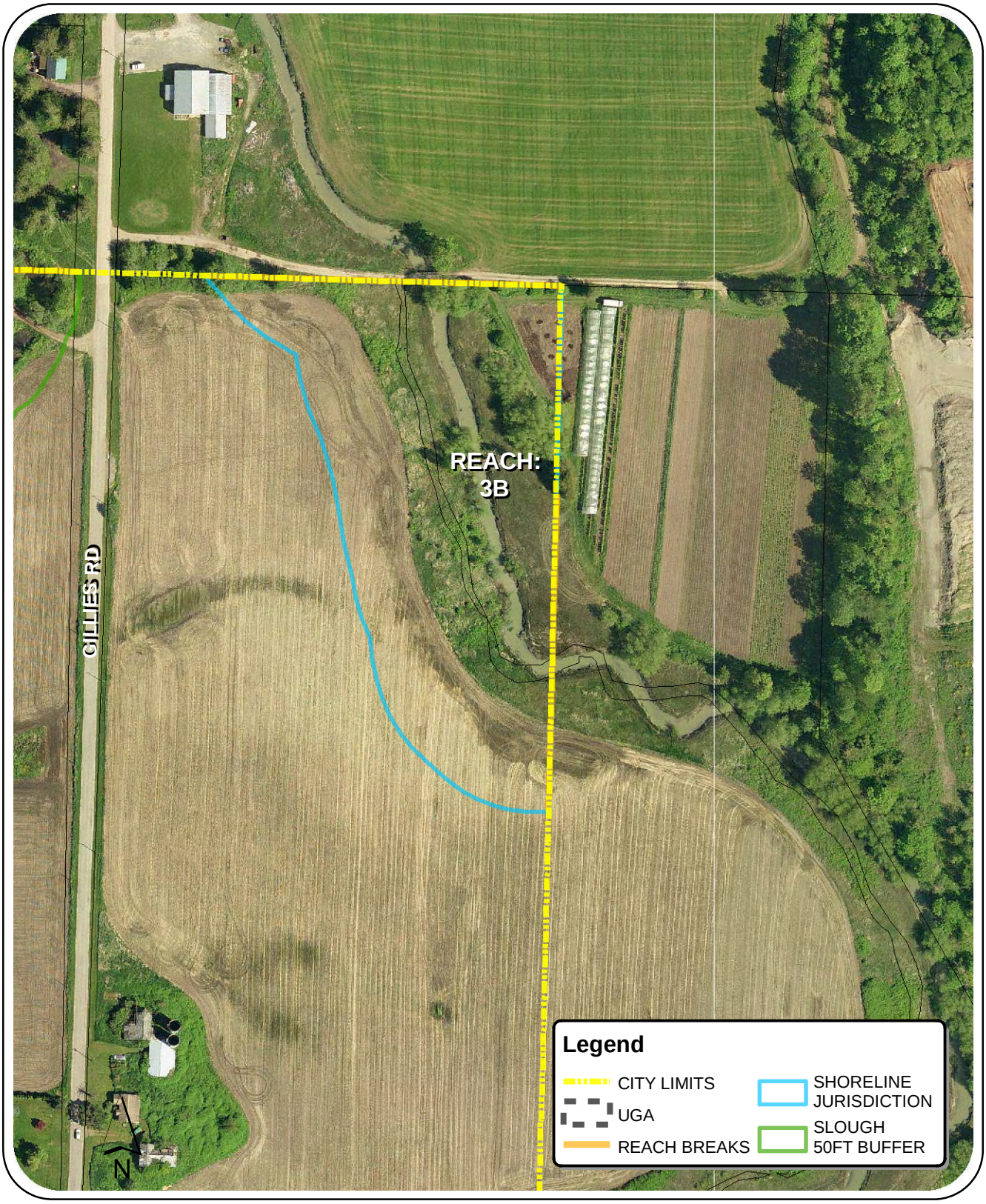
1 inch = 200 feet

PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, Whatcom County Planning/Assessor's, & 2008 Pictometry

Sehome Planning & Development

Wilson
SURVEY/ENGINEERING

CITY OF NOOKSACK, WA



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Shoreline Jurisdiction
Reach 3B

1 inch = 200 feet

PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, Whatcom County Planning/Assessor's, & 2008 Pictometry

Sehome Planning & Development

Wilson
SURVEY/ENGINEERING

SHORELINE AREA: Breckenridge Creek, west half of UGA. | **REACH NUMBER: # 4**

Land Use	Current Shoreline Designation		UGA: Whatcom County: Rural. (Ref # 16) City: Conservancy. (Ref # 1)
	Current Land Use		Undeveloped, light agriculture (pasture) and agriculture to south. Public school to the north. (Ref # 3, 7)
	Zoning		Entire reach is in the UGA: Agriculture. Future city: light industrial (5.4 ac), public (5.9 ac), residential cluster (0.4 ac), recreation along shoreline. (Ref # 2)
Potential Species Present	Wildlife species		Raptor, waterfowl. (Ref # 2).
	Fish species		Fish rearing habitat (Ref # 2). Fall Chinook presence presumed; fall chum presence documented; Coho documented rearing; and winter steelhead presence resumed (Ref # 13) Resident Cutthroat. (# 12) Resident cutthroat. (Ref # 12)
	PHS species/habitat		Priority fish presence (Ref # 12). NWI wetlands associated with Sumas River. (Ref # 2)
	TSE species		ESU for coho, fall/winter chum, bull trout. (Ref # 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 11.6 ac in the UGA. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE (Ref # 6). Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		None. (Ref # 1)
	Culverts/stormwater utilities		None observed. (Ref # 3, 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious zero acres. (Ref # 1)
	Roads/transportation		None. (Ref # 3, 7)
	Soils		Everett complex; Kickerville silt loam; Puget silt loam. (Ref # 4)
	Topography		85 to 100 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Floodplain areas along entire reach. (Ref # 2)
	Terrestrial Vegetation		The majority of the reach is characterized by undeveloped native mixed trees and shrubs. A fringe on the northern side is mowed pasture grass/ school ball field, or Himalayan blackberry mixed with pasture grasses. Two small areas on the southern side are farmed/ in agriculture. Native vegetation present provides shading over the stream and has the potential to provide good habitat. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13)
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None known/ no data. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		Unknown/ no data. Tree cover along the shoreline is moderate to high. Recruitment potential is moderate. (Ref # 3)
	Riffle/pool analysis		No data.
	Associated wetlands		NWI wetlands associated with Sumas River. (Ref # 2)
	DOE 303(d)		None. (Ref # 10)

SHORELINE AREA: Breckenridge Creek, west half of UGA. | **REACH NUMBER: # 4**

	Toxic sites/land fills	None listed. (Ref # 8)
	Point source pollution	No point source known. Non-Point source: small areas of low intensity from adjacent school (ball fields) and agriculture. (Ref # 3, 7)
Historic & Cultural	Historic aerials	No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)
	Archeological & historic sites	None indicated. (Ref # 5)
	Parks & public access	None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat	 Functioning with some impairment. Precipitation dominated (snow and rain); flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Functioning overall. Majority of reach is undeveloped and contains native vegetation (trees and shrubs). Edges of the reach are lawn or agriculture. Terrestrial: Functioning in areas dominated by native vegetation, impaired along the edge of the reach due to loss of habitat and non-native or invasive vegetation. Aquatic: functioning.
	Limiting Factors	▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable	 Sustainable at current levels: Hydrologic, shoreline vegetation, terrestrial and aquatic habitat.
	Priority Actions	▪ Preservation of existing riparian vegetation. ▪ Water quality improvement.
	Current Enhancement Projects	None known
	Preservation/Enhancement Opportunities	▪ Preservation of terrestrial vegetation, habitat and associated riparian corridor. ▪ Enhance riparian buffer: increase width of native shoreline vegetation in pasture or agriculture areas to full extent of shoreline jurisdiction. ▪ Remove invasive species (Himalayan blackberry).

