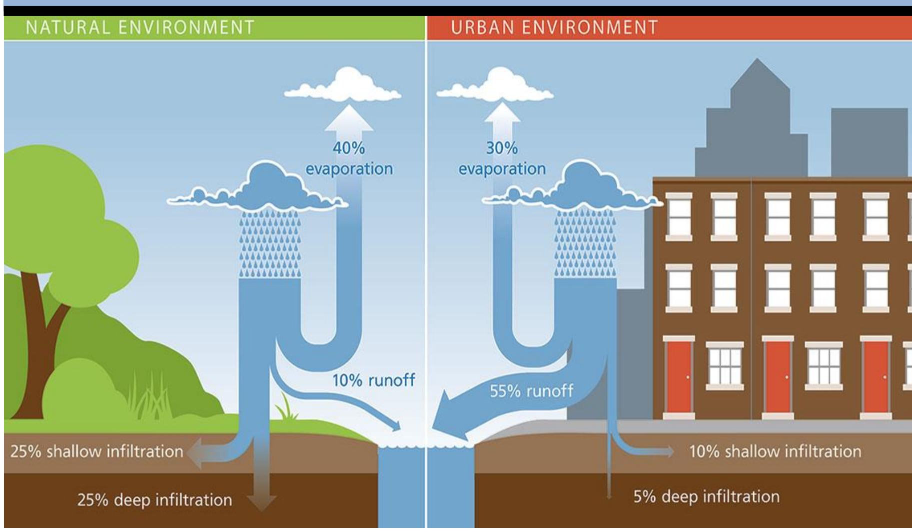
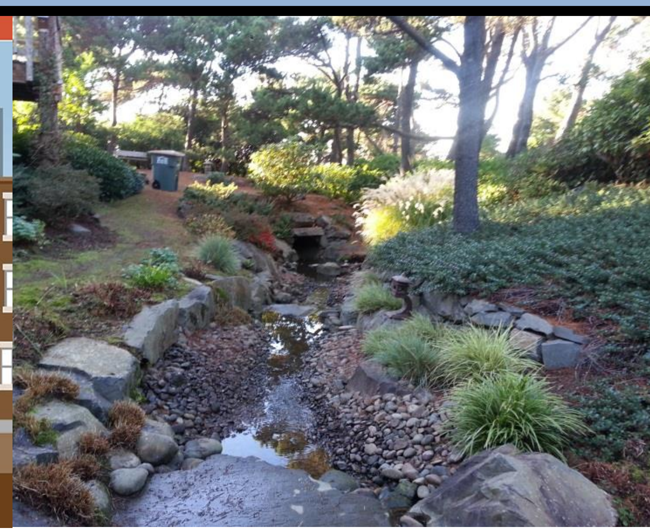
City of Newport Storm Water Master Planning Documents

- Storm Water Master Plan
- SDC Methodology Update

Prepared by:
Civil West Engineering Services, Inc.
October 2016





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Storm Water Master Plan

City of Newport

Lincoln County, Oregon
October 2016

REGISTERED PROFESSIONAL ENGINEER
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OREGON
NOV. 10, 2009
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EXPIRATION DATE: 06/30/2018

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Executive Summary

Section E

E.1 Introduction

The City of Newport is located in Lincoln County, Oregon at the mouth of the Yaquina River. The City was incorporated in 1882 and quickly became a tourist destination for residents of the Willamette Valley. Newport is one of the larger Oregon coastal town with a 2010 population of 9,989 according to the 2010 census, and a projected 2015 population of 10,584. Stormwater collected from within the City is typically piped in developed areas and discharged into the nearest natural water body (i.e. local streams, the bay or sloughs, etc.) In many cases, existing storm drains have been designed and constructed with the intent to serve only specific developing areas within the City. As storm drains have been constructed, little consideration has been given to the effects of future development in areas upstream of the subject development for which storm drain improvements have been constructed.

In April of 2013 the City of Newport authorized Civil West Engineering Services, Inc. to complete a Stormwater Master Plan. This Stormwater Master Plan has been completed to provide an overview of the existing stormwater facilities within the study area, as well as identify any piping deficiencies due to sizing, age, or other factors.

The timeframe for preparation of this Master Plan was 2013/2014, but due to numerous updates and review periods, the final Master Plan is dated October 2016. In addition to providing the technical and engineering information needed to administer and manage the stormwater system, the master plan has been prepared to provide the backing and basis for the City to develop a storm drain System Development Charges (SDC) update to help offset the financial burden that new development will place on the storm drainage system.

E.2 Existing System

For the purposes of this master plan, the study area has been divided into 43 separate drainage basins based on topography. Typically, basins include the watershed or collection area of a stream or major storm drain pipe. Some basins have been further divided into sub-basins when multiple trunk storm drains exist within the basin. Basin mapping is provided in section 2 of this study.

The existing storm drain system within the defined 43 basins includes approximately 32 miles of gravity piping in a range of sizes from 6-inches to 144-inches diameter and consisting of a variety of materials including concrete, corrugated steel, polyvinyl chloride (PVC), high density polyethylene (HDPE), and others. Detailed information is provided in the stormwater master plan regarding the specific amounts of the various sizes of pipe in the various storm drainage basins.

Predominantly the systems within these basins are one of three types, and are listed below:

1. Large diameter pipes following the elevation and alignment of natural drainage ways with significant fill above the pipe.
2. Small diameter pipes which drain straight to a nearby creeks, or streams.
3. Natural topography draining to creeks, and streams which are conveyed under HWY. 101 by means of a large culvert.

The downtown area is mixture of system types 1 and 2, while much of the far north and south are a mixture of system types 2 &3.

E.3 Identification of Deficiencies and Development of Improvement Alternatives

All of the existing storm drain system components were analyzed for deficiencies that exist presently. Facilities also have been evaluated for deficiencies that are expected to occur within the 20-year planning period. Deficiencies were identified related to the age of infrastructure, anticipated development, and capacity.

As part of this planning effort, calculations were made to estimate the peak stormwater flows that could be expected from each basin under existing and future development conditions. Runoff calculations for the various storm drainage basins identified in this Master Plan were performed using a method developed by the Soil Conservation Service (SCS) now called the National Resources Conservation Service (NRCS) for relating rainfall to runoff. The method is described in length in Technical Release 20 (TR-20) published by the SCS. The TR-20 method is based upon unit hydrograph theory and the runoff curve number method of calculating direct runoff from the rainfall occurring over specified areas. It considers an entire watershed with a variety of land uses and soil types. The TR-20 method also allows watershed areas (basins) to be divided into subbasins for analysis purposes, with drainage routes of one or more subbasins running through other subbasins downstream. This provides for the calculation of an overall peak discharge from a basin that may or may not equal the sum of the peak discharges from the individual subbasins. Stormwater runoff calculations are further discussed in Section 5 of this Master Plan.

E.4 Recommended Plan

In section 8 of this Master Plan, a number of projects are identified which will address various deficiencies within the storm drainage system. Individual projects are grouped into three priority classifications. Each classification group is loosely defined as follows:

Group A: These are the highest priority projects that should be undertaken as soon as adequate funding is available. It should be considered that these projects should be undertaken within the next 5 years with highest projects on the list to be addressed in the next year or two.

Group B: These projects, while not of the highest priority, should be on the City's capital improvement planning window beyond the 5-year horizon. As Group A projects are completed, Group B projects should be moved to Group A status. System degradation or failures, project coordination, or other occurrence may require the movement of Group B projects to Group A status ahead of schedule. New projects that are developed that are not critical, should be grouped in Group B until funding is available.

Group C: Group C projects are either of low priority or are dependent on development. If development in an area necessitates the implementation of a Group C improvement, the project should be moved to Group A. Some projects may remain in Group C indefinitely if the need for the project or the development requiring it never arises.

Table E.1 below summarizes the projects that have been developed for the City of Newport storm drain system. A total of 20 projects have been developed with estimated costs totaling just over 14 million dollars. High priority projects (Group A) for the storm drain system are estimated to cost in excess of 6 million dollars.

Table E. 1 – Storm Drain System Project Improvement Summary

	Project Rating	Project Number	Project Description	Improvement Conditions: Overflow	Improvement Conditions: Under Structures	Improvement Conditions: Future Develop.	Total Project Cost
A	1	X1	1456' of 12", and 18" SD pipe along SW 9th St.	X			$526,162
A	2	X2	571' of 18", and 24" pipe along SW 10th St.	X			$213,816
A	3	X3	1663' of 12", 24", 30", and 36" SD pipe along SW Minnie St.	X			$793,155
A	4	U4	Re-alingment of Pipe under Cash and Carry	X	X		$2,710,875
A	5	U2	739' of 54" SD pipe along NW 3RD Street & NW Coast St.	X			$612,539
A	6	T2	921' of 36" SD pipe along NW Coast St.	X			$490,012
A	7	T4	Re-alignment of Pipe under Sunwest Honda/Mazda building		X		$1,109,013
A	8	AL1	170' of 36" SD pipe crossing Hwy. 101 (Jack and Bore)	X			$102,117
A	9	N1	1200' of 12", 24", 30", and 35" SD Pipe along Hwy. 101	X			$553,428
B	10	Q1	890' of 12", 18" , and 24" SD pipe along NW Nye St.	X			$291,848
B	11	T6	Re-alignment of Pipe under Church of the Nazarine building		X		$598,801
B	12	T5	Re-alignment of Pipe under Ford Dealership building		X		$271,188
B	13	U5	Re-alignment of Pipe under local residence	X	X		$79,355
B	14	C1	525' of 24" along NE 73rd St.	X		X	$229,316
B	15	AA1	675' of 18", and 24" SD pipe along SE Avery St.	X			$212,022
B	16	AF1	1515' of 12", 18", and 24" pipe along SW 29th and SW Brant St.			X	$640,902
B	17	F1	124' of 30" SD pipe North of NW 60th St.	X		X	$67,398
B	18	T3	665' of 12", 18", and 24" SD pipe along NW Spring St.	X			$264,614
B	19	U3	1699' of 18", and 24" pipe along SW Cliff Street	X			$664,079
B	20	U6	553' of 12", and 18" SD pipe along SW 2nd St.	X	X		$169,797
B	21	AJ1	55' of culvert crossing SE 35th St.	X			$37,156
B	22	U1	753' of 18", and 24" SD pipe along NE Douglas Street	X			$304,978
B	23	R1	675' of 12", and 18" SD pipe along NW Spring St.	X			$227,522
B	24	Y1	497' of 12" SD pipe along SW 13th St.	X			$163,653
B	25	V1	533' of 18" and 24" SD pipe along SW Fall St.	X			$308,322
C	26	AG1	Drainage ditch development and Rehabilitation	X		X	$1,693,568
C	27	K1	270' of 12" & 18" SD pipe along NE Lucky Gap St.	X			$102,214
C	28	H1	305' of 12" and 18" SD pipe along NW 54th St.	X			$103,677
C	29	N2	240' of 18" SD pipe along NE Iler St.	X			$86,500
C	30	T1	161' of 12" SD pipe along NW Nye St.	X			$50,766
C	31	AC1	655' of Culverts crossing Yaquina Bay Blvd.			X	$208,698
C	32	AG2	1551' of 15", 18", and 24" SD pipe along SW 35th St.			X	$459,808
		Total					**$14,347,295**

E.5 Plan Implementation

It is presumptuous to develop a strict schedule and order for the implementation of the projects developed in this Master Plan. Funding sources, development pressures, economic environment, and other variables will steer the implementation of the plan.

It is recommended that the City maintain the 3-Group approach discussed above. By working to complete the high priority projects and maintaining a living, working capital improvement plan (CIP), the City will systematically complete the projects necessary to maintain and improve their storm drainage system.

In order to make timely progress in completing the recommended improvements, the City should immediately begin developing a plan to finance the projects selected for completion.

E.6 Potential Financing Options

The City will soon be considering undertaking numerous storm drain system improvement projects. The overall cost of these projects will be millions of dollars. The City has a monthly 'Stormwater Utility' fee of $7.50 (fiscal year 2014/2015) which is designated to pay for stormwater services, including amounts to pay for the operation, maintenance, repair, necessary replacement, and improvement of the system. The City also has the 'Utility Infrastructure Improvement' user fee of $6.60 (fiscal year 2014/2015) and up depending on water meter size, which is designed to cover the costs of water, wastewater, and stormwater maintenance, repair, necessary replacement, and improvement of the system. The current fees do not have the capacity to pay for the capital improvements outlined within this document.

Various grant and non-grant sources of funding are discussed in section 10. These sources include: the Pre-Disaster Mitigation Program, Flood Mitigation Assistance Program, Clean Water State Revolving Fund, general obligation bonds, revenue bonds, and system development charges (SDCs). Although there are grant programs, there is no way to guarantee any grant funding for the master plan projects. For this reason project funding is assumed to be covered by revenue bonds. The revenue bonds require the use of SDCs and user fees to facilitate payback of the bond.

The SDC update found in appendix E proposes a significant increase in the storm drain SDC. This new SDC is based upon: SDC eligible project costs totaling $3,308,988, and an assumed 2,280 Equivalent Dwelling Units (EDUs) of growth over the planning period. The updated SDC plan proposes the structure shown in the table below:

Table E. 2 – SDC Summary

SDC Component	SDC Charges	
	Existing	*Proposed*
Improvement		
$/EDU	$840	$1,494
$/square foot	$0.31	$0.55
Reimbursement	0	0
Credit Summary	NA	NA
Comp. Cost	4.18%	4.18%

An overall increase in user fees is recommended, in addition to developing an alternate method for assessing the current Stormwater Utility fee. Appropriate user fees for storm drainage system maintenance and improvements can be determined by several different methods. It is recommended for simplicity that charges be determined on an EDU basis as introduced in Sections 10.5.1. Under the described system, each single family dwelling would typically be charged an equal rate for one EDU. Commercial and industrial customers would be charged a rate for a number of EDU's calculated based on the amount of impermeable surface present on the site. In this way, customers having larger areas of impermeable surface, which generate greater volumes of runoff, would be responsible for a greater portion of system maintenance and improvement fees. Below is an example calculation of user fees using the recommended fee structure.

Scenario 3: In this scenario, it is assumed that the City will aggressively pursue the proposed projects by obtaining funding to complete both Priority A and Priority B groups. Under this more aggressive approach, the following impact to ratepayers applies:

Principal: $11,435,924.24
Interest Rate: 5% per year
Term: 20-years (240 months)
Monthly Payment: $74,772.24
EDU's: 16,756 (Based on total Impervious Surface area within the City divided by area per EDU)
Required Fee per EDU for Payback: $4.46
Current Stormwater Utility Fee: $7.50

Based on these terms, the rate per EDU required to pay back a loan of the indicated principal amount would be $4.46 which is a decrease in user fee for single family residences by $3.04, but would increase varied amounts for other types of properties. For example: a commercial property with a total impervious surface area of 1 Acre (43,560 ft^2) would be charged for 16 EDU, and their monthly 'Stormwater Utility' fee would be $71.24 which is an increase of $63.74.

Introduction

1.1 Background and Need

1.1.1 Community Background

The City of Newport is located in Lincoln County, Oregon at the mouth of the Yaquina River. The City was incorporated in 1882 and quickly became a tourist destination for residents of the Willamette Valley. Settlement in the area began 20 years prior to the city incorporation, shortly after sailing vessels discovered oyster beds in Yaquina Bay and realized the profit to be made by shipping oysters to San Francisco and other areas. The town was named after Newport, Rhode Island.

Historically, the Bayfront was the economic hub of Newport, housing wood product industries and a commercial fishing port. Electricity later provided the means for refrigeration and the large scale development of the seafood industry. The Yaquina Head Lighthouse, dredging, and the jetty construction made Yaquina Bay an attractive shipping port. Today, the Bayfront is still home to one of the state's largest commercial fishing fleets. It also includes shops, art galleries, restaurants, fish processing plants, and other family attractions.[1]

Nye Beach was once separate from the Bayfront. In the 1890s, Newport began to outgrow the Bayfront and a wood plank road was built to connect the two areas. By the early 1900s, Nye Beach, with its sea baths, taffy shops, and agate shops, became the number one visitor attraction on the coast. It was known for its rooming houses, resorts, and a large "sanatorium" built by Herbert Hoover's stepfather, Dr. Henry J. Minthorn. Nye Beach and other areas of Newport are now a haven for artists with numerous galleries and the Newport Performing Arts and Visual Arts Center.

The construction of Highway 101 occurred between 1919 and 1936. The completion of the Yaquina Bay Bridge not only increased the speed of travel along the coast, it also changed the face of Newport. Without the need for the ferry from Yaquina City, the Bayfront lost its role as the center of travel. Businesses moved from Nye Beach and Bayfront to along the highway. The result was the end to a dividing line between the two areas, and the development of a new, connected Newport.

In the early 1980s, a group of local businesses and government leaders joined forces to develop a community revitalization plan. The strategic plan was created to reduce the community's dependence on natural resource-based fishing and tourism industries and to develop Newport as a destination resort and research center. These developments included expanding the research facilities of the Oregon State University Hatfield Marine Science Center and the Oregon Coast Aquarium. The contemporary Marine Science Center houses a number of federal agencies, including the National Oceanic and Atmospheric Administration (NOAA), the Oregon Department of Fish and Wildlife (ODFW), U.S. Fish and Wildlife Service (USFWS), and the Environmental Protection Agency (EPA).

Tourists to Newport enjoy yearly festivals that include the Seafood and Wine Festival, the Microbrew Festival (originally called the Fishermen's Harvest), the Tuna Canning Festival, and the Newport Loyalty Days and Seafair Festival. Other events include Oregon Lighthouse Week, Stories by the Sea, Oyster

[1] History information from Northwest Fisheries Science Center, Newport Community Profile http://www.nwfsc.noaa.gov/research/divisions/sd/communityprofiles/Oregon/Newport_OR.pdf

Cloyster on the Oregon Coast, the Newport Clambake and Seafood BBQ, the Blessing of the Fleet, and the Lighted Boat Parade.

1.1.2 Storm Drain System Background

Before development began in the Newport area, the natural landscape consisted of rolling hills, ravines, streams, creeks, hillsides, and shallow wetlands. In the late 1800's people began to collect in the area, and development began. As time went on, the developed area grew as did the associated infrastructure.

Through the years of development, much of the storm drain infrastructure has been developed with similar characteristics. These characteristics are dissimilar amongst storm drain components in the North Newport Area, vs. the South Beach area.

As development expanded in the North Newport area, one of two types of storm drain systems was typically put in place. The first system being the result of fill that was placed in ravines and/or hilly areas to make a flat area for development. Within these areas the storm drain system normally was large diameter pipe conveying runoff at the natural elevation and along the original alignment of whichever creek/stream or waterway that was being covered by fill. In many cases, the cover was over 25 feet deep. As the alignment of these systems was not dictated by lot lines, or typical planning parameters, many of these pipes currently run under existing structures. The second type of system is those that were put in place within areas that maintained a similar topography to the natural landscape. The storm drain systems in these areas are typically small diameter pipe networks that follow natural grading flow paths to the nearest hillside, or ravine draining to a nearby creek or stream.

In addition to the systems expansion Northward, the City annexed the area south of Yaquina Bay, commonly referred to as 'South Beach' in the 1970's and 80's. This area extended approximately 5 miles South of Yaquina Bay, and as much as 2.5 miles inland. Much of this area is still undeveloped and thus the storm drain follows whatever path the natural ground would dictate to get to Yaquina Bay, or the Pacific Ocean. Given that this area is relatively flat, and that the natural terrain affords many areas for water storage, (wetlands) it can be difficult to model how the storm water flows through these undeveloped areas. The majority of the storm drain system within 'South Beach' is comprised of roadside ditches, culverts along HWY. 101, a piped system which outfalls east of SW 32nd St., and pipes which convey storm runoff under the Airport.

1.1.3 Prior Study and Planning Documents

To address the need for storm drain and other infrastructure amidst the annexed South Beach area, the 'South Beach Urban Renewal Plan', which was adopted in 1983, was developed. This study described the existing system within the South Beach area, and gave possible alternatives for the control of storm water. Following the completion of this Plan, implementation of expanded Federal and State wetland regulations impacted much of the anticipated land use thus limiting the legitimacy of the alternatives.

In 1990 the 'Public Facilities Plan, City of Newport, Oregon', was developed by CH2M Hill. This plan expanded the analysis from the South Beach area to cover the entire City of Newport. Much of the prior work conducted in the pre-existing Plan for South Beach was updated and incorporated into this plan.

SHN produced the 'South Beach Storm Water Master Plan' in June of 2004. This plan examined existing system within South Beach, evaluated future development locations and impacts, and analyzed the system's ability to convey the calculated flows to their designed outfalls. Where the system was found to be lacking capacity, improvements were suggested. After the submission of the completed Master Plan, wetland expansions, and government protected lands expanded, and removed the viability of a number of the recommendations found in this plan.

Many of the projects suggested within these Plans have been completed, while others have not.

1.1.3 Need for Master Plan

The City of Newport operates and maintains a stormwater drainage system with components spread throughout the City. These components include ditches, culverts, catch basins, pipelines, manholes, outfalls, and swales, and are intended to transmit stormwater runoff from upland areas, to lower areas where it eventually reaches a terminus. In Newport's case, the terminus is either the Bay or the Ocean.

The City does not currently have an overall stormwater master plan for which to guide and direct the development and planning associated with the stormwater system. This fact makes it difficult for the City to size piping, construct improvements, and plan budgets with the "big picture" in mind. Having an overall planning document specifically for the drainage system is critical for planning budgets, setting and defending SDC's, preparing and carrying out capital improvements, and staging and phasing projects to respond to growth and development.

Although there is a general need for the Master Plan, the City has also voiced some specific concerns that have prompted the need for the Master Plans development. One of the minor concerns is localized flooding at certain system structures during large storm events. Much of the overflow coming from these various structures are minor as the runoff, just bubbles out of the structure, down the gutter, and eventually finds a new way into the storm drain system. However there were two locations were major flooding is, or was, a regular occurrence that could result in potential property damage. One of the two flood points is upstream of the Nye Beach outfalls. In the past decade this area has flooded several times impacting local resident properties. Flooding has not occurred here since the system improvements were constructed which increased the collection points and system efficiency. Although recent storms have not pushed the improved system beyond its capacity, a large storm event will. The other major point of concern for the City is at the intersection of S.W. 9th St. and Hwy. 101. The area around this intersection floods almost annually, creating a risk and potential harm to local residents and associated property. Concern for these residents is another reason the City has chosen to have the Stormwater Master Plan developed.

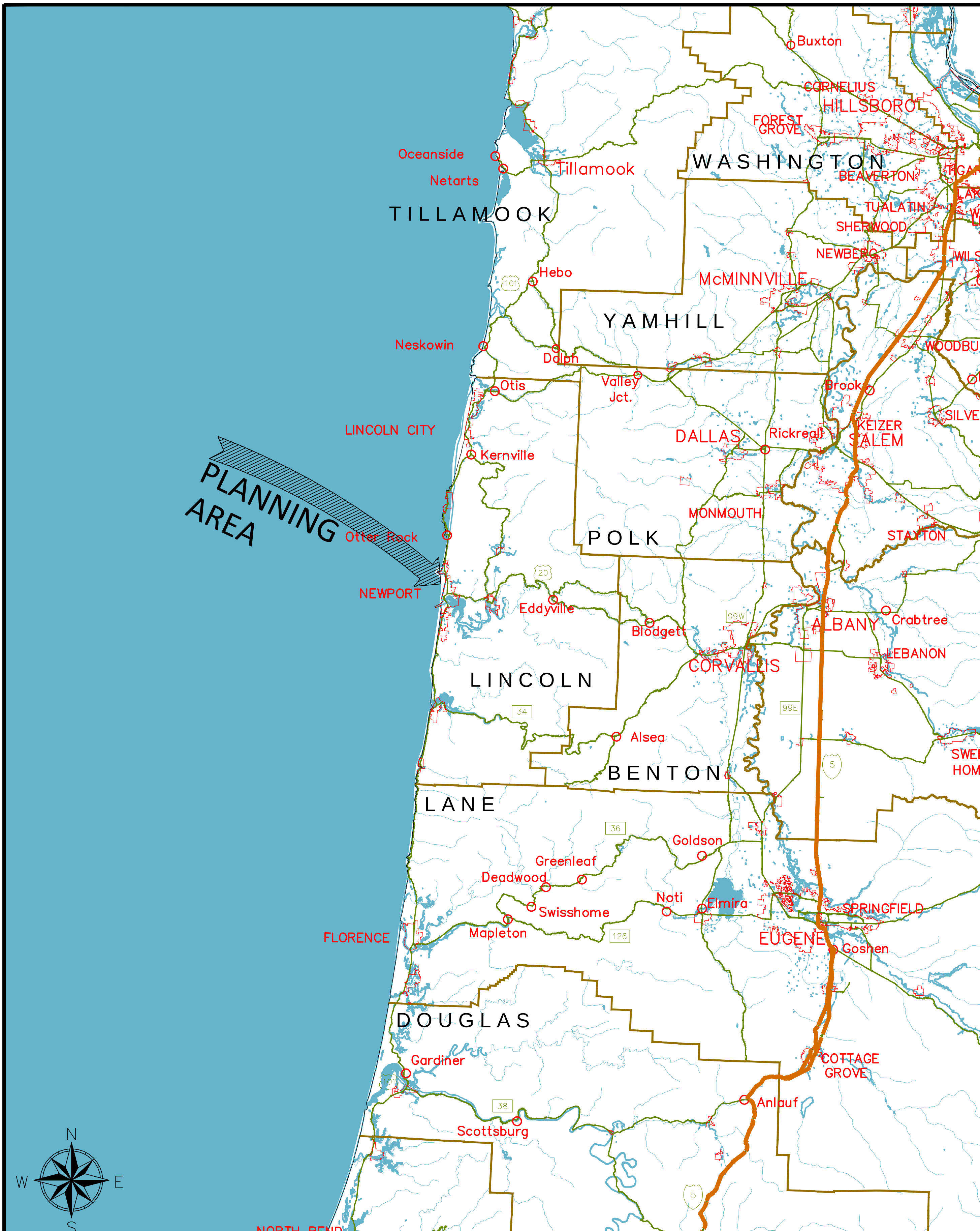
1.1.4 Study Authorization

The City of Newport authorized Civil West to develop a City Wide Stormwater Master Plan by a contract dated June 20, 2013. Services are in accordance with this professional services contract and the Civil West proposal for the project which was presented to the City in June 2013. A kick-off meeting was conducted on July 10, 2013 with Civil West, and City Staff to initiate the planning work and begin the necessary data collection.

1.2 Scope of Master Plan

1.2.1 Planning Period

The timeframe for preparation of this Master Plan was 2013/2014, but due to numerous updates and review periods, the final Master Plan is dated October 2016. The planning period for this Storm Water Master Plan is 20 years. The period must be short enough for current users to benefit from system improvements, yet long enough to provide reserve capacity for future growth and increased demand. Existing residents should not pay an unfair portion for improvements sized for future growth, yet it is not economical to build improvements that will be undersized in a relatively short period of time. Thus, it is appropriate to calculate the storm water flow increase caused by development over the next 20 years, which is a typical planning period for storm water master plans. The end of the planning period is the year 2035.



Civil West Engineering Services, Inc.

DWG BY: JRP DATE: APRIL 18, 2014	0 1"	LOCATION MAP	FIGURE
STORMWATER MASTER PLAN		CITY OF NEWPORT LINCOLN COUNTY, OREGON	1.1

1.2.2 Planning Area

The Storm Water Master Plan planning area is contained within Newport's UGB, and more specifically within the area of the storm drain system described in section 1.1.2. A map showing Newport's location is shown in Figure 1.1. Additional information and maps for the planning area are presented in Section 2.

1.2.3 Work Tasks

In order to facilitate the development of this Master Plan several tasks were undertaken, and completed. These tasks are as follows:

1.2.3.1 Task 1-Scope Development

The scope initially incorporated the typical ingredients, such as assessment and recommendations, however this list was expanded upon after further discussions with the City, the public, and other government entities. From these discussions, general concerns, government requirements, and future City planning tailored the focus of the study, and thus defined the scope.

1.2.3.2 Task 2-Data Acquisition and Project Kickoff

After defining the scope, a meeting was scheduled with the City, and the data collection process began. These steps included a site visit to kick off the new project, meeting with City staff, and obtaining existing documentation, maps, files, and other information assets. The kickoff meeting also allowed an opportunity for staff to provide insight into specific areas of concern and areas for which special attention or focus should be provided. Mapping, survey data, records, photographs, and other pertinent information from the City's files to assist in the preparation of the drainage study was acquired. Additional data collection was attained to develop and display wetland maps, soils maps, flood plain maps…etc.

1.2.3.3 Task 3-Field Work

Once compiling the existing data was completed, an evaluation was done examining where information was lacking. Information on these areas was then collected via in field inspection and survey. This information included but was not limited to: culvert and pipe sizes, man hole and catch basin location, rim elevation, relative invert elevation, storm drain flow paths, channel width and height sizes.

In addition to collecting information on the physical features of the storm drain system, photographs where collected to notate the condition of system components.

1.2.3.4 Task 4-Drainage Mapping and Modeling

A storm drain model involves two major pieces: One piece being the designed system incorporating pipes, culverts, catch basins, manholes, etc., the second piece being the natural system including ravines, plateaus, rivers, creeks, etc.

All the information on the existing system that was collected via field work and data acquisition was used to put these two pieces together and develop a model of the City's system. This was done by developing a pipe network within AutoCAD Civil 3D based on the systems physical properties. Then defining the basins using topographic contours imported into AutoCAD. Once the system and basins where defined and modeled they were then exported into AutoDesk Storm and Sewer Analysis 2014. Within this software further parameters where defined as listed in section 4 of this Master Plan.

Upon completion of the model, analysis was run on the model exploring system capacity versus flow under certain storm conditions. (25 year and 50 year events) The method and results are discussed further in section 4 and 7 respectively.

1.2.3.5 Task 5-Preparation of Drainage Master Plan

The information and analysis collected in Tasks 1 through 4 were then compiled and organized to facilitate the development of the Master Plan document. This Master plan incorporates the following sections and associated information:

- Executive Summary – summarizes the report and the recommendations and budget estimates
- Introduction – Describes the background of the City, and its storm drain system. Develops the Cities need for the Master Plan. Defines the scope of the project, and the necessary tasks required for completion. Acknowledges those involved with the Master Plans development and notes the origins of authorization.
- Study Area –Encompasses general information about the study area such as: cultural resources, biological resources, coastal resources, climate, soils, geological hazards…etc. Also covered in this section are population projections and designated land use both current and future for the referenced study area.
- Existing Stormwater Facilities – All existing storm drain system components are listed as are their associated attributes. These attributes range from general flow path of basins, to condition and dimensions of pipes and structures. Also mentioned will be any know deficiencies with the current storm drain system.
- System Modeling and Analysis – Develops the methodology used to create the system model, as well as outlining the approach used to define storm events, and establish run off from system basins.
- System Performance – Each basin is examined individually. Basin characteristics such as soil type, average grade..etc are noted, as well as any system deficiencies within the referenced basin.
- Regulatory Issues – In this section, the regulatory and environmental limiting issues that should control the development, operation, and maintenance of a stormwater utility were described and summarized. This included local, state, and federal regulations and issues. The purpose of this section is to provide guidance regarding the regulatory framework governing surface water and stormwater utilities and systems.
- Improvement Criteria – All planning and recommendations must be founded on established and accepted principals, methodologies, and regulations. This section established the methods and principals that were utilized to prepare and analyze improvement alternatives as well as make final recommendations for improvements.
- Recommendations – Includes specific recommendations for improvements to culverts, pipelines, inlets, outfalls, ditches, and other drainage facilities. Cost estimates for separate projects are developed along with a prioritization of projects that accounts for numerous factors such as importance to City, feasibility of construction…etc.
- Project Implementation – Provides a summary of the developed projects, present a proposed prioritization for the projects, and undertake a discussion on the implementation of the recommended plan.
- Financing – Summarizes potential grant and non-grant funding mechanisms, and proposes updated SDCs, and user fees required to fund the recommended improvements.

1.2.3.6 Task 6-Meetings

The level of support, meetings, public hearings, and other public interaction can vary greatly depending on the needs and desires of the City. For the purposes of this scope, we included an allowance of hours to

The level of support, meetings, public hearings, and other public interaction can vary greatly depending on the needs and desires of the City. For the purposes of this scope, we included an allowance of hours to prepare for, travel to and from, and participate and administer various meetings throughout this project and process.

1.3 Acknowledgments

Members of the City staff have contributed significant efforts to ensure complete information and proper planning of the community's storm drain system. In addition to providing aerial topo information, existing storm drain maps, and televised pipe files; the city staff assisted with field research, and provided requested information promptly, and with a sense of urgency.

1.3.1 City Council and Staff

Many City of Newport staff members contributed greatly and facilitated in the preparation of this planning document.

We wish to recognize and express gratitude to the following people for their support during this planning effort:

City Staff
Spencer Nebel – City Manager
Tim Gross – City Engineer, Public Works Director
Jason Bucholz – Senior Project Manager
Olaf Sweetman- Assistant City Engineer
Steve Stewart- Water Plant Supervisor
John Ritchey- Waste Water Superintendent
Dave White- Streets Superintendent
Bob Fuller – Public Works Administrative Assistant

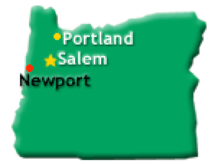
City Council
Sandra Roumagoux – Mayor
Dean Sawyer
David Allen
Laura Swanson
Ralph Busby – President
Mark Saelens
Wendy Engler

Study Area

Section 2

2.1 Study Area

2.1.1 Planning Area Location



The City of Newport is located in Lincoln County Oregon at the mouth of the Yaquina River. The city limits extend to both the north and south sides of Yaquina Bay in Townships 10S, 11S, and 12S, Range 11W. The City extends north from the bayfront along the beach to include Agate Beach, Yaquina Head, and Schooner Point, stopping just south of Moolack Creek. South of the Bay the city extends along the beach to include South Beach, the Newport Municipal Airport, and the lower drainage of Thiel Creek. The City Limits encompasses 6,619 acres or 10.3 square miles.

The planning area for the System Wide Storm Water Master plan is contained within the drainage basins crossing through the Newport city limits or Urban Growth Boundary (UGB). For ease of discussion the planning area has been divided into two sections. The region north of Yaquina Bay which will be referenced as the 'North Newport Planning Area', while the section south of Yaquina Bay will be referred as the 'South Beach Planning Area'. The described planning area is presented in Figure 2.1.*(Planning Area Map)*

2.1.2 Cultural Resources

According to the Oregon National Register List, five historic properties are located near the planning area. All listed properties lie inside the current Newport City Limits.

Table 2. 1 – Listed National Register Historic Properties, Newport

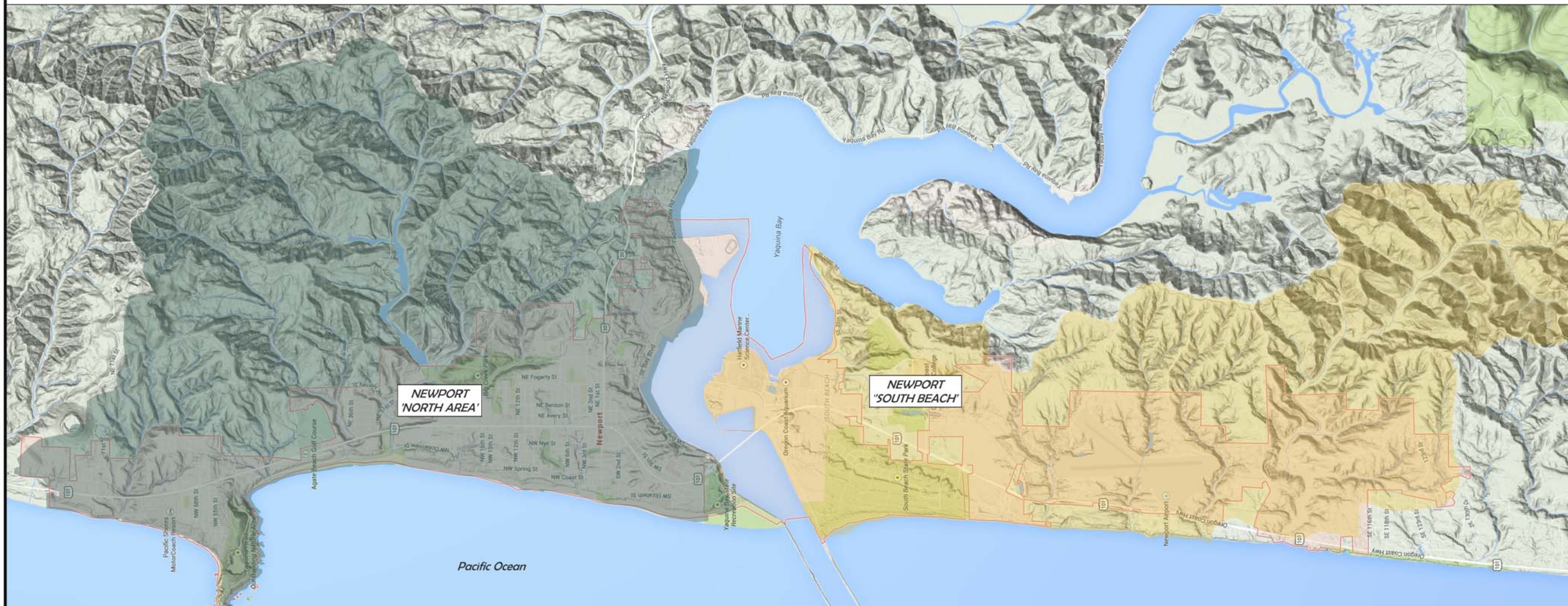
Historic Property Name	Street Address	Construction Date	Listed Date	NR Number
New Cliff House	267 NW Cliff St.	1911	11/6/1986	86002962
Old Yaquina Bay Lighthouse		1871	5/1/1974	74001692
Hilan Castle	620 SW Alder St.	1913	12/9/1981	81000500
Yaquina Bay Bridge #01820	Hwy. 101	1936	8/5/2005	05000821
Yaquina Head Lighthouse	Yaquina Head	1872	5/13/1993	73002340

Lincoln County is part of the Siletz Service Area of the Confederated Tribes of Siletz Indians. Areas around Yaquina Bay and River were once home to the Yaquina Tribe (now included in the Siletz Tribe). Several remnants of tribal settlements in the area have been discovered including fishing-weirs at Yaquina Bay at the Ahnkuti site[1], skeletal remains at Yaquina Head[2], and shell middens at north Yaquina Head[3].

2.1.3 Biological Resources

Biological resources in the area include numerous fish, shellfish, birds and mammals. Fish species include white sturgeon, pacific herring, steelhead, flatfishes, perch, coho, chinook salmon, chum salmon, surf smelt, longfin smelt, lingcod, English sole, and starry flounder. Shellfish include Pacific oysters,

[1] R. Scott Byram. Oregon Historical Quarterly, Vol. 108, No. 2
[2] Minor, Rick, Kathryn Ann Toepel, and Ruth L. Greenspan. Arch. Investigations at Yaquina Head. 1987
[3] Minor, Rick. Archaeology of the North Yaquina Head Shell Middens. U.S.Dept. of Interior. 1989



MAP LEGEND	
Designation	Elevation
	North Newport Planning Area
	South Beach Planning Area
	Newport City Boundary

Civil West
Engineering Services, Inc.

THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

Planning Area Map

STORM DRAIN MASTER PLAN

0 1"
NTS

DRAWN BY: JRP
DATE: FEB 2014

FIGURE
2.1

blue mussels, various clams, bay shrimp, and dungeness crab. A variety of bird species are present including the threatened brown pelican and threatened western snowy plover. Marine mammals in the area include California sea lions, harbor seals, and the threatened northern sea lion. Biological habitat in the area includes tidal, marine, and forest habitat.

2.1.4 Coastal Resources

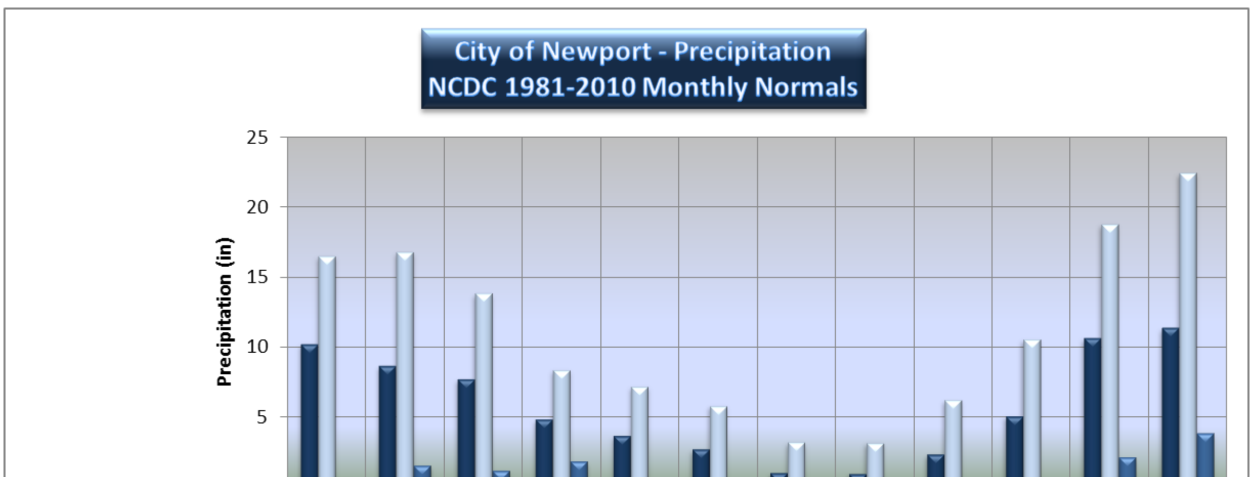
The Oregon Coastal Zone roughly includes all land west of the crest of the Coast Range. The entire planning area is therefore within the Coastal Zone. Coastal resources in Newport include coastal and marine habitat, tidal wetlands, commercial and sport fisheries, the Yaquina Bay deep draft estuary, and tourism related to the beach and Oregon Coast Aquarium.

2.2 Physical Environment

2.2.1 Climate

Climate data was obtained using long-term records collected at the Newport Station (Station 356032) as reported by the Western Regional Climate Center.

Average annual precipitation is approximately 70-inches in Newport. Record low and high precipitation years recorded were 43-inches in 1944 and 111-inches in 1968. The maximum recorded 24-hour rainfall was 4.99-inches on November 19, 1996. On average, 46% of the annual precipitation occurs in November, December, and January. Snowfall is rare with most years recording little or no snowfall; however, record snowfall of 11-inches was reported in 1942-43 and again in 1972-73. The mean annual snowfall during the period from 1930 to 2007 is 1.02-inches. No statistically significant increasing or decreasing trend in annual rainfall is evident. Based on the NOAA Atlas 2, Volume X Isopluvial maps, the 5-year storm 24-hour rainfall is 4.5 inches. Precipitation normals from the NCDC are shown in Figure 2.2.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Precipitation (in.)	10.25	8.69	7.74	4.87	3.68	2.72	1.04	1.02	2.39	5.12	10.67	11.38
Highest Precipitation (in.)	16.54	16.81	13.84	8.41	7.21	5.86	3.24	3.22	6.26	10.58	18.81	22.44
Lowest Precipitation (in.)	0.68	1.56	1.22	1.85	0.34	0.41	0.02	0.04	0.05	0.13	2.17	3.87

Figure 2. 2 – Precipitation Normals, NCDC 1971-2000

The average annual temperature in Newport ranges from 45 to 58°F with an annual mean of 51°F. A record high temperature of 100°F was recorded on July 11, 1961. A record low temperature of 1°F was recorded on December 8, 1972. August is statistically the warmest month with a mean of 58°F while December and January are the coldest with a mean of 45°F. Temperature normals from the NCDC are shown in Figure 2.3.

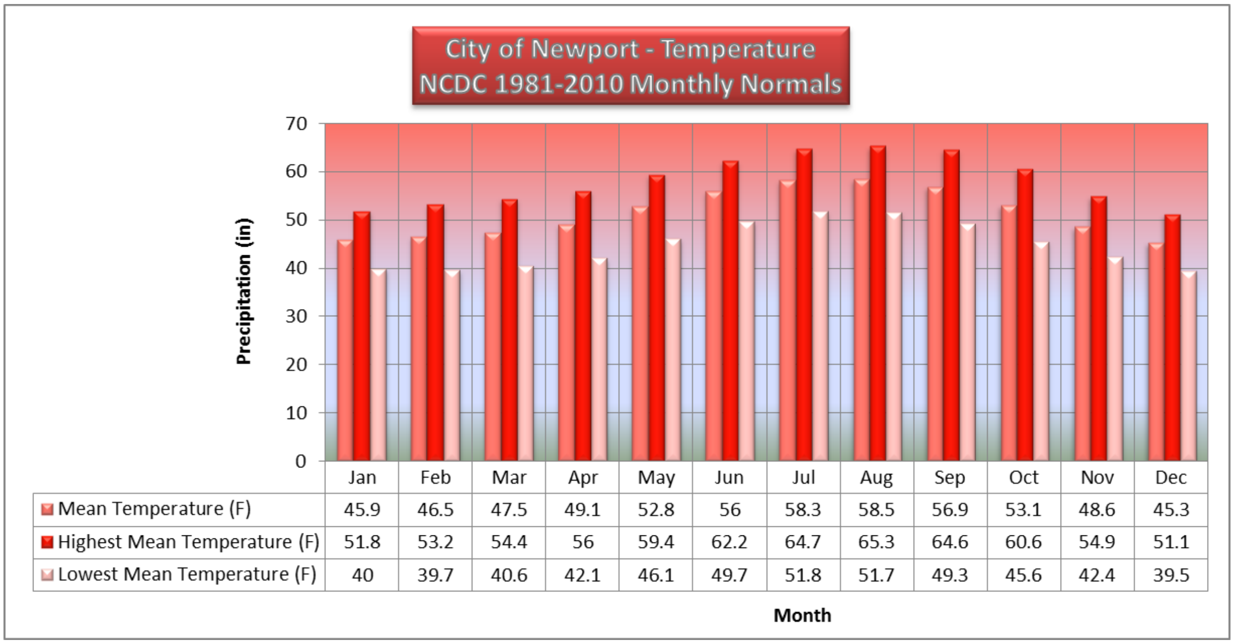


Figure 2. 3 – Temperature Normals, NCDC 1971-2000

2.2.2 Soils

Soils within the Newport area are dominated by silty loams. Within the study area there are several soil groups represented. The soil groups are described in the USDA_NRCS Custom Soil Resource Report found in Appendix B.

The Bayfront is primarily dominated by sandy soil that contains slightly and moderately decomposed plant material in the first few inches. The slopes in this region range from 0 to 12%. Given this soil type, and shallow slopes, the Bayfront segment of the basin classifies as an excessively drained area and is designated as a “A” hydrologic soil group. (5.95” to 99” per hour)

On the other end of the drainage spectrum is the loam filled steep slopes (10 to 60%) that cascade over the rest of the basin. These soils range from paragravelly medial loam to silty clay loam. Given these aggressive slopes and minimal ability of the soil to transmit water, much of the basin has a very limited capacity to absorb rain water (0.02” to 5” per hour) and is designated as a “C” hydrologic soil group.

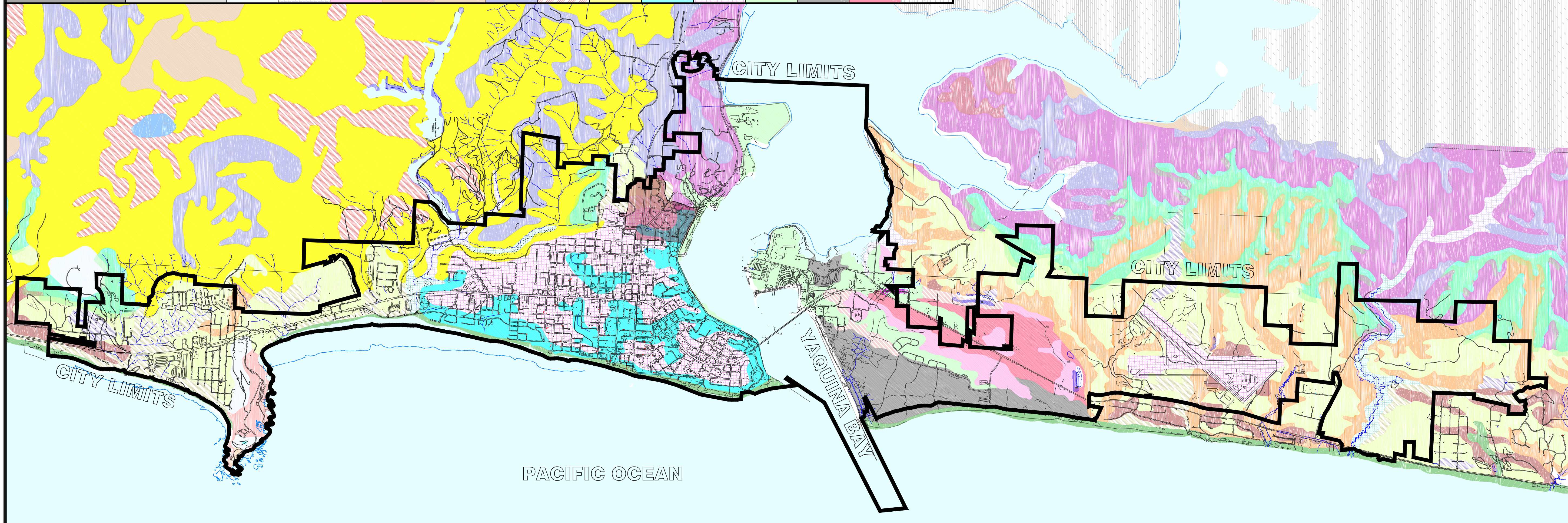
Throughout the basin there are a variety of different soils group that help to define basins ability to absorb a storm event. The soil groups can be seen on the soils map in Fig. 2.4.

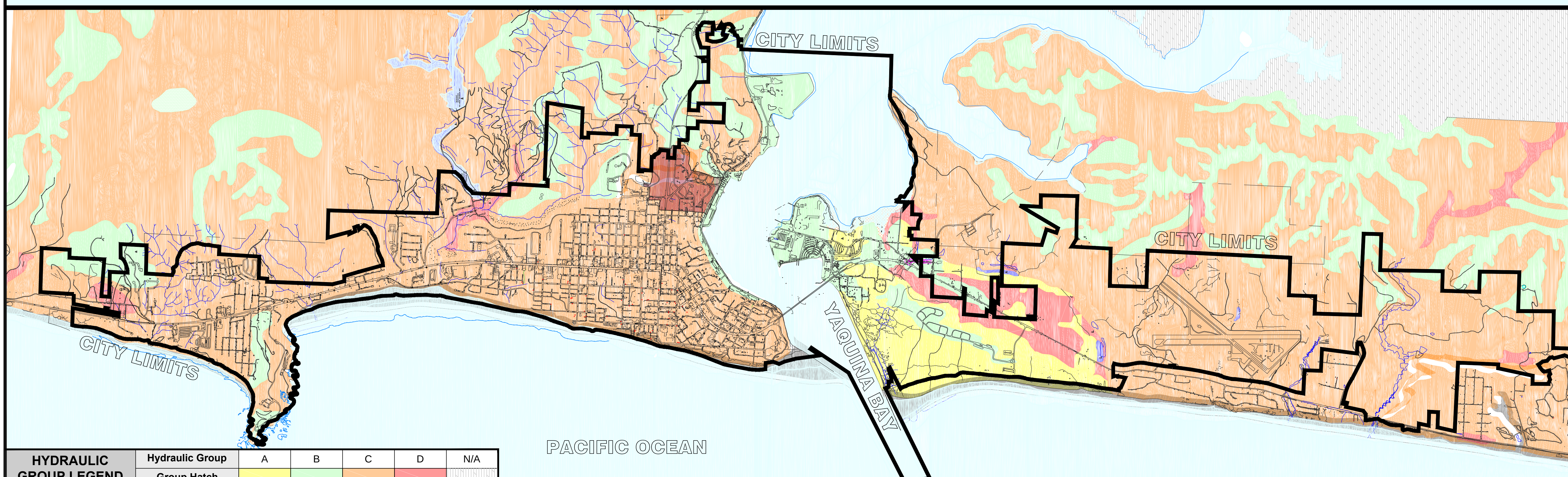
2.3 Geologic Hazards

Newport is subject to a variety of geologic hazards including flooding, landslides, high groundwater, earthquakes and tsunamis. The City developed Ordinance No. 2017 which became effective in August of 2011, to amend the existing ordinances which describe how geologic hazard areas are defined, where they are located, and what is required when building in these designated areas. The primary outlined

SOIL TYPE LEGEND

Map Unit Name	3C	3E	4A	9A	12A	14B	18G	23C	32G	35E	42C	42E	44H	45E
Soil Hatch														
Map Unit Name	45G	46A	47C	47E	52H	55E	56E	56G	58E	59C	60C	63E	67A	N/A
Soil Hatch														





HYDRAULIC GROUP LEGEND

Hydraulic Group	A	B	C	D	N/A
Group Hatch					

Civil West Engineering Services, Inc.

THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

Soils Map

BAY-MOORE DRAINAGE STUDY

1"
1" = 1000'

DRAWN BY: JRP
DATE: APRIL 2013

FIGURE
2.4

requirement in the discussed ordinance relates to building in Geologic Hazard areas. This requirement is the application submittal for a Geologic Permit. The application includes:

1. A site plan that illustrates areas of disturbance, ground topography (contours), roads and driveways, an outline of wooded or naturally vegetated areas, watercourses, erosion control measures, and tress with a diameter of at least 8-inches dbh (diameter breast height) proposed for removal.

2. An estimate of depths and the extent of all proposed excavation and fill work

3. Identification of the bluff or dune backed hazard zone or landslide hazard zone for the parcel or lot upon which development is to occur. In cases where properties are mapped with more than one hazard zone, a certified engineering geologist shall identify the hazard zone(s) within which development is proposed

4. A Geologic Report prepared by a certified engineering geologist, establishing that the site is suitable for the proposed development

5. An engineering report, prepared by a licensed civil engineer, geotechnical engineer, or certified engineering geologist (to the extent qualified), must be provided if engineering remediation is anticipated to make the site suitable for the proposed development.

The cost of this process is to be accounted for when examining potential system improvement. A discussion of each hazard and the areas it affects is presented below.

2.3.1 Flooding

Flooding in Newport is related to two factors, rainfall and tides. Winter tides frequently include high tide levels that exceed those experienced the rest of the year. There is an associated risk of flooding to those areas designated to be within the 100-year flood plain. These areas include but are not limited to SE 35th Street, Elm Street, portions of SW Bay Boulevard, and McLean Point. The Storm drains within these areas include numerous gravity culverts that discharge to the bay. When tide levels are elevated runoff is unable to exit through the culverts and water backs up onto streets through catch basins and manholes. FEMA FIRM maps for Newport are found in appendix B.

2.3.2 Landslides

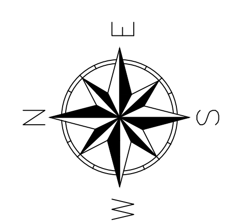
The combination of high rainfall and sea cliff erosion has resulted in many historic landslides along the coastline of Newport. The unconsolidated terrace deposits are relatively permeable and susceptible to erosion as opposed to the underlying bedrock that has low permeability and tends to perch groundwater. This cliff-side erosion, and soil movement is most currently prevalent in the Agate Beach area. Some of the impacts to this region are as follows: The north end of NW Meander St. was lost to Cliffside erosion, NW Rhododendron St. and other roadways have developed drastically abrupt rise and falls in their profile, and some local h are experiencing dramatic settling of their foundation.

Landslides are also a potential in locations where homes and/or roadways have been constructed on steep hillsides or cut banks and where high ground moisture makes slope stabilization difficult. High ground moisture coupled with clayey soils underlying the roadways can lead to recurrent sliding at these locations. A map displaying geologic hazard areas as related to Landslides is shown in Figure 2.5.

OUTFALL MAP LEGEND

Linetypes		Topography	
Designation	Description	Hatch	Elevation
(yellow line)	City Limits	(red)	Active Erosion Hazard Zone
(black dashed line)	Urban Growth Boundary	(cyan)	Active Landslide Hazard Areas
(green dash-dot line)	Highways Route	(blue)	High Risk Bluff Hazard Zone
		(magenta)	High Risk Dune Hazard Zone
		(orange)	Other Landslide Hazard Areas

Source: Geologic Hazard Information derived from DOGAMI Open File Report OFR 0_04_09. Evaluation of Coastal Erosion Hazard Zones Along Dune and Bluff Backed Shorelines in Lincoln County, Oregon



0 3800 7600 Feet

NOTE: This map is for informational use only and has not been prepared for, nor is it suitable for legal, engineering, or surveying purposes. It includes data from multiple sources. Civil West assumes no responsibility for its compilation or use, and users of this information are cautioned to verify all information with the Newport Development Department.

Civil West Engineering Services, Inc.

THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

Geological Hazard Map

CITY WIDE STORM DRAIN MASTER PLAN

1" = 3800'

DRAWN BY: JRP
DATE: MARCH 2014

FIGURE 2.5

2.3.3 Earthquake and Tsunamis

Three faults of Late Quaternary to Holocene age which are referred to as the Yaquina faults exist within the Newport area. All the faults are relatively short and are estimated to have slip rates of less than 1 mm per year. These faults are three down-south, east-striking faults that offset marine-terrace sediments and wave-cut platforms between Yaquina Head and Yaquina Bay. In general the age is constrained to less than 80,000 years before present, and the nature of the seismic potential of the faults is largely unknown.

A more significant geologic hazard is the Cascadia Subduction Zone located off the Oregon coast. The Cascadia Subduction Zone consists of a long sloping fault that stretches from mid-Vancouver Island to Northern California. The fault is located approximately 60 miles off the coast at Newport. Very large earthquakes are known to occur periodically along this fault. It is estimated that an earthquake of magnitude 9.0 or greater could occur if rupture occurred along the entire fault. Large earthquakes along the Cascadia Subduction Zone are estimated to have a return period of 400 to 600 years with the last major earthquake occurring in January 1700. The Cascadia Subduction Zone presents a significant geologic hazard to the Newport area both due to its potential to produce severe earth tremors and the likelihood to cause a tsunami following a major earthquake. Low lying areas of Newport could experience significant damage from a tsunami. Ground acceleration resulting from a large earthquake could lead to major damage in areas where soft soils and/or high groundwater exist.

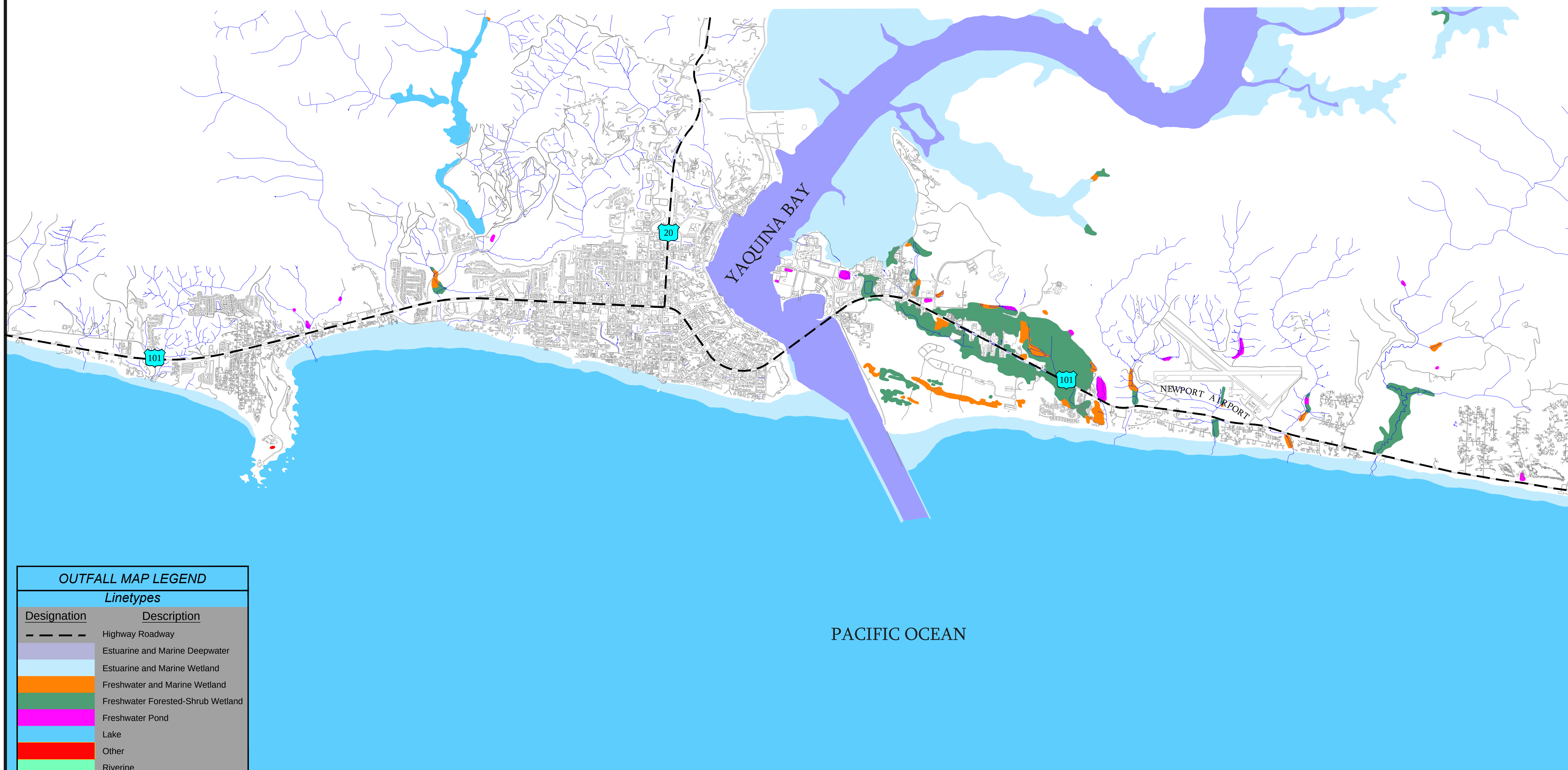
2.4 Wetlands

Several wetland designations occur in Newport according to the National Wetlands Inventory (NWI). Estuarian and Marine Wetland areas occur along the beach and tidal flats of the Yaquina River. Freshwater Forested-Shrub Wetlands occur in low areas east of South Beach State Park and near Thiel Creek, Moore Creek, Grant Creek, and Henderson Creek south of the Bay. Pockets of Freshwater Emergent Wetlands also occur along creeks and in the low areas near South Beach State Park. The wetland designation is displayed in the wetland inventory map shown in Figure 2.6. More detailed wetland maps developed for the City by PBS, Inc. can be found in Appendix C.

2.5 Air Quality and Noise

Air quality in the Newport area is generally very good due to the city's proximity to the Pacific Ocean. Summertime weather patterns include winds from the northwest which provide cool, fresh air from over the ocean. Air pollutants produced within the city are typically blown out before concentrations approach nuisance levels. Undeveloped areas around the city generally are forested or have established ground cover unless recently cleared. Despite summertime prevailing winds, dust is not typically a problem locally. During winter and spring months frequent rains keep dust and pollen levels to a minimum. Occasional brush or slash burning in the area can produce a smoke nuisance when winds direct smoke toward the city.

Major sources of noise within the city include ship horns, the ocean, and traffic along Highway 101, Highway 20, and Bay Boulevard. Generally noise levels are not significant away from the major traffic corridors. The rolling terrain of the area and the presence of numerous mature trees help diminish noise levels away from the sources



NOTE: WETLAND INVENTORY MAPS SHOWING MORE DETAIL ARE LOCATED IN APPENDIX C OF THIS STORM WATER MASTER PLAN

Civil West Engineering Services, Inc.

THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

Wetland Inventory Map

SYSTEM WIDE DRAINAGE STUDY

1"
1" = 1000'

DRAWN BY: JRP
DATE: APRIL 2013

FIGURE 2.6

2.6 Population

2.6.1 Population Forecast Background

According to Oregon Revised Statue ORS 195.036 counties are required to coordinate population forecasts among the cities and unincorporated areas within the County. As of 2011 Lincoln County had not developed a population forecast for the cities within the County. In the absence of population data, the City of Newport developed a population forecast for the urban growth boundary (UGB), and incorporated it into their comprehensive plan.

OAR 660-024 provides "safe harbor" procedures for forecasting population in cities that lack an adopted population forecast. As specified in OAR 660-024-0030(4)(b) Newport's population projection adopted the 20-year population forecast based on the Oregon Office of Economic Analysis's population forecast for the County.

2.6.2 County Population Growth Rate

US census data is shown in Table 2.2 to show the comparison of Newport growth development over the last 20 years to that of the county and state. As can be seen in Table 2.2, over the last 20 years both Newport and the County underwent an annual growth rate of 1%, which was considerably lower than the state average of 1.8%.

Oregon Department of Administrative Services' Office of Economic Analysis (OEA) forecast for the County predicts an increase from 48,427 people in 2014 to 55,045 in 2034. That growth dictates a total increase of 6,618 people within the county over 20 years, and a drop in annual growth rate from the current 1% to .64%.

Table 2. 2 – Population Change for Oregon, Lincoln County and Newport between 1990-2010

Area	Population			Change 1990 to 2010		
	1990	2000	2010	Number	Percent	AAGR
U.S.	248,709,873	284,421,906	308,745,538	60,035,665	24%	1.3%
Oregon	2,842,321	3,421,399	3,831,074	988,753	35%	1.8%
Lincoln County	38,889	44,479	46,034	7,145	18%	1.0%
Newport	8,437	9,532	9,989	1,552	18%	1.0%

Source: U.S. Census 1990 SF1 P001, U.S. Census 2000 SF1 P1
Note: AAGR is average annual Growth Rate

2.6.3 City of Newport Residential Population Projections

Projected population values for the City will be calculated relative to the OEA projected County population. Portland State University Population Research Center developed Table 2.3 which displays the annual population estimates for the City of Newport, and their relationship to the County's population for the period of 1990 and 2010. The data is from the Population Research Center (PRC) at Portland State University. The PRC uses decennial census data collected by the U.S. Census Bureau as a baseline and generates estimates using a methodology that accounts for residential building permits and various other factors.

As a result of the relatively low population numbers obtained by the 2010 census, PSU made adjustments to their forecast for the City, as well as the County. The City population that was originally estimated at 10,605 for 2010, dropped to 10,030; whereas the county increased from 44,700 people to 46,135.
Based on the Revised PSU estimates, Newport's 2010 population accounted for 21.7% of Lincoln County's population. In order to develop the City of Newport's population forecast it was assumed that

Newport's population maintained the same ratio versus the counties throughout the designated planning period.

Table 2.3 – City to County Population Ratio

Year	Lincoln County	Newport	Newport's Percentage of County Population	Year	Lincoln County	Newport	Newport's Percentage of County Population
1990	38,889	8,437	21.7%	2001	44,650	9,660	21.6%
1991	39,880	8,540	21.4%	2002	44,700	9,650	21.6%
1992	40,730	8,675	21.3%	2003	45,000	9,740	21.6%
1993	41,900	8,885	21.2%	2004	44,400	9,760	22.0%
1994	42,940	9,075	21.1%	2005	44,405	9,925	22.4%
1995	43,940	9,495	21.6%	2006	44,520	10,240	23.0%
1996	44,500	9,785	22.0%	2007	44,630	10,455	23.4%
1997	45,050	9,960	22.1%	2008	44,713	10,580	23.7%
1998	44,840	10,240	22.8%	2009	44,700	10,600	23.7%
1999	44,500	10,290	23.1%	2010	46,135	10,030	21.7%

Source: Portland State University Population Research Center; calculations by ECONorthwest

Figure 2.7 displays the population forecast for both the County (Projected by OEA @ .64% AAGR) and the City of Newport. (21.7% of the County's population) As can be seen in this Figure, the projected residential population at the end of the 20-year planning period is 11,945 persons. This is a total increase in population of 1,436 persons over the planning period.

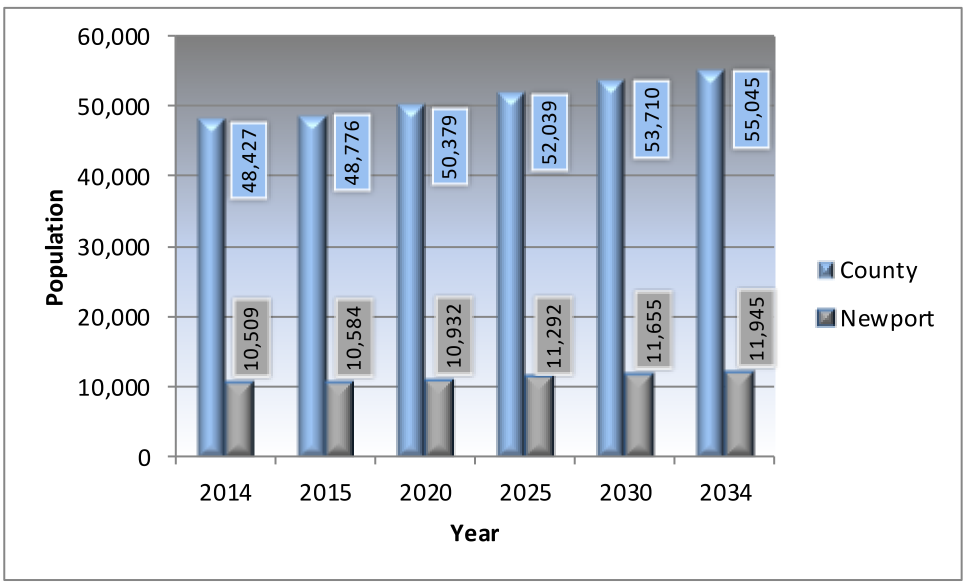


Figure 2.7 – Population Forecast for County and City

2.7 Land Use

Land use within the City Limits of Newport is a typical mixture of residential, commercial, and industrial zoning. The City is bounded on the west by the Pacific Ocean. Land to the east of the UGB is primarily zoned Timber-Conservation (T-C) including land inside the UGB east of the airport and some of the land inside the UGB northeast of Yaquina Head. Portions of land outside the City Limits but inside the UGB in the South Beach area are zoned for Public Facilities (P-F) and Planned Industrial (I-P) and the remaining land outside the City Limits but inside the UGB is zoned for residential use. The Big Creek reservoirs and the raw water transmission piping from the Siletz River Intake are located in Timber-

Conservation zoned land. Formally classified lands within the area include the South Beach State Park, Yaquina Bay State Park, Agate Beach State Recreation Site, and the Yaquina Head Outstanding Natural Area. No Wild and Scenic Rivers are located in the planning area. Figure 2.8A & B displays the zoning designations for the City of Newport. Table 2.4 below displays the zoning distribution in each basin within the planning area.

Table 2.4 – Zoning Distribution

	ACREAGE PER BASIN PER ZONE												
Basin	LDR	HDR	IND.	COM.	PUB.	OUT OF UGB	Basin	LDR	HDR	IND.	COM.	PUB.	OUT OF UGB
A	0	0	49	10	0	69	W	1	4	0	6	0	0
B	6	0	0	0	0	0	X	9	10	0	24	8	0
C	0	3	0	7	2	0	Y	0	15	0	0	2	0
D	154	88	0	0	0	428	Z	0	9	0	21	0	0
E	0	12	0	0	0	0	AA	6	6	0	21	6	0
F	17	49	0	7	0	0	AB	17	0	0	15	0	0
G	25	0	0	2	0	0	AC	126	0	0	0	0	0
H	8	0	0	0	0	0	AD	0	0	0	5	0	0
I	0	1	0	3	0	0	AE	0	0	0	0	0	0
J	42	0	0	8	0	0	AF	34	0	0	6	3	0
K	73	0	0	9	62	54	AG	2	5	146	28	72	0
L	23	29	0	0	0	97	AH	24	0	0	0	338	0
M	0	51	0	0	0	0	AI	65	64	29	10	12	0
N	432	82	0	44	192	35018	AJ	18	68	0	0	0	0
O	4	0	0	0	0	0	AK	0	24	17	0	45	0
P	21	2	0	20	0	0	AL	47	0	182	0	75	12
Q	35	0	0	6	0	0	AM	23	8	31	0	6	0
R	18	0	0	0	0	0	AN	0	47	123	0	133	210
S	7	1	0	0	0	0	AO	0	59	0	0	304	225
T	50	26	0	41	12	0	AP	10	36	0	38	205	348
U	38	117	0	78	13	0	AQ	638	0	0	0	12	1988

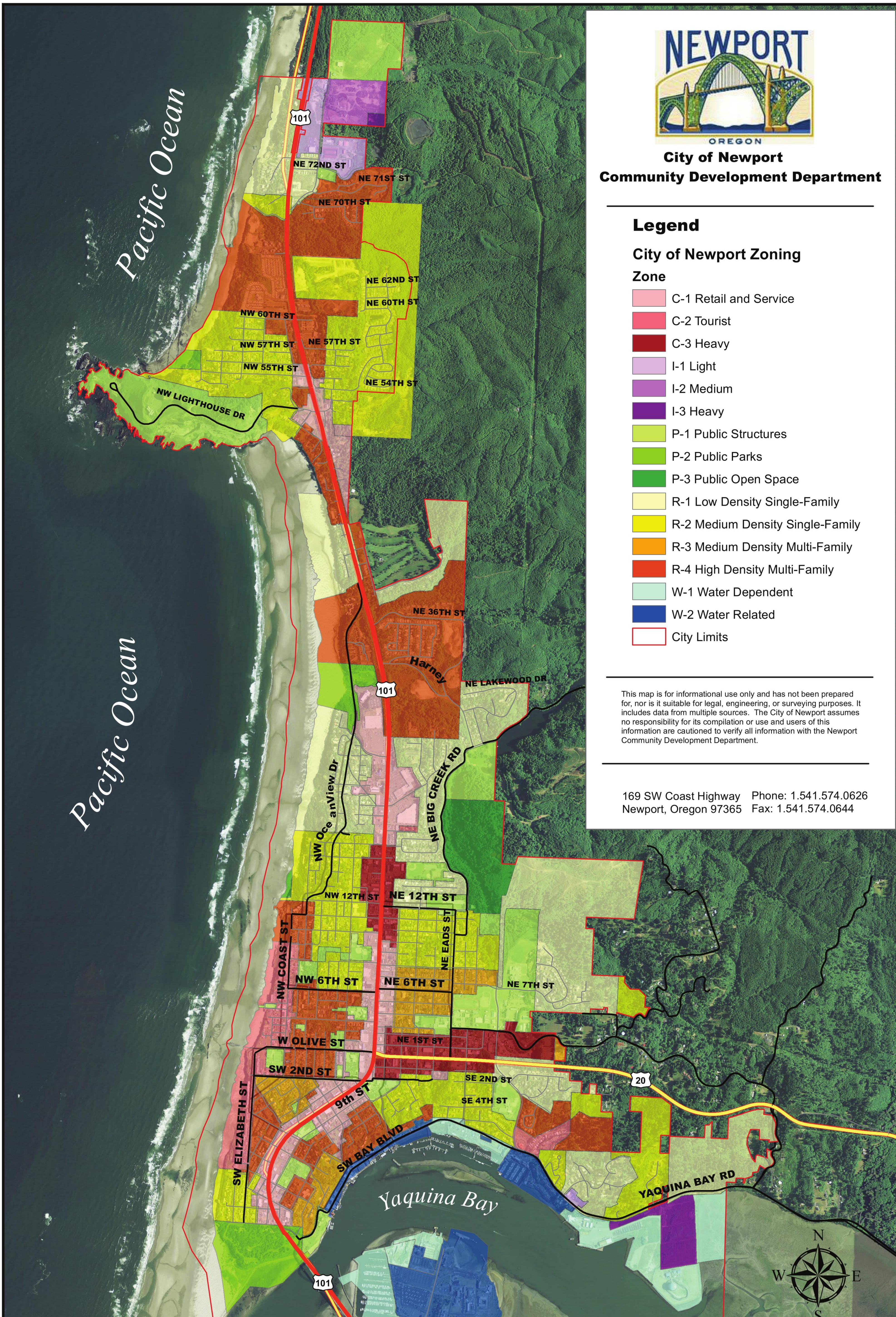


FIGURE 2.8A

0 1"

NTS

Drawn By: JRP
Date: Feb 2014

Zoning Map

STORM DRAIN MASTER PLAN

THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

Civil West Engineering Services, Inc.

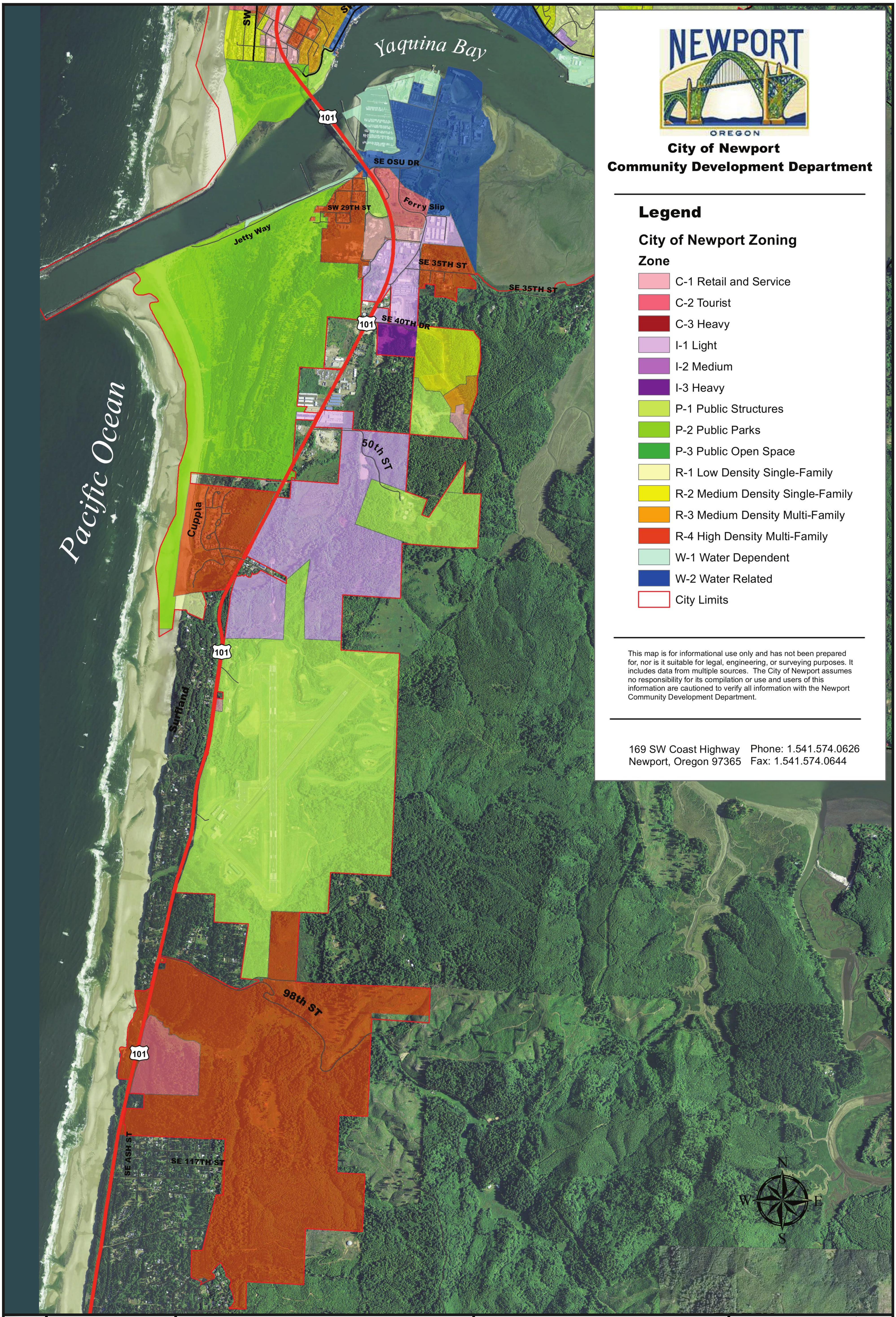


FIGURE 2.8B

0 1"
NTS

DRAWN BY: JRP
DATE: FEB 2014

Zoning Map

STORM DRAIN MASTER PLAN

THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

Civil West Engineering Services, Inc.

Existing Stormwater Facilities

Section 3

3.1 General

This Section provides a description of the existing storm drain facilities within the City of Newport. A system inventory was conducted using information obtained from the City's aerial topographic map, as-built drawings, existing storm drain system maps, and a developing GIS database which contains locations of City water, sewer, and storm drain components.

The study area has been divided into 43 storm drainage basins based on surface topography and drainage routes. In addition to being divided into basins, the system was also separated into two distinct areas. This is the 'North' storm drain area which is North of Yaquina Bay, and the 'South Beach' storm drain area which is South of Yaquina Bay. The basins within the planning area are displayed in Figures 3.1A to 3.1D.

3.2 Information Gathering and Sources

The City of Newport had relatively limited mapping resources that would facilitate laying out an accurate model of the existing storm drain system. As a result, much of the system information was collected via system inspection and investigation. Included in, but not limited to these processes, was examining of catch basins and manhole inlets, outlets, condition, and location, as well as collecting information on culverts condition, location, and size. Location data was developed using a GPS real time kinematic handheld device. Whenever possible, the field data collected was cross referenced with the existing system maps collected from the City. If there was a discrepancy, that component was further examined.

Additional system properties were assigned using other sources of data provided by the City. One of these properties was the rim elevations. These values were assigned using the elevation at the system structures taken from the City's Aerial topography. Designating pipe condition was also aided by the City's data, as it related to video feeds of the internal components of the system pipes. In addition, the City collected rim elevation, and approximate invert elevation information at requested key points within the storm drain system.

Yet another source of information was the Google Earth program. Elevation data was collected from this source to facilitate basin boundary development where the aerial topography was unavailable.

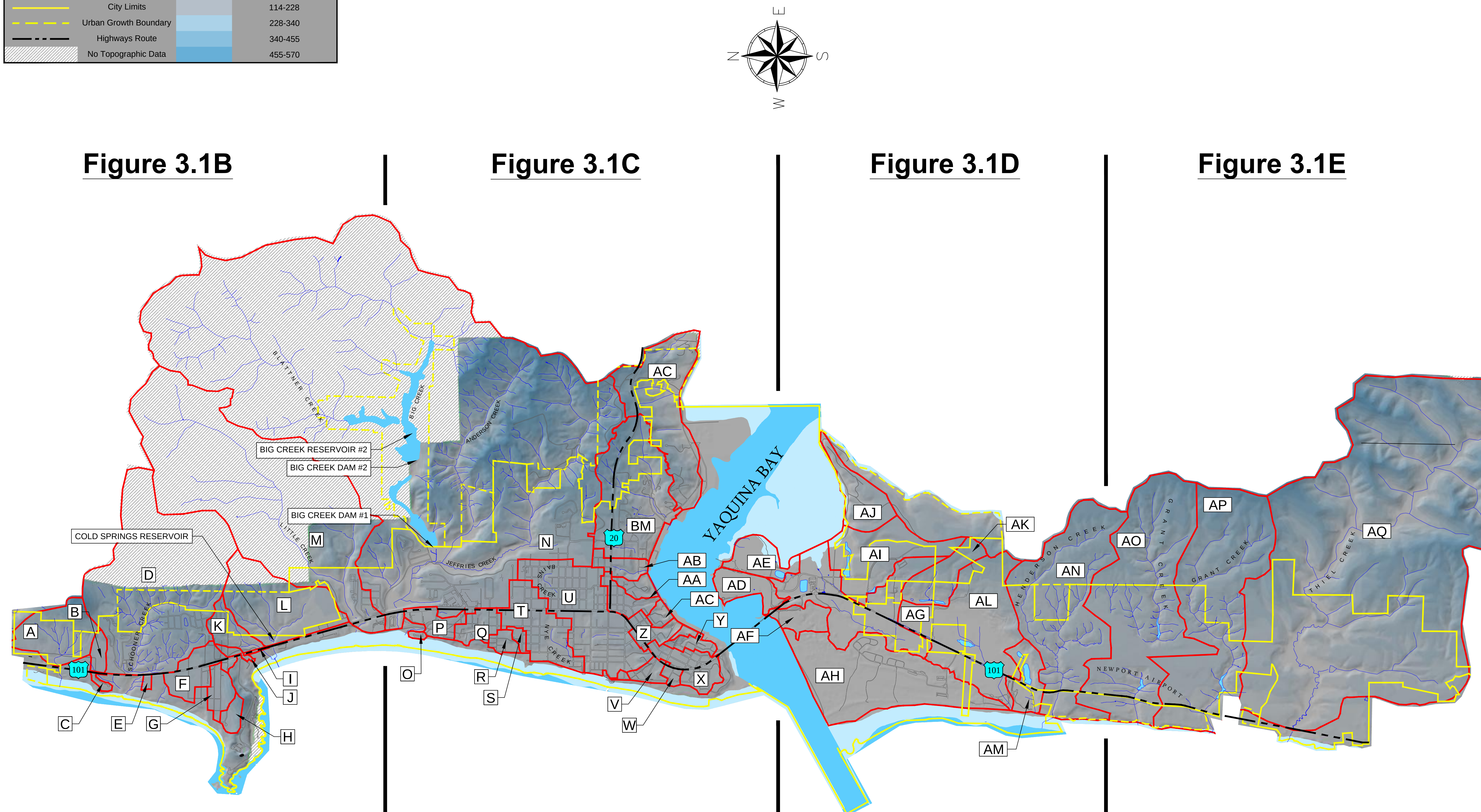
3.3 Storm Drainage System Overview

The City of Newport is situated on rolling and hilly terrain. Much of the easterly basins contain natural drainage features conveying storm runoff to nearby creeks, streams, and rivers which flow to the Pacific Ocean. The westerly portions of the basins along the coast are predominantly developed areas.

The types of systems within these developed areas predominately depend on the means of development. Developments that maintained topography relatively similar to the natural ground, their systems are typically shallow systems that drain to the closest stream or creek. Developments that occurred over drainage ways, filling ravines with a large volume of material typically contained systems with very deep

OUTFALL MAP LEGEND

Linetypes		Topography	
Designation	Description	Hatch	Elevation
	Basin Boundary		0-114
	City Limits		114-228
	Urban Growth Boundary		228-340
	Highways Route		340-455
	No Topographic Data		455-570



Civil West
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Lincoln County, Oregon

Basin index Map

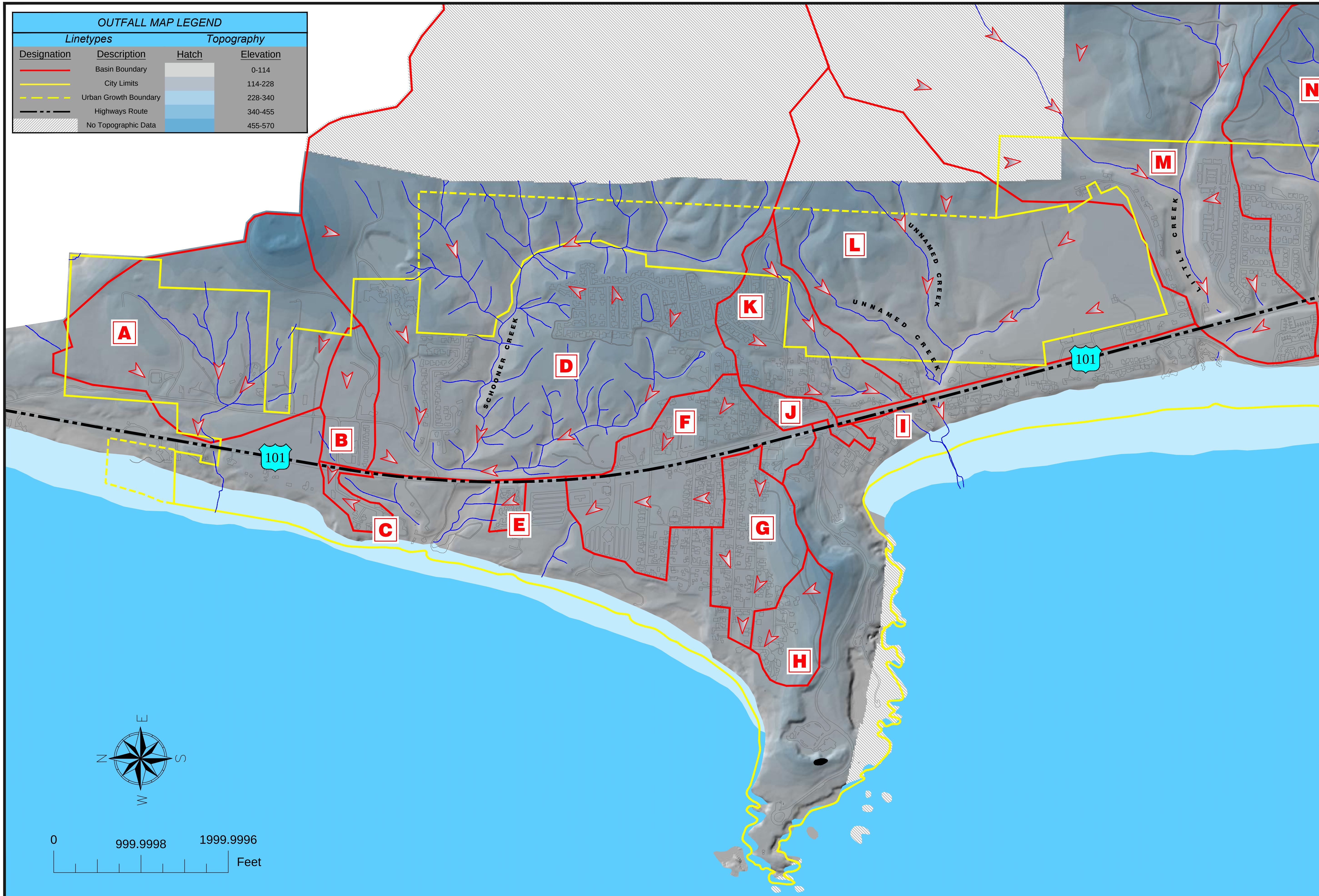
Storm Water Master Plan

1"

1" = 3800'

DRAWN BY: JRP
DATE: APRIL 2014

FIGURE
3.1A



Civil West Engineering Services, Inc.

THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

Basin Map

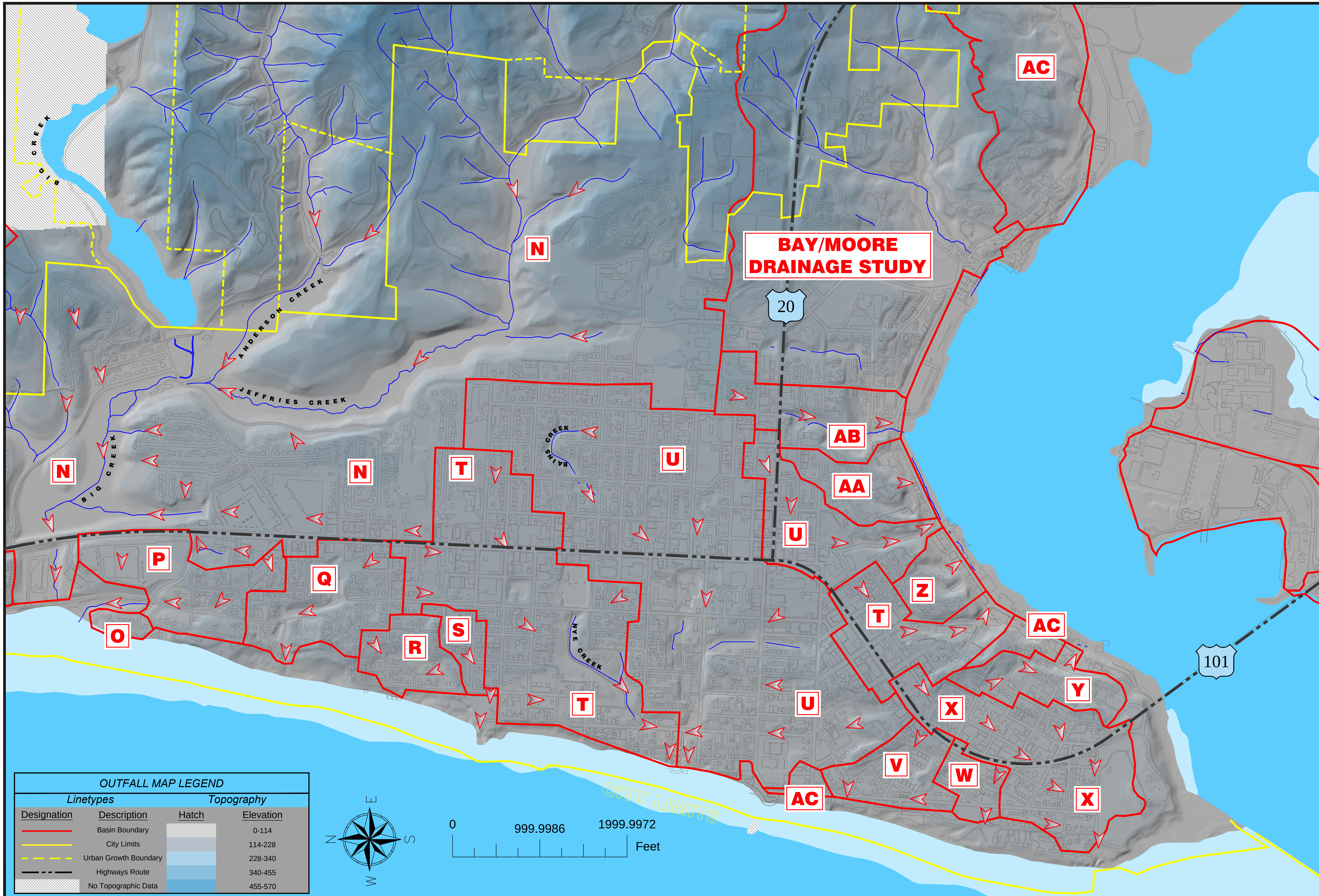
STORMWATER MASTER PLAN

1"

1" = 1000'

DRAWN BY: JRP
DATE: APRIL 2014

FIGURE
3.1B



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The City of Newport
Lincoln County, Oregon

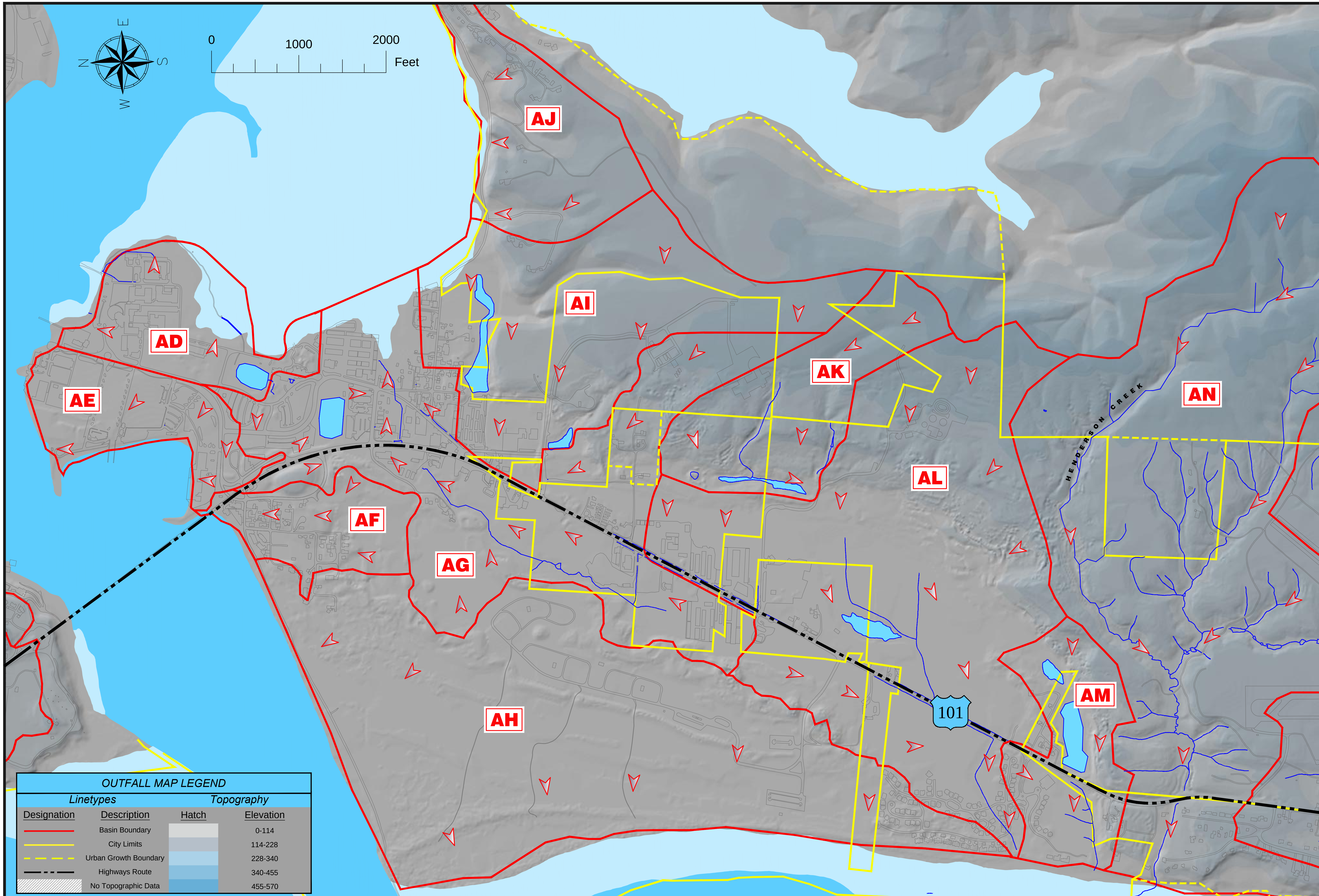
Basin Map-North Area 2

Stormwater Master Plan

1" = 1000'

DRAWN BY: JRP
DATE: APRIL 2014

FIGURE
3.1C



Civil West Engineering Services, Inc.

