

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

1.1.1 Location of Study Area

The City of Stanwood is located in Snohomish County, Washington, about 25 miles north of the City of Seattle. It is also just north of the City of Marysville and south of the City of Mount Vernon, with Skagit Bay and Camano Island of Puget Sound located to the west. I-5, located just to the east, is the region's major north-south Interstate Highway system. The Stillaguamish River runs south of the City, tangentially in several places. Figure 1-1 presents a vicinity map of the City showing its general location in relationship to Interstate 5, the Stillaguamish River, and Puget Sound.

1.1.2 City's Drainage Utility: Its Origin and Purpose

Due to its location near the point of discharge of the Stillaguamish River into Puget Sound, the City has had a long history of both local and regional flooding problems. In 2006, the City of Stanwood established the citywide Drainage Utility (Ord. 1189 § 2, 2006) to support the growing financial needs of the City's aging drainage system and to help create an effective annual stormwater capital program. From its conception, the purpose of the City's Drainage Utility has been:

- To protect life and property from storm, river, flood, and excess surface waters.
- To protect water quality by preventing siltation, contamination, and erosion of waterways.
- To protect local waterways, such as Irvine Slough.
- To assure compliance with federal and state stormwater management and water quality requirements.
- To increase public education and citizen involvement.
- To encourage the preservation and enhancement of natural drainage systems that includes wetlands, rivers, and streams within the City, as supported by a system of levees, sloughs, and pump stations.
- To continue to be an active participant in regional water resource, habitat, and flood management along with the Stillaguamish Tribe, Snohomish County, local diking drainage districts, farmers, and property owners.

Mission: *The Mission of the City of Stanwood's Drainage Utility is to develop and maintain a comprehensive stormwater infrastructure management program to protect property, health, and safety; to enhance quality of life; to preserve and improve the environment for the benefit of the public; and to be responsive and sensitive to the needs of residents, property owners, and public partners.*

To effectively address its stormwater needs, the City’s Drainage Utility actively manages and maintains its existing system of drainage infrastructure and strives to reduce flooding, enhance water quality, and provide planning and regional coordination for compliance with various local and regional regulatory requirements. The goals, objectives, and policies of the City’s Drainage Utility are presented in Appendices A-1 and A-2.

1.1.3 Purpose of This Study

As an active and growing community, with significant areas lying adjacent to and within the Stillaguamish and Skagit River floodplains, the City is threatened with an enhanced risk of flooding on an annual basis and, as a result, is faced with numerous drainage infrastructure needs. Its major challenges include providing for public safety and protecting public and private properties by reducing local flooding, meeting regulatory requirements, and developing and prioritizing limited local resources.

The City is conducting this stormwater planning process to address these challenges by developing an annual capital facilities program and preparing itself for a future National Pollutant Discharge Elimination System (NPDES) Permit by developing a plan to upgrade and expand its existing Stormwater Management Program (SWMP). Following these objectives, it is the intent of this Stormwater Comprehensive Plan (SCP) to:

This Stormwater Comprehensive Plan (SCP) defines the Utility’s capital needs, addresses the requirements of a future NPDES Permit, and provides for annual maintenance and water quality protection, along with other local and regional Stormwater Management Program (SWMP) initiatives.

- Define the capacity and deficiencies of the City’s existing stormwater system.
- Design needed capital improvement projects and estimate their costs.
- Enhance the City’s SWMP to address the requirements of a future NPDES Permit.
- Review and update associated codes, policies, and interlocal agreements.
- Identify the amount and types of staffing and financial resources needed, both annually and over the next ten years, to ensure an adequate level of runoff control is achieved throughout the City.