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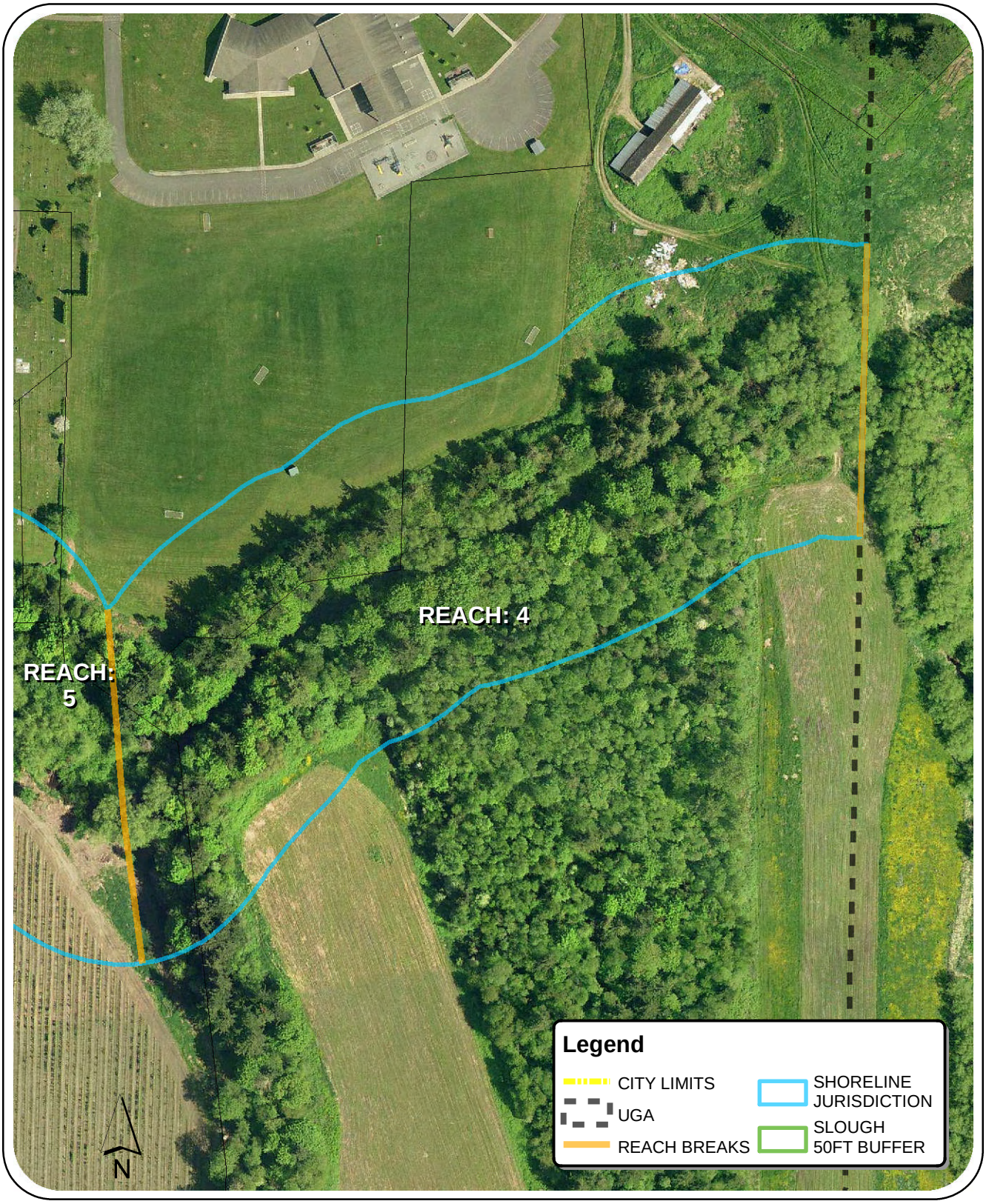

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Shoreline Jurisdiction
Reach 4

1 inch = 200 feet

PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, Whatcom County Planning/Assessor's, & 2008 Pictometry

Sehome Planning & Development

Wilson
SURVEY/ENGINEERING

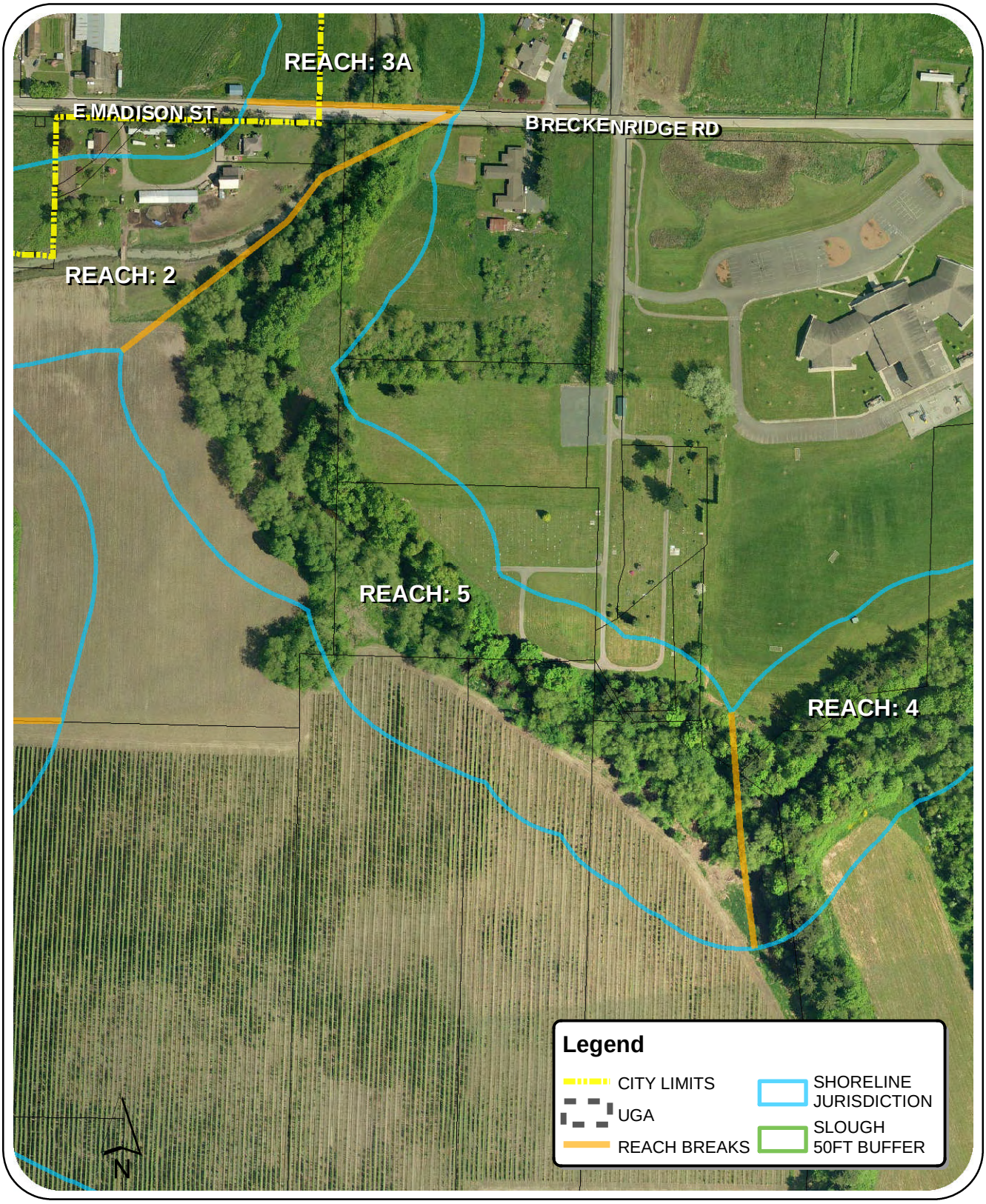
SHORELINE AREA: Breckenridge Creek, eastern portion of UGA. | **REACH NUMBER: # 5**