The City of Newport
Lincoln County, Oregon

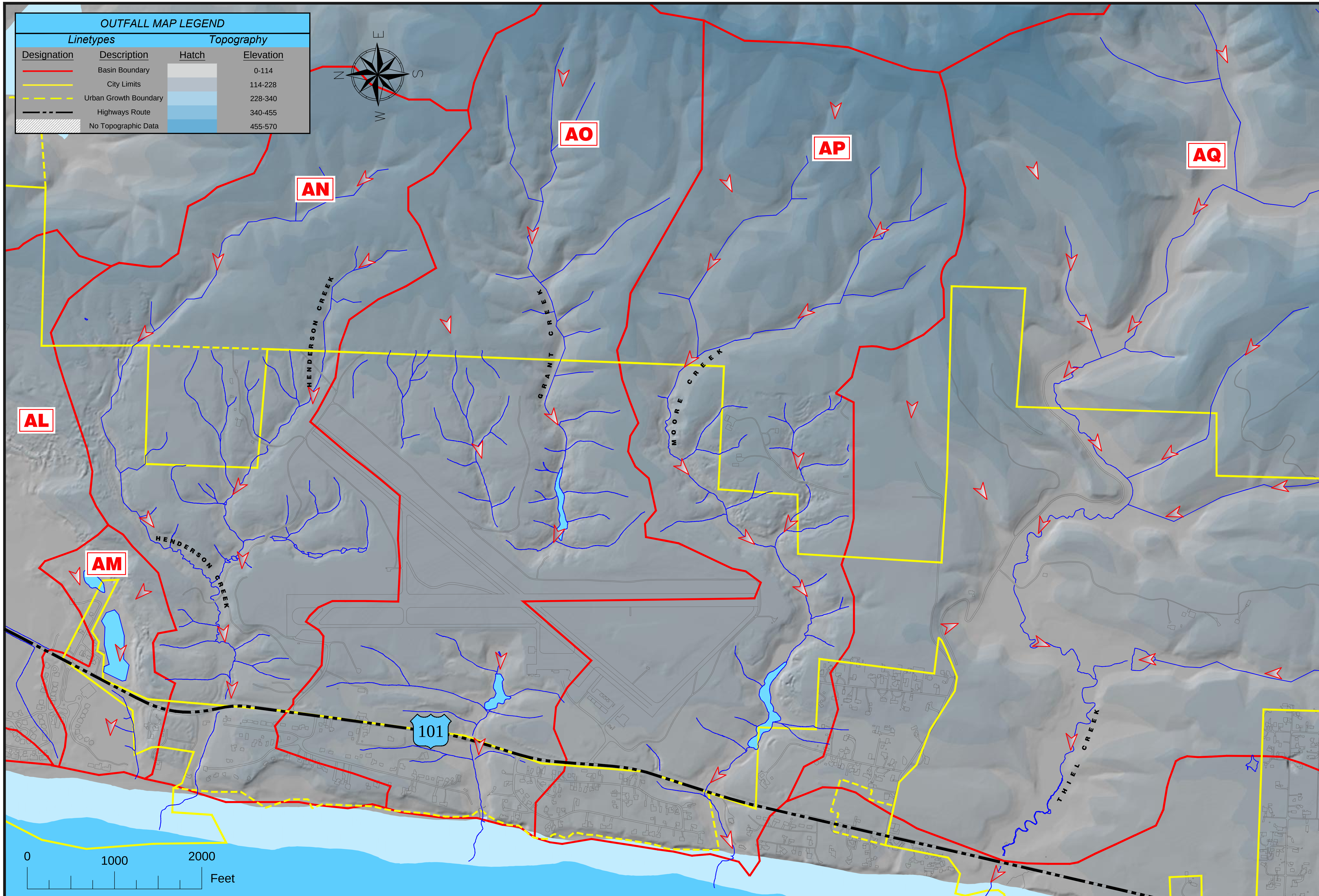
Basin Map-South Area 1

Stormwater Master Plan

1" = 1000'

DRAWN BY: JRP
DATE: APRIL 2013

FIGURE
3.1D



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The City of Newport
Lincoln County, Oregon

Basin Map-South Area 2

Stormwater Master Plan

1" = 1000'

Drawn by: JRP
Date: April 2014

FIGURE 3.1E

culverts lying under the fill at the original elevation and alignment of the covered waterway. In some locations there is 30’ of cover over the storm drain components. Much of the Citys’ downtown area consists of the latter type of system.

A general description of the 43 stormwater drainage basins and discharge points is presented below. This description is broken up into the two designated areas: North, and South Beach. Visual representation of the basins is given in Fig. 3.1.

3.3.1 North Storm Drain System

The area between NW 66th St. and NE 89th Crt. incorporates basins A, B C and D. The developed area within this region is mostly residential, while a large part of the undeveloped area is commercial and industrial. The majority of the storm drain sub-systems within these basins are smaller 8 to 12” systems, which drain the collected water from the residential lots. Much of Basin D was outside of the UGB, and collected storm water from forest land to the east. The storm water from these basins is collected in Schooner Creek and conveyed under Hwy. 101. The undeveloped northern region of these basins (primarily basin A) drains under HWY 101 and into the Pacific Ocean.

Further south, the area between NE 31st St. and NW 66th St. contains basins E through M. These basins are also primarily residential developments. There are a few exceptions like the Pacific Shores RV Park, and the Newport Cinema Center. The storm drain systems within basins E through J & M contain smaller pipe sizes ranging from 8” to 18”. All but basin J and M outfall onto various slopes that drain into the Pacific Ocean, while basin J & M outfall into an unnamed creek and Little Creek respectively. Basins K and L collect storm water from a considerable primarily undeveloped area, including land to the east of the UGB. The only storm drain components incorporated into these basins are the culverts traveling under Hwy. 101.

Basin N lies just South of 31st St., and incorporates Big Creek, Anderson Creek, and Jeffries Creek making it the largest basin in the system. Given the massive area that Basin N comprises, there are several storm drain sub systems that lie within its boundaries. These sub-systems range in size from smaller like those extending from Pacific Homes Beach Club, or the system draining the residential area developed around Lakewood Hills Drive, to larger systems like the one which drains all of the developed area to the East and a small area to the West of Hwy. 101 from NE San Bay-O Circle to 31st Street. All of these drainage systems either directly or indirectly drain to Big Creek which then drains under HWY 101 through a culvert and out into the Pacific Ocean.

Moving further south there are a collection of basins that outfall onto slopes or cliff sides that drain into the Pacific Ocean. This collection consists of basins O through X. They are located on the West of HWY 101 from 31st street down to Government Street. Basins O through S and U through X are all primarily residential areas and house relatively small systems with outfalls ranging from 10” to 24”. These systems also contain the typical components of catch basins, culverts, and manholes and are driven entirely by gravity. The two larger storm drain systems within this string of basins lay in basin T and U. The systems in these basins drain the majority of downtown Newport area and stretch from NW 15th St. in the north to 2nd St. in the South. Both of these systems are conveyed through pipe, then open channel flow (NYE and other unnamed creeks) then back to pipes where they eventually come together at the NYE beach outfalls. At this location the outfalls from basin T and U are tied together via a 24” pipe. This allows water that was collected from either basin to flow to the ocean through either the 42”, or 24” outfall or both.

At the southernmost portion of the North storm drain area there are numerous basins that line the bay front from the West portion of the City to the East. These basins which all drain into Yaquina Bay are basins Y through AB. They collect water from primarily developed residential areas intermixed with some commercial.

Basin AC does not represent a single basing but rather has been used as a 'catch all' for areas along the north side of Yaquina Bay that drain sparsely populated areas with little to no storm drain system to Yaquina Bay. Most of these undeveloped areas consist of one or two culverts or a catch basin and a pipe that drain the collected water across Bay Blvd. The majority of the sub-systems within the developed basins are primarily hard piped with little creeks, fields, or forest being used to convey the storm water flow. These piped systems use gravity to facilitate the flow, and are relatively small with the largest outfall being 24". The one exception to this is basin BM (Bay-Moore) which contains a 36 inch outfall. This larger basin and the associated storm drain is included in the 'Bay Moore Drainage Study, November 2013', and will not be detailed further in this report.

The above described basins comprise those contained in the North Area of this master plan.

3.3.2 South Beach Storm Drain System

The 'South Beach' storm drain area is relatively flat, and underdeveloped in comparison to the 'North area'. Examining the number of outfalls further illustrates the point. Although the total basin area is relatively comparable amongst the North and South Beach designated areas, there are 29 outfalls, plus the additional within basin AC, in the North and approximately 5 in the South Beach area. (culverts draining natural areas were not considered outfalls) Much of the system is conveyed through ditches and deposited into wetland areas whereby the storm water is either absorbed, or eventually directed to the Pacific Ocean.

The northern basins within 'South Beach' drain into Yaquina Bay. These basins (basin AD &AE) are zoned Shoreland, which is primarily water related commercial use. The area covered by these basins is the lands north of SE 25th Street. The storm drain systems within these basins are primarily private and lie under the impervious surfaces within Hatfield Marine Science Center, NOAA Marin Operations Center, and Newport Marina Store & Charter developments.

The majority of the storm drain system components in the South Beach area are within basin AG which lies to the east and west of Hwy. 101 extending from SE 25th St. in the north to 50th St. in the south. Much of the improvements suggested in the 'South Beach Storm Water Master Plan, June of 2004' revolved around this basin. The basin drains from the north and south toward two outfalls lying on, or just south of SE 32nd St.. The water is conveyed through many open channels, and pipe where it subsequently flows into the Yaquina Bay through a 60" and 36" outfall. Most of the terrain is relatively flat and much of the basin is designated wetland. The storm drain system within this basin also includes a 48" pipe that extends under T.C. motor lot, then across Hwy. 101, and dumps into an open channel on the east side of the highway. This is the only storm drain component in the South Beach area that crosses under land owned by a private party.

Basin AL is positioned just south of basin AG, and extends from 50th St. to 62nd St.. This basin is primarily undeveloped industrial area. The majority of the land to the east is naturally drained to the low point in the basin, then conveyed under HWY 101 and into a ditch that meanders through the terrain eventually ending at the culvert whereby the storm water flow is transported into the Pacific Ocean. In addition to draining the area within the basin, this basin also functions as an overflow for basin AK.

The area west of SW Abalone St. & SW Anchor Way contains basin AF. This basin includes the primary developed residential zone in the South Beach Area as well as the property on which the old drive in theatre used to exist. Most of the area is relatively flat, and where not cleared for development, it is vegetated. There is a small storm drain system collecting water throughout the residential zone, and then outfalling through a 36" pipe into Yaquina Bay. The majority of the system consists of curbs & gutters, catch basins, and pipe. There are currently no culverts or pump stations.

East of HWY 101, south of 35th St and north of S.E. 42nd St. there is an area primarily designated as residential that naturally drains to Yaquina Bay. Basins AI and AJ cover a portion of this described area. Basin AI is partially developed commercial and industrial area, while the rest mirrors that of basin AJ and is primarily undeveloped residential. The majority of water in these basins is conveyed through natural waterways: flowing off of hillsides into small creeks, valleys, ravines, and eventually into the Pacific Ocean. In the northern region of both of these basins the water is directed under S.E. 35th St. via culverts before it is released into the Bay.

The west and south regions of the South Beach area are all relatively undeveloped and drain naturally to the Pacific Ocean. The described area encompasses basin AH, and AN through AQ. There is minor development with the exception of the South Beach State Park, the Newport Airport, and some residential growth outside of the City limits, but within the UGB. As is typical with most undeveloped land, the storm drain system consists of a few culverts placed under roadways to maintain natural drainage pathways. The majorities of these culverts are limited to those under HWY 101, and convey flows from Henderson, Grant, and Moore Creeks.

The above described basins comprise those contained in the South Beach Area of this master plan.

3.4 Existing Storm Drain System Inventory

The existing storm drain system within the described study basin areas includes approximately 32 miles of pipe ranging in size from 6-inches to 120-inches diameter, 595 manholes and 1,197 catch basins/area drains. Table 3.1 provides an inventory of existing manholes, catch basins storm drain pipes within the study area. For the purposes of this inventory no effort has been made to distinguish between continuous storm drain pipes and culverts. For storm drain component locations see Figures 3.2 A-H.

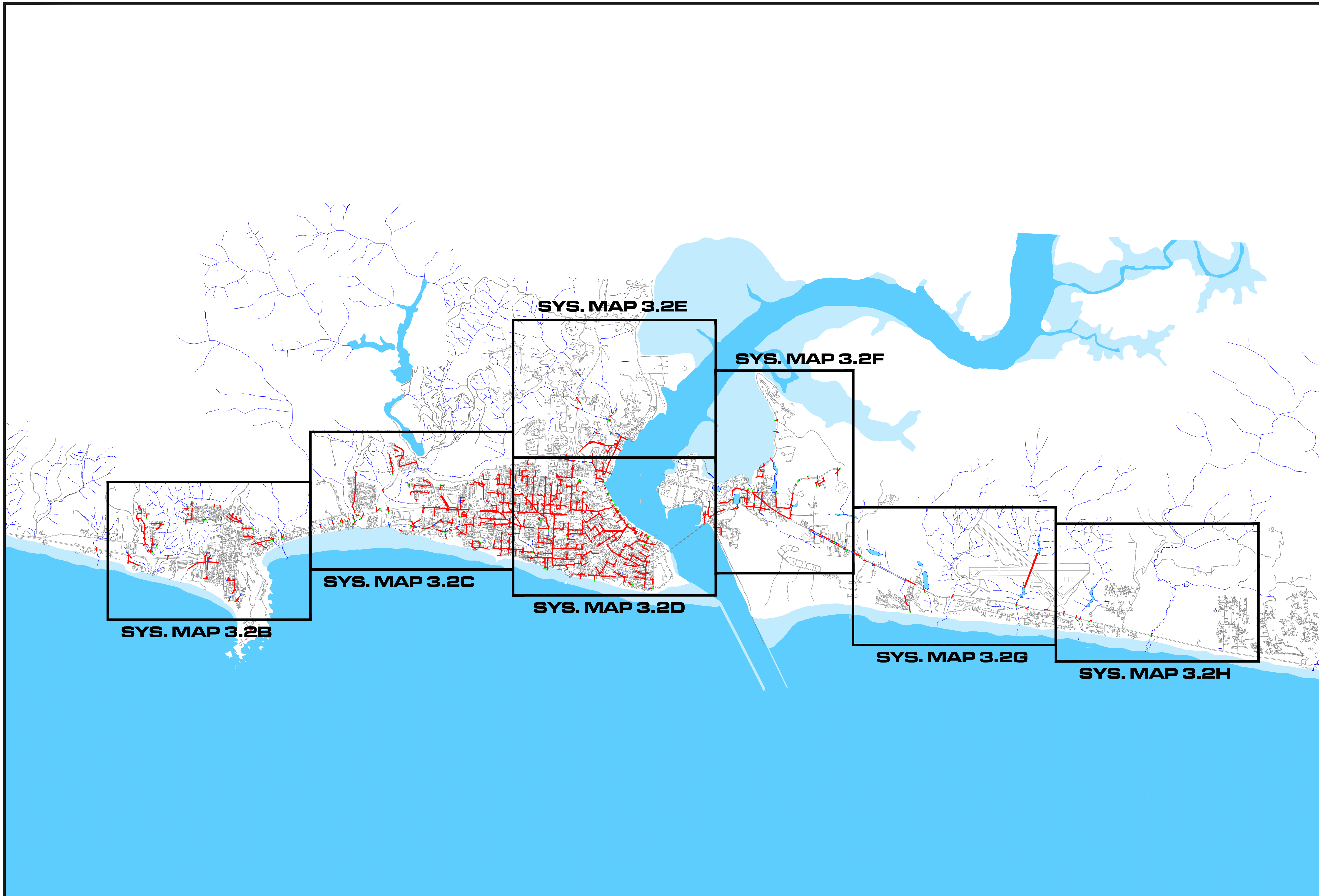
3.4.1 Storm Drain Outfalls

As described previously, Newport's storm drainage system includes a variety of pipes, culverts, open drainage ditches, and natural streams for conveyance of runoff. Thus components convey runoff to outfall points along the Pacific Ocean coastline or Yaquina Bay water front. A complete inventory of outfalls has been performed for the defined planning area. Outfalls have been numbered using the letter of the basin in which they occur followed by a sequential numbering. At the end of this sub-section, Table 3.2 provides a summary of the location, size and condition of the various storm drain outfalls within the planning area.

Outfalls described in this section and shown in Figures 3.2 A-C, are basin terminating outfalls only. Sub systems within the basin that convey water to creeks, streams or other small waterways are not shown, or discussed. Much of those sub system minor outfalls will be discussed in the sections relating to specific basins, and/or in the following culvert section.

Table 3.1 – Sub Basin Inventory

	CB	MH	6"	8"	12"	15"	18"	24"	36"	48"	Other	Total in Basin
BASIN A	0	0	0	0	0	0	0	0	200	0	0	200
BASIN B	0	0	0	0	0	0	0	220	0	0	0	220
BASIN C	5	1	0	879	86	0	0	0	0	0	0	965
BASIN D	72	12	0	4,671	2,510	0	0	0	0	0	0	7,181
BASIN E	16	6	0	1,172	332	0	0	0	0	0	0	1,504
BASIN F	2	5	0	905	330	400	613	37	800	0	0	3,085
BASIN G	2	5	0	205	14	0	255	244	305	0	0	1,023
BASIN H	6	3	0	500	0	0	0	0	0	0	0	500
BASIN I	6	0	0	1,021	0	0	0	0	0	0	0	1,021
BASIN J	0	0	0	0	0	0	0	655	0	0	0	655
BASIN K	24	8	203	2,359	403	0	0	0	0	0	157	3,122
BASIN L	0	0	0	0	0	0	450	150	0	0	250	850
BASIN M	20	2	94	2,037	298	0	0	0	0	0	0	2,430
BASIN N	106	44	478	7,390	4,003	72	1,125	289	0	0	142	13,499
BASIN O	2	0	120	0	0	0	0	0	0	0	0	120
BASIN P	15	7	11	979	301	0	0	0	0	0	0	1,291
BASIN Q	46	15	683	3,014	853	0	124	0	0	0	0	4,675
BASIN R	12	16	0	1,311	0	0	0	0	0	0	241	1,552
BASIN S	11	7	0	261	128	640	0	0	0	0	0	1,029
BASIN T	154	76	0	10,884	2,576	1,243	1,786	915	0	0	0	17,404
BASIN U	325	149	1,877	16,888	8,670	3,153	947	143	0	0	3,541	35,218
BASIN V	24	11	0	912	2,382	0	0	0	0	0	575	3,869
BASIN W	10	5	0	879	519	0	0	0	0	0	0	1,398
BASIN X	54	38	28	4,641	2,874	157	1,011	335	0	0	0	9,046
BASIN Y	19	20	685	1,979	599	0	0	0	0	0	125	3,389
BASIN Z	49	35	0	3,261	2,927	0	1,608	66	0	0	0	7,862
BASIN AA	60	31	0	5,957	933	0	812	85	0	0	0	7,787
BASIN AB	38	5	0	2,195	774	0	12	36	0	0	0	3,016
BASIN BM	0	0	0	10,530	2,393	0	0	2,620	137	311	1,408	17,399
BASIN AC	46	9	98	1,929	144	0	0	0	0	0	233	2,403
BASIN AD	13	8	0	1,262	0	314	286	670	0	0	0	2,531
BASIN AE	All Storm Drain componants on Private Property-Size and Quantities Unknown										300	300
BASIN AF	2	4	0	178	279	0	0	0	311	0	311	1,079
BASIN AG	42	39	0	3,217	59	2,997	334	0	57	983	1,884	9,531
BASIN AH	0	0	0	0	100	0	0	0	0	0	0	100
BASIN AI	20	9	0	1,558	670	0	0	952	0	0	78	3,259
BASIN AJ	0	0	0	0	0	0	0	55	0	0	0	55
BASIN AK	0	0	0	0	0	0	0	0	0	0	0	0
BASIN AL	0	0	0	0	0	0	0	0	170	0	802	972
BASIN AM	0	0	0	0	0	0	0	190	0	0	0	190
BASIN AN	0	0	0	0	0	0	0	0	0	0	130	130
BASIN AO	0	0	0	0	0	0	260	0	1,600	1,600	130	3,590
BASIN AP	0	0	0	0	0	0	520	0	0	0	130	650
BASIN AQ	0	0	0	0	0	0	0	0	0		200	200
Total in Study Area	1,201	570	4,277	92,976	35,156	8,976	10,142	7,661	3,581	2,894	10,637	176,301
% of Overall Study	1%	0%	2%	53%	20%	5%	6%	4%	2%	2%	6%	



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THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

Existing System Map Index

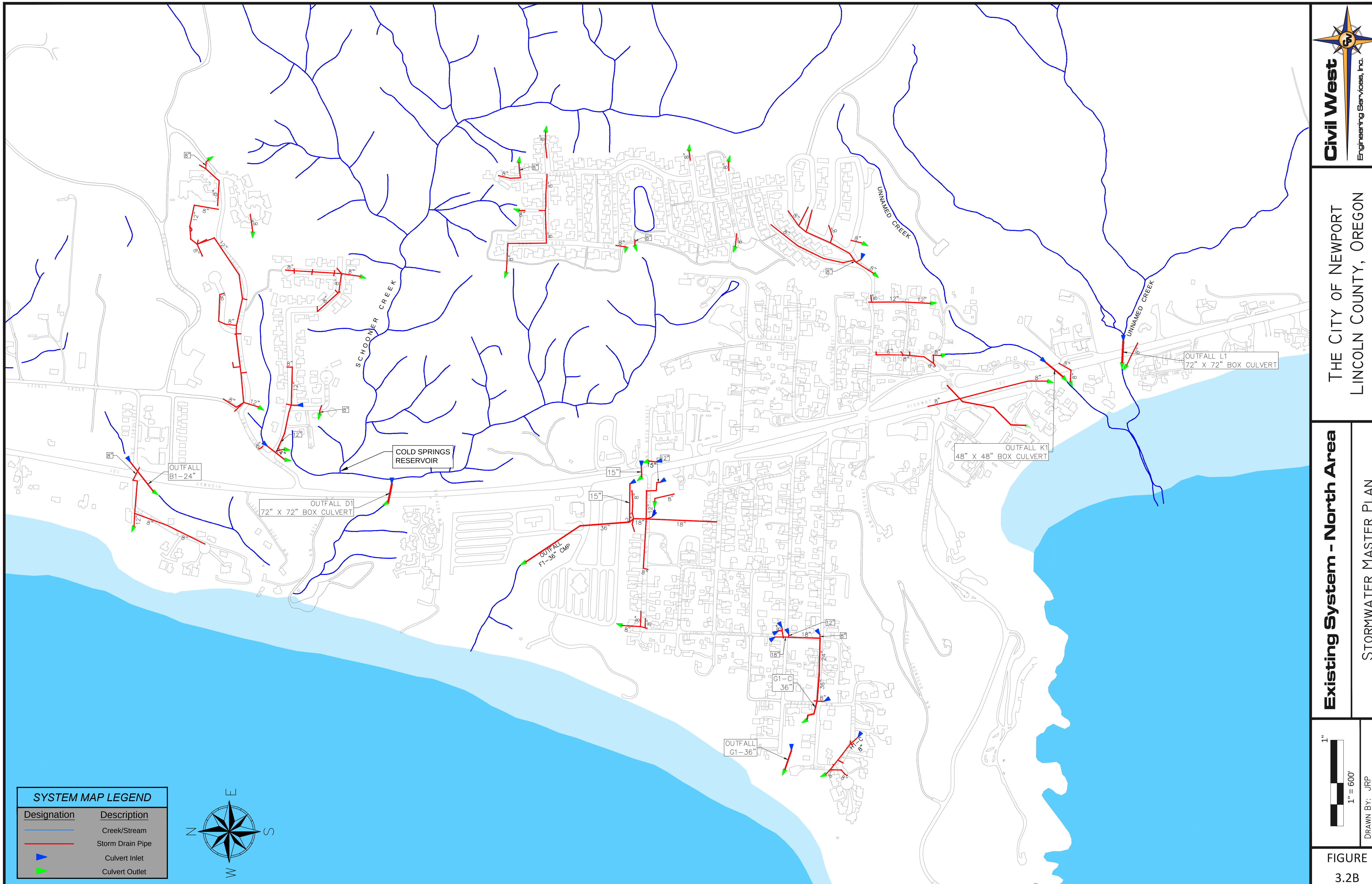
STORMWATER MASTER PLAN

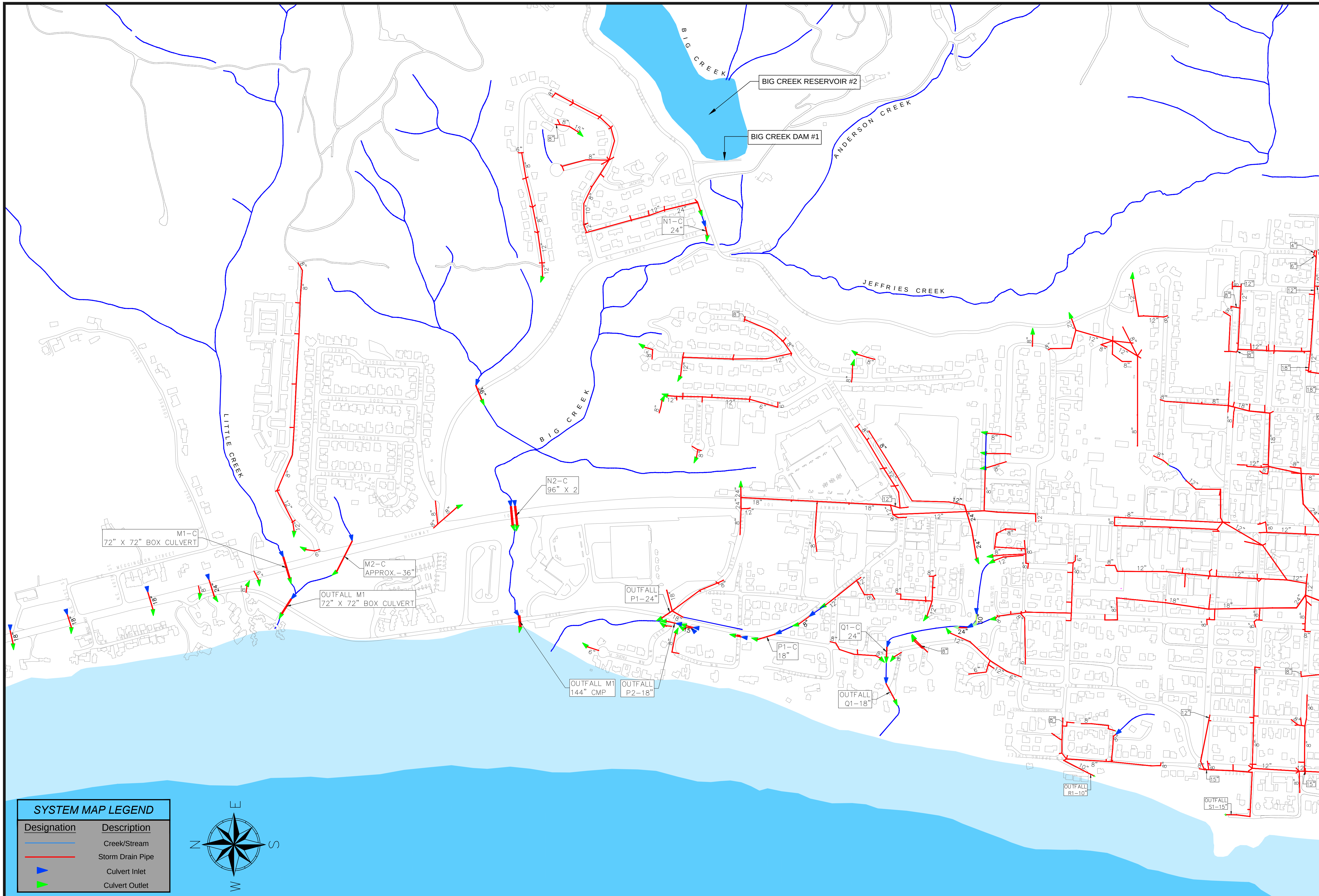
1"

NOT TO SCALE

DRAWN BY: JRP
DATE: APRIL 2013

FIGURE
3.2A


Civil West
Engineering Services, Inc.
The City of Newport
Lincoln County, Oregon
Existing System - North Area
Stormwater Master Plan
1" = 600'
Drawn by: JRP
Date: April 2014
FIGURE
3.2B
SYSTEM MAP LEGEND
Designation
Description
Creek/Stream
Storm Drain Pipe
Culvert Inlet
Culvert Outlet
COLD SPRINGS RESERVOIR
SCHOONER CREEK
UNNAMED CREEK
UNNAMED CREEK
OUTFALL B1-24"
OUTFALL D1
72" X 72" BOX CULVERT
OUTFALL F1-36" CMP
OUTFALL G1-36"
G1-C
36"
OUTFALL K1
48" X 48" BOX CULVERT
OUTFALL L1
72" X 72" BOX CULVERT



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Lincoln County, Oregon

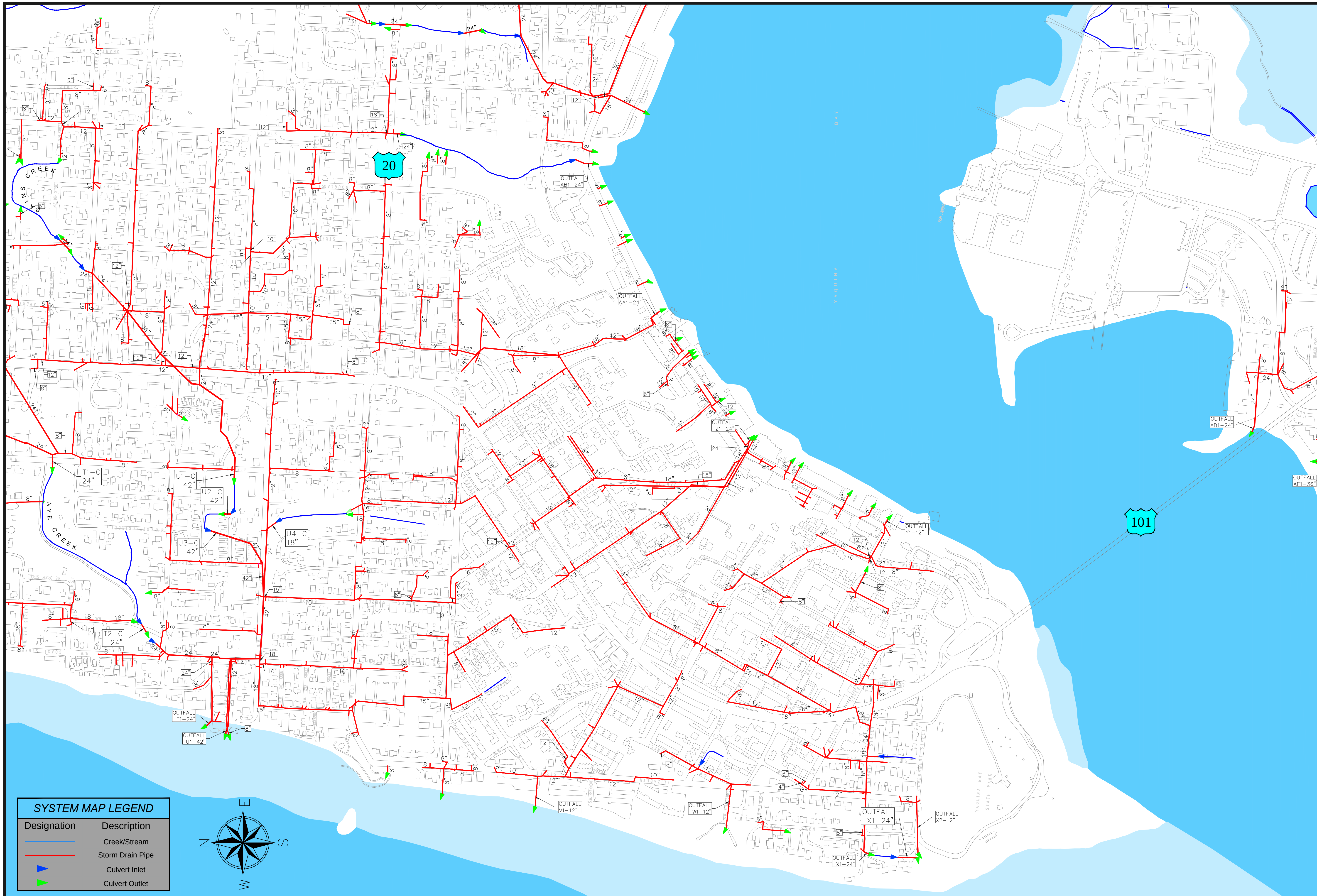
Existing System - North Area

System Wide Drainage Study

1" = 600'

Drawn by: JRP
Date: April 2014

FIGURE
3.2C



Civil West Engineering Services, Inc.

The City of Newport
Lincoln County, Oregon

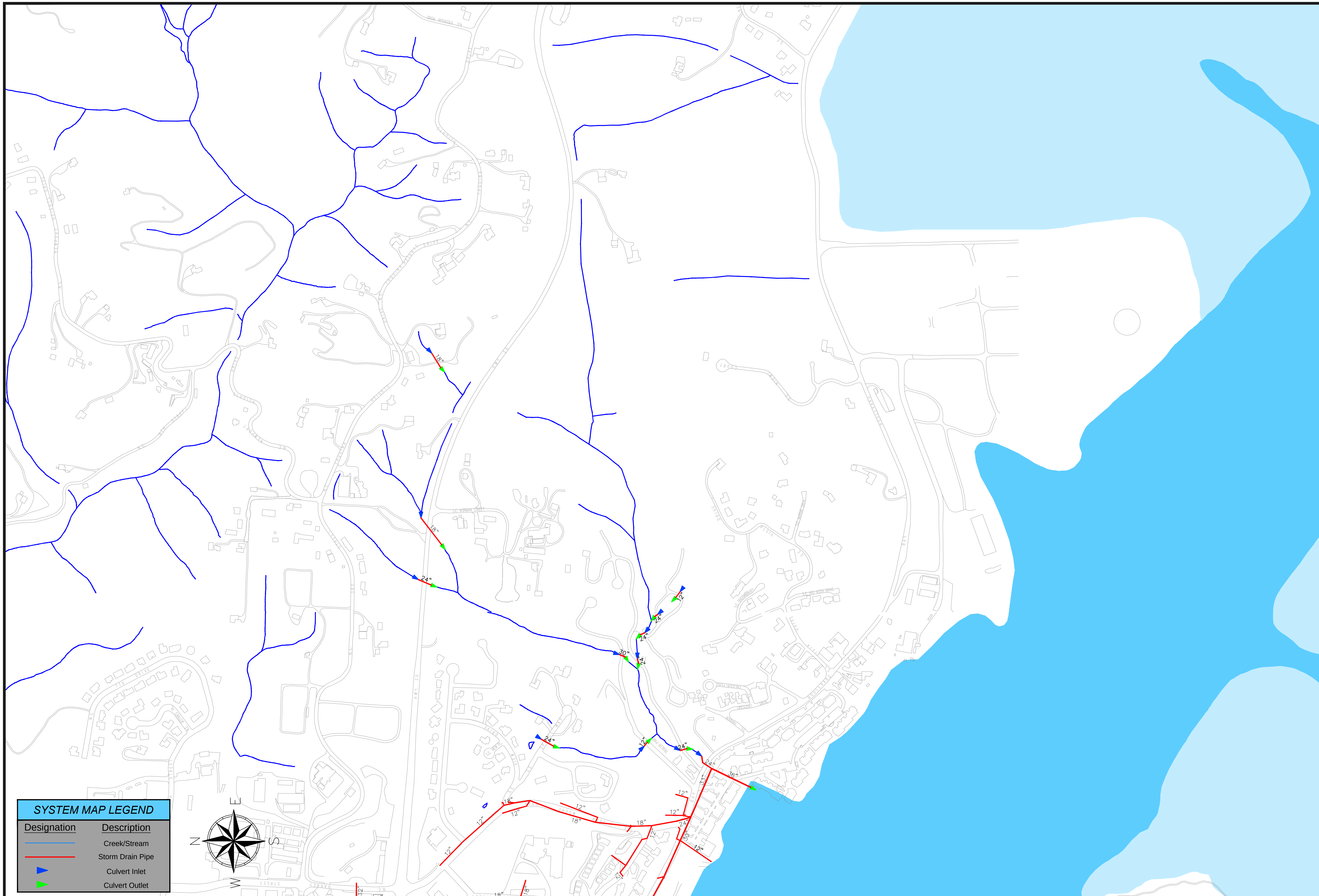
Existing System - North Area

Stormwater Master Plan

1" = 600'

Drawn By: JRP
Date: April 2014

FIGURE 3.2D



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THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

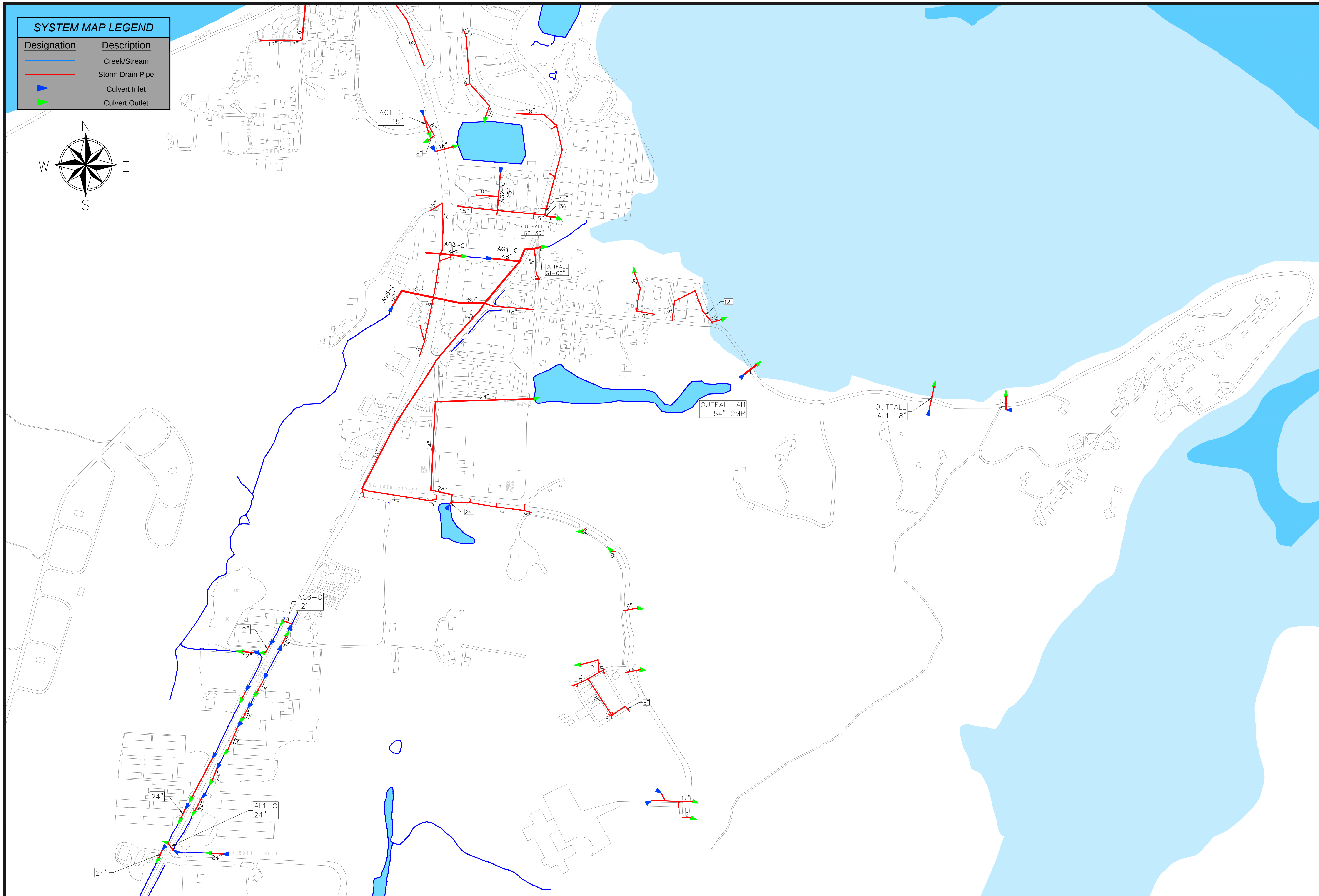
Existing System - North Area

STORMWATER MASTER PLAN

1" = 600'

DRAWN BY: JRP
DATE: APRIL 2014

FIGURE
3.2E



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THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

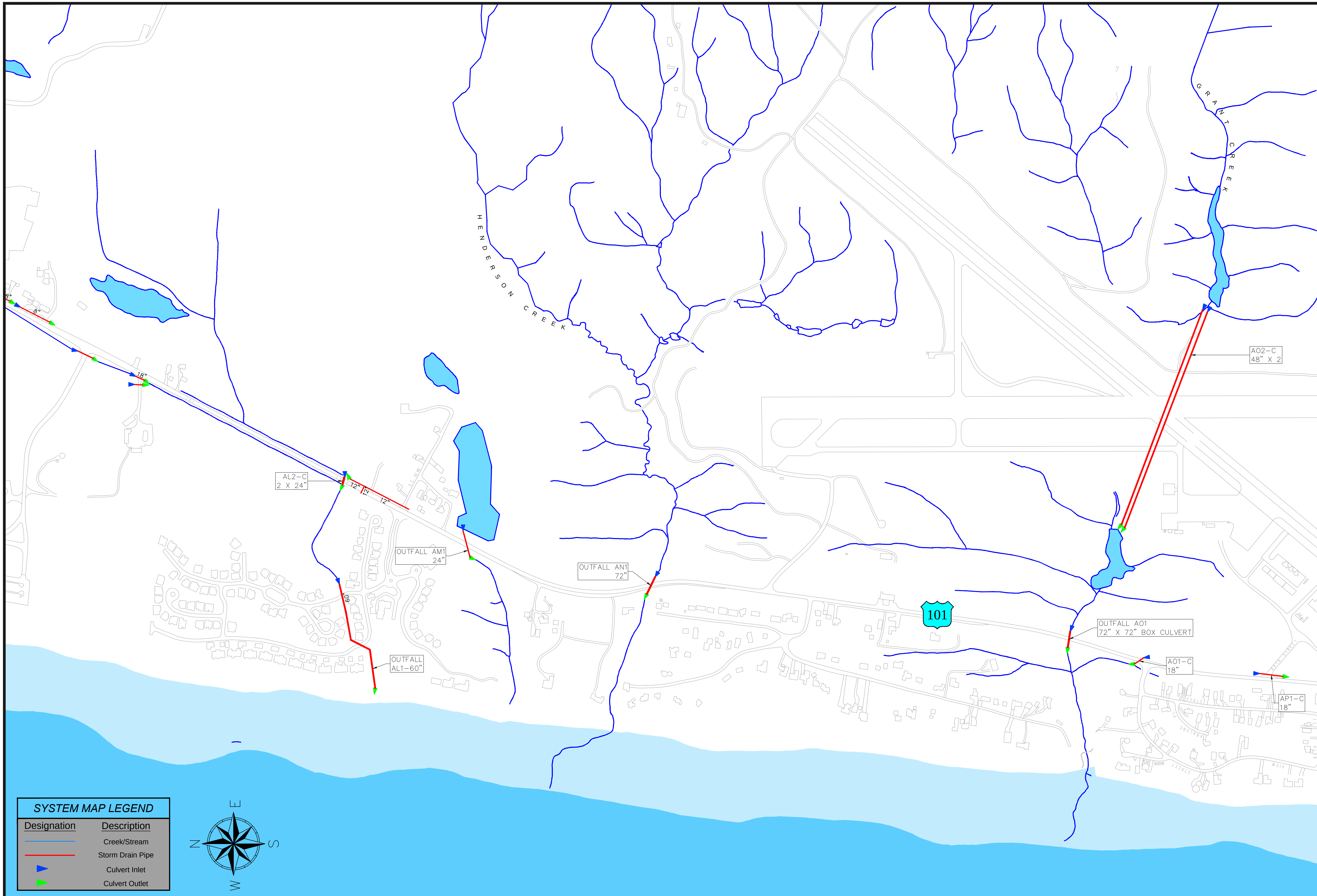
Existing System-South Beach

STORMWATER MASTER PLAN

1" = 600'

DRAWN BY: JRP
DATE: APRIL 2014

FIGURE 3.2F



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Lincoln County, Oregon

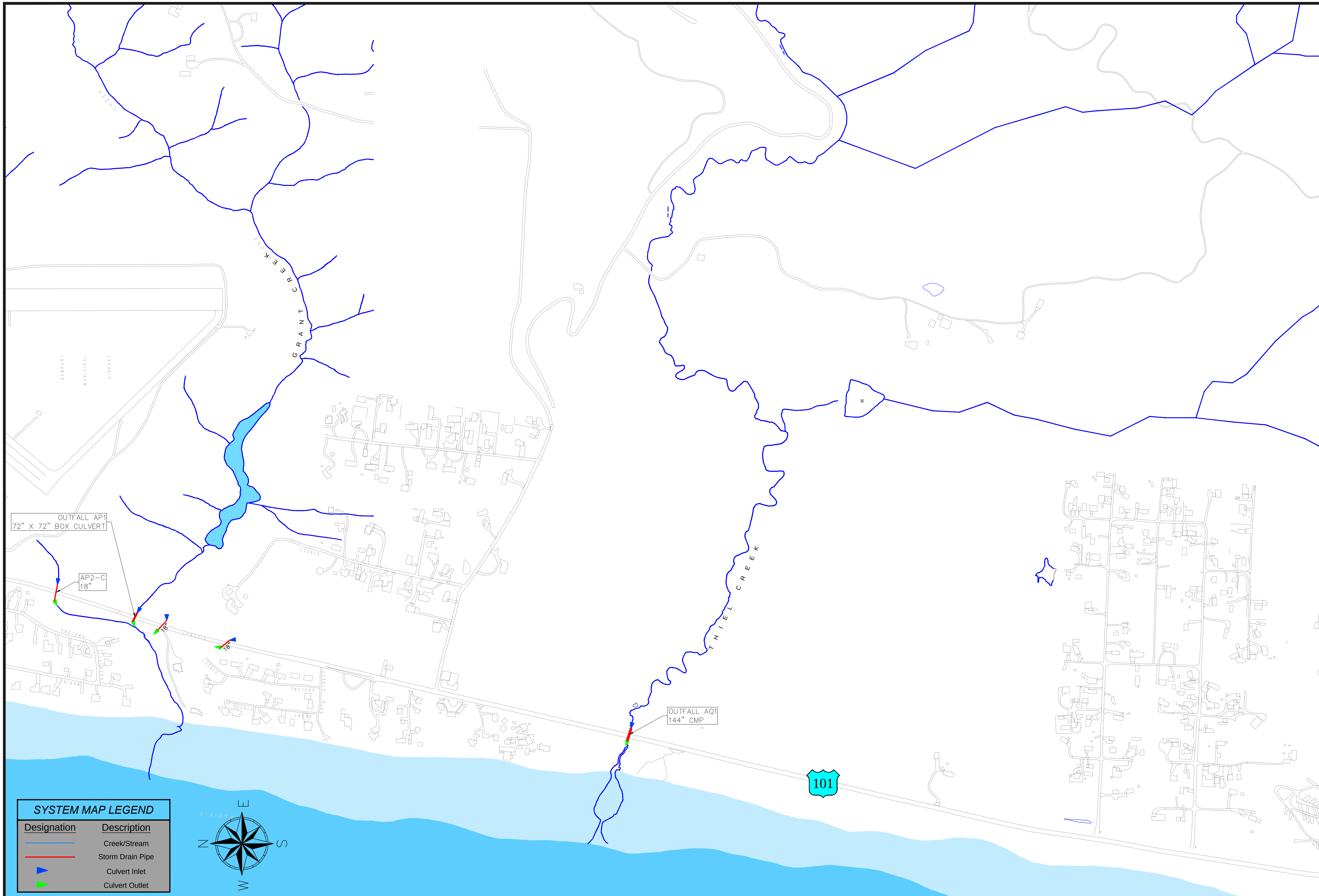
Existing System-South Beach

Stormwater Master Plan

1"
1" = 600'

Drawn by: JRP
Date: April 2014

FIGURE
3.2G



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Lincoln County, Oregon

Existing System-South Beach

Stormwater Master Plan

1" = 600'

DRAWN BY: JRP
DATE: APRIL 2014

FIGURE
3.2H

Outfall A1

Figure 3.3 – Image of Outfall A1

Outfall A1 is a 36-inch reinforced concrete pipe which conveys water under Hwy. 101 and discharges into an unnamed stream at milepost marker 136.28. The stream consequently drains into the Pacific Ocean.

The inlet of the culvert is covered with forest debris. This debris is not completely blocking the inlet but it is substantially slowing the flow through the pipe, as well as hiding the culvert's inlet from visibility. The pipe itself is in fair condition.

Outfall B1

Figure 3.4 – Image of Outfall B1

Outfall B1 is a 24-inch RCP which conveys water under the highway and discharges into an unnamed stream at milepost marker 136.67 along HWY 101. The stream subsequently drains into the Pacific Ocean.

Although the pipe is concrete, the last several feet on the outlet side are Corrugated HDPE pipe. The pipe is in good condition, and has little obstructions at either end.

Outfall C1

Outfall C1 is a 12-inch PVC pipe extending from a manhole structure to its release point hanging over a Cliffside. The pipe extends west between two residences from the corner of NW 73rd Ct. & NE 73rd Street. Condition and picture are not included as pipe location was inaccessible.

Outfall D1

Figure 3.5 – Image of Outfall D1

Outfall D1 is a 72" X 72" concrete box culvert which conveys water from Schooner Creek under the HWY 101. Following the culvert, the storm water continues to flow in Schooner Creek until it reaches the Pacific Ocean. The outfall is located at mile marker 136.87 on HWY 101.

The pipe is in good condition, and has minimal obstructions at the inlet/outlet of the culvert.

Outfall E1

Outfall E1 is a 8-inch PVC pipe which conveys water from the Schooner Landing residential development. The outfall extends from a catch basin structure on NW Schooner Circle to the north where it outfalls into a branch of Schooner Creek. Condition and picture is not included as pipe outfall was behind residential properties.

Outfall F1

Outfall F1 is a 36-inch corrugated metal pipe (CMP) which conveys water under the Pacific Shores Motorcoach Resort and discharges into a ravine whereby the storm water travels to the Pacific Ocean. The outfall is approximately 400' long and extends northwest from a 25' deep manhole located near the office of the Resort.

The pipe is in good condition, with little corrosion or erosion at the outlet.

Figure 3.6 – Image of Outfall F1

Outfall G1

Outfall G1 is a 36-inch corrugated metal pipe (CMP) which collects and conveys storm water from a portion of the Agate Beach Neighborhood. The outfall extends west from the inlet located within private property. The outlet was located along a steep bank with heavy brush and could not be found during field inspections.

The general condition of the inlet was good, and excellent maintenance of the drainage way kept the inlet clear of obstructions.

Figure 3.7 – Image of Outfall G1

Outfall H1

Outfall H1 is a 8-inch PVC pipe that extends northwest from a manhole structure approximately 75' north of the intersection of N.E. Pinery St. and N.W. 54th St..on N.E. Pinery Street. The collected storm water is conveyed to a pond area: then directed via a small waterway off a hillside, and to the Pacific Ocean.

This outfall system is on private property, and as there was no way of closely examining the outfall pipe, thus the condition is unknown.

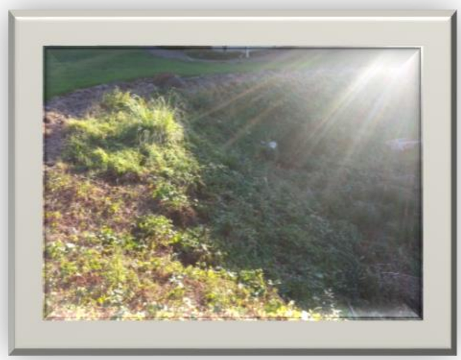

Figure 3.8 – Image of Outfall H1

Outfall I1

Outfall I1 is a 8-inch PVC pipe which drains storm water from a section of HWY 101. The outfall extends southwest from a roadside catch basin located at highway mile marker 137.78. The storm water is conveyed through approximately 150' of pipe at which point it is disbursed into the Little Schooner Creek. The Creek then contains the flow as it travels to the Pacific Ocean.

Outfall J1

Outfall J1 is a 36-inch concrete pipe which conveys water collected from the commercial/residential area northeast of the N.W. 52nd St. and HWY. 101 intersection. The outfall is located at the southeast end of N.W. Gilbert Way, and extends to a steep embankment which drains into an unnamed creek. As the outlet of the outfall daylight point was down a steep slope covered with heavy foliage, the pipe was not found during field inspections, and therefore condition is unknown.

Outfall K1

Outfall K1 is a 48-inch concrete box culvert which conveys water from mostly an undeveloped area, under HWY 101 and discharges into an unnamed creek at milepost marker 137.86 along HWY 101. The culvert is approximately 300' in length. Following the outfall, Little Schooner Creek flows into the Pacific Ocean with no further obstructions.

The inlet was in good condition with little obstructions restricting the flow through the system.

Figure 3.9 – Image of Outfall K1

Outfall L1

Outfall L1 is located east of the east of the Agate Beach Golf Course along HWY. 101 at milepost marker 138.19. The pipe size and condition is unknown as the pipe could not be accessed due to steep slopes and heavy foliage, and neither the City nor ODOT had information on the existing Culvert. It is assumed as most of the culverts under HWY. 101 are 72" x 72" box culvert, that this is the dimensions of this culvert.

Outfall M1

Outfall M1 conveys water from Little Creek under N.W. Ocean View Drive where Little Creek then continues through a developed area referred to as Little Creek Cove, and ends at the Pacific Ocean. The outfall is a 72" x 72" box culvert.

The pipe is in good condition with very little obstructions at the inlet.

Figure 3.10 – Image of Outfall M1

Outfall N1

Outfall N1 is a 144-inch corrugated metal pipe (CMP) which conveys water under the NW Ocean View Drive and discharges into the Pacific Ocean. The culvert is approximately 80' long. This outfall drains the largest basin within the City of Newport.

The culvert is in fair condition with little signs of corrosion around the edge of the pipe.

Figure 3.11 – Image of Outfall N1

Outfall 01

Outfall O1 is an 8-inch PVC pipe extending northward from a catch basin at the north end of N.W. Pacific Place. The outfall discharges over a bank and into a unnamed stream leading to the Pacific Ocean. The outfall pipe could not be seen thus no condition, length ore exact location is known.

Outfall P1

Outfall P1 is a 24-inch PVC pipe crossing under Ocean View Drive at N.W. 28th St. and discharging into an unnamed waterway. The pipe extends northwest from the 20' deep manhole structure at the intersection of N.W. 28th St. and Ocean View Drive.

The outfalls original design was to outfall into an unnamed creek which flows to the Pacific Ocean. However currently, water conveyed through the pipe sits in a ponded area until the water level is high enough to be conveyed down the unnamed creek. The ponding is happening as a result of sediment build-up around the outlet location. When full, the ponded water level is above the pipe. Either maintenance or sufficient constant flow has prevented sediment build up at the pipe outlet. Maintenance checks should be conducted at this outfall to monitor sediment build up.

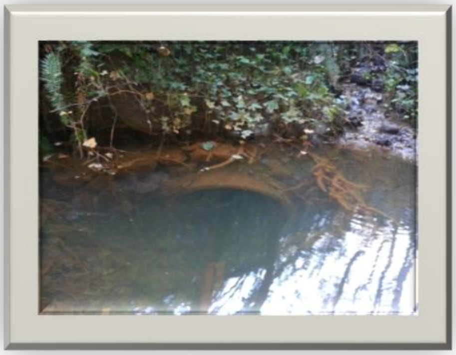

Figure 3.12 – Image of Outfall P1

Outfall P2

Outfall P2 is a 18-inch CMP crossing under N.W. Pacific Place and discharging into an unnamed waterway. The pipe extends northward along the west side of Ocean View Drive.

The pipe condition was fair. However, the pipe had an extreme slope, and over time gravity and erosion facilitated one section of the concrete pipe becoming disconnected from the rest of the pipe. This section has since completely disconnected and rolled down the slope. This outfall should be monitored for future disconnections.

Figure 3.13 – Image of Outfall P2

Outfall Q1

Outfall Q1 is a 24-inch CMP which conveys water under the west end of N.W. 20th Street. The outfall discharge is located on private land and releases the storm water into an unnamed stream which subsequently drains into the Pacific Ocean. The outfall is approximately 200' in length.

The overall pipe condition is fair. The outfall end is slightly warped out of shape, and shows signs of rusting. Beyond that there is little condition issues.

Figure 3.14 – Image of Outfall Q1

Outfall R1

Outfall R1 is a 10-inch PVC pipe which conveys storm water collected from a residential zone to a stream leading to the Pacific Ocean. The outfall extends southwest from a manhole on private property. The property location is west of the N.W. Spring St. & N.W. 5th St. intersection. Condition could not be assessed nor could a picture be taken as the manhole and outfall were behind a gate and inaccessible.

Outfall S1

Figure 3.15 – Image of Outfall S1

Outfall S1 is a 14-inch HDPE pipe which conveys storm water from a residential development to a point at the base of a hillside which drains into the Pacific Ocean. The outfall extends northward from a manhole near the intersection of N.W. Coast St. and N.W. 11th Street. As can be seen in the picture, a portion of the pipe is not buried. After running a length of approximately 250 feet the storm water is discharged from the outfall.

The condition of the pipe is good, and it appears to have been installed relatively recently.

Outfall T1

Figure 3.16 – Image of Outfall T1

Outfall T1 is a 24-inch concrete pipe which conveys water collected from a large portion of downtown Newport westward under the north section of N.W. Beach Drive, and onto Nye Beach where it subsequently drains to the Pacific Ocean. The outfall extends from a manhole structure at the intersection of N.W. Beach Drive (the north section) and N.W. Coast St. This manhole is a junction manhole that interconnects outfall T1 and U1. From here the storm water can travel to this outfall, or continue past and flow to outfall U1.

The pipe is in good condition, but the current function of the outfall is not ideal. Currently the outfall is not being used to its fullest capacity on account of the storm water bypassing at the junction manhole.

Outfall U1

Figure 3.17 – Image of Outfall U1

Outfall U1 is a 42-inch concrete box culvert which conveys water under the south section of N.W. Beach Drive, and onto Nye Beach whereby it is directed to the Pacific Ocean. The outfall begins at the intersection of N.W. Beach Drive (south section) and N.W. Coast Street and is approximately 550' in length. This length includes several manholes along the length from the described intersection.

The condition of the pipe is good. There seems to be little to no corrosion or obstructions.

Outfall V1

Figure 3.18 – Image of Outfall V1

Outfall Q1 extends westward from a manhole structure in the parking lot of the Shilo Inn Oceanfront Resort along S.W. Elizabeth Street. The pipe is 12-inch PVC and conveys storm water collected from a residential zone under the parking lot and to a hillside which drains onto the beach and thereby into the Pacific Ocean. The outfall was covered by dense foliage and thus could not be seen. From examining the manhole structure the pipe seems to be in good condition, but given the outlets environment, it was not possible to assess its condition.

Outfall W1

Outfall W1 is a 12-inch PVC pipe which conveys water under the Hallmark Oceanfront Resort parking lot into a stream which drains to the Pacific Ocean. The outfall extends approximately 350' westward from a catch basin structure just south of the S.W. Elizabeth St. and S.W.6th St. intersection. The exact location of the outfall and its condition are unknown due to excessive foliage obstructing the view. The condition of the east end of the outfall pipe was fair. The concrete pipe looked aged but not corroded.

Figure 3.19 – Image of Outfall W1

Outfall X1

Outfall X1 is a 24-inch PVC pipe which conveys storm water from residential and commercial zones to a hillside which drains to the Pacific Ocean. The outfall is located west of the S.W. Government St. and S.W. Mark St. intersection and extends approximately 150' from a large ditch north of the outfall location. The condition of the pipe is good. There are no visible deformities or corrosion issues. The outfall pipe inlet appears to be a different pipe than the outlet. Thus it should be assumed that there is some type of coupling between the inlet and outlet points.

Figure 3.20 – Image of Outfall X1

Outfall X2

Outfall X2 is a 12-inch concrete pipe which conveys storm water collected from a residential area under S.W. Government Street. The outfall extends approximately 350' westward from the manhole structure at the intersection of S.W. Government St. and S.W. Elizabeth St. to a bank that drains to the Pacific Ocean. The outfall location is within 10' of outfall X1. The pipe is in fair condition, with little corrosion, but appears to be 20 to 30 years old.

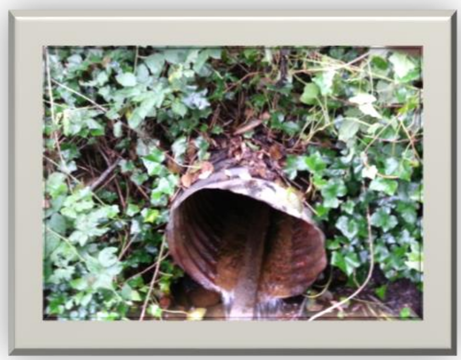

Figure 3.21 – Image of Outfall X2

Outfall Y1

Outfall Y1 is a 12-inch CMP extending approximately 75' southeast from a manhole structure located at the intersection of S.W. Bay St. and S.W. Bay Blvd.. The outfall drains a residential and commercial area along the bay front and discharges under the Bay Street Pier. The pipe was under the dock and inaccessible.

Outfall Z1

Outfall Z1 is a 12-inch concrete pipe extending approximately 200' southeast from a manhole structure located at the intersection of S.W. Fall St. and S.W. Bay Blvd.. The outfall drains a residential and commercial area along the bay front and discharges under the decking of the Fish Peddler's Market. The pipe was under the dock and inaccessible.

Outfall Z2

Outfall Z2 is a 24-inch concrete pipe extending approximately 40' southeast from a manhole structure located in the parking lot of the Fish Peddler's Market. The manhole structure is 15' deep, and was poured in place over the outfall pipe. The outfall drains a residential and commercial area along the bay front and discharges within 10' of outfall Z1. The pipe was under the dock and inaccessible.

Outfall AA1

Outfall AA1 is a 24-inch concrete pipe extending approximately 45' southeast from a manhole structure located at the intersection of S.W. Hatfield Dr. and S.W. Bay Boulevard. The outfall drains a residential and commercial area along the bay front and discharges under the pier just south of the described intersection.

The overall pipe condition is fair. Given the height of the outlet above the bay grade, there is little obstructions covering the outlet.

Figure 3.22 – Image of Outfall AA1

Outfall AB1

Outfall AB1 is a 12-inch concrete pipe extending approximately 75' south from a manhole structure located just west of the S.E. Eads St. and S.W. Bay Blvd. intersection. The outfall drains the storm water from a residential and commercial area which collects into the Hurbert Creek.

The overall pipe condition is fair. The outfall end is covered in barnacles, and bay mire, but is clear of any debris or obstructions.

Figure 3.23 – Image of Outfall AB1

Outfall BM

Outfall BM is described and discussed in the '*Bay-Moore Drainage Study*, Civil West Engineering Inc, November 2013'. See referenced document for further information.

Figure 3.24 – Image of Outfall BM

Outfall AC

Basin AC is less of a single basin, and more of a collective of smaller basins. This designation was made to facilitate combining very small storm drain systems that were not significant enough to be described in detail on their own. These systems are located along the Bay Front, and primarily have 3 or fewer culverts, or 3 or fewer catch basins with one combined outfall. Typically these drain undeveloped areas, or very small developed areas. As basin AC includes several basins, it also houses several outfalls. All of these outfalls were in fair to good condition.

Outfall AD1

Outfall AD1 is a 24-inch corrugated HDPE pipe extending approximately 220' northwest from a manhole structure located on the west side of the parking lot of the Rogue Ale Brewery. The outfall drains a commercial area into the Newport Marina.

The outfalls condition was good, with no obstructions at the outlet side of the pipe.

Figure 3.25 – Image of Outfall AD

Outfall AE1

There is not one specific outfall draining this basin. The basin consists primarily of a private development with several small outfalls which are monitored and maintained by the owners. Condition, pics and size were not collected for these outfalls.

Outfall AF1

Outfall AF1 is a 36-inch CMP extending approximately 50' north from a manhole at the intersection of S.W. 26th St. and S.W. Brant Street. This outfall drains a residential area and discharges directly into Yaquina Bay.

The overall pipe condition is fair. The outfall end consists of an outlet structure with a metal flap gate. The structure is relatively new and in good condition.

Figure 3.26 – Image of Outfall AF1

Outfall AG1

Outfall AG1 is a 36-inch concrete pipe extending approximately 50' east from a manhole structure located at the S.E. 32nd St. and S.E. Ferry Slip Rd. intersection. The outfall drains the storm water from a residential and commercial area directly into Yaquina Bay.

The pipe condition is unknown as its exact location was left undiscovered during the data collection process.

Figure 3.27 – Image of Outfall AG2

Outfall AG2

Outfall AG2 consists of two separate pipe outlets draining into an unnamed creek leading to Yaquina River. One is a 24" pipe draining the residential area surrounding S.E. Chestnut St. and S.E. 35th Street.

The second is the 60" storm drain line cutting across Hwy. 101 and connecting to the 60" box culvert shown in the image. This drains a significant area south of the outfall both west and east of HWY. 101.

The outfalls are in good shape, but are often sitting below water elevations, and thus frequent monitoring for obstructions should be a part of system maintenance.

Outfall AI1

Outfall AI1 is a 80-inch CMP extending approximately 100' northeast under S.E. 35th St.. This outfall drains a primarily undeveloped residential area that will be a focal point for future growth.

The outfall culvert was recently replaced and is therefore in good condition.

Figure 3.28 – Image of Outfall AI1

Outfall AJ1

Outfall AJ1 is a 18-inch concrete pipe extending approximately 75' northeast under S.E. 35th Street. This outfall drains the storm water from a relatively undeveloped residential area.

The overall pipe condition is fair. The pipe lies in a relatively deep ditch which presents an opportunity for sediment to easily build up at the inlet side of the pipe. System maintenance should include monitoring this outfall for obstructions.

Figure 3.29 – Image of Outfall AJ1

Outfall AL1

Outfall AL1 is a 60-inch CMP extending approximately 800' through and under the South Shore development that lies west of Hwy. 101 at milepost marker 143. The outfall drains a large undeveloped area as well as some developed industrial areas along Hwy. 101.

The overall pipe condition is fair. The outfall end is half covered with driftwood and various beach debris washed onto the grate by local tides. The attached grate on the inlet side of the culvert is slightly bent.

Figure 3.30 – Image of Outfall AL1

Outfall AM1

Outfall AM1 is a 24-inch concrete pipe extending southwest under Hwy. 101 at milepost marker 143.88. The runoff conveyed through this culvert is primarily collected from an undeveloped residential area and a wetland area on the east side of HWY. 101.

Figure 3.31 – Image of Outfall AM1

The inlet side of the pipe was inaccessible, however the outlet was located. The condition of the concrete pipe itself was fair, however, the pipe was half filled with sediment. Sediment should be cleared from mouth of pipe.

Outfall AN1

Outfall AN1 is a 72-inch concrete culvert extending westward under Hwy. 101 at milepost marker 144.14. The storm water collected from primarily undeveloped forest land, and a small section of a low density residential area is collected in Henderson Creek, then conveyed via this outfall under Hwy. 101 where it continues west until reaching the Pacific Ocean.

The overall pipe condition is good, with little obstructions at either end of the pipe.

Figure 3.32 – Image of Outfall AN1

Outfall AO1

Outfall AO1 is a 72-inch concrete culvert extending westward under Hwy. 101 at milepost marker 144.71. The storm water collected from primarily undeveloped forest land, a small section of a low density residential area, and runoff from a portion of the Newport Airport is conveyed via this outfall under the highway where it continues west until reaching the Pacific Ocean.

The overall pipe condition is good, with little obstructions at either end of the pipe.

Figure 3.33 – Image of Outfall AO1

Outfall AP1

Outfall AP1 is a 72-inch concrete culvert extending westward under Hwy. 101 at milepost marker 145.25. The storm water collected from primarily undeveloped forest land, a small section of a low density residential area, and runoff from a portion of the Newport Airport is conveyed via this outfall under Hwy. 101, along Moore Creek, where it continues west until reaching the Pacific Ocean.

The overall pipe condition is good, with little obstructions at either end of the pipe

Figure 3.34 – Image of Outfall AP1

Outfall AQ1

Outfall AQ1 is a 144-inch CMP extending westward under Hwy. 101 at milepost marker 145.89. The storm water collected from primarily undeveloped forest land, and a small section of a low density residential area is collected in Thiel Creek, then conveyed via this outfall under the highway where it continues west until reaching the Pacific Ocean.

The overall pipe condition is good.

Figure 3.35 – Image of Outfall AQ1

Table 3.2A – Storm Drain Outfall Summary

Map #	Location	Size	Material	Condition
A1	Hwy. 101 milepost marker 136.28	24"	CMP	Fair Condition-Sediment at Inlet
B1	Hwy. 101 milepost marker 136.67	24"	CMP	Good
C1	Intersection of NW 73rd Ct. & NE 73rd St.	12"	PVC	Inaccessible-Due to brush/buried
D1	Hwy. 101 milepost marker 136.87	72" x 72"	CBC	Good Condition
E1	NW Schooner Circle	8"	PVC	Inaccessible-On private property
F1	Pacific Shores Motorcoach Parking lot	36"	CMP	Good
G1	Intersection of 55th St. & Meander St.	36"	CMP	Good
H1	Intersection of NE Pinery & NW 54th St.	8"	PVC	Fair-On private property
I1	Hwy. 101 milepost marker 137.78	8"	PVC	Inaccessible-Due to brush/buried
J1	Hwy. 101 milepost marker 137.78	48" x 48"	CBC	Inaccessible-In ravine
K1	Hwy. 101 milepost marker 137.86	48" x 48"	CBC	Good-Minor foliage at inlet
L1	Hwy. 101 milepost marker 138.19	72” x 72”	CBC	Inaccessible-In ravine
M1	Ocean View Drive at Little Creek	72” x 72”	CBC	Good
N1	NW Ocean View Dr. at Big Creek	144"	CMP	Fair-some rust present
O1	North end of NW Pacific Pl.	8"	PVC	Inaccessible-Due to brush/buried
P1	Crossing Ocean View Drive at 28th St.	24"	PVC	Good-Sediment Build up at Oulet
P2	Crossing Pacific Place at Ocean View Dr.	15”	RCP	Fair condition: Last section of pipe disconnected from the main line.
Q1	West end of NW 20th St.	24"	CMP	Fair-minor rust, and outlet slightly bent
R1	West of the NW Spring St. & NW 5th St. Intersection	10"	PVC	Inaccessible-On private property
S1	Intersection of NW Coast St. & NW 11th St.	14"	PVC	Good
T1	North section of NW Beach Drive	24"	RCP	Good
U1	South Section of NW Beach Drive	42"	RCP	Good
V1	Shilo Inn Resort Parking lot on SW Elizabeth St.	12"	PVC	Inaccessible-Due to brush/buried
W1	South of SW Elizabeth St. and 6th St. Intersection	12"	RCP	Inaccessible-Due to brush/buried
X1	West of the NW Government St. & SW Mark St. Intersection	24"	RCP	Fair
X2	West of the NW Government St. & SW Mark St. Intersection	24"	PVC	Good
Y1	Intersection of SW Bay St. and SW Bay Blvd.	12"	CMP	Inaccessible-Under Dock
Z1	Intersection of SW Fall St. & SW Bay Blvd.	12"	RCP	Inaccessible-Under Dock
Z2	Intersection of SW Fall St. & SW Bay Blvd.	24"	RCP	Inaccessible-Under Dock
AA1	Intersection of SW Hatfield & SW Bay Blvd.	24"	RCP	Good
AB1	Intersection of SE Eads St. & SW Bay Blvd.	24"	RCP	Good
BM	Embarcadero Resort Parking lot	36"	CMP	Poor-Is addressed in prior study
AC	Multiple Outfalls-See outfall description	--	--	--

Table 3.2B – Storm Drain Outfall Summary Cont.

Map #	Location	Size	Material	Condition
AD1	North of Marine Science Dr. and east of Hwy. 101	24"	RCP	Good
AF1	North of SW Brant St. & SW 26th St. intersection	36"	CMP	Good
AG1	Intersection of 32nd St. & SE Ferry Slip Rd.	36"	PVC	Fair-Outlet Tide Waters
AG2	Intersection of SE Chesnut St. & SE Ferry Slip Rd.	48"	RCP	Fair-Outlet Tide Waters
AI1	Approximately 2000' East of Hwy. 101 along SE 35th St.	54"	CMP	Good
AJ1	Approximately 2000' East of AJ1 along SE 35th St.	24"	CMP	Fair-Significant sediment build up at pipe inlet
AL1	Beach West of South Shore development	60"	CMP	Good-Bent Grate at Inlet-Some Beach Debris build up at outlet
AM	Hwy. 101 milepost marker 143.88	24"	RCP	Fair-Pipe 70% filled with sediment at outlet
AN	Hwy. 101 milepost marker 144.14	72" x 72”	CBC	Good
AO	Hwy. 101 milepost marker 144.71	72" x 72”	CBC	Good
AP	Hwy. 101 milepost marker 145.25	72" x 72”	CBC	Good
AQ	Hwy. 101 milepost marker 145.89	144"	CMP	Fair-Slight rust around edge of pipe

3.4.2 Culverts

There are numerous culverts within the study area at points where roadways cross streams and open drainage channels. This subsection provides an overview of the location and condition of the major culverts within the study area. The culverts are numbered by basin in the following format: A3-C, where A is the basin designation, 3 is the culvert number, and C is included to differentiate culverts from storm drain outfalls. General descriptions of each major culvert are given below. A summary of culvert location size, material and condition is presented in Table 3.3, and culvert locations are displayed in Figure 3.2 A-C.

Figure 3.36 – Image of culvert G1-C

Culvert G1-C

Although the inlet side of the pipe is located within a manhole, the outlet side of the pipe lies within an unnamed creek and is therefore considered a culvert. Culvert G1-C includes a single 36-inch PVC pipe located at the intersection of Meander St. and N.W. 55th St.. This is the last pipe before the outfall in the storm drain system for basin G. The pipe seems to be in good condition but was inaccessible for close examination and evaluation.

Figure 3.37 – Image of culvert H1-C

Culvert H1-C

Culvert H1-C includes a single 8-inch Concrete pipe located east of the N.W. 54th Crt. and N.W. 54th St. intersection. The pipe directs water from a small drainage way into a manhole structure. Flow is restricted as the inlet of the pipe is contains some sediment, branches, and random object that have worked their way into the drainage swale. Pipe condition is fair.

Figure 3.38 – Image of culvert M1-C

Culvert M1-C

Culvert M1-C is a 72-inch concrete box culvert which conveys water collected from a predominantly undeveloped area into Little Creek, under Hwy. 101 at milepost marker 138.5. The condition of the pipe is good, and there is little obstruction at the inlet.

Culvert M2-C

Culvert M2-C is located at the bottom of a ravine, and thus is inaccessible. The city and ODOT have no information regarding this culvert. It is most likely a 36-inch corrugated metal pipe (CMP). This outfall conveys water under Hwy. 101 and discharges into a southward branch of Little Creek.

Culvert N1-C

Culvert N1-C includes a single 24-inch CMP running across N.E. Harney St. along N.E. Big Creek Road. This culvert conveys the majority of the runoff collected within the local residential area surrounding N.E. Lakewood Hills Street. The invert of the pipe upstream of this culvert approximately 12“ below the invert of this culvert. To remove ponding within the ditch line and increase the storm drain capacity either this culvert needs to be lowered or the upstream system needs to be raised.

The pipes inlet is warped and slightly rusted while the outlet is in fair condition.

Figure 3.39 – Image of culvert N1-C

Culvert N2-C

Culverts N2-C includes two 96” x 96” concrete box culverts and conveys waters from Big Creek beneath Hwy. 101. The inlets of the culverts contain considerable obstructions. Approximately 50% of their height is filled with branches, shrubs, leaves and other affiliated creek debris. These culverts need to be cleared to prevent flooding during a 25-year storm event.

The culvert is in good condition. No cracks, corrosion or deterioration were visible from field examination.

Figure 3.40 – Image of culvert N2-C

Culvert P1-C

Culvert P1-C includes a single 18-inch CMP located at the NW Ocean View Dr. and NW Edenview intersection. The culvert directs water collected at the y intersection to the southwest across NW Ocean View Drive.

The culvert is approximately 200’ in length and is in good condition. The flow through this culvert is slightly restricted by sediment build up at the inlet of the pipe.

Figure 3.41 – Image of culvert Q1-C

Culvert Q1-C

Culvert Q1- C includes a single 24-inch HDPE corrugated pipe located an estimated 155’ south of the NW Ocean View Dr. and NW 21st St. intersection. The culvert conveys water from an unnamed water way under NW Ocean Dr. and to the west toward the outfall culvert Q1. It is approximately 120’ in length and in good condition with little obstructions at the inlet.

Figure 3.42 – Image of culvert T1-C

Culvert T1-C

Culvert T1-C includes a single 24-inch concrete pipe located an estimated 175’ north of the NW Nye St. and NW 8th St. intersection. The culvert extends under NW Nye Street from a manhole on the east side to Nye Creek on the west. The culvert is approximately 110’ in length and in fair condition.

Figure 3.43 – Image of culvert T2-C

Culvert T2-C

Culvert T2-C includes a single 24-inch concrete pipe located an estimated 145’ north of the NW 6th St. and NW High St. intersection. The culvert conveys storm water in Nye Creek under High Street.

The culvert is approximately 110’ in length and in fair condition. The inlet has a grate which was put in place post construction, sits on the creek bottom, and leans against the embankment which houses the culvert’s inlet.

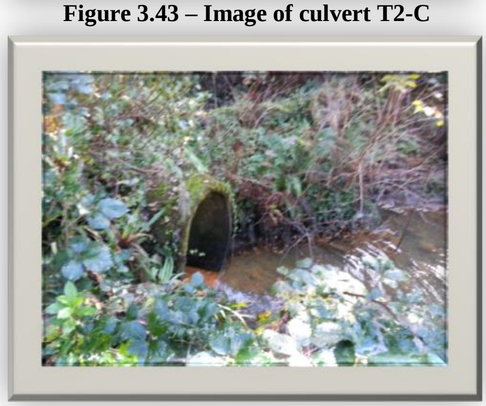

Figure 3.44 – Image of Culvert U1-C

Culvert U1-C

Culvert U1-C includes a single 42-inch concrete pipe located an estimated 125’ north of the NW 3rd St. and NW Nye St. intersection. Through this culvert the storm water is drained from the northeast section of basin U and under NW Nye St. into Nye Creek. The culvert is aged and discolored, but no corrosion is present.

The pipe condition is fair. As the inlet is a manhole structure, there are no upstream obstructions.

Culvert U2-C

Culvert U2-C includes a single 42-inch concrete pipe within the Surfside Mobile Village which allows an unnamed waterway to cross under a roadway within the development. This culvert was constructed during the same period as the development of the RV Park. The condition of the pipe is good, and there are no obstructions on the inlet, or outlet side.

Figure 3.45 – Image of Culvert U2-C

Culvert U3-C

Culvert U3-C includes a single 42-inch concrete pipe within the Surfside Mobile Village which allows an unnamed waterway to cross under the development in southwestern direction and into a manhole structure. It appears with the given alignment, that this culvert crosses under a few building structures.

The culvert inlet and outlet appear to be in fair condition with little obstructions. The inlet does contain some minor rust.

Figure 3.46 – Image of Culvert U3-C

Culvert U4-C

Culvert U4-C includes a single 18-inch corrugated HDPE pipe approximately 200’ east of NW Hubert St. and NW 3rd St. intersection. This culvert collects storm water drained from a portion of basin U and conveys it into a manhole structure.

The inlet is in good condition and the inlet is free of debris and/or considerable sediment.

Figure 3.47 – Image of Culvert U4-C

Culvert AF1-C

Culvert AF1-C includes a single 24-inch concrete pipe located west of the S.W. Coho St. and S.W.30th St. intersection. It conveys storm water north under a residential driveway where it deposits the water into a roadside ditch.

The pipe has been in place for an extended period of time, but shows no considerable corrosion. Once conveyed, the storm water follows a ditch that appears to dissipate leaving the storm water without a channel or storm pipe to direct it.

Culvert AG1-C

Culvert AG1-C includes a single 18-inch PVC pipe conveying storm water north east under the S.W. Abalone St. and Hwy. 101 intersection. The outlet of the culvert had been dug up, as it was previously under built up sediment. The inlet was not found during the data collection process. The outlet was in decent condition, but well below existing grade at outlet. Monitoring this pipe for sediment build up will be necessary during system maintenance.

Culvert AG2-C

Culvert AG2-C includes a single 15-inch CMP approximately 315' east of the S.E. 32nd St. and Hwy. 101 intersection. This culvert conveys water from the wetland area north of S.W. 32nd St. to a manhole structure that lies along N.W. 32nd Street.

The pipe is assumed to be lengthened from its original length to accommodate the LaQuinta and Holiday Inn developments. This culvert could not be found during field inspection and therefore, there is no attached picture.

Culvert AG3-C

Culvert AG3-C includes a single 48-inch CMP approximately 350' south of the S.E. 32nd St. and Hwy. 101 intersection. A portion of this culvert was abandoned in a continued effort to remove all major storm drain components from under private land. In addition to being on private land, a portion of the culvert was thought to be under an existing building. Following the abandonment of the south end, the southwest portion of the 48" pipe may be used to drain future developments west of Hwy. 101. This future use of the culvert was discussed in the 'Newport Coho/Brant Infrastructure Refinement Plan' dated June 6 2012.

Figure 3.48 – Image of Culvert AG3-C

The Condition is fair. Ditch line downstream of culvert is in need of some maintenance.

Culvert AG4-C

Culvert AG4-C includes a single 48-inch CMP which lies to the east and directly downstream of culvert AG3. As much of AG3 was abandoned, this culvert is extremely oversized for the area it is now draining. However, as mentioned above, this culvert may be experiencing more flow once further development of the south beach area begins.

Figure 3.49 – Image of Culvert AG4-C

Condition of pipe is fair. Ditch line upstream of culvert is in need of some maintenance.

Culvert AG5-C

Culvert AG5-C includes a single 60-inch box culvert located at the S.W. Anchor Way and S.E. 35th St. intersection. This

Figure 3.50 – Image of Culvert AG5-C

culvert was put in place at the same time culvert AG3 was abandoned. A large grate is attached to the inlet side of the culvert. From the inlet, the culvert conveys water from a large area west of Hwy. 101 east to a manhole structure on S.E. 35th St.

The condition of the culvert is good, and there has been little buildup of sediment at the inlet.

Figure 3.51 – Image of Culvert AG6-C

Culvert AG6-C

Culvert AG6-C includes a single 12-inch concrete pipe located north of the S.E. 42nd St. and Hwy. The culvert drains a small area of basin AG to the west under Hwy 101. After recent upgrades to the storm drain system to the north of the described intersection, this culvert conveys very little water. The culvert is in fair to poor condition, and the water way is clear of clutter and obstructions.

Figure 3.52 – Image of Culvert AL1-C1

Culvert AL1-C

Culvert AL1-C includes a single 24-inch CMP that lies north of the S.E. 50th St. and Hwy. 101 intersection. This culvert conveys water drained from the south eastern portion of basin AG to the west side of Hwy 101.

The pipe is in fair condition but displays some rusting around the pipe edges at the inlet. There is minimal sediment buildup at either end of the culvert.

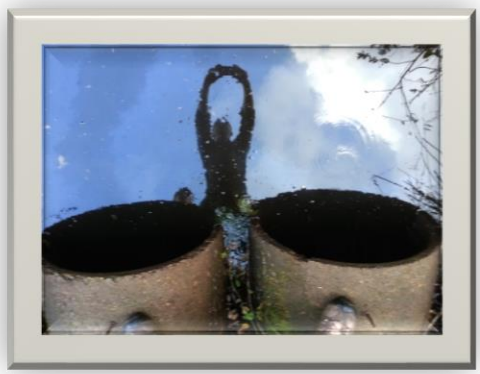

Figure 3.53 – Image of Culvert AL2-C

Culvert AL2-C

Culvert AL2-C includes two 24-inch concrete pipes approximately 450’ northeast of the S.E. 62nd St. and Hwy. 101 intersection. This culvert drains the majority of the area west of Hwy. 101 within basin L. It conveys the water under Hwy. 101 from the east side, to the west.

The condition of the culvert is fair, and there is minimal build up at the inlet or outlet.

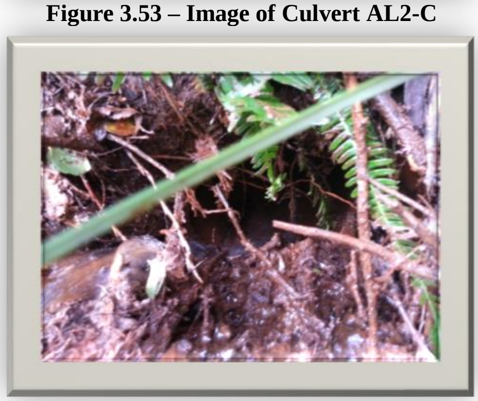

Figure 3.54 – Image of Culvert AO1-C

Culvert A01-C

Culvert AO1-C includes a single 18-inch concrete pipe located north of the S.E. 82nd St. and Hwy. 101 intersection. This culvert is approximately 75’ in length, and conveys storm water under Hwy. 101 from the east side to west

Pipe Condition is fair. Sediment is built up at the inlet, and dramatically restricting the flow through the pipe. Sediment needs to be removed from inlet of culvert.

Culvert AO2-C

Culvert AO2-C consists of two 48” culverts conveying Grant Creek under the Newport Airport. The pipes were put in place in the 1940’s, and are in excess 1100’ in length. One of the two pipes is reduced to a 36” pipe near the outlet. These pipes have up to 95’ of cover as they cross under the airport.

The conditions of the pipes are fair and there are little obstructions at the inlet/outlets of the pipe.

Figure 3.55 – Image of Culvert AO2-C

Culvert AP1-C

Culvert AP1-C includes a single 18-inch concrete pipe located north of the S.E. 84th St. and Hwy. 101 intersection. This culvert is approximately 75’ in length, is in good condition, and has minimal obstructions at either end. It conveys storm water collected from the area between 84th and the highway under Hwy. 101 from the east side to the west. The culvert is in fair condition with little corrosion, or inlet/outlet obstructions.

Figure 3.56 – Image of Culvert AP1-C

Culvert AP2-C

Culvert AP2-C includes a single 18-inch concrete pipe located at the S.E. 84th St. and Hwy. 101 intersection. This culvert is approximately 150’ in length, is in good condition, and has minimal obstructions at either end. It conveys storm water under Hwy. 101 from the east side to west.

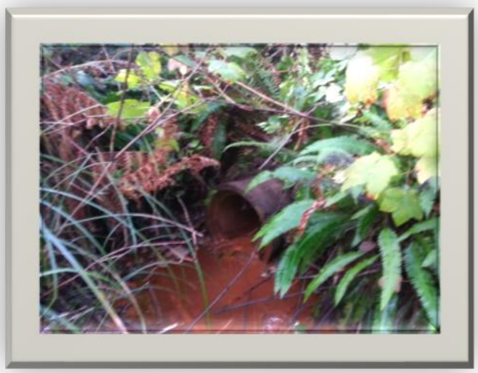

Figure 3.57 – Image of Culvert AP2-C

Culvert AP3-C

Culvert AP3-C includes a single 18-inch concrete pipe located south of the Moore Creek crossing. This culvert conveys storm water collected along and west of Hwy. 101 from the east side of the highway to the west. The culvert could not be found during data collection. As it was shown on the prior South Beach Storm Water Master Plan document it was included here.

Culvert AP4-C

Culvert AP4-C includes a single 18-inch concrete pipe located south an estimated 775' south of the Moore Creek crossing. This culvert is approximately 100' in length, is in good condition with sediment build-up at the inlet and an unobstructed outlet. It conveys storm water collected along and west of Hwy. 101 from the east side of the highway to the west.

Figure 3.58 – Image of Culvert AP4-C

Table 3.3 – Storm Drain Culvert Summary

Map #	Location	Size	Material	Condition
G1-C	East of the Meander St. & NW 54th St. intersection	36"	PVC	Good
H1-C	East of the NW 54th Crt. & NW 54th St. intersection	8"	RCP	Good-Inlet 90% Blocked
M1-C	Along Hwy. 101 @ mile post marker 138.5	72"	CBC	Good
M2-C	Along Hwy. 101 North of NE 31st St.	36"	CMP	Unknown
N1-C	N.E. Harney @ a north branch of Big Creek	24"	RCP	Fair
N2-C	Big Creed Rd. @ Big Creek	48"	CMP	OK
P1-C	N.W. Ocean View Dr. & N.W. 28th St. intersection	18"	CMP	OK
Q1-C	South of the NW Ocean View Dr. & NW 21st St. intersection	24"	RCP	Good
T1-C	North of the NW Nye St. & NW 8th St. intersection	24"	RCP	Fair
T2-C	Northwest of NW Coast St. & NW 6th St. intersection	24"	RCP	Good
U1-C	North of the N.W. 3rd St. & N.W. Nye St. intersection	42"	RCP	OK
U2-C	Inside the Surfside Mobile Village development	42"	RCP	Good-Half filled with sediment
U3-C	Inside the Surfside Mobile Village development	42"	RCP	Good
U4-C	East of NW Hubert St. & NW 3rd St. intersection	18"	CMP	Good
AF1-C	West of the SW Coho St. & SW 30th St. intersection	24"	RCP	OK-Discharge 90% filled with sediment
AG1-C	Northeast of the SW Abalone St. & Hwy. 101 intersection	18"	PVC	Good
AG2-C	East of the SE 32nd St. & Hwy. 101 intersection	15"	CMP	Good
AG3-C	South of the SE 32nd St. & Hwy. 101 intersection	48"	RCP	Good
AG4-C	Southeast of the SE 32nd St. & Hwy. 101 intersection	48"	RCP	Good
AG5-C	North of the SW Anchor Way & SE 35th St. intersection	60"	CMP	Good
AG6-C	North of the SE 42nd St. & Hwy. 101 intersection	18"	RCP	Good
AL1-C	North of the SE 50th St. & Hwy. 101 intersection	24"	RCP	Good
AL2-C	Northeast of the SE 62nd St. & Hwy. 101 intersection	24"	RCP	Good
AO1-C	North of the SE 82nd St. & Hwy. 101 intersection	18"	RCP	Fair- Inlet buried
A02-C	Along Hwy. 101 @ Grant Creek	48"	RCP	Fair
AP1-C	North of the SE 84th St. & Hwy. 101 intersection	18"	RCP	Fair
AP2-C	South of the SE 82nd St. & Hwy. 101 intersection	18"	RCP	Fair - Sediment Built up at inlet
AP3_C	South of the Moore Creek crossing	18"	RCP	Good
AP4-C	South of the Moore Creek crossing	18"	RCP	Good

System Modeling and Analysis

Section 4

4.1 General

This chapter presents the basis of the hydrologic analysis used in evaluating the City's existing storm drainage facilities within this master plan. There are several classifications of hydrologic models used for stormwater runoff analysis, each with a specific application to which it is best suited. The classifications include calibrated and uncalibrated peak discharge models, single event hydrograph models, watershed multiple event models, and joint probability models. Each of these types of models and their specific applications is discussed in depth in the textbook, "Hydrologic Analysis and Design," by Richard H. McCuen, Prentice-Hall, Inc., 1989. For the purposes of this master plan an uncalibrated peak discharge model has been used. A calibrated model would require peak discharge data obtained from flood frequency analyses at gauged sites. No studies have been performed within the City of Newport to provide such data.

The peak discharge is a primary variable for the design of stormwater runoff pipe systems, storm inlets, culverts, and small open channels. It also can be used for hydrologic planning such as small detention facilities. Peak discharge modeling is considered an acceptable method for designs where the time variation of storage is not a primary factor in the runoff process. Storm drainage basins identified in the preparation of this master plan range in area from about 4 acres to 36,508 acres. For basins of this range of sizes and accounting for the fairly steep slopes that are common along primary drainage routes within the study area, significant storage is not expected to occur. Therefore, peak discharge modeling is considered appropriate for design of storm drainage facilities within the City of Newport. Even in basins where some storage is likely to occur, peak discharge modeling is acceptable as it would tend to result in facilities being conservatively oversized rather than undersized.