1.1.4 Structure and Content of the City’s Updated Stormwater Comprehensive Plan

The structure, format, and content of this updated SCP has been developed to match the requirements of a future federal NPDES Western Washington Phase II Permit (Permit), as issued by the Washington State Department of Ecology. In addition to identifying the capital needs of the City’s stormwater system, a portion of this study has focused on documenting the activities, costs, and staffing of the City’s existing SWMP and comparing them to the regulatory requirements of a new Permit. This “regulatory gap analysis” will become the core of the City’s new SWMP because it contains all of the elements necessary for operating an effective SWMP including: public education and involvement, development review, construction inspection and enforcement, adoption of new updated stormwater

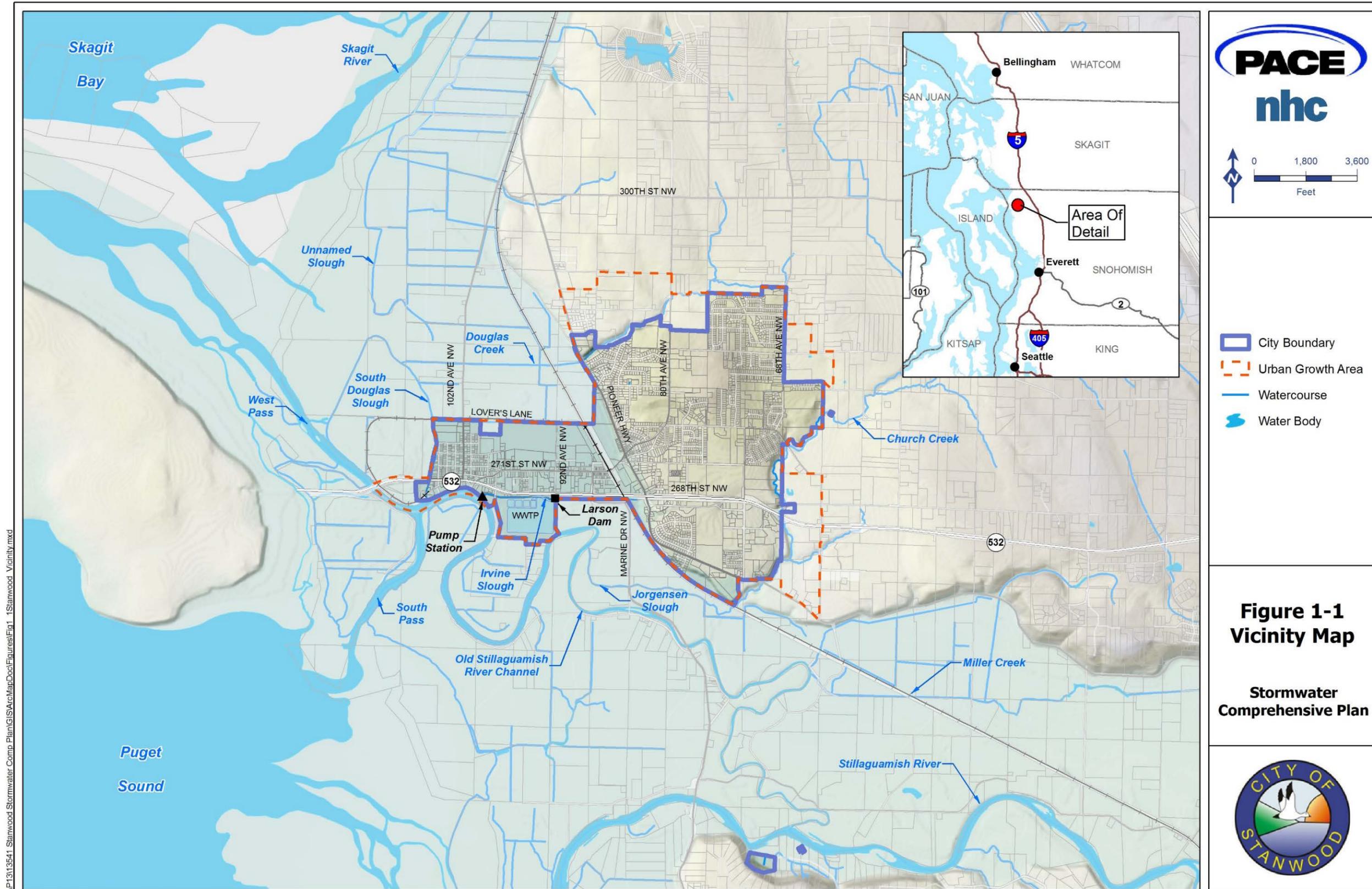
design standards (in the form of the Department of Ecology 2012 Stormwater Management Manual for Western Washington), illicit discharge detection and elimination, and an annual maintenance program, using the latest methodologies/frequencies and based on a thorough and complete inventory of the City's stormwater facilities.