Land Use	Current Shoreline Designation		UGA: Whatcom County: Rural. (Ref # 16) City: Conservancy. (Ref # 1)
	Current Land Use		Light to moderate agriculture (raspberries) to south. Cemetery and some areas undeveloped to the north. (Ref # 3, 7)
	Zoning		Entire reach is in the UGA: Agriculture. Future city: public (5.6 ac), residential (4.0 ac), residential cluster (9.5 ac), recreation along shoreline. (Ref # 2)
Potential Species Present	Wildlife species		Raptor, waterfowl. (Ref #2A) Riparian zone. (Ref # 17)
	Fish species		Fish rearing habitat (Ref # 2). Fall Chinook presence presumed; fall chum presence documented; Coho documented rearing; and winter steelhead presence presumed. (Ref # 13) Resident cutthroat.(Ref # 12)
	PHS species/habitat		Priority fish presence. (Ref # 12) NWI wetlands associated with Sumas River. (Ref # 2)
	TSE species		ESU for coho, fall/winter chum, bull trout. (Ref # 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 19.1 in the UGA. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE. (Ref # 6) Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		None. (Ref # 1)
	Culverts/stormwater utilities		None observed. (Ref # 3, 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 0.15 ac (1%) (Ref # 1)
	Roads/transportation		Farm access road south of river; cemetery access roads north of river. (Ref # 3, 7)
	Soils		Kickerville silt loam; Oridia silt loam; Mt Vernon fine sandy loam. (Ref # 4)
	Topography		85 to 100 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Floodplain areas along entire reach. (Ref # 2)
	Terrestrial Vegetation		Approximately half of the reach on either side of the stream is characterized by undeveloped native deciduous trees and shrubs. Native vegetation present has the potential to provide good habitat. Himalayan blackberry dominant in portions of the understory. The remainder of the reach is pasture/agricultural land. To the north these areas are vegetated with native and non-native herbaceous species; this area is mainly within the cemetery and always mowed. To the south the remaining areas are planted in raspberries. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13)
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None observed/ no data. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		Unknown. Tree cover along the shoreline is moderate to high. Recruitment potential is moderate to high. (Ref # 3)
	Riffle/pool analysis		No data.

SHORELINE AREA: Breckenridge Creek, eastern portion of UGA. | **REACH NUMBER: # 5**

	Associated wetlands	NWI wetlands associated with Sumas River. (Ref # 2)
	DOE 303(d)	None. (Ref # 10)
	Toxic sites/land fills	None listed. (Ref # 8)
	Point source pollution	No point source known. Non-Point source: low intensity agriculture (raspberry farming) to the south. (Ref # 3, 7)
Historic & Cultural	Historic aerials	No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)
	Archeological & historic sites	None indicated. (Ref # 5)
	Parks & public access	None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat	 Functioning with some impairment. Precipitation dominated (snow and rain); flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Functioning with some impairment. Approximately half of the reach contains native vegetation (trees and shrubs) and is functioning. The other half if lawn (cemetery) or agriculture and is impaired. Terrestrial: Functioning in areas dominated by native vegetation, impaired in others due to loss of habitat, and non-native or invasive vegetation. Aquatic: Functioning.
	Limiting Factors	▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable	 At current levels: Hydrologic, shoreline vegetation, terrestrial and aquatic habitat. Terrestrial habitat impaired due to adjacent land uses and may not be sustainable or improved without a change in use.
	Priority Actions	▪ Preservation of existing riparian vegetation. ▪ Water quality improvement.
	Current Enhancement Projects	None known
	Preservation/Enhancement Opportunities	▪ Preservation of terrestrial vegetation, habitat and associated riparian corridor. ▪ Enhance riparian buffer: increase width of native shoreline vegetation in pasture and agriculture areas. ▪ Remove invasive species (Himalayan blackberry).

CITY OF NOOKSACK, WA



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PROJECTION:
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Shoreline Jurisdiction
Reach 5

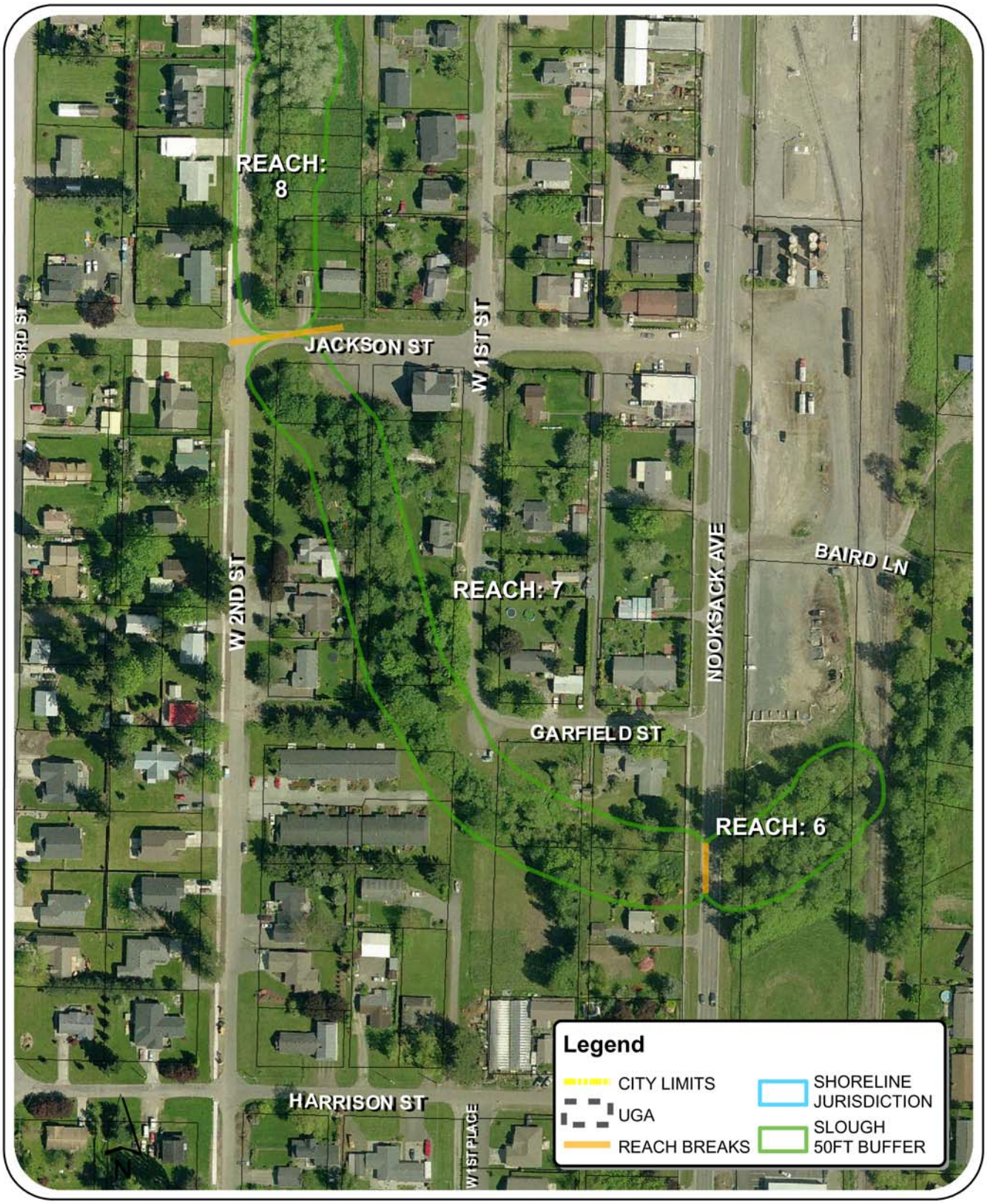
SHORELINE AREA: Nooksack Slough, east of Nooksack Avenue. **REACH NUMBER: # 6**