4.2 Rational Method

McCuen notes that several peak discharge hydrologic models exist for various applications based on land use, terrain, and characteristics of the primary drainage route. The Rational Method is the most widely used equation. Mathematically, the Rational Method relates the peak discharge (q_p, ft^3/sec) to the drainage area (A, acres), the rainfall intensity (i, in/hr), and the runoff coefficient (C) by the following formula:

$$q_p = CiA$$

The rainfall intensity is obtained from an intensity-duration-frequency (IDF) curve using the return period and a duration equal to the time of concentration (T_c) as input. The value of the runoff coefficient is a function of the land use, cover condition, soil group, and surface slope.

A primary use of the Rational Method has been for design of storm drainage systems for small urban areas (less than 200 acres) which are characterized by small drainage areas, short times of concentration and relatively uniform land use. For such designs, short duration storms are critical, which is why the time of concentration is used as the input duration for obtaining i from the IDF curves.

4.3 SCS Rainfall Runoff Relationship

The Soil Conservation Service (SCS; now NRCS) has developed a method for relating rainfall to runoff which considers an entire watershed with a variety of land uses and soil types. The method, described in length in Technical Release 20 (TR-20) published by the SCS, is based upon unit hydrograph theory and the runoff curve number method of calculating direct runoff from the rainfall occurring over specified areas. The TR-20 method also allows watershed areas (basins) to be divided into subbasins for analysis purposes, with drainage routes of one or more subbasins running through other subbasins downstream. This provides for the calculation of an overall peak discharge from a basin that may or may not equal the sum of the peak discharges from the individual subbasins. The TR-20 method is considered much more versatile for modeling complex areas where the Rational Method is limited.

The volume of storm runoff depends on a number of factors, including but not limited to, rainfall volume. For very large watersheds, the volume of runoff from one storm event may depend on rainfall that occurred during previous storm events. However, for smaller watersheds such as those identified within this master plan, hydrologists usually assume that runoff from a given storm event is independent of rainfall which occurred in previous events. This assumption of storm independence is common and has been applied herein.

4.3.1 Factors Affecting Runoff Volume

In addition to rainfall, other factors affecting the volume of runoff include land cover, land use, soil type, and antecedent soil moisture conditions. In hydrologic modeling, the amount of rainfall available for runoff is typically separated into three parts: direct runoff, initial abstraction, and losses. Land cover and use, soil type and antecedent soil moisture conditions affect the split between losses and runoff. Many factors affect the separation of rainfall into direct runoff and losses, and therefore hydrologic modeling requires that a number of assumptions be made in order to simplify the process.

4.3.2 SCS-Runoff Equation

Development of the SCS rainfall – runoff relationship included dividing the total rainfall (P) into the following components: direct runoff (Q), actual retention (F), and the initial abstraction (I_a). The initial abstraction is the amount of rainfall at the beginning of a storm that is not available for runoff. It includes water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. The actual retention is the difference between the amount of rainfall available for runoff and the actual runoff. It is quantified according to the following relationship:

$$F = (P - I_a) - Q$$

The potential maximum retention (S) is assumed to have the following relationship to the other components:

$$F / S = Q / (P - I_a)$$

By substituting the first equation above into the second and by rearranging to isolate Q, the following relationship is derived:

$$Q = (P - I_a)^2 / [(P - I_a) + S]$$

The preceding equation contains one known value, P, and two unknown variables, I_a and S which must be estimated in order to calculate the runoff volume. According to the NRCS Technical Release 55 (TR-55) I_a is highly variable but generally is correlated with soil and cover parameters. It is further noted in TR-

55 that through studies of many small agricultural watersheds, I_a was found to be approximated by the following empirical equation:

$I_a = 0.2S$

By substituting the above equation for I_a in the previous runoff equation, the following equation, having only a single unknown, *S*, is derived after simplifying:

$Q = (P - 0.2S)^2 / (P + 0.8S)$

The preceding equation is identified as the basic equation for computing the runoff depth, Q, for a given rainfall depth, P. In this expression Q and P have units of depth (inches) but are commonly referred to as volumes as it is assumed for design that rainfall occurs at a uniform depth over the entire watershed.

4.3.3 Runoff Curve Numbers

In order to compute the runoff for a given depth of precipitation within a watershed one must be able to estimate the retention, *S*. The SCS runoff curve number (CN) was developed for this purpose. The curve number is an index that represents the combination of a hydrologic soil group and a land use and treatment class. Curve numbers are indicated to be functions of the three factors, soil group, cover complex, and antecedent moisture conditions. The CN has a range of 0 to 100 and is related to *S* according to the following equation:

$S = (1000/\text{CN}) - 10$

Soil Group Classification

The SCS method includes dividing soils into four groups represented by the letters A, B, C, and D. Group A soils are identified as deep sand, deep loess, and aggregated silts and are defined as having a minimum infiltration rate of 0.30 to 0.45 inch/hour. Group B soils include shallow loess and sandy loam with infiltration rates ranging from 0.15 to 0.30 inch/hour. Group C soils are those low in organic content and usually high in clay, including clay loams and shallow sandy loams with an infiltration rate in the range of 0.05 to 0.15 inch/hour. Group D soils are those that swell significantly when wet including fat (highly plastic) clays and certain saline soils and are identified as having an infiltration rate less than 0.05 inch/hour.

The NRCS Soil Survey for Lincoln County identifies a variety of soils within the study area. Figure 2.4 shows the soils within the study area and gives a brief description of each soil type, including a rate of permeability ranging from very rapid to very slow. For modeling purposes, soil types identified by the Soil Survey as having very rapid to rapid permeability were classified as Group A soils; soil types identified as having moderately rapid to moderate permeability were classified as Group B soils; and soil types identified as having slow to very slow permeability were classified as Group C soils. No fat clay soils were identified within the study area and consequently no Group D soils were considered in the stormwater modeling performed for this master plan.

Cover Complex Classification

The cover complex classification developed by SCS consists of three factors: land use, treatment or practice, and hydrologic condition. There are approximately 21 different land uses identified in the tables for estimating curve numbers. In reviewing cover complex within watershed areas for analysis of specific storm drains, land uses were generally found to be of one of the following classifications: open space (lawns, parks, etc.), paved streets with curbs, paved streets with open ditches, gravel roads, residential districts with 1/8 acre to 1/2 acre average lot sizes, commercial/business districts, industrial, and undeveloped forest or brush areas.

Curve Number Selection

Curve numbers used in the stormwater modeling performed for this study were determined from the runoff curve number table (Table 2-2) contained within TR-55 as published by the NRCS. A copy of the table is shown in Table 4.1. The CN for each distinct area identified within the watersheds was selected based on a combination of the cover complex and hydrologic soil group of the specific location as explained above. The land area applying to each CN identified was determined from the City's aerial topographic mapping and the Soil Map (Figure 2.4). An overall weighted CN was calculated for each watershed area based on the individual CN's and their corresponding land areas. Peak runoff was calculated using the weighted CN for each watershed area analyzed. The following table presents curve numbers that were selected representing a variety of land uses identified within the study area.

Table 4.1 – SCS Curve Numbers for Identified Land Uses

	Hydrologic Soil Group		
Cover Type and Hydrologic Condition	**A**	**B**	**C**
Open Space (lawns, parks, cemeteries, etc.) – fair condition	49	69	79
Paved Streets w/ curbs and storm drains	98	98	98
Paved Streets w/ open ditches	83	89	92
Commercial and business districts	89	92	94
Industrial areas	81	88	91
Residential with 1/8 acre or smaller lots, town houses	77	85	90
Residential with 1/4 acre lots	61	75	83
Residential with 1/3 acre lots	57	72	81
Woods (Forestland) – Grass combination – fair condition	43	65	76
Woods (Forestland) – Grass combination – good condition	32	58	72
Brush – brush-weed-grass mixture – poor condition	48	67	77
Brush – brush-weed-grass mixture – fair condition	35	56	70

4.3.4 Time of Concentration

The time of concentration (T_c) is an important input parameter used in runoff calculations. There are two commonly accepted definitions of the time of concentration. In the first, T_c is defined as the length of time for a particle of water to travel from the most distant point in a watershed to the point of design (i.e. outlet). The second definition is based on a rainfall hyetograph and the resulting runoff hydrograph. A hyetograph is the curve obtained when rainfall depth is plotted against time for a measured storm event. A hydrograph is a plot of runoff versus time for a watershed area. In the second definition of time of concentration, T_c is the time between the center of mass of rainfall excess and the inflection point on the recession of the direct runoff hydrograph. Both the rainfall excess and direct runoff are computed from the actual hyetograph and hydrograph. No direct rainfall or runoff data exist for the storm drainage basins identified herein and therefore attempting to compute the rainfall excess and direct runoff from any given basin is impractical.

Times of concentration for each basin have been calculated using velocity methods to determine the time for runoff to travel from the most distant point of the basin to the outlet. According to common practice, T_c has been computed as the sum of the individual travel times for each component of the drainage conveyance system. Runoff velocity for each component is determined based on surface roughness, channel shape, and slope. Runoff moves through a watershed as sheet flow, shallow concentrated flow, open channel flow, or some combination of these. The travel time (T_t) for an individual segment of the drainage system is equal to the length (L) of the segment divided by the velocity (V) of runoff within that segment, as shown below:

$T_t = L/V$

The velocity of overland flow has been estimated using the following relationship between velocity (ft/sec) and slope (percent):

$V = kS^{0.5}$

The value of *k* from the above equation is a function of land cover and has been determined according to the following table:

Table 4.2 – Land Cover Coefficients

K	Land Use / Flow Regime
0.25	Forest with heavy ground litter; hay meadow (overland flow)
0.50	Trash fallow or minimum tillage cultivation; contour or strip cropped; woodland (overland flow)
0.70	Short grass pasture (overland flow)
0.90	Cultivated straight row (overland flow)
1.00	Nearly bare and untilled (overland flow); alluvial fans in western mountain regions
1.50	Grassed waterway
2.00	Paved area (sheet flow); small upland gullies

Flow velocities within pipes and open channels have been computed using Manning's equation:

$V = (1.49/n)R_h^{2/3}S^{0.5}$

where V is the velocity (ft/sec), n is the roughness coefficient, R_h is the hydraulic radius (feet), and S is the slope (ft/ft). The hydraulic radius R_h is defined as the area of the flow cross section divided by its wetted perimeter. For simplicity sake, velocities in pipes have been calculated based on full flow conditions. For full or half-full pipes, the formula for hydraulic radius R_h is simplified as follows:

$R_h = d_0/4$

where d_0 is the inside diameter of the pipe. For pipe flow conditions other than full or half-full, the formula for determining hydraulic radius is more complex.

Table 4.3 – Manning's n for Partially Full Pipes and Open Channels

Type of Conduit	Minimum *n*	Normal *n*	Maximum *n*
Welded Steel	0.010	0.012	0.014
Coated Cast Iron	0.010	0.013	0.014
Corrugated Metal	0.021	0.024	0.030
Cement Mortar Lined (neat)	0.010	0.011	0.013
Concrete Culvert (finished)	0.011	0.012	0.014
Concrete pipe (steel form)	0.012	0.013	0.014
Vitrified Clay	0.011	0.014	0.017
Earth Channel, straight and uniform, clean	0.016	0.018	0.020
Earth Channel, straight and uniform, short vegetation	0.022	0.027	0.033
Earth Channel, winding, clean	0.023	0.025	0.030
Earth Channel, winding, short vegetation	0.025	0.030	0.033
Natural Channel, straight, no riffles or pools	0.025	0.030	0.033
Natural Channel, winding, some pools and shoals	0.033	0.040	0.045

The roughness coefficient *n* used in Manning's equation is a function of the channel or pipe material and condition. Studies have determined Manning's *n* for a number of different channel/pipe materials. The following table provides some typical values. The tabulated values are excerpted from Table 5, Chapter 10 of the textbook "Elementary Fluid Mechanics"; Seventh Edition; Robert L. Street, Gary Z. Watters, and John K. Vennard; Copyright 1996; John Wiley & Sons, Inc

4.3.5 Rainfall

Rainfall is the driving force of hydrologic design. Problems result when rainfall occurs at extreme volumes or rates. High rates of rainfall on small urban watersheds cause flooding of streets and parking lots because the drainage facilities were not designed to drain all the water generated by high rainfall rates. Some hydrologic planning and design requires only a volume of rainfall. For the purposes of hydrologic analysis and design, however, the distribution of rainfall with respect to time is usually required. The time distribution of rainfall is called a hyetograph. A hyetograph is a graph of the rainfall intensity or volume as a function of time.

Storm events can be separated into two groups, actual storms and design storms. Rainfall analysis is based on actual storms. Hydrologic designs are typically based on what is called the design storm approach. A design storm is a rainfall hyetograph with predefined characteristics, not an actual measured storm event. In fact, a real storm identical to the design storm most likely has not occurred and will not ever occur. Design storms have characteristics that are the average of the characteristics of storms that occurred in the past and therefore represent the average characteristics of storm events that are expected to occur in the future.

The three most important storm characteristics in hydrologic analysis and design are duration, volume, and frequency. The volume of a storm is often reported as a depth (i.e. inches). The depth is assumed to occur uniformly over an entire watershed. Therefore, the volume is actually the product of the depth times the area of the watershed. Another closely related characteristic is the intensity which is equal to the volume divided by the duration. A specified volume of rainfall may result from many different combinations of intensities and durations. The intensity and duration of a storm will have a significant effect on the resulting rate and volume of runoff.

Just as intensity, duration and volume are important in storm drainage system design, frequency also is a necessary determinant. Frequency can be discussed as either the exceedence probability or the return period. The exceedence probability is the probability that a storm of specified volume and duration will be exceeded in any one year. The return period is the average length of time between events of a specified volume and duration. The exceedence probability is inversely proportional to the return period. For example, if a storm of a specified duration and volume has a 1% chance of occurring in any one year, it has an exceedence probability of 0.01 and a return period of 100 years.

The relationship between volume (or intensity), duration and frequency is location dependent. That is, a storm with a given volume and duration will occur at a different frequency in one location than another. Because of the importance of the relationship between volume (or intensity), duration and frequency in hydrologic design, studies have been performed to develop rainfall volume – duration – frequency (VDF) curves and intensity-duration-frequency (IDF) curves for most localities. Newport is identified as lying within Oregon's IDF Zone 2.

Constant Intensity Storm

Frequently hydrologic designs on very small urban watersheds are designed based on constant intensity storms. The critical cause of flooding is often short-duration, high-intensity rainfall. Therefore, it is assumed that for the critical storm duration, the rainfall intensity will be constant. It is intuitive that the largest peak runoff rate occurs when the entire drainage area is contributing, and so it is common to assume that the duration of the design storm equals the time of concentration of the watershed. The intensity of the storm is obtained from an IDF curve for the location, often using the time of concentration as the duration and the frequency specified by the design standards (i.e. 10-year, 25-year, etc.) For a constant intensity storm, the rainfall volume is equal to the intensity multiplied by the duration.

SCS 24-Hour Storm Distributions

The SCS developed four dimensionless rainfall distributions using the Weather Bureau's Rainfall Frequency Atlases. The rainfall frequency data for areas less than 400 mi^2, for durations to 24 hours and for frequencies from 1 to 100 years were used. Analysis indicated four major regions, and the resulting rainfall distributions were labeled type I, IA, II, and III. The locations where these design storms should be used are shown in Figure 4.1. As indicated, Type IA design storms should be used for Newport.

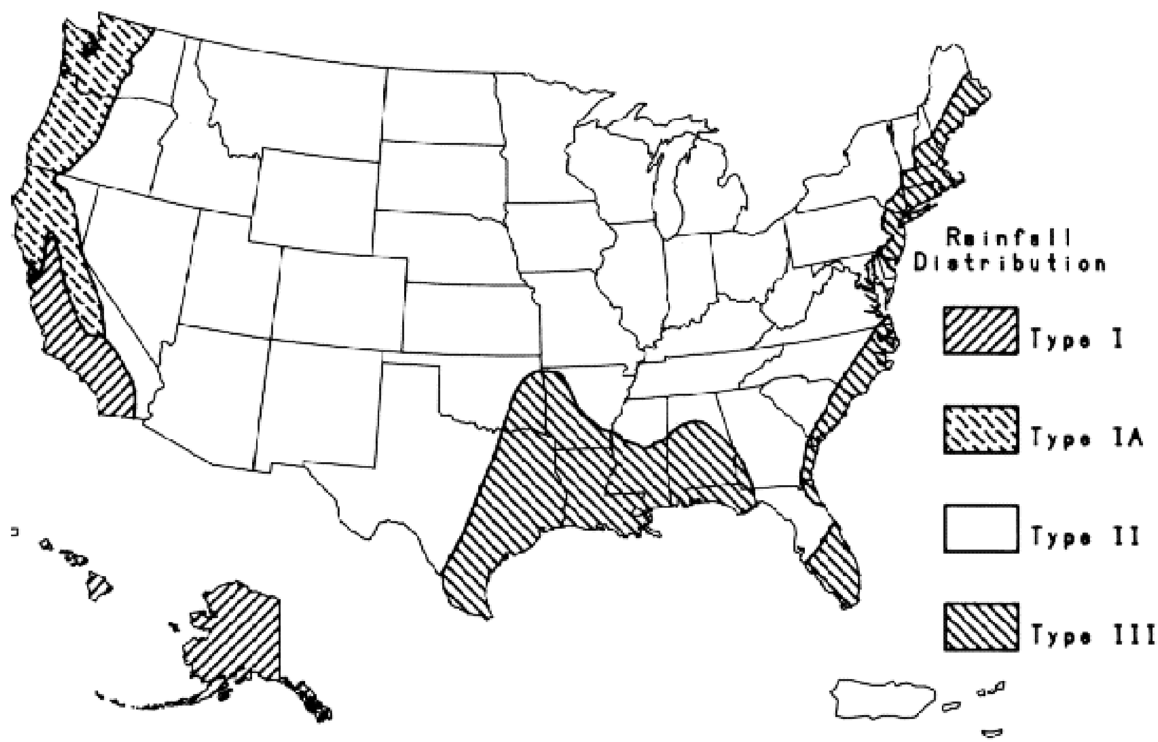

Figure 4.1 – Geographic Areas for SCS Rainfall Distributions

Rainfall Distribution

The SCS rainfall distributions are based on generalized rainfall volume-duration-frequency relationships obtained from Weather Bureau technical publications. Rainfall depths for various durations were used to derive the storm distributions. Incremental rainfall depths were determined using 6-minute increments. The time of the peak rainfall was found from the analysis of measured storm events to be location dependent. For the regions with type I and IA storms, the peak intensity was found to occur about 8 hours after the beginning of the storm, while for the regions with type II and III storms, the peak was found to occur at the center of the storm, about 12 hours. The SCS 24-hour rainfall distributions are graphically presented in Figure 4.2 below.

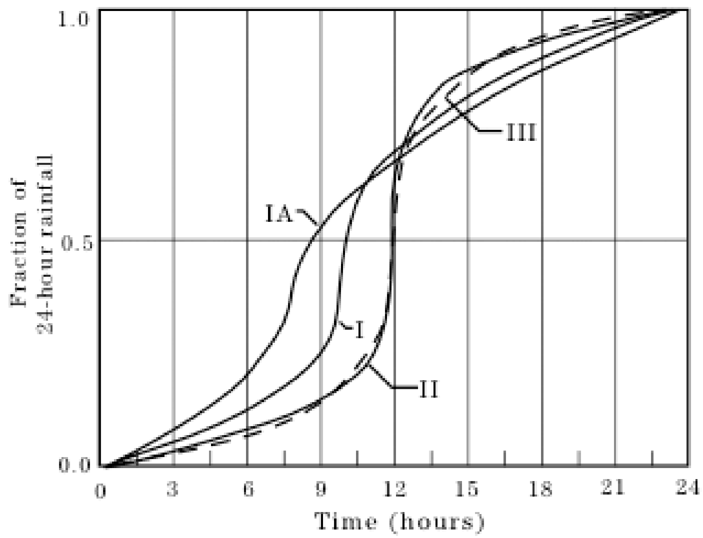

Figure 4.2 – SCS 24-Hour Rainfall Distributions

It is assumed for type II and III storms that the greatest 6-minute depth occurs at the middle of the 24-hour period, the second largest 6-minute incremental depth in the next 6 minutes, the third largest in the 6-minute interval preceding the maximum intensity, and so on, with each incremental rainfall depth to be of decreasing order of magnitude. The smallest increments fall at the beginning and end of the 24-hour storm. This procedure results in the maximum 6-minute depth is contained within the maximum 1-hour depth, the maximum 1-hour depth is contained within the maximum 6-hour depth, and so on. For type I and IA storms, the maximum incremental rainfall depth occurs at about 8-hours, with successively lower incremental depths following and preceding the maximum, and so on. Because all the critical storm depths are contained within the storm distributions, the distributions are appropriate for designs on both small and large watersheds. Type IA design storms have been used for each basin defined herein.

Rainfall Intensity

The IDF curves for an area can be used to obtain the rainfall intensities for storm durations of 5 minutes to 6 hours. A design storm can be formed using incremental data obtained from the IDF curves. This process can be somewhat cumbersome. Alternatively, isopluvial maps can be used to determine the total rainfall depth for a specific geographic area based on rainfall depth contours for storms of specific durations and return periods. For Oregon, maps are available for storms of 6-hour and 24-hour durations and 2, 5, 10, 25, 50, and 100-year return periods. The total rainfall depths presented in Table 4.4 were obtained from the isopluvial maps.

Table 4.4 – Design Storm Rainfall Totals for Newport

Design Storm Return Period	24-Hour Rainfall Total
25-year	5.1 inches
50-year	5.6 inches
100-year	6.2 inches

The Oregon Department of Transportation Hydraulics Manual recommends that storm drainage designs for city streets utilize a 25-year design storm, designs for state highways be based on a 50-year design storm, and other cases where roadway overtopping is likely a 100-year design storm be used. For the purposes of this master plan the 25 and 50 year design storms have been considered.

4.3.6 Hydrographs and Discharges

As defined previously, a hydrograph is a plot of the runoff from a watershed over time. The variation in flows represented on a hydrograph for a watershed area is expected to correlate to the variation in the rainfall hyetograph. For this study, runoff hydrographs were calculated for each storm drainage basin based on the 25 and 50-year Type IA design storms using the SCS TR-20 method. Calculations were performed using Civil 3d 2013 Storm and Sanitary Analysis modeling software which includes the SCS TR-20 method as one of the methods to calculate runoff. Results of the modeling are presented in Appendix A.

4.4 Future Flows

Developing values for increased runoff flows over the planning period required estimating growth which was measured in EDUs, and assessing the quantity of runoff increase per EDU.

4.4.1 Estimated Growth in EDUs

The impact of growth on the stormwater system will be based on an Equivalent Dwelling Unit (EDU) methodology. The EDU represents the typical amount of impervious surface area associated with a typical dwelling unit or residence. Included in this methodology is calculating the existing number of EDUs within the storm drain system, and applying a growth rate over the planning period. This results in the total EDU growth throughout the basin.

The increase in total EDU's represents the total growth of the storm drain system, and will dictate the increased runoff per basin over the planning period. The new EDUs were distributed amongst the basins using a priority system described below in combination with the city planning documents: 'Newport Housing Needs Analysis', by ECONorthwest, May 2011, the 'Commercial and Industrial Buildable Lands Inventory and Economic Opportunities Analysis', by ECONorthwest July 2012, and a figure which was submitted by the planning department. The described figure displayed possible areas of future growth within the 'North Area' of Newport. The figure is shown in appendix D. Given the growth of EDUs and thus the increase in impervious surface in each basin, the increase in run-off flow through the system can be projected.

More in-depth information on the City's storm drain EDUs and associated SDCs can be found in the Newport Storm Drain SDC Methodology Update document in appendix E.

4.4.1.1 Impervious Surface Calculations

The impervious surface area was broken up into two categories as follows: impervious surface areas from developed areas, and impervious surface areas resulting from streets and roadways. Table 4.5 shows the tabulation of impervious surfaces within each basin.

The impervious surface from development was totaled by tabulating the developed areas per zone type within each basin. This was done using the City's zoning and aerial topography maps. These areas where then multiplied by an assumed percentage of developed land covered by impervious surface. These values were 85%, 72%, 40%, 50% for commercial, industrial, LDR and HDR development respectively.

The impervious surface contributed from roadways was exclusive to roadways that were not already accounted for as part of the developed areas. These would include rural roadways, Hwy. 101, and Hwy. 20 for example.

Table 4.5 – Impervious Surface Tabulation

	Impervious Surfaces (Acres)						
Basin	LDR	HDR	Industry	Commercial	Public	Roadway	Total
A	0.00	0.00	2.02	5.13	0.00	8.48	15.63
B	2.57	0.00	0.00	0.00	0.00	0.91	3.48
C	0.00	1.54	0.00	5.47	0.43	0.89	8.34
D	17.34	10.52	0.00	0.00	0.00	1.72	29.58
E	0.00	4.37	0.00	0.00	0.00	1.12	5.49
F	6.39	17.77	0.00	3.34	0.00	5.38	32.89
G	9.52	0.00	0.00	0.00	0.00	1.73	11.25
H	3.62	0.00	0.00	0.00	0.00	0.70	4.32
I	0.00	0.00	0.00	0.00	0.00	2.84	2.84
J	1.13	0.00	0.00	2.07	0.00	0.69	3.89
K	8.63	0.00	0.00	0.89	0.00	3.97	13.49
L	0.00	0.00	0.00	0.00	0.00	1.27	1.27
M	0.00	18.79	0.00	0.00	0.00	3.82	22.62
N	44.95	3.50	0.00	33.53	12.69	6.56	101.23
O	1.62	0.00	0.00	0.00	0.00	0.37	1.99
P	6.48	0.00	0.00	16.66	0.00	5.94	29.08
Q	12.29	0.00	0.00	4.35	0.00	4.62	21.26
R	0.01	0.00	0.00	0.00	0.00	2.84	2.85
S	3.47	0.00	0.00	0.00	0.00	0.50	3.97
T	19.84	12.76	0.00	34.15	3.12	14.00	83.88
U	15.03	56.61	0.00	65.60	3.25	25.05	165.55
V	0.00	7.06	0.00	6.61	0.00	2.12	15.79
W	0.25	1.89	0.00	4.99	0.00	0.00	7.12
X	3.64	4.77	0.00	20.05	1.96	0.00	30.43
Y	0.00	6.99	0.00	0.00	0.55	0.00	7.54
Z	0.00	4.39	0.00	17.95	0.00	0.00	22.34
AA	2.50	3.05	0.00	17.51	1.60	0.00	24.67
AB	6.22	0.00	0.00	12.75	0.00	0.00	18.97
AC	18.00	0.00	0.00	0.00	0.00	3.48	21.48
AD	0.00	0.00	0.00	0.00	38.88	1.94	40.82
AE	0.00	0.00	0.00	0.00	3.71	0.00	3.71
AF	2.94	0.00	0.00	0.00	0.85	0.00	3.79
AG	0.84	0.08	62.40	24.19	0.02	13.92	101.45
AH	2.71	0.00	0.00	0.00	12.54	3.29	18.53
AI	8.24	5.16	20.68	1.52	0.54	8.61	44.74
AJ	0.00	4.98	0.00	0.00	0.00	0.00	4.98
AK	0.00	0.16	0.36	0.00	0.06	2.81	3.38
AL	4.82	0.00	10.60	0.00	2.15	1.48	19.04
AM	6.04	0.00	3.04	0.00	0.00	1.94	11.02
AN	0.00	8.62	0.00	0.00	0.00	2.97	11.59
AO	0.00	13.34	0.00	0.00	13.51	3.78	30.62
AP	0.00	13.17	0.00	0.00	16.60	4.10	33.87
AQ	0.00	0.00	0.00	0.00	0.00	8.23	8.23
Total							1049.00

4.4.1.2 EDU Value and Existing System Total

To maintain consistency throughout City planning documents the storm water EDU value was taken from the ‘Public Infrastructure SDC Methodology, December 2007, HBH Consulting’. The methodology and EDU development is shown in the following excerpt:

> *According to the City’s planning department, 55 new residential dwellings were added to the City during 2006. In each case, the planning department, as part of the plan review process, measured and recorded all new impervious areas that were part of each new improved property. These impervious surfaces includes such areas as:*
>
> - *Roof areas*
> - *Driveways*
> - *Sidewalks*
> - *Patios and impervious decks*
> - *Outbuildings*
> - *Any other improvement which will result in water running off the property*
>
> *Based on the 55 new single family dwellings constructed in 2006, a total impervious surface area of 150,010 square feet of impervious surfaces were added to the system. This is equal to around 2,727 square feet of impervious surface per EDU.*
>
> *Based on this analysis, the City should consider that a typical EDU in Newport shall add around 2,727 square feet of impervious surface to the system. This shall be used as the standard for calculating the number of stormwater EDU’s for all new development in the City of Newport.*

Given the total impervious surface area of 45, 375,145 ft^2 and the area designated per EDU of 2,727 ft^2 , the total EDU’s within the existing system is approximately 16,756.

4.4.1.3 EDU Growth and Distribution

The total EDU growth is dictated by the presumed growth rate through the planning period. The chosen growth rate was .64% as it was assumed that the impervious surface would grow at the same rate as the population. This growth rate expanded over the 20 year planning period results in an increase of 2,280 EDUs within the storm drain system.

These future EDUs were divided amongst the system basins, and then used for future flow analysis. The dispersion of EDUs were conducted with a priority system. First the total EDUs were split evenly between the ‘North Area’ basins, and the ‘South Beach’ basins. They were then divided further into allotted quantities of EDUs per zoning type. This was done using the following percentages: 28%, 32%, 3%, 15%, and 22% for commercial, Industrial, Public, HDR, and LDR respectively. These percentages are set to mirror the division of growth among the various zones discussed within the planning documents. The EDUs were then dispersed to any area where the City’s planning department, through documents or conversation, had voiced expectations of future growth. The remaining EDUs not yet distributed were then split up throughout the basins based on percentage of total availability. For example, if basin A had 10% of the total LDR developable land, then it would get 10% of the LDR remaining EDUs. Table 4.6 shows the EDU growth per basin, per zone. The new 64 EDUs projected for the publicly zoned areas are not shown on the table.

Table 4.6 – EDU Growth Distribution

	EDU Growth Per Basin Per Zone								
Basin	LDR	HDR	Com.	Ind.	Basin	LDR	HDR	Com.	Ind.
A			53	226	W		3	4	
B					X		3	9	
C		2	36		Y		6		
D	120	66			Z		4		
E					AA				
F	2	3			AB	1		8	
G	2	1			AC	4	4		171
H					AD			22	
I					AE			47	
J			5		AF		60	71	
K	15		34		AG			57	104
L	34	2	58		AH				
M	20	1			AI	130	58	110	30
N	31	32	66		AJ	130	58		
O					AK		15		35
P	3		3		AL			16	104
Q	2		14		AM	3		20	30
R	1				AN	No Growth Projected For These Areas			
S					AO				
T	1	6	11		AP				
U		24	19		AQ				
V		3	2		Total	499	351	665	700

Note: Public Growth Accounts for an additional 65 EDUs. Therefore total EDU growth Equals 2280 EDUs

4.5 Runoff Increase Per EDU

The increase in runoff is directly related to the change in surface conditions. For every additional square foot of asphalt added to the system the runoff is increased. The approximate increase was evaluated by first calculating runoff from a given area (1acre) with an associated undeveloped curve number which ranged from 55 for wooded areas with class B soils to 80 for grass covered areas with class D soils. Subsequently subtracting that value from the flow generated by the curve number of 98 which is used for impervious surfaces resulted in an estimate of the increased flow. Time of concentration was assumed to be 5 min for these comparisons. Although the initial evaluation examined 1 acre, the calculated increased flow was then divided to represent increased flow per 2,727 square feet, or per EDU. This process was done for both a 25-year event and a 50-year event. Table 4.7 shows the basins average undeveloped CN, expected EDU growth, and total expected flow increase for the 25-year and 50-year storm event.

Table 4.7 – Basin Increased Runoff Following Development

Basin	Pre-Dev. CN	Flow Increase per EDU (CFS) 25-Year	Flow Increase per EDU (CFS) 50-Year	EDU Growth	Impervious Surface Growth (Acre)	25-Year Storm Event Flows (CFS)		50-Year Storm Event Flows (CFS)	
						Existing	Increase	Existing	Increase
A	64	0.057	0.060	279	17.5	30.9	15.89	38.8	16.77
B	72	0.048	0.049	0	0.0	2.1		2.4	
C	74	0.044	0.046	38	2.4	15.5	1.69	18.8	1.74
D	67	0.044	0.046	186	11.6	210.2	8.27	253.4	8.50
E	65	0.044	0.046	0	0.0	2.8		3.3	
F	67	0.041	0.042	5	0.3	33.2	0.20	39.2	0.21
G	67	0.053	0.055	3	0.2	14.0	0.16	16.8	0.17
H	65	0.056	0.058	0	0.0	4.6		5.4	
I	74	0.053	0.055	0	0.0	2.1		2.6	
J	71	0.053	0.055	5	0.3	6.0	0.26	7.0	0.28
K	71	0.056	0.058	49	3.1	37.6	2.73	45.0	2.85
L	70	0.041	0.042	94	5.9	44.2	3.83	53.7	3.94
M	70	0.046	0.048	21	1.3	182.6	0.97	223.2	1.00
N	72	0.046	0.048	129	8.1	1257.6	5.98	1404.1	6.14
O	74	0.048	0.049	0	0.0	2.2		2.6	
P	74	0.048	0.049	6	0.4	37.9	0.29	43.1	0.30
Q	74	0.044	0.046	16	1.0	22.6	0.71	26.6	0.73
R	74	0.041	0.042	1	0.1	10.9	0.04	13.2	0.04
S	74	0.041	0.042	0	0.0	4.8		5.7	
T	74	0.041	0.042	18	1.1	89.4	0.73	101.5	0.75
U	73	0.041	0.042	43	2.7	179.3	1.75	214.0	1.80
V	74	0.041	0.042	5	0.3	12.3	0.20	19.3	0.21
W	73	0.041	0.042	7	0.4	12.0	0.28	13.5	0.29
X	73	0.043	0.044	12	0.8	47.4	0.51	58.4	0.53
Y	74	0.041	0.042	6	0.4	22.1	0.24	24.5	0.25
Z	74	0.043	0.044	4	0.3	20.3	0.17	34.7	0.18
AA	70	0.043	0.044	0	0.0	30.8		35.0	
AB	72	0.041	0.042	9	0.6	26.2	0.37	30.3	0.38
AC	72	0.041	0.042	179	11.2	N/A	7.28	N/A	7.51
AD	70	0.048	0.049	22	1.4	32.8	1.05	33.6	1.09
AE	70	0.048	0.049	47	2.9	36.0	2.24	38.2	2.32
AF	53	0.072	0.076	131	8.2	8.7	9.43	11.1	10.01
AG	78	0.034	0.034	161	10.1	135.9	5.44	160.0	5.54
AH	35	0.077	0.085	0	0.0	196.5		235.7	
AI	70	0.048	0.049	328	20.5	107.6	15.61	132.2	16.22
AJ	72	0.044	0.046	188	11.8	29.0	8.36	36.1	8.59
AK	71	0.046	0.048	50	3.1	43.3	2.32	52.0	2.38
AL	60	0.063	0.066	120	7.5	63.4	7.51	80.7	7.89
AM	58	0.065	0.069	53	3.3	27.1	3.45	33.1	3.65
AN	67	0.053	0.055	0	0.0	143.1		178.6	
AO	67	0.053	0.055	0	0.0	254.3		308.0	
AP	68	0.051	0.053	0	0.0	185.7		229.5	
AQ	67	0.053	0.055	0	0.0	300.9		355.5	

System Performance

5.1 General

The existing storm drainage systems within the study area have been modeled in order to determine their effectiveness to convey existing and future storm water flows to and through the system outfalls. As is described in section 4, a number of factors affected the systems modeled flows including but not limited to the land use, soil type, as well as the type of land cover and the topographical grade. The values used in the model for each of these parameters are shown within the basin descriptions given in this section.

The following basin descriptions also include summaries of future land use, calculated peak runoff for existing and future development conditions, as well as a description of existing storm drain facilities and their associated problems and needed improvements. Some basins are largely undeveloped at this time. Estimates have been made regarding development that is likely to occur in order to calculate peak runoff for future conditions in these areas. Problems with existing storm drainage facilities as identified in this Section are developed into improvement projects in Chapter 7, and given a project priority in section 8.

Unless noted otherwise, existing infrastructure has sufficient capacity for current and future flow volumes.

5.2 'North' Basin Description

5.2.1 Basin A

Basin A includes a total of about 129 acres, 59 of which are within the Newport City Limits. The basin lies north of N.E. 73rd St., southwest of the Moolack Creek, and east of Hwy. 101. The basin is primarily mildly developed commercial and industrial land.

Soil Type
Depoe loam (Map Unit 14B)
Nelscott loam (Map Unit 42C)
Lint Silt loam (Map Unit 35E)

Slope
0-25%

Current Land Use
49.35 Acres – Industrial (I-1, I-2 and I-3)
9.70 Acres – Light Commercial (C-1)
69.50 Acres – Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	30.92 cfs
50-Year Storm (Exist.)	38.82 cfs
25-Year Storm (Future)	46.81 cfs
50-Year Storm (Future)	55.59 cfs

Existing Storm Drain System
The storm water sheet flows east to west across the basin until it reaches Hwy. 101. The land over which the storm water flows is partially heavily wooded area, but is primarily clear cut, slightly vegetated landscape. Once conveyed to the highway, outfall A1 directs the water under Hwy. 101 and out and into an unnamed creek whereby it is conveyed to the Pacific Ocean.

Present Problems
The storm drain system within the basin consists of only one culvert. As a result there is little opportunity for problems. The outfall and only component of the storm drain system is in good condition and in no need of repair.

Future System
There are approximately 3.67 acres of available commercial land, and 55.79 acres of industrial. Within these areas it is predicted that an additional 53 EDUs of commercial development and 226 EDUs of future industrial development will be added to basin A over the planning period.

5.2.2 Basin B

The stormwater is collected from an area that surrounds 73rd St. and is bounded by Hwy 101 on the east, Pacific Ocean on the west, and natural contours to the north and south. The primarily the storm drain system collects water from a residential zone along 73rd St.. The slopes and soils are not conducive of storm water absorption, and as a result most of the storm water is conveyed to and through the storm drain system.

Soil Type
Depoe loam (Map Unit 14B)
Nelscott loam (Map Unit 42C)
Bandon fine sandy loam (Map Unit 3E)
Bandon fine sandy loam (Map Unit 3C)

Slope
0-50%

Current Land Use
5.70 Acres – Low Density Single Family (R-1)

Peak Runoff

25-Year Storm (Exist.)	2.13 cfs
50-Year Storm (Exist.)	2.40 cfs
25-Year Storm (Future)	2.13 cfs
50-Year Storm (Future)	2.40 cfs

Existing Storm Drain System
The storm drain system collects water primarily from a residential zone along 73rd Street. The water collects in various catch basins and storm drain manholes, flows south to north, and out to the Pacific Ocean through the 8” outfall “B1”.

Present Problems
There are no known issues with the storm drain system in this basin.

Future System

Sub Basin B is substantially built-out. With the exception of the potential for redevelopment, no changes are anticipated that would significantly affect the peak runoff from this basin.

5.2.3 Basin C

Basin C includes a total of about 19.5 acres, all within the Newport City Limits. The boundaries of this basin are dictated more by the natural landscape than by roadways, ditches or other components of a developed area that direct storm water flow. With this characteristic the basin cannot be very well defined with use of street names as specific boundaries, and must be described more generally. The basin is centered north to south on 73rd Street, and extends in the east from Hwy. 101 to west of the Oceanview development. This area contains several different zoning designations, and the land within these zones is a mixture of developed, and undeveloped. The majority of the land is covered with little to no vegetation.

Soil Type

Depoe loam (Map Unit 14B)
Lint silt loam (Map Unit 35E)
Bandon fine sandy loam (Map Unit 3C)
Nelscott loam (Map Unit 42C)

Slope
0-25%

Current Land Use
8.02 Acres – Commercial-Retail and Service (R-1)
2.08 Acres - High Density Multi-Family (R-4)
2.22 Acres – Industrial Light (I-2)
5.06 Acres - Medium Density Single Family (R-2)
2.14 Acres - Public

Peak Runoff

25-Year Storm (Exist.)	15.49 cfs
50-Year Storm (Exist.)	17.13 cfs
25-Year Storm (Future)	18.81 cfs
50-Year Storm (Future)	20.50 cfs

Existing Storm Drain System
Much like basin A, this basin has little storm drain components. The storm water collects across the basin and flows via natural grading to a 24” culvert that is designated outfall C1. The outfall conveys the storm water under Hwy. 101 to the Pacific Ocean .

Present Problems
There are no present concerns regarding the storm drain system within this basin.

Future System
There are 5.06 acres of LDR, and 1.59 acres of commercially zoned undeveloped land within the basin. These undeveloped areas are projected to facilitate a growth of 5 residential EDU and 5 commercial EDU. In addition to undeveloped area, this basin also houses approximately 24 vacant commercial lots. It is projected that these lots will experience a growth of 2 HDR, and 36 commercial EDUs.

5.2.4 Basin D

Basin D includes a total of about 670.8 acres with 428 acres beyond the UGB. The basin is bounded on the east by Hwy. 101, and extends to the west were it is bounded by ridgelines, and other high points of the natural landscape. The south boundary runs roughly parallel to NE 56th St. and the north boundary begins at and has a similar alignment to NE 72nd Street. The area outside of the UGB is primarily woodland, as is approximately 50% of the land within the UGB. The areas that are not described above are developed areas, or clear-cut areas being prepped for future development. Meandering through the middle of these developed and undeveloped areas is Schooner Creek. The creek travels from the east portion of the basin to the east.

Soil Type

Bandon fine sandy loam (Map Unit 3E)
Lint silt loam (Map Unit 35E)
Nelscott loam (Map Unit 42C)
Templeton-Fendall silt loams (Map Unit 55E)
Tolovana-Reedsport complex (Map Unit 56E)
Tolovana-Reedsport complex (Map Unit 56G)

Slope
5-60%

Current Land Use
88.25 Acres -High Density Multi-Family (R-4)
154.36 Acres - Medium Density Single Family (R-2)
428.21 Acres -Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	210.24 cfs
50-Year Storm (Exist.)	253.39 cfs
25-Year Storm (Future)	218.51 cfs
50-Year Storm (Future)	261.89 cfs

Existing Storm Drain System
Schooner Creek is the primary collection point for this basin. There are several 8" storm drain systems that outfall onto hillsides draining into Schooner Creek. These systems primarily stem from residential areas like Ocean View Living Center, or the Long View Hills Development. All the storm water that is collected into Schooner Creek moves from east to west where it is eventually conveyed under Hwy. 101 by outfall D1.

Present Problems
No problems have been identified in basin D

Future System
There is approximately 114 acres of LDR, and 63 acre of HDR designated land that is currently undeveloped. In addition there is roughly 35 vacant HDR lots within the basin. A portion of the vacant/undeveloped land will be used for the development of the Heritage Place which will be built across the highway from the Pacific Shores RV Park. This will introduce a 120-unit assisted living facility. (120 EDU) Other more sporadic growth is projected to occur within the basin totaling 66 EDU within the HDR zoned area.

5.2.5 Basin E

Basin E includes a total of about 5.46 acres, all within the Newport City Limits, and lays northeast of the intersection of NW 66th Dr. and Hwy. 101. This basin is bounded by the high density residential development along NW 66th Dr. and NW Schooner Circle. The land cover is predominately pavement, with a smaller portion being residential landscaping.

Soil Type
Bandon fine sandy loam (Map Unit 3E)
Nelscott loam (Map Unit 42C)

Slope
12-50%

Current Land Use
5.46 Acres – High Density Multi Family (R-4)

Peak Runoff

25-Year Storm (Exist.)	2.77 cfs
50-Year Storm (Exist.)	3.33 cfs
25-Year Storm (Future)	2.77 cfs
50-Year Storm (Future)	3.33 cfs

Existing Storm Drain System
The Storm drain system in this basin consists of several catch basins along NW Schooner Circle, and NW 66th Drive. The storm water is collected from rooftops, driveways roadways, and lawns, then conveyed north through the catch basins and manholes where it is directed through the E1 outfall. The water drains from the outfall location into the Pacific Ocean.

Present Problems
The residential development defining the basin boundaries is called Schooner Landing. Within this development there has been tectonic movement that has moved portions of the storm drain system. As this is a private development it is not the City's responsibility to adjust the storm drain system to accommodate the earth movement. Thus, although there are poor storm drain conditions within this basin, they will not be addressed or discussed further in this master plan.

Future System
Due to site conditions, no future growth is expected to occur within this basin during this planning period.

5.2.6 Basin F

Basin F includes a total of about 94.3 acres, all within the Newport UGB. This basin boundary is dictated by the natural landscape and is therefore an irregular shape that cannot be exactly defined by roads or residential areas. This boundary description simply gives the furthest South, West, East, and north streets located within the basin. To better understand the basin boundaries see Fig. 3.1. The defining roads are N.W. Rhododendruon to the west, N.E. Lucky Gap to the east, N.E. 54th St. to the south, and 60th St. to the north.

Much of the area is developed, and therefore the land cover is lawns, roof, and roadways. However the area also houses the Agate Beach Neighborhood and Dog Park which contains a more wooded area and grass field. Most of this ground is mildly sloped, and nearer to the lower end of the ‘Slope’ range shown below.

Soil Type
Bandon fine sandy loam (Map Unit 3E)
Nelscott loam (Map Unit 42C)

Slope
3-50%

Current Land Use
28.16 Acres –Commercial (C-1)
49.01 Acres -High Density Multi-Family (R-4)
17.13 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	33.2 cfs
50-Year Storm (Exist.)	39.2 cfs
25-Year Storm (Future)	33.40 cfs
50-Year Storm (Future)	39.41 cfs

Existing Storm Drain System
While there is one hard piped system within the basin, the majority of the storm water conveyance is facilitated by roadside ditches, swales, or by natural grading. Storm water collects from the east side of Hwy. 101 beginning in the south end of the basin near 54th St, and progressing north to 60th St. where the collected water flows under the highway, and enters the hard piped storm drain system. Field inspections did not reveal the exact route the storm drain system takes when conveying the storm water under HWY. 101. Storm water is also collected from 57th and 58th streets, and conveyed north via natural drainage where it enters an 18” pipe. The two main branches of the storm drain system from the south and east combine and are directed north in a 24” pipe. Near the office building of the Pacific Shores RV Park there is a manhole where this 24” pipe and several other storm drain pipes collect. The other storm drain inlets within the manhole are those used to drain the RV Park development. From this manhole the storm water travels to the northwest in a 36” CMP where it eventually outfalls into a creek.

Present Problems
Local Residences have submitted complaints regarding the minimal storm drain components and infrastructure within this neighborhood. It is suggested to clean local ditches and install storm drain pipe where needed to address citizen concerns and minor localized flooding issues.

Future System
There are 7 vacant lots in both the LDR and HDR zoned areas within the basin. In addition, there is an LDR zoned area north of 57th St. totaling 3.27 acres that is undeveloped. Future growth projected in these areas will be 2 EDU in the LDR area, and 3 additional EDU amongst the HDR zoned regions.

5.2.7 Basin G

Basin G includes a total of about 27.8 acres, all within the Newport City Limits. The basin encompasses the blocks around 55th St. and 56th Street. The area stretches from Hwy. 101 in the east to the Pacific Ocean in the west. The area is primarily developed residential with a small sector designated commercial.

Soil Type
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)
Neskowin-Salander silt loams (Map Unit 45G)

Slope
3-65%

Current Land Use
2.12 Acres –Commercial (C-1)
0.39 Acres -High Density Multi-Family (R-4)
25.30 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	14.04 cfs
50-Year Storm (Exist.)	14.20 cfs
25-Year Storm (Future)	14.16 cfs
50-Year Storm (Future)	16.95 cfs

Existing Storm Drain System
The storm water flows from the east and south ends of the basin to the west. The majority of the flow from the highway to N.W. Rhododendron St. is conveyed through ditches, and driveway culverts. At the N.W. Rhododendron intersection the storm water flow collected in the roadside ditches is combined into one 18” storm drain pipe. This pipe runs south and then west until it reaches 55th Street. At 55th the storm water from another roadside ditch is collected and the pipe size is increased to 24”. At the intersection of N.W. Meander St. and 55th St. flow from yet another ditch is introduced into the piped storm drain system at which point the pipe increases to 36”. The 36” pipe continues west and outfalls into a unnamed waterway that travels between residences, through a 36” culvert, and out to the Pacific Ocean.

Present Problems
No problems have been identified in sub basin G

Future System
There are 9 vacant lots within the LDR zoning, and roughly 2.58 acres of LDR and .39 acres of HDR zoned areas left undeveloped. The undeveloped areas contain steep slopes that would make future development difficult. As future growth happens, it is projected that 3 EDU will fill a portion of the vacant lots over the planning period.

5.2.8 Basin H

Basin H includes a total of about 8.2 acres, all within the Newport City limits, and lies southwest of the N.W. 55th St. and N.W. Meander intersection. The south side of the basin is undeveloped steep hillside with wooded and native foliage vegetation. Residential is the primary zoned area within the basin with a small section designated for public use.

Soil Type
Nelscott loam (Map Unit 42C)
Neskowin-Rock outcrop complex (Map Unit 44H)
Neskowin-Salander silt loams (Map Unit 45G)

Slope
20-99%

Current Land Use
8.2 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	4.63 cfs
50-Year Storm (Exist.)	5.43 cfs
25-Year Storm (Future)	4.63 cfs
50-Year Storm (Future)	5.43 cfs

Existing Storm Drain System
The Storm drain system in this basin consists curb, catch basins, and manholes along NW 54th St. and N.W. Perry Street. The outfall location is on private property just north of the NW 54th St. and NW 54th Crt. intersection.

Present Problems
The existing system lacks capacity to convey the storm water from a 25 and 50-year storm event. The first point of flooding occurs at the 8" pipe extending west along NW 54th St. All pipes downstream of this point are undersized.

Future System
Basin H is substantially built-out, however there are still 3 vacant lots available for future development. However, this area is experiencing considerable geotechnical instability. For this reason, future growth within this area is not projected over the planning period.

5.2.9 Basin I

Basin I includes a total of about 4.4 acres, all within the Newport UGB, and runs along Hwy. 101 from N.W. Lighthouse Dr. to south of NE Luck Gap St. This is very small basin with approximately 95% of the surface covered by asphalted roadway or parking lot. The slope of the highway is shallow; however the slope of the surrounding area is aggressive.

Soil Type
Nelscott loam (Map Unit 42C)

Slope
3-12%

Current Land Use
3.10 Acres -Commercial
1.27 Acres -High Density Multi-Family (R-4)

Peak Runoff

25-Year Storm (Exist.)	2.13 cfs
50-Year Storm (Exist.)	2.55 cfs
25-Year Storm (Future)	2.13 cfs
50-Year Storm (Future)	2.55 cfs

Existing Storm Drain System
The Storm drain system in this basin consists of catch basins along the side of Hwy. 101 that collect into a single manhole and outfall I1onto the roadside embankment. From there the storm water travels into a ravine which drains into the Pacific Ocean.

Present Problems
A recent highway overlay left a couple of the catch basins clogged or obstructed by left over asphalt. These catch basins need to be cleaned.

Future System
Basin I is substantially built-out. With the exception of the potential for redevelopment, no changes are anticipated that would significantly affect the peak runoff from this basin.

5.2.10 Basin J

Basin J includes a total of about 8.3 acres, all within the Newport UGB. The basin primarily drains the residential area and commercial area between NE Lucky Gap St. and Hwy. 101 starting at NE 52nd St. going north to NE 56th Street. The slopes in this basin are aggressive. Where residences do not exist the land cover is typical for wooded areas, while the remaining portion of the basin is lawns, roadways, and rooftops.

Soil Type
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)

Slope
3-50%

Current Land Use
4.98 Acres –Commercial (C-1)
3.32 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	6.04 cfs
50-Year Storm (Exist.)	7.04 cfs
25-Year Storm (Future)	6.30 cfs
50-Year Storm (Future)	7.32 cfs

Existing Storm Drain System
Much of the storm water runoff within the basin is directed via the natural topography from the northeast portion of the basin toward the intersection of Hwy. 101 and NE 52nd Street. From here, the water is conveyed under and across Hwy. 101 through a 24” concrete pipe. Once on the west side of the highway the water travels through two manholes, more 24” pipe, then reaches outfall J1 where it is dispersed to an unnamed creek which flows to the Pacific Ocean. On the west side of the highway there are several parking lots, and residential parcels from which the system collects runoff.

Present Problems
No problems have been identified in sub basin J

Future System
There are 4 vacant LDR parcels in addition to 2.29 acres of undeveloped Commercial zoned land. Future growth is projected to add 5 EDUs of commercial growth over the planning period.

5.2.11 Basin K

Basin K includes a total of about 49.8 acres, all within the Newport UGB. The basin primarily drains the residential area and commercial area around N.E. Windmill Dr. and N.E. Lucky Gap St. respectively. The slopes in this basin are aggressive. Where residences do not exist the land cover is typical for wooded areas, while the remaining portion of the basin is lawns, roadways, and rooftops.

Soil Type
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)

Slope
3-50%

Current Land Use
8.09 Acres –Commercial (C-1)
41.66 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	37.58 cfs
50-Year Storm (Exist.)	40.31 cfs
25-Year Storm (Future)	39.74 cfs
50-Year Storm (Future)	47.83 cfs

Existing Storm Drain System
Much of the storm water within the basin is collected and conveyed through the natural topography of the region to an unnamed waterway, then under the highway through outfall K1. The exceptions to this are the storm water collected within the Longview Hills Residential Park, along N.E. Lucky Gap St. and collected around an unnamed creek traversing through several residences. All of these exceptions are collected into hard piped storm drain systems with 8” pipes that outfall into the same unnamed creek leading to outfall K1.

Present Problems
The storm drain system within Longview Hills Residential Park was not evaluated for condition or capacity as it is a private development and is not maintained by the City.

The manhole located at the low point of NE 54th St. surcharges, and overflows causing localized flooding. The overflow spills over the curb along NE 54th St. and onto private property to the south. The lot receiving the flood waters originally (pre-development) housed a creek which was the natural drainage path for the watershed. Thus the flow over the curb presented no concern. However, when the lot was developed, the creek conveyance was removed, and the system put in place to accommodate the storm drain flow through the property was not sufficient. Thus there is localized flooding at this residence.

Future System
There are 11 vacant LDR parcels in addition to 17.30 acres and 2.44 acres of undeveloped LDR and Commercial zoned land respectively. Much of the residential area available for future growth contains aggressive slopes which limit the constructability of new residences. That said, future growth is projected to add 15 EDUs (fill-in of vacant parcels) to the residential area, and 34 EDUs to the commercial over the planning period.

5.2.12 Basin L

Basin L includes a total of about 197.7 acres, 53.9 of which is outside the UGB. The basin lies east of Hwy. 101 between NE 42st St. in the south and NE Lucky Gap St. in the north. There is a very small portion of the commercial zoned area within the basin that is developed. The rest of the basin is undeveloped, and is primarily covered with vegetation typical to a woodland area. The topography is primarily sloped hillsides which drain and collect into an unnamed creek.

Soil Type
Bandon fine sandy loam (Map Unit 3E)
Nelscott loam (Map Unit 42C)
Tolovana-Reedsport complex (Map Unit 56G)

Slope
3-60%

Current Land Use
8.52 Acres –Commercial (C-1)
72.87 Acres - Medium Density Single Family (R-2)
62.35 Acres -Public
53.90 Acres -Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	44.16 cfs
50-Year Storm (Exist.)	53.70 cfs
25-Year Storm (Future)	47.99 cfs
50-Year Storm (Future)	57.64 cfs

Existing Storm Drain System
The Storm drain system consists of a single unnamed stream, and the outfall culvert L1 traveling under Hwy. 101. The storm drain collects and drains across the basin from east to west.

Present Problems
No problems have been identified in sub basin L

Future System
There are 72.88 acres and 8.52 acres of undeveloped LDR and areas respectively within the basin. The projected growth for these areas is 36 residential EDUs, and 58 Commercial EDU. The residential growth will result from the 'Nautical Hill' development scheduled to begin construction following completion of the City's new water tank.

5.2.13 Basin M

Basin M lies east and west of Hwy. 101 between 31st St. and N.E. Golf Corse Drive, and defines the Little Creek watershed. The basin includes a total of about 199.95 acres 96.6 of which is outside the UGB. The majority of the basin within City limits is zoned residential, and a portion of this land is developed just east of HWY. 101. These developments include the Pacific Hills Beach Club, and many apartments complexes branching off of N.W. 33rd St. including Little Creek Apartments. Much of the basins undeveloped areas are wooded hillsides. The aggressive slopes associated with this terrain will limit the amount of residential developments in the area.

Soil Type
Bandon fine sandy loam (Map Unit 3E)
Nelscott loam (Map Unit 42C)
Tolovana-Reedsport complex (Map Unit 56E)
Tolovana-Reedsport complex (Map Unit 56G)

Slope
3-60%

Current Land Use
80.74 Acres - High Density Multi-Family (R-4)
22.59 Acres - Medium Density Single Family (R-2)
96.62 Acres -Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	182.56 cfs
50-Year Storm (Exist.)	223.19 cfs
25-Year Storm (Future)	183.53 cfs
50-Year Storm (Future)	224.19 cfs

Existing Storm Drain System
There are a couple of sub-systems that define the storm drain system within this basin. The residential area north of NW 33rd St. has a private storm drain system that drains north into Little Creek, while the residential area to the south has a storm drain system that drains to the west and outfalls over the bank. Both of these systems are small diameter with their max pipe size being 8”. In addition to the smaller sub-systems, the storm drain includes outfall M1 that drains water from the Pacific Hills Beach Club development under Hwy. 101 and into Little Creek.
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Present Problems
No problems have been identified in basin M

Future System
There are 3 vacant parcels within this basin M. It is projected that 1 EDU will be added as fill-in within the planning period.

There is 22.6 acres of undeveloped land zoned LDR, 3 individual LDR vacant parcels, and 3 acres of HDR undeveloped land within the basin. The projected growth within these vacant areas is 20 EDUs in the LDR zone, and 1 EDU in the HDR zone. These EDUs will more than likely be in the north region of the basin.

5.2.14 Basin N

Basin N is the largest basin studied in this master plan and includes a total acreage of approximately 35,768 acres, 35,018 acres of which are outside the UGB. The basin boundaries are defined by Hwy. 20 on the south side, NE Fogarty St. & Hwy.101 on the west side, and by natural terrain features on the north and east sides. The east side of the basin which is entirely outside the current UGB is primarily woodland areas that house Big Creek, Jeffries Creek, Anderson Creek, and Blattner Creek. The grades throughout the basin are drastic, and are not conducive for the construction of future developments. The west side of the basin also contains a large portion of woodland areas segregated by various creeks and waterways. Apart from the undeveloped wooded areas, this basin contains commercial developments along Hwy. 101, residential developments east and south of Jeffries Creek, and more residential areas to the northwest of the basin.

Soil Type
Lint silt loam (Map Unit 35E)
Bandon fine sandy loam (Map Unit 3E)
Nelscott loam (Map Unit 42C)
Nestucca silt loam (Map Unit 46A)
Templeton-Fendall silt loams (Map Unit 55E)
Tolovana-Reedsport complex (Map Unit 56E)
Tolovana-Reedsport complex (Map Unit 56G)
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)
Brenner silt loam (Map Unit 9A)

Slope
0-60%

Current Land Use
44.4 Acres - Commercial
81.7 Acres - High Density Multi-Family (R-4)
431.7 Acres - Medium Density Single Family (R-2)
192.3 Acres - Public
35,018 Acres - Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	1257.57 cfs
50-Year Storm (Exist.)	1404.11 cfs
25-Year Storm (Future)	1263.45 cfs
50-Year Storm (Future)	1410.15 cfs

Existing Storm Drain System
The furthest upstream components are the Big Creek Dams 1 and 2. These components had little impact on the storm water flow given the modeling approach. The model assumes a worst case scenario. The scenario being that the reservoir is full when the storm event takes place, thus all the storm water flow will be directly conveyed through the spillways. There is a slight amount of storage and subsequent decreased flow that takes place while the incoming flow is greater than the capacity of the spillway and the water backs up in the reservoir until it reaches the emergency spillway elevation. This storage and diminished flow were accounted for, and found to be relatively minimal.

Downstream of the dams, the storm drain system is a collection of smaller systems stemming from residential and commercial developments. Many of these developments storm drain systems outfall onto banks or into streams that drain to one of the various creeks within the area (Jeffries Creek, Anderson Creek, or Big Creek). The majority of these sub-systems maximum pipe size is 12”, however the 24” minor outfall at the intersection of NE Big Creek St. and NE Harney Street, the 36” minor outfall at NE 7th St. and NE Harney Street, and the 24” minor outfall just west of the NW 28th St. and Hwy. 101 intersection are all exceptions to the rule. Below is a brief description of the area drained by these listed minor outfalls.

The 24” minor outfall at the intersection of NE Big Creek St. and NE Harney St. drains the residential development southwest of the NE Lisi Pl. and NE Lakewood Dr. intersection.

The 36” minor outfall north of NE 7th St. and NE Harney St. intersection drains an areas north of Hwy. 20, south of 7th St. west of NE Fogarty St. and to the east of NE Laurel St.

The 24” minor outfall west of the NW 28th St. and Hwy.101 intersection drains the area east of Hwy. 101 between NE Chamber Crt. and NW 28th Street.

The storm drain flow from all these various sub-systems eventually combine into one flow at the junction of Big Creek, and Jeffries Creek. This point occurs just west of the NE Harney St. and NE Big Creek Rd. intersection. Once combined, the storm water is conveyed down Big Creek, and under Hwy. 101 via two 8’ x 8’ concrete box culverts, then to the Pacific Ocean through outfall N1.

Present Problems

Much of the system deficiencies within this basin are related to maintenance. This is evidenced by the obstructions along the various creeks which have caused the water to back-up, and flood areas that would normally not see any water flows. These obstructions range from beaver damns, to dead trees settling in the water way after being blown down by a large storm. Cluttered ditch lines are also impeding conveyance of storm water within the basin. This can be seen in the sub-system draining the residential area around Lakewood Dr. The manhole at the intersection of NE Iler St. & NE Big Creek Rd. is half full of standing water at all times. This pipe has sufficient capacity to drain the storm flows, however, the ditch to which it drains, is full of sediment, and weeds which does not allow the manhole to drain.

Along with maintenance, lack of capacity is an issue within the basin as well. Along Hwy. 101 stretching from NE 17th St. to NW 28th St., the storm drain is lacking capacity. The pipe ranges from 12” to 24” and runs at minimal slopes. Given the modeled flows, this pipe requires almost twice the capacity throughout its length. There is also a small section of pipe along NE Iler Street that is lacking capacity, and needs to be increased in size.

Future System

There are 40 vacant LDR parcels, 250 acres of LDR, 56 acres of HDR, and 4.95 acres of Commercial zoned undeveloped land. There has been land purchased and tentative plans made for a few residential developments within this basin. However, the cost factor associated with providing access to sites, and building around the slope constraints has slowed the progress and diminished the feasibility of these developments. As a result the majority of the residential projected EDU growth for this basin is fill-in. There are 31 EDUs projected for the LDR area, 32 for the HDR, and 66 EDU for the commercial.

5.2.15 Basin O

Basin O includes a total of about 3.6 acres all within the Newport City Limits, and is located at the northwest end of N.W. Pacific Place. This basin is bounded by the low density residential development along N.W. Pacific Place. The land cover is predominately pavement, with a smaller portion being residential landscaping.

Soil Type
Urban land-Bandon complex (Map Unit 58E)

Slope
12-50%

Current Land Use
3.60 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	2.22 cfs
50-Year Storm (Exist.)	2.60 cfs
25-Year Storm (Future)	2.22 cfs
50-Year Storm (Future)	2.60 cfs

Existing Storm Drain System
The Storm drain system in this basin consists of several catch basins along NW Pacific Place. The storm water is collected from rooftops, driveways roadways, and lawns, then conveyed north through the catch basins and manholes where it is directed through the 8”-O1 outfall. The storm water drains from the outfall location into the Pacific Ocean.

Present Problems
No problems have been identified in basin O.

Future System
Due to site conditions, no future growth is expected to occur within this basin during this planning period.

5.2.16 Basin P

Basin P includes a total of about 42.2 acres, all within the Newport City Limits. The boundary for this basin is very irregular in shape and is defined as much by roadways as it is by the natural contours of the landscape. The body of the basin extends from N.W. 20th St. in the south to the north end of the Walmart complex in the north and from N.W. Pacific St. in the west to Hwy. 101 in the east. There are some portions of the described area that belong to basin N and Q, but the majority of it is within basin P. While most of land is covered by vegetation and surfaces typical of developed commercial and residential areas, there are a few areas still left undeveloped and follow the vegetation characteristics more typical to a wooded area. The slopes within the basin vary dramatically, but are predominately 6-12%.

Soil Type
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
0-50%

Current Land Use
19.82 Acres –Commercial (C-1)
1.86 Acres -High Density Multi-Family (R-4)
20.52 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	37.88 cfs
50-Year Storm (Exist.)	43.13 cfs
25-Year Storm (Future)	38.17 cfs
50-Year Storm (Future)	43.43 cfs

Existing Storm Drain System
The storm drain system within basin P contains ditches, culverts, catch basins, and manholes. The storm water travels from the south end of the basin to outfall P1 & P2, and from the northeast to outfall P1. Starting at the south end, the water collects into roadside ditches, travels north along NW Edenview Way through several driveway culverts, then into an 18” culvert at the intersection of NW Edenview Way and N.W. Ocean View Dr. which conveys the water north to the east side of NW Ocean View Drive. From there the storm water continues north until it reaches the intersection of NW 28th St. and NW Ocean View Dr. where it is conveyed to the Pacific Ocean through the 24” outfall P1. The storm water from the northwest is collected within the Walmart complex and along NW 28th St. and conveyed to the outfall previously described. The properties west of NW Ocean View Dr. all drain into a roadside ditch where the storm water is conveyed north along the west side of the road until it reaches outfall P2.

Present Problems
Many of the culverts conveying water under driveways are undersized and thus the driveways will be overtopped by the storm water from a 25-year storm event. In addition the 18” culvert extending north from the NW Edenview Way and NW Ocean View Dr. intersection is 85% filled with sediment. Standard system maintenance needs to be carried out at this location.

Future System
There are 8 vacant LDR parcels, 4.56 acres of LDR and 0.22 acres of Commercial zoned undeveloped land within the basin. The projected growth for these areas is 3 LDR EDUs which are a combination of fill-in and new developments, and 3 newly developed Commercial EDUs.

5.2.17 Basin Q

Basin Q includes a total of 41.3 acres, all within the Newport City Limits, and is bounded by NW 15th St. in the south, NW 22nd St. in the north, Hwy. 101 in the east and the coastline terrain on the west. The basin is primarily residential zone with a small commercial portion along Hwy. 101. Much of the land cover is what would typically found in a developed residential/commercial zone, however in the heart of the basin there is an unnamed creek, and around this creek there is a wooded area that contains much more vegetation.

Soil Type
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
0-50%

Current Land Use
6.23 Acres –Commercial (C-1)
35.10 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	22.56 cfs
50-Year Storm (Exist.)	26.64 cfs
25-Year Storm (Future)	23.27 cfs
50-Year Storm (Future)	27.37 cfs

Existing Storm Drain System
This storm drain within this basin consists of many sub-systems that outfall into an unnamed creek which in turn flows to the 24” outfall Q1. These sub-systems are briefly described below. Sub-system 1 collects storm water from 15th St. and a large commercial development, and then is conveyed north to a 12” minor outfall. Sub-system 2 collects storm water from 15th St., 16th St. and NW Nye St., then conveys it north to a 8” minor outfall. Sub-system 3 collects water along and west of NW Ocean View Dr. and conveys its north through an 8” minor outfall. Sub-system 4 collects drain water from N.W. 19th St., 20th St. and N.W. Nye St., and conveys it west to an 8” minor outfall. Sub-system 5 collects water from 21st St., 21st Pl., NW 22nd St., and NW Ocean View Dr. and conveys it south to an 8” minor outfall. Also part of the storm drain system is a group of culverts directing the unnamed creek around a gravel road that was placed along the natural creek bed.

Present Problems
The north portion of Sub-system 2 is undersized and could not contain the storm water from a 25-year storm event. The storm drain model results where validated by a local citizen and nearby land owner whom commented on the storm drains inability to contain all the storm water during any large storm event. Also the 18” culvert conveying water under NW Ocean View Dr. and the 18” outfall do not have the capacity for a 25 year storm event. Although the capacity is lacking in those culverts, the ravines through which the unnamed creek flows have enough volume to contain the water that backs up during the storm. Another point of lacking capacity is the culverts traveling along the gravel road. Much of the capacity issues associated with these culverts are due to sediment blocking the inlets/outlets.

Future System
There are a total of 16 vacant LDR parcels and 6 vacant Commercial parcels, 1 acre of buildable LDR and .59 acre of Commercial zoned undeveloped areas within the basin. The LDR projected 2 EDU growth will be fill-in, while the Commercial 14 EDU growth will be a mix of fill-in and new development.

5.2.18 Basin R

Basin R includes a total of about 17.7 acres, all within the Newport City Limits, and lies west and east of NW Ocean View Dr. from NW 12th St. to NW 18th St.. The west boundary is NW Spring St. and on the east NW Lake Street. The basin covers a residential area filled with sections that are densely developed and leave little room for natural vegetation while other portions of the area are more sparsely developed, and contain native shrubs, trees, and grass. The average slope across the developed areas range from 2% to 6% while the undeveloped areas are more aggressively sloped at 8% to 15%.

Soil Type
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
2-18%

Current Land Use
17.69 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	10.94 cfs
50-Year Storm (Exist.)	13.20 cfs
25-Year Storm (Future)	10.98 cfs
50-Year Storm (Future)	13.24 cfs

Existing Storm Drain System
This system is typical for a residential zone as the storm water typically flows along the ground, or out of roof drains, onto the roadway, flows down the gutter, and collects in a catch basin. The storm water moves from the southeast corner of the basin toward the 10” R1 outfall in the northwest corner.

Present Problems
Pipes along and downstream of NW 14th St. lack capacity extending all the way to outfall R1. These pipes need to be increased in size.

Future System
There are 6 vacant LDR parcels and 1.77 acres of undeveloped land. These areas are projected to experience a growth of 1EDU.

5.2.19 Basin S

Basin S includes a total of about 8.3 acres all within the Newport City Limits, and is located to the northwest of the NW 12th St. and NW Nye St. intersection. The basin defines an area designated residential, and contains ground covering typical for residentially developed areas, as well as having some wooded ground covering in the steeper sections of the basin.

Soil Type
Urban land - Nelscott complex (Map Unit 59C)

Slope
0 - 12%

Current Land Use
1.11 Acres -High Density Multi-Family (R-4)
7.15 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	4.82 cfs
50-Year Storm (Exist.)	5.70 cfs
25-Year Storm (Future)	4.90 cfs
50-Year Storm (Future)	5.81 cfs

Existing Storm Drain System
The Storm drain system in this basin consists of several catch basins along NW 11th St., NW 12th St., and NW Spring Street. The storm water is collected from rooftops, driveways roadways, and lawns, then conveyed southwest through the catch basins and manholes where it is directed through the 15”-S1 outfall. The storm water drains from the outfall location into the Pacific Ocean.

Present Problems
No problems have been identified in basin S.

Future System
There are 5 vacant LDR parcels within this basin. With the exception of the potential for redevelopment, no changes are anticipated that would significantly affect the peak runoff from this basin.

5.2.20 Basin T

Basin T includes a total of 129.2 acres all within the Newport City Limits, and it comprises a large portion of the downtown area. The basin is bounded by the coastline on the west, and spreads northeast from the NW Coast St. and NW Beach Dr. intersection until reaching the NE Chamber Crt. and NE 12th St. intersection. The basin primarily surrounds and drains into Nye Creek. There are commercial, residential and a small portion of public lands within the basin. The land is mostly developed and as such mostly covered by impervious surfaces and lawns. The exception to this rule is vacant lots, steep slopes, public lands, and waterways. These exceptions are typically covered with wooded areas, or as is the case with the Betty Wheeler Memorial Field, large fields. The slope across much of the basin ranges from 2-6%, while some of the steeper slopes reach up to 50%.

Soil Type
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
0 - 50%

Current Land Use
40.68 Acres –Commercial (C-1)
26.39 Acres -High Density Multi-Family (R-4)
50.20 Acres - Medium Density Single Family (R-2)
12.49 Acres –Public

Peak Runoff

25-Year Storm (Exist.)	89.4 cfs
50-Year Storm (Exist.)	101.52 cfs
25-Year Storm (Future)	90.16 cfs
50-Year Storm (Future)	102.28 cfs

Existing Storm Drain System
The Storm drain system within basin T is made up of two primary sub-systems which outfall into Nye Creek, which then conveys the storm water to the inlet of a 24” pipe. This pipe connects to a manhole structure that also collects storm water from north of the NW 6th St. and NW Ocean St. intersection. From this manhole the storm water is conveyed through a 24” pipe south on Ocean St, and then west on NW Beach drive to the 24” outfall T1. As it is currently designed, storm water can bypass this outfall, and exit the storm drain system through the 42” outfall U1. The two sub-systems that outfall into Nye Creek are described below.

Sub-System 1 collects all the storm water within basin T east of N.W. Nye St., and conveys it southeast to the 24” minor outfall north of the N.W. 8th St. and N.W. Nye St. intersection. Much of this sub-system piping is buried deep in the ground, and does not travel along typical R.O.W. paths. As a result, much of the pipes run under buildings, or through private properties.

Sub-System 2 collects the majority of the storm water north of Nye Creek and west of Nye Street, and conveys it south to the 18” minor outfall located at the Nye Creek crossing of NW High Street. The main trunk of this sub-system runs along NW Spring Street.

Present Problems

There are two main points of concern with the storm drain system within basin T. The first being insufficient capacity, the second being that portions of the storm drain are currently under private properties, and structures. Below is a list of pipes and/or manholes that exhibit one or both of these problems.

Insufficient Capacity

1. The 8" pipe extending north from the manhole structure northeast of the NW 8th St. and NW Nye St. intersection cannot convey the quantity of storm water resulting from a 25-year storm event.
2. The 8" pipe extending south from the NW Spring St. and NW 11th St. intersection cannot convey the quantity of storm water resulting from a 25-year storm event.
3. The 24" pipe located at the NW 6th St. and NW Coast St. intersection is the last pipe into which the Nye Creek flow. From this point to the outfall T1, the storm drain system lacks capacity to carry the delivered storm water resulting from a 25-year storm event.
4. The piping system beginning with the 8" pipe extending north on NW 11th St. to the NW 11th St.& NW Spring St. intersection and ending with the 15" pipe at the intersection of NW 9TH St. & NW Spring St. has insufficient capacity throughout its length.

Under Existing Privately Owned Land and/or Structures

1. 24" Storm drain pipe that travels west on NE 10th Ct., then turns southwest at a manhole structure and conveys the storm water under the Sunwest Honda building.
2. 12" Storm drain pipe that travels southwest across Hwy. 101 between NE 12th St. and NW 11th St. conveys storm water under the Ford dealership.
3. 18" Storm drain pipe that is just east of NW Nye St. and travels south between NW 13th St. and NW 11th St. conveys storm water under the Church of the Nazarene and a private residence.

Future System

There are 6 vacant LDR parcels, 11 vacant HDR parcels, 11 vacant Commercial parcels, .94 acres of LDR, and 1.38 acres of HDR undeveloped land within basin T. Within these areas it is projected that the area zoned LDR will gain 1 EDU, the area zoned HDR will gain 6 EDU, and the area zoned Commercial will gain 11 EDU over the planning period. The City has noted no specific future growth areas within this basin.

5.2.21 Basin U

Basin U includes a total of 245.2 acres all within the Newport City Limits, and it comprises another large portion of the downtown area. The basin is bounded by the coastline on the west and spreads northeast from the SW Neff Wy. and the Hwy. 101 intersection until reaching the NE Fogarty St. and NE 12th St. intersection. There are commercial, residential and a small portion of public lands within the basin. The land is mostly developed and as such mostly covered by impervious surfaces and lawns. The exception to this rule is vacant lots, steep slopes, public lands, and waterways. These exceptions are typically covered with wooded areas, or as is the case with the Newport High, large fields. The slopes across the northeast region of basin ranges from 2-5%, while the typical slopes seen across the southwest region range more drastically from 3-15%.

Soil Type
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
0 - 50%

Current Land Use
78.06 Acres -Commercial
116.55 Acres -High Density Multi-Family (R-4)
37.57 Acres - Medium Density Single Family (R-2)
13.01 Acres –Public

Peak Runoff

25-Year Storm (Exist.)	179.33 cfs
50-Year Storm (Exist.)	213.96 cfs
25-Year Storm (Future)	181.04 cfs
50-Year Storm (Future)	215.72 cfs

Existing Storm Drain System
The Storm drain system within basin U is made up of many sub-systems. Several of these small residential sub-systems, with outfalls ranging from 6-18”, release water into an unnamed creek that will be referred to as UC-1 and that is located in the north east region of the basin. UC-1 is conveyed into the piped storm drain system west of the N.E. Benton St. and N.E. 8th St. intersection. Here it joins the sub-system that facilitates the collection and conveyance of all the storm water east of Hwy. 101. This sub-system crosses Hwy. 101 at two locations, collects and outfalls through a 42” pipe into another unnamed creek that will be referenced as UC-2. UC-2 then carries the storm water to a 42” inlet pipe located within the Surfside Mobile Village. This 42” inlet pipe is part of the hard piped system that leads directly to outfall U1. From the 42” inlet, the storm water is conveyed south to the intersection of N.W. Hubert St. and N.W. 3rd St.. To the north of this connection another sub-system dumps into the main storm drain system along 3rd St.. After collecting the water from the described sub-systems, the storm drain continues east along 3rd St. As the system progresses west, it combines the existing flow with that from system branches draining the southern region of the basin. These system branches range in size from 8 to 18”. At the intersection of N.W. Coast St. and N.W. 3rd St. the main trunk line changes direction at the manhole structure and travels north. At the southern intersection of N.W. Beach Dr. and N.W. Coast St. the storm drain turns west, and travels to the 42” outfall U1.

There are numerous sub-systems within this basin that are not significant enough to be discussed further, however there are two that will be described below:

Sub-system 1 collects storm water from the area south of Sam Case Elementary School between N.E. Benton Street and N.E. Eads St.. The main trunks travel south along N.E. Douglas St. and west along N.E. Ct. and combine at the intersection of these two roadways. The minor outfall is an 18” PVC line that navigates between two residences and dumps into UC-1.

Sub-System 2 collects storm water from south of N.W. Olive St. and east of N.E. Cottage St., and outfalls through an 18” line into a unnamed creek that will be referenced as UC-3.

Present Problems
There are two main points of concern with the storm drain system within basin U. The first being insufficient capacity, the second being that portions of the storm drain are currently under private properties, and structures. Below is a list of pipes and/or manholes that exhibit one or both of these problems.

Insufficient Capacity

1. The 24” pipe extending southwest from the Nye Creek inlet on N.E. 8th St. between N.E. Benton St. and N.E. Avery St. lacks sufficient capacity to convey the 25-year storm event. The majority of the storm drain system down stream of this location is also lacking in capacity.

2. The 12” storm drain line extending south from the intersection of N.E. 11th St. and N.E. Douglas St. lacks sufficient capacity to convey the 25-year storm event.

3. The majority of the pipe along N.E. 4th St. between N.E. Douglas St. and N.E. Avery St. is 10”. This piping does not meet the capaCity’s required to convey all of the storm water. As a result, several of the manhole structures flood during a 25-year storm event.

4. The 42” pipe located at the intersection of N.W. Brook St. and N.W. Third St. is lacking capacity to contain a 25-year storm event. Much of the system downstream of this point will also require an increase in size to facilitate conveyance of such a storm event. This is not the case when nearing the outfall N1, as the slope of N.W. Beach Dr. is 6%+ as is the associated storm drain lying beneath it.. The increased slope provides sufficient capacity through the 42” pipe to convey a 25-year storm event.

5. The 10” pipe extending north from the West Olive St. and S.W. Coast St. intersection does not have adequate capacity to convey the storm water from a 25-year storm event.
    a. The pipe has a capacity of 2.12 CFS while the flow to this intersection is 3.37 CFS. The pipe size is undersized until it meets the main trunk of the storm drain at the S.W. Ocean St. and N.W. 3rd St. intersection.

6. The 15” pipe extending west from a manhole structure located at the S.W. 4th St. and S.W. 2nd St. intersection is lacking capacity. This storm drain line remains 15” from the described manhole to the manhole located at the intersection of N.W. Cliff St. and N.W. 3rd St.. As the slope is relatively constant along the storm drain path, all of the 15” downstream pipes are undersized for the given storm event.

Under Existing Privately Owned Land and/or Structures

1. There is a 24” storm drain line extending southwest from a manhole on N.E 8th St. about half way between N.E. Avery St. and N.E. Benton Street. This 24” line conveys storm water under two homes and an apartment complex as it travels to the N.E. 7th St. and N.E. 8th St. intersection.

2. The 36” pipe extending southwest from the N.E. 7th St. and N.E. Avery St. intersection travels under the corner of Cash & Carry-Smart Foodservice.

3. A 10” storm drain line extends through several private properties, and directly under an existing home. This line lies between N.E Avery St. and N.E. Benton St. and extends from N.E. 3rd St. and to N.E. 4th St..

4. The 42” UC-2 inlet extends under a couple structures with the Surfside Mobile Village.

5. There is a 15” pipe that travels north from N.E. 1st St. to N.E. 2nd St. between N.E. Avery St. and N.E. Benton Street. This path extends through private property, but the pipe does not lie under any existing structures. As a result, a project was not developed in section seven to address this storm drain component lying outside the City’s R.O.W..

Future System

There are 42 vacant HDR parcels, 19 vacant Commercial parcels, and 5.26 acres of HDR undeveloped land within basin T. Within these areas it is projected that the area zoned HDR will gain 23 EDU within the HDR zoned area, and 19 EDU in the Commercial zoned area. The City mapped no specific growth patterns for this basins, so the EDU are assumed to be spread out evenly through their respective areas.

5.2.22 Basin V

Basin V includes a total of about 22.5 acres all within the Newport City Limits. This acreage extends southeast from the S.W. Elizabeth St. and SW Fall St. intersection and is bounded to the south by SW Case St. and to the north by SW 3rd St.. The basin defines an area designated residential and commercial and contains ground covering typical for developed areas. The areas that are not developed are typically steep slopes, and or creek beds that have vegetation typical to a coastal wooded area with heavy underbrush. The slopes within this basin are typically 0 – 5% with the exception of the steep terrain east of SW Woods St. and SW Abbey Street.

Soil Type
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
0 - 50%

Current Land Use
7.86 Acres –Commercial (C-1)
14.60 Acres -High Density Multi-Family (R-4)

Peak Runoff

25-Year Storm (Exist.)	12.32 cfs
50-Year Storm (Exist.)	19.31 cfs
25-Year Storm (Future)	12.52 cfs
50-Year Storm (Future)	19.52 cfs

Existing Storm Drain System
The main trunk line of the storm drain system begins at the intersection of SW Abbey St. and Hwy. 101. The 8” system extends northwest until it hits SW 7th St. where it is directed northeast and increases in size to a 12” pipe. The system is then directed back northwest where it intersects with SW Fall Street. It then follows SW Fall St. to the intersection of NW Fall St. and SW Elizabeth St. picking up the storm water collected from the SW 5th St. along the way. The system then travels north along SW Elizabeth St. approximately 160’ where it turns west and ends at the 12” outfall V1. There is also a 10” storm drain line extending from the north to the outfall manhole location.

Present Problems
At the location where the storm water from SW 5th St. joins the main system, the 25-year storm event flows exceed the 3.87 CFS capacity of the existing 12” pipe.

Future System
There are 6 vacant HDR parcels, 2 vacant Commercial parcels, and .75 acres of HDR undeveloped land. The projected growth in these areas over the planning period is 3 EDU and 2 EDU in the HDR and Commercial area respectively.

5.2.23 Basin W

Basin W includes a total of about 10.8 acres all within the Newport City Limits. This acreage extends southeast from the SW Euilo St. and SW Elizabeth St. intersection and is bounded to the south by SW Bay St. and to the north by SW Abbey Street. The basin contains areas designated residential and commercial with ground covering typical for developed areas. The areas that are not developed are typically steep slopes, and or creek beds that have vegetation typical to a coastal wooded area with heavy underbrush. The slopes within this basin are typically 0 – 12%.

Soil Type
Urban land-Nelscott complex (Map Unit 59C)

Slope
0 - 12%

Current Land Use
6.05 Acres –Commercial (C-1)
4.16 Acres -High Density Multi-Family (R-4)
0.61 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	11.97 cfs
50-Year Storm (Exist.)	13.45 cfs
25-Year Storm (Future)	12.25 cfs
50-Year Storm (Future)	13.74 cfs

Existing Storm Drain System
The main trunk line of the storm drain system begins at north end of SW 6th St. and extends southwest toward the SW Euilo St. and SW Elizabeth St. intersection. From there the system travels west to the 12” outfall W1.

Present Problems
No problems have been identified in basin W.

Future System
There are 5 vacant HDR parcels, 3 vacant Commercial parcels, and .63 acres of HDR undeveloped land. The projected growth in these areas over the planning period is 3 EDU and 4 EDU in the HDR and Commercial area respectively.

5.2.24 Basin X

Basin X includes a total of about 51.3 acres all within the Newport City Limits. This acreage extends northeast and west from the SW Bayley St. and Hwy. 101to SW Alder St and NW Mark St. respectively. The basin defines an area with a commercial zone along Hwy. 101, and both LDR, HDR, and Public zones extending on one or both sides of the highway. As is the case across Newport, much of the developed land cover is roofs, driveways, roads and lawns. While the basin is predominately developed land, there are a few portions left undeveloped. The only large portion of undeveloped land is part of the Yaquina Bay State park and is located at the southwest end of the basin. This area is primarily wooded with typical native ground cover for a coastal wooded area. The underbrush is heavy. Slopes within the basin are typically mild ranging from 2-5%. However, the slope of the terrain does drastically vary at certain locations.

Soil Type
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
0 - 50%

Current Land Use
24.01 Acres –Commercial (C-1)
10.02 Acres -High Density Multi-Family (R-4)
9.40 Acres - Medium Density Single Family (R-2)
7.83 Acres –Public

Peak Runoff

25-Year Storm (Exist.)	47.37 cfs
50-Year Storm (Exist.)	58.35 cfs
25-Year Storm (Future)	47.88 cfs
50-Year Storm (Future)	58.88 cfs

Existing Storm Drain System
The storm drain system within this basin includes the main conveyance portion and a sub system that drains east to west along S.W. Government St. to the 12” outfall X2. The main trunk line begins at the intersection of S.W. 9th St. and S.W. Alder Street. The system then extends southwest to the intersection of S.W. 9th St. and Hwy. 101. Here, the conveyance system collecting water from the north along Hwy. 101 is connected to the main trunk line. The trunk then crosses under Hwy. 101 with an 18” PVC pipe, and south to a manhole structure at the intersection of S.W. Minnie St. and Hwy. 101. At this structure, the storm drain collecting storm water along S.W. 10th St. is connected to the main trunk line via an 18” pipe crossing under Hwy. 101. The system then travels west along SW Minnie Street, and as it progresses picks up the storm drain piping draining SW 8th St and SW Elizabeth Street. At the west end of SW Minnie St, the storm drain increases in size to 24” and outfalls into an unnamed creek. The creek flows south until it reaches the 24” outfall X1 from which point it is conveyed to the Pacific Ocean.

Present Problems
The primary point of concern within this basin is capacity. No Storm drain components are under privately owned properties or existing structures, nor are there any condition issues within the storm drain system. Below is a list of pipes that do not have adequate capacity to convey the resulting storm water from their designated design storm event.

Insufficient Capacity

1. The 18” pipe crossing extending southwest from intersection of SW Bayley St. and Hwy. 101 has a capacity of 13.2 CFS, while the 50-year storm (The larger storm event is required for any crossing under a state highway) conveys 21.16 CFS to the inlet of the pipe. All pipes downstream of the described 18” pipe lack sufficient capacity.

2. The 12” pipe crossing extending west from the SW Minnie St. and SW 10th St. intersection has a capacity of 3.99 CFS, while the 50-year storm (The larger storm event is required for any crossing under a state highway) conveys 12.89 CFS to the inlet of the pipe.

3. There is considerable flooding along 4th St. between NE Douglas St. and NE Avery St. as a result of a 25-year storm event. The majority of the pipe through this section of storm drain is 10”. This piping does not meet the capaCity’s required to convey the storm water further downstream. As a result several of the manhole structures flood during a 25-year storm event. All total, the combined flooding flow is approximately 12.5 CFS. A portion of this section of storm drain also extends under a house and will be discussed below.

Future System

There are 3 vacant LDR parcels, 6 vacant HDR parcels, 9 vacant Commercial parcels, and .47 acres of LDR and .75 acres of HDR undeveloped land. The projected growth in these areas over the planning period is 3 EDU, and 9 EDU in the HDR and Commercial areas respectively. The City is not aware of any specific developments that will be occurring within this basin over the planning period. Therefore the projected EDUs were spread out evenly across their associated areas.

5.2.25 Basin Y

Basin Y includes a total of about 17 acres all within the Newport City Limits. This acreage extends north of Yaquina Bay from Hwy. 101 to east of S.W. Abbey St. The terrain within this basin is relatively steep which results in less developed land and more wooded hillsides with heavy foliage. HDR zoned areas represent most of the basin, while a small section south of the PCH clinic is zoned Public.

Soil Type
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
0 - 50%

Current Land Use
14.85 Acres -High Density Multi-Family (R-4)
2.19 Acres –Public

Peak Runoff

25-Year Storm (Exist.)	22.10 cfs
50-Year Storm (Exist.)	24.43 cfs
25-Year Storm (Future)	22.34 cfs
50-Year Storm (Future)	24.73 cfs

Existing Storm Drain System
The main trunk line of the storm drain system begins as an 8” pipe located at the SW Abbey St. and SW Harbor Way intersection. The system extends southeast along SW Harbor Way to SW 13th St. where an 8” line draining the area east of S.W. Harbor connects into the system at this intersection. The system then travels SW 13th St. until reaching SW Bay Street. Just north of this intersection a storm drain sub-system draining the area around SW 12th St. outfalls onto the hillside. The storm water then drains off the bank and directly into the main system. The pipe size is increased to 12” and the system alters course and travels along SW Bay St. where it will then be conveyed through the 12” outfall Y1.

Present Problems
Much of this storm drain system is considerably undersized within this storm drain. The capacity shortages begin at the intersection of S.W. 11th St. and SW Harbor Way. Every pipe downstream of this lacks capacity for a 25-year storm event. The shortages conclude at the outfall Y1 which has a capacity of 11.8 CFS, while needing to convey 18.9 CFS. Much of the upstream storm water overflowing from the manhole and catch basin structures sheets off the bank south of the SW 13th St. and SW Harbor Way intersection and flows into a storm drain sub-system within a section of basin AC.

Future System
There are 11vacant HDR parcels, and 1.38 acres of HDR undeveloped land. The projected growth in these areas over the planning period is 6 EDU within the HDR area. The City is not aware of any specific developments that will be occurring within this basin over the planning period. Therefore the projected EDUs were spread out evenly across their associated areas.

5.2.26 Basin Z

Basin Z includes a total of about 30.5 acres all within the Newport City Limits. This acreage extends northwest of the SW Bay Boulevard and SW Fall St. intersection to SW 7th Street. The terrain within this basin is relatively steep which results in less developed land and more wooded hillsides with heavy foliage. Commercial zoned areas represent most of the basin, while the smaller portion is HDR.

Soil Type
21.12 Acres –Commercial (C-1)
9.33 Acres -High Density Multi-Family (R-4)

Slope
0 - 50%

Current Land Use
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)

Peak Runoff

25-Year Storm (Exist.)	20.26 cfs
50-Year Storm (Exist.)	34.69 cfs
25-Year Storm (Future)	20.43 cfs
50-Year Storm (Future)	34.87 cfs

Existing Storm Drain System
As residential and commercial developments began to spread, the storm drain had to be increased in size to accommodate the increased flow. However in this basin, the existing storm drain was not removed and replaced with a larger pipe. New pipes to drain the developments were constructed alongside the existing pipes. This can be seen most prevalently on SW Fall St. which contains 2-18” and one 12” storm drain lines conveying water to the south east. Each one of these pipes drains a specific area. One 18” drains the area east of SW Hurbert St. and north of SW 10th Street. The other 18” drains the area west of SW Hurbert St., and north of SW 11th Street. The 12” line drains a few areas along SW Canyon Way. At the southeast end of SW Fall St. the two 18” pipes combine into one 18” then continue southeast where it increases in size to a 24” pipe, and then ends at outfall Z1. The 12” line follows SW Fall St. southeast until ending at the 12” outfall Z2.

Present Problems
No problems have been identified in basin Z.

Future System
There are 7vacant Commercial parcels, and 0.88 acres of Commercial undeveloped land. The projected growth in these areas over the planning period is 4 EDU within the Commercial area. The City is not aware of any specific developments that will be occurring within this basin over the planning period. Therefore the projected EDUs were spread out evenly across their associated areas.

5.2.27 Basin AA

Basin AA includes a total of about 39.6 acres all within the Newport City Limits. This acreage extends northeast of the SW Bay Boulevard and S.W. Hatfield Dr. intersection to NE 1st St. and SE Douglas St. intersection. The terrain within this basin is relatively steep which results in less developed land and more wooded hillsides with heavy foliage. Several types of zoning areas are represented within the basin. The largest represented portion being Commercial and the smallest being LDR. This basin contains no creeks, or any significant natural waterways.

Soil Type
Urban land-Nelscott complex (Map Unit 59C)
Urban land-Bandon complex (Map Unit 58E)
Urban land-Waldport complex (Map Unit 60C)

Slope
0 - 50%

Current Land Use
20.6 Acres –Commercial (C-1)
6.1 Acres -High Density Multi-Family (R-4)
6.46 Acres - Medium Density Single Family (R-2)
6.40 Acres –Public

Peak Runoff

25-Year Storm (Exist.)	30.76 cfs
50-Year Storm (Exist.)	35.01 cfs
25-Year Storm (Future)	30.82 cfs
50-Year Storm (Future)	30.93 cfs

Existing Storm Drain System
The storm drain system in basin AA is one long main line with various branches connecting as the system navigates from the furthest upstream point to the outfall. The upstream beginning point is the NE Douglas St. and NE 1st St. intersection. The main line begins as an 8” pipe. The system travels west along East Olive St., then south on S.E Avery Street. At SE 1st St. the system is increased to 12”, and then continues south. South of SE 2nd St. the system increases in size again to an 18” pipeline. The line then crosses the City Hall parking lot, and heads south on SW Hatfield Drive. At the south end of Hatfield, the system increases in size to 24”, then crosses SW Bay Boulevard and ends at the 24” outfall AA1.

