CITY OF MARYSVILLE

SNOHOMISH COUNTY **WASHINGTON**

SURFACE WATER COMPREHENSIVE PLAN UPDATE

G&O #15550
SEPTEMBER 2016

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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CHAPTER 1

INTRODUCTION

Prior to the late 1970s, stormwater management in the U.S. and specifically the Puget Sound region consisted primarily of conveying runoff away from developed areas in order to preserve the health and safety of citizens and protect property, both public and private. Drainage improvement projects addressed large storm events and local flooding with little thought for upstream, downstream, or environmental impacts. With the passage of the Clean Water Act in 1972, completion of the Nationwide Urban Runoff Program in 1983, and subsequently other federal and state laws, the cumulative effects of smaller storms in developed/urbanized areas were formally recognized as a major contributor to water quality and habitat degradation.

Stormwater runoff picks up and carries sediment and pollutants from exposed construction sites and agricultural areas and pollutants from residential, commercial, and industrial developments. Pollutants in stormwater runoff include metals such as lead, cadmium, and copper; oil and grease; pesticides and fertilizers; nutrients; suspended solids; and harmful bacteria. In addition, urbanization increases the amount of impervious surfaces such as rooftops, streets, and parking areas. Impervious surfaces directly relate to an increase in runoff volumes and peak flow rates. The pollutant loads and increased volumes of stormwater runoff result in negative impacts to downstream properties and surface water bodies such as lakes, streams, and wetlands and reduced infiltration to groundwater. Due to regulations required under the Clean Water Act and the listing of anadromous (salmon, trout, char) species under the Endangered Species Act, it has become increasingly important for municipalities to implement stormwater quality and quantity (flow) control measures.

The City of Marysville last adopted its Surface Water Comprehensive Plan in 2009. The City population has grown from approximately 25,000 in 2002 to approximately 63,000 today, primarily through annexation. A significant portion of this growth has occurred since the completion of the 2009 Surface Water Comprehensive Plan when the City annexed the majority of its Urban Growth Area (UGA) in December of 2009.

PURPOSE

The City of Marysville Surface Water Comprehensive Plan (Plan) is a planning document that provides guidance to minimize adverse effects of stormwater runoff on ground and surface water in a manner that complies with federal, state, remove, and local surface water regulations. It identifies water quality and quantity problems associated with stormwater runoff that may affect the environment and community, and provides recommendations for improvements and programs including a financial analysis and implementation schedule.

The Plan identifies specific structural and nonstructural solutions to quantity and water quality problems within the City. Structural solutions include construction of capital projects such as stormwater detention and treatment facilities, infiltration facilities, pipelines, and culverts. Nonstructural solutions include stormwater management facility inspection and maintenance, public education and outreach, water quality monitoring, implementation of best management practices (BMPs), and regulations encouraging vegetation preservation and low impact development.

GOALS

As additional development and redevelopment occur within the City, the amount of naturally vegetated areas will decrease while the amount of impervious surfaces will increase, leading ultimately to increased peak runoff rates and transport of more pollutants to the City's streams, wetlands, and rivers.

The primary goal of the Marysville Stormwater Comprehensive Plan is to provide guidance to the City Council, staff, and citizens to preserve and protect the water quality and hydrologic regime within the City's natural and manmade surface and stormwater drainage system, and the major receiving waters, Ebey Slough and the Snohomish River.

To this end, the City intends to manage land development and stormwater programs to preserve natural areas, minimize contact with contaminants, mitigate the impacts of increased runoff, enforce the City's National Pollutant Discharge Elimination System (NPDES) permit conditions and erosion control BMPs on construction sites, and to preserve fish and wildlife habitat. The City's implementation of the Plan will meet the goals to protect the health, safety, and welfare of the local citizenry and to preserve surface water resources within the City.

CHAPTER 2

SERVICE AREA CHARACTERISTICS

LOCATION

The City of Marysville (City) was officially incorporated in Washington State in 1891 with a population of 350. It is located in Snohomish County, approximately 5 miles north of Everett and directly borders the City of Arlington to the north. The City's current boundary and Urban Growth Area (UGA) encompass approximately 21 square miles of land. Interstate 5 and State Routes 531, 528, and 539 pass through the City, while State Route 9 provides the border to the east. The Burlington Northern Santa Fe Railroad also runs north/south through the City. Figure 2-1 provides a vicinity map of the area.

Marysville is the second largest city in Snohomish County. Per the census conducted in 2010, the population was approximately 60,000, representing 8.4 percent of the total population of Snohomish County. In 2015, the population was estimated to be 65,000.

TOPOGRAPHY

Marysville lies between the Puget Sound and the Central Cascade Mountains, with Mount Pilchuck being a prominent fixture on the horizon. The south end of the City sits along Ebey Slough just before it discharges into Possession Sound along with Steamboat Slough and the Snohomish River (see Figure 2-2). The elevation within the City gradually slopes north to south along the I-5 corridor from 160 feet in the north end of the City to 5 feet at Ebey slough in the south end. This area is known as the Marysville Trough, which is an alluvial plain that runs through much of the City. The Tulalip Plateau borders the Marysville Trough to the west, and to the east is the Getchell Hill Plateau, reaching a maximum elevation of 465 feet on the eastern border of the Marysville city limits. In the Smokey Point neighborhood, on the north end of the city, the trough continues well beyond the City limits, maintaining fairly flat terain throughout.

DRAINAGE BASINS

The City of Marysville is located within the Snohomish River Drainage Basin within Water Resource Inventory Area 7 (WRIA 7), the second largest watershed in the state. The basin encompasses 1,978 square miles west of the Cascade crest. As shown in Figure 2-3, four smaller drainage basins have been delineated around the City's drainage infrastructure: Quilceda Creek, Allen Creek, Sunnyside Creek, and Ebey Slough. All four of these basins empty into Ebey Slough, which then joins with the Snohomish River near its drainage point into Possession Sound.

Quilceda Creek Basin encompasses 36.6 square miles, 9.3 square miles of which are located in the City and is the largest basin within the City. It runs north-south on the east side of the City and is predominately located within the Marysville Trough. It generally consists of till and outwash soils. Although outwash soils usually drain well, high groundwater in the winter months creates saturated soil conditions that impedes infiltration, and commonly results in a high rate of surface water runoff.

The second largest basin that lies within the Marysville UGA is the Allen Creek Basin. It has an overall area of 10.4 square miles, 7.7 of which are within the UGA boundary. The Allen Creek Basin makes up a large portion of the southeastern part of the City, having most of its area on the Getchell Plateau. The soils in the Allen Basin are very similar to that of the Quilceda Basin and have similar surface water runoff issues caused by high groundwater.

The other two basins, Ebey Slough Basin and Sunnyside Creek Basin, are significantly smaller than the Quilceda and Allen Creek Basins, only making up 1.9 and 2.9 square miles respectively. The Ebey Slough Basin is contained entirely within the Marysville city limits on the south end and sits mostly within the Marysville Trough. The Sunnyside Basin sits atop the Getchell Plateau and extends south from the edge of the Marysville City limits with approximately half the basin contained within the city limits.

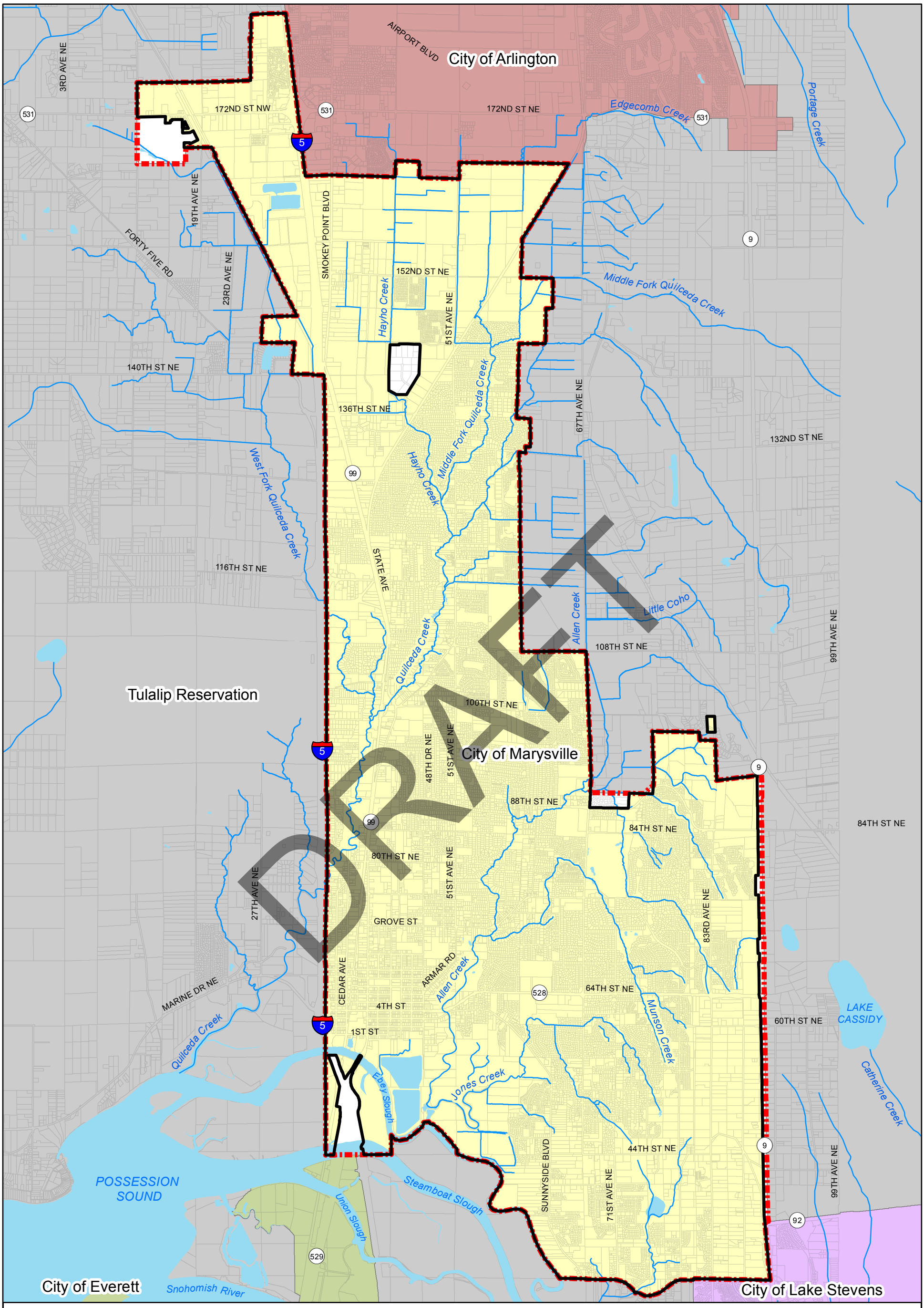
WATERWAYS AND WATER BODIES

The City of Marysville contains many waterways, most of which are within the Quilceda Creek and Allen Creek Basins. These waterways have been manipulated and channelized over the years and are highly susceptible to environmental problems such as pollution, erosion, and flooding. Non-point source pollution from agriculture and urban development have increased the presence of pesticides, animal waste, chemical fertilizers, sediments, heavy metals, detergents, and petroleum. Allen Creek and Quilceda Creek have been placed on Washington State's 303(d) list for fecal coliform, which requires them to have Total Maximum Daily Load (TMDL) cleanup plans. Low dissolved oxygen levels are also a concern in the summer months and can compromise crucial fish and wildlife habitat.

The Quilceda and Allen Creek systems are within the Tulalip Tribes' usual and accustomed fishing areas. Land use within this these systems is therefore governed by a variety of tribal, state, county, and city governments.

SOILS

The soils of Snohomish County were surveyed by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The NRCS website indicates 22 soil types within the UGA of Marysville, as shown in Figure 2-4 and Table 2-1.



Cities

- Arlington
- Everett
- Lake Stevens
- Marysville

- Marysville City Limits
- Urban Growth Boundary
- Streams
- Water Bodies

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VICINITY MAP
FIGURE 2-1

CITY OF Marysville WASHINGTON

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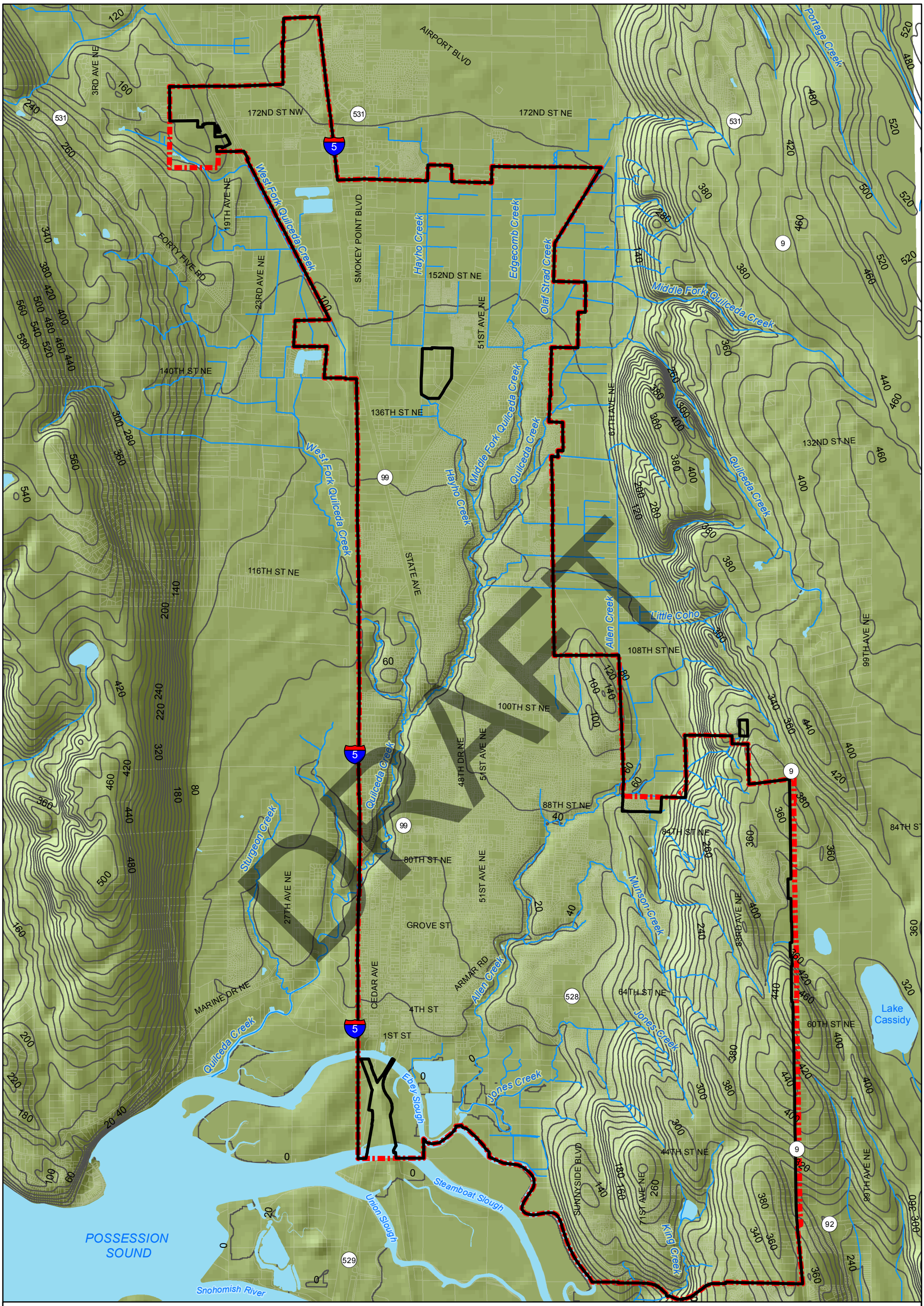

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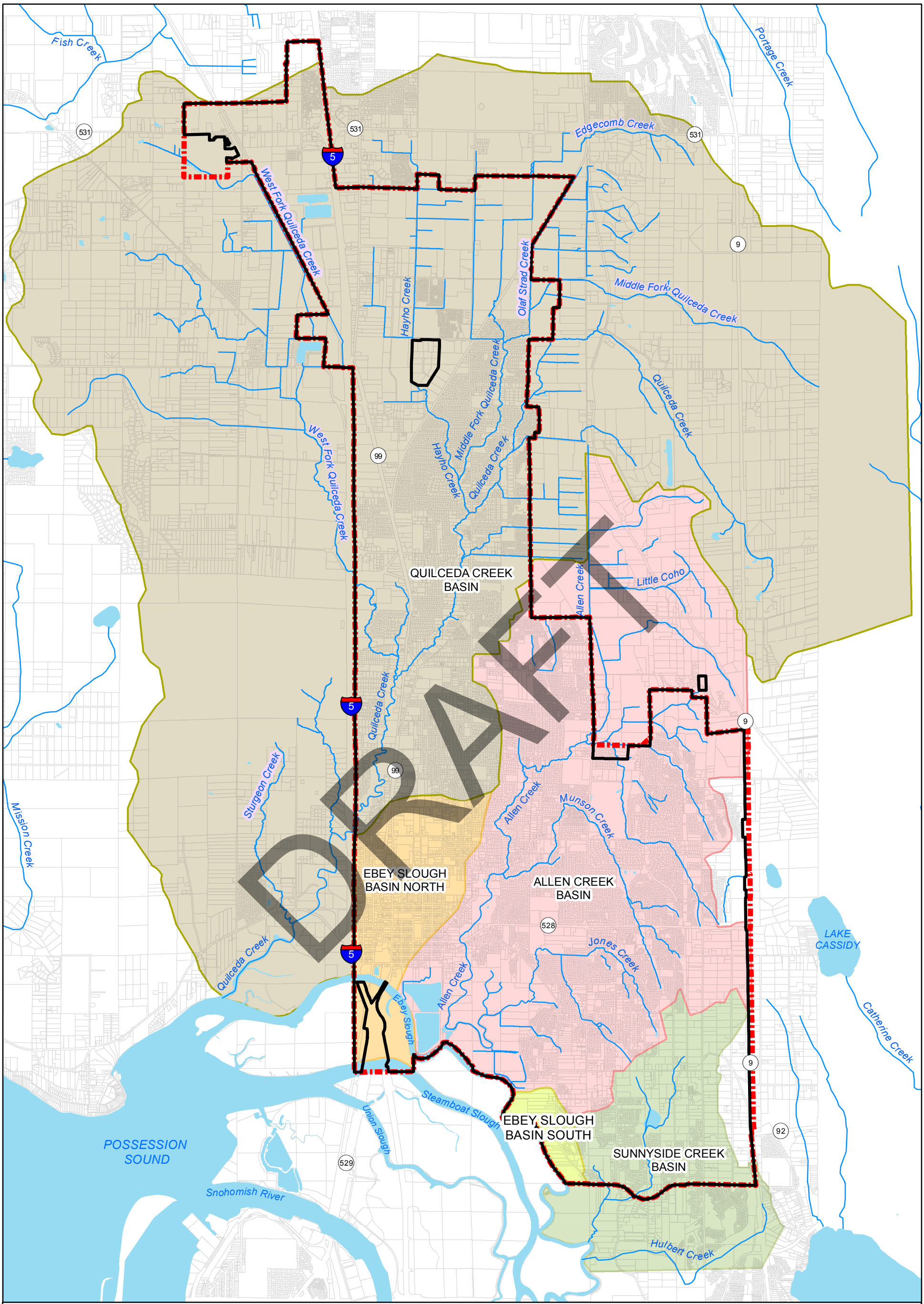

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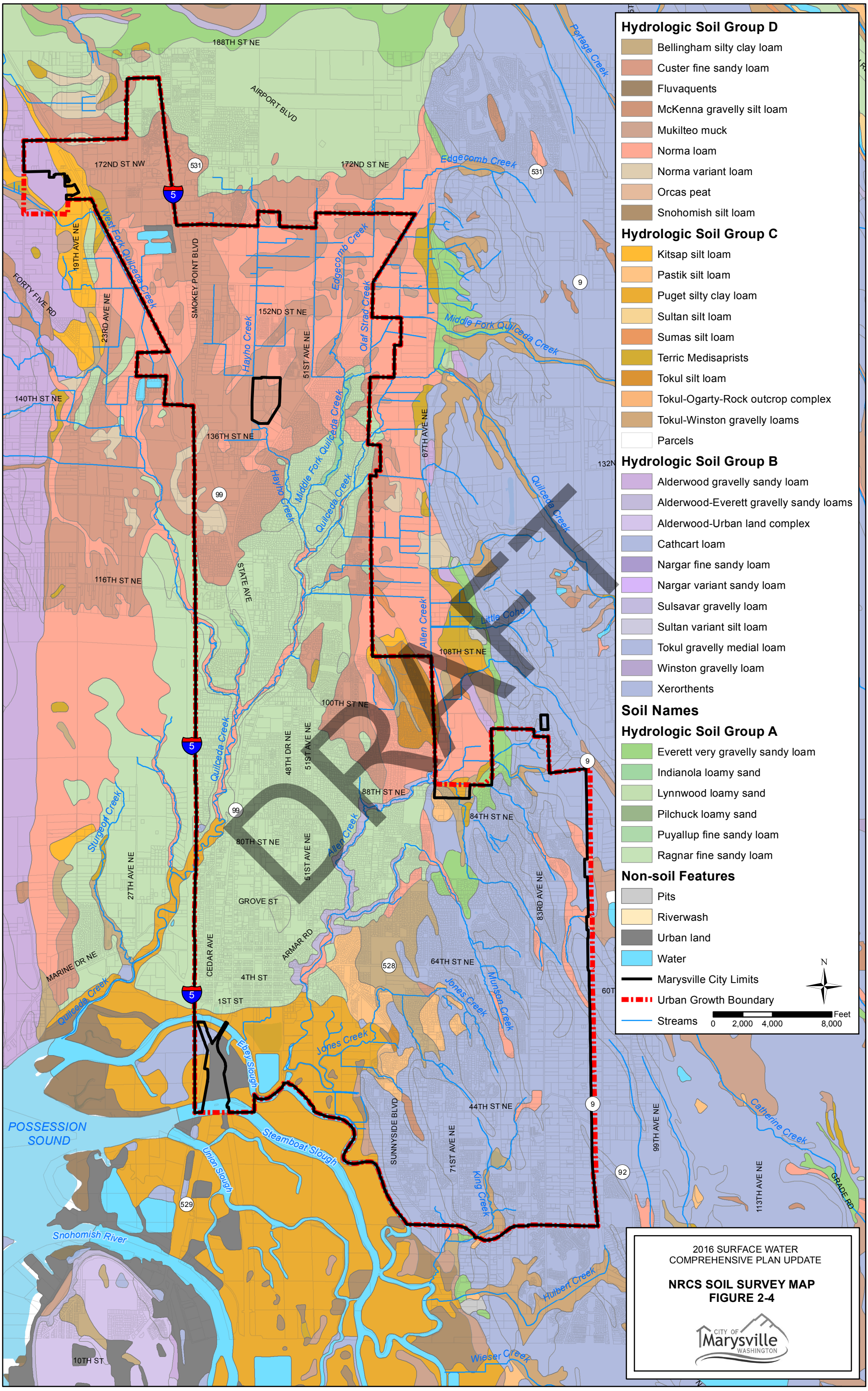

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TABLE 2-1

Soil Characteristics

Soil	Hydrologic Soil Group	Drainage Class Rating
Alderwood gravelly sandy loam	B	Moderately well drained
Alderwood-Everett gravelly sandy loams	B	Moderately well drained
Bellingham silty clay loam	C/D	Poorly drained
Custer fine sandy loam	C/D	Poorly drained
Everett very gravelly sandy loam	A	Somewhat excessively drained
Indianola loamy sand	A	Somewhat excessively drained
Kitsap silt loam	C	Moderately well drained
Lynnwood loamy sand	A	Somewhat excessively drained
McKenna gravelly silt loam	D	Poorly drained
Mukilteo muck	B/D	Very poorly drained
Norma loam	B/D	Poorly drained
Norma variant loam	C/D	Poorly drained
Pastik silt loam	C	Moderately well drained
Puget silty clay loam	C	Poorly drained
Ragnar fine sandy loam	A	Well drained
Snohomish silt loam	D	Poorly drained
Sumas silt loam	C	Poorly drained
Terric Medisaprists	C	Very poorly drained
Tokul silt loam	C	Moderately well drained
Tokul gravelly medial loam	B	Moderately well drained
Tokul-Winston gravelly loams	C	Moderately well drained
Xerorthents	B	Well drained

The Soil Classification System (SCS) classifies soils, from A to D, according to runoff potential. Type A has low runoff potential and high infiltration rates even when thoroughly wetted, and mostly consists of well to excessively drained sands or gravels. Type B consists of moderately well to well drained soils with moderately fine to moderately coarse texture and moderate infiltration rates when thoroughly wetted. Type C has low infiltration rates when thoroughly wetted with moderately fine to fine textured soils, and often have a layer that impedes downward movement of water. Type D has the highest runoff potential and very low infiltration rates when thoroughly wetted. It consists of clay soils with high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. The SCS also provides information pertaining to the physical and chemical properties of the soils, including drainage class, which refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed.

The northern region of the city predominantly contains low infiltration Type C and D soils, while the central area consists mostly of Type A soils, and the southeastern area

consists mostly of Type B soils. Type A and B soils have high to moderate infiltration and lower potential of runoff.

POPULATION TRENDS

Residential population for the City was estimated by the United States Census to be 60,202 in 2010. Per the City's 2015 Comprehensive Plan, it is estimated that approximately 65,000 people live within the City. The City Plan also creates a 20-year population growth target which estimates approximately 87,000 people in 2035. This estimate is based upon available land areas and existing zoning classifications within the City and UGA. Census data, proposed new residential units and sensitive areas factored into the development of the growth rate.

Table 2-2 summarizes the historic population estimates based on the U.S. Census as well as the forecasted population estimates from the City's current Comprehensive Plan.

TABLE 2-2

Population

Year	Population
1980	5,080
1990	10,328
2000	25,315
2010	60,202
2015	65,087(1)
2035	87,800(1)

(1) Estimated.

ZONING AND LAND USE

The population in Marysville grew by approximately 137 percent between the year 2000 and 2010. Land use and zoning play an important role in determining growth patterns, and therefore the potential locations of future storm water facilities. Future land use and changing population densities, as directed by applicable zoning ordinances, can significantly impact a system's ability to provide adequate services to specific areas.

Marysville has a combination of residential, commercial, industrial and open space land uses as shown in Figure 2-5. This figure provides a map of future land use for the City as shown in the City's 2015 Comprehensive Plan. Residential zones make up two thirds of the Marysville UGA, and are positioned in the central and southeastern regions, with a small region in the Lakewood area as well. The open space areas are spread throughout the City, with the largest located in the south end of the City where Jones Creek and Allen Creek discharge into Ebey Slough.

The vast majority of the commercial and industrial property is on the west side of the City along I-5. New commercial and industrial development is occurring in the Lakewood and Smokey Point neighborhoods in the north, and in the Downtown area, located in the south end of the City. The development in the Smokey Point region has potential to have significant stormwater implications, as much of that land is currently being used for agriculture, but is zoned light industrial and could soon experience a significant increase in impervious surface. This change in impervious surface will require extensive storm water management to mitigate flooding and pollution of surface waters in the upper reaches of the Quilceda Creek Basin.

The land use classifications within the City are shown in Table 2-3.

TABLE 2-3

Land Use

Land Use Category	Acreage
R12 Multi-Family Low	362
R18 Multi-Family Medium	478
R28 Multi-Family High	71
R6-18 Multi-Family Low	156
R4.5 Single-Family Medium	3,948
R6.5 Single-Family High	3,441
R4-8 Single-Family High	142
R8 Single-Family High Small Lot	209
Business Park	92
Community Business	435
Downtown Commercial	162
General Commercial	650
General Industrial	324
Light Industrial	1,369
Neighborhood Business	15
Mixed Use	456
Public-Institutional	77
Recreation	340
Open	526

Overall, the city is 66.5 percent residential, 26.4 percent commercial and industrial, and 7.1 percent public land, recreation, and open space.