Land Use	Current Shoreline Designation		Undesignated. (Ref # 1)
	Current Land Use		Undeveloped. (Ref # 3, 7)
	Zoning		Commercial (.072 ac), residential (0.013 ac). (Ref # 2)
Potential Species Present	Wildlife species		None indicated. (Ref # 2, 12)
	Fish species		None indicated. (Ref # 13)
	PHS species/habitat		No NWI wetlands indicated. (Ref # 2)
	TSE species		None indicated. (Ref # 12, 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 0.73 ac. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE. (Ref # 6) Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		None. (Ref # 1)
	Culverts/stormwater utilities		Culvert under Nooksack Avenue (assumed). (Ref # 3, 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 0.1 ac (14%) (Ref # 1)
	Roads/transportation		Nooksack Avenue at western edge; railroad at eastern edge. (Ref # 3, 7)
	Soils		Mt Vernon fine sandy loam. (Ref # 4)
	Topography		75 to 85 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Floodplain areas along most of reach. (Ref # 2)
	Terrestrial Vegetation		The entire reach is characterized by undeveloped native deciduous trees and shrubs. Native vegetation present has the potential to provide good habitat. Small patches of Himalayan blackberry present along the outer edges. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13) Presumed low due to topography.
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None observed/ no data. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		Unknown. Tree cover along the shoreline is moderate to high. Recruitment potential is moderate. (Ref # 3)
	Riffle/pool analysis		No data.
	Associated wetlands		No NWI wetlands indicated (Ref # 2). Slough is PFO/ PSS wetland. (Ref # 3).
	DOE 303(d)		None indicated. (Ref # 10)
	Toxic sites/land fills		None listed. (Ref # 8)
	Point source pollution		No point source known. Non-Point source: low to moderate intensity from adjacent residential use, industry/railroad. (Ref # 3, 7)
Histori c &	Historic aerials		No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)
	Archeological & historic sites		None indicated. (Ref # 5)

SHORELINE AREA: Nooksack Slough, east of Nooksack Avenue. | **REACH NUMBER: # 6**

	Parks & public access	None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat	 Functioning with some impairment. Precipitation dominated; flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, ditching, impervious surfaces. Functioning. Majority of reach is undeveloped, and contains native vegetation (trees and shrubs). Terrestrial: Functioning, although area is isolated for certain species due to railroad tracks and roads. Aquatic: Functioning.
	Limiting Factors	▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable	 At current levels: Hydrologic, shoreline vegetation, and aquatic habitat. Terrestrial not be sustainable if land use changes (buffer is currently undeveloped).
	Priority Actions	▪ Preservation of existing riparian vegetation. ▪ Water quality improvement.
	Current Enhancement Projects	None known
	Preservation/Enhancement Opportunities	▪ Preservation of terrestrial vegetation, habitat and associated riparian corridor. ▪ Remove invasive species (Himalayan blackberry).

CITY OF NOOKSACK, WA



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Shoreline Jurisdiction
Reaches 6 & 7

Sehome Planning & Development
Wilson
SURVEY/ENGINEERING

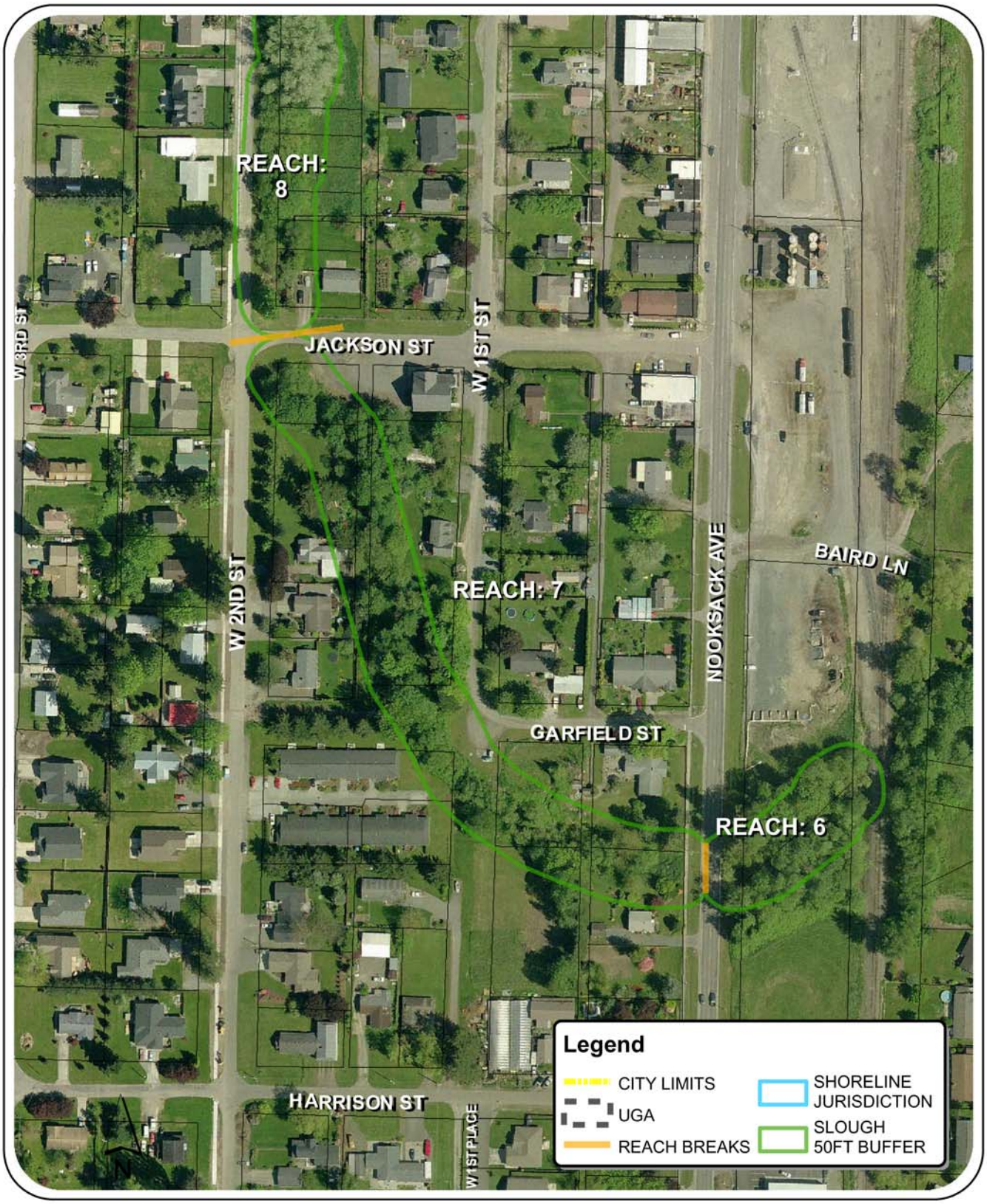
SHORELINE AREA: Nooksack Slough, Nooksack Avenue to Jackson Street. | **REACH NUMBER: # 7**