Present Problems
There are capacity issues within this basin. Points of lacking capacity are primarily at the upstream portion of the storm drain; however the downstream is also being pushed right to the edge of its capacity with a 25-year storm event. The initial flooding begins at the intersection of N.E. Coos St. and East Olive St.. The 8” line has a capacity of 1.2 CFS, and the storm water flow from the commercial area during the storm event is 4.7 CFS. From this point until the storm drain system increases to an 18” pipe, the system is undersized.

Future System
There are 2 vacant LDR parcel within the basin. The projected growth in these areas over the planning period is 1 EDU within the LDR area. The City is not aware of any specific developments that will be occurring within this basin over the planning period. Therefore the projected EDUs were spread out evenly across their associated areas.

5.2.28 Basin AB

Basin AB includes a total of 31.9 acres all within the Newport City Limits. This acreage extends north of the SW Bay Boulevard and SE Eads St. intersection to NE 3rd St.. The terrain within this basin is relatively steep which results in less developed land and more wooded hillsides with heavy foliage. The area is roughly evenly split between residential and commercial zoned land. This basin contains one unnamed creek that is located approximately in the center of the basin and flows from north to south. The slopes in the northern portion of the basin are mild ranging from 0-6% while the slopes closer to the Bay are more drastic ranging from 5-12%.

Soil Type
Urban land-Nelscott complex (Map Unit 59C)
Urban land-Bandon complex (Map Unit 58E)
Urban land-Waldport complex (Map Unit 60C)

Slope
0 - 50%

Current Land Use
15.36 Acres –Commercial (C-1)
16.54 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	26.17 cfs
50-Year Storm (Exist.)	30.30 cfs
25-Year Storm (Future)	26.54cfs
50-Year Storm (Future)	30.68 cfs

Existing Storm Drain System
The storm drain system in basin AB consists of two residential/commercial sub systems that dump into an unnamed creek. The creek conveys the water to the 24" outfall AB1 lying under SW Bay Blvd. The furthest north sub system drains the area bounded by East Olive St. in the south, NE 3rd St. in the north, NE Eads St. to the west and NE Grant St. to the east. The system collects on, and drains south along NE Eads St. where it eventually outfalls into the unnamed creek. The other sub system drains the east portion of SE 1st St. into the unnamed creek.

Present Problems
There are no system deficiencies within basin AB, however outfall AB1 is very close to its capacity, and if more development occurs within this basin outfall AB1 may be pushed beyond its capacity within the planning period. The current capacity of AB1 is 25.83 CFS while the expected flow during a 25-year storm event is 25.43 CFS.

Future System
There are 10 vacant LDR parcels, 8 vacant Commercial parcels, and 1.57 acres of undeveloped LDR land within the basin. The projected growth in these areas over the planning period is 1 EDU and 8 EDU within the LDR and Commercial areas respectively. The City is not aware of any specific developments that will be occurring within this basin over the planning period. Therefore the projected EDUs were spread out evenly across their associated areas.

No changes in this basins' current system will be required to accommodate the growth experienced during the planning period of this master plan.

5.2.29 Basin AC

Basin AC is actually a collective of basins along Yaquina Bay that are relatively small in size, have very little storm drain components (typically a one culvert or catch basin system), and are not expected to develop much further due to slope constraints within the areas. These areas are shown in Fig. 3.1A.

Soil Type
Urban land-Bandon complex (Map Unit 58E)
Urban land-Nelscott complex (Map Unit 59C)
Fendall-Templeton silt loams (Map Unit 18G)
Templeton-Fendall silt loams (Map Unit 55E)
Urban land-Waldport complex (Map Unit 60C)

Slope
0 - 50%

Current Land Use
Industrial (I-1, I-2 and I-3)
High Density Multi-Family (R-4)
Medium Density Single Family (R-2)

Peak Runoff
N/A

Existing Storm Drain System
The storm drain system within the AC basins is as described above. Most consist of a single catch basin connected to a minor outfall, or lying under and outfalling on the south side of S.W. Bay Boulevard.

Present Problems
Toward the east side of the City's' Yaquina Bayfront near SE Benson St. there are two culvert that lack the capacity to convey a 25-year storm event.

Future System
A private developer (Doina Family Trust) owns and has made clear their intention to develop land within one of the AC basins. That said, design and construction has been impeded due to no available infrastructure and significant slope constraints. As a result, the land has been in a holding pattern, and the City believes this is the least likely of all current proposed developments to be completed within the planning period. Although this development may not completed within the planning period the collective basins within basin AC total a considerable area, and will see some fill-in, and minor expansions of development within the planning period.

There are 10 vacant HDR parcels, 8.10 acres of LDR, and 42.34 acres of Industrial buildable undeveloped land within the basin. In these areas a growth of 4 EDU, 4 EDU and 171 EDU are projected for the LDR, EDR, and Industrial areas respectively.

To address future growth along and west of S.E. Benson Street, two culverts are to be removed and replaced with larger 24" culverts. These culverts will convey storm water under Yaquina Bay Rd. and into Yaquina Bay.

5.3 'South Beach' Basin Descriptions

As discussed prior, the 'South Beach' area represents all area south of Yaquina Bay, and within the City's' UGB.

As much of the basins within the 'South Beach' area are undeveloped employing the use of roadways and various other infrastructure components to describe the basins boundaries and flow pathing is difficult. To simplify this task, Figure 5.1, and 5.2 was developed showing sub-basin designations that in some cases will be used to describe basin boundaries and flow patterns.

5.3.1 Basin AD

Basin AD includes a total of 55.5 acres all within the Newport City Limits. This acreage incorporates the northwest region of the South drainage area. The majority of the basin is mildly sloped parking lot surrounding the Port of Newport. Aside from parking lots, NOAA Marine Operations Center in addition to several commercial businesses are also housed with the basin area. There is little vegetation, and no natural drainage features.

Soil Type
Urban land-Waldport complex (Map Unit 60C)
Waldport fine sand (Map Unit 63E)

Slope
0 - 12%

Current Land Use
50.5 Acres Shoreland
5.0 Acres Commercial

Peak Runoff

25-Year Storm (Exist.)	32.78 cfs
50-Year Storm (Exist.)	33.62 cfs
25-Year Storm (Future)	39.34 cfs
50-Year Storm (Future)	44.06 cfs

Existing Storm Drain System
The storm drain system in basin AD consists of: a few parking lot storm drain sub systems draining directly into the bay, and a larger subsystem conveying water from northward on Hwy. 101 and westward on S.E. Marine Science Drive. These two branches traveling along their respective roads combine into a 24" pipe at the intersection of SE Pacific Way and SE Marine Science Drive. The storm drain system then travels north into the final manhole, then further north to the Yaquina Bay outfall AD1.

Present Problems
No problems have been identified in the AD basins.

Future System
According to the Newport transportation System Plan Update, City of Newport, March 2011 there will be 55,000 square feet of impervious surface added to the basin within the planning period. These surfaces will result from development of the NOAA Marine Operations Center. This surface equates to an additional 22 Commercial EDU.

As this site will contain its own storm drain system that drains into the Bay, no changes in this basins' current system will be required to accommodate the growth experienced during the planning period of this master plan.

5.3.2 Basin AE

Basin AE includes a total of 57.8 acres all within the Newport City Limits. This acreage incorporates the northeast region of the South drainage area and extends from the Yaquina Bay to the south end of the Oregon Coast Aquarium site. The majority of the basin is mildly sloped parking lot surrounding the Hatfield Marine Science Center, and the Oregon Coast Aquarium. Some of the vegetation was brought in with the landscaping of the Hatfield Marine Science Center Site, while the remaining is shrubs/small trees and wetland plants native to the area.

Soil Type
Urban land-Waldport complex (Map Unit 60C)

Slope
0 - 8%

Current Land Use
5 Acres – Commercial (C-1)
52.8 Acres – Shoreland

Peak Runoff

25-Year Storm (Exist.)	36.02 cfs
50-Year Storm (Exist.)	38.22 cfs
25-Year Storm (Future)	38.26 cfs
50-Year Storm (Future)	40.56 cfs

Existing Storm Drain System
The storm drain system in basin AE consists of several small storm drain systems draining parking lots surrounding the marina. The primary storm drain sub system within the basin outfalls into the northwest corner of the basin.

Present Problems
No problems have been identified in the AE basins.

Future System
According to the Newport transportation System Plan Update, City of Newport, March 2011 there will be 145,000 square feet of impervious surface added to the basin within the planning period. These surfaces will result from further development of the Hatfield Marine Science Center, and the Oregon Coast Aquarium. This surface equates to an additional 47 Commercial EDU.

As this site will contain its own storm drain system that drains into the Bay, no changes in this basins' current system will be required to accommodate the growth experienced during the planning period of this master plan.

5.3.3 Basin AF

Basin AF includes a total of 48.9 acres all within the Newport City Limits. The basin is bounded by Yaquina Bay in the north, Hwy. 101 on the east, SE 35th St in the south, and SW Coho St. to the west. This basin contains a mixture of zoning designations. The residential area is partially developed and therefore a mixture of gravel roads, landscaped yards, and wooded areas. The commercial area is primarily cleared area with various shrubs and small plant life dispersed throughout the area. The public area is partially and will be entirely landscaped within the planning period. The slopes within this basin are very shallow predominately ranging from 0 – 5%. The public area is the exception to this rule. The slopes within this region range as high as 30%.

Soil Type
Netarts fine sand (Map Unit 47C)
Netarts fine sand (Map Unit 47E)
Urban land-Waldport complex (Map Unit 60C)

Slope
0 - 30%

Current Land Use
12.94 Acres –Commercial (C-1)
34.25 Acres - Medium Density Single Family (R-2)
1.71 Acres –Public

Peak Runoff

25-Year Storm (Exist.)	8.72 cfs
50-Year Storm (Exist.)	11.10 cfs
25-Year Storm (Future)	18.15 cfs
50-Year Storm (Future)	21.11 cfs

Existing Storm Drain System
The current storm drain system begins to collect storm water in the catch basin at the west end of SW 27th Street. The storm water is then conveyed east to the intersection of SW 27th St. and SW Brant St. where the storm drain pipe increases in size to a 36", and then directs the storm flow north along SW Brant Street. At the intersection of SW Brant St. and SW 26th St, the storm drain leaves the last manhole structure and travels northward to the 36" outfall AF1.

Present Problems
No problems have been identified in the AF basins.

Future System
The 'Final Technical Memorandum #12 Analysis of South Beach Land Use Scenarios, Parametrix, March 2011' designates this basin as a major growth area. The commercial area west of Hwy. 101 is projected to increase its impervious surface by 85,000 square feet over the planning period, equating to 31 EDU. The residential area is projected to add 120 condominium units which equates to 60 EDU. In addition to the growth projected within the cited report, further development will take place during the planning period of this report in the form of the OMSI facility. This facility is projected to add an additional 71 commercial EDUs.

The proposed storm drain system improvements developed to accommodate this future growth is outlined in the City's 'Newport Coho/Brant, Infrastructure Refinement Plan, Cameron MCarthy, June 2012', and will be discussed further in section 8.

5.3.4 Basin AG

Basin AG includes a total of 253.3 acres all within the Newport City Limits. The basin extends east and west of Hwy. 101 from SE 50th St. in the south to SE Marine Science Dr. in the north. Much of the basin is flat and designated 'Freshwater Forested – Shrub Wetland. Woodland areas cover portions of the basin that are not wetland, and that are outside of the paved commercial and industrial developments surrounding Hwy. 101. The development of and along Hwy. 101 has had significant impact on the natural drainage that once existed within the basin. The highway and the 4' to 6' of fill placed under it bisected the basin area. Culverts where placed at natural points of drainage. As development expanded along Hwy. 101 there was little consideration given to storm drain flow. Culverts where often put in place undersized, or with no thought toward upstream or downstream conditions. Roadside ditches, culverts, open channels of minimal grade resulting in slow moving system typify the hydrology in this basin. These system characteristics, along with a water table elevation that hovers just below the ground surface, results in considerable ponding throughout the basin year round.

Soil Type
Coquille silt loam (Map Unit 12A)
Bandon fine sandy loam (Map Unit 3C)
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)
Netarts fine sand (Map Unit 47C)
Netarts fine sand (Map Unit 47E)
Urban land-Waldport complex (Map Unit 60C)
Waldport fine sand (Map Unit 63E)
Yaquina fine sand (Map Unit 67A)

Slope
0 - 30%

Current Land Use
28.46 Acres –Commercial (C-1)
5.16 Acres -High Density Multi-Family (R-4)
145.76 Acres –Industrial (I-1)
2.10 Acres - Medium Density Single Family (R-2)
71.80 Acres –Public

Peak Runoff

25-Year Storm (Exist.)	135.86 cfs
50-Year Storm (Exist.)	159.98 cfs
25-Year Storm (Future)	140.25 cfs
50-Year Storm (Future)	164.46 cfs

Existing Storm Drain System
There are three primary storm drain sub-systems within this basin. They will be referred to as SS1-AG, SS2-AG, and SS3-AG.

SS1-AG: Starting at the south end of basin AG, this sub system conveys the storm water drained from sub basin AG18 (See Fig. 5.1) west under Hwy. 101 through a 24" and 18" culvert located at S.E. 50th St. and SE 42nd St. respectively. Although sub basin AG18 spans a large area, much of its storm water is naturally detained, and not collected into the storm drain system. Once on the west side of Hwy. 101 the storm water travels north along the natural waterways until reaching the 60" pipe at the west end of SW 35th

Sreet. These natural waterways consist primarily of a series of ditches, and wetlands that meander through sub basin AG17 and AG12. As the storm water from AG18 is conveyed through these natural waterways, it is joined by the storm water collected from those sub basins through which it travels. After reaching the 60" pipe, the combined storm flow is conveyed east, back across Hwy. 101 then northeast along SE Ferry Slip Rd. where it reaches the Bay through the 60" outfall AG1 located approximately 250' southwest of the S.E. 32nd St. and SE Ferry Slip Rd. intersection. At this outfall location there is an additional 24" outfall for a smaller sub-system draining a portion of SE Chestnut Street.

SS2-AG: Storm water collects from sub-basins AG13, AG14, AG15, and AG16 located northeast of SE 42nd St. and is conveyed in a 36" pipe north along Hwy. 101, then northeast along SE Ferry Slip Rd. where it combines via a manhole structure with the flow from the 60" pipe along SE 35th St. discussed in sub-system SS1-AG. Also added to the storm water flow at this manhole is the water collected and conveyed through an 18" pipe east of S.E. Ferry Slip Rd. along SE 35th St. (sub-basin AG10). Beyond this point, the storm water flows through the 60" pipe as described in the previously mentioned sub-system SS1-AG.

SS3-AG: Most of the storm water collected within this basin is conveyed to a wetland area within AG7 just north of SE 32nd Street. Sub-basin AG2, AG4, and AG5 collect into a piped storm drain system along SE Ferry Slope Rd. which outfalls into the described wetland area. Sub-basin AG1 is the southeast section of the Port of Newport RV Park Annex which also conveys its storm water to the wetland area via natural drainage. Storm water from AG3 is collected on the west side of Hwy. 101 and conveyed it under the highway to the east side via a 18" pipe. From the wetland area, the storm water flows into a 15" inlet just east of the LaQuinta Inn & Suites on SE 32nd St. and then east along SE 32nd St. until it reaches the 36" outfall AG2.

The 60" pipe along SE 35th St. that is part of sub-system SS1-A was put in place following the 'South Beach Storm water Master Plan by SHN, June 2004', and was intended to bypass the existing 45" storm drain line which lacked capacity, and traveled under privately owned property. Although the primary flow from sub-basins AG17 AG18 and AG12 no longer travels through the 45" pipe, there is still some flow originating in basin AG8 that travels through this 45" pipe.

Present Problems

Although much of the past concerns regarding drainage in this basin have been addressed following the 'South Beach Storm Water Master Plan', there are still a few remaining deficiencies left unaddressed. The natural waterways meandering through sub basins AG17 and AG12 are currently on private land and much of them are inaccessible, and thus experience very little maintenance. This lack of maintenance has enabled the local wildlife or storm events to damn, or block the natural waterway, resulting in upstream flooding.

Future System

The 'Alternate Mobility Standards Final Technical Memorandum' projects several different developments within this basin which are as follows: Retail developments adjacent to or near Hwy. 101 totaling 7.29 acres, industrial parks adjacent or near Hwy. 101 totaling 1.21 acres, County Park west of Hwy. 101 totaling 78.1 acres, 150 room hotel west of Hwy. 101, and a 55 site campground/RV park east of Hwy. 101. The total EDU growth projection discussed in section 4 dictates that there will be more industrial/commercial growth within this basin than shown from the listed developments. The total EDUs projected to be added within this basin as a result of these developments, and the mentioned addition are: 130 Commercial/Industrial EDUs, and 25 Public EDU. The 'Newport Coho/Brant, Infrastructure Refinement Plan, Cameron MCarthy, June 2012' outlines infrastructure improvements necessary to facilitate the future expansion around SW Coho and SW Brant Streets. These improvements within basin AG are discussed and shown in more detail in section 8.

5.3.5 Basin AH

Basin AH encompasses a 361.6 acre area which surrounds the South Beach State Park, and is bounded by the ocean outlet to Yaquina River to the north, the Pacific Ocean on the west, basin AG and AF on the east, and the Southshore residential community to the south. Low beach dunes separate this basin from basin AG and AF which contain the ancient river outlet. The State Parks campground is positioned between the described dune, and another dune further to west. Moving westward beyond the dune, the landscape becomes a mixture of foredune and sandy beaches. Although the presence of foredunes dictate a small ridgeline, the slope across the majority of the basin is relatively mild. (0 to 5%) In addition to the area around the State Park, most of the basin is zoned Public. The only exception is a residential zone at the southern tip of the basin.

Soil Type
Netarts fine sand (Map Unit 47C)
Netarts fine sand (Map Unit 47E)
Urban land-Waldport complex (Map Unit 60C)
Waldport fine sand (Map Unit 63E)

Slope
0 - 30%

Current Land Use
23.70 Acres - Medium Density Single Family (R-2)
337.88 Acres –Public

Peak Runoff

25-Year Storm (Exist.)	196.45 cfs
50-Year Storm (Exist.)	235.68 cfs
25-Year Storm (Future)	196.45 cfs
50-Year Storm (Future)	235.68 cfs

Existing Storm Drain System
Given the sandy soils within this basin much of the storm water resulting from a storm event is absorbed directly into the soil. Aside from the Park's campsite and a few culverts located under the access road, the rest of the storm water is conveyed to the Ocean without the use of storm drain components.

Present Problems
No problems have been identified in the AH basins.

Future System
The opportunity for future growth within this basin is limited resulting in no future EDUs being projected for this basin.

5.3.6 Basin AI

Basin AI encompasses a 168.1 acre which has natural boundaries consisting of ridgelines, creeks, wetlands, and Yaquina Bay. Approximately half of the basin lies within the City limits, while the remaining portion is contained within the UGB. Amid the basins boundaries, every primary zoning designation is represented, although little is developed. While most of the basin is open for future development, there is a small developed section in the northwest corner. As most of the land is undeveloped, it is covered primarily by wooded area with dense underbrush. Much of these wooded areas are aggressively sloped (10 –15%)

Soil Type
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)
Nestucca silt loam (Map Unit 46A)
Netarts fine sand (Map Unit 47C)
Urban land-Waldport complex (Map Unit 60C)

Slope
0 - 30%

Current Land Use
64.07 Acres – High Density Multi-Family (R-4)
64.97 Acres – Medium Density Single Family (R-2)
10.31 Acres – Commercial (C-1)
28.72 Acres – Industrial (I-1)

Peak Runoff

25-Year Storm (Exist.)	107.63 cfs
50-Year Storm (Exist.)	132.24 cfs
25-Year Storm (Future)	123.24 cfs
50-Year Storm (Future)	148.46 cfs

Existing Storm Drain System
In the undeveloped sections of the basin storm water flow is characterized by sheet flow from hillsides, gradually becoming channelized stream flow and discharging into the Bay through a culvert crossing under SE 35th St.. The developed area contains a hard piped system beginning at the 'Freshwater and Marine Wetland' designated area northeast of the SE Ash St. and SE 40th St. intersection. The inlet structure combines storm water flow from the wetland area and from an area extending westward along SE 40th Street. The combined flow is conveyed northward along S.E. Ash St., then east through the PUD parking lot, where it discharges into a intertidal wetland that is conveyed to the bay through a ditch and a 42" culvert under SE 35th Street. Although the flow from a 25-year storm event is greater than the capacity of the Ash Street storm drain piping, the 'Freshwater and Marine Wetland' outlet can limit the outflow to the system, and retain the flood water until the storm dissipates.

Present Problems
Although the storm drain system along SE Ash lacks capacity during a 25 year storm event, the wetland area provides enough storage to facilitate conveyance of a 25-year storm event without flooding.

Future System
The 'Alternate Mobility Standards Final Technical Memorandum' projects several different developments within this basin which are as follows: 261 Unit Condominium/Townhouse development, South Beach Campus Village (100,000 ft^2), 260 Single family Residences, and a retail development with an area of roughly 100,000 ft^2. The mentioned residential developments are divided amongst this basin and basin AJ, and therefore the EDU growth within this basin doesn't entirely account for the listed developments.

The EDU growth projected from these developments is 188 residential EDUs, and 110 Commercial EDUs. An additional 30 industrial EDU where projected for this basin to meet the Industrial EDU growth allotted to the 'South Beach' area based on EDU growth projections discussed in section 5. Much of the proposed developments will not drain into the existing piped system. They will instead drain into the intertidal wetland area, and through the 42" culvert under SE 35th Street. Therefore future systems will consist of private development storm drain systems that drain to natural drainage points.

5.3.7 Basin AJ

Basin AJ encompasses an 85.2 acre area extending east from Idaho Point, and is bounded by the ridgeline of Idaho Point to the south, Yaquina Bay to the north, and basin AI to the west. The area is located entirely outside of the City limits, but entirely within the UGB. The basin is primarily undeveloped with the exception of a residential neighborhood located at the east end of the basin. The landscape type is woodland with heavy underbrush and the slope is aggressive throughout much of the basin.

Soil Type
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)

Slope
3 - 50%

Current Land Use
67.72 Acres -High Density Multi-Family (R-4)
17.50 Acres - Medium Density Single Family (R-2)

Peak Runoff

25-Year Storm (Exist.)	29.03 cfs
50-Year Storm (Exist.)	36.08 cfs
25-Year Storm (Future)	37.39 cfs
50-Year Storm (Future)	44.67 cfs

Existing Storm Drain System
The basins storm water flow is characterized by sheet flow from hillsides, gradually becoming channelized stream flow and discharging into the Bay through an 18" culvert crossing under S.E. 35th St.

Present Problems
The existing 18" culvert appears to be crushed on one end which is restricting the flow and will cause overtopping of SE 35th St. during a 25-year storm event.

Future System
The 'Alternate Mobility Standards Final Technical Memorandum' projects several different developments within this basin which are as follows: 261 Unit Condominium/Townhouse developments, and 260 Single family Residences. The mentioned developments are divided amongst basin this basin and basin AI, and therefore the EDU growth within this basin doesn't entirely account for the listed developments. The EDU growth projected from these developments is 188 residential EDUs

Much of the proposed developments will not drain into the existing piped system. They will instead drain into the intertidal wetland area, and through the 42" culvert under SE 35th Street. Therefore future systems will consist of private development storm drain systems that drain to natural drainage points.

5.3.8 Basin AK

Basin AK encompasses a 85.7 acre area west of Hwy. 101 which is bounded by ridgelines and a wetland area designated ‘Freshwater Pond’. Approximately 40% of the basin is within the city limits, while the remaining portion is within the UGB. The basin is primarily undeveloped with the exception of a the Oregon Coast Community College and a small residential neighborhood located at the northeast corner of the basin. The landscape type is woodland with heavy underbrush and the slope is aggressive throughout much of the basin.

Soil Type
Lint silt loam (Map Unit 35E)
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)

Slope
3 - 50%

Current Land Use
24.16 Acres -High Density Multi-Family (R-4)
16.90 Acres -Industrial
44.64 Acres –Public

Peak Runoff

25-Year Storm (Exist.)	43.26 cfs
50-Year Storm (Exist.)	51.97 cfs
25-Year Storm (Future)	45.58 cfs
50-Year Storm (Future)	54.35 cfs

Existing Storm Drain System
This is the only basin discussed within the ‘South Beach’ area that does not outfall directly into the Yaquina Bay, or the Pacific Ocean. The basins storm water flow is characterized by sheet flow from hillsides, gradually becoming channelized stream flow which is conveyed to a wetland area at the west end of the basin. During storm events this wetland area, rises until the storm water overflows into basin AK.

Present Problems
No problems have been identified in the AK basins.

Future System
The potential for development within the majority of the basin is limited due to the steep nature of the natural landscape. However, there is a portion of the basin at the south end that can facilitate some future residential growth.

The ‘Alternate Mobility Standards Final Technical Memorandum’ projects several different developments within this basin which are as follows: 78.1 Acre County Park, and 261 Condominiums/Townhouses. Primarily these developments occur in basin AI and AJ, and thus only a small portion will take place within basin AK. The resulting EDU growth is 15 residential EDUs, 35 Industrial EDUs, and 16 EDUs of publicly zoned land.

The new developments will design their private storm drain system to discharge their storm flow to natural drainage points, and thus will not require any changes, or additions to the public storm drain system.

5.3.9 Basin AL

Basin AL encompasses a 316.4 acre area offset to the east and west of Hwy. 101 from South Beach State Park to SE 50th Street. The east and west boundary are predominantly defined by the southern half of the ancient river outlet and various ridgelines throughout the region. Approximately 80% of the basin is mildly sloped 'Freshwater Forested-Shrub' and 'Freshwater and Marine' designated wetland. As a result the majority of the basin is undeveloped with the exceptions being: two industrial/commercial sites located at the northeast section of the basin, the City's new wastewater treatment plant located northeast of Mike Miller Park, a residential development in the southwest corner of the basin (South Shore) and several individual residences dispersed along Hwy. 101.

Soil Type
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)
Netarts fine sand (Map Unit 47C)
Waldport fine sand (Map Unit 63E)
Yaquina fine sand (Map Unit 67A)

Slope
3 - 50%

Current Land Use
0.33 Acres - High Density Multi-Family (R-4)
182.26 Acres – Industrial (I-1)
46.50 Acres - Medium Density Single Family (R-2)
75.33 Acres – Public (P-1)
11.98 Acres - Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	63.42 cfs
50-Year Storm (Exist.)	80.67 cfs
25-Year Storm (Future)	70.8 cfs
50-Year Storm (Future)	90.51 cfs

Existing Storm Drain System
Much of the storm water is detained within the numerous wetland areas present in the basin. The stormwater runoff not detained is conveyed to and south along Hwy. 101. Just north of SE 62nd St. the flow is conveyed westward under Hwy. 101 through two 24" concrete culverts and discharged into an open channel. From there the storm flow is conveyed further westward where it is directed into a 60" culvert lying underneath the South Shore development. The water is the delivered to the Pacific Ocean through the outfall AL1 located at the end of this 60" culvert.

Present Problems
Similar to basin AG, the roadside ditches, open channels, and culverts all lie at minimum grades resulting in a slow moving system.

The 60" CMP which conveys the entirety of basin ALs runoff is in good condition, however the grate on its inlet is bent and the culvert lies under an existing residential development.

Future System

There are three limiting factor to future growth within this basin which are as follows: South Beach State Park owns a portion of the property within the basin, slope constraints exist on the eastern portion of the basin, and wetlands cover a large majority of the basin. Despite these limitations the ‘Alternate Mobility Standards Final Technical Memorandum’ projects a portion of a retail (100,000 ft^2), and an industrial park (100,000 ft^2) development will be introduced into the area during the planning period. As this is the largest area of undeveloped industrial land within the UGB, much of the projected industrial growth allotted to the South Beach area was designated to be within this basin. This designated growth was added to that resulting from the developments discussed in the ‘Alternate Mobility Standards Final Technical Memorandum’. Much of the industrial growth designated for this basin will involve wetland management. In total the projected growth is 120 EDU of commercial/industrial growth. Following the projected development the two 24” culverts conveying storm water under Hwy. 101 will need to be replaced as they will lack capacity.

5.3.10 Basin AM

Basin AM encompasses a 68.1 acre area offset east and west of Hwy. 101. The basin is bounded by the Pacific Ocean on the west, basin AN on the south and basin AL to the north. The landscape to the south of the basin is sloped steeply and is mostly undeveloped wooded hillsides. The north part of the basin is mildly sloped and contains numerous developed commercial/industrial sites on the east side of Hwy. 101 as well as developed residential sites found in the south end of the South Shore development. Both the north and south side of the basin slope to form a unnamed creek running through the middle of the basin.

Soil Type
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)
Netarts fine sand (Map Unit 47C)
Waldport fine sand (Map Unit 63E)
Yaquina fine sand (Map Unit 67A)

Slope
3 - 50%

Current Land Use
7.58 Acres - High Density Multi-Family (R-4)
31.40 Acres – Industrial (I-1)
23.40 Acres - Medium Density Single Family (R-2)
5.74 Acres – Public (P-1)

Peak Runoff

25-Year Storm (Exist.)	27.05 cfs
50-Year Storm (Exist.)	33.07 cfs
25-Year Storm (Future)	30.50 cfs
50-Year Storm (Future)	36.72 cfs

Existing Storm Drain System
The basin drains from the north and south to the center of the basin where it collects in three distinct bodies of water. Two of these bodies contain water year round. The storm flow travels from east to west, and is conveyed under Hwy. 101 through a 24” concrete culvert.

Present Problems
No problems have been identified in the AM basins.

Future System
The potential for development within the majority of the basin is limited due to the steep nature of the natural landscape. However, there is some buildable land that can facilitate a small amount of growth.

The ‘Alternate Mobility Standards Final Technical Memorandum’ projects three developments within this basin which are as follows: 3 single family residences, a 65 room hotel, and 13,000 ft^2 of retail development. The total growth from these developments is 3 residential EDU, and 50 commercial and industrial EDUs.

The new developments will design their private storm drain system to discharge their storm flow to natural drainage points, and thus will not require any changes, or additions to the public storm drain system.

5.3.11 Basin AN

Basin AN encompasses a 512.6 acre area which is bound by ridgelines to the north, south, and east, and by the Pacific Ocean on the west. The only development within this region is approximately 120 acres of farmland northeast of the airport, and a small residential development west of Hwy. 101. The remainder of the basin is undeveloped and contains ground cover typical to wooded or clear \cut areas. Most of the basin is aggressively sloped toward the Henderson Creek which travels from west to east along the center of the basin. Roughly 40% of the basin extends beyond the current UGB.

Soil Type
Depoe loam (Map Unit 14B)
Lint silt loam (Map Unit 35E)
Bandon fine sandy loam (Map Unit 3C)
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
0 - 50%

Current Land Use
47.06 Acres - High Density Multi-Family (R-4)
122.76 Acres – Industrial (I-1)
133.16 Acres – Public
209.57 Acres - Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	143.02 cfs
50-Year Storm (Exist.)	178.57 cfs
25-Year Storm (Future)	143.02 cfs
50-Year Storm (Future)	178.57 cfs

Existing Storm Drain System
The storm flow within the basin begins in the eastern highland as sheet flow off hillsides, changing to shallow concentrated flow as the run-off is collected in the ravines defining Henderson Creek. The storm flow is conveyed east to west along the creek, and then under Hwy. 101 through a 6’ X 6’ concrete box culvert. On the west side of the highway the storm flow is dispersed to a much wider wetland area. From there, the storm water travels in open channels to the beach where it meets the Pacific Ocean.

Present Problems
No problems have been identified in the AN basins.

Future System
The ‘Alternate Mobility Standards Final Technical Memorandum’ projected no growth within this basin, and thus none were projected for this basin.

5.3.12 Basin AO

Basin AO encompasses a 587.6 acre area which is bound ridgelines to the north, south, and east, and by the Pacific Ocean on the west. The only development within this region is the Newport Municipal Airport located just east of Hwy. 101, and a small residential development west of Hwy. 101. Wooded and clear cut ground cover on steep slopes characterizes the majority of the basin. The basin is the watershed for Grant Creek. Roughly 38% of the basin extends beyond the current UGB.

Soil Type

Depoe loam (Map Unit 14B)
Lint silt loam (Map Unit 35E)
Bandon fine sandy loam (Map Unit 3C)
Bandon fine sandy loam (Map Unit 3E)
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)
Urban land-Nelscott complex (Map Unit 59C)

Slope

0 - 50%

Current Land Use

58.90 Acres -High Density Multi-Family (R-4)
303.53 Acres -Public
225.18 Acres -Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	254.31 cfs
50-Year Storm (Exist.)	307.99 cfs
25-Year Storm (Future)	254.31 cfs
50-Year Storm (Future)	307.99 cfs

Existing Storm Drain System

The storm flow within the basin begins in the eastern highland as sheet flow off hillsides, changing to shallow concentrated flow as the run-off is collected in the ravines defining Grant Creek. The storm flow is conveyed east to west along the creek, and then under the Newport Municipal Airport through two 48” parallel culverts. These culverts which were installed in the 1940’s lie under the intersection of the two runways, are approximately 1100’ in length, and have up to 95’ feet of ground cover. Downstream of these culverts the storm flow is conveyed through some ponds, narrow wetlands, then passes under Hwy. 101 through a 6’ X 6’ concrete box culvert. On the west side of the highway the storm flow is dispersed to a much wider wetland area. From there, the storm water travels in open channels to the beach where it joins the Pacific Ocean.

Present Problems

In past years, there was some concern regarding the condition of the 48” pipes conveying water under the airport; however they have been recently inspected and found to be in good condition. As a result, there are no storm drain problems to be discussed.

Future System

The ‘Alternate Mobility Standards Final Technical Memorandum’ projected no growth within this basin, however there is considerable available buildable land east of the airport. This land is zoned Public in the City’s Comprehensive Plan, and therefore the potential development would be a public facility. The City has no current plans for developing this area, and therefore no growth was projected for this basin during the planning period. When considering either a ‘no growth’ future scenario, or some developed public land growth, there is no changes to the existing storm drain required.

5.3.13 Basin AP

Basin AP is the watershed for Moore Creek, and encompasses a 636.1 acre area which is bound by ridgelines to the north, south, and east, and by the Pacific Ocean on the west. The only development within this region is the Newport Municipal Airport located just east of Hwy. 101, and a small residential development west of Hwy. 101. Wooded and clear cut ground cover on steep slopes characterizes the majority of the basin. The basin is the watershed for Grant Creek. Roughly 55% of the basin extends beyond the current UGB.

Soil Type
Lint silt loam (Map Unit 35E)
Bandon fine sandy loam (Map Unit 3C)
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)

Slope
0 - 50%

Current Land Use
38.24 Acres -Commercial
35.52 Acres -High Density Multi-Family (R-4)
9.75 Acres - Medium Density Single Family (R-2)
205.10 Acres -Public
347.51 Acres -Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	185.66 cfs
50-Year Storm (Exist.)	229.52 cfs
25-Year Storm (Future)	185.66 cfs
50-Year Storm (Future)	229.52 cfs

Existing Storm Drain System
The storm flow within the basin begins in the eastern highland as sheet flow off hillsides, changing to shallow concentrated flow as the run-off is collected in the ravines defining Moore Creek. The storm flow is conveyed east to west along the creek, and then under Hwy. 101 through a 6’ X 6’ concrete box culvert. On the west side of the highway the storm flow is dispersed to a much wider wetland area. From there, the storm water travels in open channels to the beach where it joins the Pacific Ocean.

Present Problems
No problems have been identified in the AP basins.

Future System
The ‘Alternate Mobility Standards Final Technical Memorandum’ projected no growth within this basin, however there is considerable available buildable land east of the airport. This land as in basin AO, is zoned Public in the City’s Comprehensive Plan, and therefore the potential development would be a public facility. The City has no current plans for developing this area, and therefore no growth was projected for this basin during the planning period. When considering either a ‘no growth’ future scenario, or some developed public land growth, there is no changes to the existing storm drain required.

5.3.14 Basin AQ

Basin AQ is the watershed for Thiel Creek, and encompasses a 2638 acre area which is bound by ridgelines to the north, south, and east, and by the Pacific Ocean on the west. The only development within this region is a small residential development in the northwest region of the basin. Wooded and clear cut ground cover on steep slopes characterizes the majority of the basin. The basin is the watershed for Theil Creek. Roughly 75% of the basin extends beyond the current UGB.

Soil Type
Depoe loam (Map Unit 14B)
Fendall-Templeton silt loams (Map Unit 18G)
Lint silt loam (Map Unit 35E)
Bandon fine sandy loam (Map Unit 3C)
Bandon fine sandy loam (Map Unit 3E)
Nelscott loam (Map Unit 42C)
Nelscott loam (Map Unit 42E)
Nestucca silt loam (Map Unit 46A)
Templeton-Fendall silt loams (Map Unit 55E)
Urban land-Nelscott complex (Map Unit 59C)

Slope
0 - 50%

Current Land Use
637.78 Acres - Medium Density Single Family (R-2)
12.14 Acres -Public
1988.09 Acres -Out of Urban Growth Boundary

Peak Runoff

25-Year Storm (Exist.)	300.87 cfs
50-Year Storm (Exist.)	355.45 cfs
25-Year Storm (Future)	300.87 cfs
50-Year Storm (Future)	355.87 cfs

Existing Storm Drain System
The storm flow within the basin begins in the southeast highlands as sheet flow off hillsides, changing to shallow concentrated flow as the run-off is collected in the ravines defining Theil Creek. The storm flow is conveyed east to west along the creek, and then under Hwy. 101 through a 144” CMP culvert. On the west side of the highway the storm flow is discharged into a wetland area. From there, the storm water travels in open channels to the beach where it joins the Pacific Ocean.

Present Problems
No problems have been identified in the AQ basins.

Future System
The ‘Alternate Mobility Standards Final Technical Memorandum’ projected no growth within this basin; however there is considerable available buildable land throughout the basin. This land is zoned HDR, but has the stipulation that any development within the basin must be large scale. More specifically it must be a large Destination Resort type development. Given this stipulation, it is not possible for the basin to experience typical EDU growth and thus none was attributed to it. However, if developments did occur and they discharged their storm flow into Thiel Creek, the 144” culvert traveling under Hwy. 101 has considerable capacity to facilitate those future flows.

Regulatory Requirements

Section 6

6.1 Federal Regulations

The Environmental Protection Agency requires permits for significant storm water discharges in the National Pollutant Discharge Elimination System (NPDES) program. The permit process protocol is covered in 40 CFR 122.26. The intent of this program is to set goals, standards and/or requirements that will prevent pollution of public waters. The current permitting program is broken into two phases.

The Phase I rule was issued in 1990 and pertains to medium and large municipal separate storm sewer systems (MS4's) serving a population larger than 100,000. Phase I requirements are extensive requiring system monitoring, development of a Storm Water Management Plan, reduction of pollutants to Maximum Extent Practicable (MEP), and more. Phase I also extends to operators of construction activities disturbing 5 or more acres of land.

Phase II rule was developed for small municipalities in urbanized areas (UA's). Phase II regulations cover MS4s in UA, or that has a population of at least 50,000, or a density of 1,000 people per square mile. The UA designations are based on the most recent US census data. For those MS4s not directly placed into Phase II based on being classified a UA, the Phase II rule also requires the NPDES Permitting Authority (DEQ) to establish criteria for, at a minimum, those MS4's located in population areas of at least 10,000 if it concludes that storm run-off discharges could pollute the receiving waters. Also, DEQ, as it determines necessary, may include communities with populations of 1,000 and up as designated MS4s.

6.1.1 Phase II Measures

Due to the population, the City of Newport does not qualify as a UA, nor has it been designated by the DEQ as a Phase II system. Therefore the storm drain system is not regulated or required to operate under the regulations of a Phase II MS4 system. Although the City is not required to fulfill the responsibilities of a Phase II permit, there is a general movement toward developing standards and regulations that mirror much of the permitting requirements. This direction will provide a good base for system management, and will facilitate future incorporation into a Phase II permit if at any point that becomes necessary.

There are six measures associated with the Phase II permitting process which were developed to minimize environmental impact of storm MS4 systems. These measures are listed and described below:

1. Public Education and Outreach
2. Public Participation and Involvement
3. Elicit Discharge Detection and Elimination
4. Construction-Site Runoff Control
5. Post-Construction Runoff Controls
6. Pollution Prevention and Good Housekeeping

Public Education and Outreach:

This measure requires the permitee to implement an education and outreach program designed to achieve measurable goals based on target audiences, specific stormwater quality issues in the community, or identified pollutants of concern. Some tasks associated with this measure are as follows:

- Develop and document a public education and outreach strategy that promotes pollutant source control and a reduction of pollutants in stormwater discharges. The strategy must identify targeted pollutants of concern, the targeted audience, specific education activities, and the entity or individual responsible for implementation. The public education and outreach strategy may incorporate cooperative efforts with other MS4 regulated permittees or efforts by other groups or organizations provided a mechanism is developed and implemented to track the public education and outreach efforts within the MS4 regulated area and the results of such efforts are reported annually

- Provide educational materials to the community or conduct equivalent outreach activities describing the impacts of stormwater discharges on water bodies and the steps or actions the public can take to reduce pollutants in stormwater runoff.

- Provide public education on the proper use and disposal of pesticides, herbicides, fertilizers and other household chemicals.

- Provide public education on the proper operation and appropriate maintenance of privately-owned or operated stormwater quality management facilities.

Public Participation and Involvement:

This measure requires the permitee to implement a public participation approach that provides opportunities for the public to effectively participate in the development, implementation and modification of the City’s stormwater management program. The approach must include provisions for receiving and considering public comments on the monitoring plan, annual reports, SWMP revisions, and the TMDL pollutant load reduction benchmark development.

Elicit Discharge Detection and Elimination:

This measure requires the permitee to continue to implement a comprehensive program to detect, remove, and eliminate illicit discharges to the MS4. Some tasks associated with this measure are as follows:

- Prohibiting, through ordinance or other regulatory mechanism, illicit discharges into the City's MS4.

- Include documentation in an enforcement response plan or similar document, describing the enforcement response procedures the City will implement when an illicit discharge investigation identifies a responsible party.

- Identify response procedures to investigate portions of the MS4 that, based on the results of general observations, field screening, laboratory analysis or other relevant information, such as a complaint or referral, indicates the likely presence of an illicit discharge. The response procedures must reflect the goal to eliminate the illicit discharge in an expeditious manner.

Construction-Site Runoff Control:

This measure requires the permitee to continue to implement a program to reduce pollutants in stormwater runoff to the MS4 from construction activities. Some tasks associated with this measure are as follows:

- Developing ordinances or other enforceable regulatory mechanisms that require erosion prevention and sediment controls be designed, implemented, and maintained to prevent adverse impacts to water quality and minimize the transport of construction-related contaminants to waters of the State. Construction site runoff control program ordinances or other enforceable regulatory mechanism should apply to construction activities that result in a land disturbance of 1,000 square feet or greater.

- Require construction site operators to develop erosion prevention and sediment control site plans, and to implement and to maintain effective erosion prevention and sediment control best management practices.

- Require construction site operators to prevent or control non-stormwater waste that may cause adverse impacts to water quality such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste.

- Perform on-site inspections in accordance with documented procedures and criteria to ensure that the approved erosion prevention and sediment control plan is properly implemented. Inspections of construction sites should include disturbed areas of the site, material and waste storage areas, stockpile areas, construction site entrances and exits, sensitive areas, discharge locations to the MS4, and, if appropriate, discharge locations to receiving waters. Inspections should be documented, including photographs and monitoring results as appropriate.

Post Construction Runoff Controls:

This measure requires the permitee to develop and implement a post-construction stormwater pollutant and runoff control program. Some of the tasks and objectives associated with the plan are as follows:

- Developing site-specific management practices to mimic natural surface or predevelopment hydrologic functions as much as practicable. The site-specific management practices should optimize on-site retention based on the site conditions;

- Reduce site specific post-development stormwater runoff volume, duration and rates of discharges to the municipal separate storm sewer system (MS4) to minimize hydrological and water quality impacts from impervious surfaces;

- Prioritize and include implementation of Low-Impact Development (LID), Green Infrastructure (GI) or equivalent planning, design and construction approaches.
- Capture and treat a percentage of the annual average runoff volume, based on a documented local or regional rainfall frequency and intensity.

- Where a new development or redevelopment project site is characterized by factors limiting use of on-site stormwater management methods to achieve the post-construction site runoff performance standards, such as high water table, shallow bedrock, poorly- drained or low permeable soils, contaminated soils, steep slopes or other constraints, the Post-Construction Stormwater Management program should require equivalent pollutant reduction measures, such as off-site stormwater quality management. Off-site stormwater quality management may include off-site mitigation, such as using low impact development principles in the construction of a structural stormwater facility within the sub-watershed, a stormwater quality structural facility mitigation bank or a payment-in-lieu program.

Pollution Prevention and Good Housekeeping:

This measure requires the permitee to implement a program to reduce the discharge of pollutants to the MS4 from properties owned or operated by City, including, but not limited to, parks and open spaces, fleet and building maintenance facilities, transportation systems and fire-fighting training facilities. Some tasks associated with this measure are as follows:

- Operate and maintain public streets, roads and highways over which the co-permittee has authority in a manner designed to minimize the discharge of stormwater pollutants to the MS4, including pollutants discharged as a result of deicing activities;
- Implement a management program to control and minimize the use and application of pesticides, herbicides and fertilizers on co-permittee-owned properties;
- Inventorying, assessing, and implementing a strategy to reduce the impact of stormwater runoff from municipal facilities that treat, store or transport municipal waste, such as yard waste or other municipal waste and are not already covered under a 1200 series NPDES, a DEQ solid waste, or other permit designed to reduce the discharge of pollutants;
- Limit infiltration of seepage from the municipal sanitary sewer system to the MS4;
- Implement a program to prevent or control the release of materials related to fire-fighting training activities; and,
- Assess City flood control projects to identify potential impacts on the water quality of receiving water bodies and determine the feasibility of retrofitting structural flood control devices for additional stormwater pollutant removal. The results of this assessment must be incorporated and considered along with the results of the Stormwater Retrofit Assessment required by this permit.

6.2 Local Regulations

The City currently has minimal regulatory policies in place for the management of the storm drain system. However, measures are being taken to facilitate a more structured governing of the existing and future system.

Although Phase II permitting is not expected to be required of Newport in the near future the City has begun working with DEQ who is in turn working with NOAA to develop a Mid-Coast TMDL Implementation Plan. This plan will incorporate TMDL's of major basins and waterways, and define various methods of achieving the pre-defined six measure of Phase II permitting. This process has proven to be extensive and a possible completion date is unknown.

Until the TMDL implementation plan comes to a conclusion, it is recommended that the City move toward regulations of their own that emulate these Phase II measures as they currently have very little regulatory structure in place pertaining to storm water. As the City progresses toward these measures it is recommended that an ordinance is developed adopting the standards set forth in the 'Drainage System Design Standards Manual, Civil West Engineering, 2014' as the design standard for all new construction.

This manual is in appendix F, has been developed and submitted to the City for review, and is expected to be accepted during 2016. Development of Best Management Practices (BMP's) and a Storm Water Management Plan would also facilitate creation of a more complete regulatory structure.

6.2.1 Design Manual

The purpose of the Drainage System Design Standards Manual is to set standards for the design and construction of storm sewer and drainage system improvements to serve new and future development. These design requirements are summarized below and address numerous categories of design considerations for new storm drain systems.

General Provisions:

All developments that will increase or modify impervious surface area shall, if further study is not required by the criteria outlined within the Manual, submit a drainage study and plan for the development site that provides for system capacity design for a 25 year storm event. The time of concentration for the study shall be determined by using a 10-minute start time and calculated travel times in gutters, pipes and swales for each drainage basin on the development area. The drainage design shall be checked for overflow impacts that may occur in the 25-year storm event and shall include contingency measures to protect both on-site buildings and abutting properties.

The storm sewer and drainage improvements shall be designed to detain any increased runoff created through the development of the site, as well as convey any existing off-site surface water entering the site from other properties. Facilities shall be sized adequately to convey all necessary flows off site to an approved point of discharge. Detention facilities include but are not limited to the stormwater mains, inlets, manholes, laterals for roof and foundation drains, detention systems (if required), control structures (if required), inflow and outflow devices (if required), and energy dissipaters (if required).

The developer shall submit hydrology/detention calculations to the Public Works Director or designee for review and approval. The applicant shall provide documentation to verify the accuracy of the hydrology and detention calculations.

The developer's engineer shall perform studies and prepare designs based on an engineering analysis which takes into consideration water quality issues, runoff rates, pipe flow capacity, hydraulic grade line, soil characteristics, pipe strength, and potential construction problems.

Other agencies (i.e. DEQ, ODOT, Lincoln County) may require some form of drainage review and impose additional drainage requirements that are separate from and in addition to those of the City. The developer shall coordinate with these other agencies and resolve any conflicts or concerns in drainage requirements and water quality requirements. The City must receive copies of approval letters, review letters, and other relevant documentation as required.

Water Quality:

Water quality components will only be required if determined necessary by the Public Works Director or representative or as required by another agency (ODOT, DEQ, etc.)

Each water quality component shall be designed for the runoff from the upstream watershed at build-out, based on the applicable comprehensive land use plan. No flow shall be introduced into the manhole in addition to the design amount.

Flooding Provisions:

The developer shall show the 100-year overflow (storm) path and shall not design the flow to cross any developed properties.

Down-Stream Provisions:

Developer shall account for all surface and stormwater drainage from the point of origin to the ultimate point of discharge to an appropriate receiving stream or storm drainage system. The impact to facilities downstream of the development must be identified to determine if improvements are required outside of the development. If required, developer will increase the capacity of downstream facilities or, through detention and attenuation, hold drainage on site and release it in a controlled manner so as not to affect the capacity of the downstream facilities.

Up-Stream Provisions:

The developer shall design and construct a system that provides for the future extension of the drainage facilities to the entire drainage basin taking into consideration current and projected "upstream" conditions.

Ditches and Channels:

Vegetation lined channels are to be used whenever possible.

Channels designed to handle the runoff from a development shall be constructed from the development to an existing public drainage conveyance system with an established outfall to a receiving water body.

On-Site Detention:

On-site detention facilities shall be constructed when any of the following conditions exist:

- An identified downstream deficiency along with upstream detention, rather than downstream conveyance system enlargement, is determined to be the more effective solution.
- There is an identified regional detention site within the boundary of the development.
- The need for pre-treatment of stormwater discharge dictates that flows be detained for water quality processes.
- There is a need to mitigate flow impacts on receiving streams.
- There is a need for additional detention due to an increase in impermeable surface area.

When required, on-site stormwater detention facilities shall be designed to capture run-off so the run-off rates from the site after development do not exceed the predevelopment conditions, based upon a 25-year, 24-hour return storm. Volume and duration of predevelopment conditions will be considered.

When required, due to an identified downstream deficiency, on-site stormwater detention facilities shall be designed so that peak run-off rates will not exceed predevelopment rates for the specific range of storms that cause the downstream deficiency.

Construction of on-site detention shall not be allowed as an option if such a detention facility would have an adverse effect upon receiving waters in the basin or sub-basin in the event of flooding, or would increase the likelihood or severity of flooding problems downstream of the site.

6.2.2 Best Management Practices (BMP's)

The Phase II permit is a narrative rule that requires the implantation of BMP's to achieve compliance. The Phase II rule dictates that EPA and permitting authorities issue BMP menus for each minimum measure to assist MS4's in developing complete system management programs. These BMP's are broken up into Structural and Non-Structural categories, and examples of both are given below.

Structural BMP's:

Porous Pavement/Concrete: Consist of a permeable surface course underlain by a uniformly-graded stone bed which provides infiltration of storm water and reduces run-off quantities.

Figure 6.1 – Porous Concrete

Porous Paver Blocks: Consist of interlocking units (often concrete) that provide some portion of surface area that may be filled with a pervious material such as gravel. The design provides storm water an avenue of filtration, and is especially suited for plazas, patios, and small parking areas.

Source: http://www.sjrwmd.com

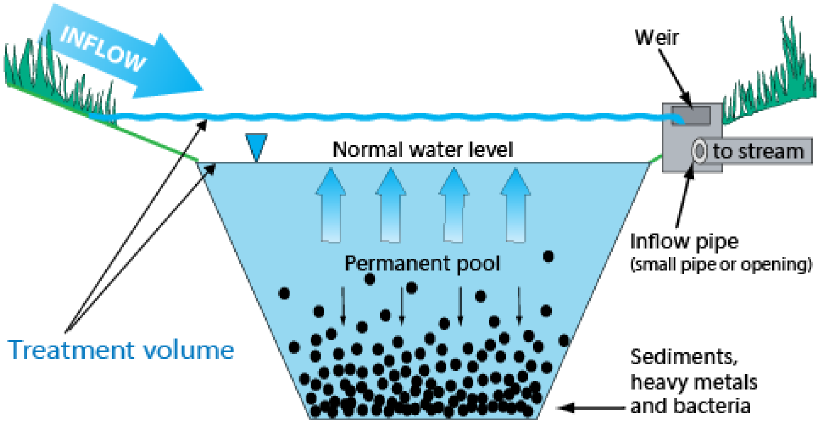


Figure 6.2 – Retention Pond

Retention Pond/Infiltration Basin: Is a shallow impoundment that stores and infiltrates runoff over a level, subtle, uncompacted area with permeable soils. Infiltration Basins use the existing soil mantle to reduce the volume of stormwater runoff by infiltration and evapotranspiration. The variance between the retention and detention pond is that the retention pond maintains a designated water level, and does not fully drain.

Detention Pond/Infiltration Basin: Is a shallow impoundment that stores and infiltrates runoff over a level, subtle, uncompacted area with permeable soils. Infiltration Basins use the existing soil mantle to reduce the volume of stormwater runoff by infiltration and evapotranspiration. The water storage associated with a detention pond is temporary in nature, and subsides following a storm event, as its contents are discharged to the downstream water way.

Source: http://imgarcade.com

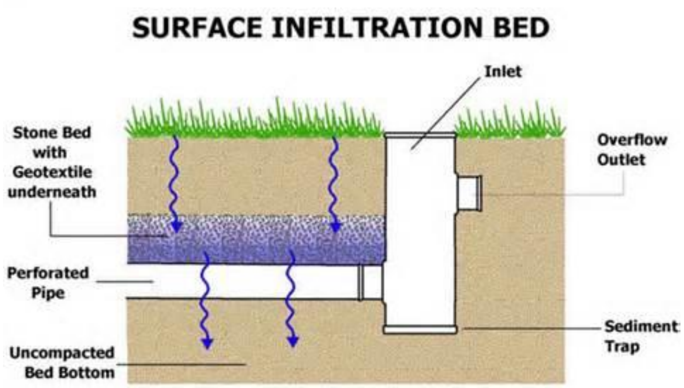


Figure 6.3 – Subsurface Infiltration Bed

Subsurface Infiltration Bed: Is the temporary storage and infiltration of stormwater runoff employing infiltration beds of varying types below an engineered layer of soil and vegetation. Their ideal application is in large, generally flat open spaces, such as, meadows, and lawns located down grade from impervious areas.

Source: http://www.sudswales.com

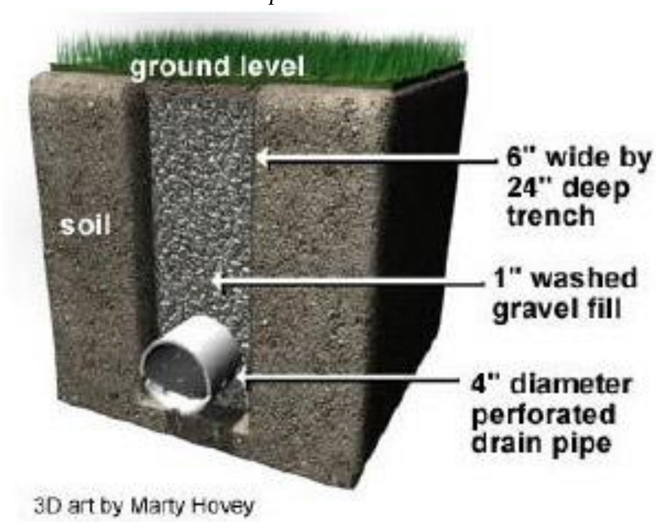


Figure 6.4 – Infiltration Trench

Infiltration Trench: A trench system which incorporates a layer of topsoil, underneath of which is a layer of stone in which lies a perforated pipe. The runoff infiltrates through the soil, then through the stone where it enters the pipe, and is conveyed further toward the discharge point of the storm drain system. This system provides minor detention, and quality treatment through infiltration.

Source: http://stonepocket.com/

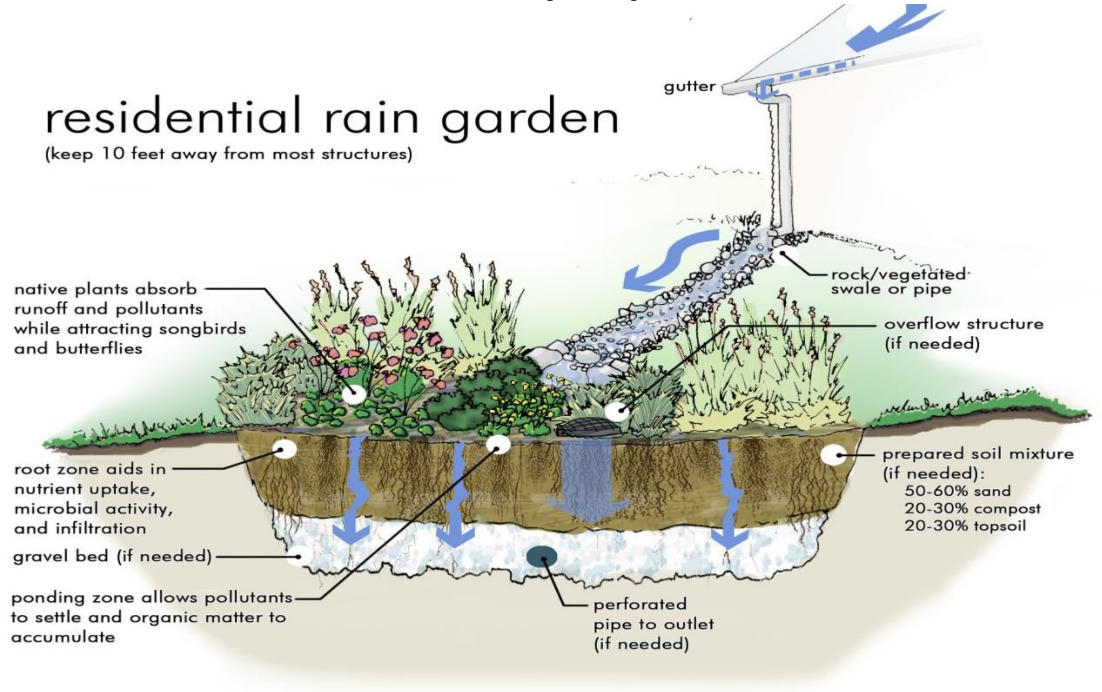


Figure 6.5 – Rain Garden

Rain Garden (Bio-Retention): An excavated shallow surface depression planted with specifically chosen native vegetation meant to treat and capture runoff all underlayed by a sand or gravel infiltration bed. This practice is primarily used in lawns, parking lots, and along roadways for stormwater quality refinement and quantity reduction.

Source: http://www.watershedmanagement.vt.gov/

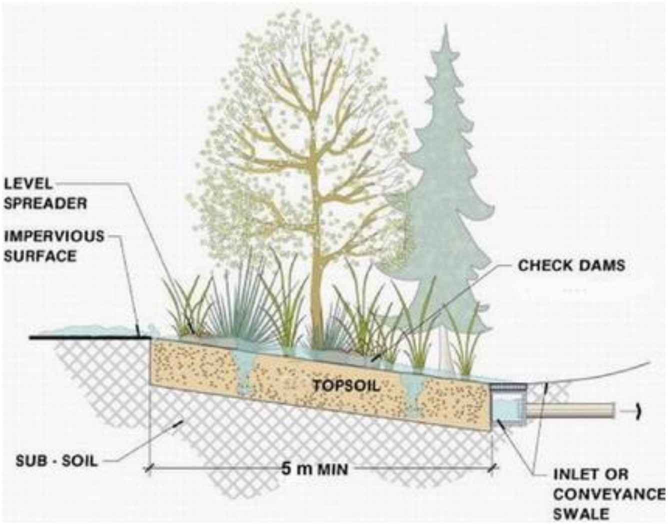


Figure 6.6 – Vegetative Filter Strip

Vegetative Filter Strip: Land areas of planted or indigenous vegetation, situated between a potential pollutant-source area and a surface-water boy that receives run off. The strip solely provides quality control, filtering out contaminants as the storm water flow through the vegetation to the waterway. These are commonly seen located along stream, lake, pond, or sinkhole boundaries.

Source: http://www.hydro-int.com

Figure 6.7 – Filtration Device

Filtration Devices: A broad spectrum of BMPs has been designed to remove non-point source pollutants from runoff as a part of the runoff conveyance system. These structural BMPs vary in size and function, but all utilize some form of settling and filtration to remove particulate pollutants from storm water runoff. Many water quality filters, catch basin inserts, and hydrodynamic devices are available and used throughout MS4 conveyance systems.

Non-Structural BMP's:

The non-structural BMP's are general in nature, and thus are not supplied with extended descriptions.

- *Educate public on material disposal/recycling/Spill Prevention*
- *Identify and Eliminate Illicit Discharges*
- *Promote Street Sweeping*
- *Develop Public Education/Participation programs*
- *Public Meetings and Citizen Groups*
- *Establish Buffers along stream and other waters:*
- *Volunteer Clean up and monitoring programs*

6.2.3 Storm Water Management Plan

Although BMP's and design standards dictating construction methods are currently being developed and given the system classification are more than is required, many smaller municipalities are choosing to additionally develop a Storm Water Management Plan (SWMP). The SWMP's combine all storm water policies, standards, BMP's, and regulations into one document and are intended to present a plan that will:

- Reduce flood damage
- Minimize, to the extent practical, any increase in stormwater runoff from any new development
- Reduce soil Erosion
- Assure the Adequacy of existing and proposed culverts and bridges
- Maintain groundwater recharge
- Prevent, to the greatest extent feasible, an increase in non-point pollution
- Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect

public health, to safeguard fish and aquatic life an scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water

- Protect Public safety through the proper design and operation of stormwater basins

A 'Stormwater Management Plan' template developed at the University of Oregon can be found at http://search.oregonstate.edu/?q=stormwater+managment+plan&client=default_frontend.

7.1 General

All planning and recommendations must be founded on established and accepted principals, methodologies, and regulations. This section shall establish the methods and principals that were utilized to prepare and analyze improvement alternatives as well as make final recommendations for improvements.

7.2 Design Criteria

Design of future stormwater conveyance system expansions are based on topography, available and undeveloped land within the storm drainage basin, the existing UGB, and estimated peak flows based on the design storm. Sizing of facilities will be based upon projected growth of impervious area within each basin during the planning period to ensure that the conveyance system has capacity for estimated peak flows.

General design criteria used in the development of alternatives and, ultimately, the final recommendations are discussed below.

7.2.1 Design Period

The design period must be long enough to ensure the new facilities will be adequate for future needs, but short enough to ensure that the facilities are effectively utilized within their economic and practical life. Primarily amongst municipal studies, the period of 20 years is used for planning purposes as it meets both the described needs of a design period.

The improvements within this Master Plan were based on the growth of impervious surface that would occur within the individual basins over the next 20 years.

7.2.2 Storm Drain and Culvert Design

Stormwater conveyance systems were designed considering natural ground slope, subsurface conditions, capacity requirements, minimum slope considerations, and minimum flow velocities required to maintain solids suspension. Whenever possible, gravity stormwater conveyance systems should be utilized rather than systems that require a pump station. Stormwater conveyance systems were designed to facilitate future growth projected for the planning period within the storm drainage basins.

The minimum diameter of storm drain used is 8-inches. Smaller pipes are difficult to clean or maintain using modern cleaning, TV-inspection, and repair equipment. Pipe diameter sizing was based on anticipated flows and master planning, not minimum slope considerations.

Manholes are spaced no more than 500 feet apart for storm drains up to 24-inches in diameter. Manholes should be constructed where alignment, slope, or pipe size changes occur. To facilitate self-cleaning, a “drop” or elevation change should occur from the inlet side of the manhole to the outlet and should be required to be incorporated into the manhole base. Flow channels in manholes should include a minimum 0.2-foot drop when the flow is straight through the manhole. If a manhole is constructed with a channel where the flow direction changes by 90-degrees with piping of the same size, the channel should include a base with a drop of 0.4-feet between the inlet and outlet pipes. Where manholes join pipes of more than one size, all incoming pipes should be elevated such that their respective crowns match elevation. See the diagram below for clarity.

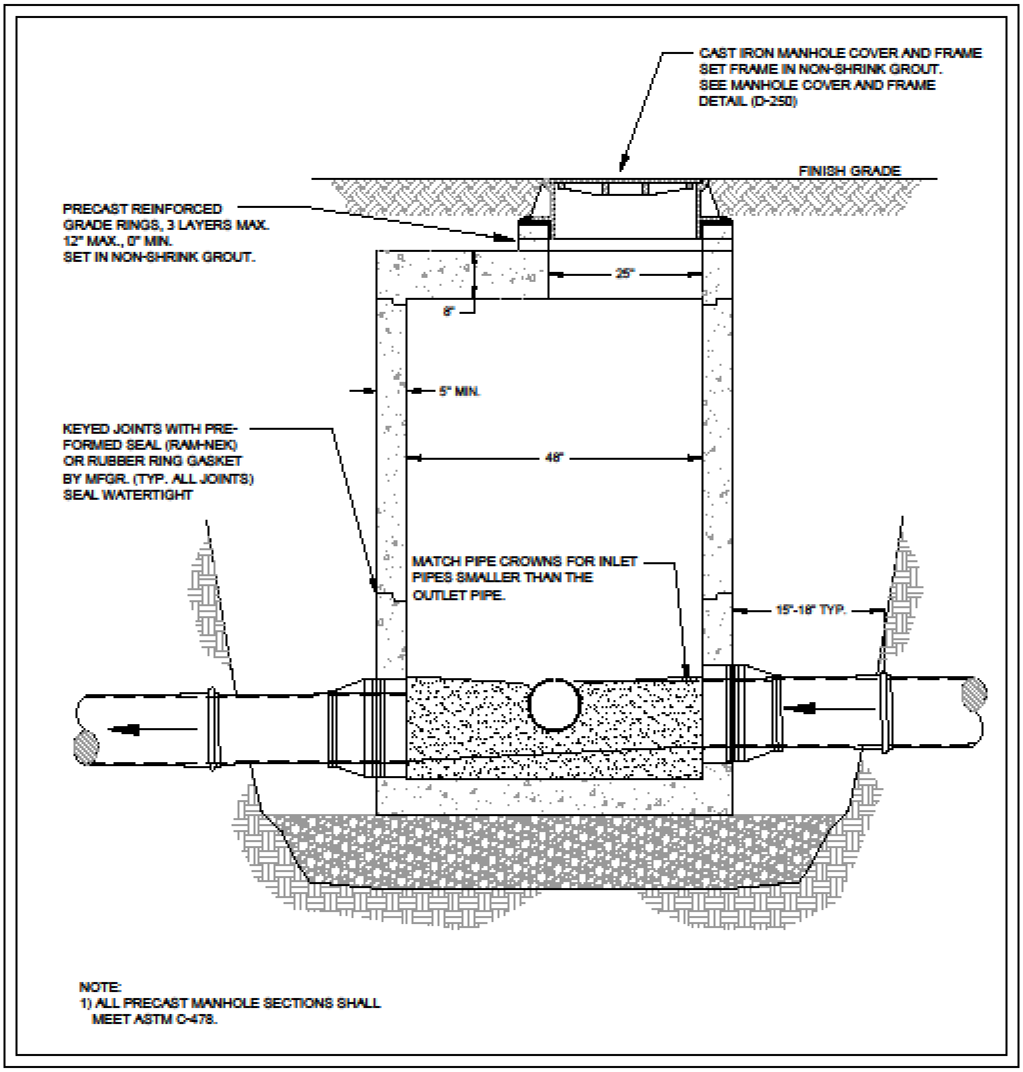


Figure 7.1 – Storm Drain Typical Manhole Detail

Manholes should have a minimum inside diameter of 48-inches at the bottom and have a standard 23-inch manhole access opening and lid. Manholes located in areas where flooding is expected should have bolt down lids to prevent lids from being lifted off by rising water.

Flat top manholes shall be utilized for all manholes. New manholes in Newport should not be provided with integrated ladders in the manhole sections.

Minimum pipe slopes are established to ensure that flow velocities are high enough to provide a self-cleaning action for the stormwater conveyance piping. Current conventional design practice recommends that a minimum velocity of two feet per second (fps) be achieved regardless of pipe size to maintain a self-cleaning action. It is desirable to have a velocity of 3 fps or more whenever topography and existing conditions allow. Minimum pipe slopes applied for small diameter laterals were 2-percent or ¼-inch drop per foot.

Standard methods of determining the slope for self-cleaning velocities are based on pipes flowing at least half-full. Where flows are expected to be less than half-full and adequate grade (topography) exists, a slope should be used that will provide velocities of three fps for full or half full pipes. In general, minimum pipe slopes were established based on the information in Table 7.1.

Table 7.1 – Recommended Slopes for Storm Drains (ft/ft)
(Based on a Manning's 'n' of 0.013)

Nominal Pipe Diameter (in)	Minimum Slope (2 fps)	Recommended Slope (3 fps)
10	0.0025	0.0055
12	0.0019	0.0044
15	0.0014	0.0032
18	0.0011	0.0025
21	0.0009	0.0021
24	0.0008	0.0017
27	0.0007	0.0015
30	0.0006	0.0013
36	0.0004	0.0010
42	0.0004	0.0008
48	0.0003	0.0007
60	0.0002	0.0005

While the information in the table above provides the theoretical slopes to attain 2 fps or 3 fps for various pipe sizes, it is not usually considered practical to construct a gravity pipeline at a slope less than 0.2%. Therefore, while pipes larger than 12-inch could be placed at a flatter slope, practical application will result in pipes with higher capacities and flow velocities than if they were placed at the minimum slopes presented above.

7.2.3 Storm Drain Pipe Materials

Traditional materials used in manufacturing pipe and conduits such as ceramics, concrete and metals are being increasingly replaced by pipes made from plastics, which are lighter weight, less expensive, more resistant to corrosion, and have superior flow characteristics. Plastic pipes used for municipal infrastructure improvements are predominantly made from polyethylene or polyvinyl chloride (PVC). Double walled high density polyethylene (HDPE) pipes, having a corrugated exterior and smooth interior, are commonly used in municipal stormwater applications. These pipes offer superior strength and corrosion resistance compared to corrugated metal pipe (CMP) products, and improved hydraulic performance when compared to both CMP and concrete.

Smooth walled rigid plastic pipe (HDPE or PVC) is frequently used to line existing conduits, such as CMP culverts. Although the insertion of a liner within an existing pipe decreases the internal diameter of the conduit, additional capacity is often achieved due to the improved hydraulic performance of the plastic pipe. Therefore, it is frequently desirable to line existing pipes with rigid plastic liners prior to structural failure of the existing pipe. Significant cost savings can be achieved by lining rather than removing and replacing existing pipes.

It is generally touted by plastic pipe manufacturers that a service life of 50 years or more can be expected with plastic pipes. In Technical Release TR-43/2003 "Design Service Life of Corrugated HDPE Pipe" published by the Plastics Pipe Institute, it is concluded, "There is considerable supporting justification for assuming a 100-year or greater design service life for corrugated polyethylene pipe, when properly used and reasonably well installed." The publication describes case studies on corrugated polyethylene pipe measuring tensile strength, elasticity, chemical resistance, and abrasion resistance that support the conclusion stated above. It is also clear in bulletins published by the American Concrete Pipe Association that HDPE storm drain pipe must be properly installed in order to achieve a long service life. The ACPA has recorded numerous cases where HDPE storm drain pipes have failed or deflected significantly within a few years of installation.

In the past, the City of Newport has experienced failure of HDPE pipe, and therefore will primarily use PVC for projects involving pipe sizes under 18", and Concrete for any pipe above 18". For projects where pipe lining can be utilized, rigid HDPE or PVC pipe is recommended.

7.3 Basis for Cost Estimate

The construction cost estimates presented in this Plan will include a number of basic components, each of which is discussed in the following sections. The estimates presented are preliminary and are based on the level of detail and planning presented in the Master Plan. As projects proceed and as site specific and new information becomes available, the estimates should be reviewed and updated.

7.3.1 Construction Costs

Construction costs are estimated using a combination of engineering experience with similar past projects, material cost data provided by equipment suppliers, and material and labor cost estimates and indexes published by such sources as the Engineering News Record and others.

Whenever possible, existing as-built drawings were studied to determine the scope of work required for constructing and implementing improvements to existing facilities. When appropriate, preliminary layouts were developed and utilized when preparing construction cost estimates.

Future changes in the cost of labor, equipment and materials will justify comparable changes in the cost estimates provided in this Plan. For this reason, common engineering practice is to tie planning cost estimates to a construction index which is updated regularly in response to changes in the economy and the construction marketplace.

Table 7. 2 – ENR Index 1998 to 2013

YEAR	INDEX	% CHANGE/YR
1998	5920	--
1999	6059	2.35
2000	6221	2.67
2001	6343	1.96
2002	6538	3.07
2003	6694	2.39
2004	7115	6.29
2005	7446	4.65
2006	7751	4.10
2007	7966	2.77
2008	8310	4.32
2009	8570	3.13
2010	8799	2.67
2011	9070	3.08
2012	9308	2.62
2013	9484	1.89
2014	9936	2.72

The Engineering News Record (ENR) construction cost index is the most commonly used for engineering planning and estimating purposes. The ENR index is based on a beginning value of 100 established in the year 1913. Average yearly values for the past 15 years are summarized in Table 7.2.

Cost estimates prepared in this plan are based on the December 2014 index. Future costs should be compared to a baseline ENR Index value of 9936.

If specific ENR index figures are not available, the historical ENR growth pattern has been around 2.7% per year.

A summary of estimated costs for various storm drain improvements is shown below in Table 7.3.

Table 7. 3 – Summary of Primary Cost Estimate Values

Cost Estimate Values					
Pipes				Structures	
Diameter	*Material*	*Bury Depth*	*Cost Per Linear Foot*	*Description*	*Cost per Unit*
8	PVC	10-	$125	New 48" MH (3-10 Depth)	$4,000
12	PVC	10-	$135	New 60" MH (3-10 Depth)	$4,250
18	RCP	10-	$136	New 72" MH (3-10 Depth)	$4,500
24	RCP	10-	$163	New 84" MH (3-10 Depth)	$5,000
30	RCP	10-	$191	New 96" MH (3-10 Depth)	$7,000
36	RCP	10-	$202	New 108" MH (3-10 Depth)	$10,000
42	RCP	10-	$223	New 48" MH (10-20 Depth)	$5,200
48	RCP	10-	$264	New 60" MH (10-20 Depth)	$5,525
54	RCP	10-	$336	New 72" MH (10-20 Depth)	$5,850
18	RCP	10-20	$177	New 84" MH (10-20 Depth)	$6,500
24	RCP	10-20	$235	New 96" MH (10-20 Depth)	$9,100
30	RCP	10-20	$291	New 108" MH (10-20 Depth)	$13,000
36	RCP	10-20	$314	New 48" MH (20-30 Depth)	$6,800
42	RCP	10-20	$363	New 60" MH (20-30 Depth)	$7,225
54	RCP	10-20	$526	New 72" MH (20-30 Depth)	$7,650
30	RCP	20+	$351	New 84" MH (20-30 Depth)	$8,500
42	RCP	20+	$448	New 96" MH (20-30 Depth)	$11,900
48	RCP	20+	$533	New 108" MH (20-30 Depth)	$17,000
54	RCP	20+	$639	Water Quality Catch Basin (2' x 2')	$5,500

7.3.2 Contingencies

Contingencies are a prudent inclusion in planning cost estimates to account for unforeseen circumstances that may increase costs. For the purposes of this planning document and the preliminary cost estimates provided, a contingency is used, which is 30% percent of the estimated construction costs. After design work is completed for a project and updated construction cost estimates are completed, contingency is typically reduced to 10% for estimates used immediately prior to construction.

While efforts have been made to provide costs for all facets of the proposed projects, it is appropriate that allowances be made for variations in the final design, bidding market conditions, adverse construction conditions, unanticipated specialized investigation and studies, and other difficulties which cannot be foreseen at this time but may tend to increase the final costs of the proposed projects.

7.3.3 Engineering

The cost of engineering services for major capital improvement projects typically include surveying, foundation explorations, preparation of contract documents and project drawings, development of construction and material specifications, bidding services, construction management, inspection, construction staking, startup services, and the preparation of operation and maintenance manuals.

Depending on the size and type of the project and the required scope of engineering services, engineering costs may range between 18 to 25 percent.

In some cases, additional engineering or technical services may be required such as flow studies, predesign reports, environmental reports or others. These additional services would typically be in addition to the regular engineering services covering surveying, design, bidding, construction management, and construction inspection.

For the purposes of conservative planning, the cost estimates prepared in this Master Plan assume that all projects will require a relatively comprehensive and complete scope of engineering services. Therefore, an engineering cost of 20% is assumed for nearly all projects. In the future, if it is determined that some projects will not warrant this level of service, the cost for engineering on those projects can be reduced. On the other hand, smaller and less expensive projects may warrant a higher engineering cost percentage.

7.3.4 Legal and Administrative

Legal and administrative costs include such items as legal counsel review of contracts and contract documents, costs related to obtaining and recording easements and permits, additional city administration expenses occurring during a project, and other miscellaneous legal and administrative costs.

This cost category also includes potential costs for internal budget planning, grant administration, liaison costs, interest on interim loans financing, and other non-construction costs related to the projects.

A cost equal to 3% of the estimated construction cost is used for the estimates in this study.

7.3.5 Land Acquisition Costs

Some projects will require the acquisition of land for placement of new piping, or other system components when property is not available on an existing site or within an existing public right-of-way. In some cases, a property owner will require reimbursement for providing an easement across his/her property.

An effort was made in the study to anticipate and identify which projects would require land or easement acquisition. For these projects, costs have been included for the purchase of additional properties for the improvements. Property costs can vary depending on location, market volatility, owner's willingness to sell, and many other factors.

When a project is undertaken, the City should review the potential need for land acquisition. If it is determined that additional land is required, the costs for the acquisition of that land should be reviewed and updated based on the land cost climate at the time.

Recommendations

Section 8

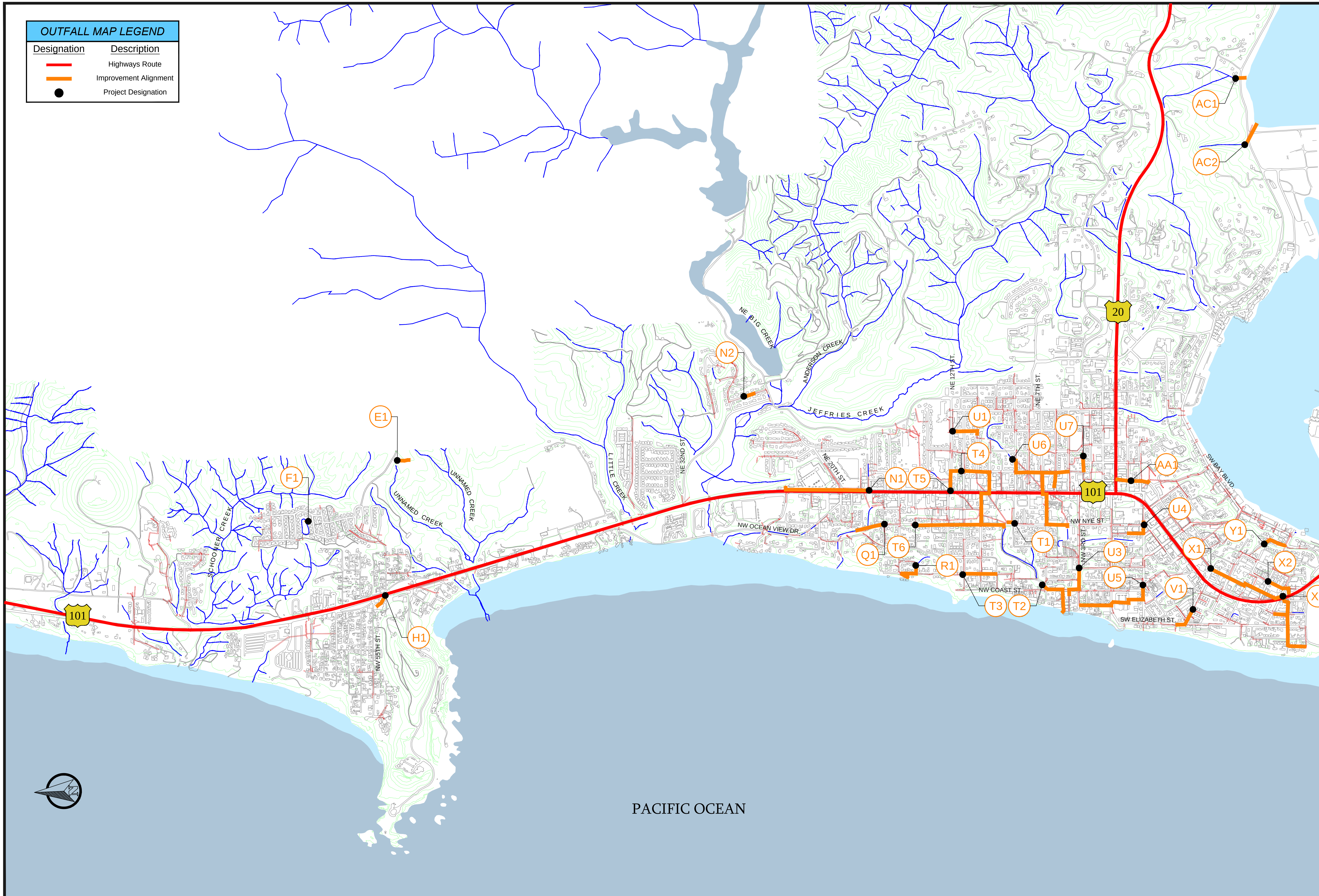
8.1 Proposed Storm Drain System Improvements

With the use of hydraulic modeling, collected data from the City, and in field inspections, recommended storm drain projects have been developed to address existing capacity deficiencies, maintenance needs, and future development capacity requirements. Alternatives, recommendations, and project cost estimates are discussed for each basin in need of improvements. Noteworthy system conditions within certain basins are also discussed in this section. The table below summarizes all recommended improvement projects, and displays the cost estimate value as well as the location of the designated improvement. Figure 8.1 shows approximate improvement project location and general configuration.

Table 8.1 – Recommended Improvement Summary

Project Number	Project Description	Deficiency			Total Project Cost
		Limited Capacity	*Under Structures*	*Future Develop.*	
C1	525' of 24" along NE 73rd St.	X		X	$229,316
F1	124' of 30" SD pipe North of NW 60th St.	X		X	$67,398
H1	305' of 12" and 18" SD pipe along NW 54th St.	X			$103,677
K1	270' of 12" & 18" SD pipe along NE Lucky Gap St.	X			$102,214
N1	1200' of 12", 24", 30", and 35" SD Pipe along Hwy. 101	X			$553,428
N2	240' of 18" SD pipe along NE Iler St.	X			$86,500
Q1	890' of 12", 18" , and 24" SD pipe along NW Nye St.	X			$291,848
R1	675' of 12", and 18" SD pipe along NW Spring St.	X			$235,197
T1	161' of 12" SD pipe along NW Nye St.	X			$50,766
T2	921' of 36" SD pipe along NW Coast St.	X			$490,012
T3	665' of 12", 18", and 24" SD pipe along NW Spring St.	X			$264,614
T4	Re-alignment of Pipe under Sunwest Honda/Mazda building		X		$1,109,013
T5	Re-alignment of Pipe under Ford Dealership building		X		$271,188
T6	Re-alignment of Pipe under Church of the Nazarine building		X		$598,801
U1	753' of 18", and 24" SD pipe along NE Douglas Street	X			$304,978
U2	739' of 54" SD pipe along NW 3RD Street & NW Coast St.	X			$612,539
U3	1699' of 18", and 24" pipe along SW Cliff Street	X			$664,079
U4	Re-alingment of Pipe under Cash and Carry	X	X		$2,710,875
U5	Re-alignment of Pipe under local residence	X	X		$79,355
U6	553' of 12", and 18" SD pipe along SW 2nd St.	X	X		$169,797
V1	533' of 18" and 24" SD pipe along SW Fall St.	X			$308,322
X1	1456' of 12", and 18" SD pipe along SW 9th St.	X			$526,162
X2	571' of 18", and 24" pipe along SW 10th St.	X			$213,816
X3	1663' of 12", 24", 30", and 36" SD pipe along SW Minnie St.	X			$793,155
Y1	497' of 12" SD pipe along SW 13th St.	X			$163,653
AA1	675' of 18", and 24" SD pipe along SE Avery St.	X			$212,022
AC1	655' of Culverts crossing Yaquina Bay Blvd.			X	$208,698
AF1	1515' of 12", 18", and 24" pipe along SW 29th and SW Brant St.			X	$640,902
AG1	Drainage ditch development and Rehabilitation	X		X	$1,693,568
AG2	1551' of 15", 18", and 24" SD pipe along SW 35th St.			X	$459,808
AJ1	55' of culvert crossing SE 35th St.	X			$37,156
AL1	170' of 36" SD pipe crossing Hwy. 101 (Jack and Bore)	X			$102,117

There are certain design factors that are consistent throughout all the discussed improvements. Where pipes lacked capacity, the associated projects propose a 'remove and replace' approach. If an existing



Civil West Engineering Services, Inc.

The City of Newport Lincoln County, Oregon

NORTH-RECOMMENDED IMPROVEMENTS

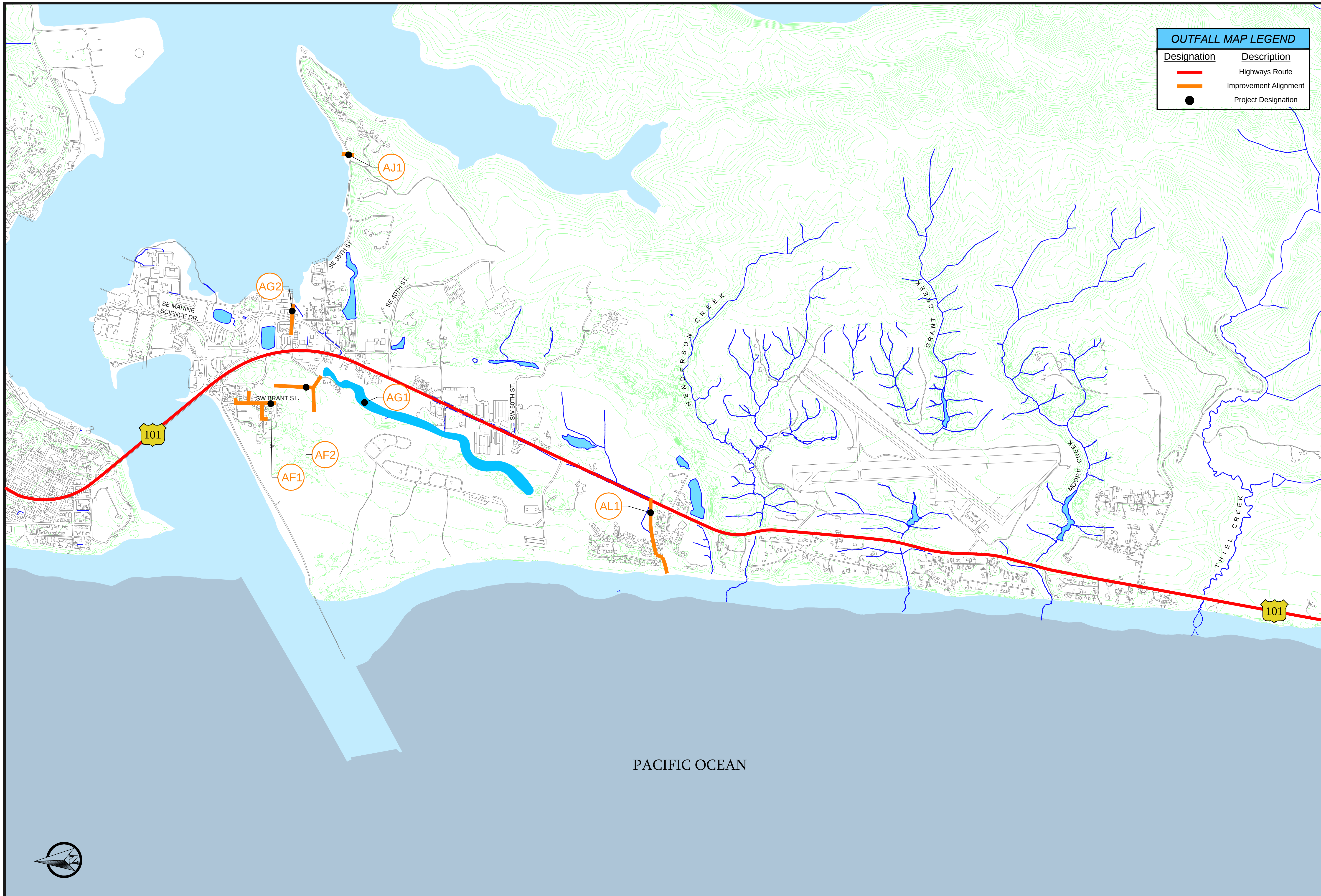
Stormwater Master Plan

1"

NOT TO SCALE

DRAWN BY: JRP
DATE: APRIL 2014

FIGURE 8.1A



Civil West Engineering Services, Inc.

THE CITY OF NEWPORT
LINCOLN COUNTY, OREGON

South-Recommended Improvements

STORMWATER MASTER PLAN

1"

1" = 1000'

DRAWN BY: JRP
DATE: APRIL 2013

FIGURE
8.1B

storm drain component is extended under an existing structure, it is proposed to abandon the pipe in place, fill the pipe with CLSM or sand, and realign the storm drain in a manner that would allow for bypass of the filled line. In general the remediation measures included use of RCP for new or replacement pipe larger than 18" and PVC pipe for any pipe below 18" to prevent future failure of large diameter pipes. Jack and Bore, or directional drilling construction methods were used were possible when installing storm drain pipe under Hwy. 101 to avoid problems associated with open trench construction in the right-of-ways. Duckbill tide gates are employed where installing new or replacement outfalls due to their higher reliability and lower maintenance cost. Also, any catch basin recommended to be installed is to be a water quality type structure.

General system maintenance is discussed within a number of the project developments. The system maintenance referred to for the developed storm drain is catch basin cleaning, execution of a road sweeping program, and removal of shrubbery, large weeds, and other obstructions preventing or restricting storm drain flow along the ditch line.

8.1.1 Basin C

Figure C.1 – Project Area Image

The single point of concern within this basin is ditch line along NE 73rd Street. An area to east of NE 73rd St. and NE Avery St. intersection drains to the north ditch along NE 73rd Street. This area has a peak runoff of approximately 15.62 CFS. However the ditch to which it drains is limited to the conveyance of 3.11 CFS. Either the ditch needs to be increased in size along with the culverts conveying the water under residential driveways or a piped system needs to be put in place to divert the additional flow from that area into the existing piped system. The latter option was chosen as it will better facilitate future growth and require less maintenance. The project's cost estimate is shown in Table C.1 and depiction is displayed in Figure T.1.

Table C.1 – Cost Estimate

	PROJECT C1 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$21,511.80	$21,511.80
2	Construction Facilities/Temporary Controls	ls	1	$4,780.40	$4,780.40
3	Demolition & Site Prep	ls	1	$9,560.80	$9,560.80
4	24" RCP Storm Drain Piping	lf	525	$200.00	$105,000.00
5	New 60" SD MH	ea	3	$4,250.00	$12,750.00
6	AC Pavement Repair/Trench Patching	sf	440	$4.00	$1,760.00
		Construction Total			$ 155,363.00
		Contingency (20%)			$31,072.60
		Subtotal			$ 186,435.60
		Engineering (20%)			$37,287.12
		Administrative Costs (3%)			$5,593.07
		Total Project Cost			**$229,315.79**

8.1.2 Basin F

Project F1-30" Line extending North of NW 60th St.

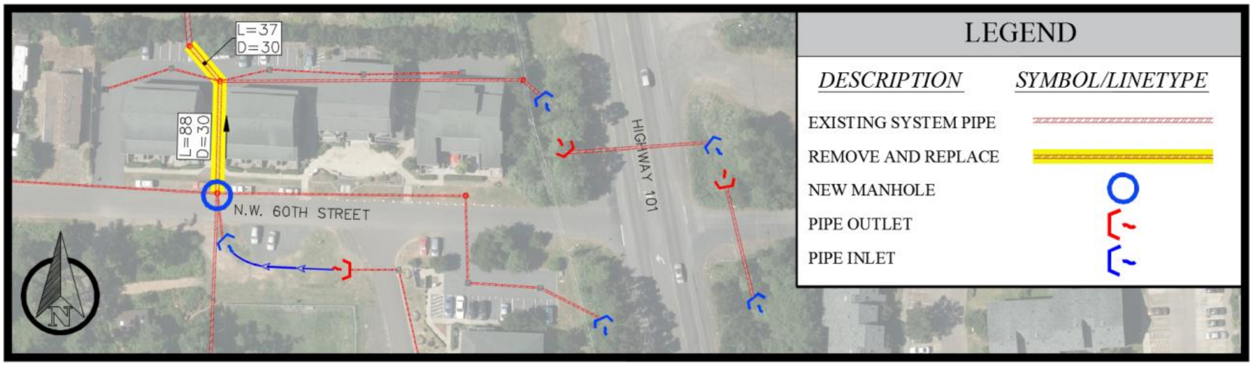


Figure F.1 – Project Area Image

As mentioned in the basin description for basin F and G, residents on the west side of Hwy. 101 have voiced a need for more storm drain infrastructure. This concern could potentially push the development of an Urban Renewal District focused on all infrastructures within the neighborhood. Development of such a district could result in the construction of additional paved roadways using curbs and catch basins to convey storm water. Given the tectonic movement in the area, it would be important to keep the newly developing infrastructure distanced from the edge of the eroding coastal embankment. In an effort to achieve this, it is recommended to drain the basin from the southwest corner of the basin to the northeast toward the 18" line leading to outfall F1. Assuming future improvements do direct the storm water as described, it is recommended that this 18" pipe be increased in size to a 30". In addition, the 37'-24" storm drain pipe downstream of the 18" be increased in size to 30". The project's cost estimate is shown in Table F.1 and depiction is displayed in Figure F.1.

Table F.1 – Cost Estimate

	PROJECT F1 COST ESTIMATE				
Item No.	*Description*	*Units*	*Quantity*	*Unit Cost*	*Total Cost*
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$6,322.50	$6,322.50
2	Construction Facilities/Temporary Controls	ls	1	$1,405.00	$1,405.00
3	Demolition & Site Prep	ls	1	$2,810.00	$2,810.00
4	30" RCP Storm Drain Piping (10'+ Cover)	lf	125	$225.00	$28,125.00
5	New 72" SD MH	ea	1	$4,500.00	$4,500.00
6	AC Pavement Repair/Trench Patching	sf	625	$4.00	$2,500.00
		Construction Total			$ 45,662.50
		Contingency (20%)			$9,132.50
		Subtotal			$ 54,795.00
		Engineering (20%)			$10,959.00
		Administrative Costs (3%)			$1,643.85
		Total Project Cost			**$67,397.85**

8.1.3 Basin G

As mentioned in the recommendations for Basin F, there is potential for future development of an Urban Renewal District within both basin F and G. The formation of such a district would more than likely result in storm drain improvements which re-direct the storm water flow to the northeast. However, as there is no Urban Renewal District currently being developed, the current system is not experiencing flooding, and the hydraulic model predicts no flooding, no improvements are recommended for Basin G.