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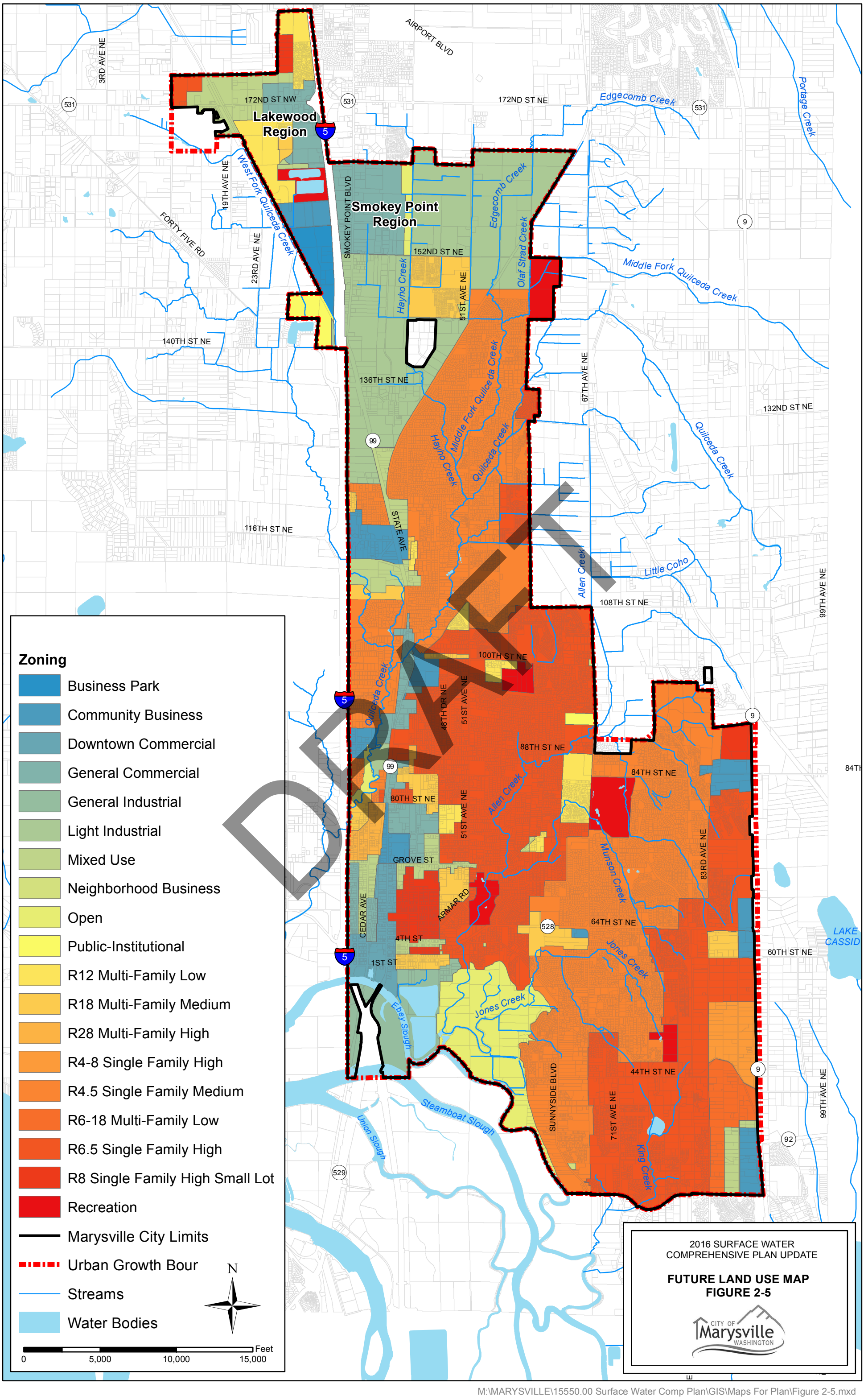

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CLIMATE

Marysville receives an average of 37.5 inches of rain per year, two thirds of which falls in autumn and winter (October through March). Table 2-4 provides historical monthly averages for temperature and precipitation as reported by NOAA from the Arlington Municipal Airport Weather Station.

TABLE 2-4

Average Monthly Climate Data

Month	High Temp.	Low Temp.	Precipitation (in.)
Jan	46°F	34°F	4.37
Feb	49°F	35°F	3.41
Mar	53°F	37°F	3.86
Apr	58°F	41°F	2.96
May	64°F	46°F	2.57
Jun	68°F	51°F	2.26
Jul	73°F	54°F	1.32
Aug	74°F	54°F	1.35
Sep	69°F	49°F	2.09
Oct	60°F	42°F	3.25
Nov	51°F	37°F	5.11
Dec	45°F	34°F	4.99
Total			**37.54**

CRITICAL AREAS

The City of Marysville Municipal Code (MMC 22E.010), identifies three categories of critical areas within its UGA: Wetlands, Fish and Wildlife Habitat areas, and Geologic Hazard Areas. These areas require special considerations and protections in order to preserve their functions that benefit the City and its residents, or to protect public health and safety from potential hazards. The aquifers that lie within the boundaries of the Marysville UGA do not fit the criteria of a critical area as defined by the Growth Management Act (RCW 36.70A.060) due to the fact that they are not used for potable water; however, they are discussed below because they play a significant role in stormwater drainage issues and are important in maintaining stream base flow, which impacts fish and wildlife habitat.

WETLANDS

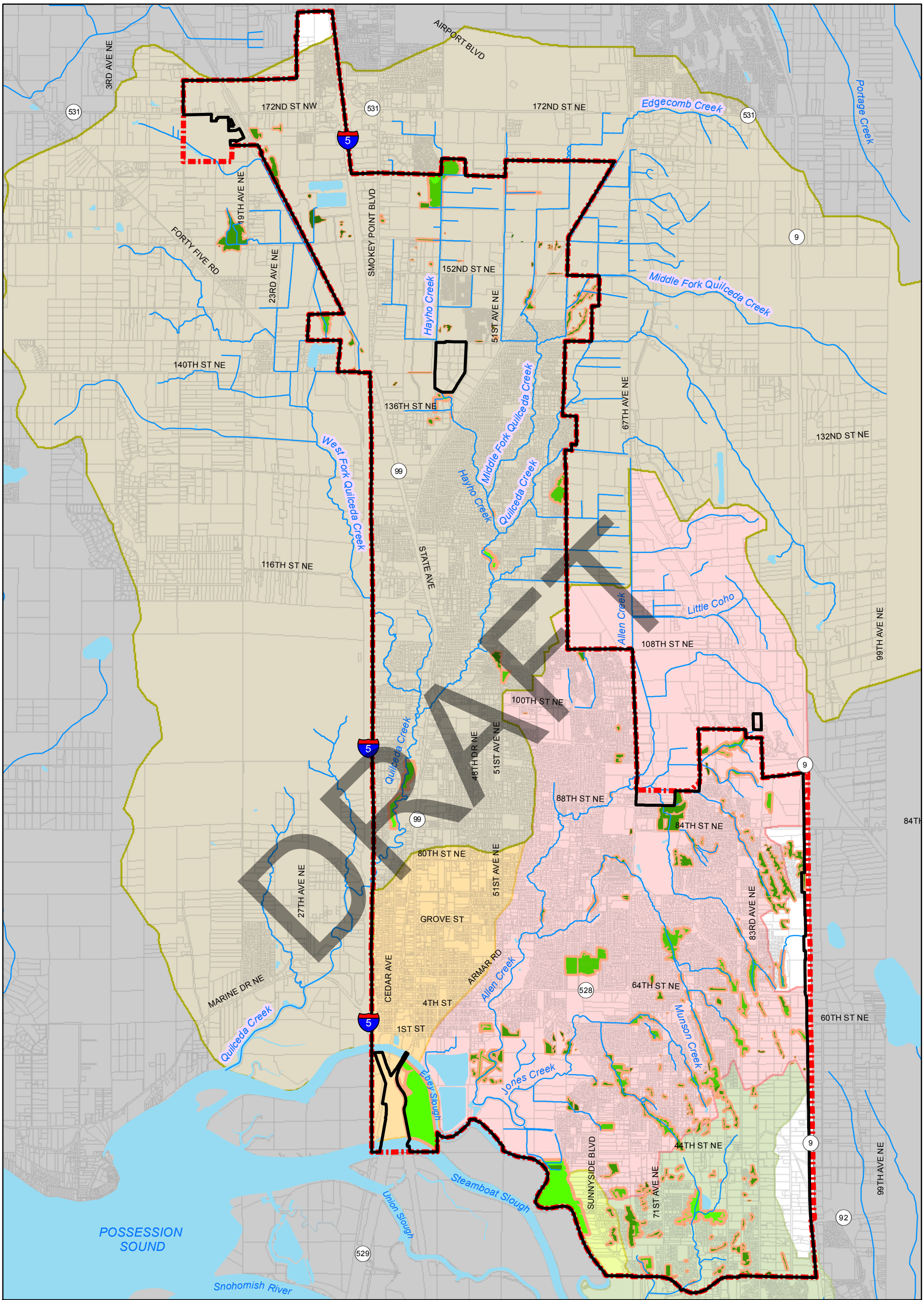
As defined by MMC 22A.020.240 wetlands are areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that

under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. This includes swamps, marshes, bogs, and similar areas, but excludes artificial wetland sites such as irrigation and drainage ditches, grass-lined swales, canals, detention facilities, farm ponds, landscape amenities, or any wetland unintentionally created by road construction after July 1, 1990. Artificial wetlands created intentionally for mitigation purposes are included in this definition and are protected under the critical areas ordinance.

Wetlands perform valuable functions within the ecosystem. Clearing of vegetation, grading, filling, draining, and other activities associated with land development may decrease the ability of the riparian zone to provide drainage, stabilize stream banks, provide wildlife habitat, and filter pollutants from runoff. Wetlands receiving surface water from surrounding areas can filter entering pollutants by a combination of physical, chemical, and biological processes.

Wetlands also play a major role in flood control. During flooding, rivers and streams overflow their banks and spread out across the flood plain. Wetlands attenuate the peak flows from storm events by storing water during wet periods and discharging this stored water later during drier periods. Wetlands also provide habitat and a source of food for fish and wildlife. Seventy-five percent of Western Washington's wildlife species use wetlands or riparian zones during some portion of their life cycle, and many species solely inhabit wetland areas.

Washington State Department of Ecology (Ecology) rates wetlands into four different categories (Categories I, II, III, and IV). These categories are based on the wetland's sensitivity to disturbance, rarity, functions they provide, and whether or not they are replaceable; Category I being the most crucial to protect. Within the UGA, Marysville has a total of 434 acres of known wetland area; 142 acres of Category I, 134 acres of Category II, 141 acres of Category III, and 18 acres of Category IV. Figure 2-6 depicts the delineation of all four wetland categories as provided by the City's GIS data, as reported from limited scope studies and from development. MMC 22E.010.100 establishes minimum targets for buffer widths around wetland boundaries based on the sensitivity and category of the wetland and the intensity of human activity proposed to be conducted. Table 2-5 provides these minimum regulatory buffer area requirements. Exemptions and exceptions to wetland protections and buffer widths can be found in MMC 22E.010



Wetlands

- Category 1
- Category 2
- Category 3
- Category 4
- Water Bodies
- Wetland Buffers

Basin Name

- Allen Creek Basin
- Ebey Slough Basin North
- Ebey Slough Basin South
- Quilceda Creek Basin
- Sunnyside Creek Basin

- Marysville City Limits
- Urban Growth Boundary
- Streams

Note: Wetlands shown are reflective of what information the City has obtained to date. This map is not comprehensive and is not intended to be used for site specific purposes.

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0 5,000 10,000 15,000 Feet

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WETLANDS MAP
FIGURE 2-6

CITY OF Marysville WASHINGTON

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TABLE 2-5

Wetland Buffer Widths

Wetland Category	Buffer Width
Category I	125 feet
Ebey Slough	100 feet
Ebey Slough Exception: North and south shore between the western city limits, at approximately I-5, and 47th Avenue NE	25 feet
Category II	100 feet
Category III	75 feet
Category IV	35 feet

AQUIFER RECHARGE AREAS

Marysville relies on an aquifer for potable drinking water only in the Lake Goodwin area. Surrounding aquifers within the City's UGA mainly provide discharge into streams, supporting year round flow and crucial fish and wildlife habitat. The Marysville Trough Aquifer and the Getchell-Snohomish Aquifer are both partially located within the Marysville UGA and benefit from stream and wetland protections under the Critical Area Ordinance.

The Marysville Trough Aquifer and the Getchell-Snohomish Aquifer also have an influence on Geologic Hazard Areas and storm water runoff. In the winter months, the ground water levels in these aquifers often reach ground level causing overland flow that can carry pollutants directly into surface waters, and cause flooding in some areas. Additionally, the saturated soils create favorable conditions for landslides to occur in areas with steep slopes and can increase erosion, reducing the suitable habitat for salmon.

FISH AND WILDLIFE HABITAT AREAS

Most of the City's wildlife habitat exists in areas that have retained second growth forest or heavy vegetation. This includes the healthy salmonid spawning and rearing habitat at the headwaters of many of the tributaries to Quilceda Creek and Allen Creek. Healthy Coho and Chum salmon spawning habitat and rearing habitat can be found in many parts of the Quilceda Creek system along with resident cutthroat trout habitat in the headwaters of Edgecomb Creek. Fish habitat in agricultural areas has declined as buffers are not common in agricultural fields. Much of the spawning habitat has diminished in the Allen Creek system due to erosion causing stream beds to fill in with mud and silt, canary reed grass growing in streambeds/channelized sections of the system, and eliminated wetlands. Chinook salmon, steelhead, and rainbow trout also utilize the streams in the Quilceda and Allen Creek watersheds but to a lesser degree than the previously mentioned species.

In order to provide protection for crucial anadromous fish and other aquatic habitat, the City of Marysville has classified its stream system into four categories, per WAC 222-16-30.

The following categories are defined by MMC 22E.010.220 and are shown in Figure 2-7.

Type S Stream: Those streams, within their ordinary high water mark, as inventoried as "shorelines of the state" under Chapter 90.58 RCW and the rules promulgated pursuant thereto.

Type F Stream: Those stream segments within the ordinary high water mark that are not Type S streams, and which are demonstrated or provisionally presumed to be used by salmonid fish. Stream segments which have a width of two feet or greater at the ordinary high water mark and have a gradient of 16 percent or less for basins less than or equal to 50 acres in size, or have a gradient of 20 percent or less for basins greater than 50 acres in size, are provisionally presumed to be used by salmonid fish.

Type Np Stream: Those stream segments within the ordinary high water mark that are perennial and are not Type S or Type F streams. However, for the purpose of classification, Type Np streams include intermittent dry portions of the channel below the uppermost point of perennial flow.

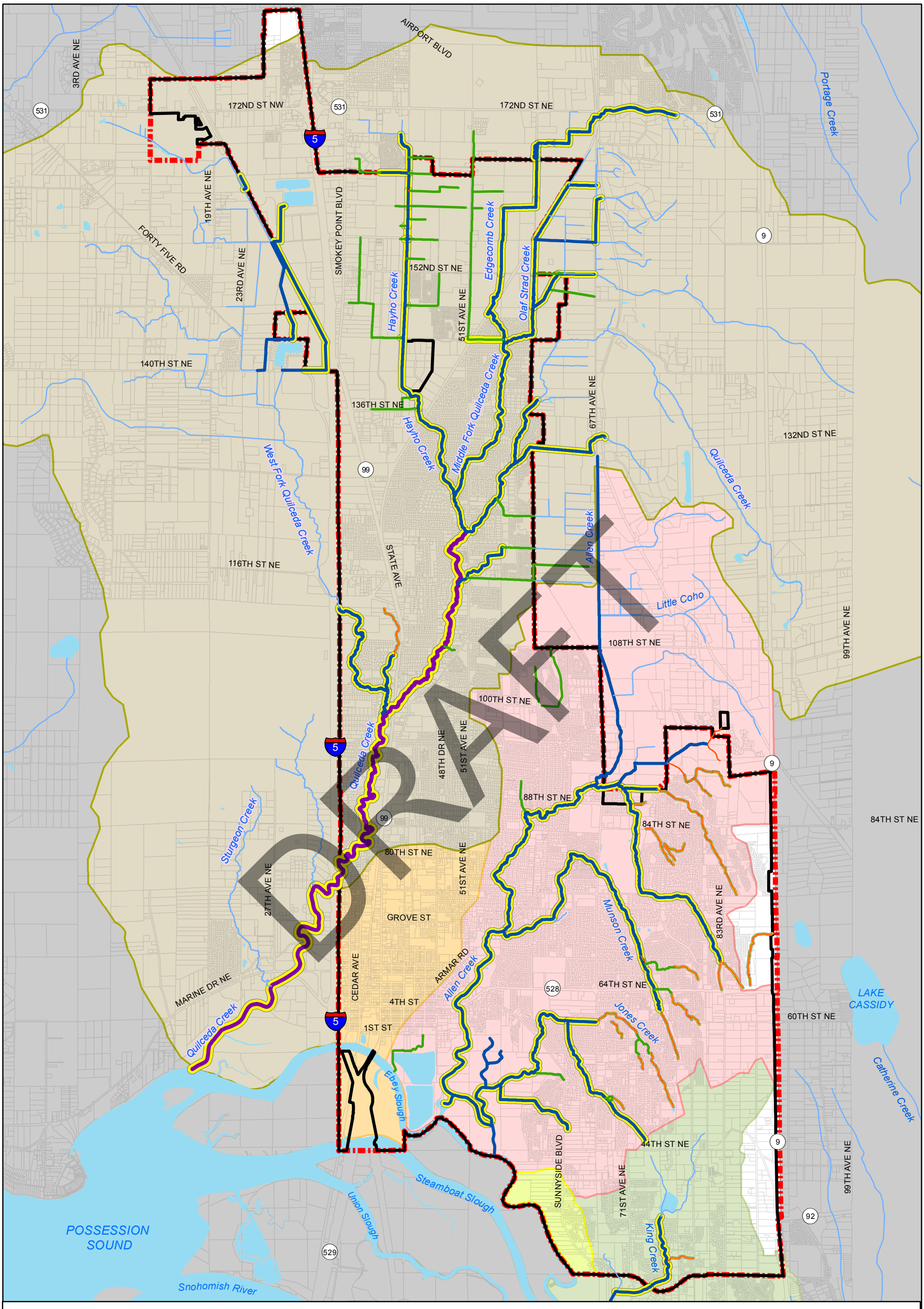
Type Ns Stream: Those stream segments within the ordinary high water mark that are not Type S, Type F, or Type Np streams. These include seasonal streams in which surface flow is not present for at least some portion of a year of normal rainfall that are not located downstream from any Type Np stream segment.

Table 2-6 provides those categories along with their associated protected buffer widths.

TABLE 2-6

Stream Classifications and Buffer Width

Stream Category and Name	Description	Buffer Width
Type S	Shoreline	200 feet
	Quilceda Creek	100 feet
	Ebey Slough Except north and south shore between the western City limits and 47th Avenue NE	25 feet
Type F	Fish bearing	150 feet
	Gissberg Twin Lakes	Lake setbacks correspond to county park boundaries
Type Np	Perennial	100 feet
Type Ns	Seasonal	50 feet



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GEOLOGICALLY HAZARDOUS AREAS

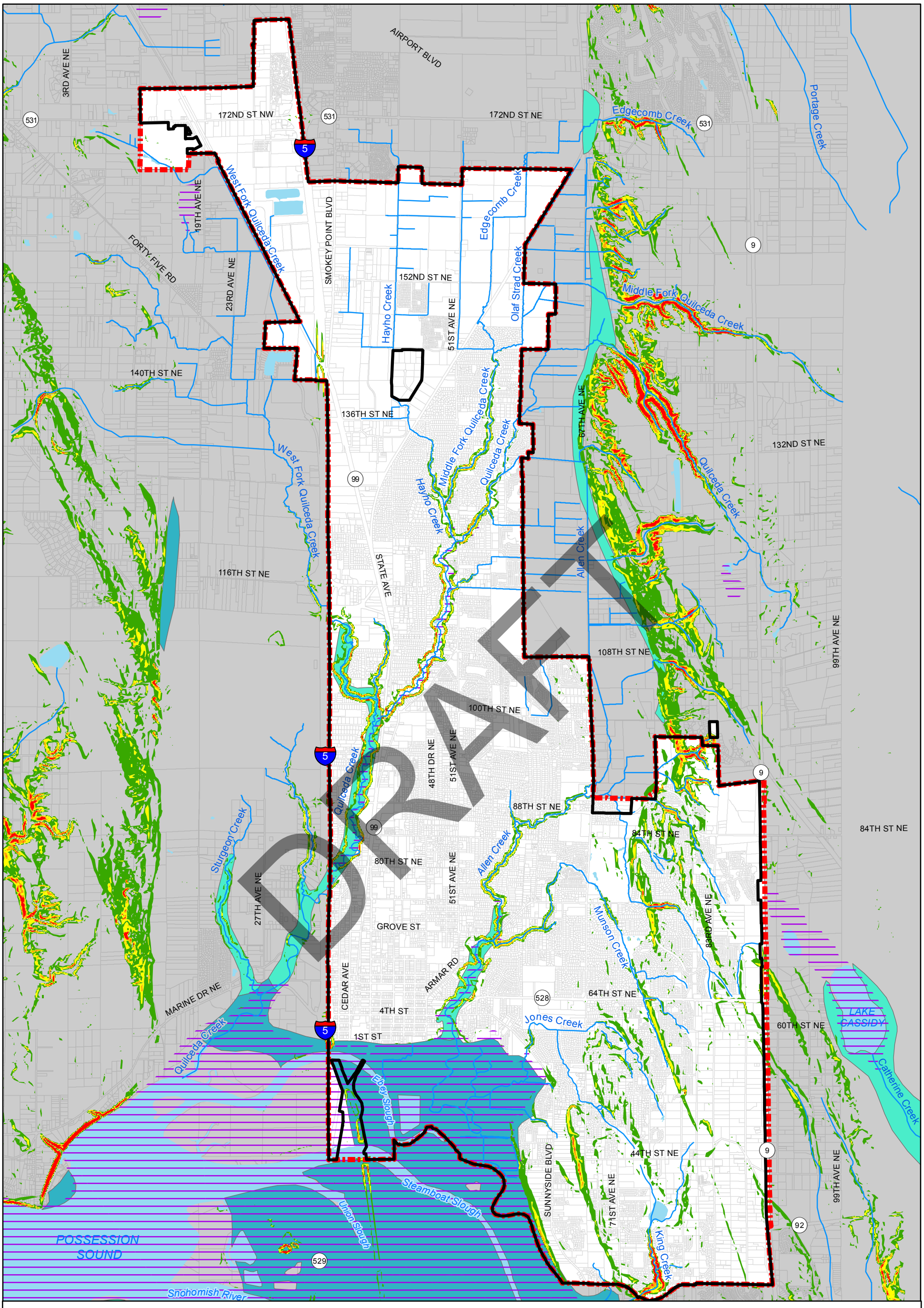
Geologically hazardous areas are defined in the City's Municipal Code as lands or areas characterized by geologic, hydrologic, and topographic conditions that render them susceptible to potentially significant or severe risk of landslides, erosion, or seismic activity. Figure 2-8 is provided to give a general guide to where potential hazard areas are located within the City. Field investigation and analysis is required to confirm the presence or absence of these areas before development can occur. Generally, these areas warrant additional engineering investigation to assess the level of hazard and would typically require setbacks from these areas, special construction techniques, or outright prohibition with respect to land disturbance and development.

The most prominent Geological hazard area within the Marysville UGA is in the 100-year flood zone of Ebey Slough. This area is characterized to have moderate to high susceptibility to soil liquefaction during a seismic event. High susceptibility for soil liquefaction is also found along portions of Quilceda Creek and Allen Creek. Soil liquefaction may occur in areas that have saturated silt and/or sand soils when shaking due to seismic activity causes the soil to act as a liquid, losing its ability to support structures.

Landslide hazard areas have been identified in many areas of the Getchell Plateau including the banks along Munson Creek, and along the banks of Quilceda Creek and Allen Creek. A combination of steep slopes ranging from 25 percent to 75 percent, soft soils, and groundwater seepage create favorable conditions for landsides to occur. These areas, along with other tributaries to Quilceda and Allen Creeks, are also prone to erosion. The previously mentioned geologic conditions combined with human activities such as land use change/development have led to unstable slopes and increased stream flow, causing significant erosion in some areas.

STORMWATER UTILITY SERVICES

The City of Marysville has had a surface water management (SWM) program since 1991. Until 2007, the surface water utility fee was collected by Snohomish County in connection to property taxes and then remitted to the City of Marysville. In January 2007, the City's Public Works Department took over administration of the SWM utility and continues to manage the program. Fees collected by the SWM utility are for the purpose of operating public stormwater facilities to help reduce flooding and drainage problems, improve water quality, and meet regulatory requirements. Operation of this utility includes the ability to finance, construct, develop, improve, and maintain the City's stormwater facilities. The facilities consist of approximately 6,225 lineal feet of detention pipe, 185 miles of storm lines, 11,914 catch basins, 346 infiltration/detention ponds, and multiple outfalls into area receiving waters.



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CHAPTER 3

STORMWATER MANAGEMENT SYSTEM ANALYSIS

INTRODUCTION

This chapter presents an analysis of the City of Marysville's existing stormwater management system, and its ability to accommodate flow for future development conditions. The analysis includes review of previous reports completed by Snohomish County and the City of Marysville, hydraulic and hydrologic modeling of areas identified by City staff, and feasibility studies for water quality improvements to address discharge into compromised waterways.

EXISTING STORMWATER MANAGEMENT SYSTEM

The City's existing stormwater management system consists of a combination of open ditches, pipes, catch basins, culverts, detention ponds, detention vaults, infiltration ponds, infiltration vaults, bioswales, filter strips, raingardens, and water quality treatment ponds. A base map showing drainage facilities within the City is shown in Figure 3-1. A large fold-out map is also included in Appendix A.

REFERENCED REPORTS

The following reports were reviewed during the analysis of the City's stormwater management system:

- *Quilceda Creek Drainage Needs Report, DNR No. 1, December 2002, Snohomish County Public Works Department Surface Water Management Division*
- *Allen Creek Drainage Needs Report, DNR No. 8, December 2002, Snohomish County Public Works Department Surface Water Management Division*
- *City of Marysville Surface Water Comprehensive Plan Update, February 2009, Otak, Inc.*
- *North Marysville Edgecomb Creek Relocation Feasibility Study, July 2009, Otak, Inc.*

WATER QUALITY

While water quality is an important part of stormwater management, this Plan focuses mostly on conveyance infrastructure. Marysville holds a Phase II National Pollutant Discharge Elimination System (NPDES) Stormwater Permit, which requires annual reporting of stormwater monitoring and assessment. Further information about

Marysville's water quality program may be found in the City of Marysville's Stormwater Management Program Plan (SWMP) available on the City's website.

CITY IDENTIFIED STORMWATER CONVEYANCE PROBLEMS

City employee comments and public complaints were reviewed in order to identify any issues that have occurred since the 2009 Surface Water Comprehensive Plan (2009 Comp Plan). A field investigation of specific problem areas was conducted to identify new projects. The City also provided an account of projects identified in previous plans that still need to be addressed. Many of these projects required reevaluation to ensure compliance with the Washington Department of Fish and Wildlife 2013 Water Crossing Guidelines (WDFW 2013 Guidelines) Modeling.

Hydrologic and hydraulic models of the City's stormwater system and drainage basins were developed by Snohomish County while conducting the 2002 Drainage Needs Report No. 1 for the Quilceda Creek Basin (2002 DNR No. 1) and the 2002 Drainage Needs Report No. 8 for the Allen Creek Basin (2002 DNR No. 8). Updated versions of the models were used in the 2009 Comp Plan, and additional modeling was performed for the current Plan.

HYDROLOGIC MODEL

Hydrologic analysis addresses the movement of rainfall to the conveyance system. The purpose of a hydrologic model is to predict the flow of stormwater runoff into the system. Hydrologic models were developed by Snohomish County for the 2002 DNRs using the Hydrologic Simulation Program- FORTRAN (HSPF), version 12.0, developed by the United States Environmental Protection Agency. The HSPF model simulates rainfall-runoff from pervious and impervious land surfaces, soil moisture dynamics, and hydrologic routing on a continuous basis, and uses historical rainfall records to generate a long-term series of stormwater discharges. The long-term flow record is necessary for the evaluation of detention facilities and other volume dependent features within the conveyance system, and is important in the Puget Sound region for accurately evaluating flooding, where flooding is often caused by a series of back-to-back storm events rather that an isolated rainfall event.

HYDRAULIC MODEL

Hydraulic analysis addresses the movement of runoff through the conveyance system. The purpose of a hydraulic model is to evaluate the capacity of features within the conveyance system, such as pipes, culverts, and open channels. Hydraulic modeling for the stream systems and tributary open channels within the Marysville UGA was developed by Snohomish County for the 2002 DNRs using the Hydrologic Engineering Center River Analysis System (HEC-RAS) model. HEC-RAS is a backwater model designed to simulate the hydraulics of open channel systems, and can simulate flow through culverts and other features commonly found throughout a developed area.

For a portion of the Sunnyside neighborhood within the Allen Creek Basin, a model was developed by Snohomish County using the Extran portion of the U.S. Environmental Protection Agency's Stormwater Management Model (SWMM). For this model, storms were identified that had peak flows at or near the 2-year, 10-year, and 25-year return frequency peaks, and of these, three 3-day events were selected to account for antecedent rainfall. In the 2009 Comp Plan, a later and proprietary version of this same modeling software (XPSWMM, owned by XP Solutions) was used to simulate conveyance systems and detention ponds within the North Marysville region.

XP Solutions later developed a newer version of XPSWMM called XPStorm, which was used for this current Plan to model the designs for culverts subject to the WDFW 2013 Guidelines, and to evaluate flooding issues.

DRAINAGE BASINS

The City's stormwater infrastructure is divided into four drainage basins: Quilceda Creek, Allen Creek, Sunnyside Creek, and Ebey Slough. Table 3-1 shows the total area of each basin, as well as the area within the Marysville UGA. These basins are described in detail in Chapter 2.

TABLE 3-1

Drainage Basin Summary

Basin	Total Area (mi ^{2})	Area within UGA (mi ^{2})
Quilceda Creek	36.6	9.3
Allen Creek	10.4	7.7
Sunnyside Creek	2.9	1.6
Ebey Slough	1.9	1.9

IDENTIFIED DEFICIENCIES

After review of deficiencies identified by the past Snohomish County Plans, staff comments and public complaints, the following areas have been identified as current deficiencies. These areas are named and organized by drainage basin, and described below. The two letters in the identification number of the problem area represent the initials of the drainage basin (e.g., QC1 = Quilceda Creek Area No. 1). The former name of the projects from the 2009 Comp Plan is given in parentheses. The new identification numbers also correspond to the number assigned to the recommended Capital Improvement Plan (CIP) project for each individual project. Further discussion regarding solutions or recommended CIPs for these problem areas is described in Chapter 4 (Capital Improvement Plan).

QUILCEDA CREEK BASIN

Several key problem areas were identified within the Quilceda Creek Basin. These areas include flooding issues, fish passage barriers, ecological deficiencies, aging infrastructure, and stormwater management. Figures 3-2 and 3-3 locate the Quilceda Creek areas described herein.

QC1 Stormwater Pipe Damage at Edward Springs Reservoir

City staff identified a 36-inch CMP drainage pipe that runs along the northeast side of the Edward Springs Reservoir (SD-LINE-15039) as having significant rust damage due to age. The recommended solution for this issue is to replace 395 LF of CMP pipe with new corrugated polyethylene pipe (CPEP) pipe.