Land Use	Current Shoreline Designation		Undesignated. (Ref # 1)
	Current Land Use		Undeveloped, residential (Ref # 3, 7)
	Zoning		Residential (2.6 ac). (Ref # 2)
Potential Species Present	Wildlife species		None indicated. (Ref # 2, 12)
	Fish species		None indicated. (Ref # 13)
	PHS species/habitat		No NWI wetlands indicated. (Ref # 2)
	TSE species		None indicated. (Ref # 12, 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 2.6 ac. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE. (Ref # 6) Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		One (1) partial – residential. (Ref # 1)
	Culverts/stormwater utilities		Culvert under Jackson Street (assumed). (Ref # 3, 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 0.1 ac (4%) (Ref # 1)
	Roads/transportation		Jackson St at northern extent of reach. (Ref # 3, 7)
	Soils		Mt Vernon fine sandy loam. (Ref # 4)
	Topography		75 to 85 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Not mapped as floodway or floodplain. (Ref # 2)
	Terrestrial Vegetation		The majority of the reach is characterized by undeveloped native deciduous trees and shrubs. Native vegetation provides cover and has the potential to provide good habitat. A few patches of invasive species were observed (Himalayan blackberry and field bind weed). In a few small areas adjacent residential lawns encroach into the reach. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13) Presumed low due to topography.
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None observed/ no data. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		Unknown. Tree cover along the shoreline is moderate. Recruitment potential is moderate. (Ref # 3, 7)
	Riffle/pool analysis		No data.
	Associated wetlands		No NWI wetlands indicated (Ref # 2). Slough is a PFO/ PSS wetland. (Ref # 3)
	DOE 303(d)		None indicated. (Ref # 10)
	Toxic sites/land fills		None listed. (Ref # 8)
	Point source pollution		No point source known. Non-Point source: low intensity from adjacent residential use. (Ref # 3, 7)
Hi st	Historic aerials		No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)

SHORELINE AREA: Nooksack Slough, Nooksack Avenue to Jackson Street. | **REACH NUMBER: # 7**

	Archeological & historic sites	Bible Camp Tabernacle (WH00206). (Ref # 5)
	Parks & public access	None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat	 Functioning with some impairment. Precipitation dominated; flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Functioning overall, but some very small areas are present that are impaired. Majority of reach is undeveloped, and contains native vegetation (trees and shrubs). Small areas impaired where vegetation is lawn from adjacent residences or invasive species occur; these areas cover a very small percentage of the reach. Terrestrial: Functioning in areas dominated by native vegetation, impaired in others due to loss of habitat, non-native or invasive vegetation, and human influence. Aquatic: Functioning, but likely impaired to some extent due from adjacent residential uses.
	Limiting Factors	▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable	 All but terrestrial are sustainable at current levels, however, residential ownership may reduce sustainability. Terrestrial habitat (due to residential development).
	Priority Actions	▪ Preservation of existing riparian vegetation. ▪ Water quality improvement.
	Current Enhancement Projects	None known
	Preservation/Enhancement Opportunities	▪ Preservation of terrestrial vegetation, habitat and associated riparian corridor. ▪ Enhance riparian buffer: increase width of native shoreline vegetation in areas that area currently lawn; add evergreen trees for species diversity. ▪ Removal of invasive species (Himalayan blackberry, field bind weed).

CITY OF NOOKSACK, WA



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PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, Whatcom County Planning/Assessor's, & 2008 Pictometry

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Shoreline Jurisdiction
Reaches 6 & 7

Sehome Planning & Development
Wilson
SURVEY/ENGINEERING

SHORELINE AREA: Nooksack Slough, Jackson Street to west terminus of W. Lincoln Street.

REACH NUMBER: # 8

Land Use	Current Shoreline Designation		Undesignated. (Ref # 1)
	Current Land Use		Undeveloped, residential. (Ref # 3, 7)
	Zoning		Residential (3.2 ac). (Ref # 2)
Potential Species Present	Wildlife species		None indicated. (Ref # 2, 12)
	Fish species		None indicated. (Ref # 13)
	PHS species/habitat		No NWI wetlands indicated. (Ref # 2)
	TSE species		None indicated. (Ref # 12, 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 3.2 ac. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE (Ref # 6). Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		Two (2) – residential. (Ref # 1)
	Culverts/stormwater utilities		Culvert under W Madison St (assumed). (Ref # 3, 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 0.3 ac (9%) (Ref # 1)
	Roads/transportation		All or part of three residential driveways; W Madison Street bisects the reach; W 2nd Street along western edge. (Ref # 3, 7)
	Soils		Mt Vernon fine sandy loam. (Ref # 4)
	Topography		75 to 85 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Not mapped as floodway or floodplain. (Ref # 2)
	Terrestrial Vegetation		The majority of the reach is characterized by deciduous trees and shrubs, mostly native but some non-native. Vegetation provides shading to the slough, and native vegetation present has the potential to provide good habitat. Patches of invasive species (Himalayan blackberry, field bind weed) are present. Residential lawns encroach in a number of areas. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13) Presumed low due to topography.
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None observed/ no data. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		Unknown. Tree cover along the shoreline is moderate to high. Recruitment potential is moderate to high. (Ref # 3)
	Riffle/pool analysis		No data.
	Associated wetlands		No NWI wetlands indicated (Ref # 2). Slough is a PFO/ PSS wetland. (Ref # 3)
	DOE 303(d)		None indicated. (Ref # 10)
	Toxic sites/land fills		None listed. (Ref # 8)
	Point source pollution		No point source known. Non-Point source: low intensity from adjacent residential use. (Ref # 3, 7)

SHORELINE AREA: Nooksack Slough, Jackson Street to west terminus of W. Lincoln Street.