8.1.4 Basin H

Project H1-Outfall H1 Improvements

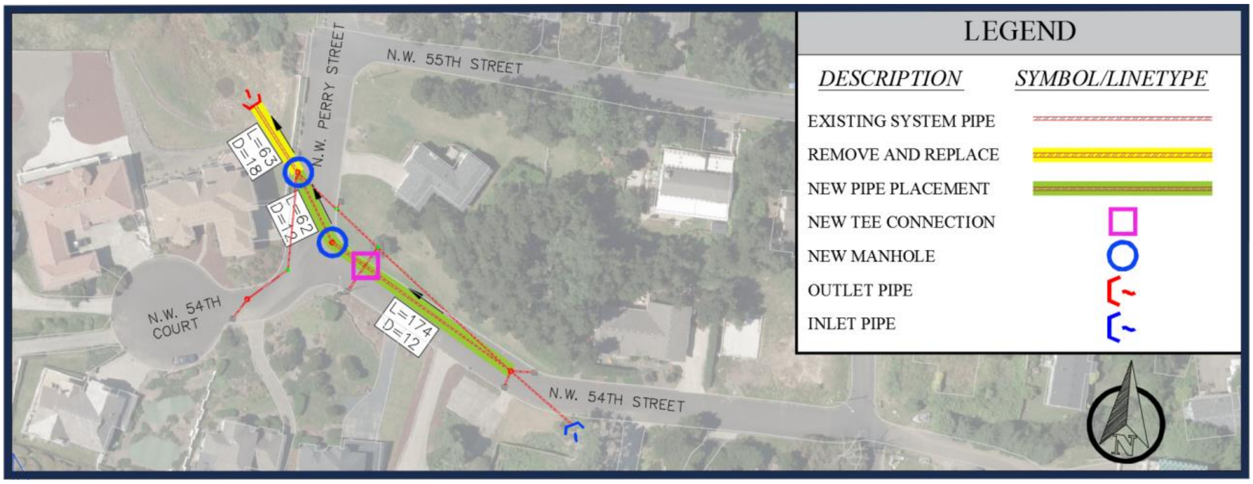


Figure H.1 – Project Area Image

To address the lack of capacity within basin H it is recommended to re-align, and remove and replace a portion of the existing storm drain system. This portion of the system lies along NW 54h St., and outfalls half way up NW Perry St. As shown in the above figure, the recommended improvements for this basin includes: a re-alignment consisting of approximately 236’ of 12” pipe, and removal of 63’ of 8” pipe and installment of 18” pipe in its place. The project’s cost estimate is shown in Table H.1 and depiction is displayed in Figure H.1.

Table H.1 – Cost Estimate

	PROJECT H1 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$9,725.76	$9,725.76
2	Construction Facilities/Temporary Controls	ls	1	$2,161.28	$2,161.28
3	Demolition & Site Prep	ls	1	$4,322.56	$4,322.56
4	12" PVC Storm Drain Piping	lf	240	$125.00	$30,000.00
5	18" RCP Storm Drain Piping	lf	65	$136.00	$8,840.00
6	New 48" SD MH	ea	2	$4,000.00	$8,000.00
7	Tee Connections	ea	1	$600.00	$600.00
8	AC Pavement Repair/Trench Patching	sf	1648	$4.00	$6,592.00
		Construction Total			$ 70,241.60
		Contingency (20%)			$14,048.32
		Subtotal			$ 84,289.92
		Engineering (20%)			$16,857.98
		Administrative Costs (3%)			$2,528.70
		Total Project Cost			**$103,676.60**

8.1.5 Basin I

No specific storm drain piping deficiencies were identified or projects developed for Basin I. System maintenance related to catch basin obstructions will be required for a couple of the catch basins along the new Hwy. 101 overlay.

8.1.6 Basin K

Project K1-12" Line along NE Lucky Gap St.

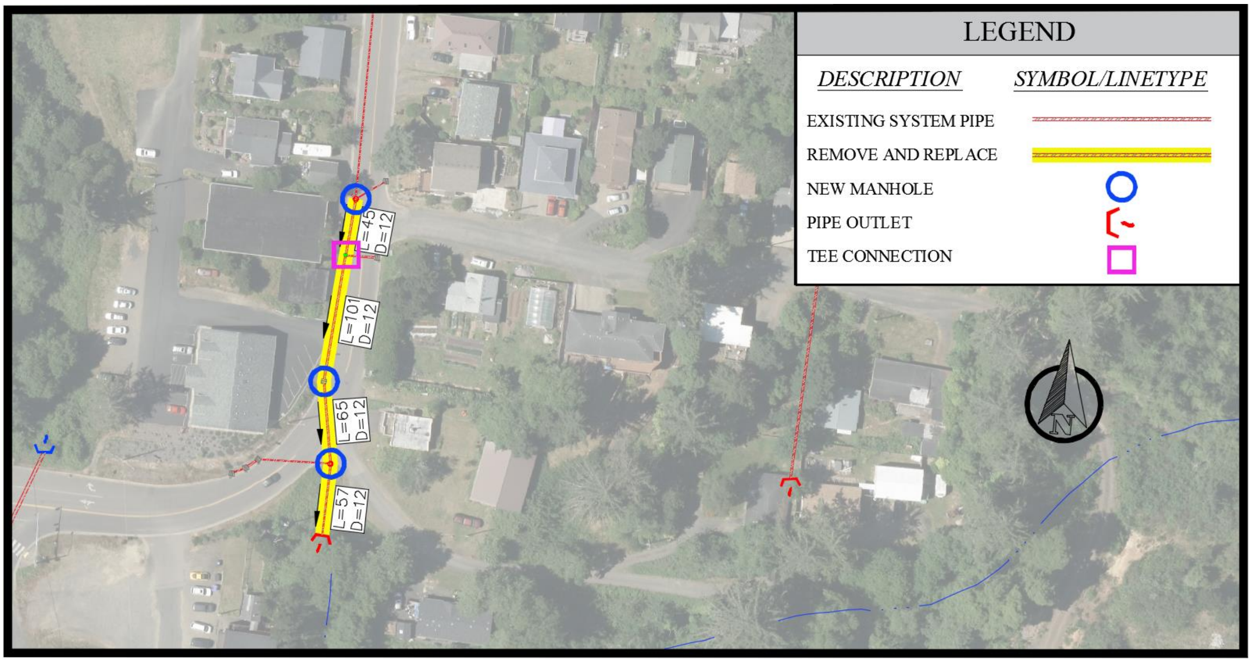


Figure K.1 – Project Area Image

Basin K delivers approximately 6.82 CFS of peak run-off to a section of 8" pipe with a capacity of 4.09 CFS. As a result these storm drain components running south from the NE 53rd St. and NE Lucky Gap St. intersection to outfall K1 will cause localized surcharging and system flooding. Increasing this pipe size from 8" to 12" will increase the system capacity sufficiently to convey the designated storm events. This construction would require: the removal and replacement of 270' of pipe, the replacement of 2 manholes, 2 tee connections stemming from nearby catch basins, and a catch basin replacement. The project's cost estimate is shown in Table K.1 and depiction is displayed in Figure K.1.

Table K.1 – Cost Estimate

	PROJECT K1 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$9,588.60	$9,588.60
2	Construction Facilities/Temporary Controls	ls	1	$2,130.80	$2,130.80
3	Demolition & Site Prep	ls	1	$4,261.60	$4,261.60
4	12" PVC Storm Drain Piping	lf	270	$125.00	$33,750.00
5	New 48" SD MH	ea	3	$4,000.00	$12,000.00
6	Tee Connections	ea	1	$600.00	$600.00
7	Curb & Gutter	lf	130	$20.00	$2,600.00
8	Commercial Reinforced Driveway	sf	120	$9.00	$1,080.00
9	AC Pavement Repair/Trench Patching	sf	810	$4.00	$3,240.00
		Construction Total			$ 69,251.00
		Contingency (20%)			$13,850.20
		Subtotal			$ 83,101.20
		Engineering (20%)			$16,620.24
		Administrative Costs (3%)			$2,493.04
		Total Project Cost			**$102,214.48**

8.1.7 Basin N

There are two points of lacking capacity within basin N which were discussed in the basin description given in section 6.

<u>Project N1-Storm Drain Capacity Increase along Hwy. 101 @ NE 20th St.</u>

The deficient system along Hwy. 101 has a capacity of 32.45 at the minor outfall across from NW 25th Street. The peak runoff delivered to this location is 48.03 and 54.65 CFS given a 25-year and 50-year storm event respectively. This capacity deficiency extends from the minor outfall south to NE 17th Street. The Hwy. 101 improvements will include construction of: 128' of 24" RCP, 500' of 30" RCP, and 600' of 36" RCP. The project's cost estimate is shown in Table N.1 and depiction is displayed in Figure N.1.

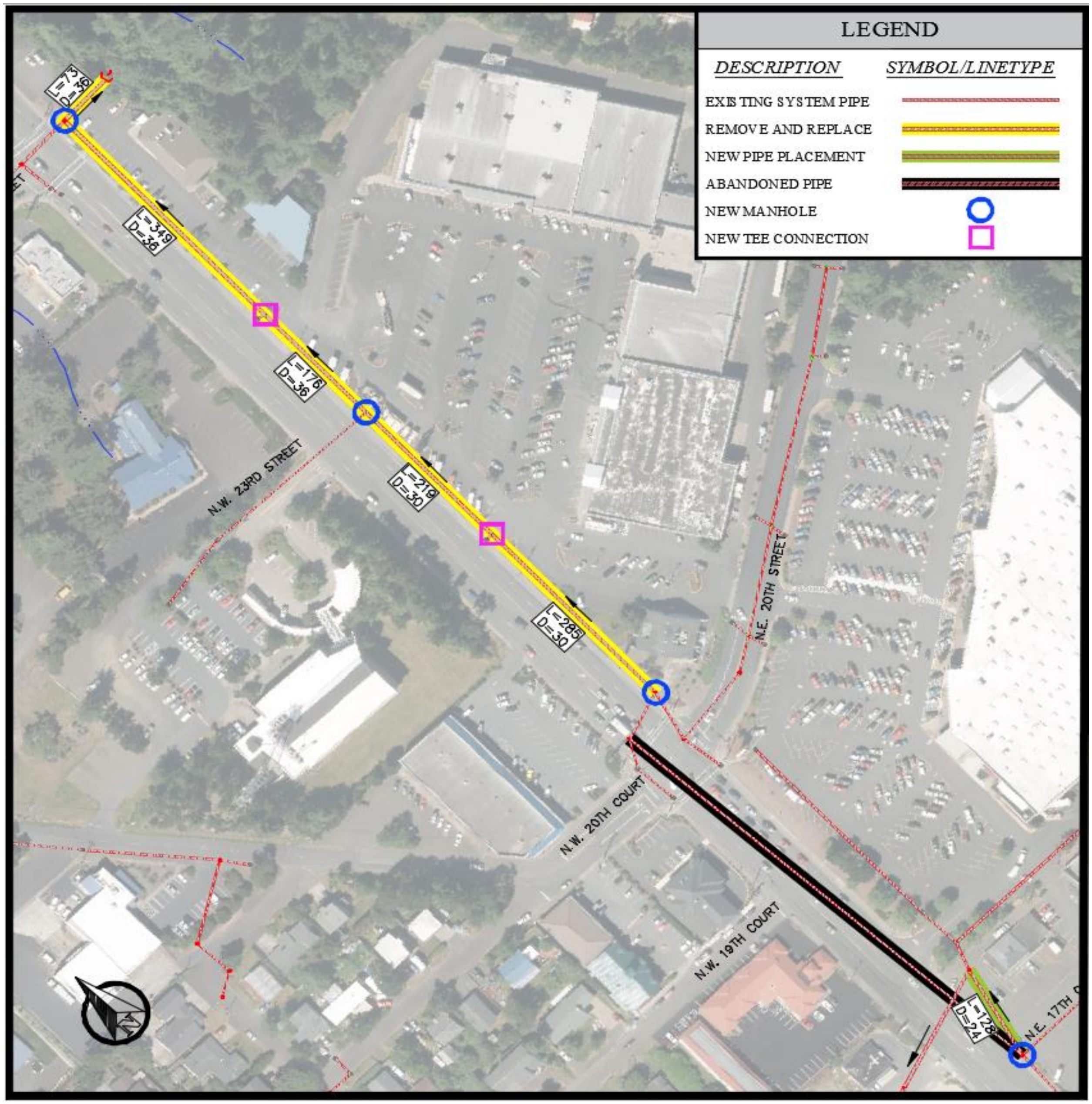


Figure N.1 – Project Area Image

Table N.1 – Cost Estimate

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
	PROJECT N1 COST ESTIMATE				
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$51,916.32	$51,916.32
2	Construction Facilities/Temporary Controls	ls	1	$11,536.96	$11,536.96
3	Demolition & Site Prep	ls	1	$23,073.92	$23,073.92
4	24" RCP Storm Drain Piping	lf	128	$163.00	$20,864.00
5	30" RCP Storm Drain Piping	lf	500	$191.00	$95,500.00
6	36" RCP Storm Drain Piping	lf	600	$202.00	$121,200.00
7	New 48" SD MH	ea	1	$4,000.00	$4,000.00
8	New 60" SD MH	ea	2	$4,250.00	$8,500.00
9	New 84" SD MH	ea	1	$5,000.00	$5,000.00
10	Tee Connections	ea	4	$600.00	$2,400.00
11	Permitting Process	ls	1	$2,000.00	$2,000.00
12	AC Pavement Repair/Trench Patching	sf	7240	$4.00	$28,960.00
		Construction Total			$ 374,951.20
		Contingency (20%)			$74,990.24
		Subtotal			$ 449,941.44
		Engineering (20%)			$89,988.29
		Administrative Costs (3%)			$13,498.24
		Total Project Cost			**$553,427.97**

Project N2-18" Storm Drain Line along NE Iler St.

Figure N.2 – Project Area Image

The system lacking capacity along Iler street consists of two pipes with an ability to convey 6.41 CFS of storm water while a 25-year storm event would convey 13.41 CFS to the inlet of the pipe. Improvements along NE Iler St. include the installment of 240' of 18" RCP increasing the system capacity to 18.91 CFS. The project's cost estimate is shown in Table N.2 and depiction is displayed in Figure N.2..

Table N.2 – Cost Estimate

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$8,114.40	$8,114.40
2	Construction Facilities/Temporary Controls	ls	1	$1,803.20	$1,803.20
3	Demolition & Site Prep	ls	1	$3,606.40	$3,606.40
4	18" RCP Storm Drain Piping	lf	240	$136.00	$32,640.00
5	New 48" SD MH	ea	2	$4,000.00	$8,000.00
6	Tee Connections	ea	1	$600.00	$600.00
7	AC Pavement Repair/Trench Patching	sf	960	$4.00	$3,840.00
		Construction Total			$ 58,604.00
		Contingency (20%)			$11,720.80
		Subtotal			$ 70,324.80
		Engineering (20%)			$14,064.96
		Administrative Costs (3%)			$2,109.74
		Total Project Cost			**$86,499.50**

8.1.8 Basin P

Ditch lines around inlets at driveway culverts need to be cleared along NW Edenview Street. Also the culvert extending northeast from the intersection of NW Edevnview St. and NW Ocean View Dr. is 70% blocked with sediment at the inlet side of the pipe. With the sediment and ditches cleared, the system has capacity to handle a 25-year storm event, but not a 50-year storm event. However, as none of this system crosses a major highway, meeting the conveyance requirements of a 25-year storm event is adequate. An improvement project was not developed for this basin as there is very minimal work to be done, and it would be classified more as typical system maintenance than needed improvements.

8.1.9 Basin Q

Project Q1 – Storm Drain System Capacity Increase along NW Nye St.

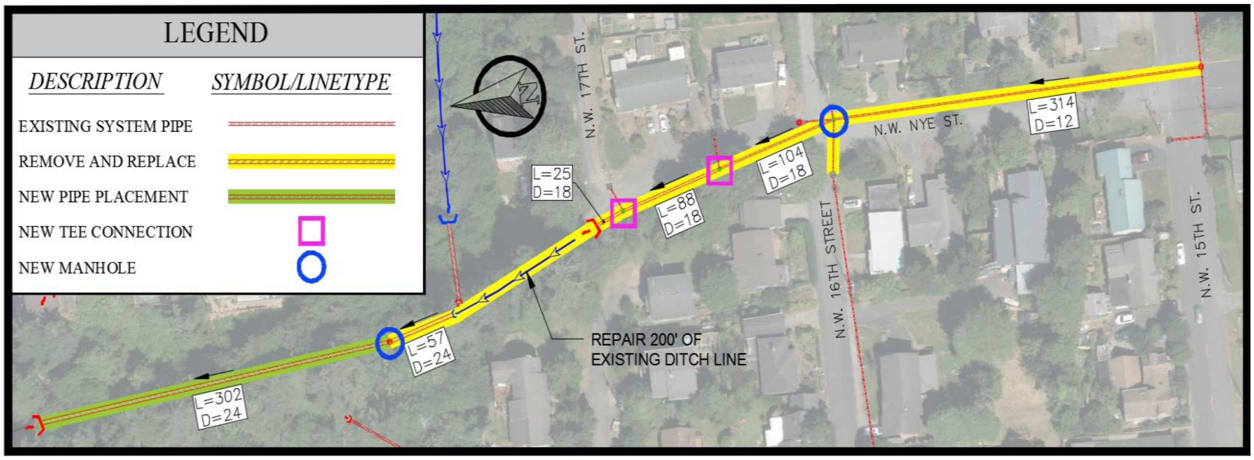


Figure Q.1 – Project Area Image

A resident complained of flooding from the existing storm drain system along NW Nye Street between NW 15th and 17th street. The system model also predicts insufficient capacity in this area as the 25-year storm produces roughly 3.54 CFS of storm water that cannot be contained within the existing system. This is primarily due to insufficient pipe sizes (8”) as well as a ditch line at the north end of the system which is littered with obstructions.

To address the described deficiencies the following is recommended: Approximately 530’ of 8” storm drain line along NW Nye St. should be increased to 12” then 18” further downstream. To address the capacity issues related to the ditch line, approximately 200’ of this ditch line needs to be repaired or reconstructed to match a trapezoidal ditch configuration.

There are further flow restrictions downstream of the suggested ditch line reconstruction. Beyond this point, Nye Creek traverses alongside an infrastructure access road. The creek is conveyed under this roadway two times as it travels to outfall Q1. The inlet and outlets of the culverts along with the ditch line/creek waterway is full of sediment, and cluttered with obstructions. It is recommended to collect Nye Creek into a single 24” pipe which runs the length of the access road. This will require the placement of approximately 302’ of 24” RCP. This improvement was originally discussed in the ‘Public Facilities Plan-City of Newport, CH2MHill, 1990’.

The project’s cost estimate is shown in Table Q.1 and depiction is displayed in Figure Q.1.

Table Q.1 – Cost Estimate

	PROJECT Q1 COST ESTIMATE				
Item No.	*Description*	*Units*	*Quantity*	*Unit Cost*	*Total Cost*
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$27,377.82	$27,377.82
2	Construction Facilities/Temporary Controls	ls	1	$6,083.96	$6,083.96
3	Demolition & Site Prep	ls	1	$12,167.92	$12,167.92
4	12" PVC Storm Drain Piping	lf	314	$125.00	$39,250.00
5	18" RCP Storm Drain Piping	lf	217	$136.00	$29,512.00
5	24" RCP Storm Drain Piping	lf	359	$163.00	$58,517.00
6	New 48" SD MH	ea	2	$4,000.00	$8,000.00
7	Tee Connections	ea	2	$600.00	$1,200.00
8	Ditch Repair-Trapezoidal	lf	200	$6.00	$1,200.00
9	AC Pavement Repair/Trench Patching	sf	3605	$4.00	$14,420.00
		Construction Total			$ 197,728.70
		Contingency (20%)			$39,545.74
		Subtotal			$ 237,274.44
		Engineering (20%)			$47,454.89
		Administrative Costs (3%)			$7,118.23
		Total Project Cost			**$291,847.56**

8.1.10 Basin R

Project R1 - Storm Drain capacity increase along NW Spring St.

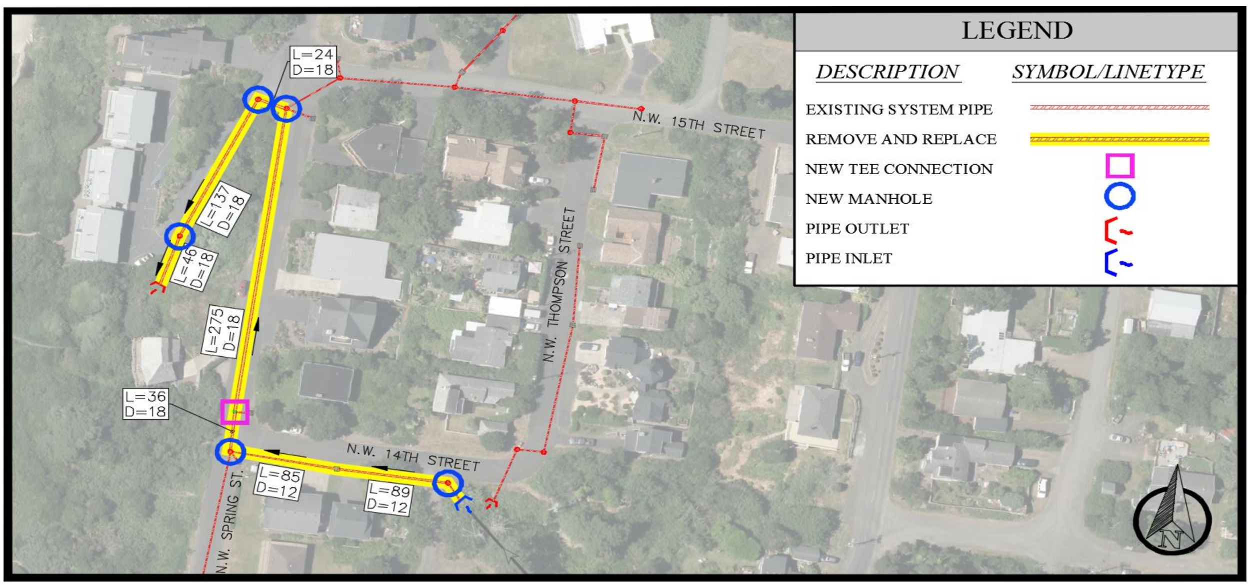


Figure R.1 – Project Area Image

This system lacks capacity. All pipes but the two nearest the outfall are 8”. The 8” pipe running along NW 14th St. experiences a peak runoff flow of 4.22 CFS, while only having the capacity for 1.85 CFS (assuming a 2% slope). The 8” pipe running north from the intersection of NW 14th Street & NW Spring Street experiences a peak runoff rate of 7.43 CFS, while also having a capacity of 1.85 CFS. Downstream of this section of pipe, the 10” pipe leading to the outfall also lack sufficient capacity for a 25-year storm event.

To address these system deficiencies the 8” pipe along these runs must be removed and replaced, and will include the following: Installment of 175’ of 12” PVC pipe, and 500’ of 18” pipe. The project’s cost estimate is shown in Table R.1 and depiction is displayed in Figure R.1.

Table R.1 – Cost Estimate

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
	PROJECT R1 COST ESTIMATE				
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$22,063.50	$22,063.50
2	Construction Facilities/Temporary Controls	ls	1	$4,903.00	$4,903.00
3	Demolition & Site Prep	ls	1	$9,806.00	$9,806.00
4	12" PVC Storm Drain Piping	lf	175	$125.00	$21,875.00
5	18" RCP Storm Drain Piping	lf	500	$136.00	$68,000.00
6	New 48" SD MH	ea	5	$4,000.00	$20,000.00
7	Tee Connections	ea	1	$600.00	$600.00
8	Development of Easment	ls	1	$2,000.00	$2,000.00
9	AC Pavement Repair/Trench Patching	sf	2525	$4.00	$10,100.00
		Construction Total			$ 159,347.50
		Contingency (20%)			$31,869.50
		Subtotal			$ 191,217.00
		Engineering (20%)			$38,243.40
		Administrative Costs (3%)			$5,736.51
		Total Project Cost			**$235,196.91**

8.1.11 Basin T

Basin T contains storm drain components that are in need of replacement due to either insufficient capacity, or pipes are currently located under existing structures. These recommended improvements will be divided into these two categories of improvements.

Insufficient Capacity

Project T1 - Storm Drain capacity increase along NW Nye St.

Figure T.1 – Project Area Image

Table T.1 – Cost Estimate

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
	PROJECT T1 COST ESTIMATE				
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$4,762.26	$4,762.26
2	Construction Facilities/Temporary Controls	ls	1	$1,058.28	$1,058.28
3	Demolition & Site Prep	ls	1	$2,116.56	$2,116.56
4	12" PVC Storm Drain Piping	lf	161	$125.00	$20,125.00
5	New 48" SD MH	ea	1	$4,000.00	$4,000.00
6	Curb & Gutter	lf	20	$20.00	$400.00
7	AC Pavement Repair/Trench Patching	sf	483	$4.00	$1,932.00
		Construction Total			$ 34,394.10
		Contingency (20%)			$6,878.82
		Subtotal			$ 41,272.92
		Engineering (20%)			$8,254.58
		Administrative Costs (3%)			$1,238.19
		Total Project Cost			**$50,765.69**

The 8” pipe extending north from the manhole structure northeast of the NW 8th St. and NW Nye St. intersection has a capacity of 4.14 CFS, however a 25-year storm will deliver 5.35 CFS to the pipe inlet.

To address this, 161' of this 8" pipe will be increased to 12". The project's cost estimate is shown in Table T.1 and depiction is displayed in Figure T.1.

Project T2 - Storm Drain capacity increase along NW Coast St.

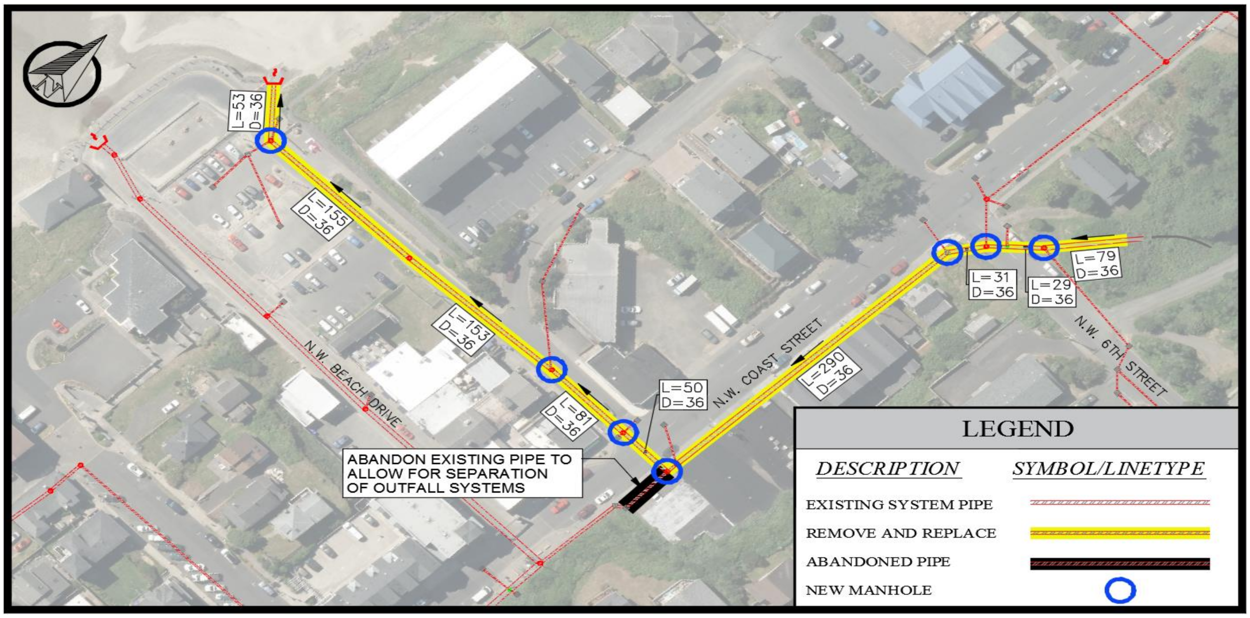


Figure T.2 – Project Area Image

The 24" pipe located at the NW 6th St. and NW Coast St. intersection is the last pipe into which Nye Creek flows, and has a capacity of 39.29 CFS which is insufficient to convey the 69.71 CFS estimated to be drained to the inlet as a result of a 25-year storm event. The capacity insufficiency continues from this point in the storm drain system to the outfall T1. Increasing the pipe size from 24" to 36" will allow for complete conveyance of the storm water flow. Additionally, the two outfalls extending west along NW Beach Drive are currently combined, and with this suggested improvement, the two systems will be separated into two independent systems. This additional design component will include the abandonment and filling of 50' of 24" pipe. The project's cost estimate is shown in Table T.2 and depiction is displayed in Figure T.2.

Table T.2 – Cost Estimate

	PROJECT T2 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$45,967.32	$45,967.32
2	Construction Facilities/Temporary Controls	ls	1	$10,214.96	$10,214.96
3	Demolition & Site Prep	ls	1	$20,429.92	$20,429.92
4	36" RCP Storm Drain Piping	lf	921	$202.00	$186,042.00
5	New 60" SD MH	ea	6	$4,250.00	$25,500.00
6	New 84" SD MH	ea	1	$5,000.00	$5,000.00
7	Tee Connections	ea	2	$600.00	$1,200.00
8	Poured in Place Outfall Structure	ea	1	$15,000.00	$15,000.00
9	Abandonement of Exisiting Line-Concrete Fill	cy	6	$88.00	$528.00
10	AC Pavement Repair/Trench Patching	sf	5526	$4.00	$22,104.00
		Construction Total			$ 331,986.20
		Contingency (20%)			$66,397.24
		Subtotal			$ 398,383.44
		Engineering (20%)			$79,676.69
		Administrative Costs (3%)			$11,951.50
		Total Project Cost			**$490,011.63**

Project T3 - Storm Drain capacity increase along NW Spring St.

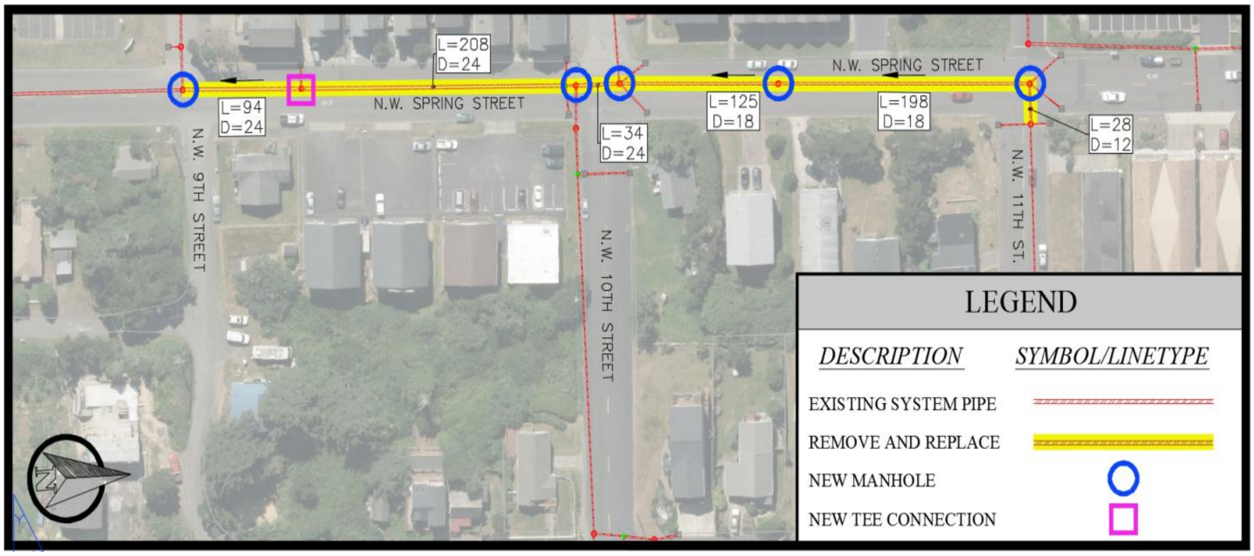


Figure T.3 – Project Area Image

The 8” pipe extending from the NW 11th St. & NW Spring St. intersection has a capacity of .91 CFS assuming a slope of .76%, while a 25-year storm event will deliver approximately 3.12 CFS to this pipe. This system must be increased in size from this point to the downstream intersection of NW 9TH St. & NW Spring Street. This improvement includes approximately 325’ of 18” pipe, and 340’ of 24’ pipe. The project’s cost estimate is shown in Table T.3 and depiction is displayed in Figure T.3.

Table T.3 – Cost Estimate

	PROJECT T3 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$24,823.08	$24,823.08
2	Construction Facilities/Temporary Controls	ls	1	$5,516.24	$5,516.24
3	Demolition & Site Prep	ls	1	$11,032.48	$11,032.48
4	12" PVC Storm Drain Piping	lf	28	$125.00	$3,500.00
5	18" RCP Storm Drain Piping	lf	325	$136.00	$44,200.00
6	24" RCP Storm Drain Piping	lf	340	$163.00	$55,420.00
7	New 60" SD MH	ea	5	$4,250.00	$21,250.00
8	Tee Connections	ea	2	$600.00	$1,200.00
9	AC Pavement Repair/Trench Patching	sf	3084	$4.00	$12,336.00
		Construction Total			$ 179,277.80
		Contingency (20%)			$35,855.56
		Subtotal			$ 215,133.36
		Engineering (20%)			$43,026.67
		Administrative Costs (3%)			$6,454.00
		Total Project Cost			**$264,614.03**

Under Existing Privately Owned Land and/or Structures

Project T4 – Re-alignment of pipe under Sunwest/Honda/Mazda building

An existing 24” storm drain line extends southwest from the NE 10th Crt. & NE Avery St. intersection. Downstream of this intersection this storm drain line conveys water under the Sunwest Honda/Mazda building and further downstream on the west side of Hwy. 101.the pipe travels under the corner of the Sacred Heart Catholic Church building. The storm drain line must be realigned to avoid all existing structures. Numerous routes were examined, but one was more cost effective, and practical for the given system. This alternative, directs the storm water south from the originally described intersection, then west along NE 10th St., across Hwy. 101, north along Hwy. 101, and west on NW 10th St. to NW Nye Street. This path will reverse the existing storm drain flow along part of NE Avery St., but in doing this; the storm drain system can collect the runoff being conveyed through all existing storm drain components along Hwy. 101. This will allow for complete abandonment of the 24" storm drain pipe lying under the existing structures. This recommended improvement is shown in Figure T.4 along with the improvements recommended in project *T5 & T6*. A cost estimate for this improvement is shown in Table T.4.

Table T.4 – Cost Estimate

	PROJECT T4 COST ESTIMATE				
Item No.	*Description*	*Units*	*Quantity*	*Unit Cost*	*Total Cost*
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$104,034.96	$104,034.96
2	Construction Facilities/Temporary Controls	ls	1	$23,118.88	$23,118.88
3	Demolition & Site Prep	ls	1	$46,237.76	$46,237.76
4	30" RCP Storm Drain Piping	lf	492	$191.00	$93,972.00
5	36" RCP Storm Drain Piping	lf	1502	$202.00	$303,404.00
6	36" RCP Storm Drain Piping (10'+ Cover)	lf	160	$314.00	$50,240.00
7	36" RCP Storm Drain Piping-Jack and Bore	lf	70	$250.00	$17,500.00
8	New 60" SD MH	ea	4	$4,250.00	$17,000.00
9	New 84" SD MH	ea	2	$5,000.00	$10,000.00
10	Abandonement of Exisiting Line-Concrete Fill	cy	85	$88.00	$7,480.00
11	Additional Appurtunaces	ls	1	$25,000.00	$25,000.00
12	AC Pavement Repair/Trench Patching	sf	13344	$4.00	$53,376.00
		Construction Total			$ 751,363.60
		Contingency (20%)			$150,272.72
		Subtotal			$ 901,636.32
		Engineering (20%)			$180,327.26
		Administrative Costs (3%)			$27,049.09
		Total Project Cost			**$1,109,012.67**

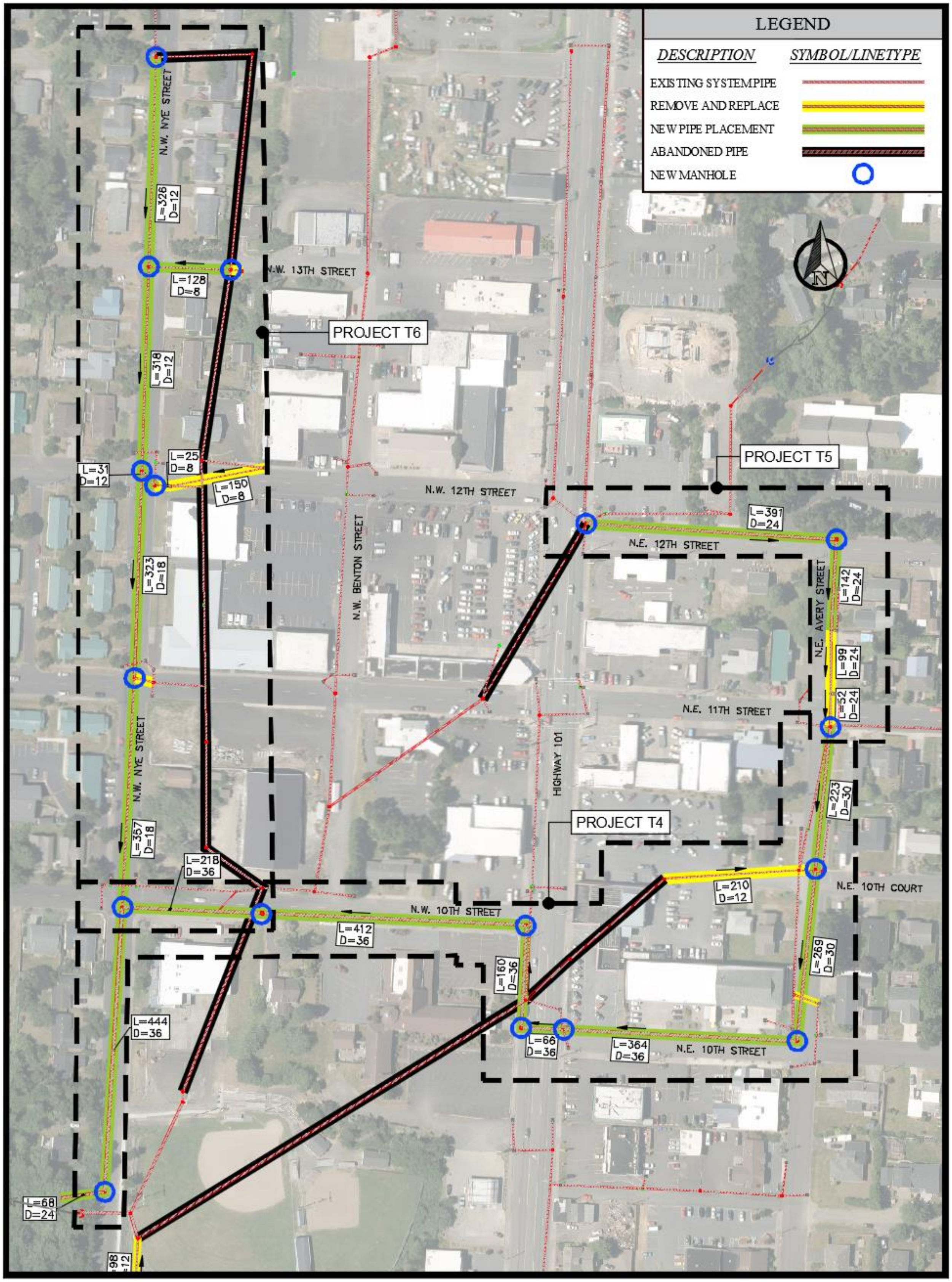


Figure T.4 – Project Area Image

Project T5 – Re-alignment of pipe under Ford dealership building

Table T.5 – Cost Estimate

	PROJECT T5 COST ESTIMATE				
Item No.	*Description*	*Units*	*Quantity*	*Unit Cost*	*Total Cost*
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$25,439.76	$25,439.76
2	Construction Facilities/Temporary Controls	ls	1	$5,653.28	$5,653.28
3	Demolition & Site Prep	ls	1	$11,306.56	$11,306.56
4	24" RCP Storm Drain Piping	lf	694	$163.00	$113,122.00
5	New 48" SD MH	ea	2	$4,000.00	$8,000.00
6	New 60" SD MH	ea	1	$4,250.00	$4,250.00
7	Tee Connections	ea	2	$600.00	$1,200.00
8	Abandonement of Exisiting Line-Concrete Fill	cy	10	$88.00	$880.00
9	AC Pavement Repair/Trench Patching	sf	3470	$4.00	$13,880.00
		Construction Total			$ 183,731.60
		Contingency (20%)			$36,746.32
		Subtotal			$ 220,477.92
		Engineering (20%)			$44,095.58
		Administrative Costs (3%)			$6,614.34
		Total Project Cost			**$271,187.84**

Northwest of the NW 11th St. & Hwy. 101 intersection a 12” storm drain pipe conveys storm water under the Ford dealership building. This pipe should be filled and abandoned. The alternate path for the storm water flow beginning at the intersection of Hwy. 101 and NE 12th St. would be east along 12th St. then south along NE Avery Street where it would connect with the new Project T4 piping at the NE 11th St. and NE Avery St. intersection. This path would require the placement of approximately 684’ of 24” pipe. This recommended improvement is shown in Figure T.4 along with the improvements recommended in project *T4 & T6*. A cost estimate for this improvement is shown in Table T.5.

Project T6 – Re-alignment of pipe under Church of the Nazarine building

An 18” Storm drain pipe that is just east of NW Nye St. and travels south between NW 13th St. and NW 11th St. conveys storm water under the Church of the Nazarene and a private residence. In addition to traveling under existing structures this storm drain system north of NW 13th St. lies out of the R.O.W and navigates through the back yards of local residents. It is recommended to abandon all storm drain piping currently existing outside of the street R.O.W. between NW Nye St. and NW Benton Street, and to construct a storm drain system within the NW Nye St. R.O.W that collects the storm water previously conveyed through the existing system. This approach would have the preferable end product (Storm Drain system within City R.O.W), but would be more expensive, and any roof drains or area drains connecting to the line would have to find other conveyance pathways. This could be a difficult and expensive process. The expense of these connections is not reflected in the cost estimate for this improvement. This recommended improvement is shown in Figure T.4 along with the improvements recommended in project *T4 & T5*. A cost estimate for this improvement is shown in Table T.6.

Table T.6 – Cost Estimate

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
	PROJECT T6 COST ESTIMATE				
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$38,390.65	$38,390.65
2	Construction Facilities/Temporary Controls	ls	1	$8,531.26	$8,531.26
3	Demolition & Site Prep	ls	1	$17,062.51	$17,062.51
4	8" PVC Storm Drain Piping	lf	303	$50.03	$15,157.58
5	12" PVC Storm Drain Piping	lf	705	$57.50	$40,537.50
6	18" RCP Storm Drain Piping	lf	680	$89.70	$60,996.00
7	Water Quality Catch Basin (2' x 2')	each	3	$5,500.00	$16,500.00
8	New 48" SD MH	ea	6	$4,500.00	$27,000.00
9	Abandonement of Exisiting Line-Concrete Fill	cy	342	$88.00	$30,114.33
10	AC Pavement Repair/Trench Patching	sf	5744	$4.00	$22,976.00
		Construction Total			$ 277,265.83
		Contingency (20%)			$55,453.17
		Subtotal			$ 332,718.99
		Engineering (20%)			$66,543.80
		Administrative Costs (3%)			$9,981.57
		Total Project Cost			**$409,244.36**

8.1.12 Basin U

Similar to basin T, this basin contains storm drain components in need of replacement for one of two reasons. One reason being insufficient capacity, while the other is the need to remove storm drain components from under existing structures. These recommended improvements will be divided into these two categories.

Insufficient Capacity

Project U1 - Storm Drain capacity increase along NE Douglas St.

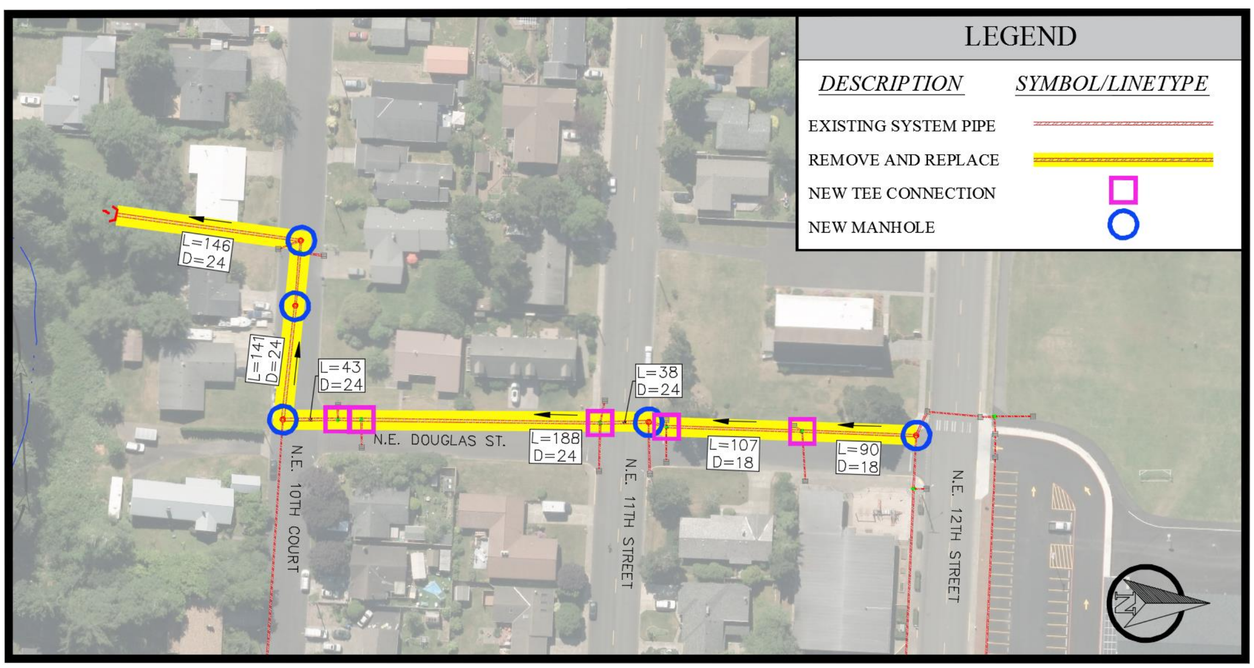


Figure U.1 – Project Area Image

The 12" pipe extending from the manhole at the intersection of 12th St. and NE Douglas St. will experience approximately 8.32 CFS of storm water flow during a 25-year storm event. The downstream pipe is only capable of handling 3.74 CFS. All the 12" pipes downstream of this point will need to be increased in size. The project's cost estimate is shown in Table U.1 and depiction is displayed in Figure U.1.

Table U.1 – Cost Estimate

	PROJECT U1 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$28,609.56	$28,609.56
2	Construction Facilities/Temporary Controls	ls	1	$6,357.68	$6,357.68
3	Demolition & Site Prep	ls	1	$12,715.36	$12,715.36
4	18" RCP Storm Drain Piping	lf	197	$136.00	$26,792.00
5	24" RCP Storm Drain Piping	lf	556	$163.00	$90,628.00
6	Tee Connections	ea	5	$600.00	$3,000.00
6	New 48" SD MH	ea	5	$4,000.00	$20,000.00
7	New 60" SD MH	ea	1	$4,250.00	$4,250.00
8	AC Pavement Repair/Trench Patching	sf	3568	$4.00	$14,272.00
		Construction Total			$ 206,624.60
		Contingency (20%)			$41,324.92
		Subtotal			$ 247,949.52
		Engineering (20%)			$49,589.90
		Administrative Costs (3%)			$7,438.49
		Total Project Cost			**$304,977.91**

Project U2 - Storm Drain capacity increase along NW 3rd Court

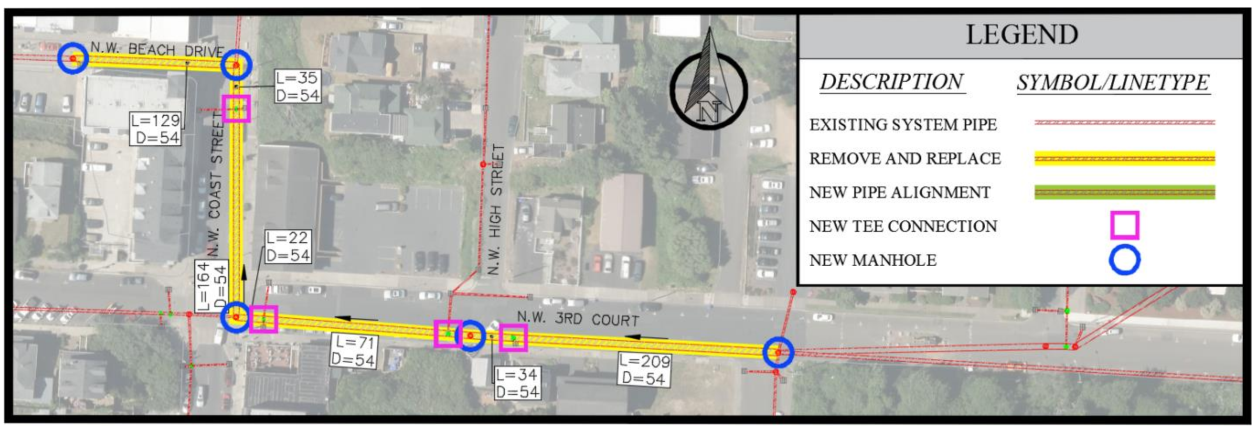


Figure U.2 – Project Area Image

The 42" pipe line leading from the Surfside Mobile Village and extending to outfall 'N1' reaches a point at which its capacity drops below the required conveyance for a 25-year storm event. This location is the intersection of NW 3RD Street and NW Brook Street. As the storm water from different areas is brought together at this intersection the totaled storm water flow requirement equals 143.80 CFS while the capacity of the pipe is 100.18 CFS. These pipes along with several of those downstream of it need to be increased to 54" diameter pipe to accommodate the specified storm event. This improvement would include: 554' of 54" pipe. The project's cost estimate is shown in Table U.2 and depiction is displayed in Figure U.2.

Table U.2 – Cost Estimate

	PROJECT U2 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$57,461.40	$57,461.40
2	Construction Facilities/Temporary Controls	ls	1	$12,769.20	$12,769.20
3	Demolition & Site Prep	ls	1	$25,538.40	$25,538.40
4	54"RCP Storm Drain Piping	lf	739	$336.00	$248,304.00
5	Tee Connections	ea	4	$600.00	$2,400.00
6	New 84" SD MH	ea	3	$5,000.00	$15,000.00
7	New 96" SD MH	ea	2	$7,000.00	$14,000.00
8	Curb & Gutter	lf	120	$20.00	$2,400.00
9	Sidewalk Replacement	sf	600	$20.00	$12,000.00
10	AC Pavement Repair/Trench Patching	sf	6282	$4.00	$25,126.00
		Construction Total			$ 414,999.00
		Contingency (20%)			$82,999.80
		Subtotal			$ 497,998.80
		Engineering (20%)			$99,599.76
		Administrative Costs (3%)			$14,939.96
		Total Project Cost			**$612,538.52**

Project U3 - Storm Drain capacity increase along NW Cliff St.

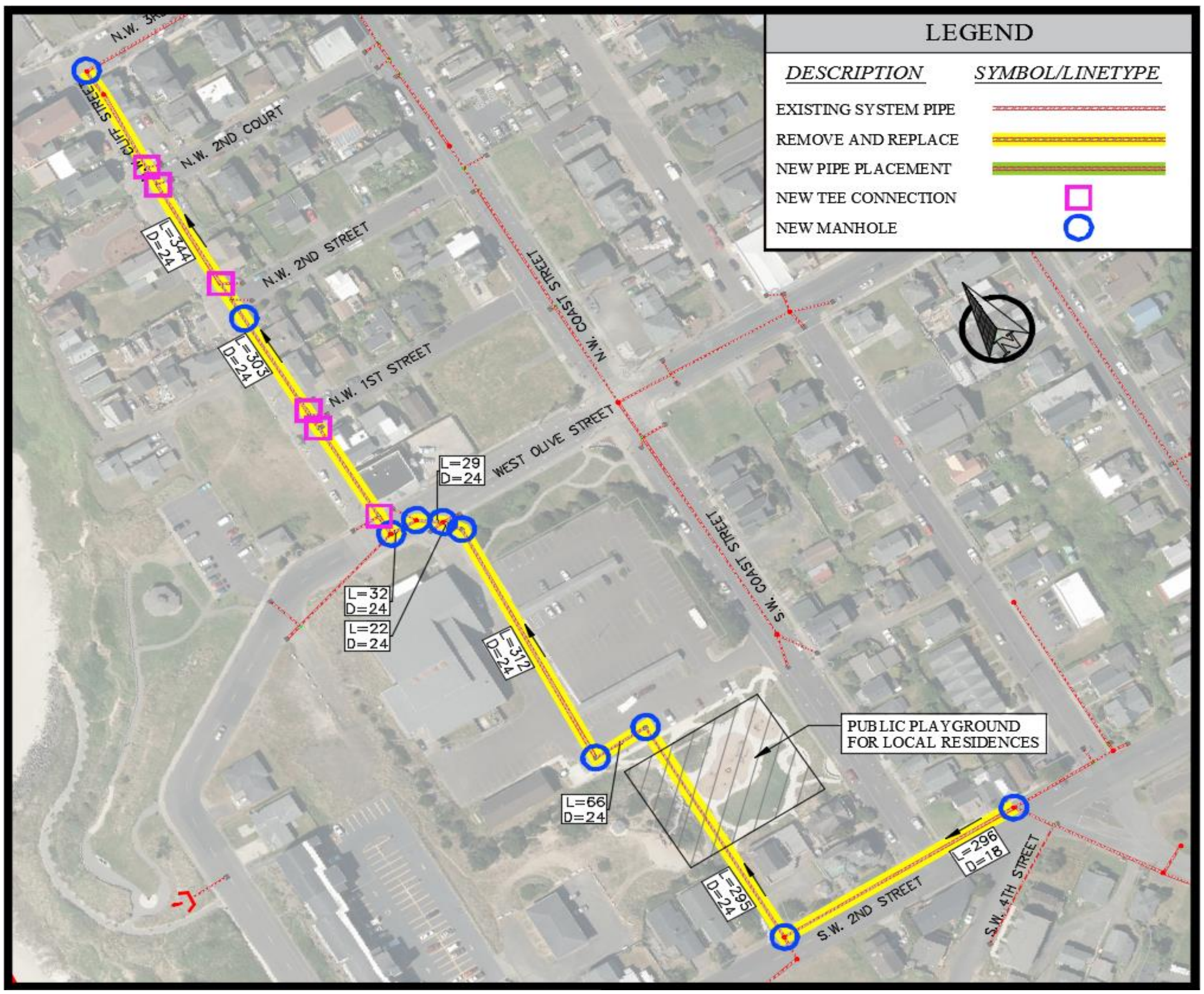


Figure U.3 – Project Area Image

Beginning at the intersection of SW 4th St. and SW 2nd St., the storm drain system lacks sufficient capacity for a 25-year storm event. The pipe at the initial intersection has a capacity of 6.46 CFS, while the storm event delivers 8.58 CFS. Increasing the system capacity to facilitate the storm event would include: placement of 296' of 18" pipe, and 1403' of 24" pipe. The project's cost estimate is shown in Table U.3 and depiction is displayed in Figure U.3.

Table U.3 – Cost Estimate

	PROJECT U3 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$62,296.38	$62,296.38
2	Construction Facilities/Temporary Controls	ls	1	$13,843.64	$13,843.64
3	Demolition & Site Prep	ls	1	$27,687.28	$27,687.28
4	18" RCP Storm Drain Piping	lf	296	$136.00	$40,256.00
5	24" RCP Storm Drain Piping	lf	1403	$163.00	$228,689.00
6	New 48" SD MH	ea	7	$4,000.00	$28,000.00
7	New 60" SD MH	ea	3	$4,250.00	$12,750.00
8	Tee Connections	ea	6	$600.00	$3,600.00
9	AC Pavement Repair/Trench Patching	sf	8199	$4.00	$32,796.00
		Construction Total			$ 449,918.30
		Contingency (20%)			$89,983.66
		Subtotal			$ 539,901.96
		Engineering (20%)			$107,980.39
		Administrative Costs (3%)			$16,197.06
		Total Project Cost			**$664,079.41**

Project U4 - Storm Drain capacity increase along NW 2nd St.

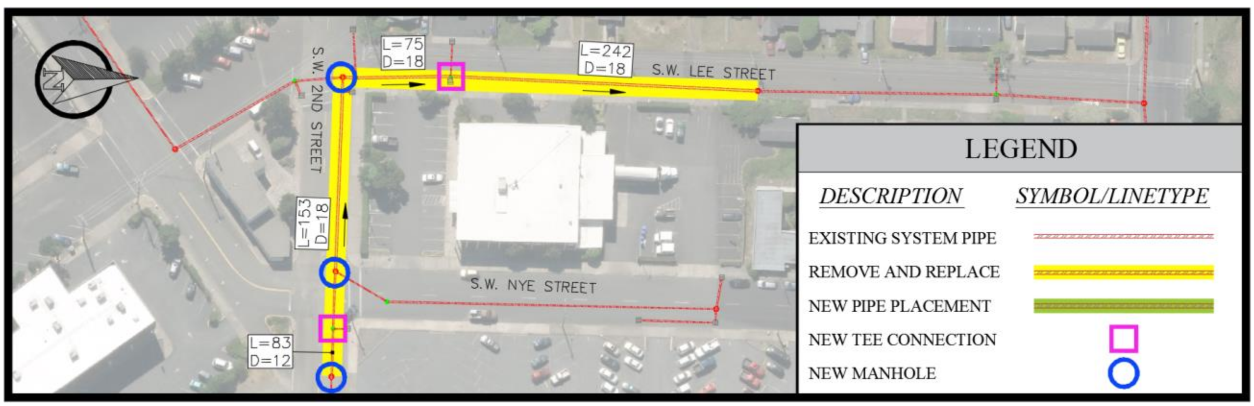


Figure U.4 – Project Area Image

Beginning east of the SW 2nd St. and SW Nye St. intersection, the storm drain system lacks sufficient capacity for a 25-year storm event. The pipe at the initial point of lacking capacity is capable of conveying 2.05 CFS, while the storm event delivers 3.18 CFS. Increasing the system capacity to facilitate the storm event would include: placement of 83' of 12" pipe, and 470' of 18" pipe. The project's cost estimate is shown in Table U.4 and depiction is displayed in Figure U.4.

Table U.4 – Cost Estimate

	PROJECT U4 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$15,928.38	$15,928.38
2	Construction Facilities/Temporary Controls	ls	1	$3,539.64	$3,539.64
3	Demolition & Site Prep	ls	1	$7,079.28	$7,079.28
4	12" PVC Storm Drain Piping	lf	83	$125.00	$10,375.00
5	18" RCP Storm Drain Piping	lf	470	$136.00	$63,920.00
6	New 48" SD MH	ea	3	$4,000.00	$12,000.00
7	Tee Connections	ea	2	$600.00	$1,200.00
8	AC Pavement Repair/Trench Patching	sf	249	$4.00	$996.00
		Construction Total			$ 115,038.30
		Contingency (20%)			$23,007.66
		Subtotal			$ 138,045.96
		Engineering (20%)			$27,609.19
		Administrative Costs (3%)			$4,141.38
		Total Project Cost			**$169,796.53**

Under Existing Privately Owned Land and/or Structures

Project U5 – Re-alignment of pipe under Cash and Carry and Washington Federal Building

Table U.5 – Cost Estimate

	PROJECT U5 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$229,526.33	$229,526.33
2	Construction Facilities/Temporary Controls	ls	1	$51,005.85	$51,005.85
3	Demolition & Site Prep	ls	1	$102,011.70	$102,011.70
4	8" PVC Storm Drain Piping	lf	353	$125.00	$44,125.00
5	12" PVC Storm Drain Piping	lf	133	$125.00	$16,625.00
6	24" RCP Storm Drain Piping	lf	256	$163.00	$41,728.00
7	30" RCP Storm Drain Piping	lf	80	$191.00	$15,280.00
8	30" RCP Storm Drain Piping (10'+ Cover)	lf	80	$291.00	$23,280.00
9	30" RCP Storm Drain Piping (20-30' Cover)	lf	108	$351.00	$37,908.00
10	42" RCP Storm Drain Piping (10'+ Cover)	lf	385	$363.00	$139,755.00
11	42" RCP Storm Drain Piping (20-30' Cover)	lf	385	$448.00	$172,480.00
12	54"RCP Storm Drain Piping	lf	971	$336.00	$326,256.00
13	54" RCP Storm Drain Piping (10'+ Cover)	lf	453	$526.00	$238,278.00
14	54" RCP Storm Drain Piping (20-30' Cover)	lf	186	$639.00	$118,854.00
15	New 48" SD MH	ea	2	$4,000.00	$8,000.00
16	New 60" SD MH	ea	1	$4,250.00	$4,250.00
17	New 72" SD MH	ea	1	$4,500.00	$4,500.00
18	New 96" SD MH (20-30' Deep)	ea	4	$11,900.00	$47,600.00
19	New 96" SD MH	ea	1	$7,000.00	$7,000.00
20	New 108" SD MH (20-30' Deep)	ea	5	$17,000.00	$85,000.00
21	Abandonement of Exisiting Line-Concrete Fill	cy	318	$88.00	$27,949.26
22	AC Pavement Repair/Trench Patching	sf	23806	$4.00	$95,224.00
		Construction Total			$ 1,836,636.13
		Contingency (20%)			$367,327.23
		Subtotal			$ 2,203,963.36
		Engineering (20%)			$440,792.67
		Administrative Costs (3%)			$66,118.90
		Total Project Cost			**$2,710,874.93**

The 24" pipe extending southwest from the Nye Creek inlet on NE 8th St. between NE Benton St. and NE Avery St. experiences a flow of storm water from a 25-year storm of approximately 36.74 CFS. The capacity of the 24" pipe is 16.09 CFS. In order to accommodate this flow, the pipe diameter must be increased to 42" and larger from this point to the downstream outfall.

In addition to addressing capacity issues this project also includes re-alignment of the storm drain system that is currently lying under existing structures. Directly downstream of the 24" pipe described is a 24" storm drain line extending southwest from the manhole on N.E 8th St. about half way between NE Avery St. and NE Benton Street. This 24" line conveys storm water under two homes and an apartment complex as it travels to the NE 7th St. and NE 8th St. intersection. From there the pipe increases to 36", and continues southwest under the corner of the Cash and Carry building, and to a parking lot just north of the NE 6th St. and Hwy. 101 intersection. The storm drain system then continues southwest, crosses Hwy.

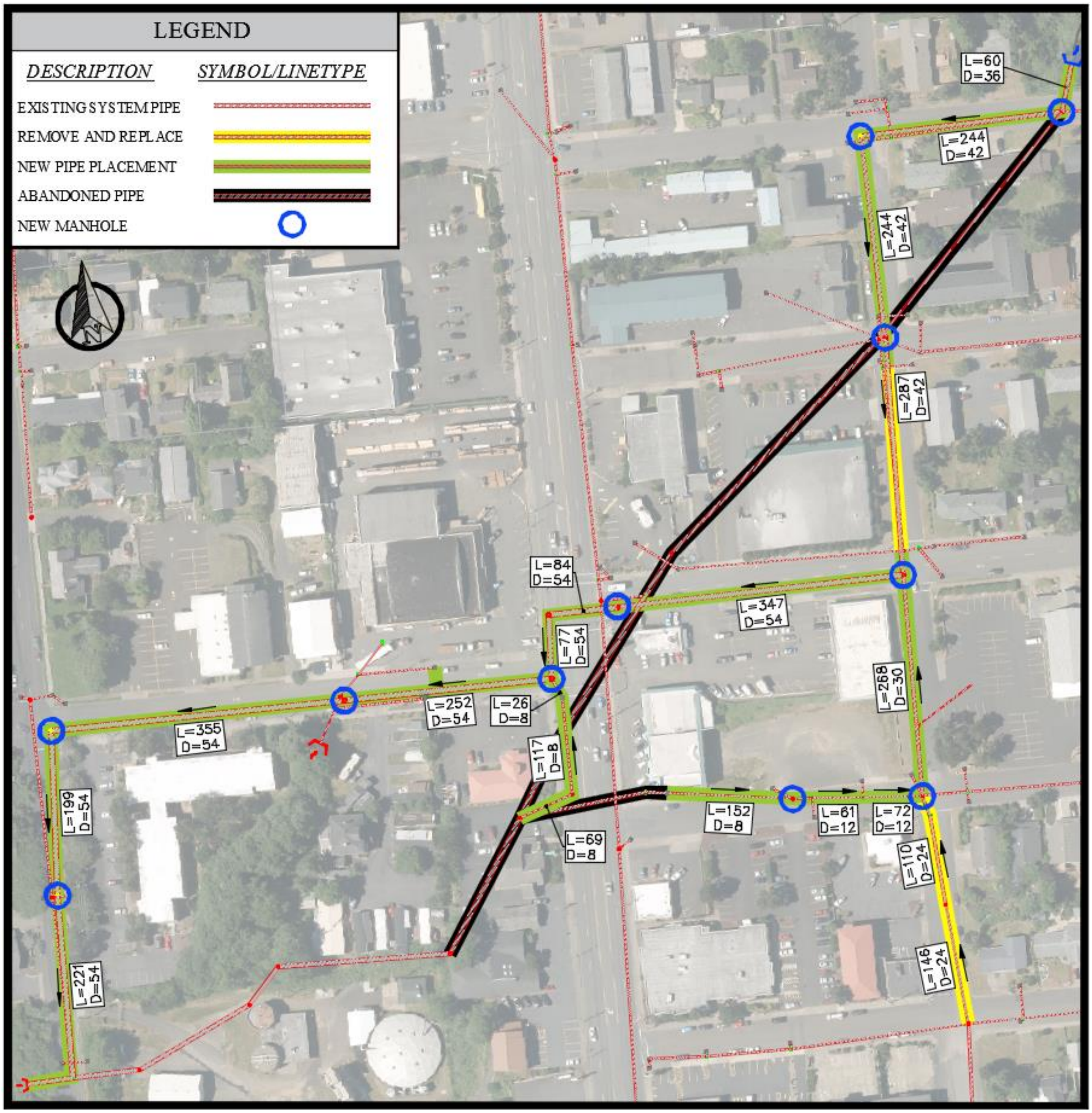


Figure U.5 – Project Area Image

101, conveys water under both the Windermere West Coast Properties building, and the Washington Federal Building. Once beyond the Federal building, the 42" pipe reaches the site of the City of Newport Wastewater Treatment Facility, and from there, it outfalls across NW Nye St. into the Nye Creek. This project proposes a re-alignment of several sections of the current piped system which will allow for the complete abandonment of all pipe sections traveling under existing structures. To facilitate this re-alignment and related pipe abandonments, the storm drain flow along NE 5th St. was reversed to now flow east to the NE 5th St. and NE Avery St. intersection. The project's cost estimate is shown in Table U.5 and depiction is displayed in Figure U.5.

Project U6 – Re-alignment of pipe under residences along NE 4th Street

Figure U.6 – Project Area Image

The 10" storm drain line between N.E Avery St. and NE Benton St. and extending from NE 3rd St. and to NE 4th St. needs to be re-aligned to avoid the private properties and one existing structure under which it travels. To achieve this, the storm drain system should be redirected west along NE 3rd St. from the beginning point of the described storm drain line to the manhole located at the NE 3rd St. and NE Avery St. intersection. This would include placement of 324' of 12" storm drain pipe. This stretch of pipe will be buried in excess of 20 feet at certain sections, therefore it is recommended to use a directional drilling process to lay the pipe. The project's cost estimate is shown in Table U.6 and depiction is displayed in Figure U.6.

Table U.6 – Cost Estimate

	PROJECT U6 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$2,026.85	$2,026.85
2	Construction Facilities/Temporary Controls	ls	1	$450.41	$450.41
3	Demolition & Site Prep	ls	1	$900.82	$900.82
4	12" PVC Storm Drain Piping (Directional Drill)	lf	313	$125.00	$39,125.00
5	New 48" SD MH	ea	1	$4,000.00	$4,000.00
6	Water Quality Catch Basin (2' x 2')	each	1	$5,500.00	$5,500.00
7	Abandonement of Exisiting Line-Concrete Fill	cy	20	$88.00	$1,760.26
		Construction Total			$ 53,763.34
		Contingency (20%)			$10,752.67
		Subtotal			$ 64,516.01
		Engineering (20%)			$12,903.20
		Administrative Costs (3%)			$1,935.48
		Total Project Cost			**$79,354.69**

8.1.13 Basin V

Project V1- Storm Drain capacity increase along SW Fall St.

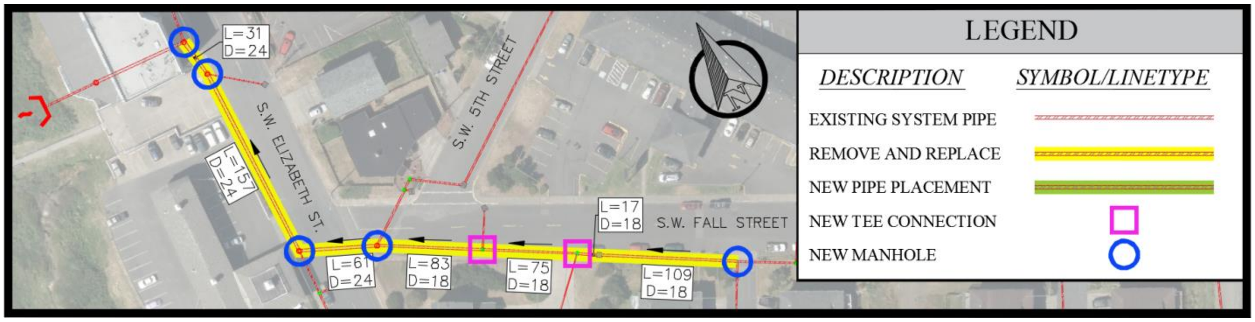


Figure V.1 – Project Area Image

The storm drain system along SW Fall St. conveys water from the southeast across Hwy. 101 to outfall V1. As the system traverses along SW Fall St. it collects the storm water from 3 separate apartment complexes on the south side of the road. The contribution from these residences results in a total flow resulting from a 25-year storm event of approximately 8.49 CFS delivered to the 12" downstream pipe which has a capacity of 5.49 CFS. This will result in surcharging and localized flooding.

To address the lacking capacity, it will require the placement of 284' of 18" pipe along SW Fall Street, and 249' of 24" pipe along SW Fall St. and SW Elizabeth Street. The project's cost estimate is shown in Table V.1 and depiction is displayed in Figure V.1.

Table V. 1 – Cost Estimate

	PROJECT V1 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$28,923.30	$28,923.30
2	Construction Facilities/Temporary Controls	ls	1	$6,427.40	$6,427.40
3	Demolition & Site Prep	ls	1	$12,854.80	$12,854.80
4	18" RCP Storm Drain Piping	lf	284	$136.00	$38,624.00
5	24" RCP Storm Drain Piping	lf	249	$163.00	$40,587.00
6	Tee Connections	ea	2	$600.00	$1,200.00
7	New 48" SD MH	ea	4	$4,000.00	$16,000.00
8	New 60" SD MH	ea	1	$4,250.00	$4,250.00
9	Sidewalk Replacement	sf	2525	$20.00	$50,500.00
10	AC Pavement Repair/Trench Patching	sf	2381	$4.00	$9,524.00
		Construction Total			$ 208,890.50
		Contingency (20%)			$41,778.10
		Subtotal			$ 250,668.60
		Engineering (20%)			$50,133.72
		Administrative Costs (3%)			$7,520.06
		Total Project Cost			**$308,322.38**

8.1.14 Basin X

Approximately 80% of the piping within basin X is currently undersized. As a result during most storm events the piped system fills and most of the storm water flows along the streets toward the low point. This is the cause of the current flooding issues at the intersection of Hwy. 101 and 9th Street.

Although most of the needed improvements are interlinked, and all part of the same system, these improvements have been broken into separate projects to better facilitate prioritization, and budgetary processes. These projects are separated into projects on the east side of Hwy.101 and the west side of Hwy. 101.

<u>Project X1-East of Hwy. 101</u>

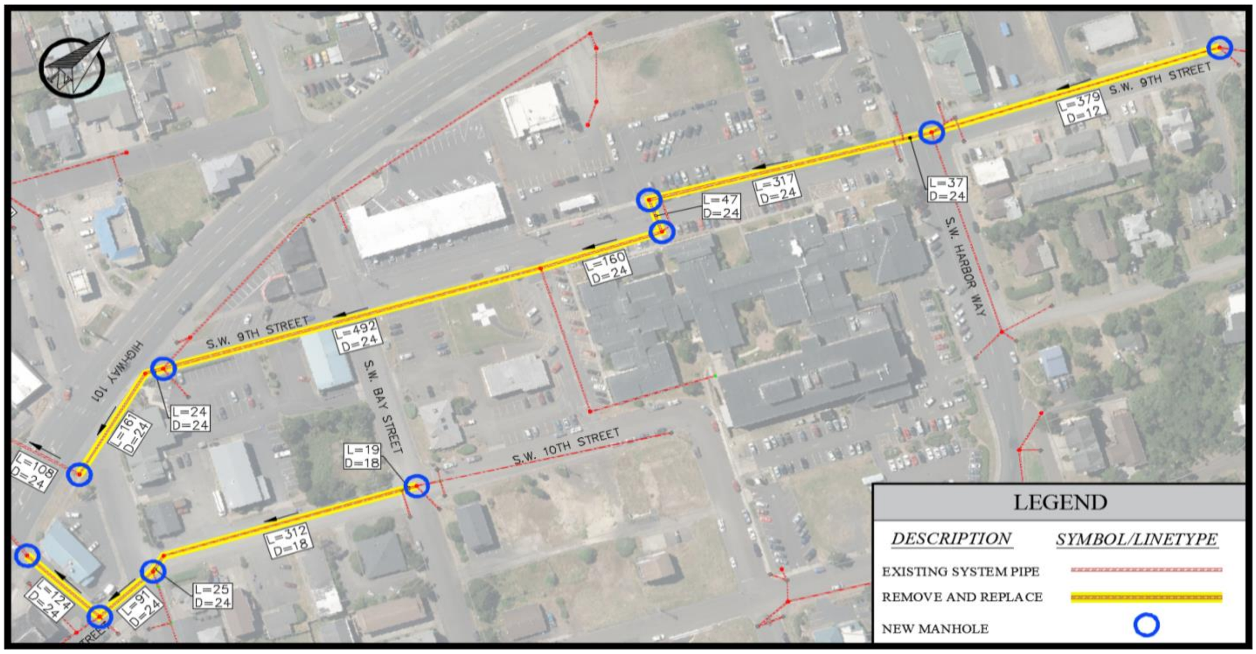


Figure X.1 – Project Area Image

This project addresses the improvements along SW 9th Street. The first point of lacking capacity is at the SW Fall cross street. The 8" line extending southwest from this intersection has a capacity of line beginning at the manhole at the intersection of 2.26 CFS, while a 50-year storm event delivers 7.03 CFS to this location in the piped system. All pipes downstream of this point lack capacity to carry the runoff from such a storm event. This project will include the placement of 379' of 12", and 1,077' of 24" pipe. 161' of the 24" line would be constructed along the east lane of Hwy. 101. The project's cost estimate is shown in Table X.1 and depiction is displayed in Figure X.1.

Table X.1 – Cost Estimate

	PROJECT X1 COST ESTIMATE				
Item No.	*Description*	*Units*	*Quantity*	*Unit Cost*	*Total Cost*
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$49,358.52	$49,358.52
2	Construction Facilities/Temporary Controls	ls	1	$10,968.56	$10,968.56
3	Demolition & Site Prep	ls	1	$21,937.12	$21,937.12
4	12" PVC Storm Drain Piping	lf	379	$125.00	$47,375.00
5	24" RCP Storm Drain Piping	lf	1077	$163.00	$175,551.00
6	Tee Connections	ea	2	$600.00	$1,200.00
7	New 48" SD MH	ea	6	$4,000.00	$24,000.00
8	AC Pavement Repair/Trench Patching	sf	6522	$4.00	$26,088.00
		Construction Total			$ 356,478.20
		Contingency (20%)			$71,295.64
		Subtotal			$ 427,773.84
		Engineering (20%)			$85,554.77
		Administrative Costs (3%)			$12,833.22
		Total Project Cost			**$526,161.82**

Project X2-East side of Hwy. 101-10th Street

This project addresses the improvements along SW 10th Street. The first point of lacking capacity is at the SW Bay cross street. The 8" line extending southwest from this intersection has a capacity of 2.26 CFS, while a 50-year storm event delivers 4.12 CFS to this location in the piped system. All pipes downstream of this point lack capacity to carry the runoff from such a storm event. This project will include the placement of 331' of 18, and 240' of 24" pipe. The project's cost estimate is shown in Table X.2 and depiction is displayed in Figure X.2.

Table X.2 – Cost Estimate

	PROJECT X2 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$20,057.76	$20,057.76
2	Construction Facilities/Temporary Controls	ls	1	$4,457.28	$4,457.28
3	Demolition & Site Prep	ls	1	$8,914.56	$8,914.56
4	18" RCP Storm Drain Piping	lf	331	$136.00	$45,016.00
5	24" RCP Storm Drain Piping	lf	240	$163.00	$39,120.00
6	Tee Connections	ea	2	$600.00	$1,200.00
7	New 48" SD MH	ea	4	$4,000.00	$16,000.00
8	AC Pavement Repair/Trench Patching	sf	2524	$4.00	$10,096.00
		Construction Total			$ 144,861.60
		Contingency (20%)			$28,972.32
		Subtotal			$ 173,833.92
		Engineering (20%)			$34,766.78
		Administrative Costs (3%)			$5,215.02
		Total Project Cost			**$213,815.72**

Project X3- West side of Hwy. 101

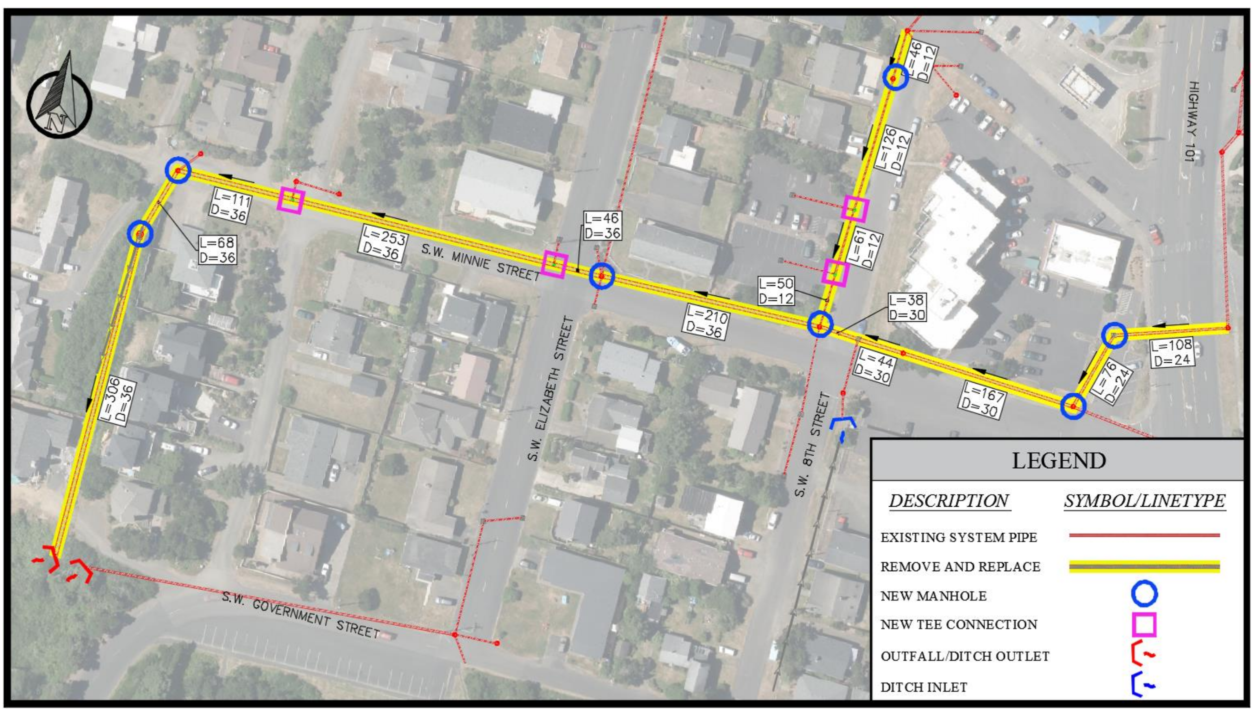


Figure X.2 – Project Area Image

This project addresses the improvements along the main trunk of the storm drain system stemming from SW 9th Street, across Hwy. 101 then to outfall X1. Also included in this project is the increase of pipe size along SW 8th St. from 8” to 12”. This entire section of storm drain along the main trunk line is lacking capacity, and must be increased in size to accommodate the resulting flows of a 50-year storm event. This will include placement of 233’ of 12”, 192’ of 24”, 249’ of 30”, and 994’ of 36” pipe. 108’ of the 24” line is recommended to jack and bore for the Hwy. 101 crossing. The project’s cost estimate is shown in Table X.3 and depiction is displayed in Figure X.2.

Table X.3 – Cost Estimate

	PROJECT X3 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$68,681.34	$68,681.34
2	Construction Facilities/Temporary Controls	ls	1	$15,262.52	$15,262.52
3	Demolition & Site Prep	ls	1	$30,525.04	$30,525.04
4	36" RCP Storm Drain Piping	lf	994	$202.00	$200,788.00
5	New 72" SD MH	ea	3	$4,500.00	$13,500.00
6	30" RCP Storm Drain Piping	lf	249	$191.00	$47,559.00
7	New 60" SD MH	ea	3	$4,250.00	$12,750.00
7	24" RCP Storm Drain Piping	lf	75	$163.00	$12,225.00
8	24" RCP Storm Drain Piping-Jack and Bore	lf	108	$160.00	$17,280.00
8	12" PVC Storm Drain Piping	lf	237	$125.00	$29,625.00
8	AC Pavement Repair/Trench Patching	sf	9084	$4.00	$36,336.00
8	Tee Connections	ea	10	$600.00	$6,000.00
8	Water Quality Catch Basin (2' x 2')	each	1	$5,500.00	$5,500.00
		Construction Total			$ 496,031.90
		Contingency (20%)			$148,809.57
		Subtotal			$644,841.47
		Engineering (20%)			$128,968.29
		Administrative Costs (3%)			$19,345.24
		Total Project Cost			**$793,155.01**

8.1.15 Basin Y

Project Y1 - Storm Drain capacity increase along SW 13th St.

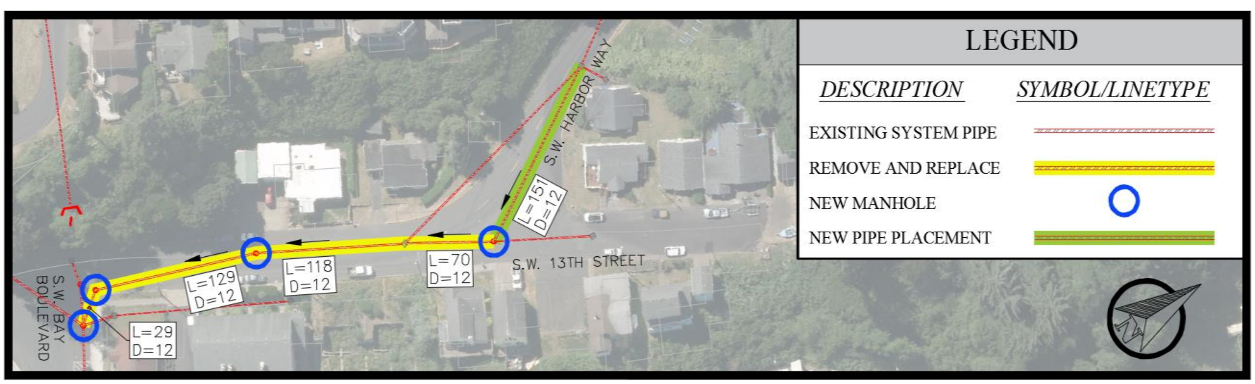


Figure Y.1 – Project Area Image

There is a 6” storm drain line running south along SW Harbor Way with a capacity of 2.14 CFS, while 4.55 CFS is required to convey the flow delivered to this point during a 25-year storm event. These pipes along with the 4 downstream pipes need to be increased to 12” in order to meet the capacity requirements. The project’s cost estimate is shown in Table Y.1 and depiction is displayed in Figure Y.1.

Table Y.1 – Cost Estimate

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
	PROJECT Y1 COST ESTIMATE				
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$15,352.02	$15,352.02
2	Construction Facilities/Temporary Controls	ls	1	$3,411.56	$3,411.56
3	Demolition & Site Prep	ls	1	$6,823.12	$6,823.12
4	12" PVC Storm Drain Piping	lf	497	$125.00	$62,125.00
5	Tee Connections	ea	2	$600.00	$1,200.00
6	New 48" SD MH	ea	4	$4,000.00	$16,000.00
7	Sidewalk Replacement	sf	0	$20.00	$0.00
8	AC Pavement Repair/Trench Patching	sf	1491	$4.00	$5,964.00
		Construction Total			$ 110,875.70
		Contingency (20%)			$22,175.14
		Subtotal			$ 133,050.84
		Engineering (20%)			$26,610.17
		Administrative Costs (3%)			$3,991.53
		Total Project Cost			**$163,652.53**

8.1.16 Basin AA

Project AA1 - Storm Drain capacity increase along SE Avery St.

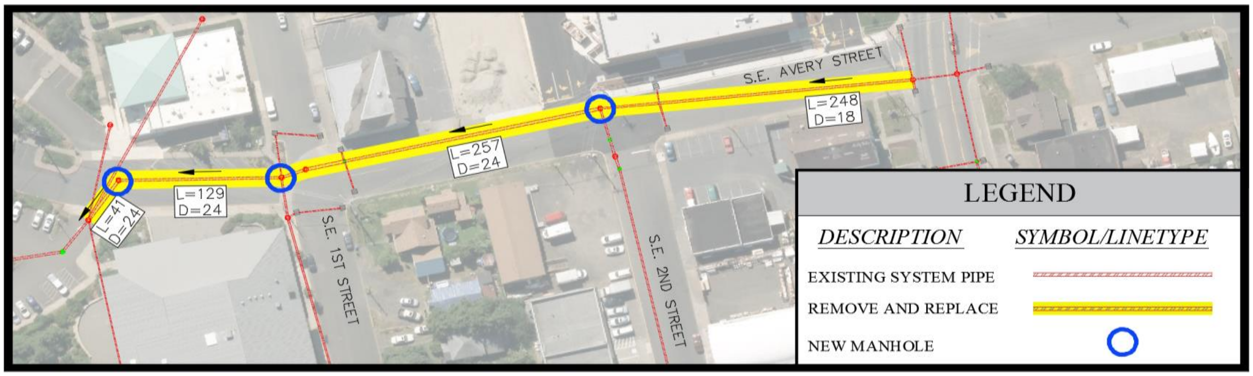


Figure AA.1 – Project Area Image

Table AA. 1 – Cost Estimate

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
	PROJECT AA1 COST ESTIMATE				
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$19,889.46	$19,889.46
2	Construction Facilities/Temporary Controls	ls	1	$4,419.88	$4,419.88
3	Demolition & Site Prep	ls	1	$8,839.76	$8,839.76
4	18" RCP Storm Drain Piping	lf	248	$136.00	$33,728.00
5	24" RCP Storm Drain Piping	lf	427	$163.00	$69,601.00
6	Tee Connections	ea	2	$600.00	$1,200.00
6	AC Pavement Repair/Trench Patching	sf	1492	$4.00	$5,968.00
		Construction Total			$ 143,646.10
		Contingency (20%)			$28,729.22
		Subtotal			$ 172,375.32
		Engineering (20%)			$34,475.06
		Administrative Costs (3%)			$5,171.26
		Total Project Cost			**$212,021.64**

This project addresses the developed storm drain system within basin AA1 (see the Storm Water Master Plan for basin boundaries). Most of the basin is drained through roadside ditches or natural landscape from the south end of the basin toward the bay. Certain components of the storm drain system along SE

3rd St. have recently been improved. However the downstream components have not, thus the system actually reduces in size from a 15” pipe upstream to a 12” pipe downstream. These downstream components are insufficiently sized to accommodate runoff from a 25-year storm event. To address this capacity insufficiency 248 and 427 linear feet of pipe shall be replaced with 18”, and 24” pipe. The project’s cost estimate is shown in Table AA.1 and depiction is displayed in Figure AA.1.

8.1.17 Basin AC

Project AC1 - Storm Drain capacity increase along Yaquina Bay Blvd.

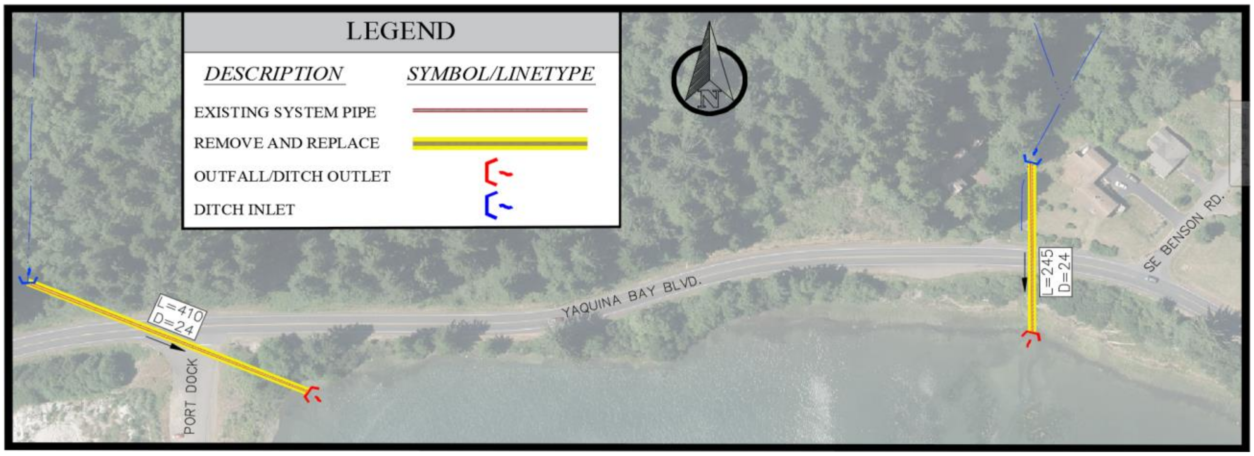


Figure AC.1 – Project Area Image

Amongst the several basins within the area defined as Basin AC there are two points requiring improvements to fully facilitate the conveyance of runoff resulting from the future developments within the area during 25-year storm event. The points of lacking capacity are at the culverts crossing under Yaquina Bay Road just east of the Port Dock, and just west of SE Benson road. Both of these pipes need to be increased in size to 24” pipes.

These culvert replacements were first mentioned in the ‘Public Facilities Plan-City of Newport, CH2MHill, 1990’, and then again mentioned as necessary improvements in the ‘Public Infrastructure System Development Charge Methodology, 2007’. The project’s cost estimate is shown in Table AC.1 and depiction is displayed in Figure AC.1.

Table AC. 1 – Cost Estimate

	PROJECT AC1 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$19,577.70	$19,577.70
2	Construction Facilities/Temporary Controls	ls	1	$4,350.60	$4,350.60
3	Demolition & Site Prep	ls	1	$8,701.20	$8,701.20
4	24" RCP Storm Drain Piping	lf	655	$163.00	$106,765.00
5	AC Pavement Repair/Trench Patching	sf	500	$4.00	$2,000.00
		Construction Total			$ 141,394.50
		Contingency (20%)			$28,278.90
		Subtotal			$ 169,673.40
		Engineering (20%)			$33,934.68
		Administrative Costs (3%)			$5,090.20
		Total Project Cost			**$208,698.28**

8.1.18 Basin AD

No specific storm drain piping deficiencies were identified or projects developed for Basin AD. Future development of the NOAA Marine Operations Center will require the developer to meet any existing City codes or ordinances relating to storm drain systems.

8.1.19 Basin AE

No specific storm drain piping deficiencies were identified or projects developed for Basin AE. As the Hatfield Marine Center expands over the planning period the developer will be required to follow any existing City codes or ordinances relating to storm drain systems when they construct the additional storm drain components for the planned expansion.

8.1.20 Basin AF

Project AF1- Future development storm drain infrastructure

Figure AF.1 – Project Area Image

Currently the system within basin AF is limited. Most of the basin is drained through roadside ditches or natural landscape from the south end of the basin toward the bay. The first component of the existing hard piped storm drain system is located at the intersection of SW 27th St. and SW Brant Street. The system runs along SW Brant and outfalls to the Bay through a 36" storm drain line. To better serve the current residents and future 131 EDUs that will be added during the planning period, it is recommended to expand the existing system. These new components will pick up runoff that is currently draining across private property, or ponding and infiltrating. The additional components collect runoff along the south end of SW Brant St., SW 29th St., and SW 30th Street.

These improvements were originally laid out in the 'Newport Coho/Brant, Infrastructure Refinement Plan', Cameron MCarthy, June 2012', and include: 581' of 12", 97' of 18", and 837' of 24" storm drain pipe. The project's cost estimate is shown in Table AF.1 and depiction is displayed in Figure AF.1.

Table AF.1 – Cost Estimate

	PROJECT AF1 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$60,122.16	$60,122.16
2	Construction Facilities/Temporary Controls	ls	1	$13,360.48	$13,360.48
3	Demolition & Site Prep	ls	1	$26,720.96	$26,720.96
4	12" PVC Storm Drain Piping	lf	581	$125.00	$72,625.00
5	18" RCP Storm Drain Piping	lf	97	$136.00	$13,192.00
6	24" RCP Storm Drain Piping	lf	837	$163.00	$136,431.00
7	New 48" SD MH	ea	7	$4,500.00	$31,500.00
8	Water Quality Catch Basin (2' x 2')	ea	10	$5,500.00	$55,000.00
9	AC Pavement Repair/Trench Patching	sf	6316	$4.00	$25,264.00
		Construction Total			$ 434,215.60
		Contingency (20%)			$86,843.12
		Subtotal			$ 521,058.72
		Engineering (20%)			$104,211.74
		Administrative Costs (3%)			$15,631.76
		Total Project Cost			**$640,902.23**

8.1.21 Basin AG

There is one area of lacking capacity within this basins piped system. The pipe runs east along SE 32nd Street. The excess runoff delivered to the SE 32nd St. system will back up into a ponding/wetland area which will drain when the storm dissipates, thus leaving no need for a recommended project. However, if future developments fill the described area, then this stretch of pipe will need to be upsized to a 24" pipe.