QC2 *(Formerly MQ-HH-19)* Irrigation Ditch Accessible to Fish Upstream of 160th Street NE

Upstream of 160th Street NE, Hayho Creek and its tributaries are subject to water withdrawals for irrigation. Waterways used for irrigation require a fish screen downstream of the withdrawal to prevent fish from being drawn into the diversion channels. Installing a fish screen at this location will protect fish by blocking off approximately 1 mile of diversion channels to fish access. This recommendation was proposed in the 2009 Comp Plan, and originated from city staff recommendations.

QC3 *(Formerly MQ-EC-03, MQ-EC-05)* Undersized Field Access Culvert along Edgecomb Creek

Two privately owned undersized 30-inch field access culverts along Edgecomb Creek were identified by the 2002 DNR No.1 (IDs of SD-CV-167 and SD-CV-168). These were also identified as Level A barriers to fish passage. The HEC-RAS model developed for the previous report determined that the field access roads would be overtopped at the 2-year frequency for existing and future land use conditions. A reevaluation of these culverts was conducted for current fish passage standards. The results showed that these culverts are a velocity barrier for fish passage. The recommended solution for this issue is to replace both 30-inch culverts with two 16-foot span reinforced concrete box culverts. Culverts should be countersunk 30 percent and should be filled with gravel and sediment to comply with WDFW 2013 Guidelines.

QC4A *(Formerly MQ-HH-16)* Hayho Creek Channel Mitigation (North Marysville Master Drainage Plan)

The North Marysville Edgecomb Creek Relocation Feasibility Study was conducted in 2009 to investigate mitigating impacts of high-density development in the Smokey Point Region. The Hayho Creek drainage basin is one of two basins present in the study area, and was evaluated for improvements to allow for development while improving aquatic

resource function. Proposed improvements for this area include realigning the headwaters of Hayho Creek through existing wetlands.

QC4B *(Formerly MQ-HH-32)* Conveyance for Regional Detention Ponds 1 and 2

The North Marysville Master Drainage Plan describes the need for installing what is currently known as Regional Pond 2 which was constructed in 2015. This pond, in conjunction with Pond 1 (built in 2004) allows for mitigation of impacts from high-density development in the Smokey Point Region. In general, Ponds 1 and 2 were designed to provide flow control and enhanced water quality treatment for 204.8 acres. Assumed land use north of the ponds includes commercial or light industrial development with 85 percent maximum impervious area. Of these 204 acres, 44.52 acres are anticipated to come from the west side of Smokey Pt. Blvd., north of 152nd Street NE. The remaining 160.31 acres would come from the east side of Smokey Pt. Blvd., north of 152nd Street NE and west of Hayho Creek. As part of the regional pond construction, 1,200 LF of 42-inch conveyance pipe and 191 LF of a 58-inch by 36-inch arched pipe was installed between the ponds and 152nd Street NE. However, additional conveyance will be necessary as development occurs within the collection basin for the regional ponds. Proposed conveyance for this area includes construction of 4,440 LF of 42-inch mainline conveyance pipe which will be used to serve future commercial or industrial areas.

QC4C *(Formerly MQ-HH-32)* Hayho Creek Regional Detention Pond 3

Regional Ponds 1 and 2 are intended to collect runoff west of Hayho Creek. Due to topography and the existence of Hayho Creek, it is infeasible to convey runoff east of Hayho Creek into the regional ponds. Therefore, a third regional pond is recommended to collect runoff from a small area east of Hayho creek, north of 152nd Street NE. With an estimated size of 3.5 acres, Regional Pond 3 is anticipated to be smaller than Ponds 1 and 2.

QC5A *(Formerly MQ-EC-13)* Edgecomb Creek Channel Mitigation (North Marysville Master Drainage Plan)

The North Marysville Edgecomb Creek Relocation Feasibility Study was conducted in 2009 to investigate impacts of high-density development in the Smokey Point Region. The development of this area would require the filling of remaining wetlands in the North Marysville Planning area, and the relocation of Edgecomb Creek. The study found that realigning Edgecomb Creek to the west side of the Burlington Northern Santa Fe Railroad would allow for improved function of the waterway and floodplain, while minimizing impacts to other waterways in the region. It would provide 64 acres of forested buffer along the realigned creek, create 29 acres of total wetland within the floodplain corridor, and provide adequate capacity within the constructed floodplain for the 100-year flood. This alignment requires minimal water crossings.

QC5B *(Formerly MQ-EC-13)* Edgecomb Creek Conveyance (North Marysville Master Drainage Plan)

In conjunction with realigning Edgecomb Creek, as development occurs, stormwater conveyance will be necessary to carry runoff away from developed sites located north of 152nd Street NE and east of 51st Avenue NE. To mitigate the need for onsite detention and treatment, a regional pond could be installed south of where the development is anticipated to occur (see QC5C below). The City could work with developers in providing a mainline conveyance trunk to this regional pond.

QC5C *(Formerly MQ-EC-13)* Edgecomb Creek Channel Mitigation (North Marysville Master Drainage Plan)

To mitigate the need for individual onsite detention and water quality treatment facilities, a 20-acre regional detention/treatment facility could be located at the south end of the Edgecomb study area, east of 51st Avenue NE and adjacent to the BNSF railway. It would serve commercial/industrial property located north of the pond and adjacent to or just east of 51st Avenue NE.

QC6 *(Formerly MQ-EC-01)* Undersized Culvert along Edgecomb Creek at 152nd Street NE

The 36-inch culvert conveying water beneath 152nd Street NE along Edgecomb Creek (SD-CV-147) was identified by the 2002 DNR No. 1 as undersized, and as a Level A barrier to fish passage. The HEC-RAS model developed for the previous report determined that 152nd Street would be overtopped at the 25-year frequency for existing land use conditions and the 10-year frequency for future land use conditions. A reevaluation of the culvert was conducted for current fish passage standards, where it was determined to be a velocity barrier for fish passage. The recommended solution for this issue is to replace the existing 36-inch culvert with a 17-foot span reinforced concrete box culvert. The culvert should be countersunk 30 percent and should be filled with gravel and sediment to comply with WDFW 2013 Guidelines.

QC7 *(Formerly MQ-MQ-07)* Undersized Culvert along Olaf Strad Creek at 152nd Street NE

The 36-inch culvert conveying water beneath 152nd Street NE along Olaf Strad Creek (SD-CV-31) was identified in the 2009 Comp Plan as undersized, and as a potential barrier to fish passage. A reevaluation of the culvert was conducted for current fish passage standards, where it was determined to be a velocity barrier for fish passage. The recommended solution for this issue is to replace the existing 36-inch culvert with a 15-foot span reinforced concrete box culvert. The culvert should be countersunk 30 percent and should be filled with gravel and sediment to comply with WDFW 2013 Guidelines.

QC8 *(Formerly MQ-MQ-04)* Undersized Culvert and Diminished Habitat along Quilceda Creek at Strawberry Fields Trail

The 36-inch culvert conveying water beneath the Strawberry Fields Trail along Middle Fork Quilceda Creek (SD-CV-3407) was identified by public complaints to have significant flooding issues. Additionally, it was identified in the 2002 DNR No. 1 to be a velocity barrier for fish passage. A reevaluation of the culvert was conducted for current fish passage standards, and was determined to be a velocity barrier for fish passage. Snohomish County also found the reaches of Middle Fork Quilceda Creek upstream and downstream of the culvert to have insufficient habitat. This was due to a lack of adequate large woody debris (LWD) and riparian recruitment. The recommended solution for this issue is to replace the existing 36-inch culvert with a 19-foot span reinforced concrete box culvert. The culvert should be countersunk 30 percent and should be filled with gravel and sediment to comply with WDFW 2013 Guidelines. Native riparian vegetation and LWD should also be installed along 1,750 linear feet of the existing channel to improve fish habitat.

QC9 *(Formerly MQ-HH-09)* Flooding of 43rd Avenue and Emerald Hills Estates

The 2009 Comp Plan found that beaver dams in Hayho Creek cause periodic flooding of 43rd Avenue NE and the adjacent retirement community. The recommended solution for this problem is to install a berm on the downstream side of the 24-inch culvert beneath 43rd Avenue (SD-CV-52), and excavate the ditch on the northwest side of the berm to allow collection of street runoff and backwatering from Hayho Creek.

QC10 *(Formerly MQ-HH-38)* Channel Erosion on Hayho Creek between the Burlington Northern Santa Fe Railroad and 47th Drive NE

The 2009 Comp Plan found the reach of Hayho Creek between the Burlington Northern Santa Fe Railroad (BNSF) and 47th Drive NE to be incising and to have significant bank erosion. This is creating a backwater issue that is causing flooding of 136th Street NE at 45th Avenue. The recommended solution to this issue is to stabilize the reach by regrading 850 linear feet of channel. Additionally, large woody debris and native riparian vegetation should be installed along both streambanks.

QC10A Flooding of 136th Street NE at 45th Avenue NE

Significant flooding has been observed on the north side of 136th Street NE at 45th Avenue NE during intense or prolonged rain events. The flood water is generated from a ditch system that runs along 136th Street NE, but is thought to be due to a backwater issue in Hayho Creek on the east side of 45th Avenue NE. This backwater issue is created downstream in a reach located between the BNSF RR and 47th Drive NE that has diminished capacity due to erosion.

The ditch system along 136th Street NE, its confluence with Hayho Creek, and the downstream stretch of Hayho Creek between 136th and the BNSF RR were modeled in XPSTORM to examine alternatives for preventing the flooding on 136th Street NE. The model used the Santa Barbara Urban Hydrograph method (SBUH) to simulate runoff within the conveyance system. Basin areas were estimated to produce peak flows for the Type 1A storm that matched the flows reported for the 100-year storm event in the 2002 DNR No. 8. The model confirmed that the flooding was due to a backwater issue from Hayho Creek, and that approximately 51,000 cubic feet of runoff along the north side of 136th Street NE would need to be stored to prevent overtopping of the road if the downstream backwater issue caused south of the BNSF culverts was not resolved. The model also showed a capacity issue upstream where a 15-inch culvert between two sections of ditch along 136th Street NE has a reverse slope.

While fixing the downstream erosion issue within Hayho Creek is the optimum solution to this flooding problem, an alternative, more economical solution can be installed to prevent the flooding of 136th Street NE until funds are available to perform the necessary downstream repairs. The recommended alternative solution for this issue is to install a storage pond along 136th Street NE at 45th Avenue NE, regrade the section of ditch located approximately 450 feet west of 45th Avenue NE, and replace the 15-inch culvert just upstream from the regraded ditch. This would allow temporary storage of the runoff until the water level downstream recedes.

QC11 *(Formerly WQ-WQ-08)* Undersized Culvert along a Tributary to West Fork Quilceda Creek at 104th Street NE

The 4-foot box culvert conveying water beneath 104nd Street NE along Lower West Fork Quilceda Creek (SD-CV-42) was identified in the 2009 Comp Plan as undersized, and as a potential barrier to fish passage. It was also noted that beaver dams just downstream from the culvert were contributing to flooding, and had caused the culvert to become clogged with silt. In 2010, emergency maintenance was conducted, which resulted in the beaver dams being removed, and the culvert being cleaned out. A 24-inch culvert was also installed above the ordinary high water mark to reduce flooding. A reevaluation of the culvert was conducted for current fish passage standards, and the existing configuration was determined to be a velocity barrier for fish passage. The recommended solution for this issue is to replace the existing 4-foot box culvert with a 50-foot prefabricated bridge along 104th Street to improve fish passage.

QC12 *(Formerly WQ-WQ-09)* Undersized Culvert along a Tributary to West Fork Quilceda Creek at 103rd Street NE

The 24-inch culvert conveying water beneath 103rd Street NE along Lower West Fork Quilceda Creek (SD-CV-43) was identified in the 2009 Comp Plan as undersized, and as a potential barrier to fish passage. A reevaluation of the culvert was conducted for current fish passage standards, where it was determined to be a velocity barrier for fish passage. The recommended solution for this issue is to replace the existing 24-inch

culvert with a 50-foot prefabricated bridge along 103rd Street to improve corridor and fish passage.

QC13 *(Formerly MQ-QC-09)* Undersized Culvert along Quilceda Creek at State Avenue

The two 6-foot box culverts conveying water beneath State Avenue NE along Quilceda Creek (SD-CV-30) was identified in the 2002 DNR No.1 to be a velocity barrier for fish passage. A reevaluation of the culvert was conducted for current fish passage standards, where it was determined to be a velocity barrier for fish passage. The recommended solution for this issue is to remove the existing culverts and install a 175-foot precast bridge along State Avenue to address corridor and fish passage concerns.

QC14 *(Formerly MQ-QC-12)* Undersized Culvert along Quilceda Creek at BNSF Railroad

The 6-foot box culvert conveying water beneath the Burlington Northern Santa Fe Railroad along Quilceda Creek (SD-CV-29) was identified in the 2002 DNR No. 1 to be a velocity barrier for fish passage. A reevaluation of the culvert was conducted for current fish passage standards, where it was determined to be a velocity barrier for fish passage. A possible solution for this issue is to remove the existing culvert and to install a 22-foot-diameter, 10-gauge tunnel liner plate. The tunnel liner plate provides a corrugated pipe with continuous circumferential corrugations which provide high strength and stiffness. The tunnel should be countersunk 30 percent and should be filled with gravel and sediment to comply with WDFW 2013 Guidelines. Although this issue is within the Marysville city limits, it is within BNSF right-of-way; and therefore, it is the responsibility of BNSF to replace this culvert.

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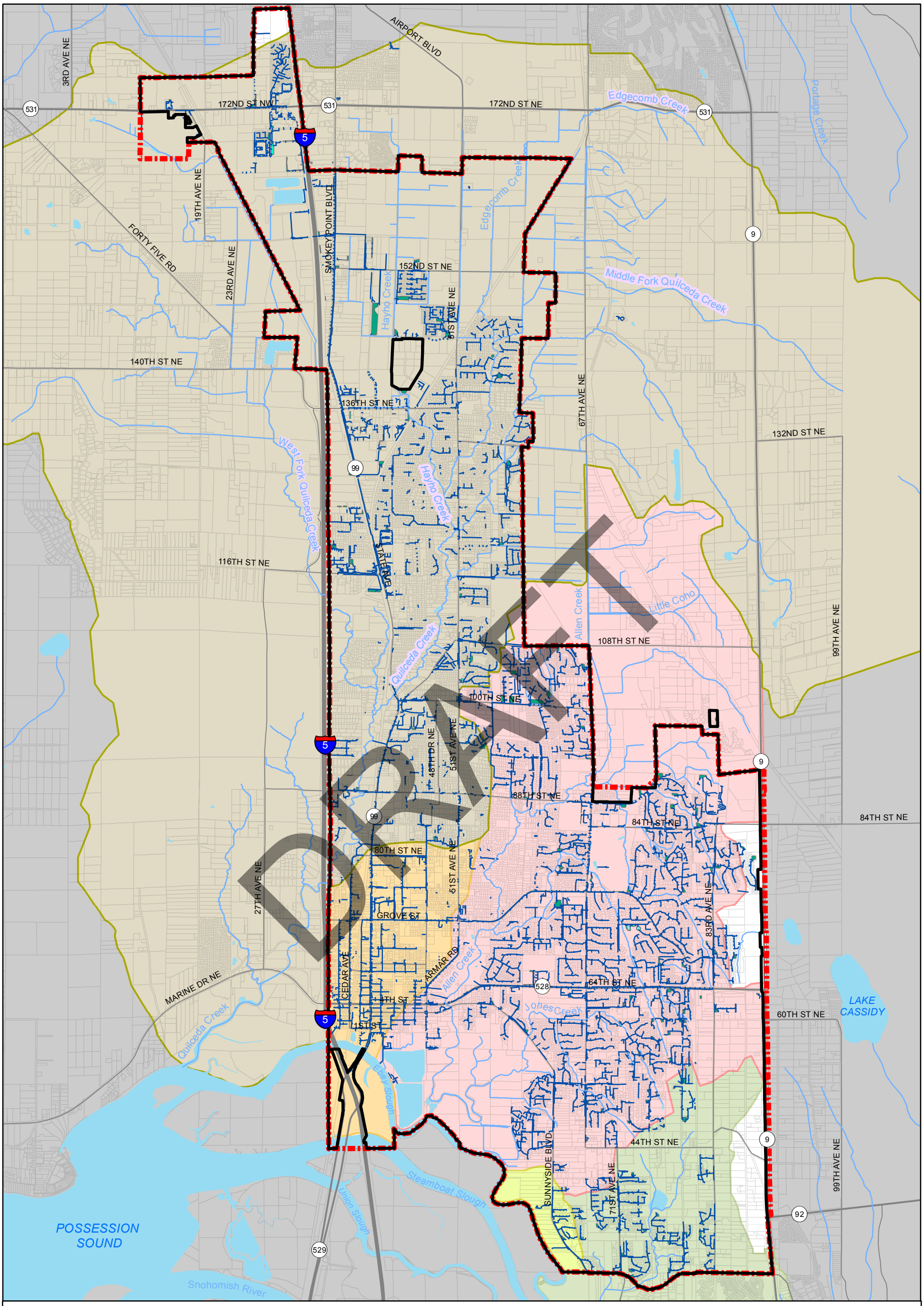

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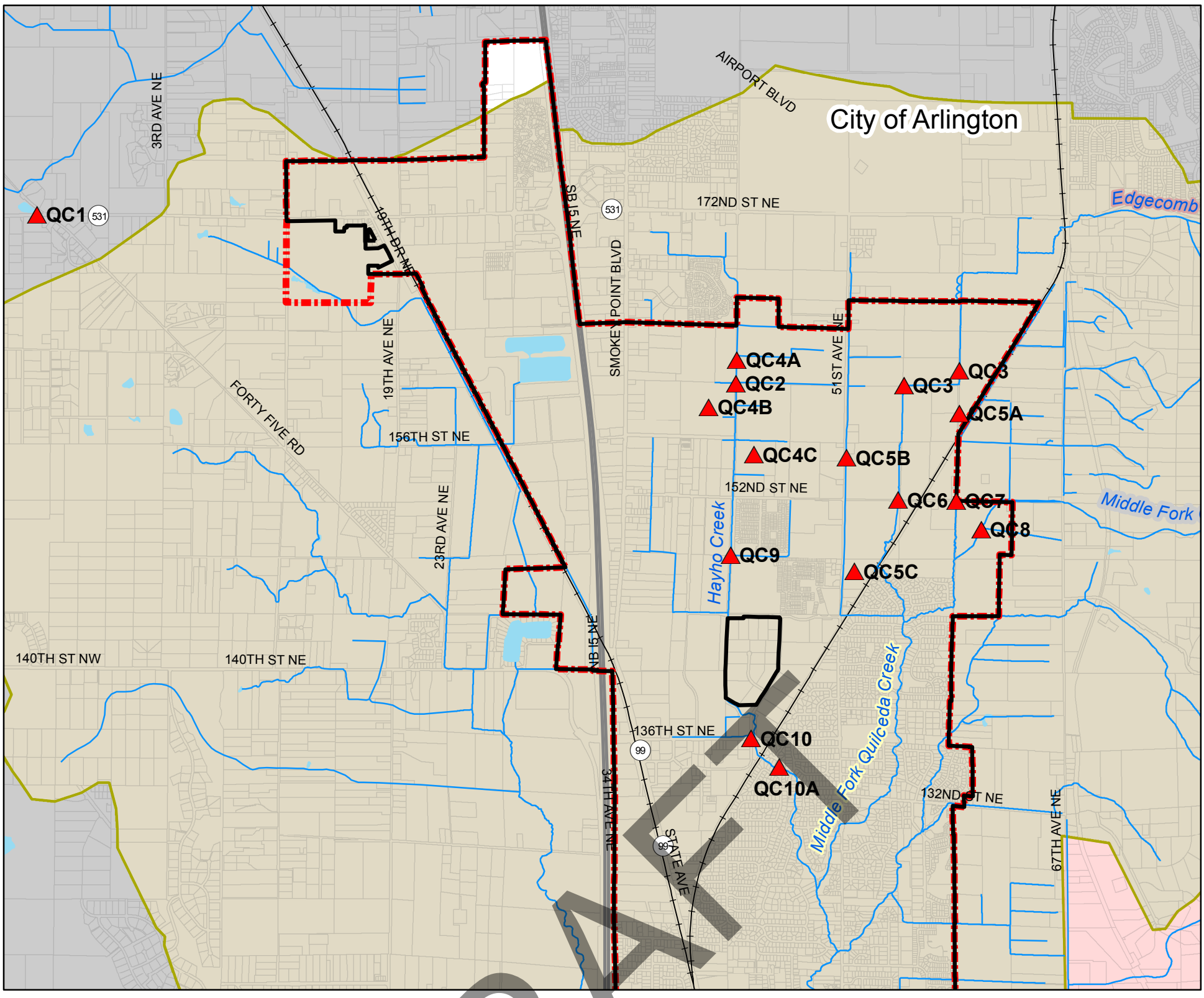

QC1: Stormwater Pipe Damage at Edward Springs Reservoir
Issue: Damage
Potential Solution: Replace 395 LF of 36" CMP pipe with 36" CPEP pipe

QC2: Irrigation Ditch Accessible to Fish upstream of 160th St NE
Issue: Biological
Potential Solution: Install fish screen

QC3: Undersized Field Access Culverts
Issue: Capacity/ Fish Passage
Potential Solution: Replace existing culverts with 16'x6' concrete box culverts

QC4A: Hayho Creek Channel Mitigation (North Marysville Master Drainage Plan)
Issue: Mitigation/Habitat
Potential Solution: Realign headwaters of Hayho Creek

QC4B: Conveyance for Regional Detention Ponds No.1 and 2
Issue: Mitigation
Potential Solution: Install 4,400 LF 42-inch conveyance pipe

QC4C: Hayho Creek Regional Detention Pond No.3
Issue: Mitigation
Potential Solution: Install 3.5 ac regional detention pond.

QC5A: Edgecomb Creek Channel Mitigation (North Marysville Master Drainage Plan)
Issue: Mitigation/Habitat
Potential Solution: Realign 2 miles of Edgecomb Creek

QC5B: Edgecomb Creek Conveyance
Issue: Mitigation
Potential Solution: Install 10,550 LF conveyance pipe (25" - 54")

QC5C: Edgecomb Creek Regional Detention Facility
Issue: Mitigation Potential
Potential Solution: Install 20ac regional detention pond

QC6: Undersized Culvert at 152nd St NE
Issue: Capacity/ Fish Passage
Potential Solution: Replace existing culvert with a 17'x6' concrete box culvert

QC7: Undersized Culvert at 152nd St NE
Issue: Capacity/ Fish Passage
Potential Solution: Replace existing culvert with a 15'x5' concrete box culvert

QC8: Undersized Culvert and Diminished Habitat at Strawberry Fields Trail
Issue: Capacity/ Fish Passage/ Habitat
Potential Solution: Replace existing culvert with a 19'x7' concrete box culvert and install native riparian vegetation along 1,750 LF of channel

QC9: Flooding of 43rd Ave at Emerald Hills Estates
Issue: Capacity/Biological
Potential Solution: Install berm and excavate ditch

QC10: Channel Erosion on Hayho Creek between BNSF and 47th Dr NE
Issue: Capacity/ Habitat
Potential Solution: Regrade 850 LF of Creek and install native riparian vegetation

QC10-A: Flooding of 136th St NE
Issue: Capacity
Potential Solution: Install storage pond along 136th St NE and replace reverse slope culvert

Identified Deficiency
Allen Creek Basin
Quilceda Creek Basin
Water Bodies
Parcels
Urban Growth Boundary
Marysville City Limits
Streams
BNSF Railroad

N

0 5,000 10,000 15,000 Feet

2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE

IDENTIFIED DEFICIENCIES
QUILCEDA CREEK BASIN NORTH
FIGURE 3-2

CITY OF Marysville WASHINGTON

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QC11: Undersized Culvert at 104th St NE
Issue: Capacity/Fish Passage
Potential Solution: Replace existing 4' box culvert and 24" culvert with a 50' prefabricated bridge

QC12: Undersized Culvert at 103rd St NE
Issue: Capacity
Potential Solution: Replace existing 24" culvert with a 50' prefabricated bridge

QC13: Undersized Culvert at State Ave
Issue: Fish Passage
Potential Solution: Remove existing 6'x6' box culverts and install a 180' prefabricated bridge

QC14: Undersized Culvert at BNSF RR
Issue: Fish Passage
Potential Solution: Replace existing culvert with a 22' diameter tunnel liner plate culvert

Identified Deficiency
Allen Creek Basin
Ebey Slough Basin North
Quilceda Creek Basin
Water Bodies
Streams
BNSF Railroad
Marysville City Limits
Urban Growth Boundary

N

0 1,000 2,000 3,000 Feet

2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE

IDENTIFIED DEFICIENCIES
QUILCEDA CREEK BASIN SOUTH
FIGURE 3-3

CITY OF Marysville WASHINGTON

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ALLEN CREEK BASIN

Deficiencies found in the Allen Creek Basin primarily involve flooding due to undersized storm pipes. One other issue was identified involving a culvert that was found to have structural issues and is a barrier to fish. Figure 3-4 locates the Allen Creek areas described herein.

AC1 *(Formerly AC-AC-10)* Undersized Stormwater Pipes at 95th Street NE and 67th Avenue NE

The storm pipe system along 95th Street NE between 95th Place NE and 67th Avenue NE was found to have insufficient conveyance capacity by Snohomish County in the 2002 DNR No. 8. The HEC-RAS model generated for the previous report determined that flooding would occur during the 10-year event for existing and future land use. The recommended solution for this issue is to replace 227 linear feet of existing 12-inch-diameter storm pipe with 18-in diameter HDPE pipe.

AC2 *(Formerly AC-AC-03)* Undersized Culvert and Erosion of the Stream Bank Along Allen Creek at 88th Street NE

The 7-foot box culvert conveying water beneath 88th Street NE along Allen Creek (SD-CV-23) was identified in the 2002 DNR No. 8 as undersized, and as a velocity barrier to fish passage. A reevaluation of the culvert was conducted for current fish passage standards, where it was confirmed to be a velocity barrier for fish passage.

Structural and maintenance issues were also found at this culvert. The survey crew reported the upstream section of the culvert had separated from the rest of the culvert, and a hydraulic jump is predicted at the 2-year event or less. No jump is predicted for higher flows. In addition, a 50-foot section of riprap-armored stream bank has failed. Roadway overtopping is predicted if the culvert is not maintained.

The recommended solution for this issue is to replace the existing 7-foot span culvert with a 25-foot span reinforced concrete box culvert. Loose rip rap from the channel should be removed and 50 linear feet of bioengineered bank stabilization measures should be installed along the eroded south bank.

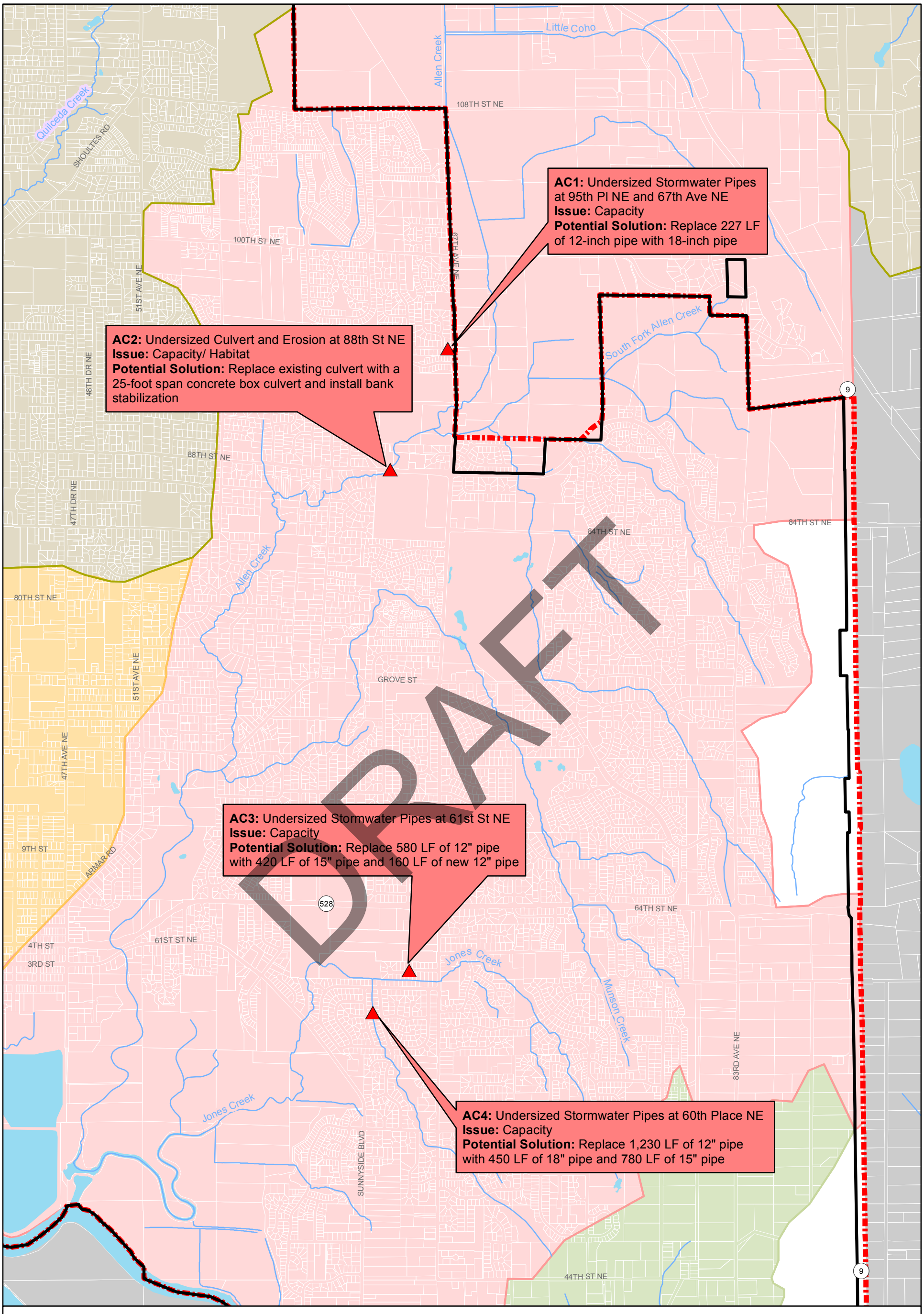
AC3 *(Formerly AC-JC-12)* Undersized Stormwater Pipes at 61st Street NE Cul-de-Sac

The storm drain system along the 61st Street NE Cul-de-Sac was identified in the 2009 Comp Plan to have insufficient conveyance capacity. The XP-SWMM model developed for this report shows flooding will occur at the 10-year event for existing land use conditions. Since the 2009 Comp Plan, a stream restoration and capacity improvement project was completed along Jones Creek, potentially reducing the severity of this conveyance issue. The Jones Creek portion of the 2002 DNR No. 8 HEC-RAS model

should be updated to include these improvements, and a new hydraulic analysis should be conducted to determine the remaining flooding issues. The recommended solution for this issue is to replace approximately 580 linear feet of existing 12-inch pipe with 420 linear feet of 15-inch CPEP pipe and 160 linear feet of new 12-inch-diameter CPEP pipe. The five catch basins along this drainage line should be replaced with 48-inch, Type II catch basins.