REACH NUMBER: # 8

Historic & Cultural	Historic aerials	No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)
	Archeological & historic sites	None indicated. (Ref # 5)
	Parks & public access	None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat	 Functioning with some impairment. Precipitation dominated; flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Functioning overall, but some areas present that are impaired. Majority of reach is undeveloped, and contains native vegetation (trees and shrubs). Impaired where invasive species occur or lawns are present. Terrestrial: Functioning in areas dominated by native vegetation, impaired in others due to development, loss of habitat, non-native or invasive vegetation, and human influence. Aquatic: Functioning, but likely impaired to some extent due from adjacent residential uses.
	Limiting Factors	▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable	 All but terrestrial are sustainable at current levels, however, residential ownership may reduce sustainability. Terrestrial habitat (due to residential development).
	Priority Actions	▪ Preservation of existing riparian vegetation. ▪ Water quality improvement.
	Current Enhancement Projects	None known
	Preservation/Enhancement Opportunities	▪ Preservation of terrestrial vegetation, habitat and associated riparian corridor. ▪ Enhance riparian buffer: increase width of native shoreline vegetation in lawn areas; add evergreen species to increase diversity. ▪ Remove invasive species (Himalayan blackberry, field bind weed).

CITY OF NOOKSACK, WA

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PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, Whatcom County Planning/Assessor's, & 2008 Pictometry

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Shoreline Jurisdiction
Reach 8

Sehome Planning & Development
Wilson SURVEY/ENGINEERING

SHORELINE AREA: Nooksack Slough, lying west of west terminus of W. Lincoln Street; two segments, currently in AG use.

REACH NUMBER: # 9

Land Use	Current Shoreline Designation		Undesignated. (Ref # 1)
	Current Land Use		Agriculture (pasture, hay), grazing cattle. (Ref # 3, 7)
	Zoning		Agriculture (0.5 ac), residential (4.8 ac). (Ref # 2)
Potential Species Present	Wildlife species		None indicated. (Ref # 2, 12)
	Fish species		None indicated. (Ref # 13)
	PHS species/habitat		Priority wetlands (Ref # 12). NWI wetlands associated with slough. (Ref # 2)
	TSE species		None indicated. (Ref # 12, 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 5.3 ac. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE (Ref # 6). Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		One (1) partial – agricultural. (Ref # 1)
	Culverts/stormwater utilities		Unknown. Two crossings in 9A, at least one appears to be a culvert. (Ref # 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 0.02 ac (<1 %) (Ref # 1)
	Roads/transportation		Private access roads appear to cross the river in two places (9A). (Ref # 7)
	Soils		Mt Vernon fine sandy loam. (Ref # 4)
	Topography		75 to 85 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Not mapped as floodway or floodplain. (Ref # 2)
	Terrestrial Vegetation		The majority of the reach (9A and 9B) is characterized by pasture/agricultural land – these areas are vegetated with native and non-native herbaceous species. A very limited number of shrubs are present along the reach. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13) Presumed low due to topography.
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		A culvert or some other kind of crossing observed (in aerial photos) in reach 9A. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		Unknown, but likely none. Tree cover along the shoreline is low. Recruitment potential is low. (Ref # 3, 7)
	Riffle/pool analysis		No data.
	Associated wetlands		NWI wetlands associated with slough (Ref # 2). PEM wetlands. (Ref # 3, 7)
	DOE 303(d)		None indicated. (Ref # 10)
	Toxic sites/land fills		None listed. (Ref # 8)
	Point source pollution		No point source known. Non-Point source: low to moderate intensity from agricultural use (cattle) within the reach. (Ref # 3, 7)
Hi st	Historic aerials		No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)

SHORELINE AREA: Nooksack Slough, lying west of west terminus of W. Lincoln Street; two segments, currently in AG use.	**REACH NUMBER: # 9**

	Archeological & historic sites		None indicated. (Ref # 5)
	Parks & public access		None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat		 Functioning with some impairment. Precipitation dominated; flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Impaired. Majority of reach is undeveloped, but lacks native vegetation (trees and shrubs). Majority of the reach is pasture and grazing cattle. Terrestrial: Impaired due to loss of habitat, and non-native or invasive vegetation. Aquatic: Impaired because reach lacks vegetation cover which results in higher water temperature, water quality may be impaired due to livestock.
	Limiting Factors		▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable		 At current levels: Hydrologic, shoreline vegetation, and aquatic habitat. Terrestrial habitat impaired due to adjacent land uses and not stainable, may be improved with a change in use.
	Priority Actions		▪ Establish riparian vegetation. ▪ Water quality improvement.
	Current Enhancement Projects		None known
	Preservation/Enhancement Opportunities		▪ Enhance riparian buffer: plant native trees and shrubs in pasture areas.

CITY OF NOOKSACK, WA

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Shoreline Jurisdiction
Reach 9A & 9B

1 inch = 200 feet

PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, Whatcom County Planning/Assessor's, & 2008 Pictometry

Sehome Planning & Development

Wilson SURVEY/ENGINEERING

SHORELINE AREA: Nooksack Slough, from west terminus of Hayes Street to railroad. | **REACH NUMBER: # 10**

Land Use	Current Shoreline Designation		Undesignated. (Ref # 1)
	Current Land Use		Undeveloped parcels, urban and rural residential, light agriculture (pasture, hay). (Ref # 3, 7)
	Zoning		Residential (4.2 ac), agriculture (0.022 ac), central market (0.144 ac). (Ref # 2)
Potential Species Present	Wildlife species		None indicated. (Ref # 2, 12)
	Fish species		None indicated. (Ref # 13)
	PHS species/habitat		Priority wetlands. (Ref # 12) NWI wetlands associated with slough. (Ref # 2)
	TSE species		None indicated. (Ref # 12, 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 4.4 ac. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE (Ref # 6). Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		None. (Ref # 1)
	Culverts/stormwater utilities		None observed in aerial photos. (Ref # 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 0.1 ac (2%) (Ref # 1)
	Roads/transportation		Portions of two residential driveways. (Ref # 7)
	Soils		Mt Vernon fine sandy loam; Oridia silt loam. (Ref # 4)
	Topography		75 to 85 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Not mapped as floodway or floodplain. (Ref # 2)
	Terrestrial Vegetation		The majority of the reach is characterized by native deciduous shrubs mixed with patches of emergent vegetation. Emergent areas dominated by reed canarygrass, an invasive species. Patches of Himalayan blackberry are also present. Residential lawns or landscaped areas encroach slightly in a number of locations. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13)
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None observed/ no data. (Ref # 3, 7)
	Fish passage blockages		Non-barrier mapped under Nooksack Avenue. (Ref # 13)
	LWD presence		Unknown. Tree cover along the shoreline is low. Recruitment potential is low. (Ref # 3, 7)
	Riffle/pool analysis		No data.
	Associated wetlands		NWI wetlands associated with slough (Ref # 2). Slough is a PSS/ PEM wetland. (Ref # 3)
	DOE 303(d)		None indicated. (Ref # 10)
	Toxic sites/land fills		None listed. (Ref # 8)
	Point source pollution		No point source known. Non-Point source: low intensity from adjacent residential use. (Ref # 3, 7)
H	Historic aerials		No significant changes observed between 1976 and 2006 other than increased