The City's new Stormwater Management Program also includes activities associated with preserving and protecting the functions and qualities of its natural drainage system (streams, wetlands, water quality, and habitat) and retrofitting existing facilities by taking a watershed-based approach for restoration and enhancement.

This study concludes with a presentation of annual costs and a discussion of funding strategies and different levels of service that will become the basis for the proposed implementation plan of the City's new updated SCP. The resulting SCP will allow the City to plan for and begin working towards developing an effective annual Capital Improvement Program (CIP) and establishing an equally effective SWMP, allowing compliance with a future state-mandated Permit.

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0 1,800 3,600
 Feet

- City Boundary
- Urban Growth Area
- Watercourse
- Water Body

**Figure 1-1
 Vicinity Map**

**Stormwater
 Comprehensive Plan**



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1.2 OVERVIEW OF THE STORMWATER COMPREHENSIVE PLAN DEVELOPMENT PROCESS

1.2.1 Introduction to the Stormwater Comprehensive Plan Development Process

Consistent with the above goals and objectives, this SCP will update the priorities of the Drainage Utility and develop an annual SWMP that establishes an updated, prioritized CIP and a corresponding annual programmatic funding and implementation plan.

The Drainage Utility will use this SCP to annually develop, fund, and implement an effective annual SWMP that plans for and satisfies future stormwater-related requirements, reduces localized flooding, and addresses local water quality and regional drainage objectives.

1.2.2 Goals and Objectives of the Stormwater Planning Process

The goals of this SCP development process are to develop an updated SWMP that:

1. Supports the Growth Management Act (GMA) planning process by providing the water quality, habitat, and stormwater infrastructure program elements.
2. Provides a plan for drainage infrastructure to support future growth and economic development.
3. Assesses the current level of services being provided by the Utility and recommends activities for an improved SWMP, as documented in an updated SCP.
4. Develops a comprehensive stormwater CIP list for short- and long-term implementation that addresses the City's stormwater conveyance objectives, as well as its water quality challenges.
5. Develops an effective financial plan that identifies and ensures adequate levels of long-term funding to address both capital and programmatic needs.

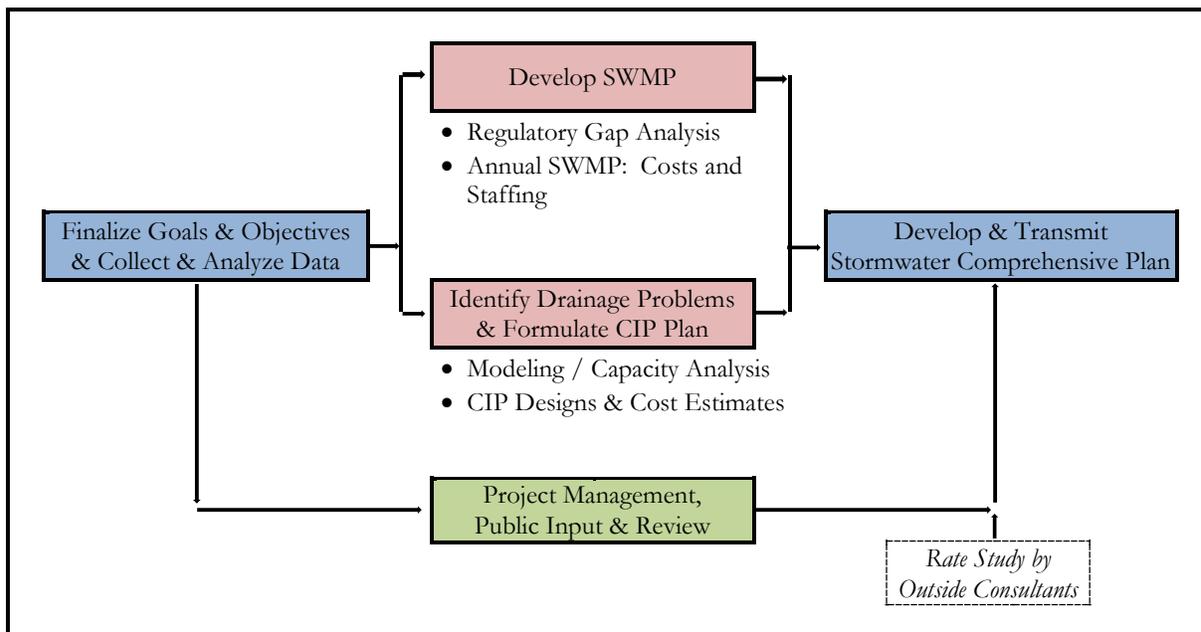
1.2.3 Planning Process to Develop the City's Updated SCP