AC4 *(Formerly AC-JC-11)* Undersized Stormwater Pipes at 60th Place NE and the Surrounding Area

The storm drain system along 60th Place NE, 64th Avenue NE, and 63rd Avenue NE was identified in the 2009 Comp Plan to have insufficient conveyance capacity. The XP-SWMM model developed for this report shows flooding will occur at the 10-year event for existing land use conditions. Since the 2009 Comp Plan, a stream restoration and capacity improvement project was completed along Jones Creek, potentially reducing the severity of this conveyance issue. The Jones Creek portion of the 2002 DNR No. 8 HEC-RAS model should be updated to include these improvements, and a new hydraulic analysis should be conducted to determine the remaining flooding issues. The recommended solution for this issue is to replace approximately 1,230 linear feet of existing 12-inch storm pipe with 450 linear feet of 18-inch-diameter CPEP pipe and 780 linear feet of 15-inch-diameter CPEP pipe. The 13 catch basins within the project area should be replaced with 48-inch, Type II catch basins.



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EBEY SLOUGH NORTH BASIN

Two areas were identified within the Ebey Slough North Basin as needing a detailed analysis and design of both site-specific and end-of-pipe solutions to improve stormwater quality and quantity before its discharges into Ebey Slough. Figure 3-5 locates the Ebey Slough Basin areas described herein.

ES1 Historic Downtown Green Retrofit Study

The City of Marysville would like to provide water quality treatment to stormwater runoff that is generated within its Historic Downtown District. The downtown area discharges untreated runoff from the right of way directly into Ebey Slough, an impaired waterway and a tributary of the Snohomish River. This study will start by creating criteria for the selection of ideal areas within Historic Downtown Marysville to carry forward into the design phase. The design phase will focus on using the 2014 Department of Ecology Stormwater Management Manual for Western Washington and the 2012 Low Impact Development Technical Guidance Manual for Puget Sound to implement green infrastructure principles that mimic predeveloped hydrologic conditions for the specific project areas. These mitigation techniques may include infiltration, filtration, and transpiration to improve water quality and quantity.

ES2 *(Formerly ES-DT-03)* Water Quality at Downtown Marina Outfall Study

A study of the Downtown region should be conducted to identify alternatives and provide a design of an end-of-pipe stormwater treatment facility to accompany the water quality improvements to the 480-acre basin located upstream of the Marina area. While reductions to basin flows and creating localized treatment through LID retrofits is effective and important, significant areas of the large, older developed basin remain untreated. Creating a regional treatment facility within the system will allow for treatment of any remaining basin runoff that is not currently being addressed by treatment facilities installed today.

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ES1: Historic Downtown Green Retrofit Study
Issue: Water Quality/Quantity
Potential Solution: Identify areas, alternatives, and final design for LID improvements

ES2: Water Quality at Downtown Marina Outfall Study
Issue: Water Quality
Potential Solution: Identify alternatives and design end of pipe treatment facility

Identified Deficiency
Allen Creek Basin
Ebey Slough Basin North
Quilceda Creek Basin
Water Bodies
Streams
BNSF Railroad
Marysville City Limits
Urban Growth Boundary

N

0 1,000 2,000 3,000 Feet

2016 SURFACE WATER
COMPREHENSIVE PLAN UPDATE

IDENTIFIED DEFICIENCIES
EBEY SLOUGH BASIN NORTH
FIGURE 3-5

CITY OF Marysville WASHINGTON

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SUNNYSIDE CREEK BASIN

One area was identified within the Sunnyside Creek Basin to be a fish passage barrier, and to have insufficient culvert sizing to allow flood debris to pass through the system. Figure 3-6 locates the Sunnyside Creek Basin area described below.

SC1 Undersized Culvert Along King Creek at Soper Hill Road

City staff identified significant debris buildup at the upstream opening of the 4-foot box culvert beneath Soper Hill Road along King Creek (SD-CV-157). The debris is thought to be the result of significant flooding in 2010. The culvert was also analyzed for fish passage and was determined to be a Level A barrier. The recommended solution for this issue is to replace the existing 4-foot box culvert with a 16-foot-long, 17-foot span 7-foot rise reinforced concrete box culvert. The culvert should be countersunk 30 percent and the stream bed inside of the culvert should be constructed using a cascade-step or pool-riffle construction to comply with WDFW 2013 Guidelines.

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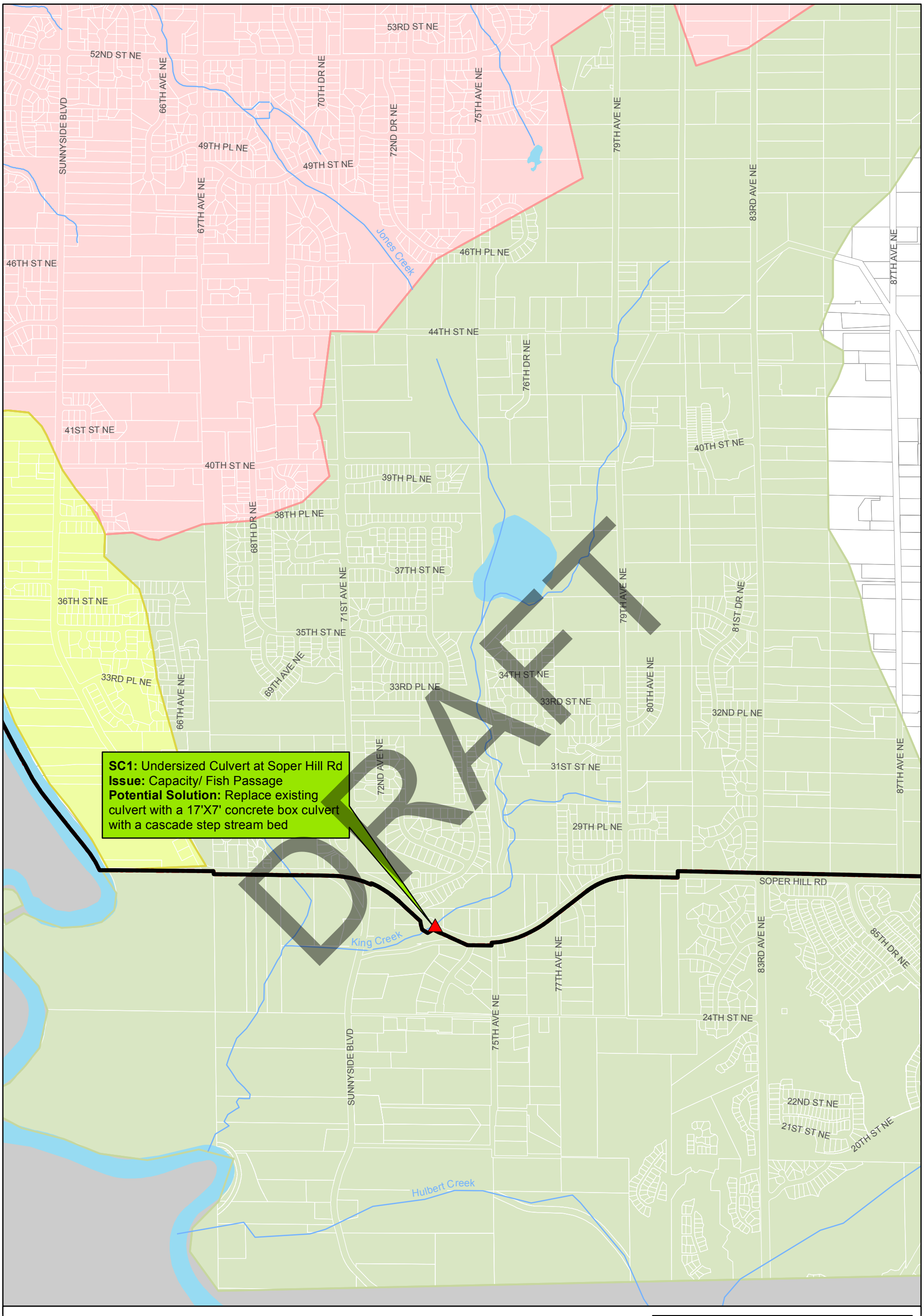


M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 3-6.mxd

CHAPTER 4

CAPITAL IMPROVEMENT PLAN

INTRODUCTION

The City of Marysville's Stormwater Capital Improvement Plan is presented in this chapter of the 2016 Surface Water Comprehensive Plan Update. The recommended projects include structural and nonstructural elements to control both the quantity and quality of stormwater runoff, and to comply with the Washington State Department of Fish and Wildlife 2013 Water Crossing Guidelines.

The Capital Improvement Plan (CIP) was developed based on input from several sources. Sources included City staff, who identified storm drainage problems, the City's 2009 Surface Water Comprehensive Plan (2009 Comp Plan), and Snohomish County's 2002 Drainage Needs Report No. 1 and No. 8 for the Quilceda Creek Basin and the Allen Creek Basin respectively (2002 DNR No. 1 and 2002 DNR No. 8), which were both reviewed for projects completed and projects outstanding.

Whenever an inadequately sized culvert, pipe, or channel is replaced or reconstructed, the improvement may transfer the problem downstream. It is therefore strongly recommended that all improvements include analysis of downstream conditions. As a general rule, projects should proceed from the downstream end of the system towards the upstream end of the system.

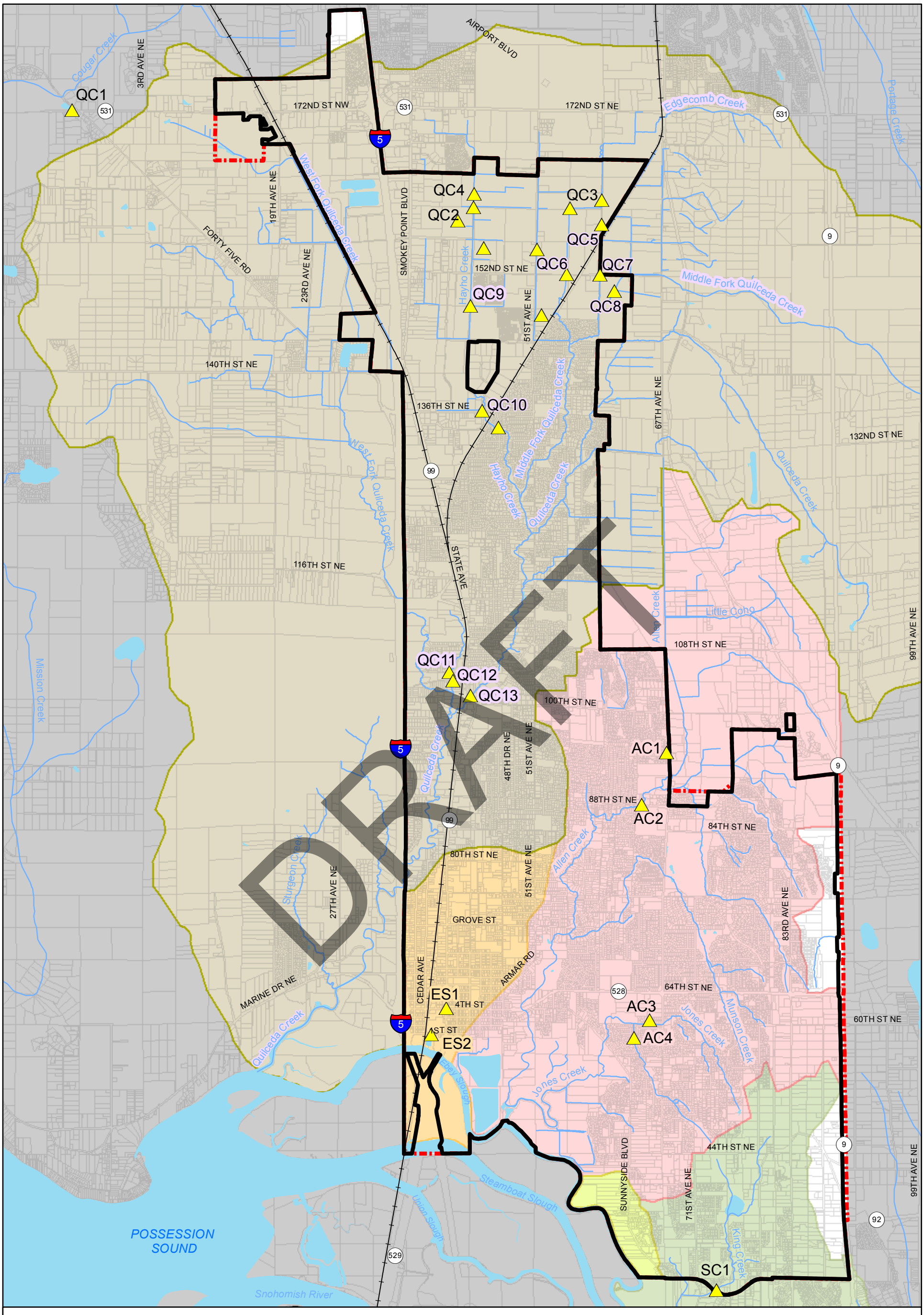
Other stormwater capital improvement projects may arise in the future that are not identified as part of the City's CIP presented in this chapter. Such projects may be deemed necessary for remedying an emergency situation, assessing growth in other areas, accommodating improvements proposed by other agencies or land development, or addressing unforeseen problems with the City's storm drainage system. Due to budgetary constraints and/or addressing growth scenarios that differ from those modeled in this Plan, the construction of these projects may require changes in the proposed completion date for projects in the CIP. When new information becomes available, the City retains the flexibility to reschedule, add to, or delete proposed projects and to expand or reduce the scope of the projects, as best determined by the City. Each capital improvement project should be re-evaluated to consider the most recent relevant planning efforts as the proposed project date approaches.

CAPITAL IMPROVEMENT PROJECTS

This Surface Water Comprehensive Plan Update reviewed the outstanding projects from the 2009 Comp Plan. In the 2009 Comp Plan, there were 30 capital improvement projects (CIPs) identified. Of those 30 CIPs, four have been completed or have been resolved by the completion of other projects as of Summer 2016. Interviews with City

staff revealed four additional CIPs including a culvert replacement in the Sunnyside Basin (SC1), a pipe replacement west of the Quilceda Creek Basin (QC1), flood storage at 136th Street NE (QC10-A), and a feasibility/design study for green retrofit projects in the Historic Downtown area (ES1).

The recommended CIP projects scheduled for completion within future years are summarized below and are shown in Figure 4-1. Each project cost estimate includes an additional 20 percent construction contingency, 25 percent for design, engineering, and permitting, and a 9.1 percent sales tax. All project costs are based on 2016 dollars with no adjustments made for inflation in future years. The naming convention uses the initials of the drainage basin that the projects fall within, along with an identification number. It should be noted that many of the projects listed may take lengthy coordination with other agencies for permitting purposes. Permit acquisition should be considered within the project's overall schedule.



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QUILCEDA CREEK BASIN PROJECTS

QC1: Stormwater Pipe Replacement at Edward Springs Reservoir

Replace 395 linear feet of 36-inch-diameter CMP pipe with 395 linear feet of CPEP pipe. Connect to the existing Type 2 catch basins on upstream and downstream ends of the pipe. Additional inspection of upstream and downstream pipe is recommended to determine whether additional replacement is required. The project is located just north of 172nd Street NW at the Edward Springs Reservoir (Figure 4-2).

Estimated Project Cost: $381,000

QC2: Fish Screen Installation Along Hayho Creek at 160th Street NE

Install a fish screen along Hayho Creek upstream of 160th Avenue NE to prevent fish from being drawn into the diversion channel. Temporary bypass of flow around the work area will be necessary during construction. A biological assessment will be required prior to installation to determine the channel's suitability for fish (Figure 4-3).

Estimated Project Cost: $231,000

QC3: Field Access Culvert Replacement along Edgecomb Creek

Replace both 30-inch culverts with 16-foot span, 6-foot rise reinforced concrete box culverts. The culverts shall be countersunk 30 percent and the streambed within the culverts shall be filled with gravel and sediment to comply with WDFW 2013 Guidelines. Temporary bypass of flow around the work area will be necessary during construction. Coordination with the property owners would be necessary for this project as these culverts are privately owned (Figure 4-4).

Estimated Project Cost: $617,000

QC4A: Hayho Creek Channel Realignment (North Marysville Master Drainage Plan)

Realign the headwaters of Hayho Creek through 15 acres of existing wetlands just south of the City limits, and install native wetland vegetation (Figure 4-5).

Estimated Project Cost: $1,680,000

QC4B: Conveyance for Regional Detention Ponds 1 and 2 (North Marysville Master Drainage Plan)

Provide approximately 4,400 LF of 42-inch conveyance pipe north of 152nd Street NE for the purpose of providing a main trunkline for future commercial or industrial development north of Regional Ponds 1 and 2 (Figure 4-5).

Estimated Project Cost: $4,901,000

QC4C: Hayho Creek Regional Detention Pond 3

Construct a 3.5-acre regional detention pond at the northeast corner of 152nd Street NE and 43rd Avenue NE to detain and treat flow east of Hayho Creek that cannot reach Regional Ponds 1 or 2 (Figure 4-5).

Estimated Project Cost: $1,831,000

QC5A: Edgecomb Creek Channel Realignment (North Marysville Master Drainage Plan)

Realign approximately two miles of Edgecomb Creek between 154th Drive NE and 172nd Street NE. This project includes installing 64 acres of forested buffer and 29 acres of wetland with native wetland vegetation. Install five fish passable culverts, two under the Burlington Northern Santa Fe Railroad, two railroad access road culverts, and one culvert under 152nd Street NE. Early permit coordination with Burlington Northern is encouraged prior to beginning a full design for the project (Figure 4-6).

Estimated Project Cost: $19,042,000

QC5B: Edgecomb Creek Conveyance (North Marysville Master Drainage Plan)

Conveyance to the regional detention pond (Project QC5C) will require the installation of approximately 2,100 linear feet of 24-inch pipe, 1,300 linear feet of 30-inch pipe, 3,250 linear feet of 36-inch-diameter pipe, 1,300 linear feet of 42-inch pipe, and 2,600 linear feet of 54-inch-diameter pipe. The project will also require the installation of approximately 33 manholes ranging in size from 48 inch to 84 inch (Figure 4-6).

Estimated Project Cost: $8,517,000

QC5C: Edgecomb Creek Regional Detention Facility (North Marysville Master Drainage Plan)

Construct a 20-acre regional detention pond at the south end of the project area between 51st Avenue NE and the Burlington Northern Santa Fe Railroad (Figure 4-6).

Estimated Project Cost: $5,054,000

QC6: Culvert Replacement along Edgecomb Creek at 152nd Street NE

Replace the existing 36-inch culvert with a 17-foot span, 6-foot rise reinforced concrete box culvert. The culvert shall be countersunk 30 percent and the streambed within the culvert shall be filled with gravel and sediment to comply with WDFW 2013 Guidelines. Temporary bypass of flow around the work area will be necessary during construction (Figure 4-7).

Estimated Project Cost: $489,000

QC7: Culvert Replacement along Olaf Strad Creek at 152nd Street NE

Replace the existing 36-inch culvert with a 15-foot span, 5-foot rise reinforced concrete box culvert. The culvert shall be countersunk 30 percent and the streambed within the culvert shall be filled with gravel and sediment to comply with WDFW 2013 Guidelines. Temporary bypass of flow around the work area will be necessary during construction (Figure 4-8).

Estimated Project Cost: $520,000

QC8: Culvert Replacement and Channel Restoration along Middle Fork Quilceda Creek at Strawberry Fields Trail

Replace the existing 36-inch culvert with a 19-foot span, 7-foot rise reinforced concrete box culvert. The culvert shall be countersunk 30 percent and the streambed within the culvert shall be filled with gravel and sediment to comply with WDFW 2013 Guidelines. Install native riparian vegetation and large woody debris (LWD) along 1,750 linear feet of existing channel. Temporary bypass of flow around the work area will be necessary during construction (Figure 4-9).

Estimated Project Cost: $548,000

QC9: Berm Installation at 43rd Avenue and Emerald Hills Estates

Install a berm on the downstream side of the 24-inch culvert under 43rd Avenue, and excavate the ditch on the northwest side of the berm to allow temporary storage of street

runoff and backwatering from Hayho Creek during periods of active beaver dams (Figure 4-10).

Estimated Project Cost: $69,000

QC10: Stabilization of Hayho Creek between the BNSF Railroad and 47th Drive NE

Stabilize 850 linear feet of Hayho Creek by regrading and installing LWD and riparian vegetation along streambank. Biological assessment of the stream and riparian corridor is necessary (Figure 4-11).

Estimated Project Cost: $2,882,000

QC10A: Runoff Storage Along 136th Street NE at 45th Avenue

Install a stormwater storage pond along 136th Street NE, just west of 45th Avenue NE. Regrade a portion of the ditch upstream from the pond site and replace 145 linear feet of 15-inch HDPE pipe upstream of the ditch excavation with 145 linear feet of 18-inch CPEP pipe (Figure 4-11).

Estimated Project Cost: $425,000

QC11: Culvert Removal and Bridge Installation at 104th Street NE

Replace the existing 4-foot box culvert with a 50-foot prefabricated bridge. Temporary bypass of flow around the work area will be necessary during construction (Figure 4-12).

Estimated Project Cost: $1,017,000

QC12: Culvert Removal and Bridge Installation at 103rd Street NE

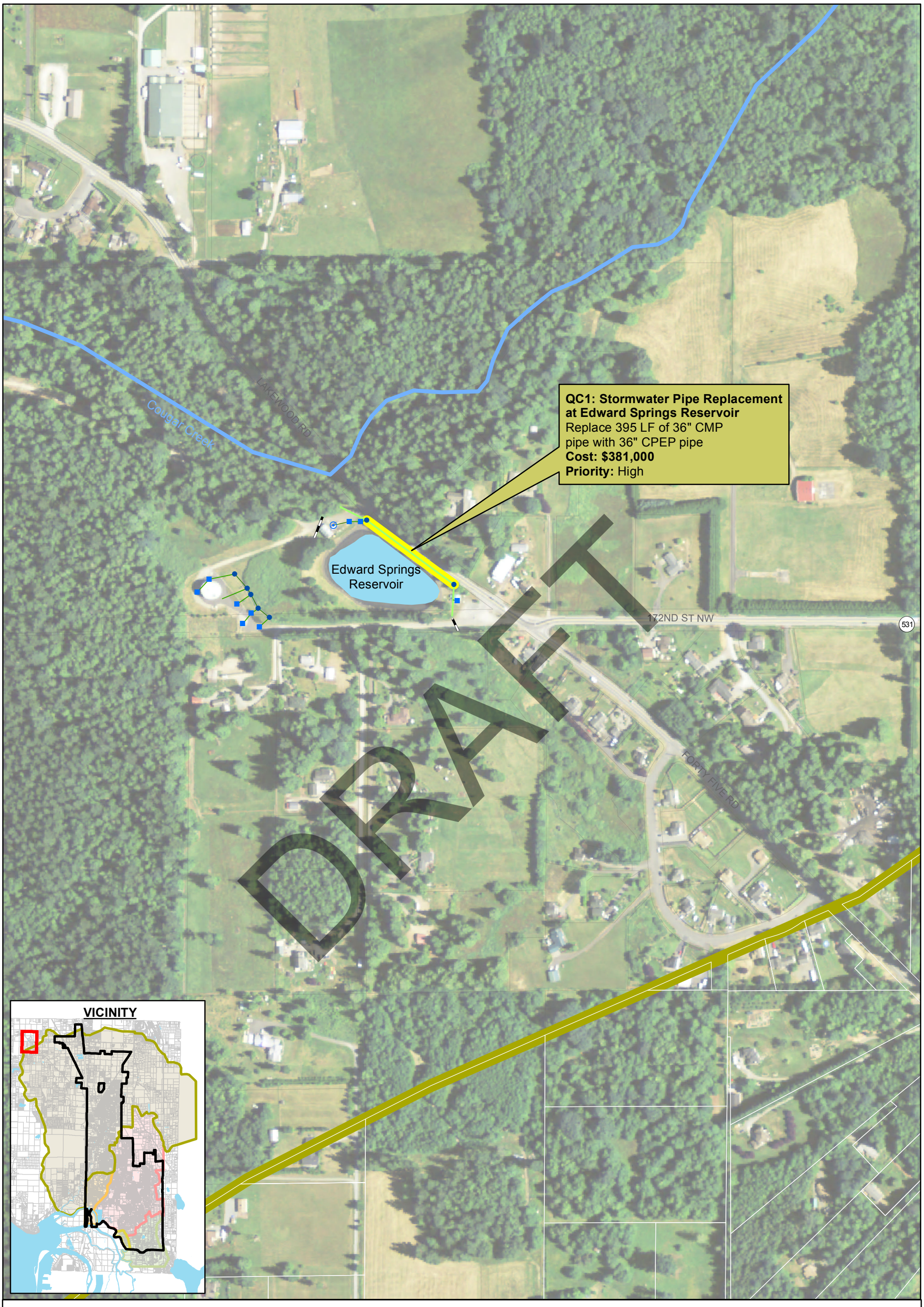
Replace the existing 24-inch culvert with a 50-foot prefabricated bridge. Temporary bypass of flow around the work area will be necessary during construction (Figure 4-13).

Estimated Project Cost: $980,000

QC13: Culvert Removal and Bridge Installation Along Quilceda Creek at State Avenue

Remove both existing 6-foot span, 6-foot rise concrete box culverts and install a 180-foot prefabricated bridge along State Avenue. Temporary bypass of flow around the work area will be necessary during construction (Figure 4-14).