			residential density. (Ref # 14)
	Archeological and historic sites		None indicated. (Ref # 5)
	Parks & public access		None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat		Functioning with some impairment. Precipitation dominated; flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Functioning in approximately half the reach, areas which contains native vegetation (trees and shrubs). Impaired in the other half, areas generally dominated by invasive grasses, other non-native or invasive vegetation, or lawn. Terrestrial: Functioning in areas dominated by native vegetation, impaired in others due to loss of habitat, and non-native or invasive vegetation. Aquatic: Functioning with some impairment due to areas which lack vegetation cover and likely result in higher water temperature.
	Limiting Factors		▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable		At current levels: Hydrologic, shoreline vegetation, terrestrial and aquatic habitat. Terrestrial habitat impaired due to adjacent land uses and may not be sustainable or improved without a change in use.
	Priority Actions		▪ Preservation of existing riparian vegetation. ▪ Water quality improvement.
	Current Enhancement Projects		None known
	Preservation/Enhancement Opportunities		▪ Preservation of terrestrial vegetation, habitat and associated riparian corridor. ▪ Enhance riparian buffer: increase width of native shoreline vegetation and species diversity of existing vegetation. ▪ Remove invasive species (Himalayan blackberry, reed canarygrass).

CITY OF NOOKSACK, WA

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PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, Whatcom County Planning/Assessor's, & 2008 Pictometry

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Shoreline Jurisdiction
Reach 10

Sehome Planning & Development
Wilson
SURVEY/ENGINEERING

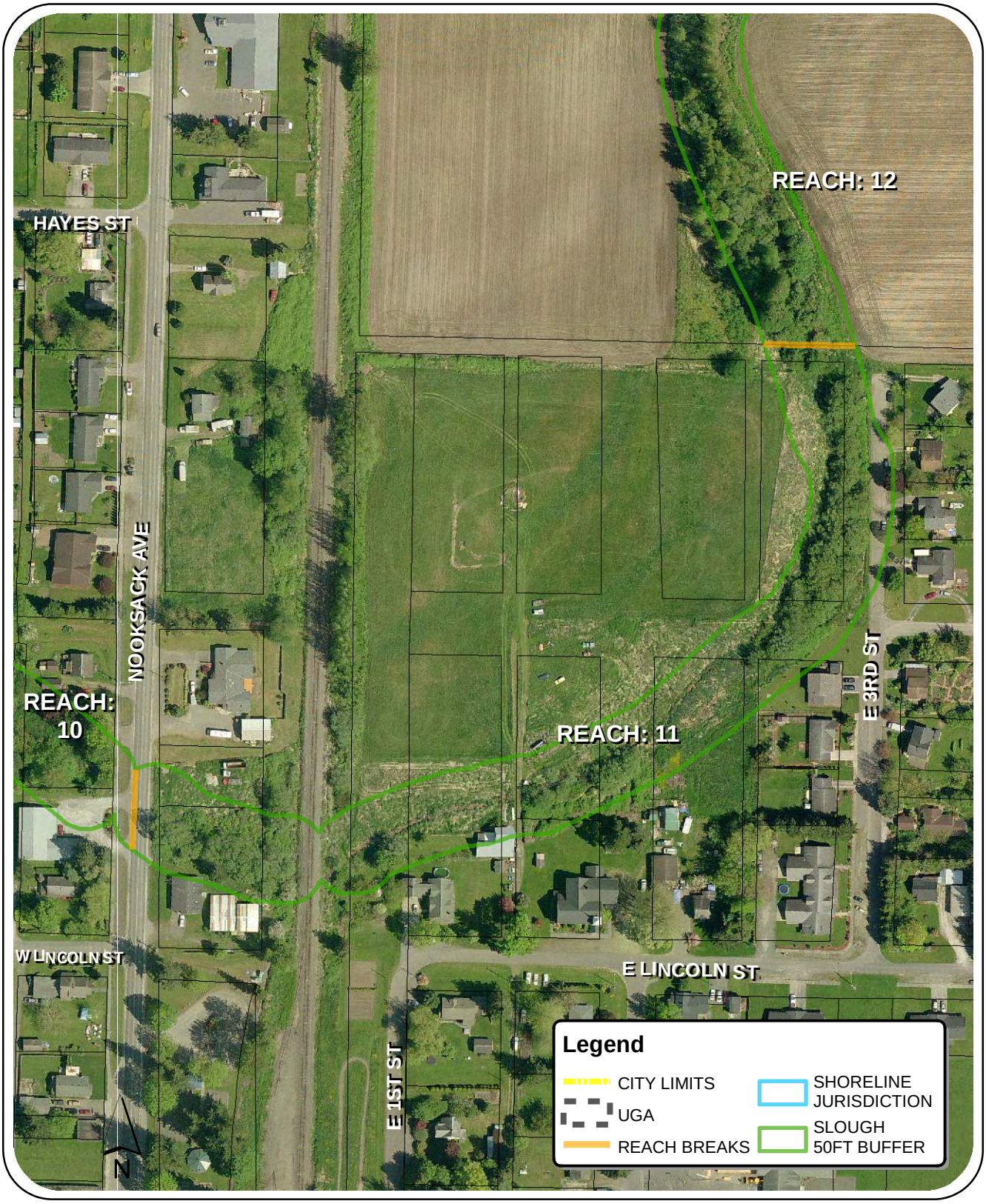
SHORELINE AREA: Nooksack Slough, from railroad to north terminus of E Third Street. | **REACH NUMBER: # 11**

Land Use	Current Shoreline Designation		Undesignated. (Ref # 1)
	Current Land Use		Undeveloped parcels, urban and rural residential, light agriculture. (pasture, hay) (Ref # 3, 7)
	Zoning		Residential (3.9 ac). (Ref # 2)
Potential Species Present	Wildlife species		None indicated. (Ref # 2, 12)
	Fish species		None indicated. (Ref # 13)
	PHS species/habitat		Priority wetlands. (Ref # 12) NWI wetlands associated with slough. (Ref # 2)
	TSE species		None indicated. (Ref # 12 ,13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 3.9 ac. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE (Ref # 6). Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17)
	Buildings		One (1) partial – residential, one bridge. (Ref # 1)
	Culverts/stormwater utilities		None observed. Culvert under Nooksack Avenue and railroad crossing (assumed). (Ref # 3, 7)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 0.3 ac (8%) (Ref # 1)
	Roads/transportation		Nooksack Avenue at western extent; E 3rd Street at eastern extent; Railroad bisects the reach. (Ref # 3, 7)
	Soils		Mt Vernon fine sandy loam; Oridia silt loam. (Ref # 4)
	Topography		75 to 85 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Not mapped as floodway or floodplain. (Ref # 2)
	Terrestrial Vegetation		The majority of the reach is characterized by palustrine emergent wetland/ slough dominated by reed canarygrass, an invasive species. Patches of native shrubs are also present, mainly at the northern and southern most ends. Overall vegetation provides little shading to the slough. Himalayan blackberry also observed in patches along the slough. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13)
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		None observed/ no data. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		Unknown/ none observed or likely. Tree cover along the shoreline is low. Recruitment potential is low. (Ref # 3, 7)
	Riffle/pool analysis		No data.
	Associated wetlands		NWI wetlands associated with slough. (Ref # 2) Slough is PSS/ PEM wetland. (Ref # 3)
	DOE 303(d)		None indicated. (Ref # 10)
	Toxic sites/land fills		None listed. (Ref # 8)