The development of the City's updated SCP was conducted in a series of steps that consisted of the following activities, as listed below and shown in the flow chart presented in Figure 1-2. The SCP development process included the following:

- Data collection and mapping of existing stormwater facilities.
- Documentation of the City's existing SWMP.
- Listing of various City regulatory requirements and SWMP objectives.
- Review and analysis of the City's SWMP in comparison to the future regulatory requirements and activities needed for NPDES Permit compliance.
- Locating and assessing existing flooding problems.
- Identifying capital and maintenance needs.
- Developing an annual Capital Facilities Plan.

- Compiling the above SWMP elements into a guidance document that establishes needed SWMP activities, CIPs, annual staffing, and funding levels.

Figure 1-2: Stormwater Comprehensive Plan Development Process



1.3 OVERVIEW AND ORGANIZATION OF THE SCP

This SCP is organized according to the following seven chapters. The content of each chapter is summarized below.

1.3.1 Chapter 1: Introduction

Chapter 1 summarizes the SCP planning process and provides an overview of the organization, format, and content of the study. It also presents a listing of the goals, objectives, and policies of the City's Drainage Utility and the SWMP.

1.3.2 Chapter 2: Planning Area Characteristics

Chapter 2 summarizes the characteristics of the City's Planning Area and includes a description of this area and discussion of the City's existing stormwater collection system. The study area is characterized by land use, population, climate, topography, and soils.

1.3.3 Chapter 3: Regulatory Requirements

Chapter 3 summarizes the stormwater regulatory requirements, under which the City is currently operating, or could be in the near future including: the Clean Water Act (CWA), the Endangered Species Act, the Puget Sound Action Agenda, the Growth Management Act, and regional watershed planning, coordination, and funding.

1.3.4 Chapter 4: Operation and Maintenance

Chapter 4 summarizes the existing Operation and Maintenance (O&M) Program and makes recommendations for a future O&M program, including staffing and expenses. Like the SWMP, the future O&M program is designed around the requirements of a future NPDES Phase II Permit.

1.3.5 Chapter 5: Stormwater System Hydrologic and Hydraulic Modeling

Chapter 5 summarizes the methodologies and results of the hydrologic and hydraulic stormwater system modeling process. It explains how modeling was used to evaluate the capacity of the existing drainage system, locate deficiencies, and develop engineering designs, in order to formulate the list of needed capital projects and their estimated costs.

1.3.6 Chapter 6: Capital Improvement Program

Chapter 6 summarizes the recommended stormwater CIP projects, including detailed descriptions, project sketches, and cost estimates. Problem areas and proposed projects are rated and ranked to form the prioritized annual CIP presented in this chapter.

1.3.7 Chapter 7: Future Stormwater Management Program Recommendations

Chapter 7 summarizes the future SWMP recommendations, including the results of the SWMP gap and CIP analyses. The recommendations include those stormwater activities needed to address the requirements of a future NPDES Phase II Permit, as well as CIP project needs and associated annual levels of staffing and funding.

1.3.8 Appendices

The documents included in the appendices provided technical support for the creation of the SCP. They were specifically designed to create the products needed to develop an effective SWMP and include the following:

1.3.8.1 Appendix A: Technical Support Documents

This first appendix includes a collection of documents that were used during the SCP development process, including goals/objectives/policies of the City's Drainage Utility, lists of data requests to the City, Public Drainage Survey, SWMP Questionnaire to City staff, results of the Public Drainage Survey, City's annual budget documents, technical memorandums from Northwest Hydraulic Consultants (two memoranda: Modeling Needs Recommendations for Stanwood SWMP and Douglas Creek Basin Detention Pond Tour Summary), memoranda of understanding between the City and the Stillaguamish Tribe as well as with Snohomish County, and information about the WRIA 5 Stillaguamish Watershed.