Estimated Project Cost: $6,755,000


QC1: Stormwater Pipe Replacement at Edward Springs Reservoir
Replace 395 LF of 36" CMP pipe with 36" CPEP pipe
Cost: $381,000
Priority: High
Edward Springs Reservoir
Cougar Creek
LAKEWOOD RD
172ND ST NW
531
FORTY FIVE RD
DRAFT
VICINITY
Stormlines
< 8 inch
8 - 12 inch
30 - 36 inch
Catch Basin
CB Type 1
CB Type 2
CB Type 3
CIP Project
Culvert
Marysville City Limits
Streams
Water Bodies
N
0
500
1,000
1,500
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
CIP PROJECTS (QC1)
FIGURE 4-2
CITY OF Marysville WASHINGTON
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QC2: Fish Screen Installation along Hayho Creek at 160th St NE
Install fish screen along Hayho Creek
Cost: $231,000
Priority: Low
QC4B
QC4C
QC9
152ND ST NE
40TH AVE NE
43RD AVE NE
47TH AVE NE
Hayho Creek
VICINITY
DRAFT
Stormlines
< 8 inch
8 - 12 inch
13 - 18 inch
21 - 28 inch
30 - 36 inch
> 42 inch
Storm Facilities
Catch Basin
CB Type 1
CB Type 2
CB Type 3
CIP Project
Culvert
Streams
N
0
500
1,000
1,500
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
CIP PROJECTS (QC2)
FIGURE 4-3
CITY OF Marysville WASHINGTON
M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-3.mxd

QC3: Field Access Culvert Replacement along Edgecomb Creek
Replace two 30" culverts with 16'x6' concrete box culverts
Cost: $617,000
Priority: Low

51ST AVE NE

Edgecomb Creek

Olaf Strad Creek

152ND ST NE

VICINITY

Stormlines
< 8 inch

Catch Basin
Cleanout
CB Type 1
CB Type 2

CIP Project
Culvert
Streams

Marysville City Limits
Urban Growth Boundary
BNSF Railroad

N

0 500 1,000 1,500 Feet

2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE

CIP PROJECTS (QC3)
FIGURE 4-4

CITY OF Marysville WASHINGTON

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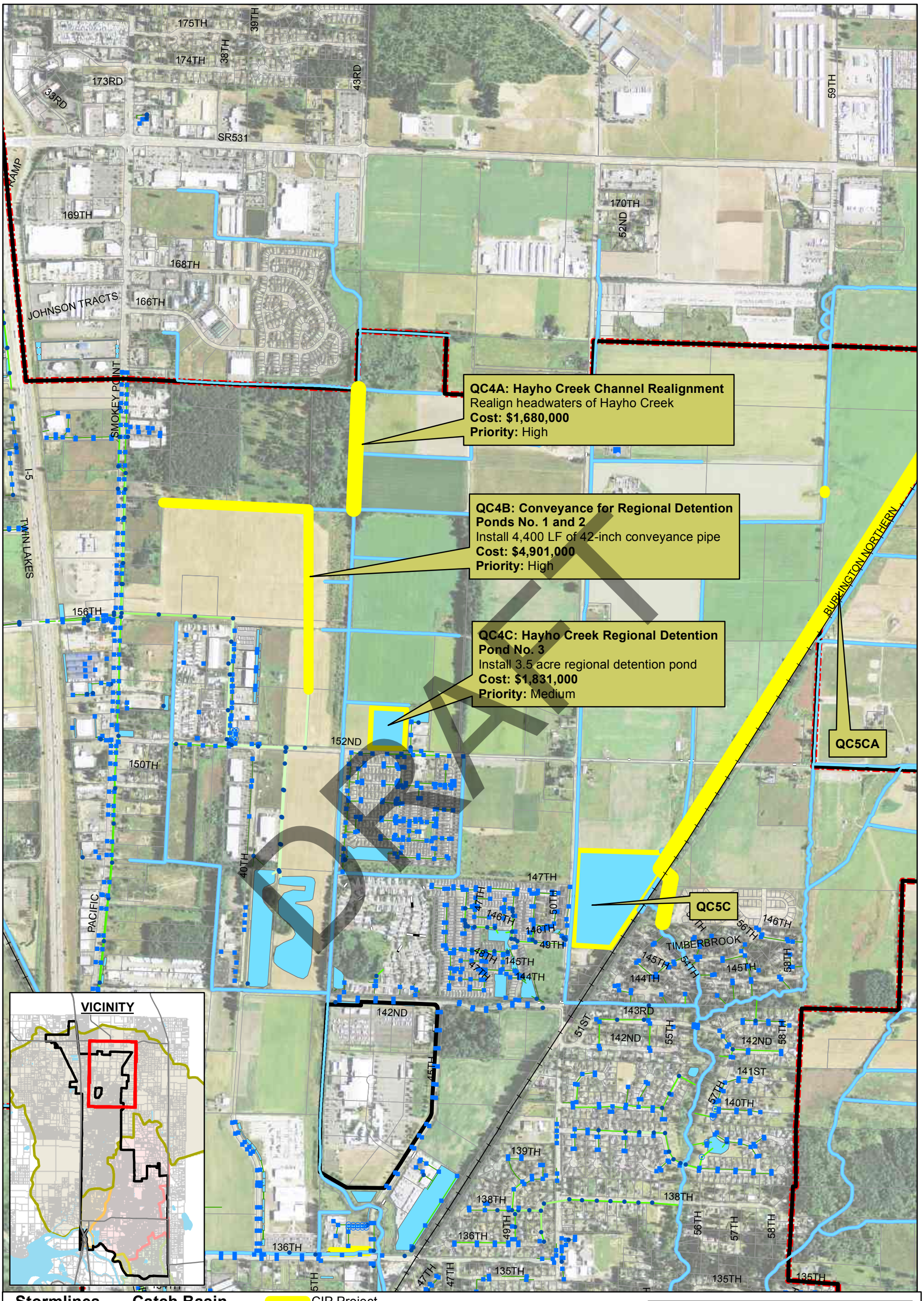
QC4A: Hayho Creek Channel Realignment
Realign headwaters of Hayho Creek
Cost: $1,680,000
Priority: High
QC4B: Conveyance for Regional Detention Ponds No. 1 and 2
Install 4,400 LF of 42-inch conveyance pipe
Cost: $4,901,000
Priority: High
QC4C: Hayho Creek Regional Detention Pond No. 3
Install 3.5 acre regional detention pond
Cost: $1,831,000
Priority: Medium
QC5CA
QC5C
DRAFT
VICINITY
175TH
174TH
173RD
39TH
38TH
43RD
33RD
SR531
59TH
170TH
52ND
169TH
168TH
166TH
JOHNSON TRACTS
SMOKEY POINT
I-5
TWIN LAKES
156TH
152ND
150TH
40TH
PACIFIC
147TH
146TH
50TH
49TH
48TH
145TH
144TH
47TH
142ND
143RD
51ST
55TH
58TH
141ST
57TH
140TH
139TH
138TH
136TH
135TH
56TH
TIMBERBROOK
54TH
BURLINGTON NORTHERN
Stormlines
< 8 inch
8 - 12 inch
13 - 18 inch
21 - 28 inch
30 - 36 inch
> 42 inch
Catch Basin
Cleanout
CB Type 1
CB Type 2
CB Type 3
Storm Facilities
CIP Project
Culvert
Streams
BNSF Railroad
Marysville City Limits
Urban Growth Boundary
N
0
500
1,000
2,000
3,000
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
CIP PROJECTS (QC4)
FIGURE 4-5
CITY OF Marysville WASHINGTON
M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-5.mxd

QC5B: Edgecomb Creek Conveyance
Install 10,550 LF conveyance pipe (24"-54" diam.)
Cost: $8,517,00
Priority: High

QC5A: Edgecomb Creek Channel Realignment
Realign 2 miles of Edgecomb Creek
Cost: $19,042,00
Priority: High

QC5C: Edgecomb Creek Regional Detention Facility
Install a 20 acre regional detention pond
Cost: $5,054,00
Priority: High

QC4A

QC4B

QC4C

VICINITY

Stormlines
- < 8 inch
- 8 - 12 inch
- 13 - 18 inch
- 21 - 28 inch
- 30 - 36 inch
- > 42 inch

Catch Basin
- Cleanout
- CB Type 1
- CB Type 2
- CB Type 3
- Storm Facilities

- CIP Project
- Culvert
- Streams
- BNSF Railroad
- Marysville City Limits
- Urban Growth Boundary

N

0 500 1,000 2,000 3,000 Feet

2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE

CIP PROJECTS (QC5)
FIGURE 4-6

CITY OF Marysville WASHINGTON

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QC6: Culvert Replacement along Edgecomb Creek at 152nd St NE
Replace 36" culvert with
17'x6' concrete box culvert
Cost: $489,000
Priority: Medium

QC7

QC8

VICINITY

Stormlines
- < 8 inch
- 8 - 12 inch
- 13 - 18 inch
- 21 - 28 INCH
- 30 - 36 INCH
- > 42 INCH

Catch Basin
- CLEANOUT
- CB Type 1
- CB Type 2
- CB TYPE 3

- CIP Project
- Culvert
- BNSF Railroad
- Marysville City Limits
- Urban Growth Boundary

N

0 15,000 30,000 45,000 Fee

2016 SURFACE WATER
COMPREHENSIVE PLAN UPDATE

CIP PROJECTS (QC6)
FIGURE 4-7

CITY OF Marysville WASHINGTON

M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-7.mxd

QC7: Culvert Replacement along Olaf Strad Creek at 152nd St NE
Replace 36" culvert with
15'x5' concrete box culvert
Cost: $520,000
Priority: Meduim

QC6

QC8

VICINITY

Stormlines
- < 8 inch
- 8 - 12 inch
- 13 - 18 inch
- 21 - 28 INCH
- 30 - 36 INCH
- > 42 INCH

Catch Basin
- CLEANOUT
- CB Type 1
- CB Type 2
- CB TYPE 3

- CIP Project
- Culvert
- BNSF Railroad
- Marysville City Limits
- Urban Growth Boundary

N

0 15,000 30,000 45,000 Feet

2016 SURFACE WATER
COMPREHENSIVE PLAN UPDATE

CIP PROJECTS (QC7)
FIGURE 4-8

CITY OF Marysville WASHINGTON

M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-8.mxd

QC6

QC7

QC8: Culvert Replacement and Channel Restoration along Middle Fork Quilceda Creek at Strawberry Fields Trail
Replace 36" culvert with 19'x7' concrete box culvert and install LWD and riparian vegetation along 1,750 LF of channel
Cost: $548,000
Priority: Low

VICINITY

Stormlines
- < 8 inch
- 8 - 12 inch
- 13 - 18 inch
- 21 - 28 INCH
- 30 - 36 INCH
- > 42 INCH

Catch Basin
- CLEANOUT
- CB Type 1
- CB Type 2
- CB TYPE 3

- CIP Project
- Culvert
- BNSF Railroad
- Marysville City Limits
- Urban Growth Boundary

N

0 15,000 30,000 45,000 Fee

2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE

CIP PROJECTS (QC8)
FIGURE 4-9

CITY OF Marysville WASHINGTON

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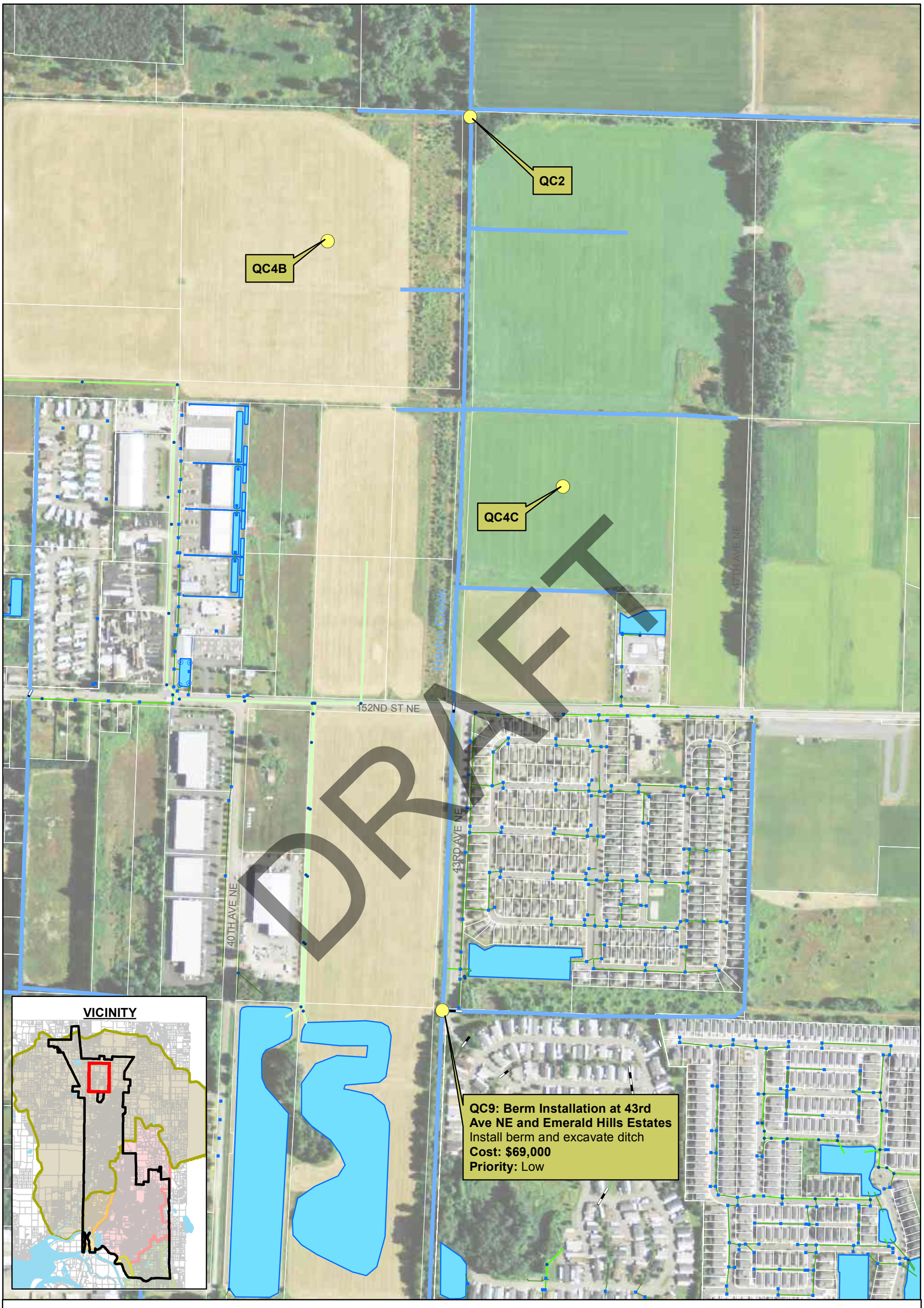

M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-10.mxd

QC10A: Runoff Storage along 136th Ave. NE at 45th Ave.
Install a stormwater storage pond to accommodate 51,000 CF of runoff, replace 145 LF of 15" HDPE pipe with 145 LF of new 18" CPEP pipe, and regrade 75 LF of ditch downstream of the replaced pipe.
Cost: $425,000
Priority: Medium

QC10: Stabilization of Hayho Creek between BNSF RR and 47th Dr. NE
Regrade Hayho Creek, install LWD and riparian vegetation
Cost: $2,882,000
Priority: Medium

VICINITY

Stormlines
- < 8 inch
- 8 - 12 inch
- 13 - 18 inch
- 21 - 28 inch
- 30 - 36 inch
- > 42 inch

Catch Basin
- CLEANOUT
- CB Type 1
- CB Type 2
- CB Type 3

- CIP Project
- Culvert
- Streams
- BNSF Railroad

N

0 15,000 30,000 45,000 Feet

2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE

CIP PROJECTS (QC10, QC10A)
FIGURE 4-11

CITY OF Marysville WASHINGTON

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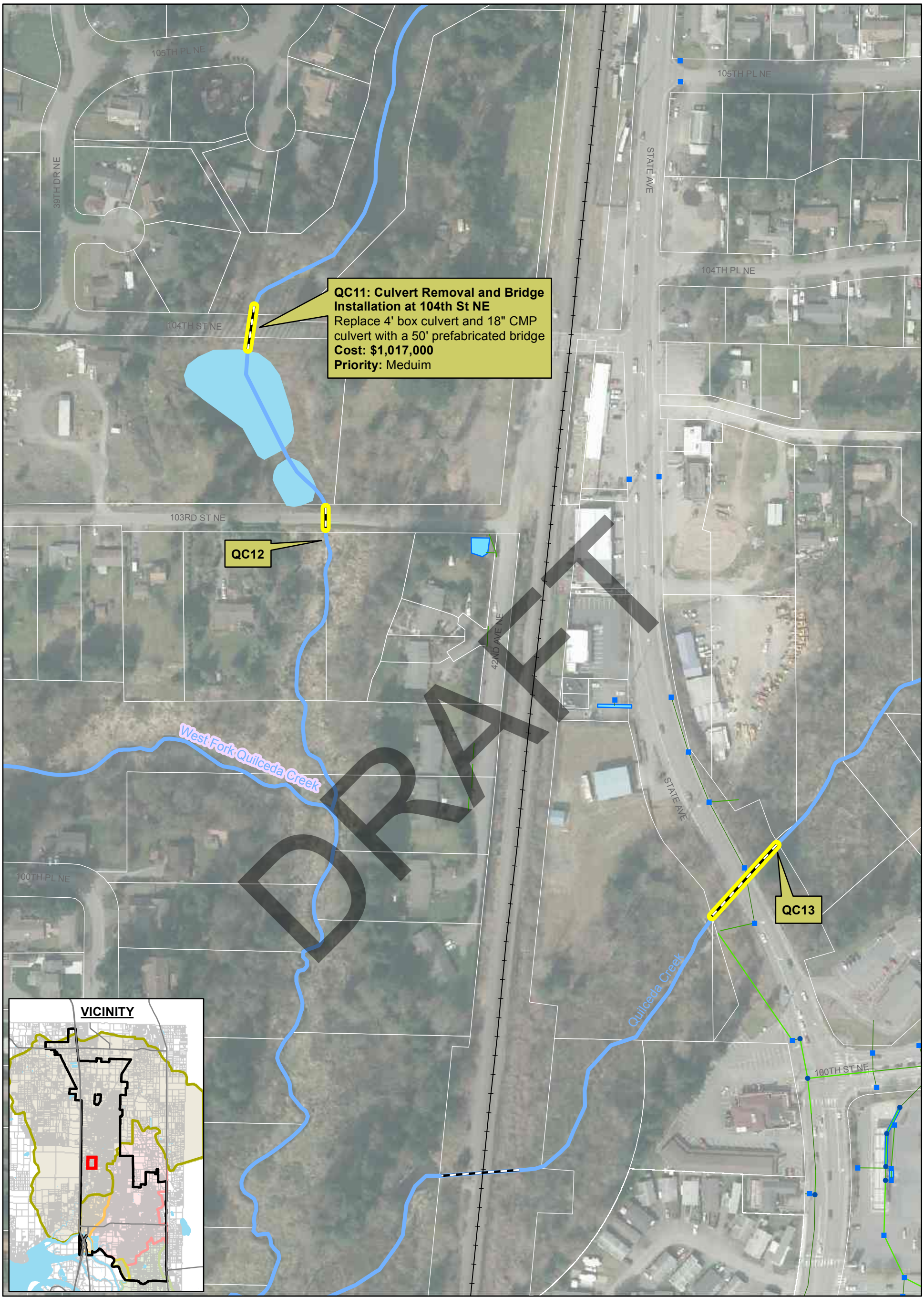

105TH PL NE
39TH DR NE
104TH ST NE
105TH PL NE
STATE AVE
104TH PL NE
QC11: Culvert Removal and Bridge Installation at 104th St NE
Replace 4' box culvert and 18" CMP culvert with a 50' prefabricated bridge
Cost: $1,017,000
Priority: Meduim
103RD ST NE
QC12
42ND AVE NE
West Fork Quilceda Creek
STATE AVE
100TH PL NE
QC13
Quilceda Creek
100TH ST NE
DRAFT
VICINITY
Stormlines
< 8 inch
8 - 12 inch
13 - 18 inch
Catch Basin
CB Type 1
CB Type 2
Storm Facilities
CIP Project
Culvert
Water Bodies
BNSF Railroad
Streams
N
0
200
400
600
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
CIP PROJECTS (QC11)
FIGURE 4-12
CITY OF Marysville WASHINGTON
M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-12.mxd

105TH PL NE

39TH DR NE

104TH ST NE

QC11

105TH PL NE

STATE AVE

104TH PL NE

103RD ST NE

QC12: Culvert Removal and Bridge Installation at 103rd St NE
Replace 24" concrete culvert with a 50' prefabricated bridge
Cost: $980,000
Priority: Medium

42ND AVE NE

West Fork Quilceda Creek

100TH PL NE

STATE AVE

QC13

Quilceda Creek

100TH ST NE

VICINITY

Stormlines
- < 8 inch
- 8 - 12 inch
- 13 - 18 inch

Catch Basin
- CB Type 1
- CB Type 2
- Storm Facilities

- CIP Project
- Culvert
- Water Bodies
- BNSF Railroad
- Streams

N

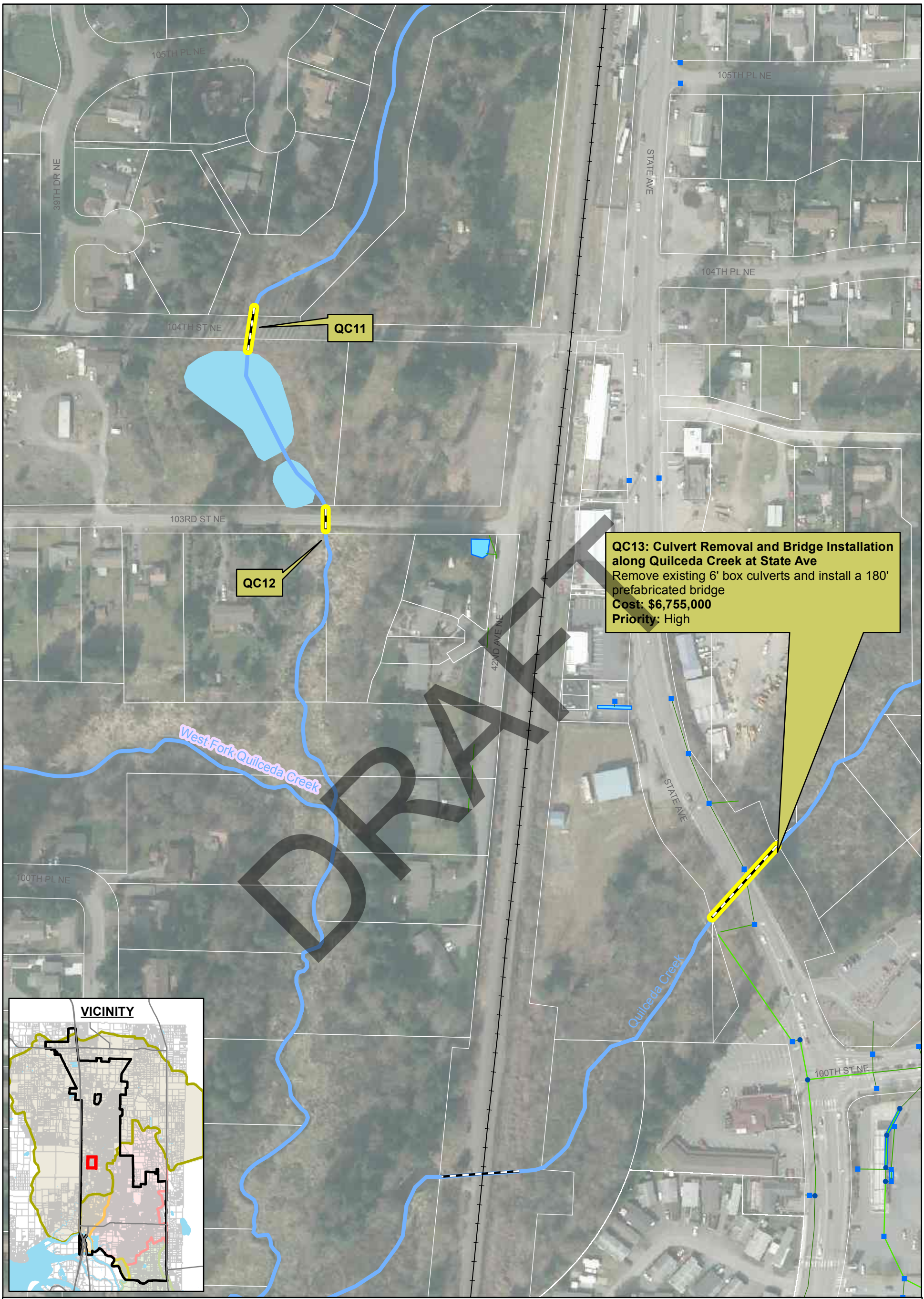
0 200 400 600 Feet

2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE

CIP PROJECTS (QC12)
FIGURE 4-13

CITY OF Marysville WASHINGTON

M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-13.mxd


105TH PL NE
39TH DR NE
104TH ST NE
QC11
103RD ST NE
QC12
West Fork Quilceda Creek
100TH PL NE
42ND AVE NE
STATE AVE
104TH PL NE
105TH PL NE
QC13: Culvert Removal and Bridge Installation along Quilceda Creek at State Ave
Remove existing 6' box culverts and install a 180' prefabricated bridge
Cost: $6,755,000
Priority: High
Quilceda Creek
100TH ST NE
DRAFT
VICINITY
Stormlines
< 8 inch
8 - 12 inch
13 - 18 inch
Catch Basin
CB Type 1
CB Type 2
Storm Facilities
CIP Project
Culvert
Water Bodies
BNSF Railroad
Streams
N
0
200
400
600
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
CIP PROJECTS (QC13)
FIGURE 4-14
CITY OF Marysville WASHINGTON
M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-14.mxd

ALLEN CREEK BASIN

AC1: Storm Pipe Replacement at 95th Street NE and 67th Avenue NE

Replace 227 linear feet of existing 12-inch-diameter storm pipe with 18-inch-diameter CPEP pipe. Replace one 48-inch Type 2 catch basin (Figure 4-15).

Estimated Project Cost: $161,000

AC2: Culvert Replacement and Erosion Control Measures at 88th Street NE

Replace the existing 7-foot span, 5-foot rise box culvert with a 25-foot span 10-foot rise reinforced concrete box culvert. The culvert shall be countersunk 30 percent and the streambed within the culvert shall be filled with gravel and sediment to comply with WDFW 2013 Guidelines. Remove loose rip rap from the channel and install 50 linear feet of bioengineered bank stabilization measures along the eroded south bank. Temporary bypass of flow around the work area will be necessary during construction (Figure 4-16).

Estimated Project Cost: $898,000

AC3: Storm Pipe Replacement at 61st Street NE Cul-de-Sac

Replace approximately 580 linear feet of existing 12-inch pipe with 420 linear feet of 15-inch CPEP pipe and 160 linear feet of new 12-inch-diameter CPEP pipe. Replace five 48-inch Type 2 catch basins (Figure 4-17).

Estimated Project Cost: $323,000

AC4: Storm Pipe Replacement at 60th Place NE and Surrounding Area

Replace approximately 1,230 linear feet of existing 12-inch storm pipe with 450 linear feet of 18-inch-diameter CPEP pipe and 780 linear feet of 15-inch-diameter CPEP pipe. Replace 13 48-inch Type 2 catch basins (Figure 4-18).

Estimated Project Cost: $654,000

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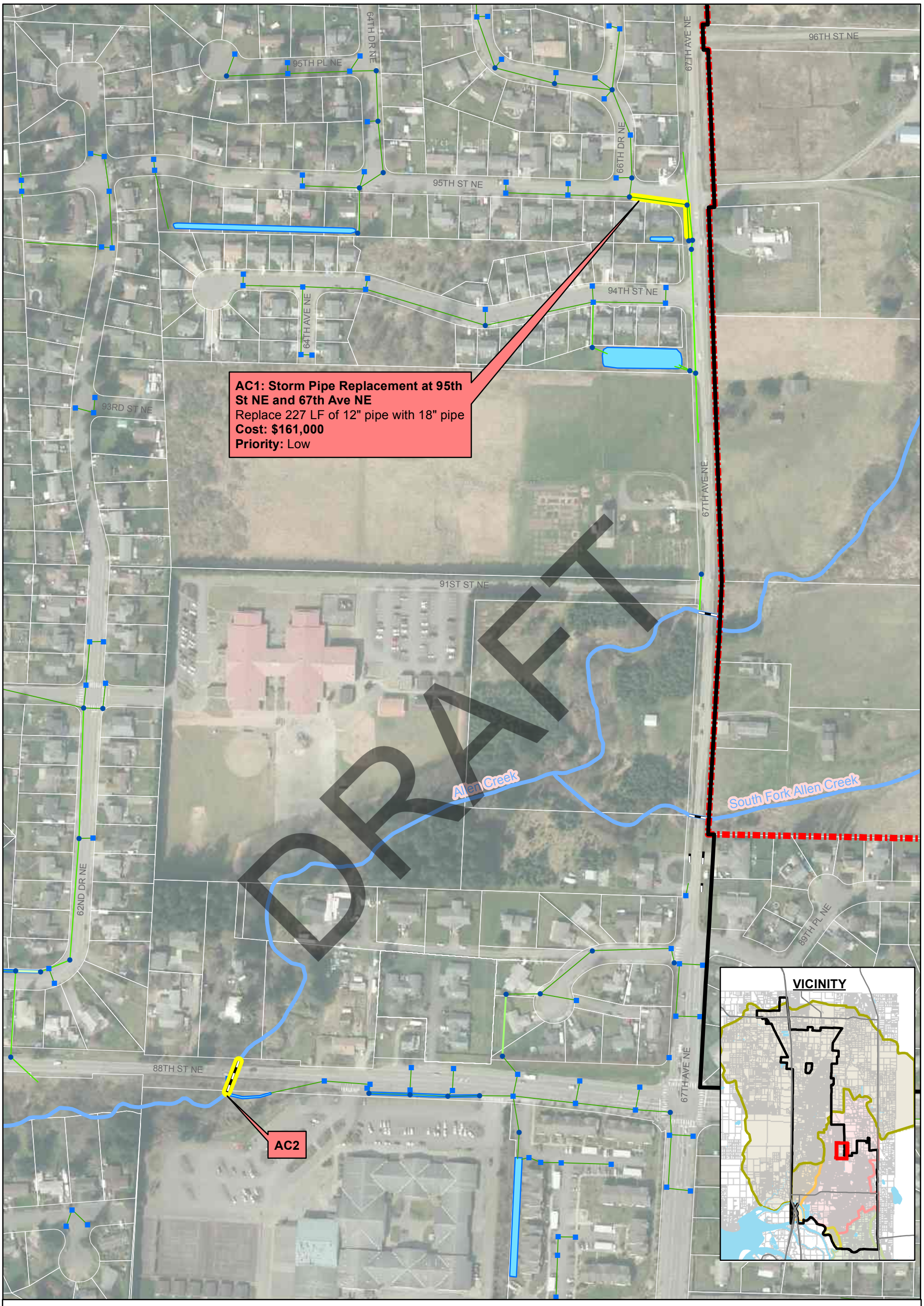
95TH PL NE
64TH DR NE
95TH ST NE
66TH DR NE
67TH AVE NE
96TH ST NE
94TH ST NE
64TH AVE NE
93RD ST NE
AC1: Storm Pipe Replacement at 95th St NE and 67th Ave NE
Replace 227 LF of 12" pipe with 18" pipe
Cost: $161,000
Priority: Low
91ST ST NE
Allen Creek
South Fork Allen Creek
62ND DR NE
89TH PL NE
88TH ST NE
AC2
DRAFT
VICINITY
Stormlines
< 8 inch
8 - 12 inch
13 - 18 inch
21 - 28 inch
30 - 36 inch
> 42 inch
Catch Basin
CB Type 1
CB Type 2
Storm Facilities
CIP Project
Culvert
Streams
Marysville City Limits
Urban Growth Boundary
N
0
300
600
900
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATES
CIP PROJECTS (AC1)
FIGURE 4-15
CITY OF Marysville WASHINGTON
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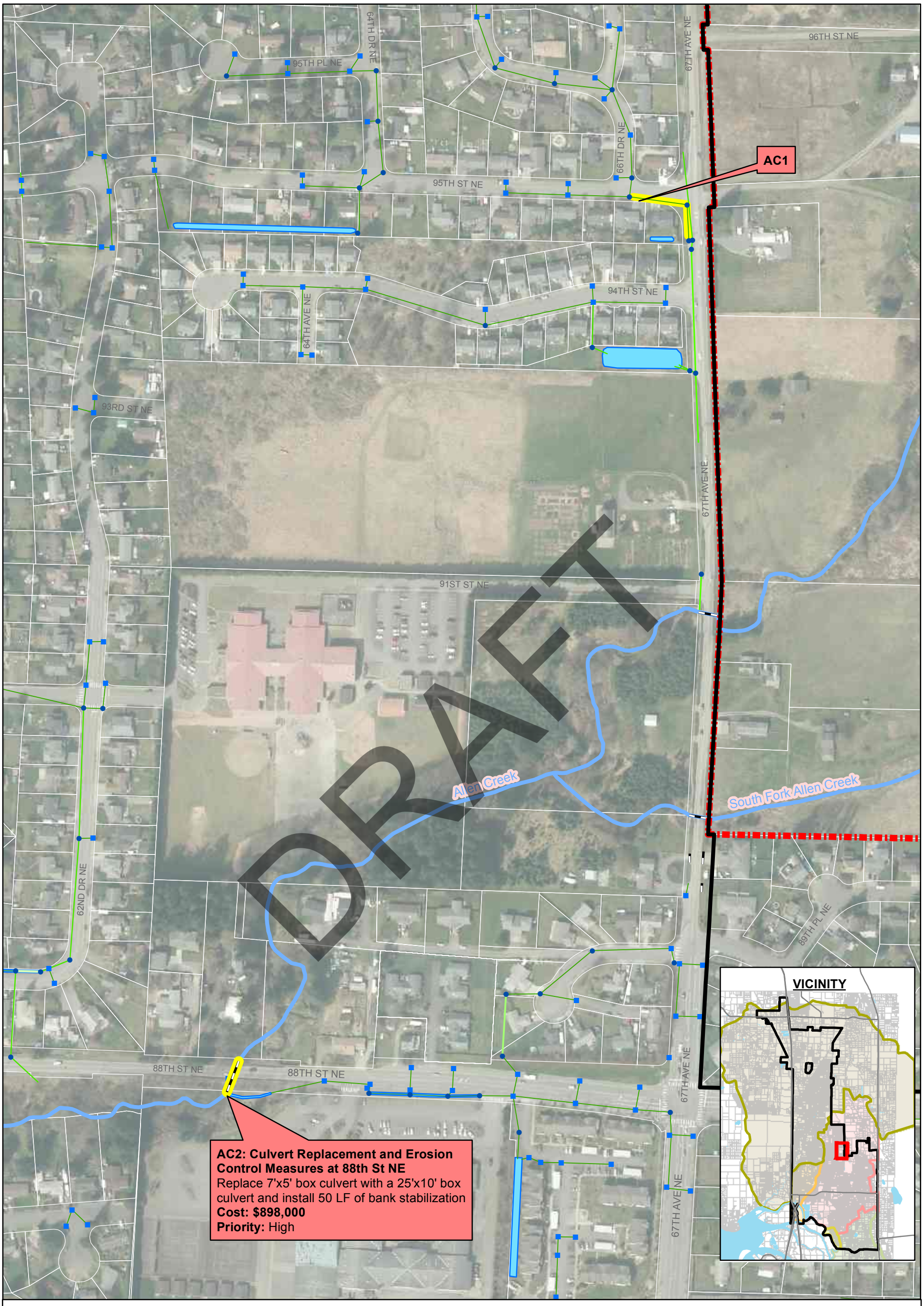