Project AG1 – Drainage ditch development and rehabilitation

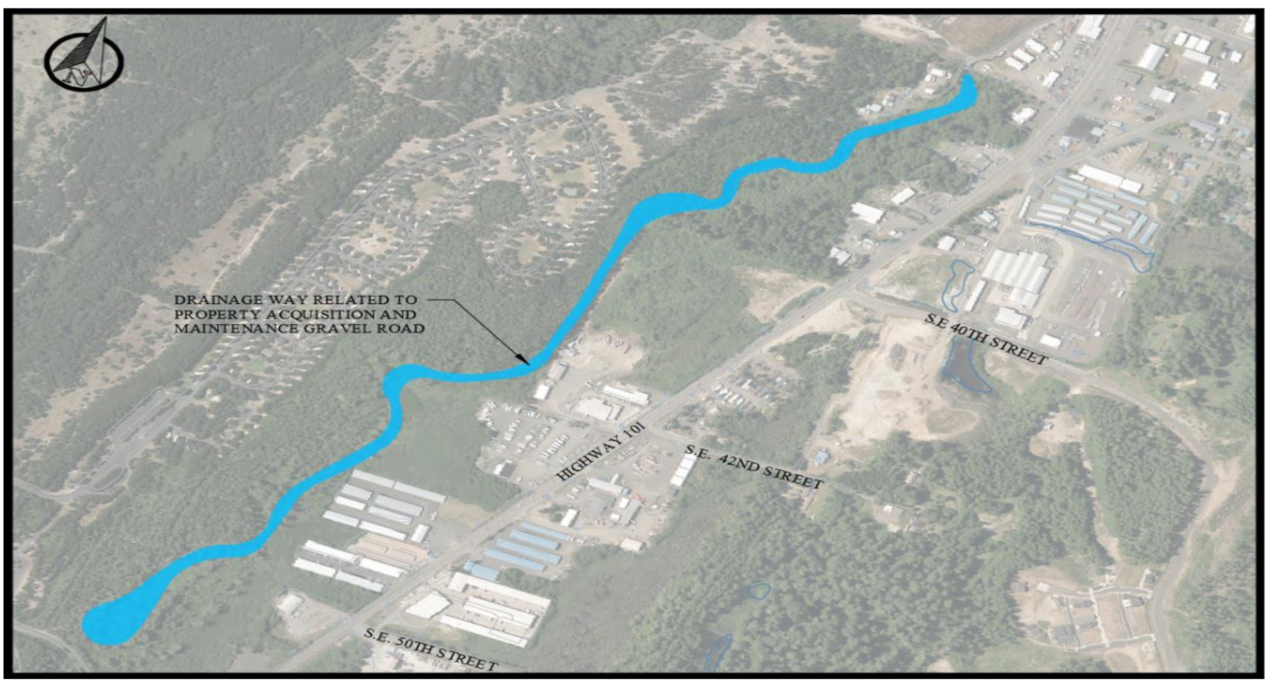


Figure AG.1 – Project Area Image

Limited access to a City's drainage ways can make maintenance and general operation of the storm drain system very difficult. Currently the natural drainage way conveying water from the south west corner of basin AG to the northwest corner is lacking adequate access. No road or trail is available to facilitate, inspection, removal of obstructions, or other general maintenance activities. It is recommended that the a 10' wide maintenance road be built along this stretch of ditches and culverts, and that public ownership of the drainage channel including adequate right-of-way for access should be pursued. The project's cost estimate is shown in Table AG.1 and depiction is displayed in Figure AG.1.

Table AG.1 – Cost Estimate

	PROJECT AG1 COST ESTIMATE				
Item No.	*Description*	*Units*	*Quantity*	*Unit Cost*	*Total Cost*
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$67,347.00	$67,347.00
2	Construction Facilities/Temporary Controls	ls	1	$29,932.00	$29,932.00
3	Land Acquisition	sf	138,750	$2.10	$291,375.00
4	Clear and Grub	acre	2	$5,500.00	$10,450.00
5	Ditch Rehabilitation	lf	5,550	$20.00	$111,000.00
6	10' Wide Maintenance Road (Excavation & Grading)	cy	20,400	$12.00	$244,800.00
7	Road Surfacing	sf	55,500	$7.00	$388,500.00
8	Pipe Culvert Installation	lf	100	$40.00	$4,000.00
		Construction Total			$ 1,147,404.00
		Contingency (20%)			$229,480.80
		Subtotal			$ 1,376,884.80
		Engineering (20%)			$275,376.96
		Administrative Costs (3%)			$41,306.54
		Total Project Cost			**$1,693,568.30**

Project AG2 – Future development storm drain infrastructure

The 'Newport Coho/Brant, Infrastructure Refinement Plan, Cameron MCarthy, June 2012' discusses a southward extension of SW Abalone Street and a westward extension of SW 35th St. to facilitate better traffic to the growing neighborhood, as well as provide access to the new OMSI environmental learning center. The plan proposes extending the storm drain system from the SW 35th St and SW Anchor Way intersection northward and westward along the 'to be' extended streets. The project's cost estimate is shown in Table AG.2 and depiction is displayed in Figure AG.2.

Table AG.2 – Cost Estimate

	PROJECT AG2 COST ESTIMATE				
Item No.	*Description*	*Units*	*Quantity*	*Unit Cost*	*Total Cost*
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$43,133.94	$43,133.94
2	Construction Facilities/Temporary Controls	ls	1	$9,585.32	$9,585.32
3	Demolition & Site Prep	ls	1	$19,170.64	$19,170.64
4	15" RCP Storm Drain Piping	lf	900	$70.00	$63,000.00
5	18" RCP Storm Drain Piping	lf	400	$136.00	$54,400.00
6	24" RCP Storm Drain Piping	lf	251	$163.00	$40,913.00
7	New 48" SD MH	ea	5	$4,500.00	$22,500.00
8	Water Quality Catch Basin (2' x 2')	ea	6	$5,500.00	$33,000.00
9	AC Pavement Repair/Trench Patching	sf	6455	$4.00	$25,820.00
		Construction Total			$ 311,522.90
		Contingency (20%)			$62,304.58
		Subtotal			$ 373,827.48
		Engineering (20%)			$74,765.50
		Administrative Costs (3%)			$11,214.82
		Total Project Cost			**$459,807.80**

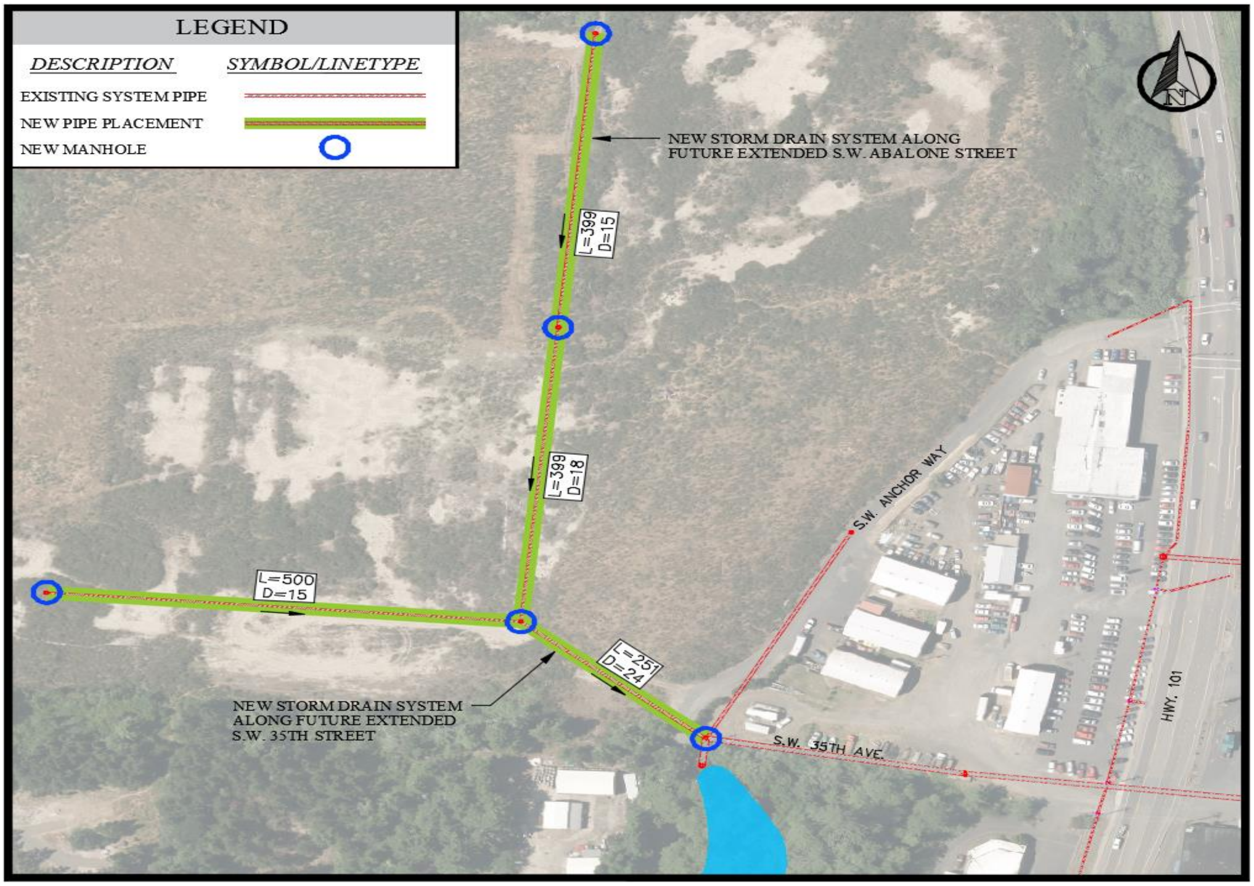


Figure AG.2 – Project Area Image

8.1.22 Basin AJ

Project AJ1 - Storm Drain capacity increase crossing SE 35th St.

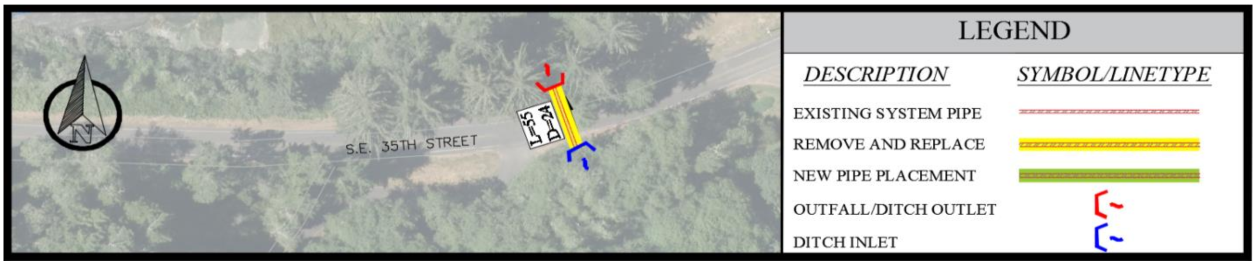


Figure AJ.1 – Project Area Image

The 18” culvert crossing under the east end of SE 35th Street is lacking capacity for future development and is in poor condition. This culvert needs to be removed and replaced with a 24” culvert. This will include the placement of 50’ of 24” pipe. The project’s cost estimate is shown in Table AJ.1 and depiction is displayed in Figure AJ.1.

Table AJ.1 – Cost Estimate

	PROJECT AJ1 COST ESTIMATE				
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$4,593.75	$4,593.75
2	Construction Facilities/Temporary Controls	ls	1	$735.00	$735.00
3	Demolition & Site Prep	ls	1	$1,470.00	$1,470.00
4	24" RCP Storm Drain Piping	lf	75	$225.00	$16,875.00
5	AC Pavement Repair/Trench Patching	sf	375	$4.00	$1,500.00
		Construction Total			$ 25,173.75
		Contingency (20%)			$5,034.75
		Subtotal			$ 30,208.50
		Engineering (20%)			$6,041.70
		Administrative Costs (3%)			$906.26
		Total Project Cost			**$37,156.46**

8.1.23 Basin AL

Project AL1 - Storm Drain capacity increase crossing Hwy. 101

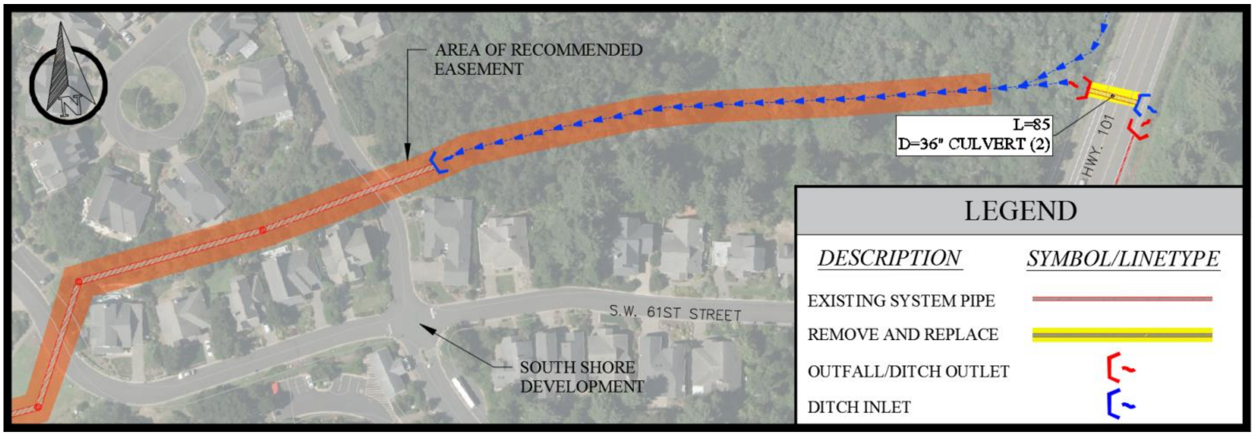


Figure AL.1 – Project Area Image

The existing dual 24” culverts crossing under Highway 101 north of SW 62nd Street have a combined capacity of approximately 39 CFS (1% assumed slope). This is not sufficient to convey the pre-development flow of 66.86 CFS resulting from a 50-year storm event. The pipe will need to be sized to accommodate the post development flows of 76.7 CFS. It is recommended to replace the 85’ long 2-24” pipes with two 36” culverts. The Jack and Bore method is recommended for pipe placement as trenching across Hwy. 101 would not save a great deal of money, but would require much more time for construction, permitting and review.

Downstream of the 2-24” pipes discussed above, the storm drain system continues west through natural drainage ways to a 60” culvert. This culvert conveys the water through the South Shore Development to the Ocean. Currently this portion of the public storm drain system travels through privately owned land. It is recommended that the City acquires an easement along the 60” culvert. The pipe currently resides under 4 tax lots that are free of structures and are designated ‘Common Areas’ for the South Shore Development residents. As the pipe is not currently under any existing structures, and in giving an easement, the private developer would no longer have any liability related to the existing storm drain system, procuring an easement should not be a difficult process. The project’s cost estimate is shown in Table AL.1 and depiction is displayed in Figure AL.1.

Table AL. 1 – Cost Estimate

	PROJECT AL1 COST ESTIMATE				
Item No.	*Description*	*Units*	*Quantity*	*Unit Cost*	*Total Cost*
1	Bonds, Insurance, Overhead, Mobilization Costs	ls	1	$12,625.00	$12,625.00
2	Construction Facilities/Temporary Controls	ls	1	$2,020.00	$2,020.00
3	Demolition & Site Prep	ls	1	$4,040.00	$4,040.00
4	36" HDPE (Jack and Bore)	lf	170	$250.00	$42,500.00
5	Easement Documents (Through South Shore Dev.)	Per Lot	4	$2,000.00	$8,000.00
		Construction Total			$ 69,185.00
		Contingency (20%)			$13,837.00
		Subtotal			$ 83,022.00
		Engineering (20%)			$16,604.40
		Administrative Costs (3%)			$2,490.66
		Total Project Cost			**$102,117.06**

8.2 Cleaning and Televising

The City should develop a program to regularly and systematically televise the entire system. Through this approach, the entire storm drain system will be cleaned and deficiencies can be discovered and corrected over a period of time.

All television inspection tapes should be provided to the engineering staff at the City for review. Deficiencies should be noted and catalogued for potential improvement projects. Serious deficiencies should be corrected immediately.

8.3 Storm Drain System Management and Maintenance

A program of regular investment in system maintenance will do much to eliminate major system overhauls, replacement projects, and costly system breakdowns. The storm drain system is continuously deteriorating. The state of deterioration is unique to each section of pipe based on the age of the pipe, soil conditions, and characteristics of flows within the pipe.

The City has begun developing system maps of all its infrastructures including storm drain. The software of choice is Arc GIS. Currently the system maps hold basic display information as well as minimal component information. It is recommended that the City continue to develop the GIS mapping for the storm drain system, and add to the GIS database more specific information related to system components. Such as: age, component condition, and descriptions of any possible failure points (Cracks, pipe sag, obstructions…etc). ArcGIS also has the capability of adding links to system components that will bring up associated pictures and videos. As system components are televised, and/or examined and documented with pictures, these files should be added to the GIS mapping. These additions to the current mapped system will aid in the organization and management of system maintenance efforts.

Implementation

Section 9

9.1 Introduction

This Stormwater drainage Study has identified a number of capacity deficiencies and potential maintenance/liability issues in the storm drain piping network owned and maintained by the City of Newport. To address these deficiencies, improvement projects have been developed that will correct, repair, replace, or upgrade system components that are currently deficient or are projected to be deficient within the planning period.

Cost estimates have been prepared for each project, including potential costs for design, construction, contingency, and project administration. The projects and their associated costs make up the basis for the recommended plan that the City of Newport is to follow throughout the planning period.

Determination of which projects are to be undertaken and the order in which they are undertaken is dependent on a number of variables. New development, system failures, priority maintenance issues, and other factors will drive the selection of projects during the planning period.

The purpose of this Chapter of the Master Plan is to provide the City with a "starting place" for which to begin their stormwater planning. This Section will provide a summary of the developed projects, present a proposed prioritization for the projects, and undertake a discussion on the implementation of the recommended plan.

It is understood that the prioritization and schedule developed in this Plan will be subject to change based on the variables discussed above. The City should develop and maintain a "living and functional" Capital Improvement Plan (CIP) that includes the highest priority projects developed in this Plan.

It is very possible that a project that is not currently considered a high priority can become one due to a catastrophic system failure or, perhaps, due to unanticipated development pressure. In this case, the City must react and reprioritize projects accordingly.

It is also possible that system components that have not been identified as having a potential deficiency during the planning period will become deficient, necessitating an improvement project. In these cases, the City must develop projects to correct previously unknown or unexpected deficiencies and add projects to the CIP and the project priority list.

9.2 Project Cost Summary

Projects were developed throughout the City's stormwater drainage system and in many of the basins to correct existing deficiencies, address maintenance issues, and/or to provide for future system capacity.

The projects developed in Chapter 7 for storm drain piping improvements are summarized in Table 9.1. In addition to the projects summarized within this table, other recommendations were made in Chapter 8 including the development of a maintenance and inventory database system and systematic television inspection program to locate problem areas. While these programs have costs associated with them, specific budgets were not developed as part of the CIP (Capital Improvement Plan). For planning purposes, a minimum annual budget of $25,000 is suggested for inventory and inspection of existing storm drain piping.

Table 9.1 – Storm Drain System Improvement Project Summary

Project Number	Project Description	Total Project Cost
C1	525' of 24" along NE 73rd St.	$229,316
F1	124' of 30" SD pipe North of NW 60th St.	$67,398
H1	305' of 12" and 18" SD pipe along NW 54th St.	$103,677
K1	270' of 12" & 18" SD pipe along NE Lucky Gap St.	$102,214
N1	1200' of 12", 24", 30", and 35" SD Pipe along Hwy. 101	$553,428
N2	240' of 18" SD pipe along NE Iler St.	$86,500
Q1	890' of 12", 18" , and 24" SD pipe along NW Nye St.	$291,848
R1	675' of 12", and 18" SD pipe along NW Spring St.	$235,197
T1	161' of 12" SD pipe along NW Nye St.	$50,766
T2	921' of 36" SD pipe along NW Coast St.	$490,012
T3	665' of 12", 18", and 24" SD pipe along NW Spring St.	$264,614
T4	Re-alignment of Pipe under Sunwest Honda/Mazda building	$1,109,013
T5	Re-alignment of Pipe under Ford Dealership building	$271,188
T6	Re-alignment of Pipe under Church of the Nazarine building	$598,801
U1	753' of 18", and 24" SD pipe along NE Douglas Street	$304,978
U2	739' of 54" SD pipe along NW 3RD Street & NW Coast St.	$612,539
U3	1699' of 18", and 24" pipe along SW Cliff Street	$664,079
U4	Re-alingment of Pipe under Cash and Carry	$2,710,875
U5	Re-alignment of Pipe under local residence	$79,355
U6	553' of 12", and 18" SD pipe along SW 2nd St.	$169,797
V1	533' of 18" and 24" SD pipe along SW Fall St.	$308,322
X1	1456' of 12", and 18" SD pipe along SW 9th St.	$526,162
X2	571' of 18", and 24" pipe along SW 10th St.	$213,816
X3	1663' of 12", 24", 30", and 36" SD pipe along SW Minnie St.	$793,155
Y1	497' of 12" SD pipe along SW 13th St.	$163,653
AA1	675' of 18", and 24" SD pipe along SE Avery St.	$212,022
AC1	655' of Culverts crossing Yaquina Bay Blvd.	$208,698
AF1	1515' of 12", 18", and 24" pipe along SW 29th and SW Brant St.	$640,902
AG1	Drainage ditch development and Rehabilitation	$1,693,568
AG2	1551' of 15", 18", and 24" SD pipe along SW 35th St.	$459,808
AJ1	55' of culvert crossing SE 35th St.	$37,156
AL1	170' of 36" SD pipe crossing Hwy. 101 (Jack and Bore)	$102,117
Total		**$14,354,970**

9.3 Project Prioritization

When considering prioritizing piping projects, the following should be considered:

1. Are there areas of lacking capacity within the system given existing and future conditions?
2. Is there a deficiency that could result in a total failure of the piping section?
3. Are current storm drain components lying under existing structures?
4. The length of time the deficiency has caused problems for the City and for residents.
5. Availability and source of funding.
6. Coordination of project with other improvements (water, sewer, streets, etc).

Although all of these factors were taken into account when formulating the priority of projects, three carried the most weight in the development of priorities. These three dominant influences were listed as 1 through 3, and were weighed so heavily because flooding and large pipe failures under structures will have the largest impact on public safety and welfare. Table 9.2 displays the project priority in addition to showing which of these two factors impacted each project.

Table 9.2 – Storm Drain System Improvement Project Summary

	Project Rating	Project Number	Project Description	Deficiency			Total Project Cost
				Limited Capacity	*Under Structures*	*Future Develop.*	
	1	X1	1456' of 12", and 18" SD pipe along SW 9th St.	X			$526,162
	2	X2	571' of 18", and 24" pipe along SW 10th St.	X			$213,816
	3	X3	1663' of 12", 24", 30", and 36" SD pipe along SW Minnie St.	X			$793,155
	4	U4	Re-alingment of Pipe under Cash and Carry	X		X	$2,710,875
A	5	U2	739' of 54" SD pipe along NW 3RD Street & NW Coast St.	X			$612,539
	6	T2	921' of 36" SD pipe along NW Coast St.	X			$490,012
	7	T4	Re-alignment of Pipe under Sunwest Honda/Mazda building			X	$1,109,013
	8	AL1	170' of 36" SD pipe crossing Hwy. 101 (Jack and Bore)	X			$102,117
	9	N1	1200' of 12", 24", 30", and 35" SD Pipe along Hwy. 101	X			$553,428
	10	Q1	890' of 12", 18" , and 24" SD pipe along NW Nye St.	X			$291,848
	11	T6	Re-alignment of Pipe under Church of the Nazarine building			X	$598,801
	12	T5	Re-alignment of Pipe under Ford Dealership building			X	$271,188
	13	U5	Re-alignment of Pipe under local residence	X		X	$79,355
	14	C1	525' of 24" along NE 73rd St.	X	X		$229,316
	15	AA1	675' of 18", and 24" SD pipe along SE Avery St.	X			$212,022
	16	AF1	1515' of 12", 18", and 24" pipe along SW 29th and SW Brant St.		X		$640,902
B	17	F1	124' of 30" SD pipe North of NW 60th St.	X	X		$67,398
	18	T3	665' of 12", 18", and 24" SD pipe along NW Spring St.	X			$264,614
	19	U3	1699' of 18", and 24" pipe along SW Cliff Street	X			$664,079
	20	U6	553' of 12", and 18" SD pipe along SW 2nd St.	X		X	$169,797
	21	AJ1	55' of culvert crossing SE 35th St.	X			$37,156
	22	U1	753' of 18", and 24" SD pipe along NE Douglas Street	X			$304,978
	23	R1	675' of 12", and 18" SD pipe along NW Spring St.	X			$235,197
	24	Y1	497' of 12" SD pipe along SW 13th St.	X			$163,653
	25	V1	533' of 18" and 24" SD pipe along SW Fall St.	X			$308,322
	26	AG1	Drainage ditch development and Rehabilitation	X	X		$1,693,568
	27	K1	270' of 12" & 18" SD pipe along NE Lucky Gap St.	X			$102,214
	28	H1	305' of 12" and 18" SD pipe along NW 54th St.	X			$103,677
C	29	N2	240' of 18" SD pipe along NE Iler St.	X			$86,500
	30	T1	161' of 12" SD pipe along NW Nye St.	X			$50,766
	31	AC1	655' of Culverts crossing Yaquina Bay Blvd.		X		$208,698
	32	AG2	1551' of 15", 18", and 24" SD pipe along SW 35th St.		X		$459,808
		Total					**$14,354,970**

9.4 Implementation Plan

Implementation of a plan to repair or replace piping sections and initiate new maintenance and management practices in the City's storm drainage system represents a complicated and costly decision for the City of Newport.

It may be considered presumptuous for a master plan to develop a schedule or direct a City to undertake projects in a particular order or on a specific timeline. However, it is appropriate to provide some "broad strokes" with regard to the findings and recommendations in the plan and point the City in the proper general direction.

This section will attempt to discuss a potential schedule and discuss financing if the City undertakes the high priority projects recommended in the plan.

9.4.1 Schedule

While many have attempted to provide rigid schedules in master planning efforts, they are almost never followed in practice. Budget processes, seasonal issues, depressions, and other issues change the proposed schedule from almost the first day. It is, perhaps, more important to identify the highest priority projects and recommend that the City undertake those projects as soon as funding is available.

In Section 9.3 projects were ranked and listed in order of priority. While the content and project prioritization previously presented may be argued, the list will provide the City with a starting place when considering what projects to place on their capital improvement list and in what order those projects should be undertaken.

Table 9.2 identifies three separate project groups, A, B, and C, which are roughly defined as follows:

> **Group A:** These are the highest priority projects that should be undertaken as soon as adequate funding is available. It should be considered that these projects should be undertaken within the next 5 years with highest projects on the list to be addressed in the next year or two.
>
> **Group B:** These projects, while not of the highest priority, should be on the City's capital improvement planning window beyond the 5-year horizon. As Group A projects are completed, Group B projects should be moved to Group A status. System degradation or failures, project coordination, or other occurrence may require the movement of Group B projects to Group A status ahead of schedule. New projects that are developed that are not critical, should be grouped in Group B until funding is available.
>
> **Group C:** Group C projects are either of low priority or are dependent on development. If development in an area necessitates the implementation of a Group C improvement, the project should be moved to Group A status assuming that adequate funding is available to undertake it. Some projects may remain in Group C indefinitely if the need for the project or the development requiring it never arises.

Based on these definitions the Group A projects are priority projects that should be undertaken as soon as funding is available. And as stated previously, it is recommended that <u>all</u> Group A projects be completed within the next 5 years. All other projects are dependent upon funding, the completion of Group A projects, or development pressures. The City should maintain a "living" capital improvement list and project schedule based on these general guidelines.

9.4.2 Potential Financing Options

The City will soon be considering undertaking numerous storm drain system improvement projects. The overall cost of these projects will be millions of dollars.

Unlike projects involving water or wastewater system improvements, funding assistance is not typically available for storm drain system improvements since public health is not at stake. Non-grant funding includes bonds, loans, system development charges (SDC's), capital construction funds (sinking funds), local improvement districts, and others. These various funding options are discussed further in the following section.

Financing

Section 10

10.1 Introduction

The City will soon be considering undertaking numerous storm drain system improvement projects. The overall cost of these projects will be millions of dollars. Currently the City has a monthly 'Stormwater Utility' fee of $7.50 is designated to pay for stormwater services, including amounts to pay for the operation, maintenance, repair, necessary replacement, and improvement of the system. The City also has the 'Utility Infrastructure Improvement' user fee of $6.60 and up depending on water meter size is designed to cover the costs of water, wastewater, and stormwater maintenance, repair, necessary replacement, and improvement of the system. The current fees do not have the capacity to pay for the capital improvements outlined within this document.

This section summarizes potential grant and non-grant funding mechanisms, and proposes updated SDCs, and user fees required to fund the recommended improvements. Grant programs are discussed first, followed by non-grant funding alternatives.

10.2 Federal Emergency Management Agency (FEMA) Grants

The U.S. Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) programs present a critical opportunity to reduce the risk to individuals and property from natural hazards while simultaneously reducing reliance on Federal disaster funds. HMA programs reduce community vulnerability to disasters and their effects, promote individual and community safety and resilience, and promote community vitality after an incident. Furthermore, HMA programs reduce response and recovery resource requirements in the wake of a disaster or incident, which results in a safer community that is less reliant on external financial assistance.

Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage. Accordingly, States, Territories, Indian Tribal governments, and communities are encouraged to take advantage of funding that HMA programs provide in both the pre- and post-disaster timelines.

Potential funding for a portion of the Capital Improvements could be funded through the Flood Mitigation Assistance (FMA) and Pre-Disaster Mitigation (PDM) HMA programs. These programs are described below.

10.2.1 Pre-Disaster Mitigation Program

The Pre-Disaster Mitigation (PDM) program was authorized by the Robert T. Stafford Disaster Assistance and Emergency Relief Act (Stafford Act), 42 USC, as amended by the Disaster Mitigation Act of 2000. Funding for the program is provided through the National Pre-Disaster Mitigation Fund to assist States and local governments (to include Indian Tribal governments) in implementing cost-effective hazard mitigation activities that complement comprehensive mitigation programs, reduce injuries, loss of life, and damage and destruction of property. PDM is a pre-disaster grant program.

Grants are available for the creation of Local Hazard Mitigation Plans (LHMPs) and for the implementation of mitigation projects prior to a disaster event. The following entities are eligible for grant funds: state-level agencies including state institutions (e.g., state hospital or university); Federally-recognized Indian tribal governments; local governments, including state-recognized Indian tribes, authorized Indian tribal organizations; public colleges and universities; and Indian tribal colleges and universities.

All applicants must have a FEMA-approved Local Hazard Mitigation Plan (LHMP) in order to be eligible to receive PDM project funding. In addition, all applicants MUST have a FEMA-approved State/Tribal Standard or Enhanced hazard mitigation plan in accordance with 44 CFR Part 201. Lincoln County has developed a LHMP that covers the City of Newport, and therefore this requirement would be met when pursuing project funding.

10.2.2 Flood Mitigation Assistance (FMA) Program

The Flood Mitigation Assistance (FMA) grant program provides funding to States, Federally-recognized Indian tribal governments, and communities so that cost-effective measures are taken to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program (NFIP). The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. Three types of grants are available under FMA: Planning, Project, and Technical Assistance.

The primary funding source for the National Flood Mitigation Fund (NFMF) is the National Flood Insurance Fund (NFIF). The FMA program is subject to the availability of appropriation funding and is dependent upon the amount available for transfer from the NFIF through offset collections assessed and collected under the NFIP. The allocation formula provides $110,000 base allocations to each State with surplus amounts allocated based on the total number of NFIP insurance policies and the total number of repetitive loss properties within each State/Territory.

Program Requirements Include the following: All applicants must be participating in the NFIP, and must not be on probation, suspended, or withdrawn from the NFIP, to be eligible to apply for FMA funds, and project applicants must demonstrate cost-effectiveness through a BCR of 1.0 or greater.

10.3 Department of Environemtnal Quality Clean Water State Revolving Fund (SRF)

The Clean Water State Revolving Fund loan program provides low-cost loans to public agencies for the planning, design or construction of various projects that prevent or mitigate water pollution. The Oregon Department of Environmental Quality administers the program.

Eligible agencies include federally recognized Indian tribal governments, cities, counties, sanitary districts, soil and water conservation districts, irrigation districts, various special districts and certain intergovernmental entities. DEQ partners with Oregon communities to implement projects that attain and maintain water quality standards, and are necessary to protect recreation, fish habitat, boating, irrigation, drinking water and other beneficial uses.

Four different types of loans are available within the program including loans for planning, design, construction, and local community projects. A portion of the fund is reserved for small communities, planning and green projects. All loans, except for planning loans, include an annual loan fee on the outstanding balance.

Interest rates for the loan program change quarterly based on a percentage of the national municipal bond rate. Those percentages vary from 25 percent to 55 percent of the bond rate. For example, with a quarterly bond rate of 3.75percent, CWSRF interest rates range from .94 percent to 2.06 percent depending on the length of the loan repayment period. Interest rates are found on DEQ's website (see link on the next page).

The low-interest rates and terms inherent with these loans make this program an attractive alternative to the municipal bond market. For example, a $4 million, 20-year loan with a CWSRF interest rate one-percentage point lower than a bond would reduce the interest cost by about $500,000 over the life of the loan.

DEQ accepts new applications year-round. Applicants must provide information on the Project's water quality benefits, environmental impact and estimated cost. Applications are available by contacting DEQ's regional project officers and are on DEQ's website.

DEQ reviews and scores all projects based on information submitted in the application. DEQ scores proposed projects using points associated with specific ranking criteria. Scored projects are initially listed in rank order on the program's project priority list.

Applicants whose projects are on the project priority list must complete all required program documents. These documents may include environmental reviews, land-use compatibility statements and financial reports. Once DEQ approves the documentation, the project becomes ready-to-proceed. Only projects listed as ready-to-proceed are considered for a loan. The Intended Use Plan, which describes the program's plans and goals for each fiscal year, includes both the project priority list and those projects deemed ready-to-proceed.

When sufficient funds are available, DEQ negotiates a loan agreement with an applicant who is ready-to-proceed. Projects are funded in rank order, with a maximum of 15 percent of the monies going to any one applicant. The program typically provides about $50 million annually for funding projects. A portion of the CWSRF funds are set aside in reserves to fund specific types of projects:

- Small communities (population of 10,000 or less) are funded from a reserve equaling 25 percent of total available monies.
- Planning projects are funded from a reserve not to exceed $3 million.
- Green projects are funded from a reserve whose amount is determined by the annual capitalization grant.

The balance of the program funds are allocated from the CWSRF general fund to remaining projects in rank order. DEQ will provide increases to previous, partially funded projects first as funds become available. New projects receive any remaining funds in rank order from one of the fund reserves or from the program's general fund

10.4 General Obligation Bonds

General obligation bonds are typically used for the general greater good of a community. The obligations bonds include a pledge by the local government to levy a tax (typically property) to meet the debt obligation. Because property owners typically are reluctant to risk losing their house due to property tax bills, credit rating agencies consider a general obligation bond to have an inherent high level of security, and thus carry with them a low interest rate.

10.5 Revenue Bonds

Revenue bonds are a special type of municipal bond characterized by the guarantee of repayment being born solely by a single revenue-generating entity associated with the purpose of the bonds. Although these bonds are the second most secure type of municipal bond, they typically have a higher interest rate than that of the General Obligation bond because the security is not as intact.

The City of Newport could pursue these types of bonds by increasing the current 'Stormwater Utility' fee, and by increasing the current Service Development Charge (SDC). As will be discussed later in this section and further in the attached storm water SDC update, there are little funds available through SDCs, thus much of the debt associated with this bond would rely on the increase of Stormwater Utility fees.

10.5.1 Impact on Rate Payers

The impact to rate payers will depend on the projects that the City undertakes, the schedule that they follow, and the rate structure that is established. The priority projects developed in this plan are summarized below:

Table 10.1 – Project Prioritization Summary

Priority	Description	Total
A	Group A-High Priority Projects	$6,897,299.62
B	Group B-Lower Priority Projects	$4,538,624.31
C	Group C- Low Priority and Development Depemdent Projects	$2,705,230.66

To provide a glimpse into a conservative impact to rate payers, the following scenarios are provided:

Scenario 1: It is assumed that the City will undertake all the projects in the Priority A group for a total project cost of $6,557,687.37. Because the projects will be primarily maintenance based, and in some cases capacity building to serve areas that are already developed, the projects will not be SDC eligible. Likewise, it is unlikely that local improvement districts would be approved for maintenance of existing systems. Based on these factors, the total cost impact to rate payers will be entirely based on a funding source that requires payback (loan, bond, etc.). In this scenario the user fee is based on current payment structure. Thus the user fee will be equal for all users and will be calculated by dividing the total monthly payment requirement by the total number of water meters (users).

Principal: $6,897,299.62
Interest Rate: 5% per year
Term: 20 years (240 months)
Monthly Payment: $45,097.06
EDU's: 4,525 (Based on Current Meters in System)
Required Fee per Meter for Payback: $9.96
Current Stormwater Utility Fee: $7.50

Based on these terms, the rate increase per EDU required to pay back a loan of the indicated principal amount is approximately $2.46 per month.

Scenario 2: In this scenario, it is assumed that the City will aggressively pursue the proposed projects by obtaining funding to complete both Priority A and Priority B groups. This scenario also uses current user fee structure. Under this more aggressive approach, the following impact to ratepayers applies:

Principal: $11,435,924.24
Interest Rate: 5% per year
Term: 20-years (240 months)
Monthly Payment: $74,772.24
EDU's: 4,525 (Based on Current Meters in System)
Required Fee per Meter for Payback: $16.52
Current Stormwater Utility Fee: $7.50

Based on these terms, the rate increase per EDU required to pay back a loan of the indicated principal amount is approximately $9.02 per month.

It is recommended that an alternate method for assessing the 'Stormwater Utility' fee be developed that would set the fee such that it is relative to the runoff contribution from the user. This could be simply done by mimicking the user fee structure from the 'Infrastructure Utility Improvement' user fee, which simply assess a higher user fee for users with larger meters. Alternatively, an EDU based system could be developed in which single residents pay a fee associated with 1 EDU, all other properties pay the designated amount per EDU times the amount of EDUs assessed for that property. The EDU value per property would be calculated by dividing the total impervious surface on the property by the allotted surface area for 1 EDU (2,727 ft^2).

The first method assumes there is a larger quantity of runoff from users with a larger water meter, and therefore users with larger meters pay larger fees. The second method relates runoff quantity directly with impervious surface which is calculated for each property. The properties with larger impervious surfaces pay larger user fees. Below is an example using the second method to calculate the user fees.

Scenario 3: In this scenario, it is assumed that the City will aggressively pursue the proposed projects by obtaining funding to complete both Priority A and Priority B groups. Under this more aggressive approach, the following impact to ratepayers applies:

Principal: $11,435,924.24
Interest Rate: 5% per year
Term: 20-years (240 months)
Monthly Payment: $74,772.24
EDU's: 16,756 (Based on total Impervious Surface area within the City divided by area per EDU)
Required Fee per EDU for Payback: $4.46
Current Stormwater Utility Fee: $7.50

Based on these terms, the rate per EDU required to pay back a loan of the indicated principal amount would be $4.46 which is a decrease in user fee for single family residences by $3.04, but would increase varied amounts for other types of properties. For example: a commercial property with a total impervious surface area of 1 Acre (43,560 ft^2) would be charged for 16 EDU, and their monthly 'Stormwater Utility' fee would be $71.24 which is an increase of $63.74.

The final rate increases established by the City must consider all the variables discussed above. Raising rates is a difficult step for any community to make. However, the City is responsible to maintain the existing storm drainage system and increase system capacity where development has been allowed to occur upstream of insufficiently sized facilities. Adequate funding must be raised to finance repairs of a constantly degrading infrastructure, promote development where land is available, and overcome inflation. These increases will, inevitably, require raising user rates within the City of Newport.

10.6 System Development Charges

The State of Oregon has established statutory law for the development, assessment, and administration of SDC's for local governments, utility districts, and similar agencies. Oregon Revised Statutes (ORS) 223.297 - 223.314 authorizes local governments and service districts to assess SDC's for various infrastructure sectors including sewer, water, storm drainage, streets, and others.

In 2007 HBH Engineering developed the 'Public Infrastructure System Development Charge Methodology'. Within this study a System Development Charge was developed for the storm drain system based upon the CIP project list included in the 'Public Facilities Plan, 1990, CH2MHill', and some updated input from the City. With the development of a Storm Water Master Plan, and a new CIP project list, an updated storm drain SDC document was developed, and the draft version is in Appendix E.

The SDC update proposes a significant increase in the storm drain SDC. This new SDC is based upon: SDC eligible project costs totaling $3,131,653, 2280 EDUs of growth over the planning period, and an assumed 2,727 ft^2 of impervious surface per EDU. The updated SDC plan proposes the structure shown in the table below:

Table 10.2 – SDC Summary

SDC Component	SDC Charges	
	Existing	*Proposed*
Improvement		
$/EDU	$840	$1,494
$/square foot	$0.31	$0.55
Reimbursement	0	0
Credit Summary	NA	NA
Comp. Cost	4.18%	4.18%

APPENDIX A - Soils Report

United States Department of Agriculture

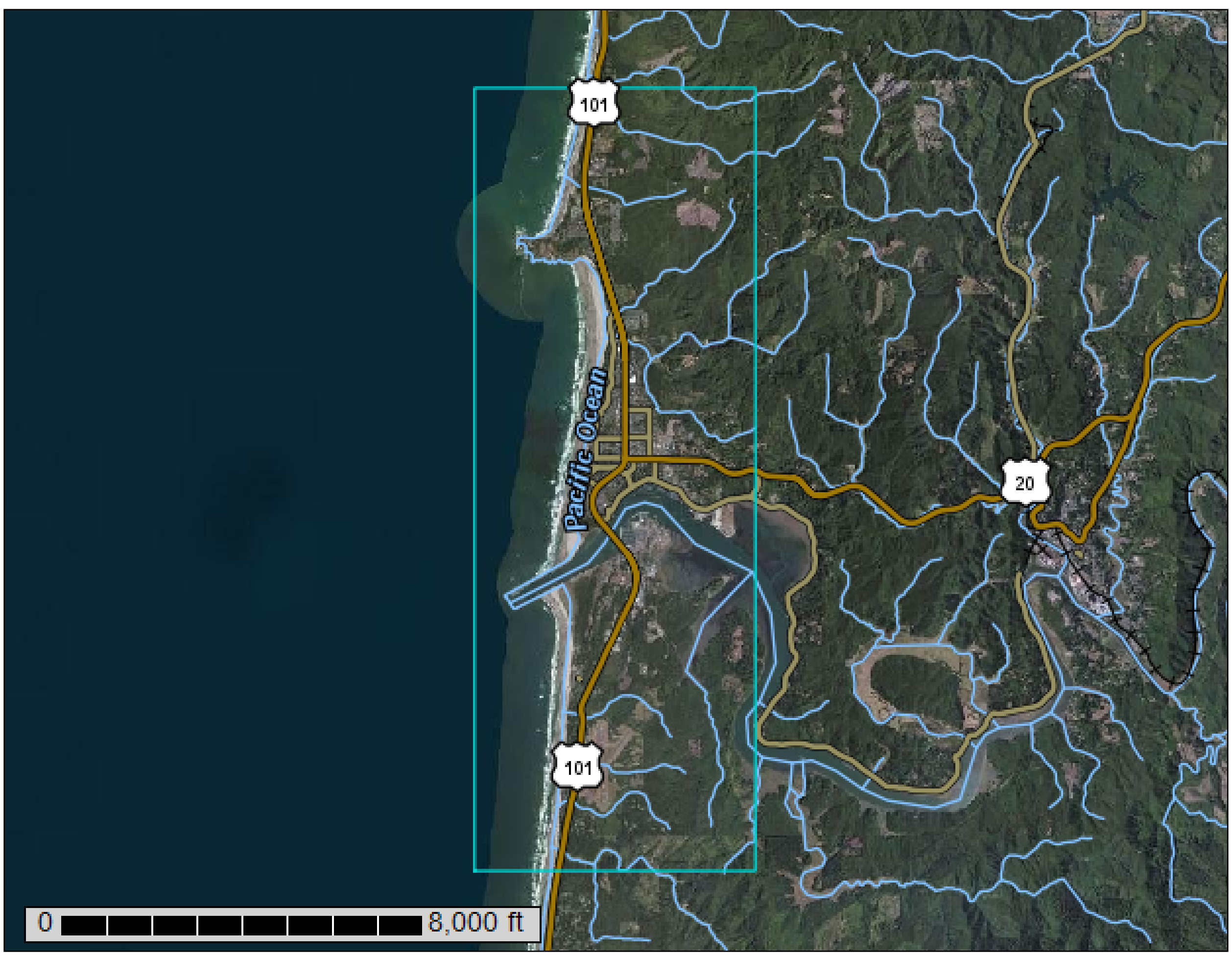
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Lincoln County Area, Oregon



January 16, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

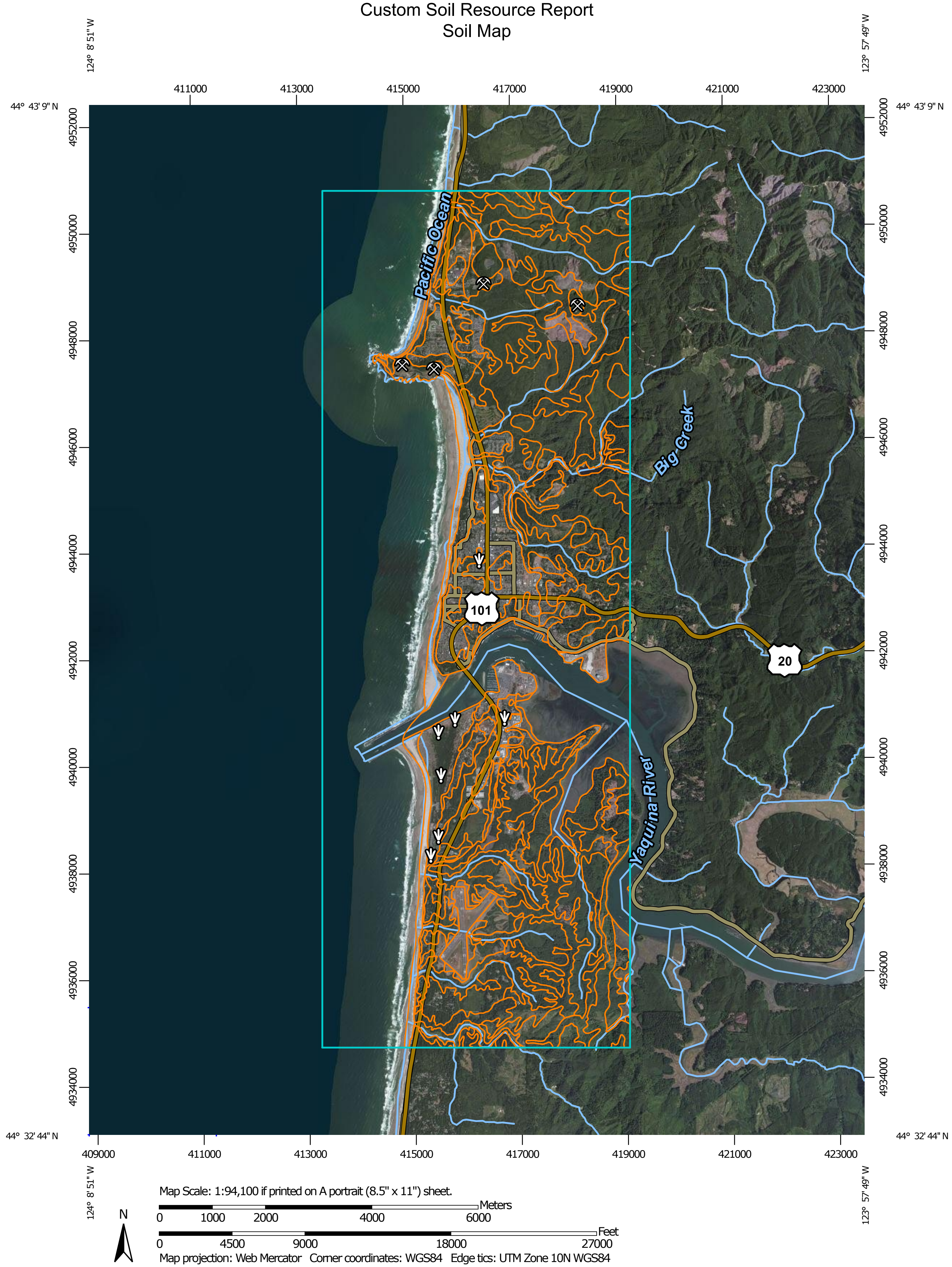
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



124° 8' 51" W
123° 57' 49" W
411000
413000
415000
417000
419000
421000
423000
44° 43' 9" N
4952000
4950000
4948000
4946000
4944000
4942000
4940000
4938000
4936000
4934000
44° 32' 44" N
409000
Pacific Ocean
Big Creek
Yaquina River
101
20
Map Scale: 1:94,100 if printed on A portrait (8.5" x 11") sheet.
Meters
0
1000
2000
4000
6000
Feet
0
4500
9000
18000
27000
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

Soil Survey Area: Lincoln County Area, Oregon
Survey Area Data: Version 11, Sep 15, 2014

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

Date(s) aerial images were photographed: Jan 1, 1999—Sep 3, 2011

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

Map Unit Legend

Lincoln County Area, Oregon (OR638)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
3C	Bandon fine sandy loam, 3 to 12 percent slopes	174.9	0.8%
3E	Bandon fine sandy loam, 12 to 50 percent slopes	347.9	1.5%
4A	Beaches, 1 to 3 percent slopes	445.4	1.9%
9A	Brenner silt loam, 0 to 2 percent slopes	116.5	0.5%
12A	Coquille silt loam, 0 to 1 percent slopes	104.5	0.5%
13A	Coquille silt loam, 0 to 1 percent slopes, protected	0.9	0.0%
14B	Depoe loam, 0 to 7 percent slopes	72.8	0.3%
18G	Fendall-Templeton silt loams, 35 to 60 percent slopes	1,235.6	5.3%
23C	Grindbrook silt loam, 2 to 12 percent slopes	134.6	0.6%
32G	Klootchie-Neotsu silt loams, 30 to 60 percent slopes	24.8	0.1%
35E	Lint silt loam, 5 to 25 percent slopes	673.4	2.9%
42C	Nelscott loam, 3 to 12 percent slopes	1,481.9	6.4%
42E	Nelscott loam, 12 to 50 percent slopes	1,024.9	4.4%
44H	Neskowin-Rock outcrop complex, 20 to 99 percent slopes	82.3	0.4%
45E	Neskowin-Salander silt loams, 5 to 35 percent slopes	4.1	0.0%
45G	Neskowin-Salander silt loams, 35 to 65 percent slopes	109.3	0.5%
46A	Nestucca silt loam, 0 to 2 percent slopes	100.0	0.4%
47C	Netarts fine sand, 3 to 12 percent slopes	155.9	0.7%
47E	Netarts fine sand, 12 to 30 percent slopes	57.3	0.2%
52H	Reedsport-Tolovana complex, 60 to 85 percent slopes	245.9	1.1%
55E	Templeton-Fendall silt loams, 5 to 35 percent slopes	979.3	4.2%
56E	Tolovana-Reedsport complex, 3 to 35 percent slopes	823.4	3.6%

Lincoln County Area, Oregon (OR638)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
56G	Tolovana-Reedsport complex, 35 to 60 percent slopes	2,905.9	12.6%
58E	Urban land-Bandon complex, 12 to 50 percent slopes	425.5	1.8%
59C	Urban land-Nelscott complex, 0 to 12 percent slopes	797.5	3.5%
60C	Urban land-Waldport complex, 0 to 12 percent slopes	427.4	1.9%
63E	Waldport fine sand, 0 to 30 percent slopes	336.8	1.5%
67A	Yaquina fine sand, 0 to 3 percent slopes	208.3	0.9%
W	Water	1,619.5	7.0%
Subtotals for Soil Survey Area		**15,116.5**	**65.4%**
Totals for Area of Interest		**23,097.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

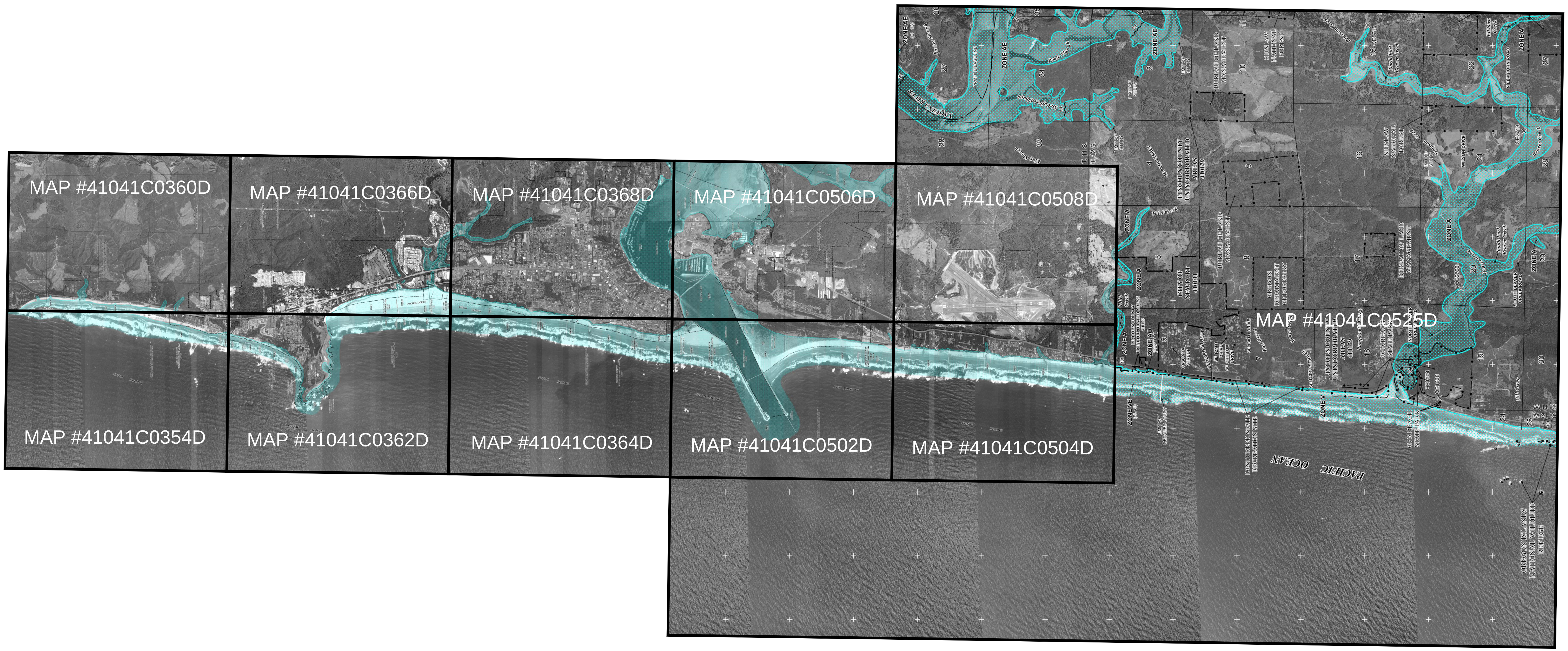
A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

APPENDIX B – FEMA Firm Maps



N E S W

NOTE: THE SCALE OF THE FOLLOWING FIRM MAPS HAVE BEEN ALTERED AND ARE THEREFORE 'NOT TO SCALE'

Civil West Engineering Services, Inc.

City of Newport
Lincolnc County, Oregon

NFIP FIRM Map Index

Stormwater Master Plan

0 1"
NTS

Drawn By: JRP
Date: Jan. 2015

FIGURE
B.1

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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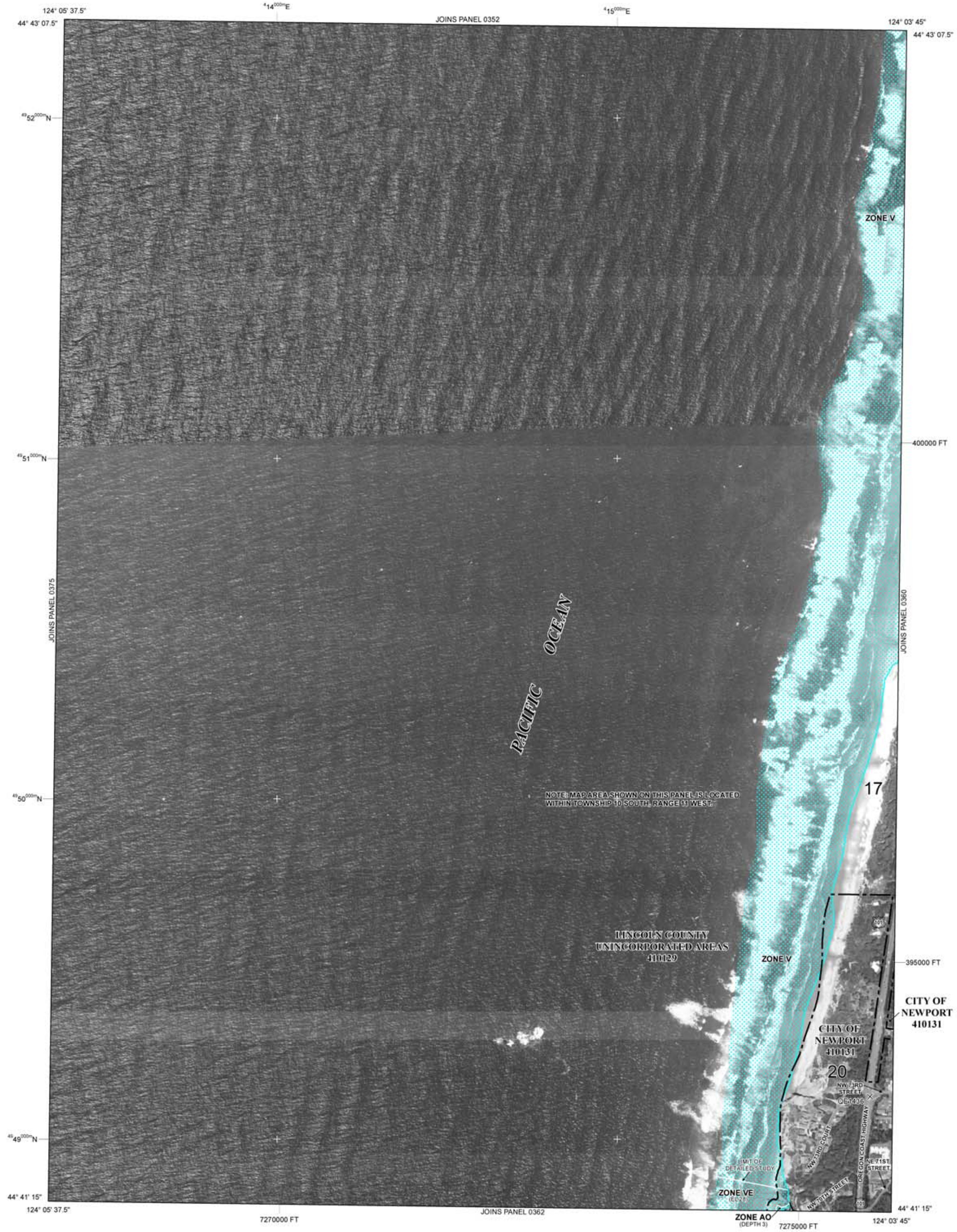

LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~513~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A —— A	Cross section line
23 - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection
$^{48}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 10N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

NOT TO SCALE

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0354D

FIRM

FLOOD INSURANCE RATE MAP

LINCOLN COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 354 OF 880
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0354	D
NEWPORT, CITY OF	410131	0354	D

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

MAP NUMBER
41041C0354D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

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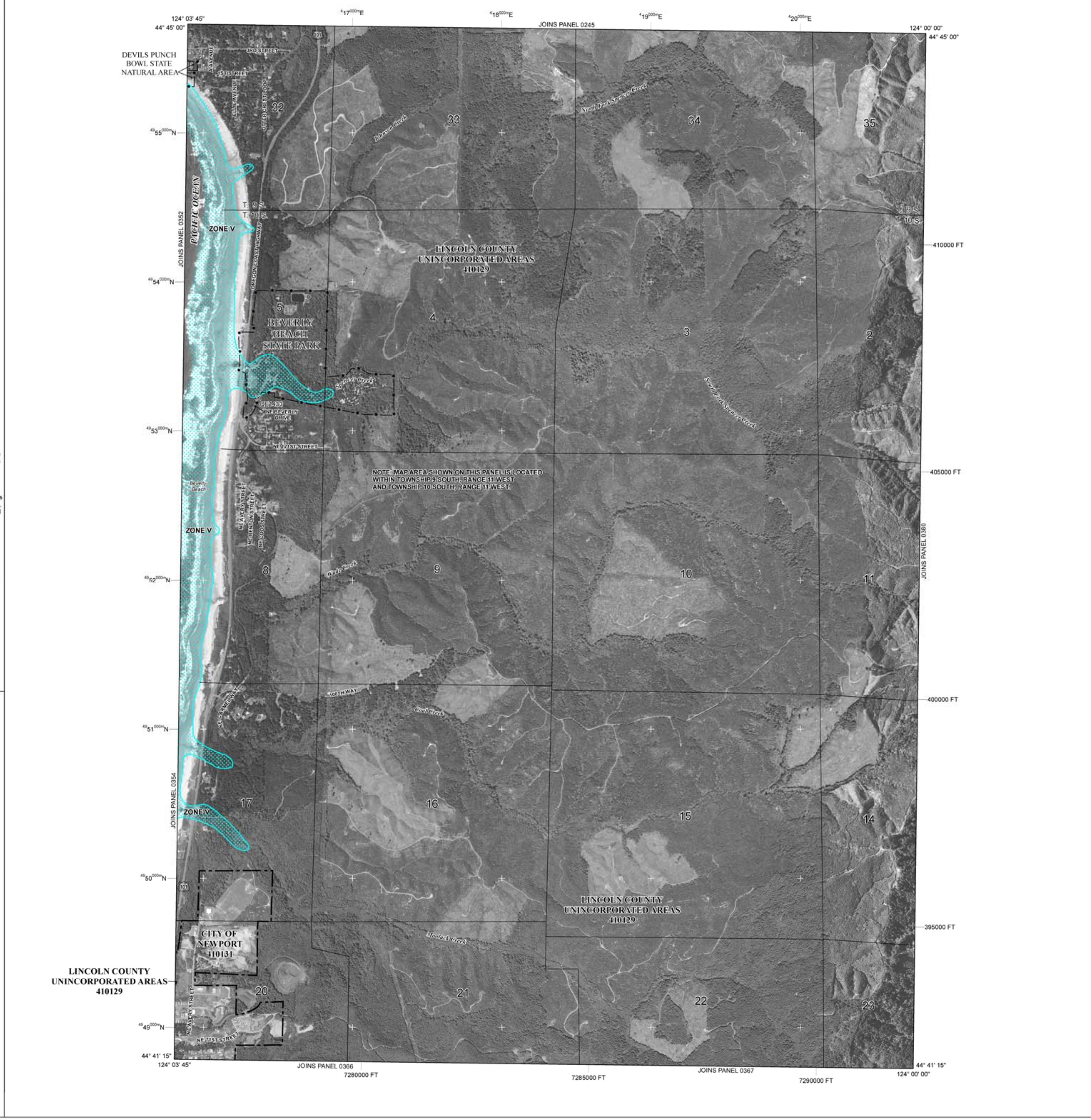

LEGEND

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FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
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1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

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$^{45}89^{000m}$ N — 1000-meter Universal Transverse Mercator grid values, zone 10N
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FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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500 0 1000 2000 FEET
300 0 300 600 METERS

NOT TO SCALE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0360D

FIRM

FLOOD INSURANCE RATE MAP

LINCOLN COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 360 OF 880
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0360	D
NEWPORT, CITY OF	410131	0360	D

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MAP NUMBER
41041C0360D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

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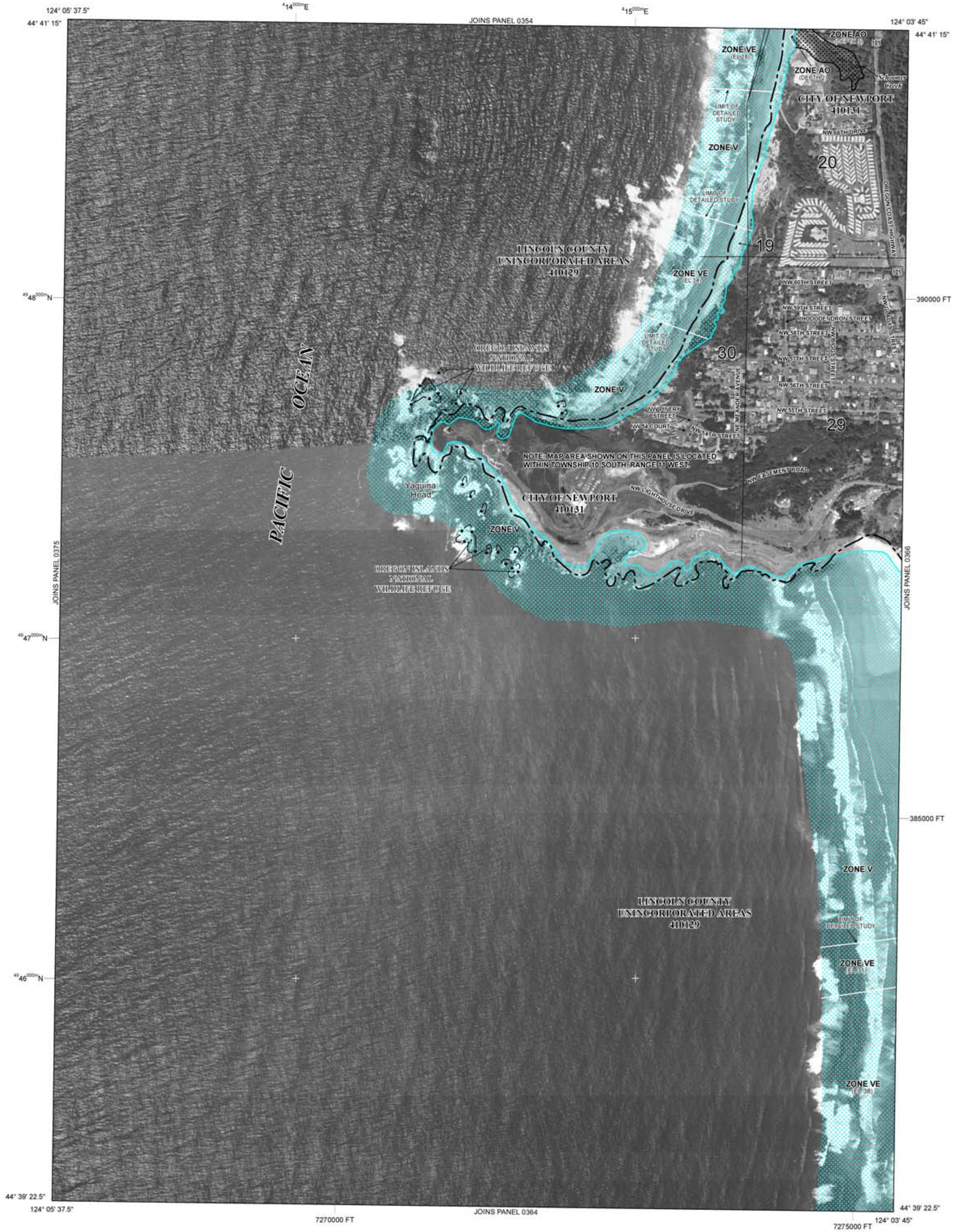

LEGEND

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FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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OTHER AREAS

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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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1% Annual Chance Floodplain Boundary

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FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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150 0 150 300 METERS

NOT TO SCALE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0362D

FIRM

FLOOD INSURANCE RATE MAP

LINCOLN COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 362 OF 880
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0362	D
NEWPORT, CITY OF	410131	0362	D

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MAP NUMBER
41041C0362D

EFFECTIVE DATE
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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

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The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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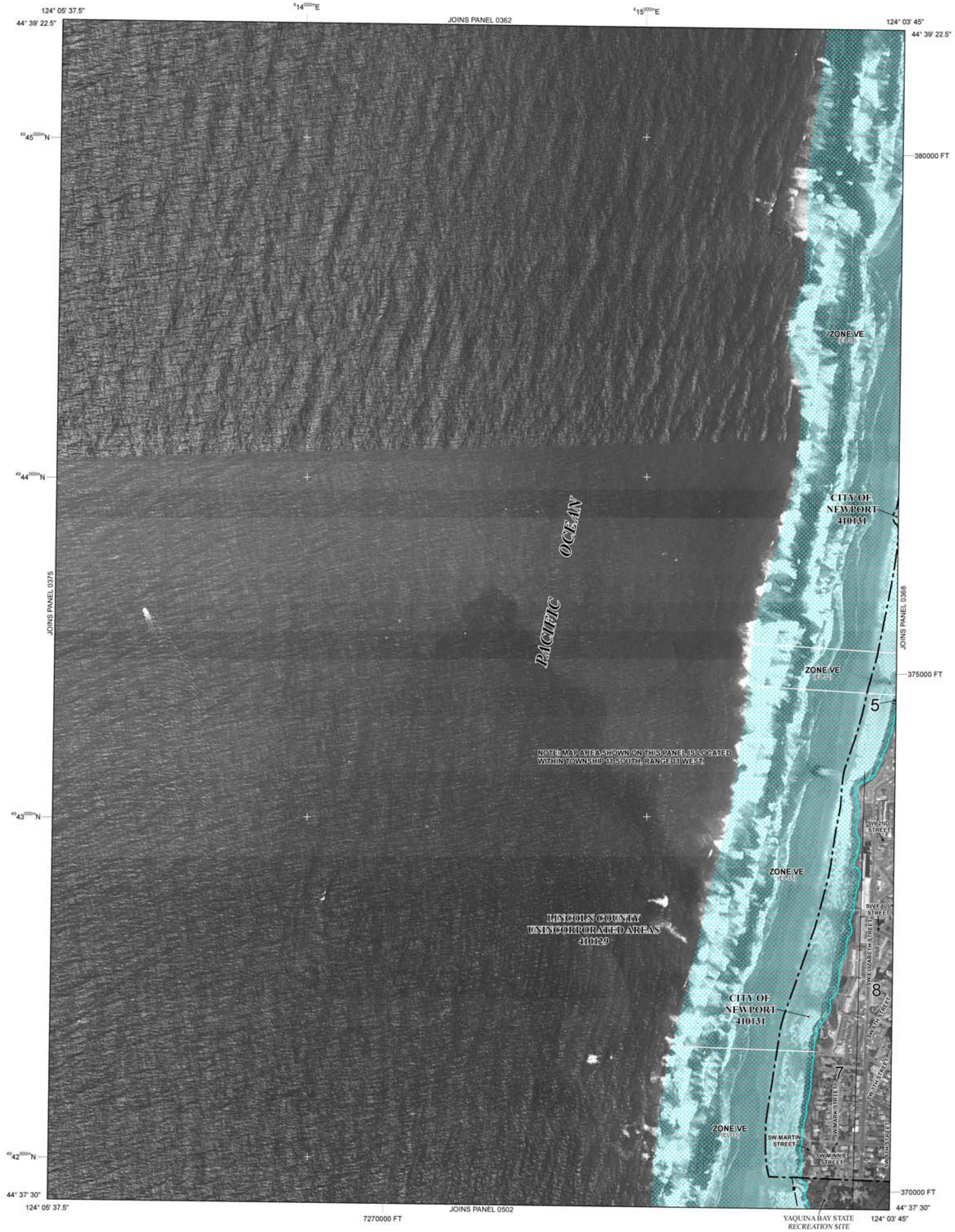
Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.



LEGEND

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

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

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A Cross section line

23 - - - 23 Transect line

45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

3100000 FT — 5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection

$^{48}89^{000m}$ N — 1000-meter Universal Transverse Mercator grid values, zone 10N

DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

NOT TO SCALE

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0364D

FIRM

FLOOD INSURANCE RATE MAP

LINCOLN COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 364 OF 880
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0364	D
NEWPORT, CITY OF	410131	0364	D

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

MAP NUMBER
41041C0364D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

NOTES TO USERS

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

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(301) 713-3242

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The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

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LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section line
(23)- - - - - -(23)	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection
4989000m N	1000-meter Universal Transverse Mercator grid values, zone 10N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 500'

NOT TO SCALE

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0366D

FIRM

FLOOD INSURANCE RATE MAP

LINCOLN COUNTY, OREGON

AND INCORPORATED AREAS

PANEL 366 OF 880

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0366	D
NEWPORT, CITY OF	410131	0366	D

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

MAP NUMBER
41041C0366D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

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SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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LEGEND

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

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ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A Cross section line

23 - - - 23 Transect line

45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

3100000 FT 5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection

$^{48}89^{000m}$ N 1000-meter Universal Transverse Mercator grid values, zone 10N

DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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N

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250 0 500 1000 FEET

150 0 150 300 METERS

NOT TO SCALE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0368D

FIRM

FLOOD INSURANCE RATE MAP

LINCOLN COUNTY, OREGON

AND INCORPORATED AREAS

PANEL 368 OF 880

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0368	D
NEWPORT, CITY OF	410131	0368	D

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MAP NUMBER
41041C0368D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

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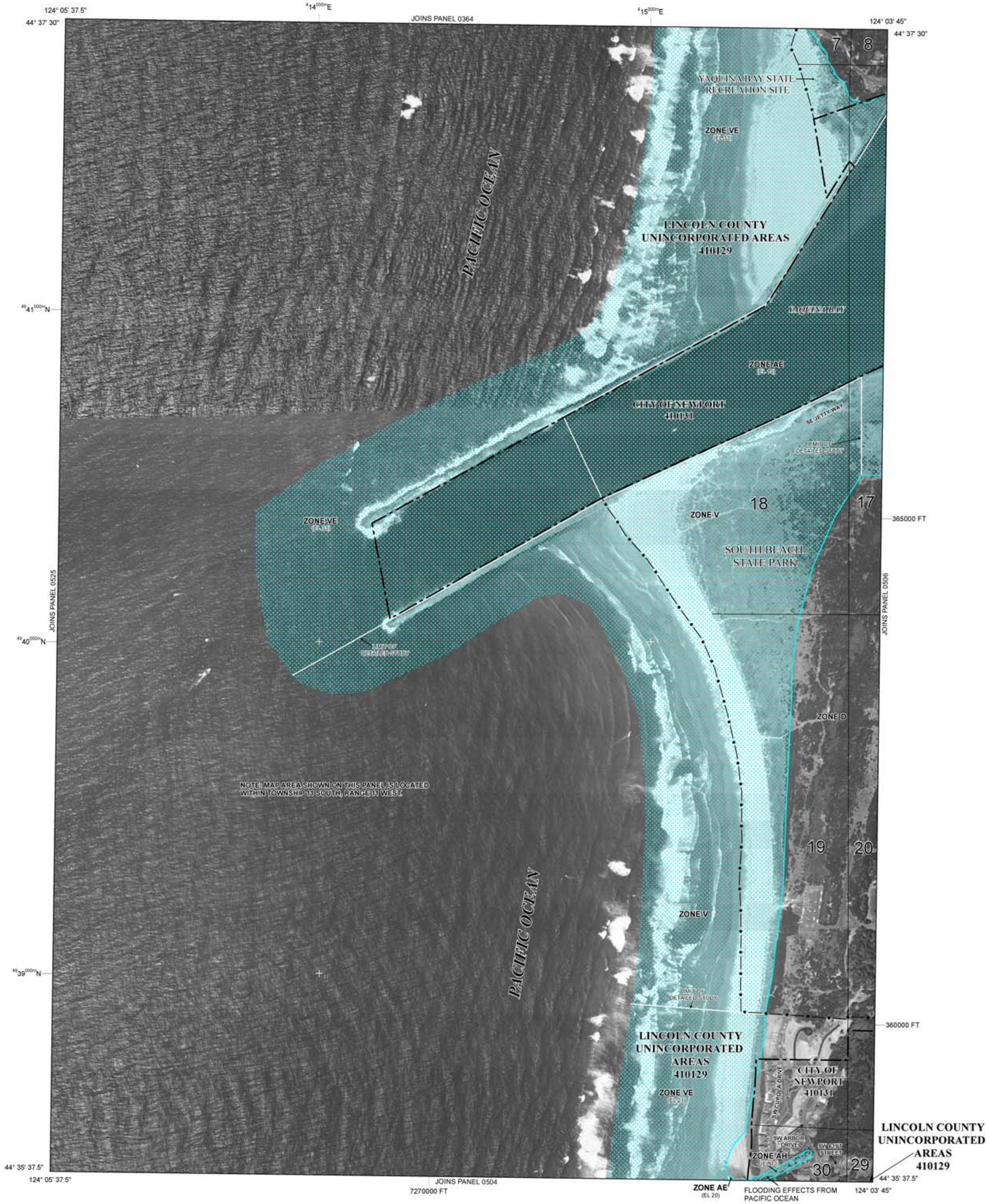

LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A Cross section line
23 - - - - 23 Transect line
45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT — 5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection
$^{48}89^{000m}$ N — 1000-meter Universal Transverse Mercator grid values, zone 10N
DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NOT TO SCALE

NFIP

PANEL 0502D

FIRM
FLOOD INSURANCE RATE MAP

LINCOLN COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 502 OF 880
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0502	D
NEWPORT, CITY OF	410131	0502	D

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

NATIONAL FLOOD INSURANCE PROGRAM

MAP NUMBER
41041C0502D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by the State of Oregon and the U.S. Fish and Wildlife Service. This information was compiled from Oregon Water Resources Department (2006), OR/WA Bureau of Land Management (2000), U.S. Fish and Wildlife Service (2008), Oregon Parks and Recreation Department (2008), National Geodetic Survey (2007), and the U.S. Census Bureau (2007) at a scale of 1:24,000.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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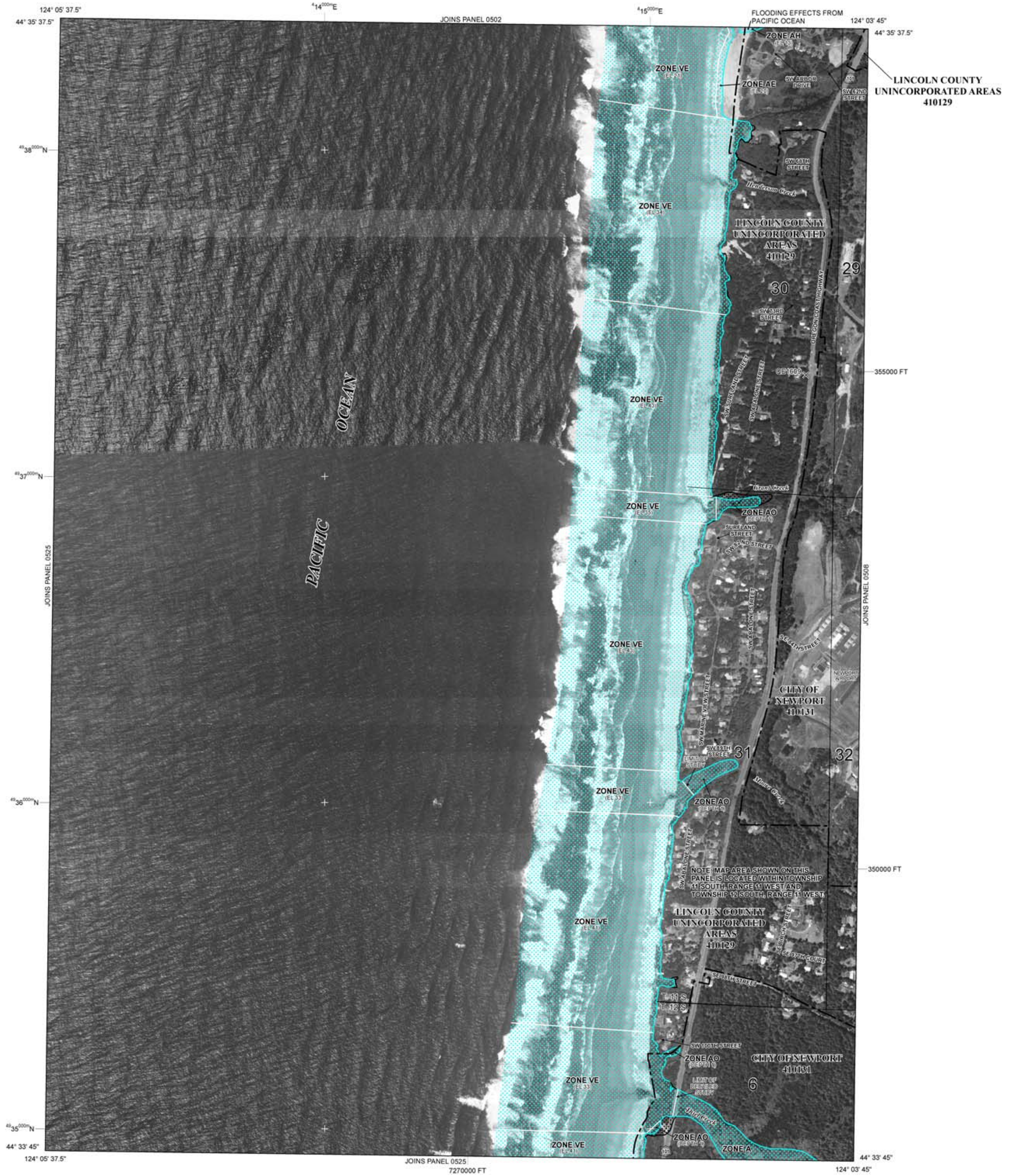

LEGEND

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

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

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ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
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ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection
89 N	1000-meter Universal Transverse Mercator grid values, zone 10N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 500'

NOT TO SCALE

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0504D

FIRM
FLOOD INSURANCE RATE MAP
LINCOLN COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 504 OF 880
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0504	D
NEWPORT, CITY OF	410131	0504	D

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MAP NUMBER
41041C0504D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

NOTES TO USERS

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

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(301) 713-3242

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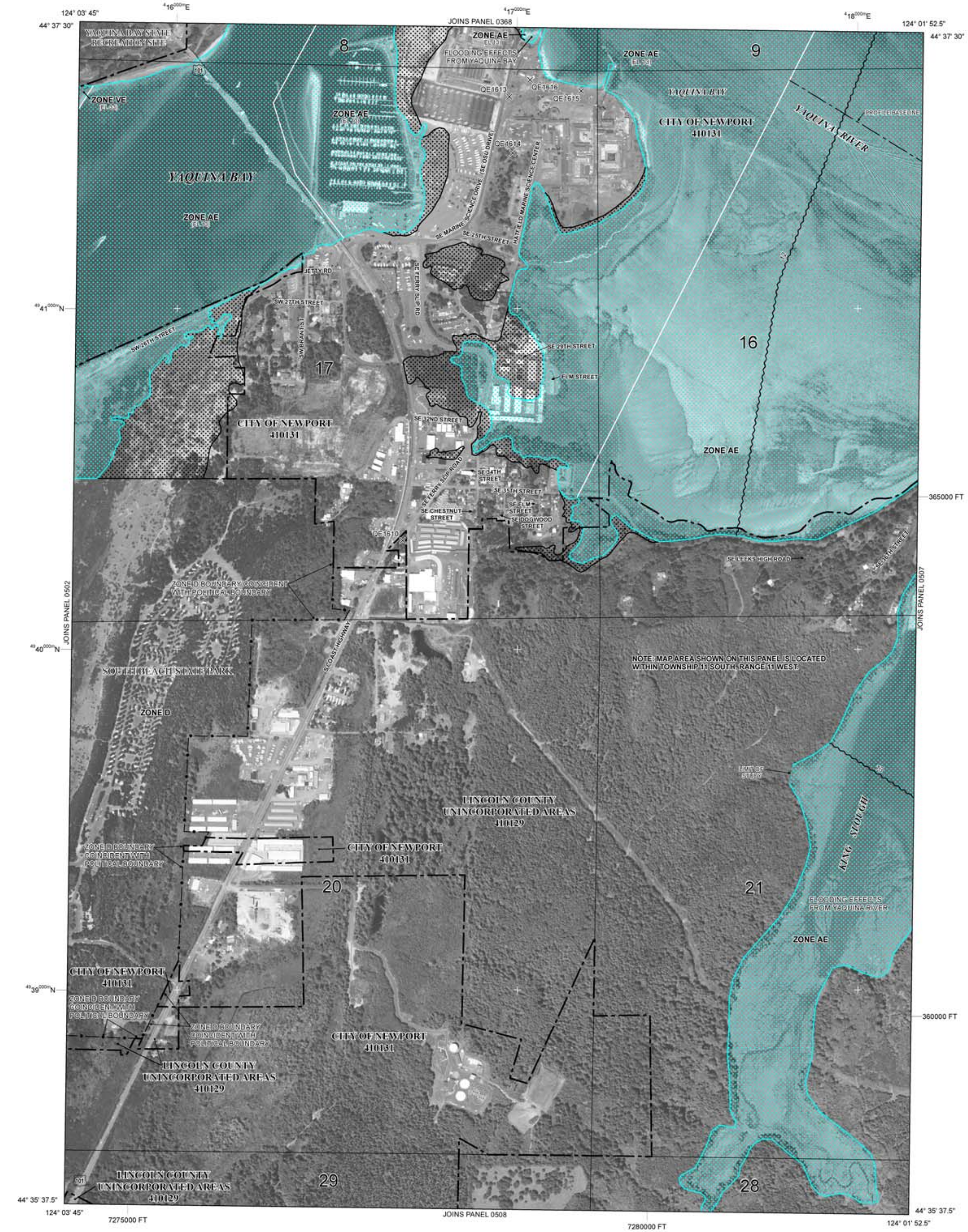

LEGEND

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)——(A)	Cross section line
(23) - - - - (23)	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection
$^{45}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 10N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 500'

NOT TO SCALE

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0506D

FIRM
FLOOD INSURANCE RATE MAP
LINCOLN COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 506 OF 880
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0506	D
NEWPORT, CITY OF	410131	0506	D

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

MAP NUMBER
41041C0506D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

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LEGEND

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A —— A	Cross section line
23 - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection
4989000m N	1000-meter Universal Transverse Mercator grid values, zone 10N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

NOT TO SCALE

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0508D

FIRM

FLOOD INSURANCE RATE MAP

LINCOLN COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 508 OF 880
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0508	D
NEWPORT, CITY OF	410131	0508	D

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

MAP NUMBER
41041C0508D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by the State of Oregon and the U.S. Fish and Wildlife Service. This information was compiled from Oregon Water Resources Department (2006), OR/WA Bureau of Land Management (2000), U.S. Fish and Wildlife Service (2008), Oregon Parks and Recreation Department (2008), National Geodetic Survey (2007), and the U.S. Census Bureau (2007) at a scale of 1:24,000.

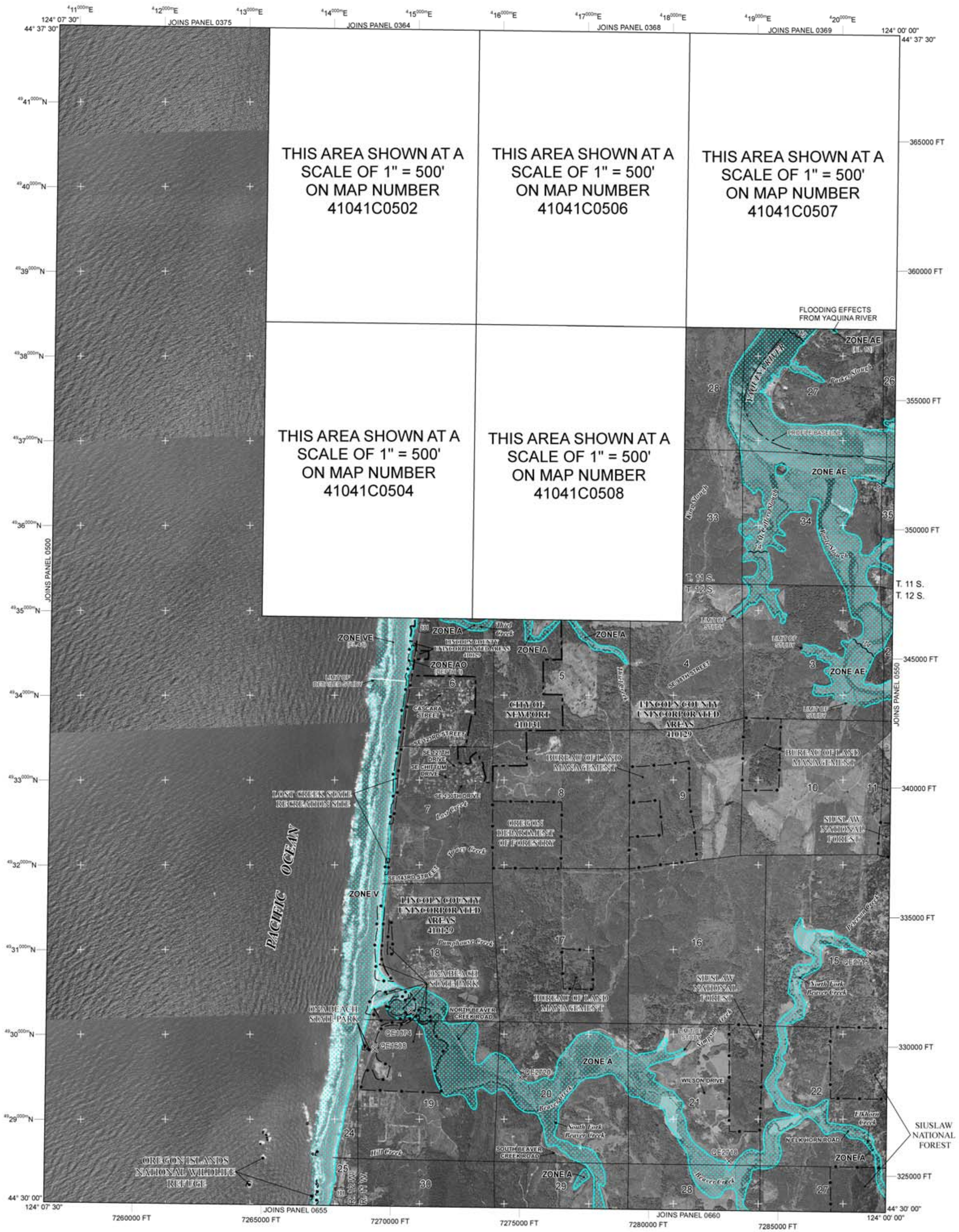
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Oregon State Plane North Zone (FIPS Zone 3601), Lambert Conformal Conic projection
4989000 N	1000-meter Universal Transverse Mercator grid values, zone 10N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET
600 0 600 1200 METERS

NOT TO SCALE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0525D

FIRM
FLOOD INSURANCE RATE MAP
LINCOLN COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 525 OF 880
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN COUNTY	410129	0525	D
NEWPORT, CITY OF	410131	0525	D

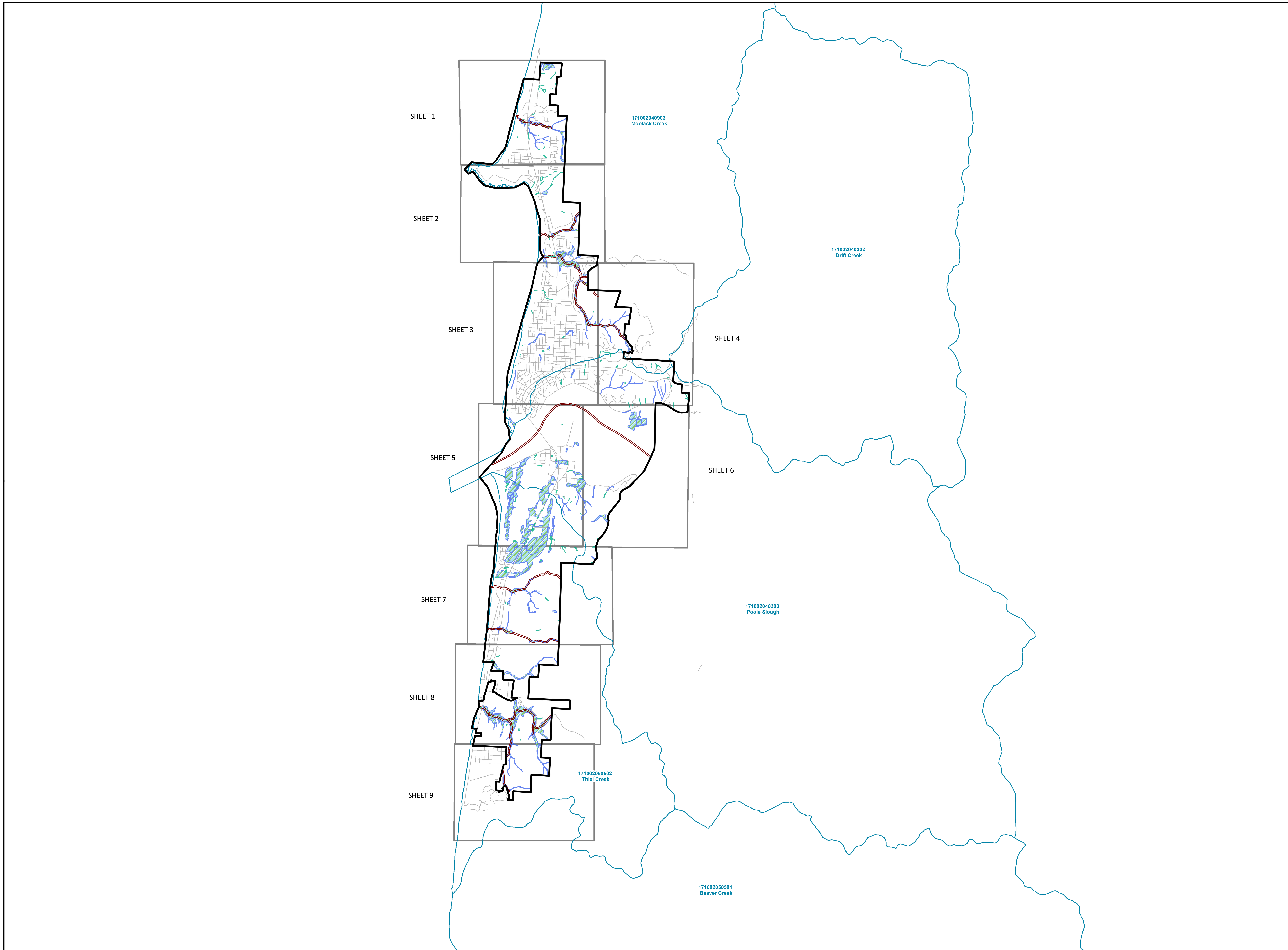
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
41041C0525D

EFFECTIVE DATE
DECEMBER 18, 2009

Federal Emergency Management Agency

APPENDIX C – PBS Wetland Maps



NEWPORT

OREGON

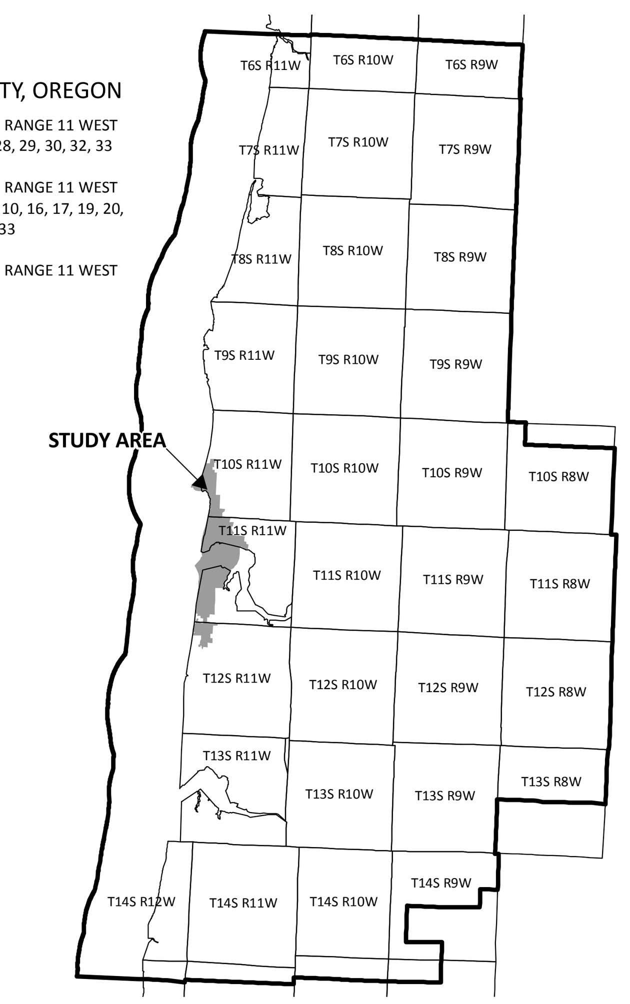
LOCAL WETLANDS AND RIPARIAN INVENTORY

LINCOLN COUNTY, OREGON

TOWNSHIP 10 SOUTH RANGE 11 WEST
SECTIONS 17, 19, 20, 28, 29, 30, 32, 33

TOWNSHIP 11 SOUTH RANGE 11 WEST
SECTIONS 4, 5, 7, 8, 9, 10, 16, 17, 19, 20, 21, 28, 29, 30, 31, 32, 33

TOWNSHIP 12 SOUTH RANGE 11 WEST
SECTIONS 5, 6, 7, 8



STUDYAREA
RIPARIAN CORRIDOR (100 FEET)
WETLAND (< 0.5 ACRES)
WETLAND (≥ 0.5 ACRES)
WATERSHEDS (HUC6)
STREETS

N

0 3,500 7,000 10,500 14,000 Feet

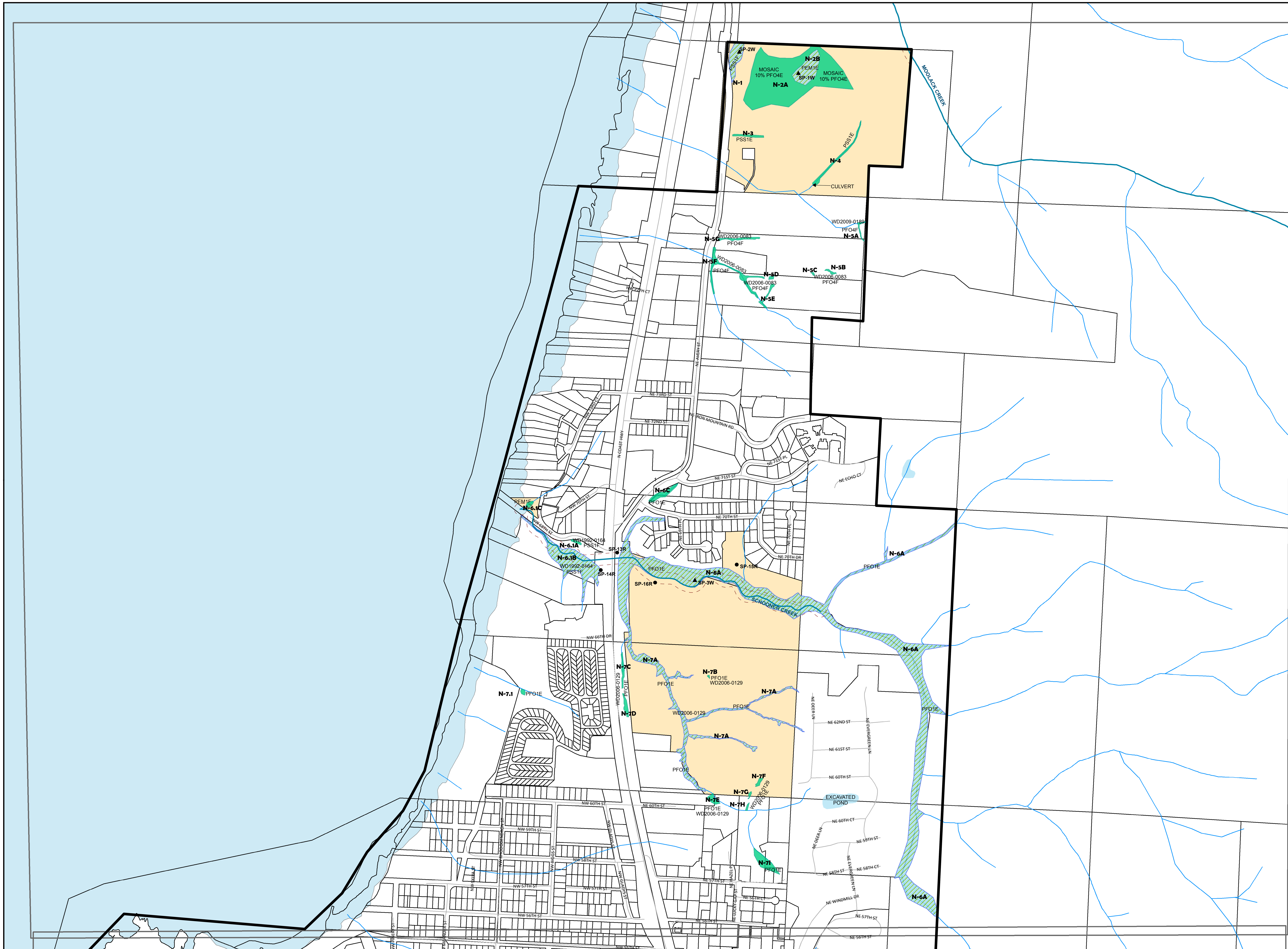
Information shown onthis map is for planning purposes, represents the conditions that exist at the map date, and is subject to change. The location and extent of wetlands and other waters is approximate. There may be unmapped wetlands and other waters present that are subject to regulation. A current Oregon Department of State Lands-approved wetland delineation is required for state removal-fill permits. You are advised to contact the Department of State Lands and the U.S. Army Corps of Engineers with any regulatory questions.

INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

PBS Engineering + Environmental

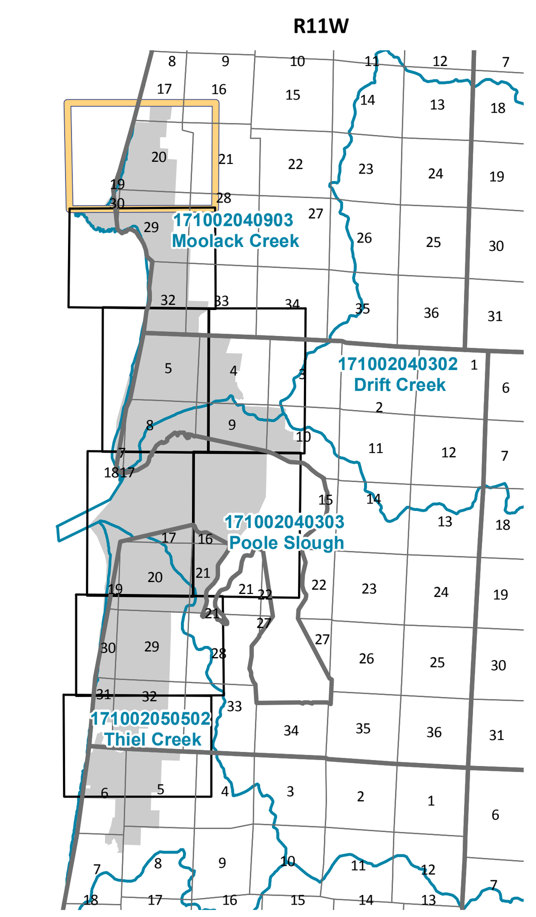
INDEX SHEET



NEWPORT

OREGON

LOCAL WETLANDS AND RIPARIAN INVENTORY



STUDYAREA
RIPARIAN PLOT
WETLAND PLOT
WETLAND (< 0.5 ACRES)
WETLAND (≥ 0.5 ACRES)
RIPARIAN CORRIDOR (100 FEET)
RIPARIAN CORRIDOR STREAMS
STREAMS
RAILROAD
STREETS
SHEETS
WATER BODIES
TAX LOT
TAX LOTS WHERE ACCESS GRANTED

0 400 800 1,200 1,600 Feet

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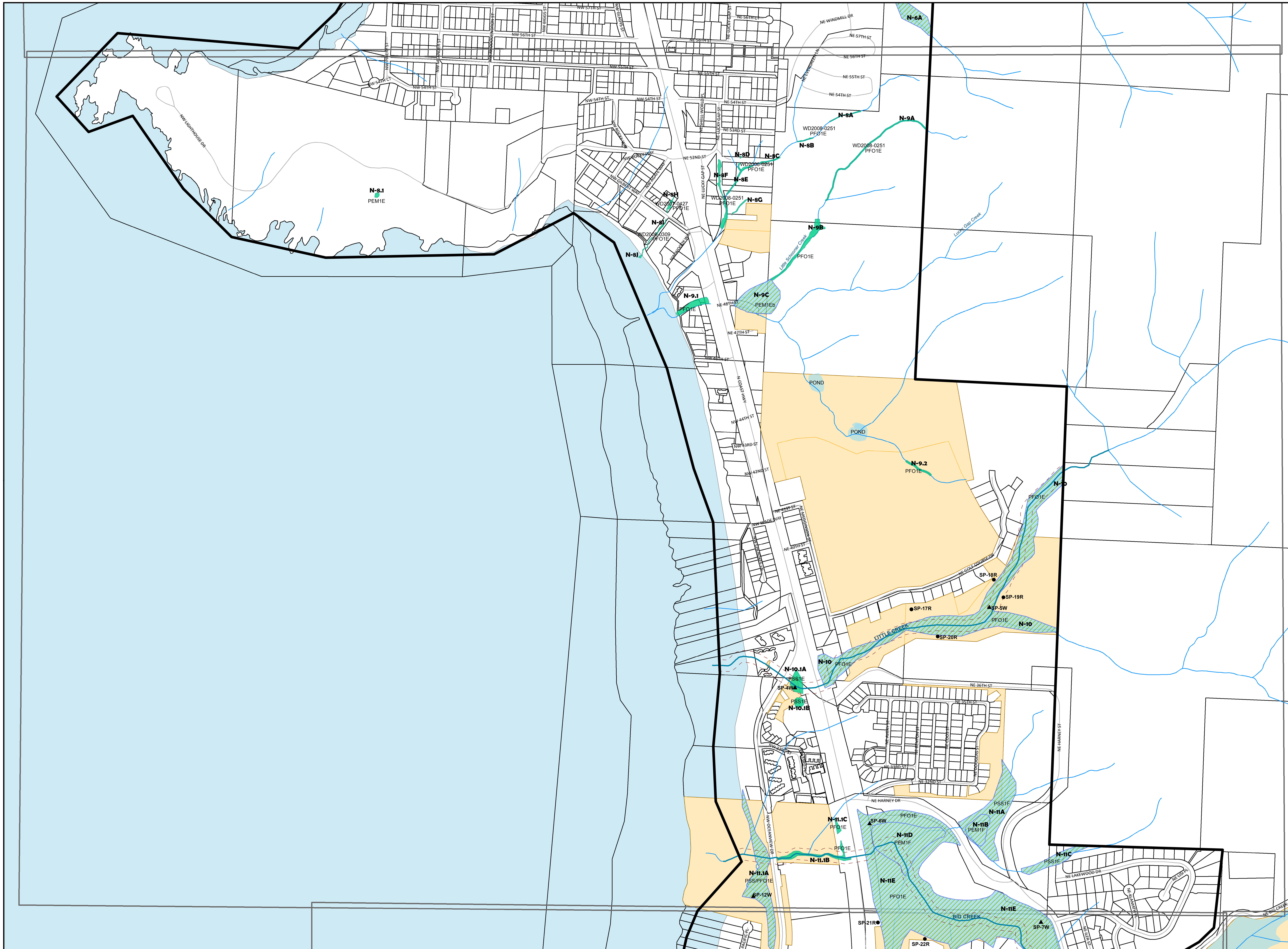
INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

PBS Engineering + Environmental

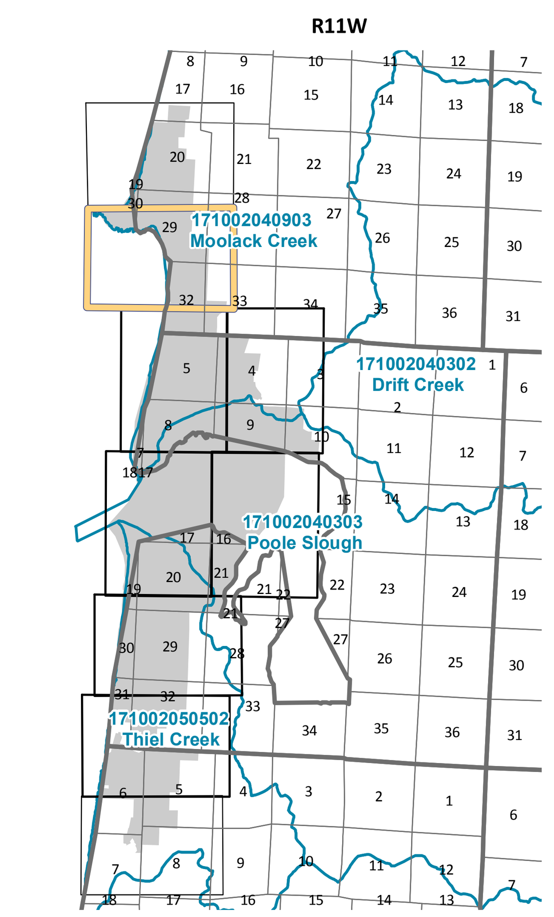
SHEET 1 OF 9



NEWPORT

OREGON

LOCAL WETLANDS AND RIPARIAN INVENTORY



- STUDYAREA
- RIPARIAN PLOT
- WETLAND PLOT
- WETLAND (< 0.5 ACRES)
- WETLAND (≥ 0.5 ACRES)
- RIPARIAN CORRIDOR (100 FEET)
- RIPARIAN CORRIDOR STREAMS
- STREAMS
- RAILROAD
- STREETS
- SHEETS
- WATER BODIES
- TAX LOT
- TAX LOTS WHERE ACCESS GRANTED

0 400 800 1,200 1,600 Feet

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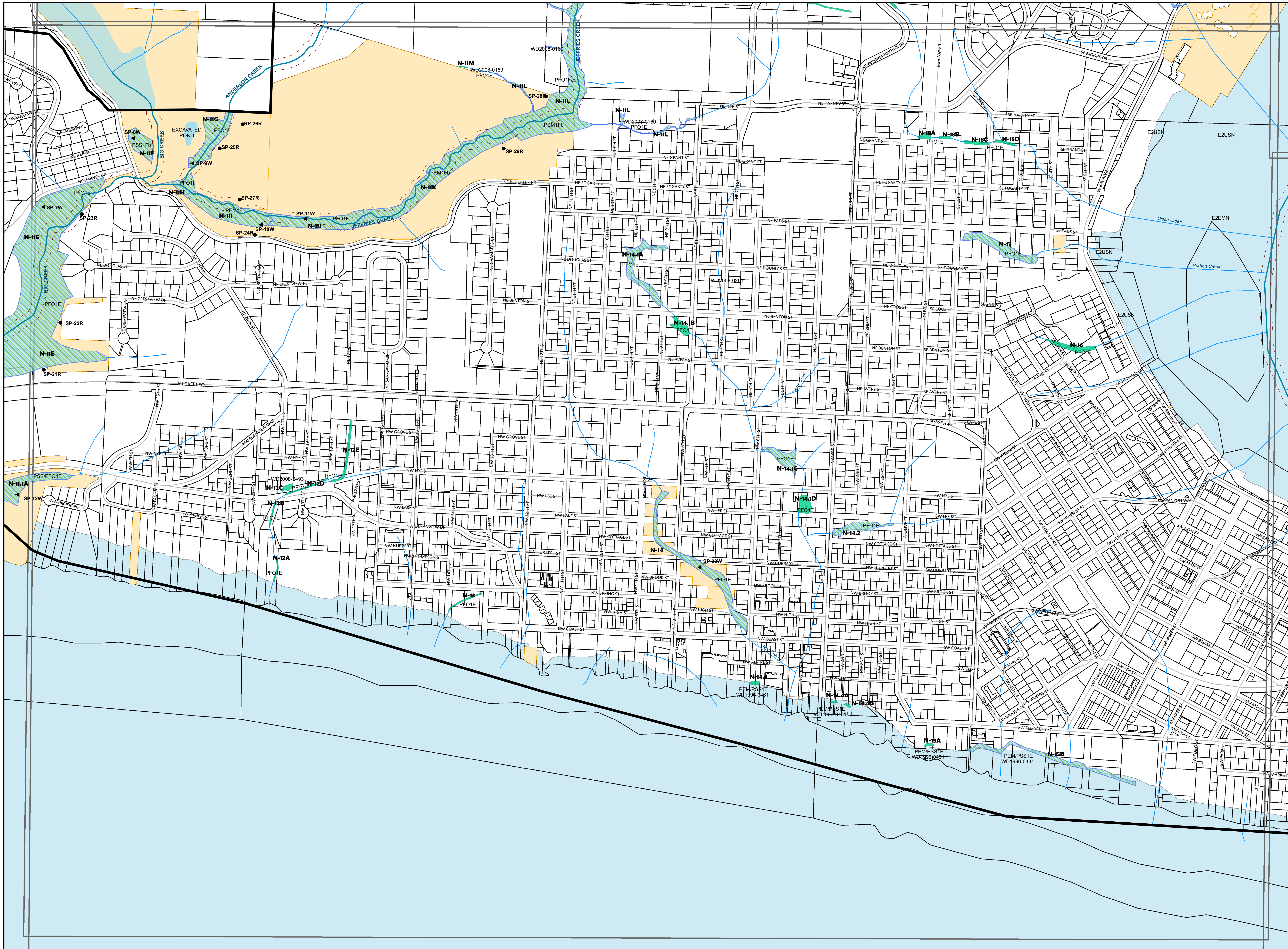
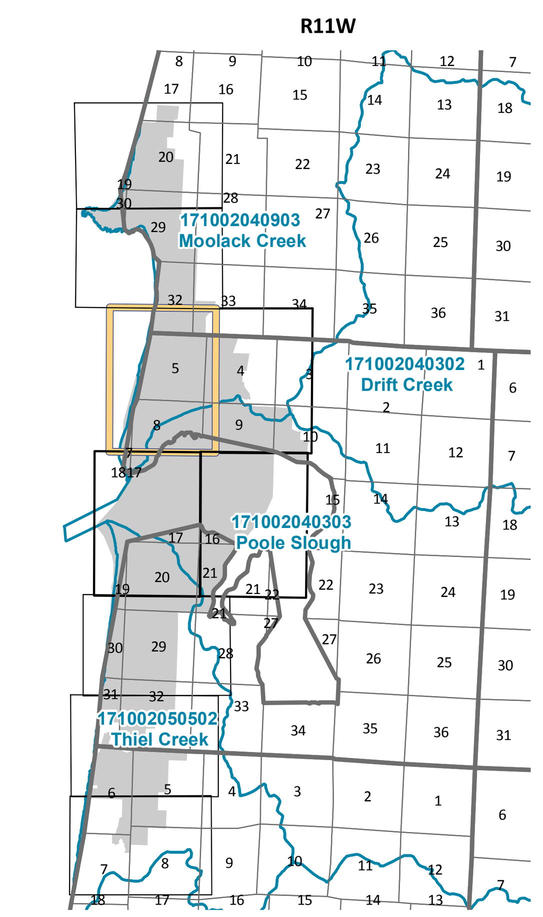
INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

PBS Engineering + Environmental

SHEET 2 OF 9





NEWPORT

OREGON

LOCAL WETLANDS AND RIPARIAN INVENTORY

STUDYAREA
RIPARIAN PLOT
WETLAND PLOT
WETLAND (< 0.5 ACRES)
WETLAND (≥ 0.5 ACRES)
RIPARIAN CORRIDOR (100 FEET)
RIPARIAN CORRIDOR STREAMS
STREAMS
RAILROAD
STREETS
SHEETS
WATER BODIES
TAX LOT
TAX LOTS WHERE ACCESS GRANTED

0 400 800 1,200 1,600 Feet

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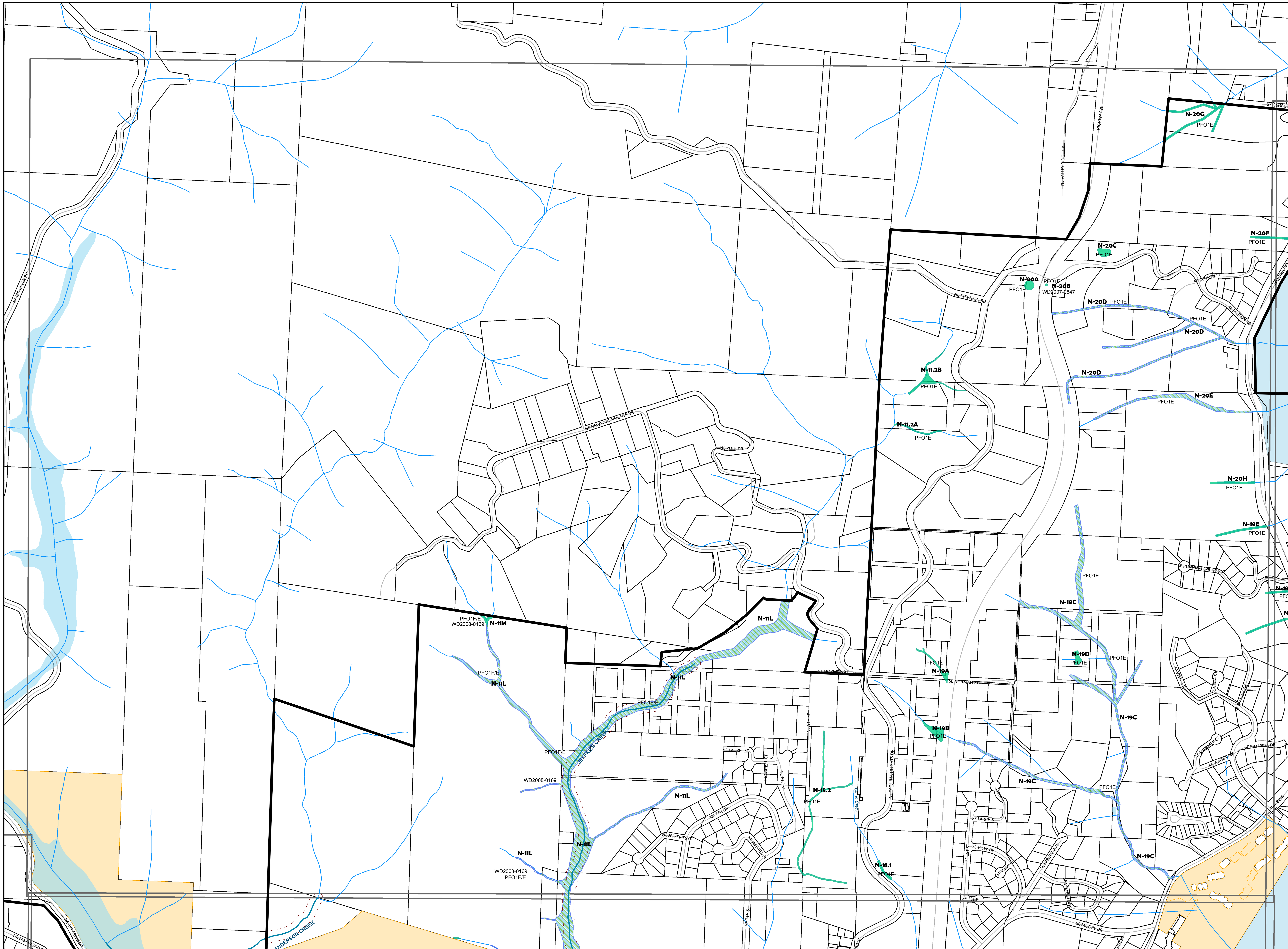
INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

PBS Engineering + Environmental

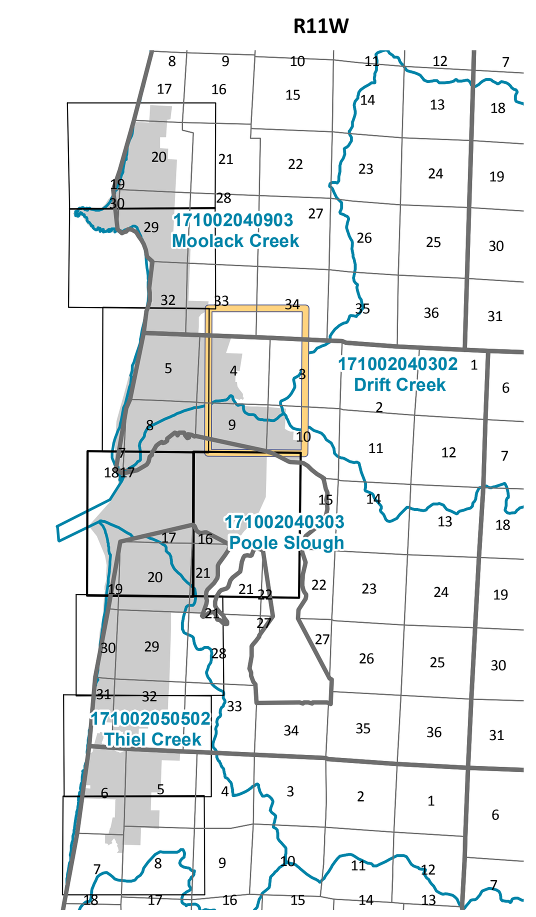
SHEET 3 OF 9



NEWPORT

OREGON

LOCAL WETLANDS AND RIPARIAN INVENTORY



- STUDYAREA
- RIPARIAN PLOT
- WETLAND PLOT
- WETLAND (< 0.5 ACRES)
- WETLAND (≥ 0.5 ACRES)
- RIPARIAN CORRIDOR (100 FEET)
- RIPARIAN CORRIDOR STREAMS
- STREAMS
- RAILROAD
- STREETS
- WATER BODIES
- SHEETS
- TAX LOT
- TAX LOTS WHERE ACCESS GRANTED

0 390 780 1,170 1,560 Feet

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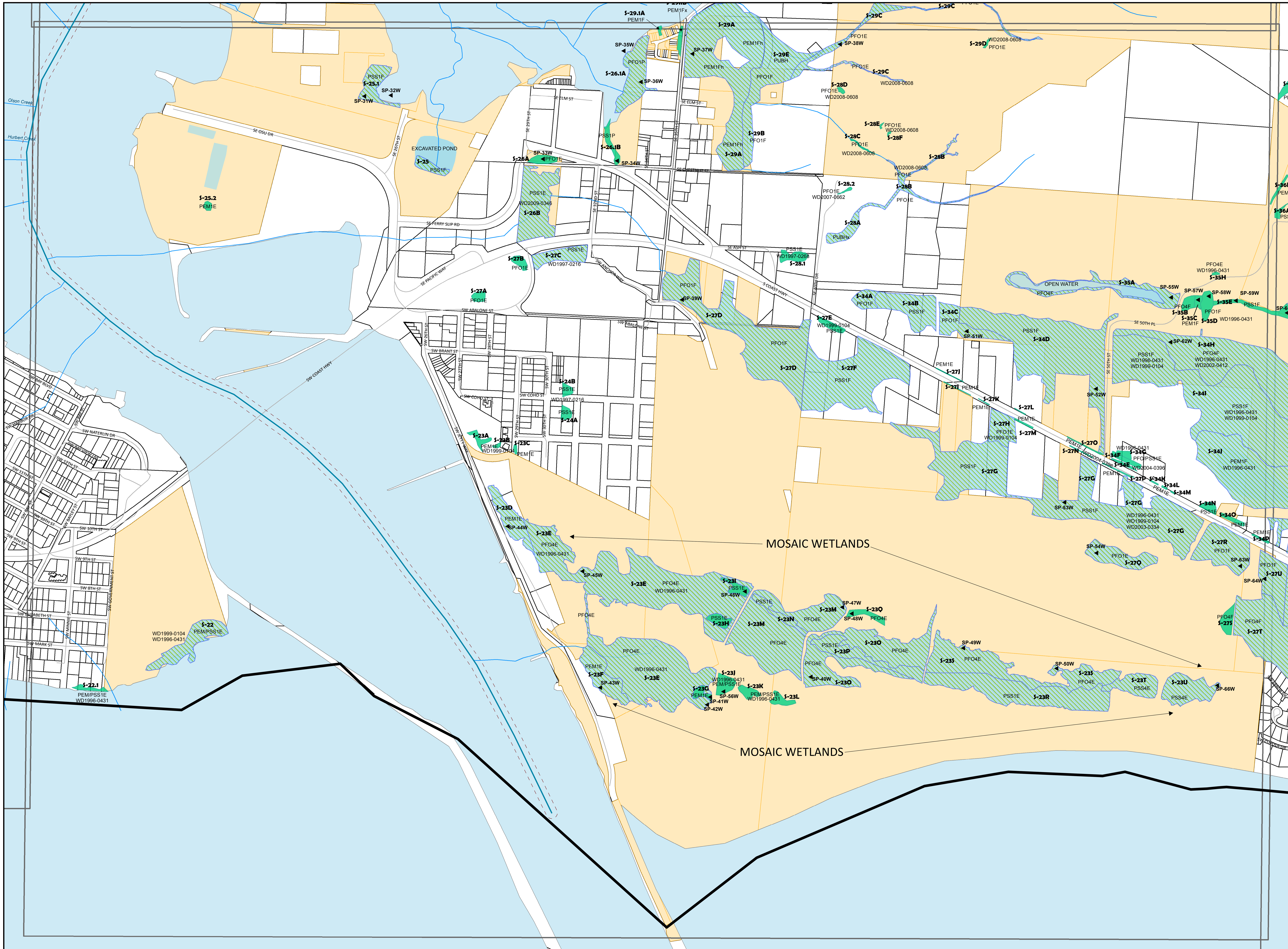
INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

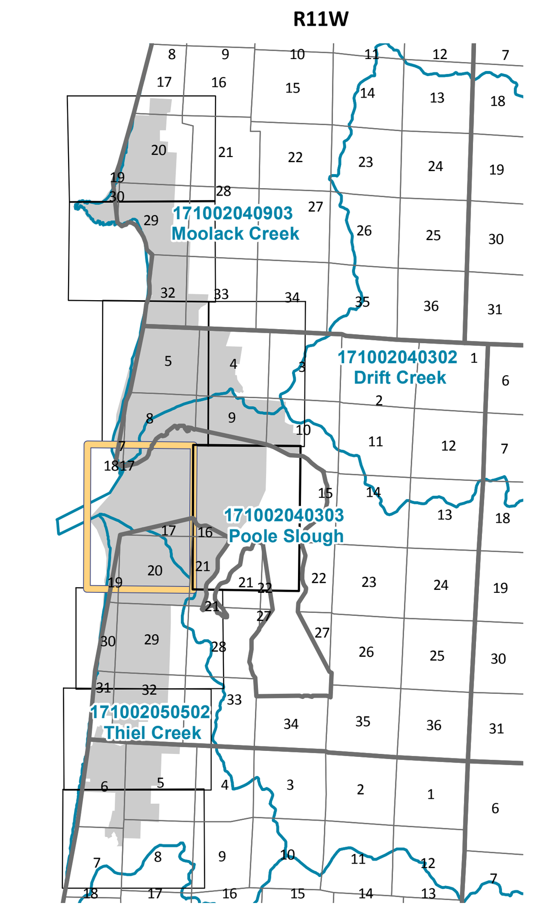
PBS Engineering + Environmental

SHEET 4 OF 9



NEWPORT
OREGON

LOCAL WETLANDS AND RIPARIAN INVENTORY



- STUDYAREA
- RIPARIAN PLOT
- WETLAND PLOT
- WETLAND (< 0.5 ACRES)
- WETLAND (≥ 0.5 ACRES)
- RIPARIAN CORRIDOR (100 FEET)
- RIPARIAN CORRIDOR STREAMS
- STREAMS
- RAILROAD
- STREETS
- SHEETS
- WATER BODIES
- TAX LOT
- TAX LOTS WHERE ACCESS GRANTED

0 400 800 1,200 1,600 Feet

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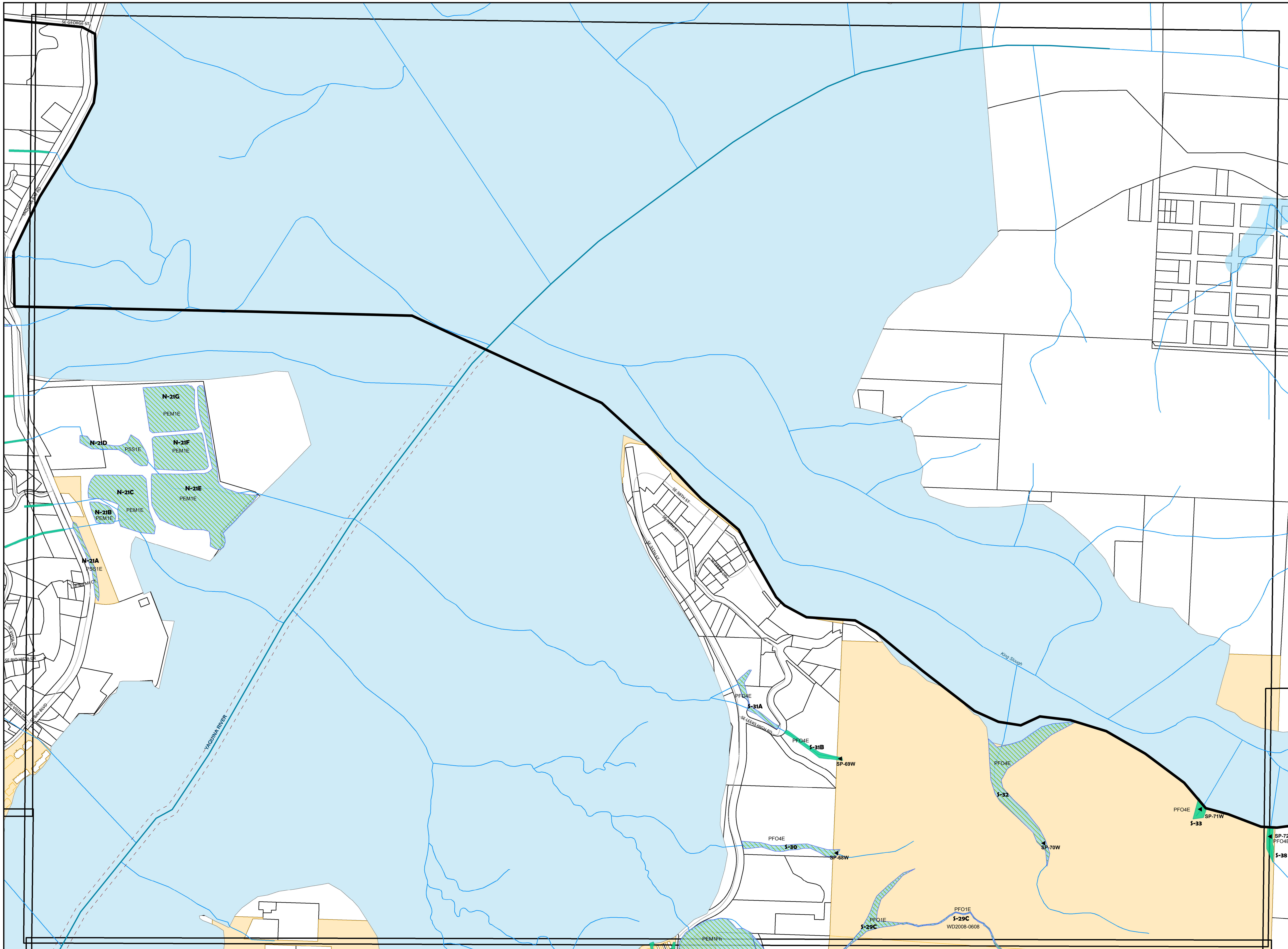
INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

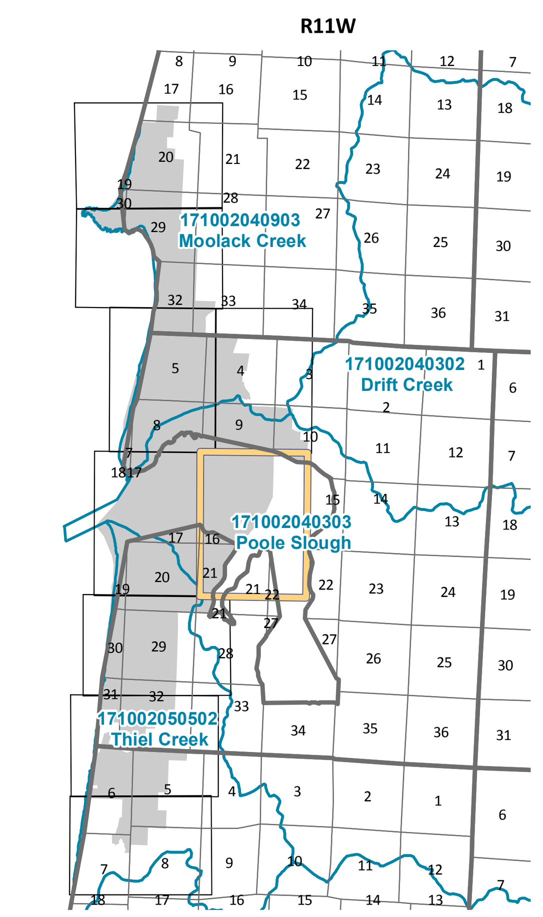
PBS Engineering + Environmental

SHEET 5 OF 9



NEWPORT
OREGON

LOCAL WETLANDS AND RIPARIAN INVENTORY



- STUDYAREA
- RIPARIAN PLOT
- WETLAND PLOT
- WETLAND (< 0.5 ACRES)
- WETLAND (≥ 0.5 ACRES)
- RIPARIAN CORRIDOR (100 FEET)
- RIPARIAN CORRIDOR STREAMS
- STREAMS
- RAILROAD
- STREETS
- SHEETS
- WATER BODIES
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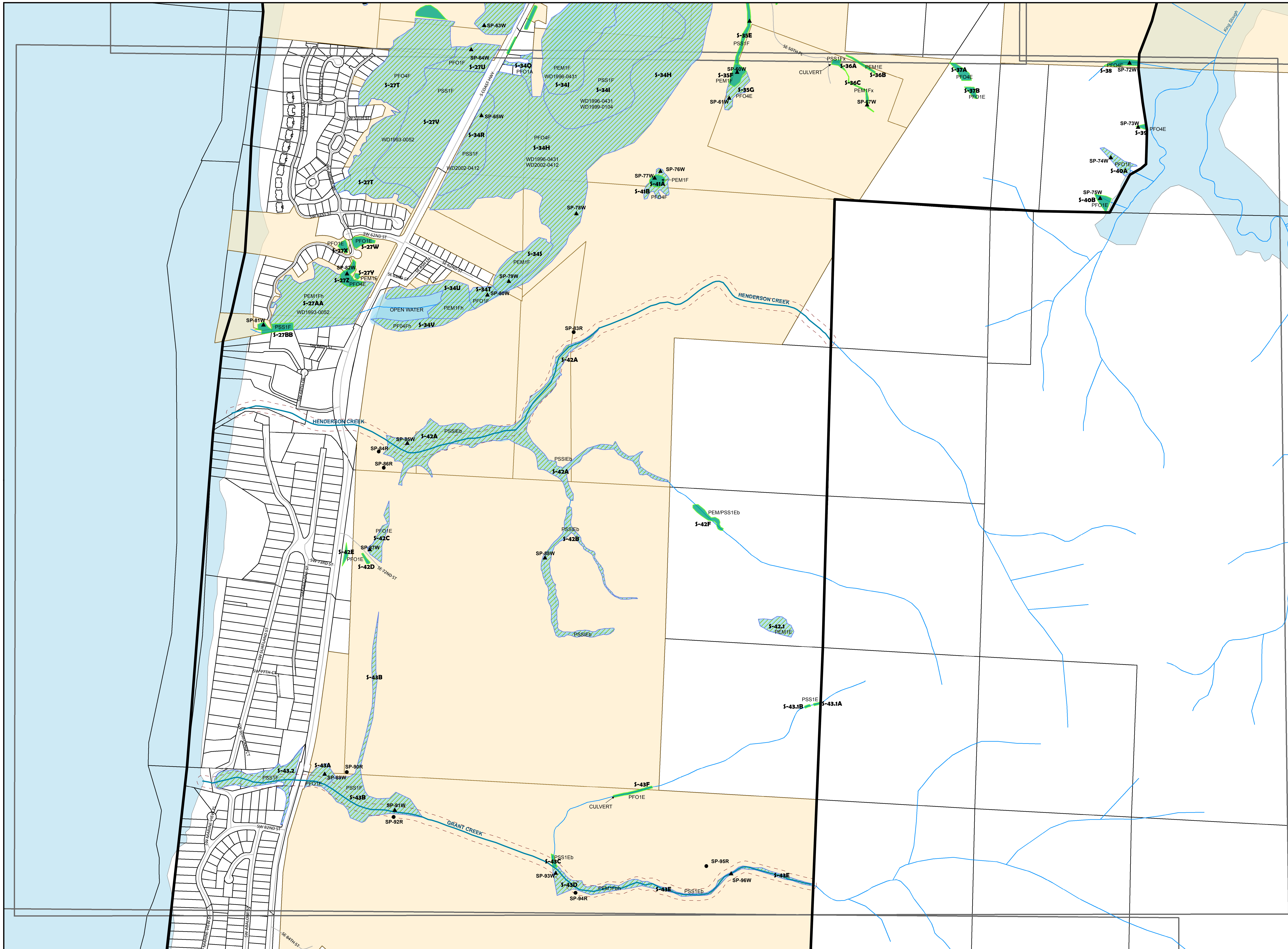
INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

PBS Engineering + Environmental

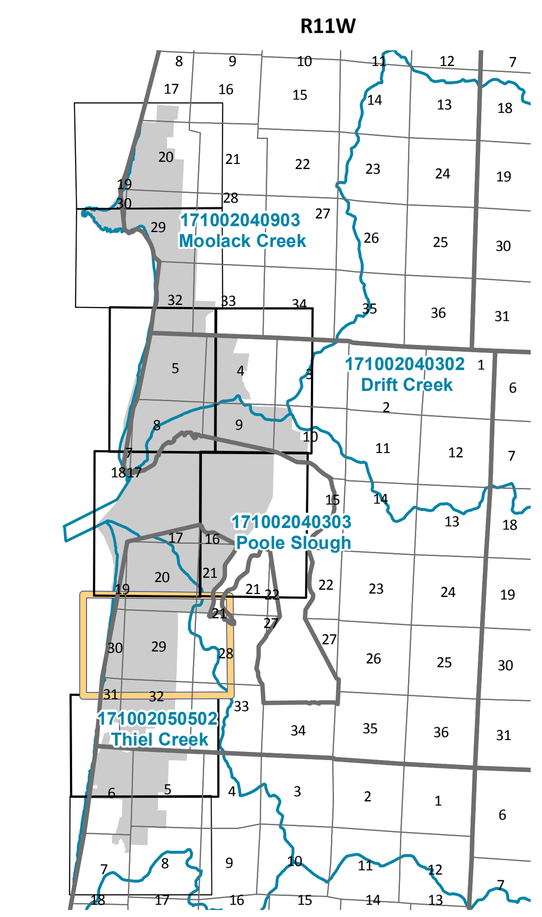
SHEET 6 OF 9



NEWPORT

OREGON

LOCAL WETLANDS AND RIPARIAN INVENTORY



- STUDYAREA
- RIPARIAN PLOT
- WETLAND PLOT
- PROBABLE WETLAND
- WETLAND
- RIPARIAN CORRIDOR (100 FEET)
- RIPARIAN CORRIDOR STREAMS
- STREAMS
- RAILROAD
- STREETS
- SHEETS
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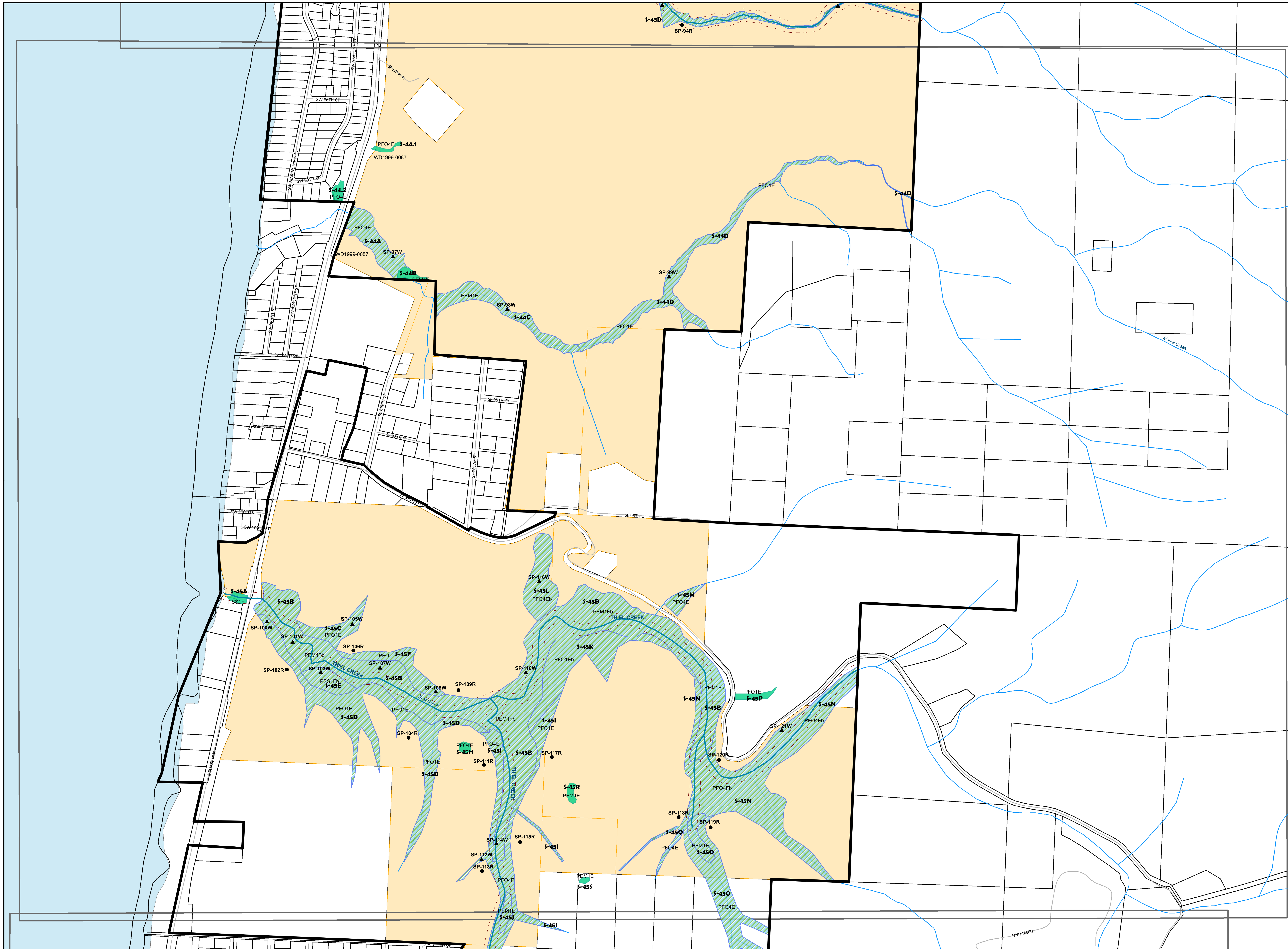
INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

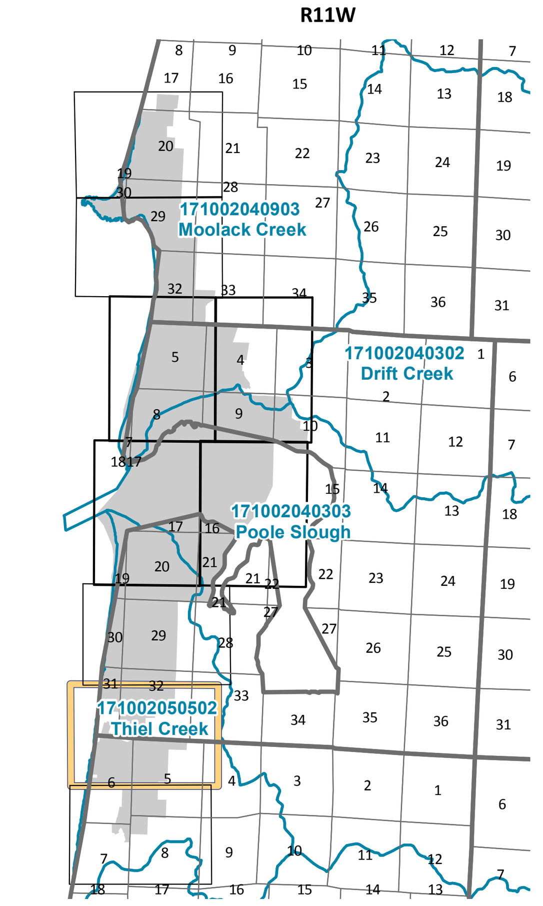
PBS Engineering + Environmental



NEWPORT

OREGON

LOCAL WETLANDS AND RIPARIAN INVENTORY



- STUDYAREA
- RIPARIAN PLOT
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- WETLAND (< 0.5 ACRES)
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- STREAMS
- RAILROAD
- STREETS
- SHEETS
- WATER BODIES
- TAX LOT
- TAX LOTS WHERE ACCESS GRANTED

0 400 800 1,200 1,600 Feet

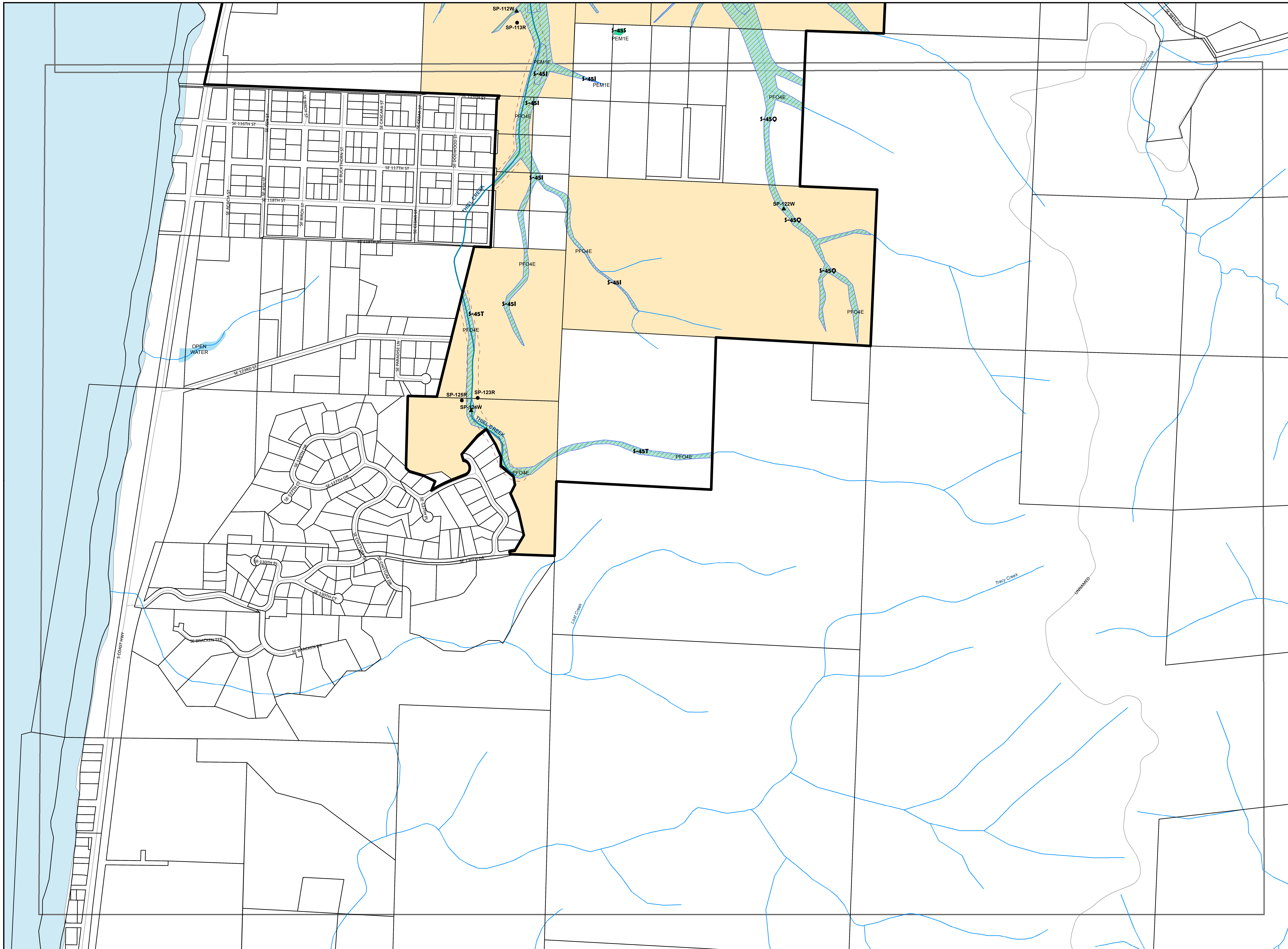
Information shown on this map is for planning purposes, represents the conditions that exist at the map date, and is subject to change. The location and extent of wetlands and other waters is approximate. There may be unmapped wetlands and other waters present that are subject to regulation. A current Oregon Department of State Lands-approved wetland delineation is required for state removal-fill permits. You are advised to contact the Department of State Lands and the U.S. Army Corps of Engineers with any regulatory questions.

INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

PBS Engineering + Environmental

SHEET 8 OF 9



NEWPORT

OREGON

LOCAL WETLANDS AND RIPARIAN INVENTORY

R11W

T10S

T11S

T12S

171002040903 Moolack Creek

171002040302 Drift Creek

171002040303 Poole Slough

171002050502 Thiel Creek

STUDYAREA

RIPARIAN PLOT

WETLAND PLOT

WETLAND (< 0.5 ACRES)

WETLAND (≥ 0.5 ACRES)

RIPARIAN CORRIDOR (100 FEET)

RIPARIAN CORRIDOR STREAMS

STREAMS

RAILROAD

STREETS

SHEETS

WATER BODIES

TAX LOT

TAX LOTS WHERE ACCESS GRANTED

N

0 400 800 1,200 1,600 Feet

Information shown on this map is for planning purposes, represents the conditions that exist at the map date, and is subject to change. The location and extent of wetlands and other waters is approximate. There may be unmapped wetlands and other waters present that are subject to regulation. A current Oregon Department of State Lands-approved wetland delineation is required for state removal-fill permits. You are advised to contact the Department of State Lands and the U.S. Army Corps of Engineers with any regulatory questions.

INFORMATION CURRENT AS OF: JUNE 2010

DRAFT MAP 06-15-2010

PBS Engineering + Environmental

SHEET 9 OF 9

APPENDIX D – Growth Planning Figure

Key	Description	Units
1	R-4 Property	16
2	R-2 Properties	19
3	R-2 Property	101
4	R-2 Properties	223
5	R-4 Property (MFD)	400+
6	R-1 Property	209
7	R-1 Properties	40
8	R-1 Properties	10
9	R-1 Property	10
10	R-1 Properties	42
11	R-2 Property	19
12	R-1 Properties	165

Key	Description	Units
13	R-2 and R-3 Properties	70-88 initial sub-phase 1,351 total

APPENDIX E – SDC Methodology

City of Newport

LINCOLN COUNTY, OREGON

STORM WATER SYSTEM
DEVELOPMENT CHARGE METHODOLOGY UPDATE

January 2015

Table of Contents

APPENDICES

Executive Summary

Section 1

1.1 Background

In the fall of 2006, the City of Newport voted to update their system development charge (SDC's) program for the various public infrastructure components in the City. HBH Consulting Engineers, Inc. was authorized to prepare SDC methodology for the water, sewer, storm drain transportation and park systems in September of 2006. The document was completed on December of 2007.

At the time the 2007 'Public Infrastructure System Development Charge Methodology' was developed the city of Newport had no storm water master plan covering all the storm drain components within the City's urban growth boundary. With the development of their 2015 Storm Water Master Plan, the City has chosen to update the SDC methodology with a current list of CIP projects and associated cost estimates to facilitate development of a more accurate SDC charge for the existing storm drain system.

The SDC methodologies and calculations presented herein are consistent with the framework set forth by the Oregon SDC legislation encapsulated within ORS 223.297 to ORS 223.314.

1.2 Overview of SDC Methodology

1.2.1 Storm Drain System SDC

This plan includes a methodology for the development of a stormwater SDC for the City of Newport. The methodology relies upon planning development in the Storm Water Master Plan, 2015. Capital projects from this plan were used to establish a CIP for the storm water system.

Growth potential in the stormwater sector was based upon impervious surface methodology. A study of residential development confirmed that a typical residential dwelling in Newport accounts for approximately 2,727 square feet of impervious surfaces. Therefore, it was determined that a single EDU is equal to 2,727 square feet of impervious surface.

By using adopted growth rates and conversions to impervious surface, a value was established for growth potential in the storm drainage system within the planning period.

The SDC charge for the storm drainage system was calculated by dividing the SDC eligible project costs by the growth potential within the system.

A summary of the storm drainage SDC is provided below in Table 1.2.3. A detailed analysis of the storm drainage SDC methodology is provided within Section 3 of this methodology.

Table 1.2.3 – Storm Drainage SDC Methodology Summary
City of Newport

SDC Component	SDC Amount
Improvement Fee	
$/EDU	$1,494
$/square foot	$0.55
Reimbursement Fee	0
Credit Summary	NA

1.2.2 Compliance Costs

Oregon law allows a utility service provider to use SDC revenues to pay for costs associated with compliance to, and administration of SDC programs. While this is not a separate category, it is acceptable to assess a "compliance charge" when collecting SDC fees.

Acceptable compliance cost activities include accounting and auditing costs, SDC methodology updates and plans, master planning costs, CIP administration costs, and other costs that are determined to be necessary to support and properly manage an SDC program.

Collection of funds to pay for these annual SDC compliance costs should be in the form of a percentage surcharge on all SDC's collected. Therefore, an estimate must be made of the revenue that the City is projecting to collect over the planning period. Based on the analysis shown in the *Public Infrastructure System Development Charge Methodology, 'HBH Consulting Engineering, December 2007' (ISDCM)*, it was projected to require a surcharge of around 4% on all SDC's to collect adequate funds to properly administer an SDC program for the City of Newport. This value was reassessed using the new stormwater CIP project list and still remains at approximately 4%.

Section 4.0 includes information and details on the establishment of SDC compliance costs. The analysis shown in this section combines the SDC compliance costs from the water, wastewater, storm drain, transportation, and park infrastructure systems to calculate one percentage rate for all SDC charges.

1.2.3 Sample SDC Assessment

Residential Customers

A simple example of SDC assessment would be for a new single family dwelling. The assessment for this new customer would be as follows:

Table 1.2.8 – Sample Residential Assessment

SDC Sector	SDC Charge Per EDU
Water System SDC	$2,366.00
Wastewater System SDC	$3,891.00
Stormwater System SDC	$1,493.90
Transportation System SDC	$1,090.00
Parks System SDC	$2,591.00
Subtotal	$11,431.90
Compliance Cost Surcharge	$477.85
Total Residential SDC	$11,910

Therefore a total SDC for all of the SDC programs in Newport would be around $11,910 for an average new residential dwelling. This does not include any potential reductions for SDC credits that may be appropriate in Newport depending on how the City undertakes the various CIP projects in the future.

Non-Residential Customers

Non-residential development will require a more complicated and case-by-case assessment process. Each section within this methodology includes a discussion of the methods that are to be used to assess new residential and non-residential customers.

The City may also allow some new non-residential customers to appeal their assessment and allow the customer to pay some of the assessment while a study is completed of their actual impact to the system. An example of a potential appeal process is provided in Section 3.10.2 of this methodology. The burden of paying for and making the case for an appeal should rest on the new customer.

Introduction to SDCs

Section 2

2.1 Background

The City of Newport owns and maintains a public infrastructure system that includes the following:

- A potable water system complete with a treatment plant, storage reservoirs, and a distribution system to deliver water to the end users.
- A sanitary sewer system that includes a wastewater collection system, several pumping stations, a treatment plant, and an ocean outfall for treated effluent.
- A storm drainage system with piping and ditching to convey rainwater runoff from high ground to appropriate outfall locations.
- A transportation system made up of major and minor roads, sidewalks, and other facilities for the purposes of providing transportation within and without the community.
- A parks system complete with several parks and other recreational facilities for the use of residents and visitors to the City.

In 2007, the City of Newport adopted an SDC methodology for each infrastructure sector mentioned above. Since that time, the SDC methodology remains unchanged.

The purpose of this study is to develop and discuss the methodology used to update the existing storm water SDC program to incorporate the capital improvement costs outlines in the recently developed Storm Water Master Plan.

2.2.1 Summary of Previous SDC Charge Structure

Prior to the preparation of this methodology, the City assessed SDC's based on the following assessment methods for each infrastructure element:

1. <u>Storm SDC</u> *Residential:* Charged a set per residence or EDU. This fee is based on the assumption that each lot has an average of 2,727 square feet, and an associated cost of $0.25 per foot. *Non-Residential:* Charged $0.25 per square foot. These fees do not include compliance costs.
2. <u>Storm SDC</u> *Commercial/Industrial:* Charged a $0.25 per square feet of impervious service added to the site.

Based on the previous methods, the total SDC for a typical residence would have been around $690. This information is provided so that the City may compare the final recommendations in this methodology to typical charges prior to the SDC update.

2.3 Oregon SDC Law

The State of Oregon has established statutory law for the development, assessment, and administration of SDC's for local governments, utility districts, and similar agencies. Oregon Revised Statutes (ORS) 223.297 - 223.314 authorizes local governments and service districts to assess SDC's for various infrastructure sectors including sewer, water, storm drainage, streets, and others.

In addition to specifying the infrastructure systems for which SDC's may be assessed, the SDC legislation provides guidelines on the calculation and modification of SDC's, accounting requirements to track SDC revenues, and the adoption of administrative review procedures. A summary of the statutory SDC provisions is provided below:

2.3.1 SDC Structure

SDC's are typically developed around two separate modes or philosophies of SDC logic. They are:

1. Reimbursement SDC
2. Improvement SDC

SDC's can also be assessed based on a combination of reimbursement and improvement charges. In addition to these charges, the statute allows agencies to recover administrative costs that are necessary to set up, comply with, and administer SDC programs. We will refer to these costs as compliance costs.

Reimbursement SDC. A reimbursement SDC is designed to recover capital costs for projects that have already been undertaken. Current legislation requires that the reimbursement SDC be established by an ordinance or resolution that sets forth the methodology used to calculate and assess the charge. The methodology must integrate a number of factors when determining an appropriate SDC cost including:

1. The cost of existing facilities when they were constructed or implemented
2. Remaining capacity available for growth or development use
3. Prior contributions from existing users
4. The value of unused capacity
5. Ratemaking principles employed to finance the capital improvements
6. Grants or other funding sources that must be subtracted from the eligible costs and
7. Other relevant factors

The objective of a reimbursement SDC is that future system users contribute an equitable portion of the capital costs of developing new facilities with excess capacity.

A typical example of how a reimbursement SDC could be utilized is with a recently upgraded or constructed sanitary sewer pump station. Sanitary sewer pump stations are required to be designed and constructed to handle a future (20 or 25 year) projected capacity. The additional cost required for the construction of a new pump station that can not only handle existing flows but future projected flows becomes the SDC eligible portion of the project cost.

For example, if a pump station was built five years ago, but has additional capacity available for future growth, the value of the remaining unused capacity of the station can be calculated and assessed as a reimbursement SDC eligible project cost to all new customers that wish to utilize some of the remaining capacity during the remainder of the design period (15 or 20 years, or whatever the case may be).

Improvement SDC. The improvement fee is designed to recover costs of planned capital improvements as they appear on an adopted capital improvement list or capital improvement plan (CIP). The improvement fee must also be specified in an ordinance or resolution and is subject to the following conditions:

1. The costs of projected capital improvements will increase the capacity of the system.
2. Projects must appear on an approved and adopted CIP list or be added to the list through development review and approval.

3. Projects must serve more than the development for which the SDC is being charged. Specifically, to be considered a qualified project:

    a. the project is not located on or contiguous to property that is being developed, or
    b. the project is located in whole or in part on or contiguous to property that is the subject of development approval and required to be built larger or with greater capacity than is necessary for the particular development project to which the improvement fee is related.

Revenues generated from improvement fees must be dedicated to capacity increasing capital improvements or the repayment of debt on such improvements. An increase in capacity is established if an improvement increases the level of service provided by existing facilities or provides new facilities. The portion of such improvements funded by improvement fees must be related to current or projected development.

Combined SDC. In most cases, growth needs due to development will be met through a combination of existing available capacity (reimbursement SDC) and future capacity enhancing improvements (improvement SDC). The sum of reimbursement and improvement SDC's is commonly referred to as a combined SDC. However, when utilizing a combined SDC, the methodology must demonstrate that the charge is not based on providing the same capacity-increasing result due to both SDC's. In short, an agency cannot "double-dip" when using a combined SDC. This is usually accomplished by structuring the fee to reflect the weighted average cost of existing and new facilities.

Compliance Costs. Oregon law allows SDC revenue to be utilized by the assessing agency for costs incurred in an effort to comply, administer, study, and update an SDC program. Compliance costs include, but are not necessarily limited to:

1. Auditing and accounting costs
2. Master/Facilities Planning Costs and Planning Updates
3. SDC Methodology Development Costs and Updating of SDC Plans
4. Maintenance of a Capital Improvement Plan (CIP) list

Compliance costs are typically assessed based on a percentage of the overall or maximum anticipated or projected annual SDC revenue. These revenues must be used to maintain or administer an active SDC program. Compliance costs are discussed in Section 8.0.

2.3.2 SDC Credits

Oregon law requires that an SDC credit be provided against any assessed improvement fee for the construction of "qualified public improvements." Qualified improvements, as discussed above, are improvements that are required as a condition of development approval, are included on the CIP list, and are either:

1. not located on or contiguous to the property being developed, or
2. located in whole or in part, on or contiguous to, property that is the subject of development approval and required to be built larger or with greater capacity than is necessary for the particular development project to which the improvement fee is related.

In simple terms and for example, if a new wastewater pump station appears on a CIP list and is required for a specific development to be undertaken, the owner of the development can construct the new pump station and receive an SDC credit for the SDC eligible portion of the project costs, assuming that the new station is needed to serve more customers than are represented by the development alone.

An additional credit must be included in the methodology for the present worth of financing payments that may occur in the future for an undertaken improvement. In short, new users cannot be required to pay SDC's for specific improvements as well as pay increased user rates to pay back loans that were required to construct the improvements. This form of "double-dipping" is overcome by establishing a credit based on the present worth of a potential increase in monthly user rates over a specified period of time.

2.3.3 Update and Review Requirements

SDC methodology is public information and must be made available for public review.

The SDC ordinance must include procedures and practices for not only the establishment but the modifying and updating of SDC fees. Public agencies must maintain a list of persons and organizations who have made a written request for notification prior to the adoption or amendment of any new or updated SDC fees.

However, changes to the SDC rates resulting from:

1. changes to costs in materials, labor, or real property as applied to projects in the required project list, or
2. application of a cost index that considers average change in costs of materials, labor, or real property and is published for purposes other than SDC rate setting (i.e. ENR Construction Cost Index)

are not considered "modifications" to the SDC. As such, the local agency is not required to adhere to the notification provisions.

If changes to the SDC methodology or assessment amounts do represent a modification, the notification provisions in the Oregon law require a 90-day written notice period prior to the first public hearing, with the new SDC methodology available for review at least 60 days prior to the public meeting.

2.3.4 Other SDC Statutory Provisions

Other provisions of the Oregon legislation require:

1. Development of a capital improvement program/plan (CIP) or comparable planning effort that lists the improvements that may be funded with improvement fee revenues and the estimated timing and cost of each improvement. (This is usually accomplished through a master planning effort.)
2. Deposit of SDC revenues into dedicated and individual accounts and the annual accounting of revenues and expenditures. The annual accounting effort must include a list detailing the amount spent on each project funded, in whole or in part, by SDC revenues, including costs attributed to complying with the SDC legislation.
3. Creation of an administrative appeals procedure, in accordance with the legislation, whereby a citizen or other interested party may challenge any expenditure of SDC revenues.
4. Preclusion against challenging the SDC methodology after 60 days from the enactment of or revision to the SDC ordinance or resolution.

The provisions of the legislation are invalidated if they are construed to impair the local government's bond obligations or the ability of the local government to issue new bonds or other financing. Furthermore, the establishment or modification of an SDC or a project list is not a land use decision issue.

2.4 Capacity Replacement Protocol

It is common to have a system in place that allows a new land use or development to replace an existing land use and provide an adjustment to SDC's.

For example, if someone buys an old house, tears it down, and constructs a new residential home in its place, no new flows or demands are added to the system, and no new capacity is required to service the new residence. Therefore, it would be appropriate to waive SDC fees in this instance.

If someone tears down a number of old homes to build a new apartment complex, the project must be carefully considered, and an adjustment made, depending on how many new units there will be, how much more impervious surface, etc. compared to the previous land use.

Capacity replacement issues must be handled on a case by case basis and a process developed to allow a fair adjustment when existing capacity use is replaced with a similar land use.

2.5 Public Education and Input to Methodology

A successful SDC methodology update must incorporate a public education and public input component that effectively conveys information to interested and affected groups in the community and allows them a forum to ask questions, voice concerns, and seek resolutions.

As this update was developed to recalculate the SDC value based on an updated project list, the structure and methodology of the SDC charge is not being altered and is therefore a result of public input received during the development of the '*Public Infrastructure System Development Charge Methodology, HBH Engineering, 2006*'. As the general methodology for calculating the updated stormwater SDC will not waiver from the 2006 methodology, there was little need for pursuing extensive public input. Therefore the following sections are an excerpt from the prior SDC document describing the public input process underwent during the development of that document.

2.5.1 SDC Task Force

One of the first activities undertaken by the City was the formation of an appointed SDC task force. When considering whom to appoint to the task force, the City considered which groups in the community would be most affected by the SDC update. Key members of these groups were approached and asked to serve on the SDC task force during the preparation of the SDC methodology, throughout the public notification and education periods, to the ultimate completion and implementation of the new SDC program.

Members of the SDC task force included:

- *A leader in the local property development community*
- *A member of the local homebuilders association and a local contractor*
- *A president of a local banking institution*
- *A leader in the local realtor community*
- *A member of the City of Newport Planning Commission, and*

- *A member of the City of Newport City Council*

The intent with this group was to educate and involve key members of specific groups who, in turn, would provide support and assistance in delivering information to and answering questions posed by members of their individual groups or communities. By involving these communities and groups early in the process, it was hoped that differences, problems, or misunderstandings could be avoided later in the process.

2.5.2 SDC Meetings and Public Education

Soon after beginning the SDC methodology update process, two meetings were held to educate and present the project objectives to key participants. The first two meetings were:

1. *A kickoff meeting with key members of City staff to discuss SDC's in general, talk about the plan for updating SDC's, discuss the role each member of the City staff will play in the updating of SDC's, and answer questions from staff. This meeting was held on October 30, 2006.*
2. *A kickoff meeting was then held with members of the SDC task force to discuss SDC in general, discuss the need for an SDC methodology update, and answer questions that members of the task force had with regard to the process. This meeting was also held on October 30, 2006.*

Additional meetings were scheduled and held for the purpose of public education where a presentation would be provided to the City Council and members of the public would be allowed to comment and ask questions about the process.

A total of three public education meetings were planned as part of the SDC methodology update process."

2.6 Report Organization

The following sections comprise this City of Newport SDC Methodology Plan as presently constituted:

- **Section 1 – Executive Summary.** This section provides a brief overview and summary of the SDC Plan and is intended to provide the reader with the important facts and findings contained in the overall plan.
- **Section 2 – Introduction.** This section provides information on the background of SDC's in Newport, related efforts for other infrastructure areas, and the legal and statutory background for the establishment of SDC's within the State of Oregon.
- **Section 3 – Storm Drainage SDC Methodology.** This section provides a detailed accounting of the storm drainage SDC methodology.
- **Section 4 – Compliance Costs.** This section provides a detailed accounting and methodology for the establishment of a compliance cost for the maintenance of SDC programs for all of the SDC methodologies.
- **Appendix.** The Appendix includes information that is referenced in this study but is not included in the referenced planning documents.

SDC Methodology

3.1 Introduction

This section describes in detail the calculations, background information, and methodology used to develop and identify the maximum defendable storm drainage SDC for the City of Newport. This section will seek to identify the existing and future capacity requirements as well as provide a summary of the City's stormwater capital improvement plan (CIP).

This section will develop a method for determining system population or input based on impervious surface methodology and will seek to make projections for future capacity requirements, assuming an increase in impervious surfaces.

3.2 System Overview and Background

The City of Newport has completed several planning documents over the years to provide a level of planning support for the City's stormwater system. A summary of each is provided below:

Storm Sewer Facilities Plan (CH2M Hill, 1990) This planning effort was part of an overall infrastructure planning document that looked at all of the public infrastructure in the City. The Storm Sewer Facilities Plan considers system-wide issues and divides the City into several storm drainage basins. Deficiencies were identified and improvements and cost estimates prepared.

South Beach Storm Water Master Plan (SHN Consulting Engineers, 2004) This planning effort was commissioned to address storm drainage in the southern part of the system in response to current and anticipated growth patterns in the area. The study addresses several deficiencies in the southern part of the system and includes recommended improvements and cost estimates to address these deficiencies.

Storm Water Master Plan (Civil West Engineering Services, 2014) This planning effort was commissioned to address storm drainage within the City's urban growth boundary through the planning period of 2034. The study addresses several deficiencies within the system and includes recommended improvements and cost estimates to address these deficiencies.

3.2.1 Overall System Description

The basins encompassing the area of Newport contain ravines, streams, creeks, hillsides, shallow wetlands, and Yaquina bay which all convey storm water to the Pacific Ocean. As the City began to develop around this natural landscape, ravines were morphed into flat lands with underlying culverts following the natural drainage way profile and alignment. Ditches and culverts where introduced as roads began expanding north, south, and east.

In prior planning documents, the storm drain system description has been broken up into the 'North Area' and the 'South Beach' area. For the congruency of planning documents, the same will be done within this SDC update.

North Area

The ‘North Area’ consists of all storm drain components north of Yaquina Bay. Within this area there are outfalls with diameters as large as 48” and lesser outfalls as small as 8”. Many of these outfalls are along SE Bay Blvd. draining the area southeast of Hwy. 101 and South of Hwy. 20. These range in size from 8” to 36”. Further north at the west end of NW Beach Drive lies the two major outfalls within the City draining most of the area east and west of Hwy. 101 between SW 7th St. and NW 14th Street. This area comprises the largest portion of the Cities storm drain system. North of 14th Street and south of NE 32nd St., there are several smaller systems that drain directly to the Pacific Ocean, or into Big Creek or Jeffries Creek. Primarily, the systems west of Hwy. 101 drain into the Pacific Ocean, and the systems east drain into the creeks, then under Hwy. 101 and into the Pacific Ocean. The storm drain system north of NE 32nd St. is mostly comprised of roadside ditches, 12” or smaller piped systems draining local residential areas, and large culverts conveying creeks to the Pacific Ocean. An exception to this pattern is the 36” outfall extending through and from the Pacific shores RV park. This pipe drains an area east of Hwy. 101 and an area to the south between NW 57th St. and NW 60th Street.

South Beach

The City annexed the area south of Yaquina Bay, commonly referred to as ‘South Beach’ in the 1970’s and 80’s. This area extended approximately 5 miles South of Yaquina Bay, and as much as 2.5 miles inland. Much of this area is left undeveloped and thus the storm drain follows whatever path the natural topography would dictate. Given that this area is relatively flat, and that the natural terrain affords many areas for water storage (wetlands), much of the stormwater within the South Beach area is retained, and either infiltrated, evaporated, or slowly conveyed to Yaquina Bay, or the Pacific Ocean.

Although much of South Beach is undeveloped, the areas to the north of South Beach and along Hwy. 101 contain some development. The storm drain system within these mildly developed areas is primarily small piped sub-systems draining to Yaquina Bay, or the Pacific Ocean. North of SE 25th St. the Newport Marina, NOAA Marine Operations, and the Hatfiled Marine Science Center developments cover the majority of the area with impervious surfaces. These surfaces are drained with private systems, all conveying runoff directly to Yaquina Bay. Just North of SE Marine Dr. there is a 24” outfall draining the Rogue Ales Brewery parking lot and a portion of Marine Drive. To the south at the intersection of SW Brant and SW 27th St. there is a 36” outfall which drains a residential area to the south of the intersection. Further south there is a 36” outfall at the intersection of SE 32nd St. and SE Ferry Slip Road. This outfall drains the area to the northwest of the two crossing streets. Just south of SE 32nd St. there is a 60” and 36” outfall at the intersection of SE Chesnut St. and SE Ferry Slip Road. The 60” outfall conveys waters from west and south of Hwy. 101 and SE 35th St. respectively. The 36” outfall drains a small portion of Hwy. 101, and most of SE Ferry Slip road. The final piped system larger than 12” is aligned along Ash Street, and outfalls to the east directly into Yaquina Bay. The majority of the remaining systems within South Beach are 12” or smaller, or contain a single large culvert conveying local streams, and creeks under Hwy. 101.

3.2.2 Basis for Population Impact & System Growth

The impact of growth on the stormwater system will be based on an impervious surface methodology. In general, this methodology will determine how much impervious surface a typical EDU will add to the system. All new development can then be compared against this typical value to determine how many EDU’s are being added and how this will impact the stormwater facilities within the City of Newport.

3.3 EDU Methodology and Projected Growth

This section will seek to describe the methods used in this SDC methodology to establish the growth component of the storm drainage SDC. The methodology is to be based on impervious surface methodology and shall be based on information taken from the City's aerial maps.

The aerial maps were used to examine the total impervious area on an average residential lot. Completion of this task was reached by examining 55 Residential lots spread throughout the city and totaling the impervious area, then dividing this area by the total amount of residential lots evaluated. These impervious surfaces includes such areas as:

- Roof areas
- Driveways
- Sidewalks
- Patios and impervious decks
- Outbuildings
- Any other improvement which will result in water running off the property

Based on the 70 family dwellings examined, there was a total impervious surface area of 195,300 square feet. This is equal to around 2,790 square feet of impervious surface per EDU.

Based on this analysis, the City should consider that a typical EDU in Newport shall add around 2,790 square feet of impervious surface to the system. However in the 2007 SDC study the square foot per EDU was calculated to be 2,727 and as these two numbers are not dramatically different, for the purposes of consistency, this number shall be used in this SDC update as well.

In section 5 of the Cities 2014 Storm Water Master Plan the growth potential of the storm system is presented. It is estimated that, based on this growth scenario, that approximately 2,215 new non-public EDU's will be added to the system during the planning period. It is reasonable to assume that with each EDU added there will be the typical amount of impervious surface added to the system. Therefore:

> 2,215 new EDU's x 2,727 square feet of impervious surface per EDU = 6.0-million square feet or around 138.7 acres of new impervious surface added to the system.

Therefore, the growth potential for the planning period for the stormwater SDC methodology is summarized as:

- 2,727 square feet per new EDU
- Approximately 2,280 new EDU's added to the system
- Approximately 6.0-million square feet of impervious surface added to the system
- Approximately 138.7 acres of impervious surface added to the system

These figures will be used later in this section to calculate appropriate SDC charges for the stormwater system.

3.4 CIP Project Summary and Project Costs

The City's Stormwater Master Plan document includes numerous recommended projects that the City wishes to undertake as part of their stormwater CIP. This section will seek to provide a brief description of each project and discuss the potential for SDC eligibility for each project.

The SDC methodology must include a discussion of the percentage of each project's cost that can be attributed as necessary for growth and, therefore, be considered SDC eligible. As discussed previously, SDC's must be based on a project's costs or the portion of a project's cost that is necessary to add system capacity in response to or in anticipation of growth.

A summary of the Stormwater CIP costs and associated SDC eligibility is provided in Table 3.1. To preserve document consistency, the projects will retain the name given them in the Storm Water Master Plan, and are listed in alphabetical order.

3.4.1 Project Descriptions and Need

Project C1 – 525 lf of 24-inch Storm Drain. Project C1 addresses lacking system capacity along NE 73rd Street. An area east of the 73rd and NE Avery St. intersection drains to the north ditch along NE 73rd Street. This area has a peak runoff of approximately 15.62 CFS. However the ditch to which it drains is limited to the conveyance of 3.11 CFS. To increase the capacity the flow directed into the ditch on the north side of 73rd will be diverted and piped into the existing piped storm drain system.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, however the storm water runoff will significantly increase with the estimated growth during the planning period. This increase will bump the required diversion pipe size from 18" to 24". For these reasons this project will be considered to be partially (50%) SDC eligible.

Project F1 – 88 lf of 24-inch Storm Drain. Project F1 addresses lacking system capacity from a point within the storm drain system lying on NW 60th St. between Hwy. 101 and NW Gladys Street. The pipe extends northward and is currently limiting the ability of the system to convey a 25-year storm event. This lacking capacity is directly related to runoff collected with an improved storm drain system within basin F & G. (See Storm Drain Master Plan, Civil West Engineering, 2015) With the current layout, the described pipe has sufficient capacity to convey a 25-year storm event.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and although future development within the collection area of this storm drain piping is minimal the flow within the system will increase dramatically due to future construction. For these reasons this project will be considered 100% SDC eligible.

Project H1 – 240 lf of 12-inch & 65 lf of 18-inch Storm Drain. Project H1 addresses lacking capacity associated with the storm drain system within the vicinity of NW Perry St. and NW 54th St. in the northern part of the community.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (3 EDU). For these reasons this project will not be considered as SDC eligible.

Project K1 – 270 lf of 12-inch Storm Drain. Project K1 addresses the storm drain components running south from the NE 53rd St. and NE Lucky Gap St. intersection to their outfall point K1. The lacking capacity within these pipes will cause localized surcharging and system flooding. Increasing this pipe size from 8" to 12" will increase the system capacity sufficiently to convey the designated storm events. This construction would require: the removal and replacement of 270' of pipe, the replacement of 2 manholes, 2 tee connections stemming from nearby catch basins, and a catch basin replacement.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain accounts for 10% of the fully developed flow. For these reasons 10% of this project will be considered as SDC eligible.

Project N1 – 200 lf of 18-inch, 550 lf of 24-inch & 1,100 lf of 30-inch Storm Drain. Project N1 addresses the capacity deficiency which extends along Hwy. 101 from the minor outfall across from SW 25th St. south to NE 17th Street. The highway improvements will include construction of: 200' of 18" RCP, 550' of 24" RCP (50' of which will be placed using the jack and bore method), and 1,100' of 30" RCP.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (6 EDU). For these reasons this project will not be considered as SDC eligible.

Project N2 – 250 lf of 18-inch Storm Drain. Project N2 addresses the capacity deficiency along Iler Street. Two pipes along this pathway need to be replaced to facilitate future conveyance of a 25-year storm event.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project Q1 – 224 lf of 12-inch Storm Drain & 200 lf of Ditch Repair. Project Q1 addresses insufficient capacity and system maintenance along NW Nye Street. There have been resident complaints of flooding, or overflow being disbursed out of the existing storm drain system along NW Nye Street between NW 16th and 17th street. The system model also shows insufficient capacity in this area as the 25-year storm produces roughly 3.54 CFS of storm water that cannot be contained within the existing system. This is primarily due to insufficient pipe sizes (8") as well as a ditch line at the north end of the system that is littered with obstructions. To address the current deficiencies the 225' of 8" storm drain line along NW Nye St. should be increase to 12", and approximately 100' of ditch line needs to be repaired or reconstructed to match a 1'-6" trapezoidal ditch configuration with a 1' wide bottom.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions and poor maintenance of the existing system, additionally future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project R1 – 175 lf of 12-inch & 500 lf of 18-inch Storm Drain. Project R1 addresses the storm drain system downstream of the NW 14th St. and NW Thompson St. intersection which lacks sufficient capacity. These pipes are currently 8" and need to be increased in size to 12-inch and 18-inch pipe further downstream.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (3 EDU). For these reasons this project will not be considered as SDC eligible.

Project T1 – 161 lf of 12-inch Storm Drain. Project T1 addresses lacking capacity in the 8” pipe extending north from the manhole structure northeast of the NW 8th St. and NW Nye St. intersection. This pipe has a capacity of 4.14 CFS, however a 25-year storm will deliver 5.35 CFS to the pipe inlet. To address this, 161’ of this 8” pipe will be increased to 12”.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (1 EDU). For these reasons this project will not be considered as SDC eligible.

Project T2 – 240 lf of 18-inch Storm Drain. Project T2 addresses the insufficient capacity of the 24” pipe located at the NW 6th St. and NW Coast Street. The capacity insufficiency continues from this point in the storm drain system downstream to the outfall T1. Increasing the pipe size from 24” to 36” will allow for complete conveyance of the storm water flow. Additionally, the two outfalls extending west along NW Beach Drive are currently combined, and with this suggested improvement, the two systems will be separated into two independent systems. This additional design component will include the abandonment and filling of 50’ of 24” pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (7 EDU). For these reasons this project will not be considered as SDC eligible.

Project T3 – 325 lf of 18-inch & 340 lf of 24-inch Storm Drain. Project T3 addresses lacking capacity within the 8” pipe extending to the NW 11th St. & NW Spring St. intersection. This system must be increased in size from this point to the downstream intersection of NW 9TH St. & NW Spring Street. This improvement includes approximately 325’ of 18” pipe, and 340’ of 24’ pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project T4 – Re-Alignment of Piping Under Existing Structures. Project T4 addresses abandonment of an existing storm drain line lying under an existing structure. More specifically, an existing 24” storm drain line extends southwest from the NE 10th Crt. & NE Avery St. intersection. Downstream of this intersection this storm drain line conveys water under the Sunwest Honda/Mazda building and further downstream on the west side of Hwy. 101.the pipe travels under the corner of the Sacred Heart Catholic Church building. The storm drain line must be realigned to avoid all existing structures. Numerous routes were examined, but one seemed more cost effective, and practical for the given system. This alternative, directs the storm water south from the originally described intersection, then west along NE 10th St., across Hwy. 101, north along Hwy. 101, and west on NW 10th St. to NW Nye Street. This path will reverse the existing storm drain flow along part of NE Avery St., but in doing this; the storm drain system can collect the runoff being conveyed through all existing storm drain components along Hwy. 101. This will allow for complete abandonment of the 24” storm drain pipe lying under the existing structures.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of foresight during the placement of the existing system, and future development within the collection area of this storm drain piping is minimal (1 EDU). For these reasons this project will not be considered as SDC eligible.

Project T5 – Re-Alignment of Piping Under an Existing Structure. Project T5 addresses abandonment of an existing storm drain line lying under an existing structure. More specifically, northwest of the NW 11th St. & Hwy. 101 intersection a 12" storm drain pipe conveys storm water under the Ford dealership building. This pipe should be filled and abandoned. The alternate path for the storm water flow beginning at the intersection of Hwy. 101 and NE 12th St. would be east along 12th St. then south along NE Avery Street where it would connect with the new Project T4 piping at the NE 11th St. and NE Avery St. intersection. This path would require the placement of approximately 684' of 24" pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of foresight during the placement of the existing system, and future development within the collection area of this storm drain piping is minimal (1 EDU). For these reasons this project will not be considered as SDC eligible.

Project T6 – Re-Alignment of Piping Under an Existing Structure. Project T6 addresses abandonment of an existing storm drain line lying under an existing structure. More specifically, an 18" Storm drain pipe that is just east of NW Nye St. and travels south between NW 13th St. and NW 11th St. conveys storm water under the Church of the Nazarene and a private residence. In addition to traveling under existing structures this storm drain system north of NW 13th St. lies out of the R.O.W and navigates through the back yards of local residents. It is recommended to abandon all storm drain piping currently existing outside of the street R.O.W. between NW Nye St. and NW Benton Street, and to construct a storm drain system within the NW Nye St. R.O.W that collects the storm water previously conveyed through the existing system. This approach would have the preferable end product (Storm Drain system within City R.O.W), but would be more expensive, and any roof drains or area drains connecting to the line would have to find other conveyance pathways. This could be a difficult and expensive process. The expense of these connections is not reflected in the cost estimate for this improvement.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of foresight during the placement of the existing system, and future development within the collection area of this storm drain piping is minimal (1 EDU). For these reasons this project will not be considered as SDC eligible.

Project U1 – 197 lf of 18-inch & 556 lf of 24-inch Storm Drain. Project U1 addresses the lacking capacity starting at the 12" storm drain pipe stemming from the manhole at the intersection of 12th St. and NE Douglas Street. All the 12" pipes downstream of this point will need to be increased in size.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project U2 – 739 lf of 54-inch Storm Drain. Project U2 addresses the capacity deficiencies just upstream of outfall U1. The 42" storm drain pipe leading from the Surfside Mobile Village and extending to outfall located on NW Beach Drive reaches a point at which its capacity drops below the required conveyance for a 25-year storm event. This location is the intersection of NW 3RD Street and NW Brook Street. As the storm water from different areas is brought together at this intersection the totaled storm water flow requirement equals 143.80 CFS while the capacity of the pipe is 100.18 CFS. These pipes along with several of those downstream of it need to be increased to 54" diameter pipe to accommodate the specified storm event. This improvement would include: 739' of 54" pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (20 EDU). For these reasons this project will not be considered as SDC eligible.

Project U3 – 296 lf of 18-inch & 1403 lf of 24-inch Storm Drain. Project U3 addresses insufficient capacity beginning at the intersection of SW 4th St. and SW 2nd Street. Increasing the system capacity to facilitate the storm event would include: placement of 296' of 18" pipe, and 1403' of 24" pipe. The cost estimate for this project is shown below and the figure above.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is nonexistent. For these reasons this project will not be considered as SDC eligible.

Project U4 – 83 lf of 12-inch & 470 lf of 18-inch Storm Drain. Project U4 addresses the lack of capacity beginning east of the SW 2nd St. and SW Nye St. intersection. The pipe at the initial point of lacking capacity is capable of conveying 2.05 CFS, while the storm event delivers 3.18 CFS. Increasing the system capacity to facilitate the storm event would include: placement of 83' of 12" pipe, and 470' of 18" pipe. The cost estimate for this project is shown below and the figure above.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is nonexistent. For these reasons this project will not be considered as SDC eligible.

Project U5 – Storm Drain Pipe Replacement and Re-alignement. Project U5 addresses the 24" pipe extending southwest from the Nye Creek inlet on NE 8th St. between NE Benton St. and NE Avery St. which lacks the capacity to convey a 25-year storm event. In order to accommodate this flow, the pipe diameter must be increased to 42" and larger from this point to the downstream outfall.

In addition to addressing capacity issues this project also includes re-alignment of the storm drain system that is currently lying under existing structures. Directly downstream of the 24" pipe described is a 24" storm drain line extending southwest from the manhole on N.E 8th St. about half way between NE Avery St. and NE Benton Street. This 24" line conveys storm water under two homes and an apartment complex as it travels to the NE 7th St. and NE 8th St. intersection. From there the pipe increases to 36", and continues southwest under the corner of the Cash and Carry building, and to a parking lot just north of the NE 6th St. and Hwy. 101 intersection. The storm drain system then continues southwest, crosses Hwy. 101, conveys water under both the Windermere West Coast Properties building, and the Washington Federal Building. Once beyond the Federal building, the 42" pipe reaches the site of the City of Newport Wastewater Treatment Facility, and from there, it outfalls across NW Nye St. into the Nye Creek. This project proposes a re-alignment of several sections of the current piped system which will allow for the complete abandonment of all pipe sections traveling under existing structures. To facilitate this re-alignment and related pipe abandonments, the storm drain flow along NE 5th St. was reversed to now flow east to the NE 5th St. and NE Avery St. intersection.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given

current development conditions and improper placement of the existing storm drain components, additionally future development within the collection area of this storm drain piping is minimal (3 EDU). For these reasons this project will not be considered as SDC eligible.

Project U6 – Re-Alignment of 10-inch Storm Drain. Project U6 addresses the 10" storm drain line between N.E Avery St. and NE Benton St. and extending from NE 3rd St. and to NE 4th St. which needs to be re-aligned to avoid the private properties and one existing structure under which it travels. To achieve this, the storm drain system should be redirected west along NE 3rd St. from the beginning point of the described storm drain line to the manhole located at the NE 3rd St. and NE Avery St. intersection. This would include placement of 324' of 12" storm drain pipe. This stretch of pipe will be buried in excess of 20 feet at certain sections, therefore it is recommended to use a directional drilling process to lay the pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is nonexistent. For these reasons this project will not be considered as SDC eligible.

Project V1 – 284 lf of 18-inch & 249 lf of 24-inch Storm Drain. Project V1 addresses the lack of capacity within the storm drain system along SW Fall Street. This system conveys water from the southeast across Hwy. 101 to outfall V1. As the system traverses along SW Fall St. it collects the storm water from 3 separate apartment complexes on the south side of the road. The contribution from these residences results in a total flow, given a 25-year storm event, of approximately 8.49 CFS which weill be delivered to the 12" downstream pipe. This pipe has a capacity of 5.49 CFS. This will result in surcharging and localized flooding. To address the lacking capacity, it will require the placement of 284' of 18" pipe along SW Fall Street, and 249' of 24" pipe along SW Fall St. and SW Elizabeth Street.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (4 EDU). For these reasons this project will not be considered as SDC eligible.