1.3.8.2 Appendix B: Stormwater Management Program Gap Analysis

This appendix includes a copy of the SWMP Gap Analysis. This is the detailed matrix analysis that lists and describes local drainage needs and regulatory requirements and

documents corresponding elements of the City's existing SWMP. It notes discrepancies and promotes recommended activities, staffing, and costs for the recommended SWMP and CIP projects.

1.4 LISTING AND OVERVIEW OF RELATED STUDIES

The Stillaguamish River and watershed are extremely important to the region. It is one of the few remaining watersheds within the Puget Sound basin that are relatively undeveloped, and it still maintains a number of native and hatchery-enhanced fish runs of various species of salmon, as well as steelhead trout. The upper reaches may have bull trout habitat, as well. This is also a relatively young and very active river, as the recent massive mudslide upstream at Oso, Washington, has demonstrated. Because it is young and active in a geologic sense, the river is unpredictable and subject to a number of floods of varying sizes on an annual basis. The Stillaguamish River Flood Control District has been formed to assist in the prediction and management of major flood events that impact the lower reaches of the river and maintains a supporting system of levees, dikes, and ditches.

Because of its natural ecological and economic importance, the Stillaguamish River has been the subject of numerous studies over the past several years. Some of the more important and recent investigations are briefly summarized below. These studies include the following:

- *The City of Stanwood Comprehensive Flood Hazard Management Plan (CFHMP) Phase I and II*
- *Stanwood Urban Growth Area Drainage Needs Report DNR No. 7*
- *The Douglas Creek Rural Drainage Needs Report*
- *City/County Regional Water Quality Study*

There are also eleven additional drainage-related studies that have been provided in the bibliographical listing which is presented in Section 1.5 below.

1.4.1 City of Stanwood CFHMP Phase I and II

The City of Stanwood Comprehensive Flood Hazard Management Plan (CFHMP) was prepared by KCM, Inc., in 1997 to address current flooding problems and plan for future development. The CFHMP was conducted in two phases, I and II. Phase I focused on flooding associated with the City's storm drainage system and Phase II focused on flooding associated with the Stillaguamish and Skagit Rivers. Both phases are discussed below.

- **Phase I, July 1997:** Phase I of the City of Stanwood's CFHMP addresses the flooding problems within the City's drainage system and plans for future development. The goal of this CFHMP is to develop an approach to provide recommendations to solve existing drainage problems and prevent new development from creating additional problems. This goal was met by defining and analyzing the City's drainage basins and stormwater control facility characteristics. Alternatives were prepared and evaluated to develop



recommendations for new drainage facilities that could mitigate existing and future storm drainage problems. An objective of this planning process was to reach project goals, while achieving benefits to water quality, recreation, and preservation or enhancement of environmental features such as wetlands and fish and wildlife habitat.

- **Phase II, June 1997:** Phase II of Stanwood's CFHMP was to address flood hazard management issues within the City that were associated with both the City's storm drainage system and the Stillaguamish and Skagit Rivers. The primary goal of this plan is to identify and evaluate flooding problems in the City caused by the Stillaguamish and Skagit Rivers and to develop cost-effective alternatives for their mitigation. This plan evaluated historical floods and flood management practices, highlighted previous investigations, identified flood problem areas, provided flood hazard management options, analyzed flood hazard management alternatives, discussed funding options, and provided recommendations for capital improvements and priority actions.

1.4.2 Stanwood Urban Growth Area Drainage Needs Report No. 7

The Stanwood Urban Growth Area (UGA) Drainage Needs Report No. 7 was prepared by Snohomish County Public Works Department Surface Water Management Division in December of 2002. The Stanwood UGA Drainage Needs Report (DNR) is one of a series of eleven drainage plans completed for Snohomish County's Urban Growth Areas (UGAs). The purpose of the DNR project was to plan for existing and future drainage infrastructure needs in a way that identifies how to reduce road and property flooding, protect and enhance aquatic habitat, and reduce stormwater pollution. This plan identifies flooding and surface water problems and recommends solutions.