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AC3: Storm Pipe Replacement at 61st St NE Cul-de-sac
Replace 580 LF of 12" pipe with 420 LF of 15" pipe and 160 LF of 12" pipe
Cost: $323,000
Priority: Low

AC4

61ST ST NE
Jones Creek
60TH PL NE
59TH ST NE
63RD AVE NE
64TH AVE NE
65TH DR NE
66TH AVE NE
58TH ST NE
61ST DR NE
57TH PL NE
56TH PL NE

VICINITY

Stormlines
- < 8 inch
- 8 - 12 inch
- 13 - 18 inch
- 30 - 36 inch

Catch Basin
- Cleanout
- CB Type 1
- CB Type 2
- Storm Facilities

- CIP Project
- Culvert
- Parcels
- Streams

N

0 200 400 600 Feet

2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE

CIP PROJECTS (AC3)
FIGURE 4-17

CITY OF Marysville WASHINGTON

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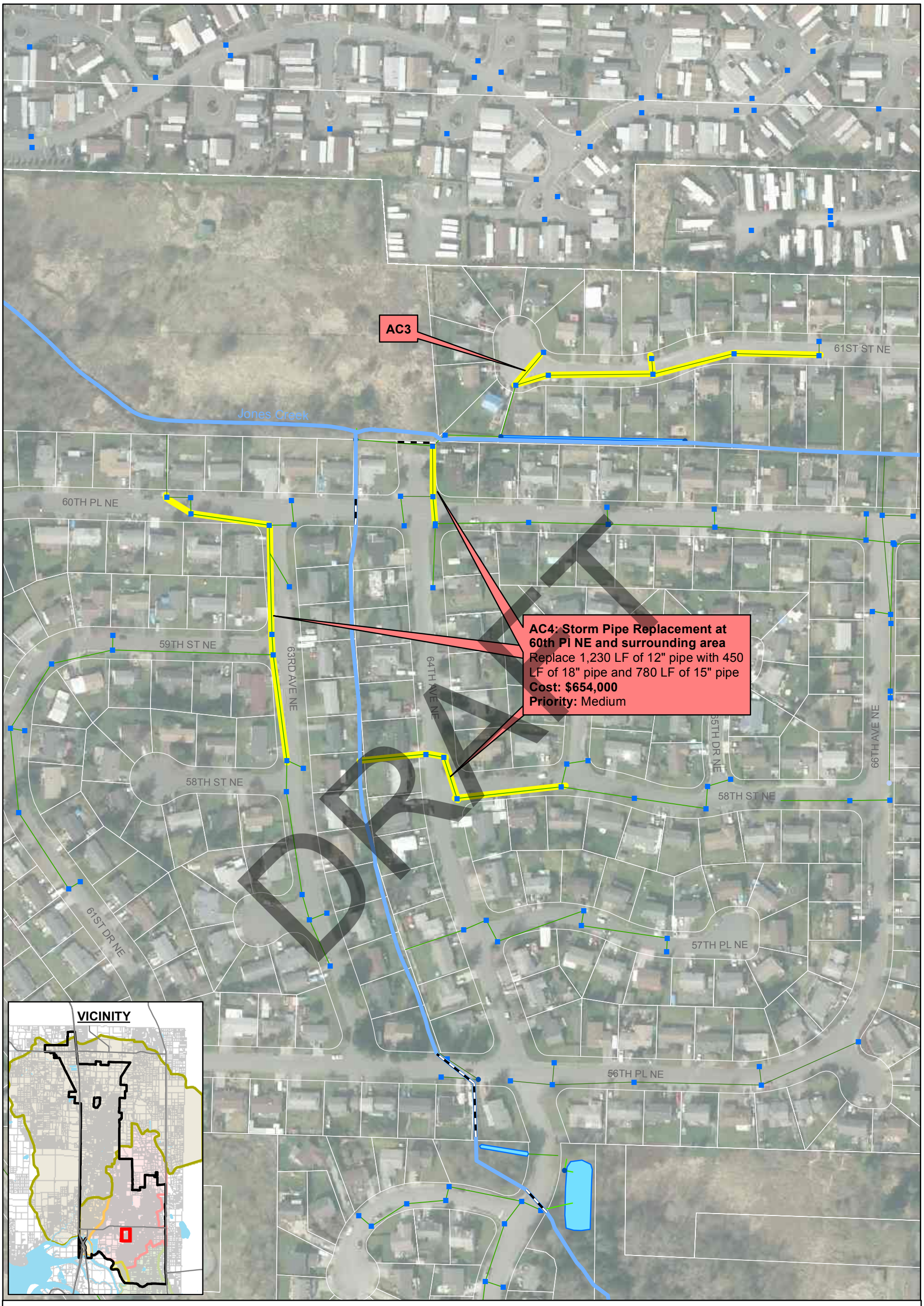
AC3
AC4: Storm Pipe Replacement at 60th Pl NE and surrounding area
Replace 1,230 LF of 12" pipe with 450 LF of 18" pipe and 780 LF of 15" pipe
Cost: $654,000
Priority: Medium
Jones Creek
61ST ST NE
60TH PL NE
59TH ST NE
63RD AVE NE
64TH AVE NE
58TH ST NE
65TH DR NE
66TH AVE NE
61ST DR NE
57TH PL NE
56TH PL NE
VICINITY
DRAFT
Stormlines
< 8 inch
8 - 12 inch
13 - 18 inch
30 - 36 inch
Catch Basin
Cleanout
CB Type 1
CB Type 2
Storm Facilities
CIP Project
Culvert
Parcels
Streams
N
0
200
400
600
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
CIP PROJECTS (AC4)
FIGURE 4-18
CITY OF Marysville WASHINGTON
M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-18.mxd

EBEY SLOUGH NORTH BASIN

ES1: Historic Downtown Green Retrofit Study

Create selection criteria to identify ideal locations for green stormwater infrastructure within the Historic Downtown District. Design stormwater management solutions in accordance with the 2012 *Low Impact Development Technical Guidance Manual for Puget Sound* and the 2014 Department of Ecology *Stormwater Management Manual for Western Washington* for the locations selected (Figure 4-19).

Estimated Project Cost: $150,000

ES2: Water Quality Treatment Facility at Downtown Marina Outfall

Identify alternatives, design and construct an end-of-pipe stormwater treatment facility at the Downtown Marina outfall. The facility is estimated to be up to 12,000 sf and would provide treatment to the upstream downtown core of the City. The specific form of treatment will be identified in the predesign stage as numerous proprietary and standard facilities continue to be made available. For the purposes of this Plan, it is estimated that a new treatment facility will cost approximately $350 per acre of facility provided (Figure 4-20).

Estimated Project Cost: $8,208,000

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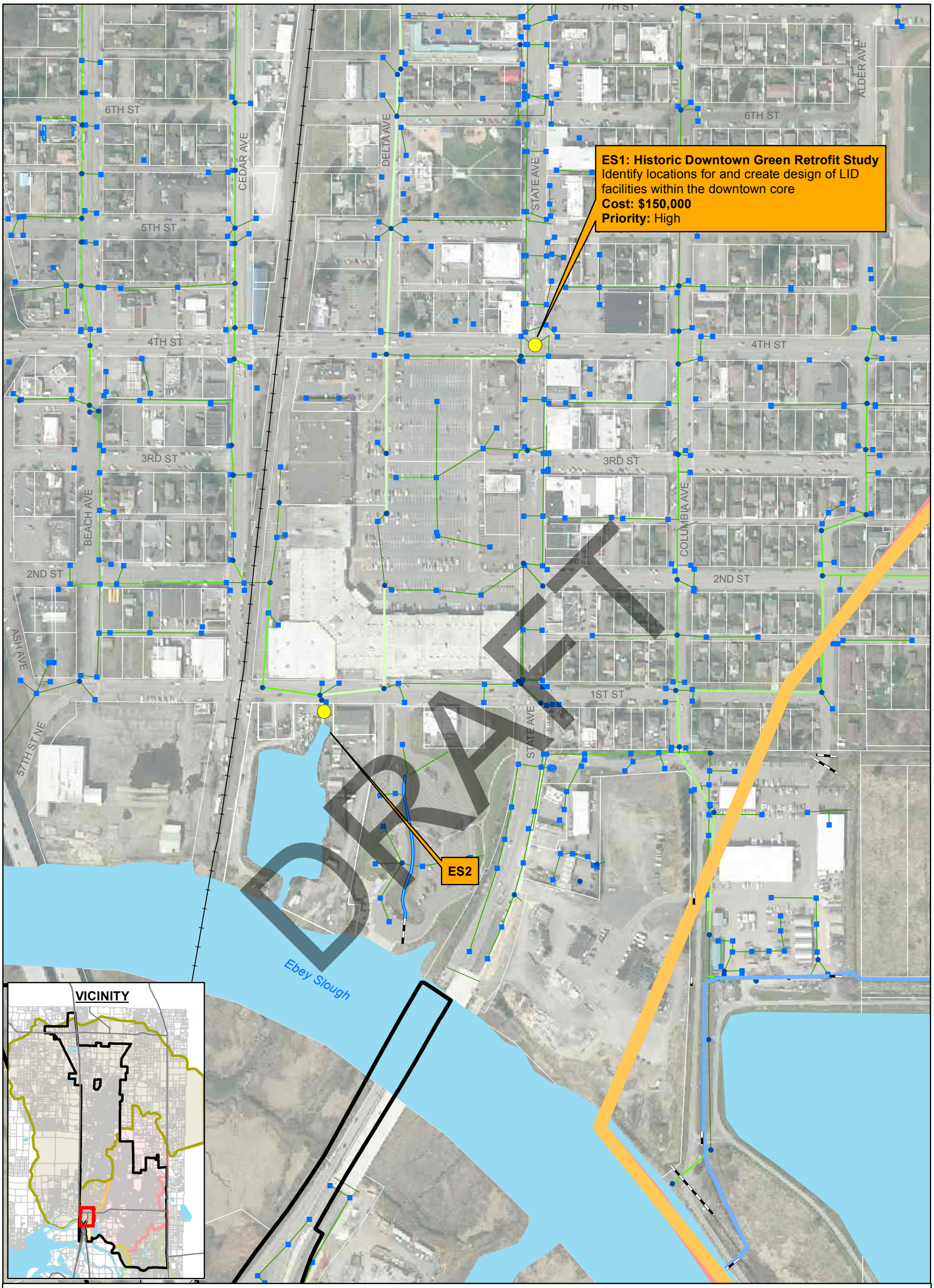
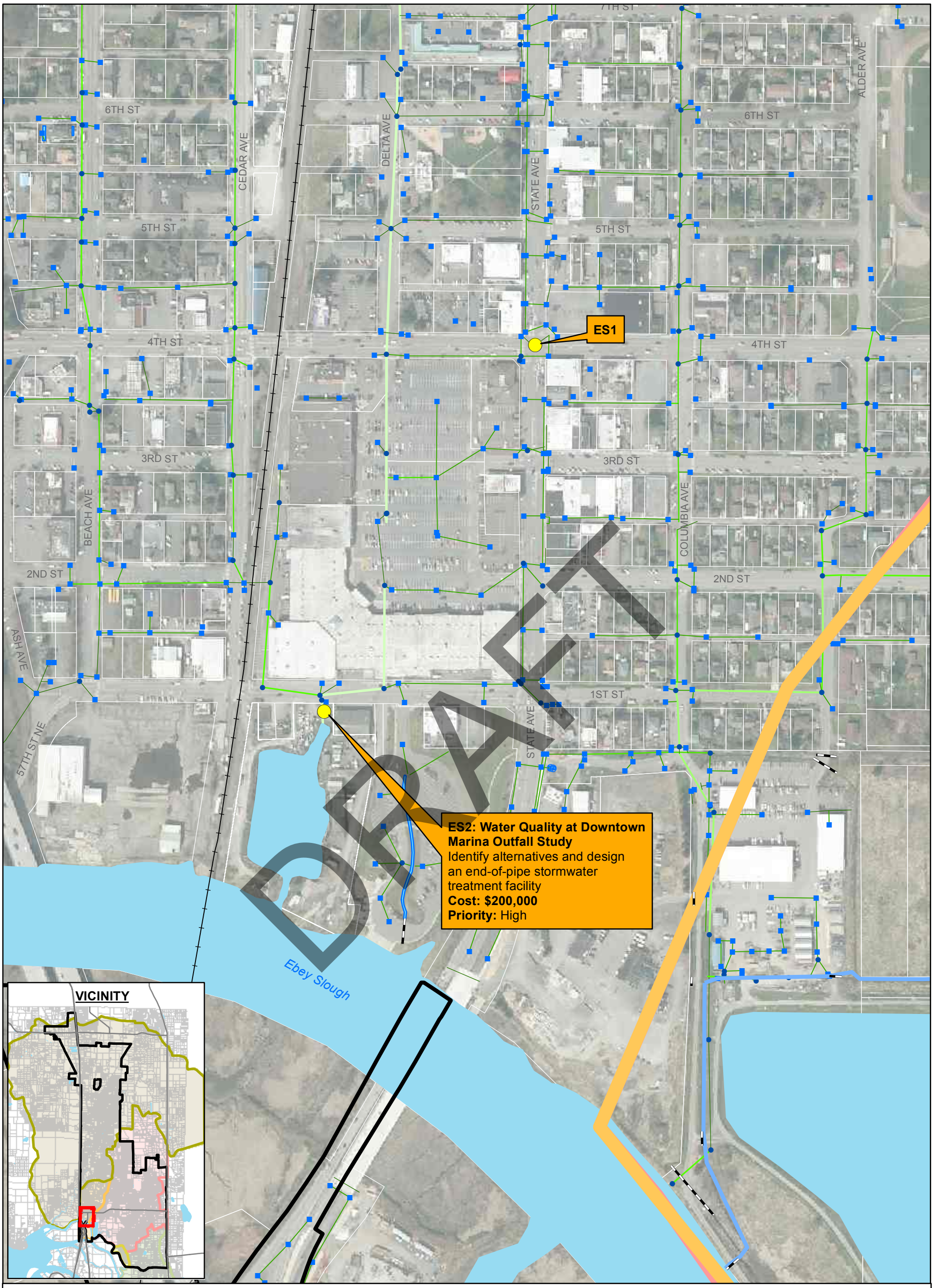

6TH ST
CEDAR AVE
DELTA AVE
STATE AVE
ALDER AVE
5TH ST
4TH ST
3RD ST
BEACH AVE
2ND ST
ASH AVE
57TH ST NE
1ST ST
COLUMBIA AVE
ES1: Historic Downtown Green Retrofit Study
Identify locations for and create design of LID facilities within the downtown core
Cost: $150,000
Priority: High
ES2
Ebey Slough
DRAFT
VICINITY
Stormlines
< 8 inch
8 - 12 inch
13 - 18 inch
21 - 28 inch
30 - 36 inch
> 42 inch
Catch Basin
CB Type 1
CB Type 2
CB Type 3
Storm Facilities
CIP Project
Culvert
Marysville City Limits
BNSF Railroad
Streams
N
0
400
800
1,200
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
CIP PROJECTS (ES1)
FIGURE 4-19
CITY OF Marysville WASHINGTON
M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-19.mxd


6TH ST
CEDAR AVE
DELTA AVE
STATE AVE
ALDER AVE
5TH ST
4TH ST
3RD ST
BEACH AVE
COLUMBIA AVE
2ND ST
ASH AVE
1ST ST
57TH ST NE
ES1
ES2: Water Quality at Downtown Marina Outfall Study
Identify alternatives and design an end-of-pipe stormwater treatment facility
Cost: $200,000
Priority: High
Ebey Slough
VICINITY
DRAFT
Stormlines
< 8 inch
8 - 12 inch
13 - 18 inch
21 - 28 inch
30 - 36 inch
> 42 inch
Catch Basin
CB Type 1
CB Type 2
CB Type 3
Storm Facilities
CIP Project
Culvert
Marysville City Limits
BNSF Railroad
Streams
N
0
400
800
1,200
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
CIP PROJECTS (ES2)
FIGURE 4-20
CITY OF Marysville WASHINGTON
M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-20.mxd

SUNNYSIDE CREEK BASIN

SC1: Culvert Replacement along King Creek at Soper Hill Road

Replace existing 4-foot span, 3-foot rise box culvert with a 17-foot span, 7-foot rise reinforced concrete box culvert that is 160-feet in length. The culvert shall be countersunk 30 percent and the streambed within the culvert shall be filled with gravel and sediment to comply with WDFW 2013 Guidelines. The average spacing of the steps or cascades should be approximately 26 feet throughout the length of the culvert. Temporary bypass of flow around the work area will be necessary during construction (Figure 4-21).

Estimated Project Cost: $1,590,000

A list of the capital improvement projects with corresponding project cost estimates and priorities are provided in Table 4-1.

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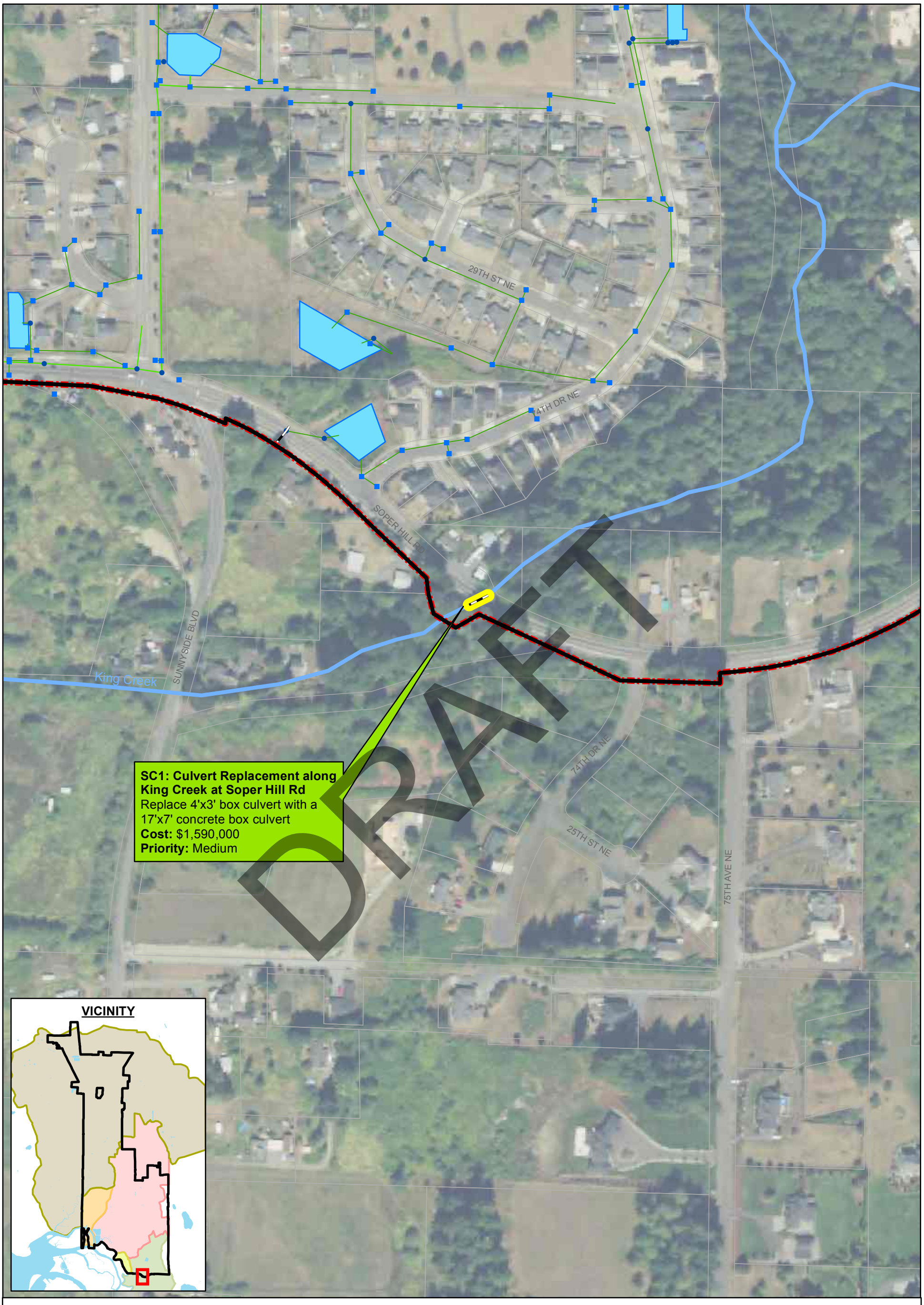

29TH ST NE
74TH DR NE
SOPER HILL RD
SUNNYSIDE BLVD
King Creek
74TH DR NE
25TH ST NE
75TH AVE NE
SC1: Culvert Replacement along King Creek at Soper Hill Rd
Replace 4'x3' box culvert with a 17'x7' concrete box culvert
Cost: $1,590,000
Priority: Medium
DRAFT
VICINITY
Stormlines
< 8 inch
8 - 12 inch
13 - 18 inch
21 - 28 INCH
30 - 36 INCH
> 42 INCH
Catch Basin
CLEANOUT
CB Type 1
CB Type 2
CB Type 3
Storm Facilities
Marysville City Limits
Urban Growth Boundary
Streams
Parcels
N
0
200
400
600
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
CIP PROJECTS (SC1)
FIGURE 4-21
CITY OF Marysville WASHINGTON
M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Figure 4-21.mxd

TABLE 4-1

Capital Improvement Projects

Project No.	Previous Project No. (2009)	Project Location	Project Description	Cost	Priority
Quilceda Creek					
QC1	N/A	North of 172nd at Edward Springs Reservoir	Replace existing 36-inch CMP stormwater pipe with new CPEP pipe	$381,000	High
QC2	MQ-HH-19	Field north of 152nd between Smokey Point Boulevard and 51st Avenue NE	Install Fish Screen in Hayho Creek	$231,000	Low
QC3	MQ-EC-03/ MQ-EC-05	Field north of 152nd between 51st Avenue NE and the BNSF Railroad (1)	Replace existing 30-inch concrete and CMP culverts with 16-foot span, 6-foot rise reinforced concrete box culverts.	$617,000	Low
QC4A	MQ-HH-16	Hayho Creek between 144th Avenue NE and 172nd Street NE(1)	Realign Hayho Creek within existing wetlands	$1,680,000	Medium
QC4B	MQ-HH-32	North of 152nd St. NE(1)	Provide 4,400 LF of 48-inch conveyance to serve as a main trunk line for Ponds 1 and 2	$4,901,000	High
QC4C	MQ-HH-32	Corner of 152nd St. NE and 43rd Ave. NE	Construct 3.5-acre Regional Pond 3	$1,831,000	Medium
QC5A	MQ-EC-13	West side of the BNSF RR between 154th Drive NE and 172nd Street NE	Realign Edgecomb Creek and install a 20-acre regional detention pond	$19,042,000	High
QC5B	MQ-EC-13	Along and east of 51st Ave. NE(1)	Install 10,550 LF of conveyance pipe ranging from 24-inch to 54-inch.	$8,517,000	High
QC5C	MQ-EC-13	Between 51st Ave. NE and BNSF railway	Install 20-acre regional detention pond	$5,054,000	High
QC6	MQ-EC-01	152nd Street NE between 51st Avenue NE and BNSF RR (Edgecomb Creek)	Replace existing 36-inch CMP culvert with new 17-foot span, 6-foot rise reinforced concrete box culvert	$489,000	Medium
QC7	MQ-MQ-07	152nd Street NE between BNSF RR and 67th Avenue NE	Replace existing 30-inch CMP culvert with a 15-foot span, 5-foot rise reinforced concrete box culvert	$520,000	Medium
QC8	MQ-MQ-04	Strawberry Fields Trail just south of 152nd Street NE	Replace existing 36-inch CMP culvert with 19-foot span, 7-foot rise reinforced concrete box culvert and restore 1,750 LF of channel bank	$548,000	Low

TABLE 4-1 – (continued)

Capital Improvement Projects

Project No.	Previous Project No. (2009)	Project Location	Project Description	Cost	Priority
QC9	MQ-HH-09	43rd Avenue NE at Emerald Hills Estates	Provide a berm within the existing channel	$69,000	Low
QC10	MQ-HH-38	Hayho Creek between BNSF RR and 47th Drive NE(1)	Regrade 850 LF of Hayho Creek and install native riparian vegetation	$2,882,000	Medium
QC10A	N/A	136th Street NE at 45th Avenue NE	Provide 51,000 cf of temporary storage via a pond on the north side of 136th Street NE and replace 145 LF of 15-inch HDPE with 18-inch CPEP	$425,000	Medium
QC11	WQ-WQ-08	104th Street NE between 39th Drive NE and 42nd Avenue NE	Replace existing 4-foot span concrete box culvert with a 50-foot prefabricated bridge	$1,017,000	Medium
QC12	WQ-WQ-09	103rd Street NE west of 42nd Avenue NE	Replace 24-inch CMP culvert with 50-foot Bridge	$980,000	Medium
QC13	MQ-QC-09	State Avenue between 100th Street NE and 103rd Place NE	Replace two existing 6-foot span 6-foot rise concrete box culverts with 180-foot prefabricated bridge	$6,755,000	High
Allen Creek					
AC1	AC-AC-10	95th Street NE and 67th Avenue NE	Replace 227 LF of existing 12-inch storm pipe with 18-inch CPEP pipe	$161,000	Low
AC2	AC-AC-03	88th Street NE between 60th Drive NE and 67th Avenue NE	Replace existing 7-foot span, 5-foot rise concrete box culvert with 25-foot span, 10-foot rise reinforced concrete box culvert and stabilize 50 LF of south bank	$898,000	High
AC3	AC-JC-12	61st Street NE	Replace 580 LF of existing 12-inch storm pipe with 420 LF of 15-inch CPEP pipe and 160 LF of new 12-inch CPEP pipe	$323,000	Low
AC4	AC-JC-11	63rd Place NE, 63rd Avenue NE, and 64th Avenue NE	Replace 1,230 LF of existing 12-inch storm pipe with 450 LF of 18-inch CPEP pipe and 780 LF of 15-inch CPEP pipe	$654,000	Medium
Ebey Slough North					
ES1	N/A	Historic Downtown Marysville	Green Retrofit Study	$150,000	High
ES2	ES-DT-03	Treatment Facility at Marina Outfall at Ebey Slough	Water Quality Treatment Facility	$8,208,000	High

TABLE 4-1 – (continued)

Capital Improvement Projects

Project No.	Previous Project No. (2009)	Project Location	Project Description	Cost	Priority
Sunnyside Creek					
SC1	N/A	Soper Hill Road at 74th Drive NE	Replace existing 4-foot span, 3-foot rise concrete box culvert with a 17-foot span, 7-foot rise reinforced concrete box culvert.	$1,590,000	Medium

(1) Coordination with private property owner(s) will be necessary.