SHORELINE AREA: Nooksack Slough, from railroad to north terminus of E Third Street. | **REACH NUMBER: # 11**

	Point source pollution	No point source known. Non-Point source: low intensity from adjacent residential use. (Ref # 3, 7)
Historic & Cultural	Historic aerials	No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)
	Archeological and historic sites	None indicated. (Ref # 5)
	Parks & public access	None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat	 Functioning with some impairment. Precipitation dominated; flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Impaired overall, but some areas present that are functioning. Majority of reach is undeveloped, but lacks native vegetation (trees and shrubs) and is dominated by an invasive grass species. Terrestrial: Functioning in smaller areas dominated by native vegetation, impaired in others due to loss of habitat, and non-native or invasive vegetation. Aquatic: Impaired due to lack of vegetation cover which results in higher water temperature.
	Limiting Factors	▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable	 Sustainable at current levels: Hydrologic, shoreline vegetation, terrestrial and aquatic habitat. Terrestrial habitat impaired due to adjacent land uses and may not be sustainable or improved without a change in use.
	Priority Actions	▪ Water quality improvement.
	Current Enhancement Projects	None known
	Preservation/Enhancement Opportunities	▪ Enhance wetlands/ slough and riparian buffer: increase width and species diversity of native vegetation. ▪ Remove invasive species (reed canarygrass, Himalayan blackberry).

CITY OF NOOKSACK, WA



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Shoreline Jurisdiction
Reach 11

Sehome Planning & Development
Wilson
SURVEY/ENGINEERING

SHORELINE AREA: Nooksack Slough, north of north terminus of E Third Street to city boundary at Gillies Road.

REACH NUMBER: # 12

Land Use	Current Shoreline Designation		Undesignated. (Ref # 1)
	Current Land Use		Agriculture (corn). (Ref # 3, 7)
	Zoning		Residential (4.7 ac). (Ref # 2)
Potential Species Present	Wildlife species		None indicated. (Ref # 2, 12)
	Fish species		None indicated. (Ref # 13)
	PHS species/habitat		Priority wetlands. (Ref # 12) NWI wetlands associated with slough. (Ref # 2)
	TSE species		None indicated. (Ref # 12, 13)
	Invasive wildlife/fish species		No data.
Physical Environment	Acres of land in reach		Total: 4.7 ac. (Ref # 1)
	Aquatic vegetation		No data.
	Slope		No slope data listed by DOE. (Ref # 6) Site class and moderate to high liquefaction hazard listed by Whatcom County (DNR 2004). (Ref # 17).
	Buildings		None – one bridge. (Ref # 1)
	Culverts/stormwater utilities		Culvert at access road. (Ref # 3)
	Geology		Glacial outwash terrace with alluvium, undifferentiated outwash and till. (Ref # 9)
	Tributary Creeks		None observed. (Ref # 1, 3, 13)
	Impervious surface		Impervious 0.04 ac (1%) (Ref # 1)
	Roads/transportation		Private access road crosses river at northern end. (Ref # 3, 7)
	Soils		Mt Vernon fine sandy loam. (Ref # 4)
	Topography		75 to 85 feet elevation. (Ref # 6)
	FEMA		100 year floodplain extends throughout most of the reach (Ref # 6). Floodplain areas mapped in most of reach. (Ref # 2)
	Terrestrial Vegetation		The majority of the reach is farmed (corn crops) or pasture (reed canarygrass). Native deciduous trees and shrubs are present, but are patchy or in a very narrow band just along creek banks, with the exception of the very southern extent. Himalayan blackberry dominated banks in other areas. Vegetation provides little shade along the majority of the slough. (Ref # 3)
Riparian Function	Aquatic substrate type		No data.
	Channel confinement		No data.
	Channel gradient		No data. (Ref # 13)
	Channel migration zone		Unknown.
	Creosote structures		None observed/ no data. (Ref # 3, 7)
	In-water structures		Culvert crossing near north extent. (Ref # 3, 7)
	Fish passage blockages		None. (Ref # 13)
	LWD presence		Unknown. Tree cover along the shoreline is low to moderate. Recruitment potential is low. (Ref # 3, 7)
	Riffle/pool analysis		No data.
	Associated wetlands		NWI wetlands associated with slough (Ref # 2). Slough is PSS/ PEM (farmed) wetland (Ref # 3, 7). PEM wetlands observed adjacent that appears to drain and/or connect to the slough and shoreline jurisdiction should extend to include adjacent wetland. (Ref # 3)
	DOE 303(d)		None indicated. (Ref # 10)
	Toxic sites/land fills		None listed. (Ref # 8)

SHORELINE AREA: Nooksack Slough, north of north terminus of E Third Street to city boundary at Gillies Road.

REACH NUMBER: # 12

	Point source pollution		No point source known. Non-Point source: low intensity from agriculture (corn) use. (Ref # 3, 7)
Historic & Cultural	Historic aerials		No significant changes observed between 1976 and 2006 other than increased residential density. (Ref # 14)
	Archeological and historic sites		None indicated. (Ref # 5)
	Parks & public access		None. (Ref # 2, 3)
Function Analysis	**Reach Function** • Hydrologic • Shoreline Vegetation • Habitat		 Functioning with some impairment. Precipitation dominated; flashy winter and early spring peaks, low summer, variable spring and fall flows. Impairment in basin due to loss of wetland area, draining, filling, and ditching. Impaired overall, but some areas present that are functioning. Majority of reach is undeveloped, but lacks native vegetation (trees and shrubs). Majority of the reach is generally pasture or agriculture with exception of a small band along the slough and localized areas at the southern extent of the reach. Terrestrial: Functioning in areas dominated by native vegetation, impaired in others due to loss of habitat, and non-native or invasive vegetation. Aquatic: Impaired because overall lacks vegetation cover which results in higher water temperature.
	Limiting Factors		▪ Water quality ▪ Existing land use/ Zoning
	Functions • Sustainable • Not Sustainable		 Sustainable at current levels: Hydrologic, shoreline vegetation, terrestrial and aquatic habitat. Terrestrial habitat impaired due to adjacent land uses and may not be sustainable or improved without a change in use.
	Priority Actions		▪ Restoration of adjacent wetland. ▪ Water quality improvement.
	Current Enhancement Projects		None known
	Preservation/Enhancement Opportunities		▪ Restoration of adjacent wetland. ▪ Preservation of existing terrestrial vegetation and habitat. ▪ Enhance wetland/ slough and riparian buffer: increase width and species diversity of native vegetation. ▪ Remove invasive species (Himalayan blackberry, reed canarygrass).

CITY OF NOOKSACK, WA

Disclaimer: These maps are for planning purposes only. Property lines are approximate.

1 inch = 200 feet

PROJECTION:
State Plane Washington North NAD 83
DATA SOURCES;
City of Nooksack, Whatcom County Planning/Assessor's, & 2008 Pictometry

city of Nooksack
INCORPORATED IN 1912
P.O. Box 4265 • 103 W. Madison Street
Whatcom County • Nooksack, Washington 98276
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Shoreline Jurisdiction
Reach 12

Sehome Planning & Development
Wilson SURVEY/ENGINEERING

NOOKSACK SMP UPDATE – LIST OF INVENTORY DATA SOURCES

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