1.4.3 Douglas Creek Rural Drainage Needs Report

Objectives of the Douglas Creek Rural Drainage Needs Report, initiated by Snohomish County in 2013, are to understand how the drainage system works and to find out where the problems and deficiencies are located. This report analyzes the drainage system connections, sizes, operation, and elevations within the lower portions of Douglas Creek, an Unnamed Slough, and Irvine Slough. It includes an analysis of the depth and duration of seasonal flooding in adjacent agricultural fields and their causes. It also proposed solutions for the flooding of the lower drainage systems by looking at both source control and increases in drainage capacity within the lower reaches of the system.

1.4.4 City/County Regional Water Quality Study: Irvine Slough at Stanwood

This study was provided by Snohomish County Public Works, Surface Water Management Division. Based on water quality monitoring conducted by the Washington State Department of Ecology in 2000/2001, as part of the Stillaguamish River Multi-Parameter Total Maximum Daily Load Plan, the water quality of the Irvine Slough was found to exceed

the standards for coliform bacteria and was listed on the Clean Water Act 303d List of impaired water bodies in 2004 and 2008. To address the pollution in the slough, the City of Stanwood is working with Snohomish County to monitor water quality, identify potential inputs of pollutants, and correct the sources of contamination. In 2012, the City and the County established four sample sites and collected fecal coliforms, total suspended solids, temperature, and dissolved oxygen samples within the City limits along Irvine Slough. Results showed a strong correlation between the operation of the pump station and fecal coliform concentrations. On-the-ground observations suggested that improving the flow out of Irvin Slough, by increasing the frequency of pumping or removing the pump station, may reduce stagnation, elevate dissolved oxygen, and reduce fecal coliform concentrations. Improving flow to reduce stagnation would require additional feasibility studies to evaluate engineering design options, as well as explore various slough and pump station operational alternatives.

1.5 REFERENCED PLANS AND STUDIES

The following plans, reports, and studies were used as reference materials in the preparation of this Plan:

- Quality Assurance Protection Plan, (August 2006). *Old Stillaguamish River Multi-Parameter Total Maximum Daily Load Study* (Publication Number 06-03-108). Published by Washington State Department of Ecology. Olympia, Washington.
- Stillaguamish Implementation Review Committee (SIRC), (2005). *Stillaguamish Watershed Chinook Salmon Recovery Plan*. Published by Snohomish County Department of Public Works, Surface Water Management Division. Everett, WA.
- State of the Stilly (2007). *Stillaguamish Clean Water District Report*. Published by Snohomish County Department of Public Works, Surface Water Management Division. Everett, WA.
- Stillaguamish Watershed Action Plan, (1990). Published by Snohomish County Department of Public Works. Everett, WA.
- Skagit Bay Fecal Coliform Bacteria Loading Assessment, (2012). Published by Washington State Department of Ecology. Olympia, WA.
- Stillaguamish Shellfish Protection Program, (2011). Published by Snohomish County Public Works, Surface Water Management Division. Everett, WA.
- 2009 Shoreline Survey of the Port Susan Shellfish Growing Area, (2009). Scott Berbells, R. S., Health Services Consultant. Published by Washington State Department of Health, Office of Shellfish and Water Protection. Olympia, WA.
- A Storm Drainage Master Plan for the Town of Stanwood, Washington, (1972). Kramer, Chin and Mayo, Consulting Engineers. Seattle, WA.



- Stillaguamish River Comprehensive Flood Hazard Management Plan, (2004). Toni E. Turner, P.E., Snohomish County Public Works Department Surface Water Management Division. Everett, WA.
- Stillaguamish River Fecal Coliform, Dissolved Oxygen, pH, Mercury, and Temperature Total Maximum Daily Load, (2007). *Water Quality Implementation Plan*. (Publication Number 07-10-033.) Published by Washington State Department of Ecology. Olympia, Washington.
- Stillaguamish River Watershed Fecal Coliform, Dissolved Oxygen, pH, Mercury, and Arsenic Total Maximum Daily Load (Water Cleanup Plan), (2005). (Publication Number 05-10-044). Published by Washington State Department of Ecology. Olympia, Washington.
- 2012 Water Quality Monitoring Report: Irvine Slough at Stanwood, (2014). Jonathan Nagata, et al., Snohomish County Public Works Department Surface Water Management Division. Everett, WA.

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