Table 4-2 summarizes the 6-Year Capital Improvement Project Plan. Detailed cost estimates are provided in Appendix B.

These projects are ranked based on the severity of the problem and City input. Other drainage problems may arise in the future and will need to be addressed at that time. In addition, the current Plan will need to be reevaluated and updated as necessary as development and regulatory requirements change.

TABLE 4-2

Capital Improvement Plan (2017 to 2022)

Project No.	Project Name	Project Description	2016 Cost	Year Planned
QC4B	Conveyance for Regional Detention Ponds 1 and 2	Install 4,400 LF of 48-inch conveyance pipe north of 152nd Street NE	$4,901,000	2019
QC13	Culvert Removal and Bridge Installation along Quilceda Creek at State Avenue	Install 180-feet prefabricated bridge along State Avenue	$6,755,000	2018
ES1	Historic Downtown Green Retrofit Study	Green Retrofit Study	$150,000	2017
ES2	Water Quality Treatment Facility at Downtown Marina Outfall	Water Quality Study	$8,208,000	2018
QC5A	Edgecomb Creek Channel Realignment	Realign Edgecomb Creek and install a 20-acre regional detention pond	$19,042,000	2023
QC5B	Edgecomb Creek Conveyance	Install 10,550 LF of conveyance pipe ranging from 24 inch to 54 inch.	$8,517,000	2022
QC5C	Edgecomb Creek Regional Detention Facility	Install 20-acre regional detention pond	$5,054,000	2021

CHAPTER 5

FINANCIAL REVIEW

The financial resources available to the City to fund operation and maintenance and capital improvements for stormwater infrastructure, other than general revenue from property taxes, include service charges, general facilities charge (GFCs), grants and loans. This chapter provides a summary of potential funding sources if additional funds are needed. The City has formed a stormwater utility to fund ongoing operation and maintenance, and capital improvements. An analysis to fund the planned stormwater program is provided.

According to information provided by the City's financial staff, the City's 2015 stormwater related operating expenditures were $1,837,000. Chapter 4 shows a range from approximately $150,000 to $19 million per year in the 6-year plan for capital project expenditures. The City's stormwater-related revenues are found to be adequate to support the planned operational expenses. However, there are significant funding deficiencies for funding capital improvements over the next 20 years.

STORMWATER UTILITY

RCW Chapter 35.67 allows the City to form a stormwater management utility to provide for the planning, development, management, operation, maintenance, use, and improvement of the storm drainage system. A utility is an enterprise that is operated or regulated by a government entity. The enterprise funds are predominantly self-sustaining and account for the acquisition, operation, and maintenance of governmental facilities.

The City of Marysville stormwater utility formation and rate structure is codified in Marysville Municipal Code Chapter 14.19. The current 2016 stormwater service charge is set at $11.26 per month per equivalent residential unit (ESU) or single-family residence (SFR). One ERU corresponds to 3,200 square feet of impervious surface area for non-single-family properties per MMC Chapter 14.19.050. Therefore, for non-single-family residential parcels, the stormwater service charge would be $11.26 for every 3,200 square feet of impervious surface area per parcel. Also, per MMC Chapter 14.17.010, the City charges a one-time Connection Charge of $95 per new ERU.

The monthly service charge is a fee levied by the City upon all developed property within the City's boundary. The stormwater service charge pays for improvements and maintenance to address drainage and flooding problems within the City. It was adopted to protect the environment and comply with new regulations protecting drainage systems.

Knowing the total number of ERUs in the City is useful in determining the monthly service charge required to support the O&M program and planned capital improvements. Using 2015 rate revenues of $4,166,817 and a monthly 2015 service rate of $11.04, it is

estimated that the City collected revenue from 31,448 ERUs (= $4.1 million / $11.04 per ERU / 12 months).

CAPITAL IMPROVEMENT PLAN

The recommended capital improvements for the stormwater utility are detailed in Chapter 4. The list of projects, recommended schedule for implementation of the 6-year CIP, and their costs are shown in Table 5-1.

TABLE 5-1

Planned Capital Improvements 2017-2023[(1)]

Capital Expense	2017	2018	2019	2020	2021	2022	2023
QC13: Culvert Removal and Bridge Installation along Quilceda Creek at State Avenue		$6,755,000					
ES2: Water Quality Treatment Facility at Downtown Marina Outfall		$8,208,000					
QC4B: Conveyance for Regional Detention Ponds 1 and 2			$4,901,000				
ES1: Historic Downtown Green Retrofit Study	$150,000						
QC5A: Edgecomb Creek Channel Realignment							$19,042,000
QC5B: Edgecomb Creek Conveyance						$8,517,000	
QC5C: Edgecomb Creek Regional Detention Facility					$5,054,000		

(1) Project costs reflect estimated Year 2016 costs. A cost escalation of approximately 3 percent should be used when budgeting for the project.

OPERATIONS AND MAINTENANCE AND EQUIPMENT PURCHASE

The annual stormwater operating expenses is shown below. In 2015, the annual stormwater maintenance cost based on City records is $1,836,340. Table 5-2 shows 2015 operating and maintenance expenses.

TABLE 5-2

2015 Operating and Maintenance Expenses

Expenditures	2015
Regular Salary	$566,860
Seasonal Salary	$30,965
Overtime	$124
Social Security	$44,916
Retirement	$55,738
Health Insurance	$110,748
Workmen's Comp.	$15,952
Unemployment Comp.	$1,172
Uniforms/Clothing	$858
Office and Operating	$49,094
Fuel Consumed	$1,121
Small Tools	$4,708
Flail Mower	$17,987
Pipe Ranger	$24,580
Professional Services	$229,503
Surface Water	$18,028
Communication	$6,923
Travel	$0
Operating Rentals	$1,152
Public Utility Service	$5,918
Repairs and Maintenance	$54,728
Miscellaneous	$28,521
NPDES Permit	$49,688
Qwuloolt Mitigation	$33,274
Qwuloolt Out.	$3,891
State Taxes	$69,233
Operating Permits	$20,794
City Taxes	$326,432
Machinery and Equipment	$17,175
Facilities Maintenance	$507
Small Engine Shop	$15,443
Computer Services	$30,291
Total	**$1,836,324**

SERVICE CHARGE DETERMINATION

The 6-year analysis assumes the capital improvement projects from Table 5-1 are funded from monthly service rates and capital facility charges. As an alternative, low interest loans from the PWTF program may be used when necessary. Use of low interest loans may be financially favorable to self-financing as long as the interest costs of the loans are less than the interest that can be earned from reserve funds.

The budget forecast assumptions are included in Table 5-3. The stormwater utility expenses are taken from the 2015 budget. An increase of 0.5 percent is assumed for ERUs, and a 2.0 percent increase in project and O&M costs is assumed as a conservative measure in assessing the budget.

TABLE 5-3

Budget Forecast Assumptions and Baseline Operating Costs

Item	Assumption
Number of ERUs in December 2015	
Total ERUs for Rate Analysis	31,448
Escalation Factors	
Growth(1)	2.0%
Inflation (Yearly O&M Expenses)	2.0%
Construction Cost Inflation	3.0%
Investment Interest	1.0%
Revenue Bond	4.6%
Taxes	
State Excise Tax	1.8%

(1) Source: City of Marysville 2015 Comprehensive Plan.

PRELIMINARY RATE ANALYSIS

Table 5-4 presents a simple, cash-based rate analysis based on the recommended project financing. The preliminary rate analysis is based on the following assumptions.

1. The rate of growth (ERUs), O&M costs, and project costs assumed at a 2.0 percent annual increase for each.

2. The utility has a zero balance at the start of 2016. This does not reflect actual conditions but since the City does not track the cash balance of each of its utilities, the beginning balance specifically for stormwater purposes could not be determined.

Based on the assumptions listed above, the financial forecast shows the amount of incoming revenues covering the anticipated operating expenses. Using the assumed

project completion dates in Table 5-1, the stormwater service charge does not have sufficient funds to accommodate the proposed 6-year CIP. Without an increase in service charges, these projects would need to be funded via other means such as grants or loans as explained in the next Section. At a minimum, it is recommended that the stormwater service charge be increased annually per a cost-of living or consumer price index factor.

TABLE 5-4
Financial Analysis

Year	2017	2018	2019	2020	2021	2022	2023
Beginning Fund Balance[(1)]	-	$2,332,729	($1,801,470)	($3,937,264)	($1,021,047)	($3,000,934)	($8,278,743)
ERUs	31,448	32,077	32,718	33,373	34,040	34,721	35,415
Monthly Storm Service Rate	$11.49	$11.71	$11.95	$12.19	$12.43	$12.68	$12.93
Rate Revenue	$4,334,193	$4,509,294	$4,691,470	$4,881,005	$5,078,198	$5,283,357	$5,496,805
Connection Fees	$59,751	$60,946	$62,164	$63,408	$64,676	$65,969	$67,289
Total Revenue	$4,393,944	$4,570,240	$4,753,634	$4,944,413	$5,142,874	$5,349,327	$5,564,094
Yearly O&M Costs	$1,911,215	$1,949,439	$1,988,428	$2,028,196	$2,068,760	$2,110,136	$2,152,338
Operating Surplus (Deficiency)	$2,482,729	$2,620,801	$2,765,207	$2,916,217	$3,074,113	$3,239,191	$3,411,755
CIP Projects							
QC13: Culvert Removal and Bridge Installation Along Quilceda Creek at State Avenue		$6,755,000					
ES2: Water Quality Treatment Facility at Downtown Marina Outfall		$8,208,000					
QC4B: Conveyance for Regional Detention Ponds 1 and 2			$4,901,000				
ES1: Historic Downtown Green Retrofit Study	$150,000						
QC5A: Edgecomb Creek Channel Realignment							$19,042,000
QC5B: Edgecomb Creek Conveyance						$8,517,000	
QC5C: Edgecomb Creek Regional Detention Facility					$5,054,000		
CIP Total	**$150,000**	**$14,963,000**	**$4,901,000**	**-**	**$5,054,000**	**$8,517,000**	**$19,042,000**
Yearly Surplus (Deficiency)	**$2,332,729**	**($10,009,470)**	**($12,145,264)**	**($9,229,047)**	**($11,208,934)**	**($16,486,743)**	**($32,116,987)**

(1) The actual beginning fund balance for 2016 could not be determined from City financial records. The ending balance in December 2016 is used to predict the beginning fund balance for 2017.

GRANT AND LOAN PROGRAMS

Grants and loans can be used to fund capital improvement projects, but cannot be used to fund operation and maintenance. Within the State of Washington, there are several grant and loan funds available for capital improvements. Among these are the Public Works Trust Fund (PWTF), Centennial Clean Water Fund (CCWF), and the State Revolving Fund (SRF). The various grant and loan programs are briefly described below for reference.

PUBLIC WORKS TRUST FUND

This program is a revolving fund loan designed to help local governments finance needed public works projects through low-interest loans and technical assistance. It was established by the Washington State Legislature in 1985 and is administered by the Public Works Board. The Legislature cancelled the 2010 to 2016 biennium funding cycles. Loan repayments and tax revenue streams that fund the program continued to be deposited in the fund and yet, it has remained uncertain as to what level of funding may be available through the program in the future. Currently, the Board is tentatively offering $100 million state-wide in construction loans for the 2017 funding cycle.

DEPARTMENT OF ECOLOGY INTEGRATED FUNDING PROGRAM

The Department of Ecology administers several loan and grant programs that can be used to fund the following:

- Stormwater capital improvements including stormwater system retrofits;
- Low-impact development projects;
- Inventories of stormwater sources;
- Public education and communication;
- Review and preparation of stormwater regulations;
- Mapping;
- Source control activities; and
- Establishing and refining stormwater utilities.

The funding programs include the Centennial Clean Water Grant program (state funds), the Clean Water Act Section 319 Grant program (federal funds), the Stormwater Financial Assistance Grant Program (state funds) and the Washington State Revolving Fund Loan program (federal and state funds). A common application is available for funding from the Ecology-administered programs. The programs are competitive and the majority of the funding available is in the form of low-interest loans.

DEBT FINANCING

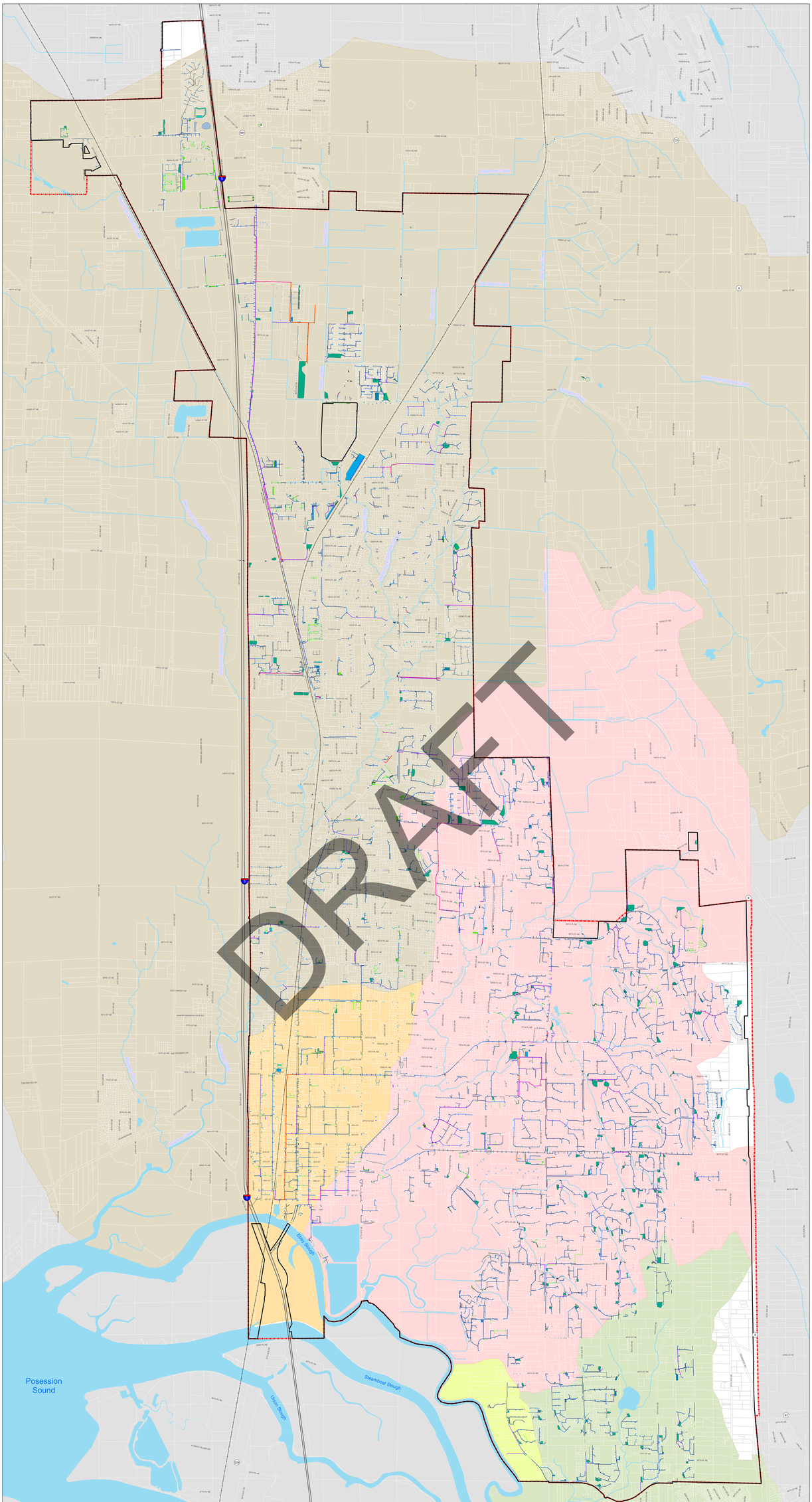
Two forms of debt financing are available for capital improvements including general obligation (G.O.) bonds and revenue bonds. G.O. bonds are backed by the "full faith and credit of the City" and are paid for through levies. These bonds require voter approval before they can be implemented. A less common means of financing capital improvements associated with stormwater projects is through the use of revenue bonds. The City, like other municipalities, is capable of issuing tax-exempt bonds. The principal and interest of such bonds are repaid from revenue generated from a utility, such as a water, sewer, or stormwater utility. This type of funding may be offered without voter approval. However, in order to qualify to sell revenue bonds, the City must establish that its net operating income is equal to or greater than its debt coverage factor, typically 1.4, multiplied by the annual principal and interest due for all outstanding bonded indebtedness. Utility rates have to be set high enough to ensure revenue bond repayment.

FUTURE CAPITAL IMPROVEMENT PLAN

The total cost, in 2016 dollars, of the 2017-2023 CIP is over $52 million. The stormwater utility revenues alone are adequate to support the planned operational expenses. However, they are inadequate to cover the capital expenses over the 6-year planning period, without any service rate increases. Further, the amount of funds available for capital projects will decrease due to increasing O&M costs. However, the total cost of the projects scheduled for years 7 through 20 is over $15 million (2016 dollars), for which there would be a significant revenue shortfall, were rates to remain unchanged.

APPENDIX A

STORMWATER BASE MAP


DRAFT
Possession Sound
Ebey Slough
Steamboat Slough
Union Slough
Allen Creek
Ebey Slough
Quilceda Creek
Snoqualmie River
Stormlines
Unknown
< 8 Inch
9 - 12 Inch
13 - 15 Inch
16 - 18 Inch
19 - 24 Inch
25 - 30 Inch
31 - 36 Inch
37 - 48 Inch
> 48 Inch
Storm Facilities
Bioswale
Detention Pipe
Detention Pond
Detention Vault
Filter Strip
Infiltration Pond
Infiltration Trench
Infiltration Vault
Rain Garden
Unkown
Catch Basins
Cleanout
CB Type 1
CB Type 2
CB Type 3
Culvert
Basins
Allen Creek Basin
Ebey Slough Basin North
Ebey Slough Basin South
Quilceda Creek Basin
Sunnyside Creek Basin
Water Bodies
Streams
Marysville City Limits
Urban Growth Boundary
BNSF Railroad
N
0
2,500
5,000
7,500
Feet
2016 SURFACE WATER COMPREHENSIVE PLAN UPDATE
STORMWATER BASEMAP
CITY OF Marysville WASHINGTON
M:\MARYSVILLE\15550.00 Surface Water Comp Plan\GIS\Maps For Plan\Stormwater Facilities Large 2.mxd

APPENDIX B

COST ESTIMATES

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC1: Stormwater Pipe Replacement at Edward Springs Reservoir
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 20,000	$ 20,000
3.	Project Temporary Traffic Control	1	LS	$ 10,000	$ 10,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Temporary Erosion Control	1	LS	$ 3,000	$ 3,000
7.	Dewatering	1	LS	$ 10,000	$ 10,000
8.	Trench Excavation Safety Systems	400	LF	$ 5	$ 2,000
9.	Excavation Incl. Haul	540	CY	$ 40	$ 21,600
10.	Remove Existing Pipe	400	LF	$ 30	$ 12,000
11.	Crushed Surfacing Base Course	720	TN	$ 35	$ 25,200
12.	36-inch Storm Pipe incl. Bedding	400	LF	$ 250	$ 100,000
13.	Connect to Drainage Structure	2	EA	$ 700	$ 1,400
14.	Surface Restoration (seeding, fertilizing, planting, etc)	230	SY	$ 7	$ 1,610
15.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 217,000
	Construction Contingencies (20%)				$ 44,000
	Sales Tax (9.1%)				$ 20,000
	Total Construction Cost				**$ 281,000**
	Design, Engineering & Construction Management (25%)				$ 71,000
	Permitting (10%)				$ 29,000
	Easements (Temporary & Permanent)	0	AC	$ 40,000	$ -
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	0	EA	$ 1,000	$ -
	TOTAL PROJECT COST				**$ 381,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC2: Fish Screen Installation along Hayho Creek at 160th Street NE
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 11,000	$ 11,000
3.	Project Temporary Traffic Control	1	LS	$ 2,000	$ 2,000
4.	Locate Existing Utilities	1	LS	$ 1,000	$ 1,000
5.	Survey	1	LS	$ 1,000	$ 1,000
6.	Temporary Erosion Control	1	LS	$ 7,500	$ 7,500
7.	Dewatering	1	LS	$ 7,500	$ 7,500
8.	Clearing and Grubbing	0.25	AC	$ 15,000	$ 3,750
9.	Temporary Stream Bypass	1	LS	$ 25,000	$ 25,000
10.	Structure Excavation	5	CY	$ 40	$ 200
11.	Fish Screen Barrier	1	EA	$ 35,000	$ 35,000
12.	Vertical In-Stream Trash Rack	1	EA	$ 15,000	$ 15,000
13.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 112,000
	Construction Contingencies (20%)				$ 23,000
	Sales Tax (9.1%)				$ 11,000
	Total Construction Cost				**$ 146,000**
	Design, Engineering & Construction Management (25%)				$ 37,000
	Permitting (25%)				$ 37,000
	Easements (Temporary & Permanent)	5856	SF	$ 1	$ 6,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	5	EA	$ 1,000	$ 5,000
	TOTAL PROJECT COST				**$ 231,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC3: Field Access Culvert Replacement along Edgecomb Creek
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
Schedule A Culvert 1					
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 15,000	$ 15,000
3.	Project Temporary Traffic Control	1	LS	$ 3,000	$ 3,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 3,000	$ 3,000
6.	Temporary Erosion Control	1	LS	$ 5,000	$ 5,000
7.	Dewatering	1	LS	$ 10,000	$ 10,000
8.	Temporary Bypass	1	LS	$ 25,000	$ 25,000
9.	Excavation Incl. Haul	210	CY	$ 40	$ 8,400
10.	Remove Existing Pipe	30	LF	$ 30	$ 900
11.	Crushed Surfacing Base Course	20	TN	$ 35	$ 700
12.	Streambed Gravel	110	TN	$ 50	$ 5,500
13.	Gravel Borrow	50	TN	$ 26	$ 1,300
14.	16-ft Span Reinforced Concrete Box Culvert	30	LF	$ 2,700	$ 81,000
15.	Surface Restoration (seeding, fertilizing, planting, etc)	90	SY	$ 7	$ 630
16.	Project Documentation	1	LS	$ 1,000	$ 1,000
				Schedule A Subtotal	$ 164,000
Schedule B Culvert 2					
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 15,000	$ 15,000
3.	Project Temporary Traffic Control	1	LS	$ 3,000	$ 3,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 3,000	$ 3,000
6.	Temporary Erosion Control	1	LS	$ 5,000	$ 5,000
7.	Dewatering	1	LS	$ 10,000	$ 10,000
8.	Temporary Bypass	1	LS	$ 25,000	$ 25,000
9.	Excavation Incl. Haul	120	CY	$ 40	$ 4,800
10.	Remove Existing Pipe	27	LF	$ 30	$ 810
11.	Crushed Surfacing Base Course	20	TN	$ 35	$ 700
12.	Streambed Gravel	130	TN	$ 50	$ 6,500
13.	Gravel Borrow	40	TN	$ 26	$ 1,040
14.	16-ft Span Reinforced Concrete Box Culvert	24	LF	$ 3,250	$ 78,000
15.	Surface Restoration (seeding, fertilizing, planting, etc)	90	SY	$ 7	$ 630
16.	Project Documentation	1	LS	$ 1,000	$ 1,000
				Schedule B Subtotal	$ 158,000
	Project Subtotal				$ 322,000
	Construction Contingencies (20%)				$ 65,000
	Sales Tax (9.1%)				$ 30,000

Total Construction Cost			**$ 417,000**
Design, Engineering & Construction Management (25%)			$ 105,000
Permitting (20%)			$ 84,000
Easements (Temporary & Permanent)	10000	SF	$ 10,000
Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	1	EA	$ 1,000
TOTAL PROJECT COST			**$ 617,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE

QC4A: Hayho Creek Channel Realignment (North Marysville Master Drainage Plan)
September 27, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 62,000	$ 62,000
3.	Project Temporary Traffic Control	1	LS	$ 7,000	$ 7,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Temporary Erosion Control	1	LS	$ 5,000	$ 5,000
7.	Dewatering	1	LS	$ 150,000	$ 150,000
8.	Clearing and Grubbing	4.5	AC	$ 15,000	$ 67,500
9.	Excavation Incl. Haul	9,500	CY	$ 5	$ 47,500
10.	Enhanced Surface Restoration (wetland plantings, seeding, etc)	21,780	SY	$ 15	$ 326,700
11.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 676,000
	Construction Contingencies (20%)				$ 136,000
	Sales Tax (9.1%)				$ 62,000
	Total Construction Cost				**$ 874,000**
	Design, Engineering & Construction Management(25%)				$ 219,000
	Permitting (20%)				$ 175,000
	Easements (Temporary & Permanent)	10	AC	$ 40,000	$ 400,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	12	EA	$ 1,000	$ 12,000
	TOTAL PROJECT COST				**$ 1,680,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE

QC4B: Conveyance for Regional Detention Ponds No. 1 and 2 (North Marysville Master Drainage Plan)
September 27, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 238,000	$ 238,000
3.	Project Temporary Traffic Control	1	LS	$ 21,000	$ 21,000
4.	Locate Existing Utilities	1	LS	$ 5,000	$ 5,000
5.	Survey	1	LS	$ 20,000	$ 20,000
6.	Temporary Erosion Control	1	LS	$ 2,000	$ 2,000
7.	Dewatering	1	LS	$ 240,000	$ 240,000
8.	Clearing and Grubbing	4.5	AC	$ 15,000	$ 68,182
9.	Trench Excavation Safety Systems	4400	LF	$ 5	$ 22,000
10.	Excavation Incl. Haul	6000	CY	$ 40	$ 240,000
11.	Gravel Borrow	50	TN	$ 26	$ 1,300
12.	42-inch Storm Pipe incl. Bedding	4400	LF	$ 300	$ 1,320,000
13.	72-inch Type II Storm Manhole	15	EA	$ 7,000	$ 102,667
14.	Enhanced Surface Restoration (wetland plantings, seeding, etc)	22000	SY	$ 15	$ 330,000
15.	Project Documentation	1	LS	$ 5,000	$ 5,000
	Subtotal				$ 2,617,000
	Construction Contingencies (20%)				$ 524,000
	Sales Tax (9.1%)				$ 239,000
	Total Construction Cost				**$ 3,380,000**
	Design, Engineering & Construction Management(25%)				$ 845,000
	Permitting (20%)			676,000	$
	TOTAL PROJECT COST				**$ 4,901,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE

QC4C: Hayho Creek Regional Detention Pond No. 3 (North Marysville Master Drainage Plan)
September 27, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 89,000	$ 89,000
3.	Project Temporary Traffic Control	1	LS	$ 9,000	$ 9,000
4.	Locate Existing Utilities	1	LS	$ 1,000	$ 1,000
5.	Survey	1	LS	$ 2,000	$ 2,000
6.	Temporary Erosion Control	1	LS	$ 4,050	$ 4,050
7.	Dewatering	1	LS	$ 113,400	$ 113,400
8.	Clearing and Grubbing	4	AC	$ 15,000	$ 52,500
9.	Excavation Incl. Haul	40,000	CY	$ 5	$ 200,000
10.	Inlet and Outlet Controls	1	LS	$ 240,000	$ 240,000
11.	Enhanced Surface Restoration (wetland plantings, seeding, etc)	16,940	SY	$ 15	$ 254,100
12.	Project Documentation	1	LS	$ 10,000	$ 10,000
	Subtotal				$ 977,000
	Construction Contingencies (20%)				$ 196,000
	Sales Tax (9.1%)				$ 89,000
	Total Construction Cost				**$ 1,262,000**
	Design, Engineering & Construction Management(25%)				$ 316,000
	Permitting (20%)				$ 253,000
	TOTAL PROJECT COST				**$ 1,831,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE

QC5A: Edgecomb Creek Channel Realignment (North Marysville Master Drainage Plan)
September 27, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 754,000	$ 754,000
3.	Project Temporary Traffic Control	1	LS	$ 75,000	$ 75,000
4.	Locate Existing Utilities	1	LS	$ 10,000	$ 10,000
5.	Survey	1	LS	$ 15,000	$ 15,000
6.	Temporary Erosion Control	1	LS	$ 80,000	$ 80,000
7.	Clearing and Grubbing	68	AC	$ 15,000	$ 1,020,000
8.	Excavation Incl. Haul	415,700	CY	$ 5	$ 2,078,500
9.	Fish Passable Culvert	10	EA	$ 100,000	$ 1,000,000
10.	Large Woody Debris	56	EA	$ 2,700	$ 151,200
11.	Riparian Plantings	309,800	SY	$ 10	$ 3,098,000
12.	Project Documentation	1	LS	$ 5,000	$ 5,000
	Subtotal				$ 8,288,000
	Construction Contingencies (20%)				$ 1,658,000
	Sales Tax (9.1%)				$ 755,000
	Total Construction Cost				**$ 10,701,000**
	Design, Engineering & Construction Management(25%)				$ 2,676,000
	Permitting (20%)				$ 2,141,000
	Easements (Temporary & Permanent)	87.5	AC	$ 40,000	$ 3,500,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	24	EA	$ 1,000	$ 24,000
	TOTAL PROJECT COST				**$ 19,042,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE

QC5B: Edgecomb Creek Conveyance (North Marysville Master Drainage Plan)
September 27, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 414,000	$ 414,000
3.	Project Temporary Traffic Control	1	LS	$ 41,000	$ 41,000
4.	Locate Existing Utilities	1	LS	$ 5,000	$ 5,000
5.	Survey	1	LS	$ 20,000	$ 20,000
6.	Temporary Erosion Control	1	LS	$ 25,000	$ 25,000
7.	Dewatering	1	LS	$ 350,000	$ 350,000
8.	Clearing and Grubbing	1.0	AC	$ 15,000	$ 15,000
9.	Trench Excavation Safety Systems	7,950	LF	$ 5	$ 39,750
10.	Excavation Incl. Haul	18,000	CY	$ 40	$ 720,000
11.	Gravel Borrow	130	TN	$ 26	$ 3,380
12.	24-inch Storm Pipe incl. Bedding	2,100	LF	$ 120	$ 252,000
13.	30-inch Storm Pipe incl. Bedding	1,300	LF	$ 180	$ 234,000
14.	36-inch Storm Pipe incl. Bedding	3,250	LF	$ 250	$ 812,500
15.	42-inch Storm Pipe incl. Bedding	1,300	LF	$ 300	$ 390,000
16.	54-inch Storm Pipe incl. Bedding	2,600	LF	$ 350	$ 910,000
17.	48-inch Type II Storm Manhole	7	EA	$ 4,000	$ 28,000
18.	54-inch Type II Storm Manhole	4	EA	$ 4,500	$ 18,000
19.	60-inch Type II Storm Manhole	10	EA	$ 5,000	$ 50,000
20.	72-inch Type II Storm Manhole	4	EA	$ 7,000	$ 28,000
21.	84-inch Type II Storm Manhole	8	EA	$ 10,000	$ 80,000
22.	Surface Restoration (seeding, fertilizing, planting, etc)	14,600	SY	$ 7	$ 102,200
23.	Project Documentation	1	LS	$ 10,000	$ 10,000
	Subtotal				4,549,000
	Construction Contingencies (20%)				$ 910,000
	Sales Tax (9.1%)				$ 414,000
	Total Construction Cost				**$ 5,873,000**
	Design, Engineering & Construction Management(25%)				$ 1,469,000
	Permitting (20%)				$ 1,175,000
	TOTAL PROJECT COST				**$ 8,517,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE

QC5C: Edgecomb Creek Regional Detention Facility (North Marysville Master Drainage Plan)
September 27, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 246,000	$ 246,000
3.	Project Temporary Traffic Control	1	LS	$ 25,000	$ 25,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Temporary Erosion Control	1	LS	$ 20,000	$ 20,000
7.	Dewatering	1	LS	$ 500,000	$ 500,000
8.	Clearing and Grubbing	15	AC	$ 15,000	$ 231,000
9.	Excavation Incl. Haul	174,000	CY	$ 5	$ 870,000
10.	Inlet and Outlet Controls	2	LS	$ 120,000	$ 240,000
11.	Chainlink Fence	760	LF	$ 35	$ 26,600
12.	Surface Restoration (seeding, fertilizing, planting, etc)	74,600	SY	$ 7	$ 522,200
13.	Project Documentation	1	LS	$ 10,000	$ 10,000
	Subtotal				$ 2,699,000
	Construction Contingencies (20%)				$ 540,000
	Sales Tax (9.1%)				$ 246,000
	Total Construction Cost				**$ 3,485,000**
	Design, Engineering & Construction Management(25%)				$ 872,000
	Permitting (20%)				$ 697,000
	TOTAL PROJECT COST				**$ 5,054,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC6: Culvert Replacement along Edgecomb Creek at 152nd Street NE
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 24,000	$ 24,000
3.	Project Temporary Traffic Control	1	LS	$ 7,000	$ 7,000
4.	Locate Existing Utilities	1	LS	$ 3,000	$ 3,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Temporary Erosion Control	1	LS	$ 10,000	$ 10,000
7.	Dewatering	1	LS	$ 15,000	$ 15,000
8.	Temporary Bypass	1	LS	$ 35,000	$ 35,000
9.	Excavation Incl. Haul	350	CY	$ 40	$ 14,000
10.	Remove Existing Pipe	42	LF	$ 30	$ 1,260
11.	Sawcutting	50	LF	$ 3	$ 150
12.	Remove Asphalt Pavement	60	SY	$ 5	$ 300
13.	Crushed Surfacing Base Course	20	TN	$ 35	$ 700
14.	Gravel Borrow	70	TN	$ 26	$ 1,820
15.	Streambed Gravel	150	TN	$ 50	$ 7,500
16.	HMA, CL 1/2-in PG 64-22	11	TN	$ 145	$ 1,600
17.	17-ft Span Reinforced Concrete Box Culvert	42	LF	$ 3,000	$ 126,000
18.	Surface Restoration (seeding, fertilizing, planting, etc)	50	SY	$ 7	$ 350
19.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 256,000
	Construction Contingencies (20%)				$ 52,000
	Sales Tax (9.1%)				$ 24,000
	Total Construction Cost				**$ 332,000**
	Design, Engineering & Construction Management (25%)				$ 83,000
	Permitting (20%)				$ 67,000
	Easements (Temporary & Permanent)	5000	SF	$ 1	$ 5,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	2	EA	$ 1,000	$ 2,000
	TOTAL PROJECT COST				**$ 489,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC7: Culvert Replacement along Olaf Strad Creek at 152nd Street NE
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 25,000	$ 25,000
3.	Project Temporary Traffic Control	1	LS	$ 8,000	$ 8,000
4.	Locate Existing Utilities	1	LS	$ 3,000	$ 3,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Temporary Erosion Control	1	LS	$ 10,000	$ 10,000
7.	Dewatering	1	LS	$ 15,000	$ 15,000
8.	Temporary Bypass	1	LS	$ 35,000	$ 35,000
9.	Excavation Incl. Haul	400	CY	$ 40	$ 16,000
10.	Remove Existing Pipe	53	LF	$ 30	$ 1,590
11.	Sawcutting	50	LF	$ 3	$ 150
12.	Remove Asphalt Pavement	60	SY	$ 5	$ 300
13.	Crushed Surfacing Base Course	20	TN	$ 35	$ 700
14.	Gravel Borrow	80	TN	$ 26	$ 2,080
15.	Streambed Gravel	150	TN	$ 50	$ 7,500
16.	HMA, CL 1/2-in PG 64-22	11	TN	$ 145	$ 1,600
17.	15-ft Span Reinforced Concrete Box Culvert	53	LF	$ 2,600	$ 137,800
18.	Surface Restoration (seeding, fertilizing, planting, etc)	50	SY	$ 7	$ 350
19.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 273,000
	Construction Contingencies (20%)				$ 55,000
	Sales Tax (9.1%)				$ 25,000
	Total Construction Cost				**$ 353,000**
	Design, Engineering & Construction Management (25%)				$ 89,000
	Permitting (20%)				$ 71,000
	Easements (Temporary & Permanent)	5000	SF	$ 1	$ 5,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	2	EA	$ 1,000	$ 2,000
	TOTAL PROJECT COST				**$ 520,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC8: Culvert Replacement and Channel Restoration along Middle Fork Quilceda Creek at Strawberry Fields Trail
September 1, 2016
G &O # 15550

NO.	DESCRIPTION	QUANTITY	UNIT		PRICE		AMOUNT
1.	SPCC Plan	1	LS	$	1,000	$	1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$	27,000	$	27,000
3.	Project Temporary Traffic Control	1	LS	$	13,000	$	13,000
4.	Locate Existing Utilities	1	LS	$	3,000	$	3,000
5.	Survey	1	LS	$	3,000	$	3,000
6.	Temporary Erosion Control	1	LS	$	15,000	$	15,000
7.	Dewatering	1	LS	$	16,000	$	16,000
8.	Clearing and Grubbing	0.25	AC	$	15,000	$	3,750
9.	Temporary Bypass	1	LS	$	15,000	$	15,000
10.	Structure Excavation	200	CY	$	40	$	8,000
11.	Remove Existing Pipe	21	LF	$	30	$	630
12.	Crushed Surfacing Base Course	10	TN	$	35	$	350
13.	Gravel Borrow	40	TN	$	26	$	1,040
14.	Streambed Gravel	110	TN	$	50	$	5,500
15.	HMA, CL 1/2-in PG 64-22	10	TN	$	145	$	1,450
16.	19-ft Span Reinforced Concrete Box Culvert	21	LF	$	3,900	$	81,900
17.	Large Woody Debris	25	EA	$	2,700	$	67,500
18.	Riparian Plantings	2420	SY	$	10	$	24,200
19.	Surface Restoration (seeding, fertilizing, planting, etc)	340	SY	$	7	$	2,380
20.	Project Documentation	1	LS	$	1,000	$	1,000
	Subtotal					$	291,000
	Construction Contingencies (20%)					$	59,000
	Sales Tax (9.1%)					$	27,000
	Total Construction Cost					**$**	**377,000**
	Design, Engineering & Construction Management (25%)					$	95,000
	Permitting (20%)					$	76,000
	Easements (Temporary & Permanent)		SF	$	1	$	-
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)		EA	$	1,000	$	-
	TOTAL PROJECT COST					**$**	**548,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC9: Berm Installation at 43rd Avenue and Emerald Hills Estates
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 3,000	$ 3,000
3.	Project Temporary Traffic Control	1	LS	$ 1,000	$ 1,000
4.	Locate Existing Utilities	1	LS	$ 1,000	$ 1,000
5.	Survey	1	LS	$ 1,000	$ 1,000
6.	Temporary Erosion Control	1	LS	$ 1,000	$ 1,000
7.	Dewatering	1	LS	$ 5,000	$ 5,000
8.	Clearing and Grubbing	0.25	AC	$ 15,000	$ 3,750
9.	Excavation Incl. Haul	20	CY	$ 40	$ 800
10.	Embankment Compaction	40	CY	$ 30	$ 1,200
11.	Quarry Spalls	10	TN	$ 60	$ 600
12.	Riparian Plantings	1210	SY	$ 10	$ 12,100
13.	Project Documentation	1	LS	$ 1,000	$ 1,000
	Subtotal				$ 33,000
	Construction Contingencies (20%)				$ 7,000
	Sales Tax (9.1%)				$ 4,000
	Total Construction Cost				**$ 44,000**
	Design, Engineering & Construction Management (25%)				$ 11,000
	Permitting (20%)				$ 9,000
	Easements (Temporary & Permanent)	4000	SF	$ 1	$ 4,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	1	EA	$ 1,000	$ 1,000
	TOTAL PROJECT COST				**$ 69,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC10: Stabilization of Hayho Creek between the BNSF Railroad and 47th Drive NE
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 134,000	$ 134,000
3.	Project Temporary Traffic Control	1	LS	$ 27,000	$ 27,000
4.	Locate Existing Utilities	1	LS	$ 1,000	$ 1,000
5.	Survey	1	LS	$ 1,000	$ 1,000
6.	Temporary Erosion Control	1	LS	$ 95,000	$ 95,000
7.	Dewatering	1	LS	$ 95,000	$ 95,000
8.	Clearing and Grubbing	0.40	AC	$ 15,000	$ 6,000
9.	Fish Removal	1	LS	$ 25,000	$ 25,000
10.	Excavation Incl. Haul	650	CY	$ 40	$ 26,000
11.	Streambed Gravel	290	TN	$ 50	$ 14,500
12.	Stream Boulders	180	EA	$ 400	$ 72,000
13.	Chainlink Fence	1740	LF	$ 35	$ 60,900
14.	Cribwalls	870	SF	$ 400	$ 348,000
15.	Vegetated Geogrid	870	SF	$ 15	$ 13,050
16.	Coir Log	1300	LF	$ 18	$ 23,400
17.	Willow Fascines	500	LF	$ 25	$ 12,500
18.	Large Woody Debris	180	EA	$ 2,700	$ 486,000
19.	Riparian Plantings	1000	SY	$ 10	$ 10,000
20.	Surface Restoration (seeding, fertilizing, planting, etc)	2000	SY	$ 7	$ 14,000
21.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 1,468,000
	Construction Contingencies (20%)				$ 294,000
	Sales Tax (9.1%)				$ 134,000
	Total Construction Cost				**$ 1,896,000**
	Design, Engineering & Construction Management (25%)				$ 474,000
	Permitting (25%)				$ 474,000
	Easements (Temporary & Permanent)	21780	SF	$ 1	$ 22,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	16	EA	$ 1,000	$ 16,000
	TOTAL PROJECT COST				**$ 2,882,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC10-A: Runoff Storage along 136th Street NE at 45th Avenue
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 21,000	$ 21,000
3.	Project Temporary Traffic Control	1	LS	$ 10,000	$ 10,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Temporary Erosion Control	1	LS	$ 3,000	$ 3,000
7.	Dewatering	1	LS	$ 25,000	$ 25,000
8.	Excavation Incl. Haul	3700	CY	$ 40	$ 148,000
9.	18-inch Storm Pipe incl. Bedding	150	LF	$ 60	$ 9,000
10.	Surface Restoration (seeding, fertilizing, planting, etc)	500	SY	$ 7	$ 3,500
11.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 230,000
	Construction Contingencies (20%)				$ 46,000
	Sales Tax (9.1%)				$ 21,000
	Total Construction Cost				**$ 297,000**
	Design, Engineering & Construction Management (25%)				$ 75,000
	Permitting (10%)				$ 30,000
	Easements (Temporary & Permanent)	0.54	AC	$ 40,000	$ 22,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	1	EA	$ 1,000	$ 1,000
	TOTAL PROJECT COST				**$ 425,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC11: Culvert Removal and Bridge Installation at 104th Street NE
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 48,000	$ 48,000
3.	Project Temporary Traffic Control	1	LS	$ 10,000	$ 10,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Utility Relocation	1	LS	$ 10,000	$ 10,000
7.	Temporary Erosion Control	1	LS	$ 20,000	$ 20,000
8.	Dewatering	1	LS	$ 15,000	$ 15,000
9.	Clearing and Grubbing	0.10	AC	$ 15,000	$ 1,500
10.	Temporary Bypass	1	LS	$ 15,000	$ 15,000
11.	Excavation Incl. Haul	800	CY	$ 40	$ 32,000
12.	Remove Existing Culvert	75	LF	$ 35	$ 2,625
13.	Remove Asphalt Pavement	200	SY	$ 5	$ 1,000
14.	Crushed Surfacing Base Course	40	TN	$ 35	$ 1,400
15.	Light Loose Riprap	70	TN	$ 80	$ 5,600
16.	Streambed Gravel	170	TN	$ 50	$ 8,500
17.	HMA, CL 1/2-in PG 64-22	50	TN	$ 145	$ 7,250
18.	50-ft Single Span Bridge	1	LS	$ 260,000	$ 260,000
19.	Concrete Footings (class 4000)	80	CY	$ 750	$ 60,000
20.	Large Woody Debris	5	EA	$ 2,700	$ 13,500
21.	Surface Restoration (seeding, fertilizing, planting, etc)	190	SY	$ 7	$ 1,330
22.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 523,000
	Construction Contingencies (20%)				$ 105,000
	Sales Tax (9.1%)				$ 48,000
	Total Construction Cost				**$ 676,000**
	Design, Engineering & Construction Management (25%)				$ 169,000
	Permitting (25%)				$ 169,000
	Easements (Temporary & Permanent)	1000	SF	$ 1	$ 1,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	2	EA	$ 1,000	$ 2,000
	TOTAL PROJECT COST				**$ 1,017,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC12: Culvert Removal and Bridge Installation at 103rd Street NE
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 46,000	$ 46,000
3.	Project Temporary Traffic Control	1	LS	$ 9,000	$ 9,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Utility Relocation	1	LS	$ 10,000	$ 10,000
7.	Temporary Erosion Control	1	LS	$ 10,000	$ 10,000
8.	Dewatering	1	LS	$ 15,000	$ 15,000
9.	Clearing and Grubbing	0.10	AC	$ 15,000	$ 1,500
10.	Temporary Bypass	1	LS	$ 15,000	$ 15,000
11.	Excavation Incl. Haul	700	CY	$ 40	$ 28,000
12.	Remove Existing Pipe	35	LF	$ 30	$ 1,050
13.	Remove Asphalt Pavement	160	SY	$ 5	$ 800
14.	Crushed Surfacing Base Course	40	TN	$ 35	$ 1,400
15.	Light Loose Riprap	70	TN	$ 80	$ 5,600
16.	Streambed Gravel	170	TN	$ 50	$ 8,500
17.	HMA, CL 1/2-in PG 64-22	40	TN	$ 145	$ 5,800
18.	50-ft Single Span Bridge	1	LS	$ 260,000	$ 260,000
19.	Concrete Footings (class 4000)	80	CY	$ 750	$ 60,000
20.	Large Woody Debris	5	EA	$ 2,700	$ 13,500
21.	Surface Restoration (seeding, fertilizing, planting, etc)	190	SY	$ 7	$ 1,330
22.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 503,000
	Construction Contingencies (20%)				$ 101,000
	Sales Tax (9.1%)				$ 46,000
	Total Construction Cost				**$ 650,000**
	Design, Engineering & Construction Management (25%)				$ 163,000
	Permitting (25%)				$ 163,000
	Easements (Temporary & Permanent)	1000	SF	$ 1	$ 1,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	3	EA	$ 1,000	$ 3,000
	TOTAL PROJECT COST				**$ 980,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
QC13: Culvert Removal and Bridge Installation along Quilceda Creek at State Avenue
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 328,000	$ 328,000
3.	Project Temporary Traffic Control	1	LS	$ 157,000	$ 157,000
4.	Locate Existing Utilities	1	LS	$ 5,000	$ 5,000
5.	Survey	1	LS	$ 54,000	$ 54,000
6.	Utility Relocation	1	LS	$ 25,000	$ 25,000
7.	Temporary Erosion Control	1	LS	$ 100,000	$ 100,000
8.	Dewatering	1	LS	$ 200,000	$ 200,000
9.	Clearing and Grubbing	0.25	AC	$ 15,000	$ 3,750
10.	Temporary Bypass	1	LS	$ 50,000	$ 50,000
11.	Excavation Incl. Haul	22600	CY	$ 40	$ 904,000
12.	Remove Existing Pipe	180	LF	$ 30	$ 5,400
13.	Remove Asphalt Pavement	890	SY	$ 5	$ 4,450
14.	Crushed Surfacing Base Course	270	TN	$ 35	$ 9,450
15.	Light Loose Riprap	140	TN	$ 80	$ 11,200
16.	Streambed Gravel	300	TN	$ 50	$ 15,000
17.	HMA, CL 1/2-in PG 64-22	210	TN	$ 145	$ 30,450
18.	180-ft Single Span Bridge	1	LS	$ 1,500,000	$ 1,500,000
19.	Concrete Footings (class 4000)	170	CY	$ 750	$ 127,500
20.	Large Woody Debris	20	EA	$ 2,700	$ 54,000
21.	Surface Restoration (seeding, fertilizing, planting, etc)	1600	SY	$ 7	$ 11,200
22.	Project Documentation	1	LS	$ 10,000	$ 10,000
	Subtotal				$ 3,607,000
	Construction Contingencies (20%)				$ 722,000
	Sales Tax (9.1%)				$ 329,000
	Total Construction Cost				**$ 4,658,000**
	Design, Engineering & Construction Management (25%)				$ 1,165,000
	Permitting (20%)				$ 932,000
	Easements (Temporary & Permanent)	0	SF	$ 1	$ -
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	0	EA	$ 1,000	$ -
	TOTAL PROJECT COST				**$ 6,755,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
AC1: Storm Pipe Replacement at 95th Street NE and 67th Avenue NE
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 9,000	$ 9,000
3.	Project Temporary Traffic Control	1	LS	$ 8,000	$ 8,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Relocate Existing Utilities	1	LS	$ 5,000	$ 5,000
7.	Temporary Erosion Control	1	LS	$ 3,600	$ 3,600
8.	Dewatering	1	LS	$ 3,600	$ 3,600
9.	Trench Excavation Safety Systems	227	LF	$ 5	$ 1,135
10.	Excavation Incl. Haul	300	CY	$ 40	$ 12,000
11.	Remove Existing Pipe	227	LF	$ 30	$ 6,810
12.	Sawcutting	464	LF	$ 3	$ 1,392
13.	Remove Asphalt Pavement	160	SY	$ 5	$ 800
14.	Crushed Surfacing Base Course	40	TN	$ 35	$ 1,400
15.	Gravel Borrow	10	TN	$ 26	$ 260
16.	Asphalt Treated Base	40	TN	$ 100	$ 4,000
17.	HMA, CL 1/2-in PG 64-22	28	TN	$ 145	$ 4,060
18.	18-inch Storm Pipe incl. Bedding	227	LF	$ 60	$ 13,620
19.	48-inch Type II Storm Manhole	1	EA	$ 4,000	$ 4,000
20.	Connect to Drainage Structure	2	EA	$ 700	$ 1,400
21.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 91,000
	Construction Contingencies (20%)				$ 18,200
	Sales Tax (9.1%)				$ 9,000
	Total Construction Cost				**$ 118,200**
	Design, Engineering & Construction Management (25%)				$ 30,000
	Permitting (10%)				$ 12,000
	Easements (Temporary & Permanent)	0	AC	$ 40,000	$ -
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	0	EA	$ 1,000	$ -
	TOTAL PROJECT COST				**$ 161,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
AC2: Culvert Replacement and Erosion Control Measures at 88th Street NE
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 42,000	$ 42,000
3.	Project Temporary Traffic Control	1	LS	$ 32,000	$ 32,000
4.	Temporary Erosion Control	1	LS	$ 15,000	$ 15,000
5.	Dewatering	1	LS	$ 15,000	$ 15,000
6.	Temporary Bypass	1	LS	$ 30,000	$ 30,000
7.	Roadway Excavation	640	CY	$ 25	$ 16,000
8.	Remove Existing Pipe	100	LF	$ 30	$ 3,000
9.	Sawcutting	60	LF	$ 3	$ 180
10.	Remove Asphalt Pavement	240	SY	$ 5	$ 1,200
11.	Crushed Surfacing Base Course	80	TN	$ 35	$ 2,800
12.	Gravel Borrow	150	TN	$ 26	$ 3,900
13.	Streambed Gravel	170	TN	$ 50	$ 8,500
14.	HMA, CL 1/2-in PG 64-22	60	TN	$ 145	$ 8,700
15.	25-ft Span Reinforced Concrete Box Culvert	80	LF	$ 3,500	$ 280,000
16.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 462,000
	Construction Contingencies (20%)				$ 93,000
	Sales Tax (9.1%)				$ 43,000
	Total Construction Cost				**$ 598,000**
	Design, Engineering & Construction Management (25%)				$ 150,000
	Permitting (25%)				$ 150,000
	Easements (Temporary & Permanent)	0	SF	$ 1	$ -
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	0	EA	$ 1,000	$ -
	TOTAL PROJECT COST				**$ 898,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
AC3: Storm Pipe Replacement at 61st Street NE Cul-de-sac
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 17,000	$ 17,000
3.	Project Temporary Traffic Control	1	LS	$ 4,000	$ 4,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Temporary Erosion Control	1	LS	$ 5,000	$ 5,000
7.	Dewatering	1	LS	$ 15,000	$ 15,000
8.	Trench Excavation Safety Systems	680	LF	$ 5	$ 3,400
9.	Excavation Incl. Haul	790	CY	$ 40	$ 31,600
10.	Remove Existing Pipe	680	LF	$ 30	$ 20,400
11.	Sawcutting	1370	LF	$ 3	$ 4,110
12.	Remove Asphalt Pavement	460	SY	$ 5	$ 2,300
13.	Crushed Surfacing Base Course	100	TN	$ 35	$ 3,500
14.	Gravel Borrow	10	TN	$ 26	$ 260
15.	HMA, CL 1/2-in PG 64-22	90	TN	$ 145	$ 13,050
16.	12-inch Storm Pipe incl. Bedding	160	LF	$ 45	$ 7,200
17.	15-inch Storm Pipe incl. Bedding	520	LF	$ 50	$ 26,000
18.	48-inch Type II Storm Manhole	5	EA	$ 4,000	$ 20,000
19.	Connect to Drainage Structure	3	EA	$ 700	$ 2,100
20.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 185,000
	Construction Contingencies (20%)				$ 37,000
	Sales Tax (9.1%)				$ 17,000
	Total Construction Cost				**$ 239,000**
	Design, Engineering & Construction Management (25%)				$ 60,000
	Permitting (10%)				$ 24,000
	Easements (Temporary & Permanent)	0	AC	$ 40,000	$ -
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	0	EA	$ 1,000	$ -
	TOTAL PROJECT COST				**$ 323,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
AC4: Storm Pipe Replacement at 60th Place NE and surrounding area
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 34,000	$ 34,000
3.	Project Temporary Traffic Control	1	LS	$ 17,000	$ 17,000
4.	Locate Existing Utilities	1	LS	$ 5,000	$ 5,000
5.	Survey	1	LS	$ 10,000	$ 10,000
6.	Utility Coordination	1	LS	$ 10,000	$ 10,000
7.	Temporary Erosion Control	1	LS	$ 10,000	$ 10,000
8.	Dewatering	1	LS	$ 15,000	$ 15,000
9.	Trench Excavation Safety Systems	1230	LF	$ 5	$ 6,150
10.	Excavation Incl. Haul	1500	CY	$ 40	$ 60,000
11.	Remove Existing Pipe	1230	LF	$ 30	$ 36,900
12.	Sawcutting	2470	LF	$ 3	$ 7,410
13.	Remove Asphalt Pavement	760	SY	$ 5	$ 3,800
14.	Crushed Surfacing Base Course	160	TN	$ 35	$ 5,600
15.	Gravel Borrow	30	TN	$ 26	$ 780
16.	HMA, CL 1/2-in PG 64-22	140	TN	$ 145	$ 20,300
17.	15-inch Storm Pipe incl. Bedding	780	LF	$ 50	$ 39,000
18.	18-inch Storm Pipe incl. Bedding	450	LF	$ 60	$ 27,000
19.	48-inch Type II Storm Manhole	13	EA	$ 4,000	$ 52,000
20.	Connect to Drainage Structure	10	EA	$ 700	$ 7,000.00
21.	Surface Restoration (seeding, fertilizing, planting, etc)	70	SY	$ 7	$ 490
22.	Project Documentation	1	LS	$ 5,000	$ 5,000
	Subtotal				$ 374,000
	Construction Contingencies (20%)				$ 75,000
	Sales Tax (9.1%)				$ 34,100
	Total Construction Cost				**$ 483,100**
	Design, Engineering & Construction Management (25%)				$ 121,000
	Permitting (10%)				$ 49,000
	Easements (Temporary & Permanent)	0	AC	$ 40,000	$ -
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	0	EA	$ 1,000	$ -
	TOTAL PROJECT COST				**$ 654,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE

ES2: Water Quality Treatment Facility at Downtown Marina Outfall
September 20, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 445,000	$ 445,000
3.	Project Temporary Traffic Control	1	LS	$ 5,000	$ 5,000
4.	Locate Existing Utilities	1	LS	$ 2,000	$ 2,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Temporary Erosion Control	1	LS	$ 20,000	$ 20,000
7.	Dewatering	1	LS	$ 75,000	$ 75,000
8.	Clearing and Grubbing	0.28	AC	$ 15,000	$ 4,132
9.	Excavation Incl. Haul	1,800	CY	$ 10	$ 18,000
10.	Inlet and Outlet Controls	2	LS	$ 50,000	$ 100,000
11.	Treatment Facility	12,000	SF	$ 350	$ 4,200,000
12.	Surface Restoration (seeding, fertilizing, planting, etc)	1,344	SY	$ 7	$ 9,411
13.	Project Documentation	1	LS	$ 5,000	$ 5,000
	Subtotal				4,890,000
	Construction Contingencies (20%)				$ 978,000
	Sales Tax (9.1%)				$ 445,000
	Total Construction Cost				**$ 6,313,000**
	Design, Engineering & Construction Management(25%)				$ 1,579,000
	Permitting (5%)				$ 316,000
	TOTAL PROJECT COST				**$ 8,208,000**

CITY OF MARYSVILLE
ENGINEER'S COST ESTIMATE
SC1: Culvert Replacement along Sunnyside Creek at Soper Hill Road
September 1, 2016
G&O # 15550

NO.	DESCRIPTION	QUANTITY		UNIT PRICE	AMOUNT
1.	SPCC Plan	1	LS	$ 1,000	$ 1,000
2.	Mobilization, Cleanup and Demobilization	1	LS	$ 77,000	$ 77,000
3.	Project Temporary Traffic Control	1	LS	$ 24,000	$ 24,000
4.	Locate Existing Utilities	1	LS	$ 3,000	$ 3,000
5.	Survey	1	LS	$ 5,000	$ 5,000
6.	Temporary Erosion Control	1	LS	$ 10,000	$ 10,000
7.	Dewatering	1	LS	$ 15,000	$ 15,000
8.	Temporary Bypass	1	LS	$ 35,000	$ 35,000
9.	Excavation Incl. Haul	5220	CY	$ 40	$ 208,800
10.	Remove Existing Pipe	100	LF	$ 30	$ 3,000
11.	Sawcutting	44	LF	$ 3	$ 132
12.	Remove Asphalt Pavement	200	SY	$ 5	$ 1,000
13.	Crushed Surfacing Base Course	40	TN	$ 35	$ 1,400
14.	Gravel Borrow	240	TN	$ 26	$ 6,240
15.	Streambed Gravel	410	TN	$ 50	$ 20,500
16.	Quarry Spalls	300	TN	$ 60	$ 18,000
17.	Stream Boulders	200	EA	$ 400	$ 80,000
18.	HMA, CL 1/2-in PG 64-22	47	TN	$ 145	$ 6,800
19.	Guardrail	160	LF	$ 30	$ 4,800
20.	17-ft Span Reinforced Concrete Box Culvert	160	LF	$ 2,000	$ 320,000
21.	Surface Restoration (seeding, fertilizing, planting, etc)	230	SY	$ 7	$ 1,610
22.	Project Documentation	1	LS	$ 2,000	$ 2,000
	Subtotal				$ 845,000
	Construction Contingencies (20%)				$ 169,000
	Sales Tax (9.1%)				$ 77,000
	Total Construction Cost				**$ 1,091,000**
	Design, Engineering & Construction Management (25%)				$ 273,000
	Permitting (20%)				$ 219,000
	Easements (Temporary & Permanent)	5000	SF	$ 1	$ 5,000
	Fixed costs for Easements (Negotiations, Agent, Survey, etc.)	2	EA	$ 1,000	$ 2,000
	TOTAL PROJECT COST				**$ 1,590,000**