Project X1 – 379 lf of 12-inch & 1,077 lf of 24-inch Storm Drain. Project X1 addresses the improvements along SW 9th Street. The first point of lacking capacity is at the SW Fall cross street. All pipes downstream of this point lack capacity to carry the runoff from a 50-year storm event (50-year analysis is required for highway crossings). To address the lacking capacity, it will require the placement of 379' of 12" pipe and 1,077' of 24" pipe along SW 9th Street.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (4 EDU). For these reasons this project will not be considered as SDC eligible.

Project X2 – 331 lf of 18-inch & 240 lf of 24-inch Storm Drain. This project addresses the improvements along SW 10th Street. The first point of lacking capacity is at the SW Bay cross street. The 8" line extending southwest from this intersection has a capacity of 2.26 CFS, while a 50-year storm event delivers 4.12 CFS to this location in the piped system. All pipes downstream of this point lack capacity to carry the runoff from such a storm event. To address the lacking capacity, it will require the placement of 331' of 18" pipe and 240' of 24" pipe along SW 10th Street.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given

current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project X3 –Removal and Replacement of Several Sizes of Storm Drain. This project addresses the improvements along the main trunk of the storm drain system stemming from SW 9th Street, across Hwy. 101 then to outfall X1. Also included in this project is the increase of pipe size along SW 8th St. from 8" to 12". This entire section of storm drain along the main trunk line is lacking capacity, and must be increased in size to accommodate the resulting flows of a 50-year storm event. This will include placement of 283' of 12", 452' of 24", 249' of 30", and 803' of 36" pipe. 161' of the 24" line would be constructed along the east lane of Hwy. 101, and 108' of the 24" line is recommended to jack and bore for the Hwy. 101 crossing.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (3 EDU). For these reasons this project will not be considered as SDC eligible.

Project Y1 – 331 lf of 18-inch & 240 lf of 24-inch Storm Drain. This project addresses a 6" storm drain line running south along SW Harbor Way with a capacity of 2.14 CFS, while 4.55 CFS is required to convey the flow delivered to this point during a 25-year storm event. To address the lacking capacity, it will require the placement of 497' of 12" pipe along SW 13th Street.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project AA1 – 248 lf of 18-inch & 427 lf of 24-inch Storm Drain. This project addresses the developed storm drain system within basin AA1 (see the Storm Water Master Plan for basin boundaries). Most of the basin is drained through roadside ditches or natural landscape from the south end of the basin toward the bay. Certain components of the storm drain system along SE 3rd St. have recently been improved. However the downstream components have not, thus the system actually reduces in size from a 15" pipe upstream to a 12" pipe downstream. These downstream components are insufficiently sized to accommodate runoff from a 25-year storm event. To address this capacity insufficiency 248 and 427 linear feet of pipe shall be replaced with 18", and 24" pipe respectively.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is non-existent. For these reasons this project will not be considered as SDC eligible.

Project AC1 – 655 lf of 24-inch Storm Drain. This project addresses two outfalls for the relatively undeveloped storm drain system within the area defined as Basin AC (see the Storm Water Master Plan for basin boundaries). Amongst the several basins within the area defined as Basin AC there are two points requiring improvements to fully facilitate the conveyance of runoff resulting from the future developments within the area during 25-year storm event. The points of lacking capacity are at the culverts crossing under Yaquina Bay Road just east of the Port Dock, and just west of SE Benson road. Both of these pipes will be increased in size to 24" pipes.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping will push the existing system beyond its capacity. For these reasons this project will be 100% considered as SDC eligible.

Project AF1 – Removal and Replacement of Several Sizes of Storm Drain. This project addresses the relatively undeveloped storm drain within basin AF (see the Storm Water Master Plan for basin boundaries). Most of the basin is drained through roadside ditches or natural landscape from the south end of the basin toward the bay. To better serve the current residents and future 131 EDUs that will be added during the planning period, it was recommended to expand the existing system. These new components will collect runoff that is currently draining across private property, or ponding and infiltrating. The additional components collect runoff along the south end of SW Brant St., SW 29th St., and SW 30th Street. These improvements were originally laid out in the 'Newport Coho/Brant, Infrastructure Refinement Plan', Cameron MCarthy, June 2012', and include: 581' of 12", 97' of 18", and 837' of 24" storm drain pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and was instead driven by the considerable future developments expected in the area. For these reasons this project will be considered as 100% SDC eligible.

Project AG1 – Drainage Way Access Improvements. This project addresses the limited access to the Cities drainage ways which can make maintenance and general operation of the storm drain system very difficult. Currently the natural drainage way conveying water from the south west corner of basin AG (see the Storm Water Master Plan for basin boundaries) to the north west corner is lacking adequate access. No road or trail is available to facilitate, inspection, removal of obstructions, or other general maintenance activities. It is recommended that the a 10' wide maintenance road be built along this stretch of ditches and culverts, and that public ownership of the drainage channel including adequate right-of-way for access should be pursued.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to existing system conditions, and future development will add considerable future development within the collection area of this storm drainage way is considerable (103 EDU) and will contribute to the need for improved access. For these reasons this project will not be considered as SDC eligible.

Project AG2 – Expansion of Existing Storm Drain System. This project addresses the discussion in the 'Newport Coho/Brant, Infrastructure Refinement Plan, Cameron MCarthy, June 2012' regarding a southward extension of SW Abalone Street and a westward extension of SW 35th St. to facilitate better traffic to the growing neighborhood, as well as provide access to the new OMSI environmental learning center. The plan proposes extending the storm drain system from the SW 35th St and SW Anchor Way intersection northward and westward along the 'to be' extended streets.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and was instead driven by the considerable future development (170 EDU) expected in the area. For these reasons this project will be considered as 100% SDC eligible.

Project AJ1 –75 lf of 24" Storm Drain. This project addresses the 18" culvert crossing under the east end of SE 35th Street and its lacking capacity for future development. This culvert needs to be removed and replaced with a 24" culvert. This will include the placement of 75' of 24" pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and was instead driven by the considerable future developments expected in the area. For these reasons this project will be considered as 100% SDC eligible.

Project AL1 –Removal and Replacement of Several Sizes of Storm Drain. The project addresses the lacking capacity at the existing dual 24" culverts crossing under Highway 101 north of SW 62nd Street. The pipe will need to be sized to accommodate the post development flows of 76.7 CFS. It is recommended to replace the 85' long 2-24" pipes with two 36" culverts.

Downstream of the 2-24" pipes discussed above, the storm drain system continues west through natural drainage ways to a 60" culvert. This culvert conveys the water through the South Shore Development to the Ocean. Currently this portion of the public storm drain system travels through privately owned land. It is recommended that the City acquires an easement along the 60" culvert.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, however there will be considerable future growth (129 EDU) that will be contributing to the run-off conveyed by the replaced culverts. For these reasons this project will be considered as 75% SDC eligible.

Table 3. 1-CIP Projects & SDC Eligibility

Basin	Description	Cost Estimate	SDC Eligible (%)	SDC Eligible
C1	525' of 24" along NE 73rd St.	$229,316	50	$114,658
F1	124' of 30" SD pipe North of NW 60th St.	$67,398	100	$67,398
H1	305' of 12" and 18" SD pipe along NW 54th St.	$103,677	0	$0
K1	270' of 12" & 18" SD pipe along NE Lucky Gap St.	$102,214	10	$10,221
N1	1200' of 12", 24", 30", and 35" SD Pipe along Hwy. 101	$553,428	0	$0
N2	240' of 18" SD pipe along NE Iler St.	$86,500	0	$0
Q1	890' of 12", 18" , and 24" SD pipe along NW Nye St.	$291,848	0	$0
R1	675' of 12", and 18" SD pipe along NW Spring St.	$227,522	0	$0
T1	161' of 12" SD pipe along NW Nye St.	$50,766	0	$0
T2	921' of 36" SD pipe along NW Coast St.	$490,012	0	$0
T3	665' of 12", 18", and 24" SD pipe along NW Spring St.	$264,614	0	$0
T4	Re-alignment of Pipe under Sunwest Honda/Mazda building	$1,109,013	0	$0
T5	Re-alignment of Pipe under Ford Dealership building	$271,188	0	$0
T6	Re-alignment of Pipe under Church of the Nazarine building	$598,801	0	$0
U1	753' of 18", and 24" SD pipe along NE Douglas Street	$304,978	0	$0
U2	739' of 54" SD pipe along NW 3RD Street & NW Coast St.	$612,539	0	$0
U3	1699' of 18", and 24" pipe along SW Cliff Street	$664,079	0	$0
U4	Re-alingment of Pipe under Cash and Carry	$2,710,875	0	$0
U5	Re-alignment of Pipe under local residence	$79,355	0	$0
U6	553' of 12", and 18" SD pipe along SW 2nd St.	$169,797	0	$0
V1	533' of 18" and 24" SD pipe along SW Fall St.	$308,322	0	$0
X1	1456' of 12", and 18" SD pipe along SW 9th St.	$526,162	0	$0
X2	571' of 18", and 24" pipe along SW 10th St.	$213,816	0	$0
X3	1663' of 12", 24", 30", and 36" SD pipe along SW Minnie St.	$793,155	0	$0
Y1	497' of 12" SD pipe along SW 13th St.	$163,653	0	$0
AA1	675' of 18", and 24" SD pipe along SE Avery St.	$212,022	0	$0
AC1	655' of Culverts crossing Yaquina Bay Blvd.	$208,698	100	$208,698
AF1	1515' of 12", 18", and 24" pipe along SW 29th and SW Brant St.	$640,902	100	$640,902
AG1	Drainage ditch development and Rehabilitation	$1,693,568	100	$1,693,568
AG2	1551' of 15", 18", and 24" SD pipe along SW 35th St.	$459,808	100	$459,808
AJ1	55' of culvert crossing SE 35th St.	$37,156	100	$37,156
AL1	170' of 36" SD pipe crossing Hwy. 101 (Jack and Bore)	$102,117	75	$76,588
Total		**$14,347,295**		**$3,308,998**

3.6 Calculation of Storm Drainage Reimbursement SDC Charge

None of the projects in the stormwater CIP are to be considered for a reimbursement SDC. Therefore, the stormwater reimbursement SDC is $0.

3.7 Calculation of Storm Drainage Improvement SDC Charge

Calculation of the improvement SDC will be based upon the methodology and the establishment of the SDC eligible project costs as outlined earlier in this section. The following table provides a summary of the total cost of SDC eligible projects recommended in the Storm Water Master Plan that have not yet been constructed.

Table 3.7.1 – Improvement SDC Calculation Summary

SDC Calculations	
SDC Eligible Costs (See Table 3.1)	$3,308,998
Total Growth EDU's (See Section 3.2)	2,215
Maximum Improvement Stormwater SDC (Based on EDU's, $/EDU)	$1,494
Total Growth Impervious Area (See Sectoin 3.2)	6,040,305
Maximum Improvement Stormwater SDC (Based on area ($/sf)	$0.55

Based on this analysis, a typical EDU in Newport will pay around $1,494 for the improvement stormwater SDC based on an average impervious surface area of around 2,727 square feet per EDU. This equates to a unit charge of around $0.55 per square foot of impervious surface area.

3.8 SDC Credits for Storm Drainage SDC

An analysis of potential SDC credits should be included as part of any SDC methodology. Credits may be appropriate to offset financing costs that will be paid by all system customers including new customers. Credits are also appropriate for developers that construct or otherwise provide improvements to the system that are part of the current CIP project list. A brief description of potential SDC credit scenarios is provided below:

3.8.1 Improvement Offset Credit

In the case of a developer completing some or all of a CIP project, the credit provided should be equal to the value of the improvement made, though the credit cannot exceed the amount of SDC that the developer would have been required to pay.

For example: Assume that a developer undertakes a subdivision that would require him to pay $50,000 in SDC fees for the stormwater system. If the same developer undertakes all or a portion of a stormwater improvement project that appears on the CIP, the developer should be eligible for some level of SDC credit for the value of the improvement he has undertaken. However, the improvement offset credit cannot exceed the value of the SDC or, in this case, $50,000.

It should be noted that determination of improvement offset credits can require some judgment as development situations vary widely. The City should maintain an open policy when working with developers to identify fair and reasonable improvement offset credits when they apply.

It should also be reiterated that offset credits are not available for improvements undertaken by the developer that do not appear on the City's CIP and are not part of the City's SDC methodology.

3.8.2 Financing Credit - Project Costs and Potential Loan Amounts

As the City currently has a rate structure or user fee for the stormwater system totaling $7.50 a month, it is possible to develop a financing credit. If the City seeks to obtain funding for the stormwater CIP projects through loans to be paid back through increased user rates, an appropriate credit should be developed for that increase in user rates.

A potential financing credit will not be developed at this time for the stormwater system.

3.8.3 Impervious Surface Reduction Credit

In some cases, credits may be appropriate for development that incorporates improvements that are designed to reduce the impact of increased drainage on the stormwater system. These measures may include construction of cisterns, detention facilities, pervious surface technology, and other efforts designed to reduce runoff from a developed property.

In each case, the City would be required to review proposed mitigation measures and determine an appropriate SDC credit for impervious surface reduction. In no case should the credit be more than the value of the SDC charge would have been.

The City is not required to provide credits for these types of mitigating practices. Also, in the case of typical residential development, the cost of the impervious surface reducing efforts will likely be far greater than the stormwater SDC charge. However, in some commercial applications, there may be an advantage for a developer to incorporate these types of improvements into a project.

3.9 Storm SDC Summary

This Stormwater SDC update has been developed to provide the City of Newport with the methodology needed to establish the maximum defendable SDC for the stormwater system. The following table provides a summary of the information utilized to complete this analysis:

Table 3.9.1 – Stormwater System SDC Summary

SDC Component	SDC Amount
Improvement Fee	
\$/EDU	\$1,494
\$/ft^2	\$0.55
Reimbursement Fee	\$0.00
Credit Summary	N/A

The maximum defendable SDC for the stormwater system is around \$1494 per EDU or \$0.55 per square foot of impervious surface without the application of an SDC credit or compliance costs. It should be reiterated that this calculation represents the maximum SDC's that can be assessed and defended with proper methodology. The City has the autonomy to adjust this charge in any way they feel is appropriate. However, if adequate SDC fees are not collected and projects must be undertaken to satisfy growth requirements, funds will have to be obtained from other sources.

3.10 Storm SDC Assessment Schedule

SDC's are typically designated as one of two types, then assessed in accordance with the type designation. These two types are residential and non-residential, and a summary of the assessment process accompanying each type is provided below.

3.10.1 Residential Assessment Methods

The residential SDC types are typically assessed using an EDU based method. Under the EDU method, each residential customer is assumed to be one EDU, regardless of the size of the new home or residential improvements. This method is the easier to administer as it does not require the City to review plans and measure or calculate impervious surface.

The EDU method assumes all residential development is relatively equal in the eyes of the stormwater SDC methodology.

The alternative is for the City to continue to perform site plan reviews, measure and calculate impervious surface area, and charge each new residential development based on the impervious surface area that is being added to the system. If this method is chosen, the unit price of $0.55 per square foot should be used. This method requires additional effort by the City to administer the SDC assessment, but it provides for an equitable assessment method for all development.

3.10.2 Non-residential Assessment Methods

It is recommended that all non-residential development be assessed on a unit basis per square foot of impervious surface area. Using this method, a site plan for each new development must be reviewed to determine the amount of impervious surface being added. The resulting assessment will be equitable for each case presented to the City for consideration.

Specifically, non-residential development should be assessed at the incremental rate of $0.55 per square foot of impervious surface area added to a previously pervious site. Accommodations may be made, on a case-by-case basis, for efforts to mitigate runoff impacts. These mitigation efforts may include detention systems, pervious surface materials, and others.

Compliance Costs

Section 4

4.1 Introduction

Oregon law includes provisions that allow SDC revenues to be used to offset costs incurred by local governments in complying with the provisions of SDC law, including expenses associated with developing SDC methodologies, master planning, administration and updating of CIP's, and other compliance related costs. Recent amendments to the law require annual accounting of SDC expenditures, including revenue collected and attributed to the costs of compliance. The expenses of this annual accounting process are also considered to be related to the costs of compliance and can, therefore, be paid for with SDC revenues.

4.2 Compliance Costs

Unlike reimbursement and improvement SDC's, compliance costs do not represent another category of system development charges. For the City of Newport, it is recommended that compliance costs be established as a "percentage" of the total SDC's that are likely to be assessed each year. The additional surcharge that is to be added to all SDC's will provide the funds necessary to administer each of the SDC programs and comply with current SDC laws and requirements.

The following sub-sections provide a brief description of the components that will make up the compliance cost methodology.

4.2.1 Auditing/Accounting Costs

As mentioned previously, the City will be required to complete annual accounting and auditing of all of the SDC programs that are implemented. The City must account for all revenues collected through SDC assessments, as well as all expenses and project costs that are fully or partially paid for with SDC funds, and all other debits or credits from the SDC funds.

For the purposes of this Study, it will be assumed that auditing and accounting expenses will not exceed $5,000 per year.

4.2.2 SDC Methodology

It will be assumed that the City will have to perform regular updates of their SDC methodology to account for increases in project costs (inflation), additions to the capital improvement plan (CIP), adjustments for project financing specifics as projects develop (i.e. interest rates, grants, etc.), population or growth rate changes, and other issues that may change the SDC charge for one or more of the individual SDC programs. These updates may be required, to a greater or lesser extent, on an annual basis.

It is also assumed that a full SDC methodology update will be required at least once each decade as planning efforts are updated. This major SDC methodology update may be required once every ten years and would ensure that the City's SDC methodology meets all current legal requirements as well as being coordinated with updated planning efforts and CIP's.

4.2.3 Infrastructure Planning Efforts

Most master planning and facilities efforts include a planning period of 20 years. However, in many cases, planning is updated before the end of the planning period. Changes in community needs, development pressures, regulatory changes, or other issues often prompt planning to be updated or repeated on a more regular basis than the planning period suggests.

For the purposes of establishing compliance costs, it is recommended that water and wastewater system planning be repeated on a schedule of at least once every 10 years. It may be that a major planning effort is required in year 1 and a less involved planning effort or update is appropriate for year 10. In any event, the City should be collecting revenues through the planning process that will allow them to update their planning documents as required.

It can be argued that 100 percent of the costs associated with planning should be considered SDC eligible. However, much of the efforts that go into infrastructure planning consist of assessing existing facilities, their capacities and condition, and the capabilities of the existing systems to provide service to existing and future customers. The planning efforts also include efforts to predict the infrastructure needs associated with growth and development. Therefore, the compliance cost associated with infrastructure planning should be shared in part by the SDC programs and in part by the existing users in the system.

For the purposes of this analysis, it is recommended that 50% of the planning costs be considered attributable to growth and are therefore, considered to be SDC eligible. The individual costs of these planning efforts are estimated in Table 4.2.5.

4.2.4 Total Estimated SDC Revenue

As it is recommended that compliance costs should be charged as a percentage surcharge of SDC revenues, the amount of SDC revenue that is anticipated to be collected must be established.

For this calculation, the current SDC values established for the City were used with the one exception of the storm drain SDC. This value was instead taken from section 3.9 and is $1,451. Once the annual compliance costs and annual revenue expected for SDC's is established, we can calculate the percentage surcharge that must be included to cover the annual compliance costs over and above the regular SDC revenues.

The growth component for each SDC program must be reviewed individually and an annual average growth unit established. For example, if it is determine that a water SDC program will add 2,000 new EDU's over 20 years, it should be assumed that the system will add an average of 100 EDU's each year to the system. Therefore, the compliance costs associated with the water SDC program should be paid as a percentage of the SDC revenues collected from the 100 new EDU's added to the system in any given year.

This same analysis should be repeated for each of the separate SDC programs. A summary of this analysis is provided below in Table 4.2.5.

4.2.5 Calculation of Compliance Expenses

The following table illustrates and summarizes the estimated compliance costs that will be associated with the proper administration of an SDC program in the City of Newport. These expenses include annual costs for accounting and administration as well as longer term costs for planning efforts.

Table 4.2.5 – Calculation of SDC Compliance Expenses
City of Newport SDC Program

Compliance Activity	Estimated Cost ($)	SDC Eligibility (%)	Frequency (years)	Annual ($)
General Accounting/Administration costs				
Auditing/Accounting	$5,000	100%	1	$5,000
SDC Methodology Administration & annual Adjustments	$10,000	100%	1	$10,000
SDC Mehodology Update	$65,000	100%	10	$6,500
Wastewater SDC Compliance Costs				
Wastewater Facilities Planning/Master Planning	$250,000	50%	10	$12,500
Water System Compliance Costs				
Water Master Planning	$100,000	50%	10	$5,000
Water Conservation and Mangement Planning	$50,000	50%	20	$1,250
Storm Drain Compliance Costs				
Storm Drain Master Planing	$150,000	50%	20	$3,750
Parks Complinace Costs				
Parks Master Planning	$75,000	50%	10	$3,750
Transportation Complinace Costs				
Tranportation Master Planning (TSP)	$180,000	50%	10	$9,000
Subtotal of Annual Costs	$885,000			$56,750

Based on this analysis, it is estimated to require in excess of $56,000 per year to properly administer the entire SDC program in Newport. This includes costs for planning as well as general administration.

4.2.6 Summary of SDC Revenue and Calculation of Compliance Surcharge

Within the 'Public Infrastructure SDC Methodology, 2007, HBH Consulting Engineers', an effort was made to establish growth potential, over a 20-year planning period, for each infrastructure sector (Storm, Water, Sewer, Traffic, and Parks). It was assumed that the growth rate for each sector occurred over the planning period, and a straight line growth rate for each sector was determined, and thereby the annual growth in each sector was calculated.

The estimated annual revenue within each infrastructure sector was then derived by multiplying the average cost per EDU by the growth expected in each sector.

Table 4.2.6 below summarizes the estimated revenue expected within each sector.

Table 4.2.6 – Calculation of Anticipated SDC Revenue by Sector
City of Newport SDC Program

Estimate of SDC Reviews	Added EDU's per Year	SDC Charge per EDU	Annual Revenue
Estimated Annual Wastewater SDC Revenues	142.43	$3,891	$554,195.13
Estimated Annual Water SDC Revenues	142.43	$2,366	$336,989.38
Estimated Annual Storm Drainage SDC Revenues	114	$1,494	$170,305.09
Estimated Annual Parks SDC Revenues	52.18	$2,591	$135,198.38
Estimated Annual Transportation SDC Revenues	170.91	$1,090	$186,291.90
Total Estimated SDC Revenue			$1,382,979.88
Compliance Cost Charge (Annual Cost/ Annual Revenue)			**4.10%**

By dividing the calculated compliance costs in Table 4.2.5 by the total estimated annual revenue in Table 4.2.6, we can calculate an appropriate SDC surcharge that is required to administer the SDC program in Newport.

Based on this analysis, it is recommended that compliance costs of approximately 4% of the SDC revenue be collected for each of the individual SDC programs. On average, this surcharge should produce enough revenue annually to assist the City with the compliance and administration of all of the SDC programs.

It should be noted that compliance costs should be shared between all infrastructure sectors. Therefore, when SDC's are collected, the City must deposit an appropriate amount into each SDC account taking care to separate the individual SDC charges as well as an appropriate portion of the compliance costs into each separate account.

APPENDIX A

SYSTEM DEVELOPMENT CHARGES

223.297 Policy. The purpose of ORS 223.297 to 223.314 is to provide a uniform framework for the imposition of system development charges by local governments, to provide equitable funding for orderly growth and development in Oregon's communities and to establish that the charges may be used only for capital improvements. [1989 c.449 §1; 1991 c.902 §25; 2003 c.765 §1; 2003 c.802 §17]

Note: 223.297 to 223.314 were added to and made a part of 223.205 to 223.295 by legislative action, but were not added to and made a part of the Bancroft Bonding Act. See section 10, chapter 449, Oregon Laws 1989.

223.299 Definitions for ORS 223.297 to 223.314. As used in ORS 223.297 to 223.314:

(1)(a) "Capital improvement" means facilities or assets used for the following:

(A) Water supply, treatment and distribution;

(B) Waste water collection, transmission, treatment and disposal;

(C) Drainage and flood control;

(D) Transportation; or

(E) Parks and recreation.

(b) "Capital improvement" does not include costs of the operation or routine maintenance of capital improvements.

(2) "Improvement fee" means a fee for costs associated with capital improvements to be constructed.

(3) "Reimbursement fee" means a fee for costs associated with capital improvements already constructed, or under construction when the fee is established, for which the local government determines that capacity exists.

(4)(a) "System development charge" means a reimbursement fee, an improvement fee or a combination thereof assessed or collected at the time of increased usage of a capital improvement or issuance of a development permit, building permit or connection to the capital improvement. "System development charge" includes that portion of a sewer or water system connection charge that is greater than the amount necessary to reimburse the local government for its average cost of inspecting and installing connections with water and sewer facilities.

(b) "System development charge" does not include any fees assessed or collected as part of a local improvement district or a charge in lieu of a local improvement district assessment, or the cost of complying with requirements or conditions imposed upon a land use decision, expedited land division or limited land use decision. [1989 c.449 §2; 1991 c.817 §29; 1991 c.902 §26; 1995 c.595 §28; 2003 c.765 §2a; 2003 c.802 §18]

Note: See note under 223.297.

223.300 [Repealed by 1975 c.642 §26]

223.301 Certain system development charges and methodologies prohibited. (1) As used in this section, "employer" means any person who contracts to pay remuneration for, and secures the right to direct and control the services of, any person.

(2) A local government may not establish or impose a system development charge that requires an employer to pay a reimbursement fee or an improvement fee based on:

(a) The number of individuals hired by the employer after a specified date; or

(b) A methodology that assumes that costs are necessarily incurred for capital improvements when an employer hires an additional employee.

(3) A methodology set forth in an ordinance or resolution that establishes an improvement fee or a reimbursement fee shall not include or incorporate any method or system under which the payment of the

fee or the amount of the fee is determined by the number of employees of an employer without regard to new construction, new development or new use of an existing structure by the employer. [1999 c.1098 §2; 2003 c.802 §19]

Note: See note under 223.297.

223.302 System development charges; use of revenues; review procedures. (1) Local governments are authorized to establish system development charges, but the revenues produced therefrom must be expended only in accordance with ORS 223.297 to 223.314. If a local government expends revenues from system development charges in violation of the limitations described in ORS 223.307, the local government shall replace the misspent amount with moneys derived from sources other than system development charges. Replacement moneys must be deposited in a fund designated for the system development charge revenues not later than one year following a determination that the funds were misspent.

(2) Local governments shall adopt administrative review procedures by which any citizen or other interested person may challenge an expenditure of system development charge revenues. Such procedures shall provide that such a challenge must be filed within two years of the expenditure of the system development charge revenues. The decision of the local government shall be judicially reviewed only as provided in ORS 34.010 to 34.100.

(3)(a) A local government must advise a person who makes a written objection to the calculation of a system development charge of the right to petition for review pursuant to ORS 34.010 to 34.100.

(b) If a local government has adopted an administrative review procedure for objections to the calculation of a system development charge, the local government shall provide adequate notice regarding the procedure for review to a person who makes a written objection to the calculation of a system development charge. [1989 c.449 §3; 1991 c.902 §27; 2001 c.662 §2; 2003 c.765 §3; 2003 c.802 §20]

Note: See note under 223.297.

223.304 Determination of amount of system development charges; methodology; credit allowed against charge; limitation of action contesting methodology for imposing charge; notification request. (1)(a) Reimbursement fees must be established or modified by ordinance or resolution setting forth a methodology that is, when applicable, based on:

(A) Ratemaking principles employed to finance publicly owned capital improvements;

(B) Prior contributions by existing users;

(C) Gifts or grants from federal or state government or private persons;

(D) The value of unused capacity available to future system users or the cost of the existing facilities; and

(E) Other relevant factors identified by the local government imposing the fee.

(b) The methodology for establishing or modifying a reimbursement fee must:

(A) Promote the objective of future system users contributing no more than an equitable share to the cost of existing facilities.

(B) Be available for public inspection.

(2) Improvement fees must:

(a) Be established or modified by ordinance or resolution setting forth a methodology that is available for public inspection and demonstrates consideration of:

(A) The projected cost of the capital improvements identified in the plan and list adopted pursuant to ORS 223.309 that are needed to increase the capacity of the systems to which the fee is related; and

(B) The need for increased capacity in the system to which the fee is related that will be required to serve the demands placed on the system by future users.

(b) Be calculated to obtain the cost of capital improvements for the projected need for available system capacity for future users.

(3) A local government may establish and impose a system development charge that is a combination of a reimbursement fee and an improvement fee, if the methodology demonstrates that the charge is not based on providing the same system capacity.

(4) The ordinance or resolution that establishes or modifies an improvement fee shall also provide for a credit against such fee for the construction of a qualified public improvement. A "qualified public improvement" means a capital improvement that is required as a condition of development approval, identified in the plan and list adopted pursuant to ORS 223.309 and either:

(a) Not located on or contiguous to property that is the subject of development approval; or

(b) Located in whole or in part on or contiguous to property that is the subject of development approval and required to be built larger or with greater capacity than is necessary for the particular development project to which the improvement fee is related.

(5)(a) The credit provided for in subsection (4) of this section is only for the improvement fee charged for the type of improvement being constructed, and credit for qualified public improvements under subsection (4)(b) of this section may be granted only for the cost of that portion of such improvement that exceeds the local government's minimum standard facility size or capacity needed to serve the particular development project or property. The applicant shall have the burden of demonstrating that a particular improvement qualifies for credit under subsection (4)(b) of this section.

(b) A local government may deny the credit provided for in subsection (4) of this section if the local government demonstrates:

(A) That the application does not meet the requirements of subsection (4) of this section; or

(B) By reference to the list adopted pursuant to ORS 223.309, that the improvement for which credit is sought was not included in the plan and list adopted pursuant to ORS 223.309.

(c) When the construction of a qualified public improvement gives rise to a credit amount greater than the improvement fee that would otherwise be levied against the project receiving development approval, the excess credit may be applied against improvement fees that accrue in subsequent phases of the original development project. This subsection does not prohibit a local government from providing a greater credit, or from establishing a system providing for the transferability of credits, or from providing a credit for a capital improvement not identified in the plan and list adopted pursuant to ORS 223.309, or from providing a share of the cost of such improvement by other means, if a local government so chooses.

(d) Credits must be used in the time specified in the ordinance but not later than 10 years from the date the credit is given.

(6) Any local government that proposes to establish or modify a system development charge shall maintain a list of persons who have made a written request for notification prior to adoption or amendment of a methodology for any system development charge.

(7)(a) Written notice must be mailed to persons on the list at least 90 days prior to the first hearing to establish or modify a system development charge, and the methodology supporting the system development charge must be available at least 60 days prior to the first hearing. The failure of a person on the list to receive a notice that was mailed does not invalidate the action of the local government. The local government may periodically delete names from the list, but at least 30 days prior to removing a name from the list shall notify the person whose name is to be deleted that a new written request for notification is required if the person wishes to remain on the notification list.

(b) Legal action intended to contest the methodology used for calculating a system development charge may not be filed after 60 days following adoption or modification of the system development charge ordinance or resolution by the local government. A person shall request judicial review of the methodology used for calculating a system development charge only as provided in ORS 34.010 to 34.100.

(8) A change in the amount of a reimbursement fee or an improvement fee is not a modification of the system development charge methodology if the change in amount is based on:

(a) A change in the cost of materials, labor or real property applied to projects or project capacity as set forth on the list adopted pursuant to ORS 223.309; or

(b) The periodic application of one or more specific cost indexes or other periodic data sources. A specific cost index or periodic data source must be:

(A) A relevant measurement of the average change in prices or costs over an identified time period for materials, labor, real property or a combination of the three;

(B) Published by a recognized organization or agency that produces the index or data source for reasons that are independent of the system development charge methodology; and

(C) Incorporated as part of the established methodology or identified and adopted in a separate ordinance, resolution or order. [1989 c.449 §4; 1991 c.902 §28; 1993 c.804 §20; 2001 c.662 §3; 2003 c.765 §§4a,5a; 2003 c.802 §21]

Note: See note under 223.297.

223.305 [Repealed by 1971 c.325 §1]

223.307 Authorized expenditure of system development charges. (1) Reimbursement fees may be spent only on capital improvements associated with the systems for which the fees are assessed including expenditures relating to repayment of indebtedness.

(2) Improvement fees may be spent only on capacity increasing capital improvements, including expenditures relating to repayment of debt for such improvements. An increase in system capacity may be established if a capital improvement increases the level of performance or service provided by existing facilities or provides new facilities. The portion of the improvements funded by improvement fees must be related to the need for increased capacity to provide service for future users.

(3) System development charges may not be expended for costs associated with the construction of administrative office facilities that are more than an incidental part of other capital improvements or for the expenses of the operation or maintenance of the facilities constructed with system development charge revenues.

(4) Any capital improvement being funded wholly or in part with system development charge revenues must be included in the plan and list adopted by a local government pursuant to ORS 223.309.

(5) Notwithstanding subsections (1) and (2) of this section, system development charge revenues may be expended on the costs of complying with the provisions of ORS 223.297 to 223.314, including the costs of developing system development charge methodologies and providing an annual accounting of system development charge expenditures. [1989 c.449 §5; 1991 c.902 §29; 2003 c.765 §6; 2003 c.802 §22]

Note: See note under 223.297.

223.309 Preparation of plan for capital improvements financed by system development charges; modification. (1) Prior to the establishment of a system development charge by ordinance or resolution, a local government shall prepare a capital improvement plan, public facilities plan, master plan or comparable plan that includes a list of the capital improvements that the local government intends to fund, in whole or in part, with revenues from an improvement fee and the estimated cost, timing and percentage of costs eligible to be funded with revenues from the improvement fee for each improvement.

(2) A local government that has prepared a plan and the list described in subsection (1) of this section may modify the plan and list at any time. If a system development charge will be increased by a proposed modification of the list to include a capacity increasing capital improvement, as described in ORS 223.307 (2):

(a) The local government shall provide, at least 30 days prior to the adoption of the modification, notice of the proposed modification to the persons who have requested written notice under ORS 223.304 (6).

(b) The local government shall hold a public hearing if the local government receives a written request for a hearing on the proposed modification within seven days of the date the proposed modification is scheduled for adoption.

(c) Notwithstanding ORS 294.160, a public hearing is not required if the local government does not receive a written request for a hearing.

(d) The decision of a local government to increase the system development charge by modifying the list may be judicially reviewed only as provided in ORS 34.010 to 34.100. [1989 c.449 §6; 1991 c.902 §30; 2001 c.662 §4; 2003 c.765 §7a; 2003 c.802 §23]

Note: See note under 223.297.

223.310 [Amended by 1957 c.397 §3; repealed by 1971 c.325 §1]

223.311 Deposit of system development charge revenues; annual accounting. (1) System development charge revenues must be deposited in accounts designated for such moneys. The local government shall provide an annual accounting, to be completed by January 1 of each year, for system development charges showing the total amount of system development charge revenues collected for each system and the projects that were funded in the previous fiscal year.

(2) The local government shall include in the annual accounting:

(a) A list of the amount spent on each project funded, in whole or in part, with system development charge revenues; and

(b) The amount of revenue collected by the local government from system development charges and attributed to the costs of complying with the provisions of ORS 223.297 to 223.314, as described in ORS 223.307. [1989 c.449 §7; 1991 c.902 §31; 2001 c.662 §5; 2003 c.765 §8a; 2003 c.802 §24]

Note: See note under 223.297.

223.312 [1957 c.95 §4; repealed by 1971 c.325 §1]

223.313 Application of ORS 223.297 to 223.314. (1) ORS 223.297 to 223.314 shall apply only to system development charges in effect on or after July 1, 1991.

(2) The provisions of ORS 223.297 to 223.314 shall not be applicable if they are construed to impair bond obligations for which system development charges have been pledged or to impair the ability of local governments to issue new bonds or other financing as provided by law for improvements allowed under ORS 223.297 to 223.314. [1989 c.449 §8; 1991 c.902 §32; 2003 c.802 §25]

Note: See note under 223.297.

223.314 Establishment or modification of system development charge not a land use decision. The establishment, modification or implementation of a system development charge, or a plan or list adopted pursuant to ORS 223.309, or any modification of a plan or list, is not a land use decision pursuant to ORS chapters 195 and 197. [1989 c.449 §9; 2001 c.662 §6; 2003 c.765 §9]

Note: See note under 223.297.

APPENDIX B

CITY OF NEWPORT

SYSTEM DEVELOPMENT CHARGE WORKSHEET

EFFECTIVE (date)	BUILDING PERMIT NO.:

NAME OF COMPANY:

CONTACT PERSON & NUMBER:

PROJECT NAME/ADDRESS:

MAP & TAX LOT NUMBER:

DEVELOPMENT TYPE/LAND USE:

NEW DEVELOPED AREA (Square Feet):

EXISTING DEVELOPED AREA (Square Feet):

EQUIVALENT DWELLING UNITS (EDUs):

A. STORM DRAINAGE # EDUs ________ X **$840** per EDU =

or: Impervious Surface ________ X **$0.31** per square foot = ________

Total Storm Drainage SDC (a)

B. WASTEWATER

EDUs ________ X **$3,891** = ________

Total Wastewater SDC (b)

C. WATER

EDUs ________ X **$2,366** = ________

Total Water SDC (c)

D. TRANSPORTATION

EDUs ________ X **$1,090** = ________

Total Transportation SDC (d)

E. PARKS

EDUs ________ X **$2,591** = **Total Parks SDC (e)**

SUBTOTAL ________ **(f)**

(add items a, b, c, d & e)

F. ADMINISTRATIVE FEES

SDC SUBTOTAL **(f)** ________ X **4.18%** = ________ **(g)**

Plus Subtotal **(f)** ________

TOTAL SDC AMOUNT DUE ________

Date ________ **Signed** ________

(Contact Person of Project)

Print Name ________

Title ________

Received by ________ On (date): ________

1/2014

APPENDIX C

Stormwater SDCs

Data Summary

	Number of Cities	
Has stormwater SDC:	60	
Provided stormwater SDC rate information:	57	
Has stormwater residential development SDCs:	57	100%
Has stormwater nonresidential development SDCs:	54	95%
Has stormwater improvement fees:	51	89%
Has stormwater reimbursement fees:	24	42%
Has stormwater other fees:	15	26%
City collects and retains revenue for stormwater SDCs:	57	100%
Collects stormwater SDC revenue for another entity:	0	0%
Has adopted an SDC lower than calculated using their methodology:	11	19%

Table 4: Individual City Rates for Strormwater SDCs

Blue highlighted cities collect revenue for another entity (see footnotes for details).
Green highlighted cities have an adopted SDC lower than the fee calculated using their methodology.

Note: All amounts rounded to the nearest dollar. Basis of fee and footnotes are as reported by cities unless noted otherwise. Some have been edited for spelling and punctuation.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
Adair Village	$263			$263			2008	2013	Four projects included
Amity	*No specific SDC rate data provided.*								
Aumsville[1]	$1,050			$1,050.00+			2000	unknown	Residential = per unit Nonresidential = at least one single family equivalent SDC and an additional equivalent for each additional 9,268 square feet, or two-decimal portion thereof, of land being developed.
Bandon	$1,439	$1,641		$5,756	$6,564		2004	unknown	Square footage
Beaverton[2]	$945			$8,411			2012	2014	Fee shown is total SDC Residential = per dwelling unit (DU)

[1] This SDC only affects Basin 1-A, 1-B and 1-C in Aumsville.
[2] Clean Water Services may be creating a regional storm water SDC.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
									Nonresidential = per sq. ft.
Brookings[3]	$393	$547	$19	$3,692	$5,146	$177	2009	unknown	Impervious area
Brownsville	$1,970						2006	2016	
Cannon Beach	$944			$944			2010	2014	Calculated per equivalent dwelling unit (EDU)
Central Point	$1,000	$27	$36	$7,865	$250	$291	2010	2013	Each equivalent service unit (ESU) is charged $1,063. An ESU is 3,000 sq. ft. This parcel has 23,500 sq. ft. of impervious surface.
Columbia City	$250			$250			1991	none planned	Total impervious area
Coquille	$0	$228	$0	$0	$2,144	$0	2012	no plan/ anytime as needed	228 per EDU. EDU based on: SFD = 1, Duplex = 1.5, Commercial/Industrial/Institutional = Impervious areas (roofs, pavement, sidewalks, etc.) 2,500 sq. ft. = 1.0 EDU, Gravel 2,500 sq. ft. = 0.6 EDU, Compacted earth 2,500 = 0.4 EDU
Corvallis[4]	$68	$14	$0	$1,598	$329	$0	2004	TBD	Square footage of impervious surface
Cottage Grove	$568	$115	$11	$5,040	$1,022	$97	2013	2014	1 ESU = 1 single family unit or 2,650 square feet impervious
Culver	$1,750			$8,400			2008	unknown	EDUs
Dayton	$734	$392		$1,956	$1,044		1999		Water meter size
Depoe Bay[5]	$1,333			$6,625			2012	2013	Fee includes improvement and reimbursement. Fee per EDU, EDU defined as single residential unit or for nonresidential development one EDU = 10,000 sq.ft. property
Dundee	$974	$1,462		$9,149	$13,733		2009	2014	Commercial = Residential: 0.5844*impervious surface; Improvement: 0.3893*impervious surface
Eagle Point[6]	$1,843	$78	$39	$13,121	$558	$279	2009		ESU. One ESU is equal to 3,300 sq. ft. of impervious surface

[3] Automatic yearly increase based on Engineering News Record (ENR) construction cost index.
[4] Inflationary adjustments made annually as well as project list adjustments.
[5] Fee update annually on July 1st.
[6] SDC was phased in starting at $1,360 in 2009; up to $1,960 in 2013.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
Estacada	$628	$183		$5,875	$1,716		2012	2013	Impervious area - square footage
Eugene[7]	$295	$262		$2,391	$2,121		2011	2013	Residential: tiered rate based on building footprint Nonresidential: flat rate per square foot impervious surface area
Florence[8]	$2,050			$6,090			2005	2014	For nonresidential $11,289 per net acre or $8,467 per gross acre
Gervais	$1,427			$1,427			2003	n/a	lot
Grants Pass[9]			$472			$472	2013	2014	Flat fee per development permit. There is an additional area "Sand Creek District" that incurs a SDC of .32 cents per SF of development.
Halsey		$1,650			$4,000		2012	2013	Square feet of impervious surface
Happy Valley	$216						n/a	n/a	Building footprint square footage
Harrisburg	*No specific SDC rate data provided.*								
Hood River			$650 per EDU			$0.26 per sq. ft. of impervious surface	2007	2014	
Independence	$823			$9,729			2012	2013	Residential: per single family unit Commercial: per 1,000 sq. ft. impervious surface
Lafayette[10]	$0	$0		$0	$0		2000	2013	
Lake Oswego	$135			$1,047					Nonresidential fees are calculated by dividing the total impervious area by 3030 and multiplying by the fee (135)
Lincoln City[11]							2012	2013	$0.014 per square foot of impervious surface
Lowell	$568						2010	2014-15	
Madras	$64			$1,512			2010 (fee rate was lowered)	do not know when it will be	Based on square footage of impervious area. The city collects $193 per residential drainage equivalent (RDE) on new

[7] Updates to SDCs in 2011 and 2013 are inflationary adjustments.
[8] SDC for stormwater was established in 2005. SDC is adjusted annually using 20-city ENR construction cost index.
[9] The Storm Water and Open Space SDC is an incurred charge for the planning, acquisition and capital development of facilities to accommodate and control stormwater run, directly associated open space, and water quality control facilities to clean surface water run prior to return to natural surface water conveyances.
[10] City Council elected not to charge fee.
[11] Updated January 1st annually.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
								raised	development and $0.08 per sq. ft. of impervious surface added for additions to existing development. 1 RDE equals 3,000 sq. ft. of impervious area. For the residential it would be 1,000/3,000 x $193.00 = $64.33. For the office building it would be 47,000/2 = 23,500/3,000 x $193 = $1,511.83. This is collected as an improvement fee only.
Manzanita			$174			$174	1995	not planned	Cost per lot
Medford[12]	$574			$4,496			2010		Single family residence (SFR) lot is per lot. Non-SFR lots are charged $574 per 3,000 sq. ft. of impervious area.
Milwaukie	$813	$286	$85	$7,057	$2,482	$738	2006	2013	Stormwater SDC for each residential property is 1 unit. For nonresidential, the SDC is calculated on square footage of impervious surface. Each Stormwater SDC corresponds to 2,706 square feet of impervious surface (1 unit).
Monmouth	*No specific SDC rate data provided.*						1994	2015	$0.081 cents per square foot of impervious surface area
Mt. Angel[13]			$96			$96	1999	TBD	
Newberg			$311			$2,540	2013	2014	Base rate is per each EDU which equals 2,877 sq. ft.
Philomath	$1,277			$10,003			2013	2014	Based on an equivalent dwelling unit of 3,000 sq. ft. A single family dwelling is calculated as 3,000 sq. ft. Nonresidential is based on total impervious surface divided by 3,000 sq. ft. to arrive at total EDUs.
Phoenix[14]	$366	$465	$33	$3,719	$2,931	$263	2010		$864.15 base rate (Improvement

[12] Not all areas of the city are subject to Storm SDC fee.
[13] The city did not have a master plan in 1999 and therefore only had the admin fee.
[14] Adopted per Resolution 735.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
									fee = 55.93%; Reimbursement fee = 44.07%; Admin fee = 3.81%) SDC = Base rate*ESU (equivalent service unit - 1 ESU = 2,500 sq. ft.)
Rogue River	*No specific SDC rate data provided.*								
Roseburg	$940		4%	$7,363		$295	2005	2014	Square footage of impervious surface, 1 ERU = 3,000 sq. ft., $940 per ERU
Salem	$494			$3,640			2002	not sure	Residential has three categories: small, medium, and large that are based on typical impervious areas. Commercial is $0.1549 per sq. ft. of impervious area.
Shady Cove	$1,389	$95	$82				2010		Based on one EDU = 3,000 sq. ft. impervious area
Sheridan	$279			$3,055			2009	2014	Square footage of impervious surface
Silverton	$2,070	$0	$0	$1 per impervious sp. Ft.	$0	$0	2002	2013	Nonresidential based on impervious area square feet. Credit given for detention.
Springfield[15]	$732	$1,065	$90	$5,734	$8,343	$703	2012	2013	A straight fee on square footage of impervious area
St. Helens[16]	$260/$130 total			$4,277/$2,135 total			no recent changes	no planned changes	Square footage based ERU equals 1,000 sq. ft.
St. Paul	$1,000			$1,000			1999	unknown	Flat fee
Sublimity	$1,880			$13,760			2001		$13,760 per acre. Based on gross area per acre developed.
Talent[17]	$676	$541	$65	$5,289	$4,233	$508	2008	2014	Single family - Per EDU and all other based on impervious surface area at .4268
Tangent	$127	$0	$0	$2,985	$0	$0	2013	2018	Square footage of impervious area
The Dalles	$342			$3,420			2007	unknown	Square footage of impervious surface
Toledo	$863	$0	$105	$8,225	$0	$1,002	2012	2013	Residential is based on EDUs, nonresidential uses are based on square footage of impervious

[15] Reductions are available for engineered onsite infiltration systems that reduce run leaving the site (based on 10 year storm event).
[16] Fees are currently reduce by 50% to entice development.
[17] Single Family EDU is equivalent to 3,000 sq. ft. of impervious surface area.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
									surface
Tualatin	$275	$0	$0	$2,448	$0	$0	unknown	unknown	Impervious surface = 2,640*$275
Veneta	$168			$1,372			2005	n/a	Residential: based upon size of house or use (i.e. small, medium & large) Nonresidential: based upon impervious surface x 0.05584
Vernonia[18]	$1,340			$5,360			2005	2013	4 EDU
Wilsonville	$624	$156		$5,264	$1,316		2012	under review	Nonresidential based on impervious surface area
Yachats	$1,062		$160	$1,062		$160	2013	2014	Based on EDU of SFD. Larger space covered=larger SDC.

[18] Dan Heffernan Company will review this SDC fee in 2013.

APPENDIX D – Growth Planning Figure

Key	Description	Units
1	R-4 Property	16
2	R-2 Properties	19
3	R-2 Property	101
4	R-2 Properties	223
5	R-4 Property (MFD)	400+
6	R-1 Property	209
7	R-1 Properties	40
8	R-1 Properties	10
9	R-1 Property	10
10	R-1 Properties	42
11	R-2 Property	19
12	R-1 Properties	165

Key	Description	Units
13	R-2 and R-3 Properties	70-88 initial sub-phase 1,351 total

APPENDIX E – SDC Methodology

City of Newport

LINCOLN COUNTY, OREGON

STORM WATER SYSTEM DEVELOPMENT CHARGE METHODOLOGY UPDATE

January 2015

Table of Contents

APPENDICES

Executive Summary

Section 1

1.1 Background

In the fall of 2006, the City of Newport voted to update their system development charge (SDC's) program for the various public infrastructure components in the City. HBH Consulting Engineers, Inc. was authorized to prepare SDC methodology for the water, sewer, storm drain transportation and park systems in September of 2006. The document was completed on December of 2007.

At the time the 2007 'Public Infrastructure System Development Charge Methodology' was developed the city of Newport had no storm water master plan covering all the storm drain components within the City's urban growth boundary. With the development of their 2015 Storm Water Master Plan, the City has chosen to update the SDC methodology with a current list of CIP projects and associated cost estimates to facilitate development of a more accurate SDC charge for the existing storm drain system.

The SDC methodologies and calculations presented herein are consistent with the framework set forth by the Oregon SDC legislation encapsulated within ORS 223.297 to ORS 223.314.

1.2 Overview of SDC Methodology

1.2.1 Storm Drain System SDC

This plan includes a methodology for the development of a stormwater SDC for the City of Newport. The methodology relies upon planning development in the Storm Water Master Plan, 2015. Capital projects from this plan were used to establish a CIP for the storm water system.

Growth potential in the stormwater sector was based upon impervious surface methodology. A study of residential development confirmed that a typical residential dwelling in Newport accounts for approximately 2,727 square feet of impervious surfaces. Therefore, it was determined that a single EDU is equal to 2,727 square feet of impervious surface.

By using adopted growth rates and conversions to impervious surface, a value was established for growth potential in the storm drainage system within the planning period.

The SDC charge for the storm drainage system was calculated by dividing the SDC eligible project costs by the growth potential within the system.

A summary of the storm drainage SDC is provided below in Table 1.2.3. A detailed analysis of the storm drainage SDC methodology is provided within Section 3 of this methodology.

Table 1.2.3 – Storm Drainage SDC Methodology Summary
City of Newport

SDC Component	SDC Amount
Improvement Fee	
$/EDU	$1,494
$/square foot	$0.55
Reimbursement Fee	0
Credit Summary	NA

1.2.2 Compliance Costs

Oregon law allows a utility service provider to use SDC revenues to pay for costs associated with compliance to, and administration of SDC programs. While this is not a separate category, it is acceptable to assess a "compliance charge" when collecting SDC fees.

Acceptable compliance cost activities include accounting and auditing costs, SDC methodology updates and plans, master planning costs, CIP administration costs, and other costs that are determined to be necessary to support and properly manage an SDC program.

Collection of funds to pay for these annual SDC compliance costs should be in the form of a percentage surcharge on all SDC's collected. Therefore, an estimate must be made of the revenue that the City is projecting to collect over the planning period. Based on the analysis shown in the *Public Infrastructure System Development Charge Methodology, 'HBH Consulting Engineering, December 2007' (ISDCM)*, it was projected to require a surcharge of around 4% on all SDC's to collect adequate funds to properly administer an SDC program for the City of Newport. This value was reassessed using the new stormwater CIP project list and still remains at approximately 4%.

Section 4.0 includes information and details on the establishment of SDC compliance costs. The analysis shown in this section combines the SDC compliance costs from the water, wastewater, storm drain, transportation, and park infrastructure systems to calculate one percentage rate for all SDC charges.

1.2.3 Sample SDC Assessment

Residential Customers

A simple example of SDC assessment would be for a new single family dwelling. The assessment for this new customer would be as follows:

Table 1.2.8 – Sample Residential Assessment

SDC Sector	SDC Charge Per EDU
Water System SDC	$2,366.00
Wastewater System SDC	$3,891.00
Stormwater System SDC	$1,493.90
Transportation System SDC	$1,090.00
Parks System SDC	$2,591.00
Subtotal	$11,431.90
Compliance Cost Surcharge	$477.85
Total Residential SDC	$11,910

Therefore a total SDC for all of the SDC programs in Newport would be around $11,910 for an average new residential dwelling. This does not include any potential reductions for SDC credits that may be appropriate in Newport depending on how the City undertakes the various CIP projects in the future.

Non-Residential Customers

Non-residential development will require a more complicated and case-by-case assessment process. Each section within this methodology includes a discussion of the methods that are to be used to assess new residential and non-residential customers.

The City may also allow some new non-residential customers to appeal their assessment and allow the customer to pay some of the assessment while a study is completed of their actual impact to the system. An example of a potential appeal process is provided in Section 3.10.2 of this methodology. The burden of paying for and making the case for an appeal should rest on the new customer.

Introduction to SDCs

Section 2

2.1 Background

The City of Newport owns and maintains a public infrastructure system that includes the following:

- A potable water system complete with a treatment plant, storage reservoirs, and a distribution system to deliver water to the end users.
- A sanitary sewer system that includes a wastewater collection system, several pumping stations, a treatment plant, and an ocean outfall for treated effluent.
- A storm drainage system with piping and ditching to convey rainwater runoff from high ground to appropriate outfall locations.
- A transportation system made up of major and minor roads, sidewalks, and other facilities for the purposes of providing transportation within and without the community.
- A parks system complete with several parks and other recreational facilities for the use of residents and visitors to the City.

In 2007, the City of Newport adopted an SDC methodology for each infrastructure sector mentioned above. Since that time, the SDC methodology remains unchanged.

The purpose of this study is to develop and discuss the methodology used to update the existing storm water SDC program to incorporate the capital improvement costs outlines in the recently developed Storm Water Master Plan.

2.2.1 Summary of Previous SDC Charge Structure

Prior to the preparation of this methodology, the City assessed SDC's based on the following assessment methods for each infrastructure element:

1. Storm SDC *Residential:* Charged a set per residence or EDU. This fee is based on the assumption that each lot has an average of 2,727 square feet, and an associated cost of $0.25 per foot. *Non-Residential:* Charged $0.25 per square foot. These fees do not include compliance costs.
2. Storm SDC *Commercial/Industrial:* Charged a $0.25 per square feet of impervious service added to the site.

Based on the previous methods, the total SDC for a typical residence would have been around $690. This information is provided so that the City may compare the final recommendations in this methodology to typical charges prior to the SDC update.

2.3 Oregon SDC Law

The State of Oregon has established statutory law for the development, assessment, and administration of SDC's for local governments, utility districts, and similar agencies. Oregon Revised Statutes (ORS) 223.297 - 223.314 authorizes local governments and service districts to assess SDC's for various infrastructure sectors including sewer, water, storm drainage, streets, and others.

In addition to specifying the infrastructure systems for which SDC's may be assessed, the SDC legislation provides guidelines on the calculation and modification of SDC's, accounting requirements to track SDC revenues, and the adoption of administrative review procedures. A summary of the statutory SDC provisions is provided below:

2.3.1 SDC Structure

SDC's are typically developed around two separate modes or philosophies of SDC logic. They are:

1. Reimbursement SDC
2. Improvement SDC

SDC's can also be assessed based on a combination of reimbursement and improvement charges. In addition to these charges, the statute allows agencies to recover administrative costs that are necessary to set up, comply with, and administer SDC programs. We will refer to these costs as compliance costs.

Reimbursement SDC. A reimbursement SDC is designed to recover capital costs for projects that have already been undertaken. Current legislation requires that the reimbursement SDC be established by an ordinance or resolution that sets forth the methodology used to calculate and assess the charge. The methodology must integrate a number of factors when determining an appropriate SDC cost including:

1. The cost of existing facilities when they were constructed or implemented
2. Remaining capacity available for growth or development use
3. Prior contributions from existing users
4. The value of unused capacity
5. Ratemaking principles employed to finance the capital improvements
6. Grants or other funding sources that must be subtracted from the eligible costs and
7. Other relevant factors

The objective of a reimbursement SDC is that future system users contribute an equitable portion of the capital costs of developing new facilities with excess capacity.

A typical example of how a reimbursement SDC could be utilized is with a recently upgraded or constructed sanitary sewer pump station. Sanitary sewer pump stations are required to be designed and constructed to handle a future (20 or 25 year) projected capacity. The additional cost required for the construction of a new pump station that can not only handle existing flows but future projected flows becomes the SDC eligible portion of the project cost.

For example, if a pump station was built five years ago, but has additional capacity available for future growth, the value of the remaining unused capacity of the station can be calculated and assessed as a reimbursement SDC eligible project cost to all new customers that wish to utilize some of the remaining capacity during the remainder of the design period (15 or 20 years, or whatever the case may be).

Improvement SDC. The improvement fee is designed to recover costs of planned capital improvements as they appear on an adopted capital improvement list or capital improvement plan (CIP). The improvement fee must also be specified in an ordinance or resolution and is subject to the following conditions:

1. The costs of projected capital improvements will increase the capacity of the system.
2. Projects must appear on an approved and adopted CIP list or be added to the list through development review and approval.

3. Projects must serve more than the development for which the SDC is being charged. Specifically, to be considered a qualified project:

    a. the project is not located on or contiguous to property that is being developed, or
    b. the project is located in whole or in part on or contiguous to property that is the subject of development approval and required to be built larger or with greater capacity than is necessary for the particular development project to which the improvement fee is related.

Revenues generated from improvement fees must be dedicated to capacity increasing capital improvements or the repayment of debt on such improvements. An increase in capacity is established if an improvement increases the level of service provided by existing facilities or provides new facilities. The portion of such improvements funded by improvement fees must be related to current or projected development.

Combined SDC. In most cases, growth needs due to development will be met through a combination of existing available capacity (reimbursement SDC) and future capacity enhancing improvements (improvement SDC). The sum of reimbursement and improvement SDC's is commonly referred to as a combined SDC. However, when utilizing a combined SDC, the methodology must demonstrate that the charge is not based on providing the same capacity-increasing result due to both SDC's. In short, an agency cannot "double-dip" when using a combined SDC. This is usually accomplished by structuring the fee to reflect the weighted average cost of existing and new facilities.

Compliance Costs. Oregon law allows SDC revenue to be utilized by the assessing agency for costs incurred in an effort to comply, administer, study, and update an SDC program. Compliance costs include, but are not necessarily limited to:

1. Auditing and accounting costs
2. Master/Facilities Planning Costs and Planning Updates
3. SDC Methodology Development Costs and Updating of SDC Plans
4. Maintenance of a Capital Improvement Plan (CIP) list

Compliance costs are typically assessed based on a percentage of the overall or maximum anticipated or projected annual SDC revenue. These revenues must be used to maintain or administer an active SDC program. Compliance costs are discussed in Section 8.0.

2.3.2 SDC Credits

Oregon law requires that an SDC credit be provided against any assessed improvement fee for the construction of "qualified public improvements." Qualified improvements, as discussed above, are improvements that are required as a condition of development approval, are included on the CIP list, and are either:

1. not located on or contiguous to the property being developed, or
2. located in whole or in part, on or contiguous to, property that is the subject of development approval and required to be built larger or with greater capacity than is necessary for the particular development project to which the improvement fee is related.

In simple terms and for example, if a new wastewater pump station appears on a CIP list and is required for a specific development to be undertaken, the owner of the development can construct the new pump station and receive an SDC credit for the SDC eligible portion of the project costs, assuming that the new station is needed to serve more customers than are represented by the development alone.

An additional credit must be included in the methodology for the present worth of financing payments that may occur in the future for an undertaken improvement. In short, new users cannot be required to pay SDC's for specific improvements as well as pay increased user rates to pay back loans that were required to construct the improvements. This form of "double-dipping" is overcome by establishing a credit based on the present worth of a potential increase in monthly user rates over a specified period of time.

2.3.3 Update and Review Requirements

SDC methodology is public information and must be made available for public review.

The SDC ordinance must include procedures and practices for not only the establishment but the modifying and updating of SDC fees. Public agencies must maintain a list of persons and organizations who have made a written request for notification prior to the adoption or amendment of any new or updated SDC fees.

However, changes to the SDC rates resulting from:

1. changes to costs in materials, labor, or real property as applied to projects in the required project list, or
2. application of a cost index that considers average change in costs of materials, labor, or real property and is published for purposes other than SDC rate setting (i.e. ENR Construction Cost Index)

are not considered "modifications" to the SDC. As such, the local agency is not required to adhere to the notification provisions.

If changes to the SDC methodology or assessment amounts do represent a modification, the notification provisions in the Oregon law require a 90-day written notice period prior to the first public hearing, with the new SDC methodology available for review at least 60 days prior to the public meeting.

2.3.4 Other SDC Statutory Provisions

Other provisions of the Oregon legislation require:

1. Development of a capital improvement program/plan (CIP) or comparable planning effort that lists the improvements that may be funded with improvement fee revenues and the estimated timing and cost of each improvement. (This is usually accomplished through a master planning effort.)
2. Deposit of SDC revenues into dedicated and individual accounts and the annual accounting of revenues and expenditures. The annual accounting effort must include a list detailing the amount spent on each project funded, in whole or in part, by SDC revenues, including costs attributed to complying with the SDC legislation.
3. Creation of an administrative appeals procedure, in accordance with the legislation, whereby a citizen or other interested party may challenge any expenditure of SDC revenues.
4. Preclusion against challenging the SDC methodology after 60 days from the enactment of or revision to the SDC ordinance or resolution.

The provisions of the legislation are invalidated if they are construed to impair the local government's bond obligations or the ability of the local government to issue new bonds or other financing. Furthermore, the establishment or modification of an SDC or a project list is not a land use decision issue.

2.4 Capacity Replacement Protocol

It is common to have a system in place that allows a new land use or development to replace an existing land use and provide an adjustment to SDC's.

For example, if someone buys an old house, tears it down, and constructs a new residential home in its place, no new flows or demands are added to the system, and no new capacity is required to service the new residence. Therefore, it would be appropriate to waive SDC fees in this instance.

If someone tears down a number of old homes to build a new apartment complex, the project must be carefully considered, and an adjustment made, depending on how many new units there will be, how much more impervious surface, etc. compared to the previous land use.

Capacity replacement issues must be handled on a case by case basis and a process developed to allow a fair adjustment when existing capacity use is replaced with a similar land use.

2.5 Public Education and Input to Methodology

A successful SDC methodology update must incorporate a public education and public input component that effectively conveys information to interested and affected groups in the community and allows them a forum to ask questions, voice concerns, and seek resolutions.

As this update was developed to recalculate the SDC value based on an updated project list, the structure and methodology of the SDC charge is not being altered and is therefore a result of public input received during the development of the '*Public Infrastructure System Development Charge Methodology, HBH Engineering, 2006*'. As the general methodology for calculating the updated stormwater SDC will not waiver from the 2006 methodology, there was little need for pursuing extensive public input. Therefore the following sections are an excerpt from the prior SDC document describing the public input process underwent during the development of that document.

2.5.1 SDC Task Force

One of the first activities undertaken by the City was the formation of an appointed SDC task force. When considering whom to appoint to the task force, the City considered which groups in the community would be most affected by the SDC update. Key members of these groups were approached and asked to serve on the SDC task force during the preparation of the SDC methodology, throughout the public notification and education periods, to the ultimate completion and implementation of the new SDC program.

Members of the SDC task force included:

- *A leader in the local property development community*
- *A member of the local homebuilders association and a local contractor*
- *A president of a local banking institution*
- *A leader in the local realtor community*
- *A member of the City of Newport Planning Commission, and*

- *A member of the City of Newport City Council*

The intent with this group was to educate and involve key members of specific groups who, in turn, would provide support and assistance in delivering information to and answering questions posed by members of their individual groups or communities. By involving these communities and groups early in the process, it was hoped that differences, problems, or misunderstandings could be avoided later in the process.

2.5.2 SDC Meetings and Public Education

Soon after beginning the SDC methodology update process, two meetings were held to educate and present the project objectives to key participants. The first two meetings were:

1. *A kickoff meeting with key members of City staff to discuss SDC's in general, talk about the plan for updating SDC's, discuss the role each member of the City staff will play in the updating of SDC's, and answer questions from staff. This meeting was held on October 30, 2006.*
2. *A kickoff meeting was then held with members of the SDC task force to discuss SDC in general, discuss the need for an SDC methodology update, and answer questions that members of the task force had with regard to the process. This meeting was also held on October 30, 2006.*

Additional meetings were scheduled and held for the purpose of public education where a presentation would be provided to the City Council and members of the public would be allowed to comment and ask questions about the process.

A total of three public education meetings were planned as part of the SDC methodology update process."

2.6 Report Organization

The following sections comprise this City of Newport SDC Methodology Plan as presently constituted:

- **Section 1 – Executive Summary.** This section provides a brief overview and summary of the SDC Plan and is intended to provide the reader with the important facts and findings contained in the overall plan.
- **Section 2 – Introduction.** This section provides information on the background of SDC's in Newport, related efforts for other infrastructure areas, and the legal and statutory background for the establishment of SDC's within the State of Oregon.
- **Section 3 – Storm Drainage SDC Methodology.** This section provides a detailed accounting of the storm drainage SDC methodology.
- **Section 4 – Compliance Costs.** This section provides a detailed accounting and methodology for the establishment of a compliance cost for the maintenance of SDC programs for all of the SDC methodologies.
- **Appendix.** The Appendix includes information that is referenced in this study but is not included in the referenced planning documents.

SDC Methodology

3.1 Introduction

This section describes in detail the calculations, background information, and methodology used to develop and identify the maximum defendable storm drainage SDC for the City of Newport. This section will seek to identify the existing and future capacity requirements as well as provide a summary of the City's stormwater capital improvement plan (CIP).

This section will develop a method for determining system population or input based on impervious surface methodology and will seek to make projections for future capacity requirements, assuming an increase in impervious surfaces.

3.2 System Overview and Background

The City of Newport has completed several planning documents over the years to provide a level of planning support for the City's stormwater system. A summary of each is provided below:

Storm Sewer Facilities Plan (CH2M Hill, 1990) This planning effort was part of an overall infrastructure planning document that looked at all of the public infrastructure in the City. The Storm Sewer Facilities Plan considers system-wide issues and divides the City into several storm drainage basins. Deficiencies were identified and improvements and cost estimates prepared.

South Beach Storm Water Master Plan (SHN Consulting Engineers, 2004) This planning effort was commissioned to address storm drainage in the southern part of the system in response to current and anticipated growth patterns in the area. The study addresses several deficiencies in the southern part of the system and includes recommended improvements and cost estimates to address these deficiencies.

Storm Water Master Plan (Civil West Engineering Services, 2014) This planning effort was commissioned to address storm drainage within the City's urban growth boundary through the planning period of 2034. The study addresses several deficiencies within the system and includes recommended improvements and cost estimates to address these deficiencies.

3.2.1 Overall System Description

The basins encompassing the area of Newport contain ravines, streams, creeks, hillsides, shallow wetlands, and Yaquina bay which all convey storm water to the Pacific Ocean. As the City began to develop around this natural landscape, ravines were morphed into flat lands with underlying culverts following the natural drainage way profile and alignment. Ditches and culverts where introduced as roads began expanding north, south, and east.

In prior planning documents, the storm drain system description has been broken up into the 'North Area' and the 'South Beach' area. For the congruency of planning documents, the same will be done within this SDC update.

North Area

The 'North Area' consists of all storm drain components north of Yaquina Bay. Within this area there are outfalls with diameters as large as 48" and lesser outfalls as small as 8". Many of these outfalls are along SE Bay Blvd. draining the area southeast of Hwy. 101 and South of Hwy. 20. These range in size from 8" to 36". Further north at the west end of NW Beach Drive lies the two major outfalls within the City draining most of the area east and west of Hwy. 101 between SW 7th St. and NW 14th Street. This area comprises the largest portion of the Cities storm drain system. North of 14th Street and south of NE 32nd St., there are several smaller systems that drain directly to the Pacific Ocean, or into Big Creek or Jeffries Creek. Primarily, the systems west of Hwy. 101 drain into the Pacific Ocean, and the systems east drain into the creeks, then under Hwy. 101 and into the Pacific Ocean. The storm drain system north of NE 32nd St. is mostly comprised of roadside ditches, 12" or smaller piped systems draining local residential areas, and large culverts conveying creeks to the Pacific Ocean. An exception to this pattern is the 36" outfall extending through and from the Pacific shores RV park. This pipe drains an area east of Hwy. 101 and an area to the south between NW 57th St. and NW 60th Street.

South Beach

The City annexed the area south of Yaquina Bay, commonly referred to as 'South Beach' in the 1970's and 80's. This area extended approximately 5 miles South of Yaquina Bay, and as much as 2.5 miles inland. Much of this area is left undeveloped and thus the storm drain follows whatever path the natural topography would dictate. Given that this area is relatively flat, and that the natural terrain affords many areas for water storage (wetlands), much of the stormwater within the South Beach area is retained, and either infiltrated, evaporated, or slowly conveyed to Yaquina Bay, or the Pacific Ocean.

Although much of South Beach is undeveloped, the areas to the north of South Beach and along Hwy. 101 contain some development. The storm drain system within these mildly developed areas is primarily small piped sub-systems draining to Yaquina Bay, or the Pacific Ocean. North of SE 25th St. the Newport Marina, NOAA Marine Operations, and the Hatfiled Marine Science Center developments cover the majority of the area with impervious surfaces. These surfaces are drained with private systems, all conveying runoff directly to Yaquina Bay. Just North of SE Marine Dr. there is a 24" outfall draining the Rogue Ales Brewery parking lot and a portion of Marine Drive. To the south at the intersection of SW Brant and SW 27th St. there is a 36" outfall which drains a residential area to the south of the intersection. Further south there is a 36" outfall at the intersection of SE 32nd St. and SE Ferry Slip Road. This outfall drains the area to the northwest of the two crossing streets. Just south of SE 32nd St. there is a 60" and 36" outfall at the intersection of SE Chesnut St. and SE Ferry Slip Road. The 60" outfall conveys waters from west and south of Hwy. 101 and SE 35th St. respectively. The 36" outfall drains a small portion of Hwy. 101, and most of SE Ferry Slip road. The final piped system larger than 12" is aligned along Ash Street, and outfalls to the east directly into Yaquina Bay. The majority of the remaining systems within South Beach are 12" or smaller, or contain a single large culvert conveying local streams, and creeks under Hwy. 101.

3.2.2 Basis for Population Impact & System Growth

The impact of growth on the stormwater system will be based on an impervious surface methodology. In general, this methodology will determine how much impervious surface a typical EDU will add to the system. All new development can then be compared against this typical value to determine how many EDU's are being added and how this will impact the stormwater facilities within the City of Newport.

3.3 EDU Methodology and Projected Growth

This section will seek to describe the methods used in this SDC methodology to establish the growth component of the storm drainage SDC. The methodology is to be based on impervious surface methodology and shall be based on information taken from the City's aerial maps.

The aerial maps were used to examine the total impervious area on an average residential lot. Completion of this task was reached by examining 55 Residential lots spread throughout the city and totaling the impervious area, then dividing this area by the total amount of residential lots evaluated. These impervious surfaces includes such areas as:

- Roof areas
- Driveways
- Sidewalks
- Patios and impervious decks
- Outbuildings
- Any other improvement which will result in water running off the property

Based on the 70 family dwellings examined, there was a total impervious surface area of 195,300 square feet. This is equal to around 2,790 square feet of impervious surface per EDU.

Based on this analysis, the City should consider that a typical EDU in Newport shall add around 2,790 square feet of impervious surface to the system. However in the 2007 SDC study the square foot per EDU was calculated to be 2,727 and as these two numbers are not dramatically different, for the purposes of consistency, this number shall be used in this SDC update as well.

In section 5 of the Cities 2014 Storm Water Master Plan the growth potential of the storm system is presented. It is estimated that, based on this growth scenario, that approximately 2,215 new non-public EDU's will be added to the system during the planning period. It is reasonable to assume that with each EDU added there will be the typical amount of impervious surface added to the system. Therefore:

> 2,215 new EDU's x 2,727 square feet of impervious surface per EDU = 6.0-million square feet or around 138.7 acres of new impervious surface added to the system.

Therefore, the growth potential for the planning period for the stormwater SDC methodology is summarized as:

- 2,727 square feet per new EDU
- Approximately 2,280 new EDU's added to the system
- Approximately 6.0-million square feet of impervious surface added to the system
- Approximately 138.7 acres of impervious surface added to the system

These figures will be used later in this section to calculate appropriate SDC charges for the stormwater system.

3.4 CIP Project Summary and Project Costs

The City's Stormwater Master Plan document includes numerous recommended projects that the City wishes to undertake as part of their stormwater CIP. This section will seek to provide a brief description of each project and discuss the potential for SDC eligibility for each project.

The SDC methodology must include a discussion of the percentage of each project's cost that can be attributed as necessary for growth and, therefore, be considered SDC eligible. As discussed previously, SDC's must be based on a project's costs or the portion of a project's cost that is necessary to add system capacity in response to or in anticipation of growth.

A summary of the Stormwater CIP costs and associated SDC eligibility is provided in Table 3.1. To preserve document consistency, the projects will retain the name given them in the Storm Water Master Plan, and are listed in alphabetical order.

3.4.1 Project Descriptions and Need

Project C1 – 525 lf of 24-inch Storm Drain. Project C1 addresses lacking system capacity along NE 73rd Street. An area east of the 73rd and NE Avery St. intersection drains to the north ditch along NE 73rd Street. This area has a peak runoff of approximately 15.62 CFS. However the ditch to which it drains is limited to the conveyance of 3.11 CFS. To increase the capacity the flow directed into the ditch on the north side of 73rd will be diverted and piped into the existing piped storm drain system.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, however the storm water runoff will significantly increase with the estimated growth during the planning period. This increase will bump the required diversion pipe size from 18" to 24". For these reasons this project will be considered to be partially (50%) SDC eligible.

Project F1 – 88 lf of 24-inch Storm Drain. Project F1 addresses lacking system capacity from a point within the storm drain system lying on NW 60th St. between Hwy. 101 and NW Gladys Street. The pipe extends northward and is currently limiting the ability of the system to convey a 25-year storm event. This lacking capacity is directly related to runoff collected with an improved storm drain system within basin F & G. (See Storm Drain Master Plan, Civil West Engineering, 2015) With the current layout, the described pipe has sufficient capacity to convey a 25-year storm event.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and although future development within the collection area of this storm drain piping is minimal the flow within the system will increase dramatically due to future construction. For these reasons this project will be considered 100% SDC eligible.

Project H1 – 240 lf of 12-inch & 65 lf of 18-inch Storm Drain. Project H1 addresses lacking capacity associated with the storm drain system within the vicinity of NW Perry St. and NW 54th St. in the northern part of the community.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (3 EDU). For these reasons this project will not be considered as SDC eligible.

Project K1 – 270 lf of 12-inch Storm Drain. Project K1 addresses the storm drain components running south from the NE 53rd St. and NE Lucky Gap St. intersection to their outfall point K1. The lacking capacity within these pipes will cause localized surcharging and system flooding. Increasing this pipe size from 8" to 12" will increase the system capacity sufficiently to convey the designated storm events. This construction would require: the removal and replacement of 270' of pipe, the replacement of 2 manholes, 2 tee connections stemming from nearby catch basins, and a catch basin replacement.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain accounts for 10% of the fully developed flow. For these reasons 10% of this project will be considered as SDC eligible.

Project N1 – 200 lf of 18-inch, 550 lf of 24-inch & 1,100 lf of 30-inch Storm Drain. Project N1 addresses the capacity deficiency which extends along Hwy. 101 from the minor outfall across from SW 25th St. south to NE 17th Street. The highway improvements will include construction of: 200' of 18" RCP, 550' of 24" RCP (50' of which will be placed using the jack and bore method), and 1,100' of 30" RCP.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (6 EDU). For these reasons this project will not be considered as SDC eligible.

Project N2 – 250 lf of 18-inch Storm Drain. Project N2 addresses the capacity deficiency along Iler Street. Two pipes along this pathway need to be replaced to facilitate future conveyance of a 25-year storm event.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project Q1 – 224 lf of 12-inch Storm Drain & 200 lf of Ditch Repair. Project Q1 addresses insufficient capacity and system maintenance along NW Nye Street. There have been resident complaints of flooding, or overflow being disbursed out of the existing storm drain system along NW Nye Street between NW 16th and 17th street. The system model also shows insufficient capacity in this area as the 25-year storm produces roughly 3.54 CFS of storm water that cannot be contained within the existing system. This is primarily due to insufficient pipe sizes (8") as well as a ditch line at the north end of the system that is littered with obstructions. To address the current deficiencies the 225' of 8" storm drain line along NW Nye St. should be increase to 12", and approximately 100' of ditch line needs to be repaired or reconstructed to match a 1'-6" trapezoidal ditch configuration with a 1' wide bottom.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions and poor maintenance of the existing system, additionally future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project R1 – 175 lf of 12-inch & 500 lf of 18-inch Storm Drain. Project R1 addresses the storm drain system downstream of the NW 14th St. and NW Thompson St. intersection which lacks sufficient capacity. These pipes are currently 8" and need to be increased in size to 12-inch and 18-inch pipe further downstream.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (3 EDU). For these reasons this project will not be considered as SDC eligible.

Project T1 – 161 lf of 12-inch Storm Drain. Project T1 addresses lacking capacity in the 8" pipe extending north from the manhole structure northeast of the NW 8th St. and NW Nye St. intersection. This pipe has a capacity of 4.14 CFS, however a 25-year storm will deliver 5.35 CFS to the pipe inlet. To address this, 161' of this 8" pipe will be increased to 12".

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (1 EDU). For these reasons this project will not be considered as SDC eligible.

Project T2 – 240 lf of 18-inch Storm Drain. Project T2 addresses the insufficient capacity of the 24" pipe located at the NW 6th St. and NW Coast Street. The capacity insufficiency continues from this point in the storm drain system downstream to the outfall T1. Increasing the pipe size from 24" to 36" will allow for complete conveyance of the storm water flow. Additionally, the two outfalls extending west along NW Beach Drive are currently combined, and with this suggested improvement, the two systems will be separated into two independent systems. This additional design component will include the abandonment and filling of 50' of 24" pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (7 EDU). For these reasons this project will not be considered as SDC eligible.

Project T3 – 325 lf of 18-inch & 340 lf of 24-inch Storm Drain. Project T3 addresses lacking capacity within the 8" pipe extending to the NW 11th St. & NW Spring St. intersection. This system must be increased in size from this point to the downstream intersection of NW 9TH St. & NW Spring Street. This improvement includes approximately 325' of 18" pipe, and 340' of 24' pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project T4 – Re-Alignment of Piping Under Existing Structures. Project T4 addresses abandonment of an existing storm drain line lying under an existing structure. More specifically, an existing 24" storm drain line extends southwest from the NE 10th Crt. & NE Avery St. intersection. Downstream of this intersection this storm drain line conveys water under the Sunwest Honda/Mazda building and further downstream on the west side of Hwy. 101.the pipe travels under the corner of the Sacred Heart Catholic Church building. The storm drain line must be realigned to avoid all existing structures. Numerous routes were examined, but one seemed more cost effective, and practical for the given system. This alternative, directs the storm water south from the originally described intersection, then west along NE 10th St., across Hwy. 101, north along Hwy. 101, and west on NW 10th St. to NW Nye Street. This path will reverse the existing storm drain flow along part of NE Avery St., but in doing this; the storm drain system can collect the runoff being conveyed through all existing storm drain components along Hwy. 101. This will allow for complete abandonment of the 24" storm drain pipe lying under the existing structures.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of foresight during the placement of the existing system, and future development within the collection area of this storm drain piping is minimal (1 EDU). For these reasons this project will not be considered as SDC eligible.

Project T5 – Re-Alignment of Piping Under an Existing Structure. Project T5 addresses abandonment of an existing storm drain line lying under an existing structure. More specifically, northwest of the NW 11th St. & Hwy. 101 intersection a 12" storm drain pipe conveys storm water under the Ford dealership building. This pipe should be filled and abandoned. The alternate path for the storm water flow beginning at the intersection of Hwy. 101 and NE 12th St. would be east along 12th St. then south along NE Avery Street where it would connect with the new Project T4 piping at the NE 11th St. and NE Avery St. intersection. This path would require the placement of approximately 684' of 24" pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of foresight during the placement of the existing system, and future development within the collection area of this storm drain piping is minimal (1 EDU). For these reasons this project will not be considered as SDC eligible.

Project T6 – Re-Alignment of Piping Under an Existing Structure. Project T6 addresses abandonment of an existing storm drain line lying under an existing structure. More specifically, an 18" Storm drain pipe that is just east of NW Nye St. and travels south between NW 13th St. and NW 11th St. conveys storm water under the Church of the Nazarene and a private residence. In addition to traveling under existing structures this storm drain system north of NW 13th St. lies out of the R.O.W and navigates through the back yards of local residents. It is recommended to abandon all storm drain piping currently existing outside of the street R.O.W. between NW Nye St. and NW Benton Street, and to construct a storm drain system within the NW Nye St. R.O.W that collects the storm water previously conveyed through the existing system. This approach would have the preferable end product (Storm Drain system within City R.O.W), but would be more expensive, and any roof drains or area drains connecting to the line would have to find other conveyance pathways. This could be a difficult and expensive process. The expense of these connections is not reflected in the cost estimate for this improvement.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of foresight during the placement of the existing system, and future development within the collection area of this storm drain piping is minimal (1 EDU). For these reasons this project will not be considered as SDC eligible.

Project U1 – 197 lf of 18-inch & 556 lf of 24-inch Storm Drain. Project U1 addresses the lacking capacity starting at the 12" storm drain pipe stemming from the manhole at the intersection of 12th St. and NE Douglas Street. All the 12" pipes downstream of this point will need to be increased in size.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project U2 – 739 lf of 54-inch Storm Drain. Project U2 addresses the capacity deficiencies just upstream of outfall U1. The 42" storm drain pipe leading from the Surfside Mobile Village and extending to outfall located on NW Beach Drive reaches a point at which its capacity drops below the required conveyance for a 25-year storm event. This location is the intersection of NW 3RD Street and NW Brook Street. As the storm water from different areas is brought together at this intersection the totaled storm water flow requirement equals 143.80 CFS while the capacity of the pipe is 100.18 CFS. These pipes along with several of those downstream of it need to be increased to 54” diameter pipe to accommodate the specified storm event. This improvement would include: 739’ of 54” pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (20 EDU). For these reasons this project will not be considered as SDC eligible.

Project U3 – 296 lf of 18-inch & 1403 lf of 24-inch Storm Drain. Project U3 addresses insufficient capacity beginning at the intersection of SW 4th St. and SW 2nd Street. Increasing the system capacity to facilitate the storm event would include: placement of 296’ of 18” pipe, and 1403’ of 24” pipe. The cost estimate for this project is shown below and the figure above.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is nonexistent. For these reasons this project will not be considered as SDC eligible.

Project U4 – 83 lf of 12-inch & 470 lf of 18-inch Storm Drain. Project U4 addresses the lack of capacity beginning east of the SW 2nd St. and SW Nye St. intersection. The pipe at the initial point of lacking capacity is capable of conveying 2.05 CFS, while the storm event delivers 3.18 CFS. Increasing the system capacity to facilitate the storm event would include: placement of 83’ of 12” pipe, and 470’ of 18” pipe. The cost estimate for this project is shown below and the figure above.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is nonexistent. For these reasons this project will not be considered as SDC eligible.

Project U5 – Storm Drain Pipe Replacement and Re-alignement. Project U5 addresses the 24” pipe extending southwest from the Nye Creek inlet on NE 8th St. between NE Benton St. and NE Avery St. which lacks the capacity to convey a 25-year storm event. In order to accommodate this flow, the pipe diameter must be increased to 42” and larger from this point to the downstream outfall.

In addition to addressing capacity issues this project also includes re-alignment of the storm drain system that is currently lying under existing structures. Directly downstream of the 24” pipe described is a 24” storm drain line extending southwest from the manhole on N.E 8th St. about half way between NE Avery St. and NE Benton Street. This 24” line conveys storm water under two homes and an apartment complex as it travels to the NE 7th St. and NE 8th St. intersection. From there the pipe increases to 36”, and continues southwest under the corner of the Cash and Carry building, and to a parking lot just north of the NE 6th St. and Hwy. 101 intersection. The storm drain system then continues southwest, crosses Hwy. 101, conveys water under both the Windermere West Coast Properties building, and the Washington Federal Building. Once beyond the Federal building, the 42” pipe reaches the site of the City of Newport Wastewater Treatment Facility, and from there, it outfalls across NW Nye St. into the Nye Creek. This project proposes a re-alignment of several sections of the current piped system which will allow for the complete abandonment of all pipe sections traveling under existing structures. To facilitate this re-alignment and related pipe abandonments, the storm drain flow along NE 5th St. was reversed to now flow east to the NE 5th St. and NE Avery St. intersection.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given

current development conditions and improper placement of the existing storm drain components, additionally future development within the collection area of this storm drain piping is minimal (3 EDU). For these reasons this project will not be considered as SDC eligible.

Project U6 – Re-Alignment of 10-inch Storm Drain. Project U6 addresses the 10" storm drain line between N.E Avery St. and NE Benton St. and extending from NE 3rd St. and to NE 4th St. which needs to be re-aligned to avoid the private properties and one existing structure under which it travels. To achieve this, the storm drain system should be redirected west along NE 3rd St. from the beginning point of the described storm drain line to the manhole located at the NE 3rd St. and NE Avery St. intersection. This would include placement of 324' of 12" storm drain pipe. This stretch of pipe will be buried in excess of 20 feet at certain sections, therefore it is recommended to use a directional drilling process to lay the pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is nonexistent. For these reasons this project will not be considered as SDC eligible.

Project V1 – 284 lf of 18-inch & 249 lf of 24-inch Storm Drain. Project V1 addresses the lack of capacity within the storm drain system along SW Fall Street. This system conveys water from the southeast across Hwy. 101 to outfall V1. As the system traverses along SW Fall St. it collects the storm water from 3 separate apartment complexes on the south side of the road. The contribution from these residences results in a total flow, given a 25-year storm event, of approximately 8.49 CFS which weill be delivered to the 12" downstream pipe. This pipe has a capacity of 5.49 CFS. This will result in surcharging and localized flooding. To address the lacking capacity, it will require the placement of 284' of 18" pipe along SW Fall Street, and 249' of 24" pipe along SW Fall St. and SW Elizabeth Street.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (4 EDU). For these reasons this project will not be considered as SDC eligible.

Project X1 – 379 lf of 12-inch & 1,077 lf of 24-inch Storm Drain. Project X1 addresses the improvements along SW 9th Street. The first point of lacking capacity is at the SW Fall cross street. All pipes downstream of this point lack capacity to carry the runoff from a 50-year storm event (50-year analysis is required for highway crossings). To address the lacking capacity, it will require the placement of 379' of 12" pipe and 1,077' of 24" pipe along SW 9th Street.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (4 EDU). For these reasons this project will not be considered as SDC eligible.

Project X2 – 331 lf of 18-inch & 240 lf of 24-inch Storm Drain. This project addresses the improvements along SW 10th Street. The first point of lacking capacity is at the SW Bay cross street. The 8" line extending southwest from this intersection has a capacity of 2.26 CFS, while a 50-year storm event delivers 4.12 CFS to this location in the piped system. All pipes downstream of this point lack capacity to carry the runoff from such a storm event. To address the lacking capacity, it will require the placement of 331' of 18" pipe and 240' of 24" pipe along SW 10th Street.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given

current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project X3 –Removal and Replacement of Several Sizes of Storm Drain. This project addresses the improvements along the main trunk of the storm drain system stemming from SW 9th Street, across Hwy. 101 then to outfall X1. Also included in this project is the increase of pipe size along SW 8th St. from 8" to 12". This entire section of storm drain along the main trunk line is lacking capacity, and must be increased in size to accommodate the resulting flows of a 50-year storm event. This will include placement of 283' of 12", 452' of 24", 249' of 30", and 803' of 36" pipe. 161' of the 24" line would be constructed along the east lane of Hwy. 101, and 108' of the 24" line is recommended to jack and bore for the Hwy. 101 crossing.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (3 EDU). For these reasons this project will not be considered as SDC eligible.

Project Y1 – 331 lf of 18-inch & 240 lf of 24-inch Storm Drain. This project addresses a 6" storm drain line running south along SW Harbor Way with a capacity of 2.14 CFS, while 4.55 CFS is required to convey the flow delivered to this point during a 25-year storm event. To address the lacking capacity, it will require the placement of 497' of 12" pipe along SW 13th Street.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is minimal (2 EDU). For these reasons this project will not be considered as SDC eligible.

Project AA1 – 248 lf of 18-inch & 427 lf of 24-inch Storm Drain. This project addresses the developed storm drain system within basin AA1 (see the Storm Water Master Plan for basin boundaries). Most of the basin is drained through roadside ditches or natural landscape from the south end of the basin toward the bay. Certain components of the storm drain system along SE 3rd St. have recently been improved. However the downstream components have not, thus the system actually reduces in size from a 15" pipe upstream to a 12" pipe downstream. These downstream components are insufficiently sized to accommodate runoff from a 25-year storm event. To address this capacity insufficiency 248 and 427 linear feet of pipe shall be replaced with 18", and 24" pipe respectively.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping is non-existent. For these reasons this project will not be considered as SDC eligible.

Project AC1 – 655 lf of 24-inch Storm Drain. This project addresses two outfalls for the relatively undeveloped storm drain system within the area defined as Basin AC (see the Storm Water Master Plan for basin boundaries). Amongst the several basins within the area defined as Basin AC there are two points requiring improvements to fully facilitate the conveyance of runoff resulting from the future developments within the area during 25-year storm event. The points of lacking capacity are at the culverts crossing under Yaquina Bay Road just east of the Port Dock, and just west of SE Benson road. Both of these pipes will be increased in size to 24" pipes.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and future development within the collection area of this storm drain piping will push the existing system beyond its capacity. For these reasons this project will be 100% considered as SDC eligible.

Project AF1 – Removal and Replacement of Several Sizes of Storm Drain. This project addresses the relatively undeveloped storm drain within basin AF (see the Storm Water Master Plan for basin boundaries). Most of the basin is drained through roadside ditches or natural landscape from the south end of the basin toward the bay. To better serve the current residents and future 131 EDUs that will be added during the planning period, it was recommended to expand the existing system. These new components will collect runoff that is currently draining across private property, or ponding and infiltrating. The additional components collect runoff along the south end of SW Brant St., SW 29th St., and SW 30th Street. These improvements were originally laid out in the 'Newport Coho/Brant, Infrastructure Refinement Plan', Cameron MCarthy, June 2012', and include: 581' of 12", 97' of 18", and 837' of 24" storm drain pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and was instead driven by the considerable future developments expected in the area. For these reasons this project will be considered as 100% SDC eligible.

Project AG1 – Drainage Way Access Improvements. This project addresses the limited access to the Cities drainage ways which can make maintenance and general operation of the storm drain system very difficult. Currently the natural drainage way conveying water from the south west corner of basin AG (see the Storm Water Master Plan for basin boundaries) to the north west corner is lacking adequate access. No road or trail is available to facilitate, inspection, removal of obstructions, or other general maintenance activities. It is recommended that the a 10' wide maintenance road be built along this stretch of ditches and culverts, and that public ownership of the drainage channel including adequate right-of-way for access should be pursued.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to existing system conditions, and future development will add considerable future development within the collection area of this storm drainage way is considerable (103 EDU) and will contribute to the need for improved access. For these reasons this project will not be considered as SDC eligible.

Project AG2 – Expansion of Existing Storm Drain System. This project addresses the discussion in the 'Newport Coho/Brant, Infrastructure Refinement Plan, Cameron MCarthy, June 2012' regarding a southward extension of SW Abalone Street and a westward extension of SW 35th St. to facilitate better traffic to the growing neighborhood, as well as provide access to the new OMSI environmental learning center. The plan proposes extending the storm drain system from the SW 35th St and SW Anchor Way intersection northward and westward along the 'to be' extended streets.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and was instead driven by the considerable future development (170 EDU) expected in the area. For these reasons this project will be considered as 100% SDC eligible.

Project AJ1 –75 lf of 24" Storm Drain. This project addresses the 18" culvert crossing under the east end of SE 35th Street and its lacking capacity for future development. This culvert needs to be removed and replaced with a 24" culvert. This will include the placement of 75' of 24" pipe.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was not necessary due to a lack of capacity given current development conditions, and was instead driven by the considerable future developments expected in the area. For these reasons this project will be considered as 100% SDC eligible.

Project AL1 –Removal and Replacement of Several Sizes of Storm Drain. The project addresses the lacking capacity at the existing dual 24" culverts crossing under Highway 101 north of SW 62nd Street. The pipe will need to be sized to accommodate the post development flows of 76.7 CFS. It is recommended to replace the 85' long 2-24" pipes with two 36" culverts.

Downstream of the 2-24" pipes discussed above, the storm drain system continues west through natural drainage ways to a 60" culvert. This culvert conveys the water through the South Shore Development to the Ocean. Currently this portion of the public storm drain system travels through privately owned land. It is recommended that the City acquires an easement along the 60" culvert.

The SDC eligibility of the project was determined based on two pieces of information collected from the Storm Water Master Plan and are as follows: This project was necessary due to a lack of capacity given current development conditions, however there will be considerable future growth (129 EDU) that will be contributing to the run-off conveyed by the replaced culverts. For these reasons this project will be considered as 75% SDC eligible.

Table 3. 1-CIP Projects & SDC Eligibility

Basin	Description	Cost Estimate	SDC Eligible (%)	SDC Eligible
C1	525' of 24" along NE 73rd St.	$229,316	50	$114,658
F1	124' of 30" SD pipe North of NW 60th St.	$67,398	100	$67,398
H1	305' of 12" and 18" SD pipe along NW 54th St.	$103,677	0	$0
K1	270' of 12" & 18" SD pipe along NE Lucky Gap St.	$102,214	10	$10,221
N1	1200' of 12", 24", 30", and 35" SD Pipe along Hwy. 101	$553,428	0	$0
N2	240' of 18" SD pipe along NE Iler St.	$86,500	0	$0
Q1	890' of 12", 18" , and 24" SD pipe along NW Nye St.	$291,848	0	$0
R1	675' of 12", and 18" SD pipe along NW Spring St.	$227,522	0	$0
T1	161' of 12" SD pipe along NW Nye St.	$50,766	0	$0
T2	921' of 36" SD pipe along NW Coast St.	$490,012	0	$0
T3	665' of 12", 18", and 24" SD pipe along NW Spring St.	$264,614	0	$0
T4	Re-alignment of Pipe under Sunwest Honda/Mazda building	$1,109,013	0	$0
T5	Re-alignment of Pipe under Ford Dealership building	$271,188	0	$0
T6	Re-alignment of Pipe under Church of the Nazarine building	$598,801	0	$0
U1	753' of 18", and 24" SD pipe along NE Douglas Street	$304,978	0	$0
U2	739' of 54" SD pipe along NW 3RD Street & NW Coast St.	$612,539	0	$0
U3	1699' of 18", and 24" pipe along SW Cliff Street	$664,079	0	$0
U4	Re-alingment of Pipe under Cash and Carry	$2,710,875	0	$0
U5	Re-alignment of Pipe under local residence	$79,355	0	$0
U6	553' of 12", and 18" SD pipe along SW 2nd St.	$169,797	0	$0
V1	533' of 18" and 24" SD pipe along SW Fall St.	$308,322	0	$0
X1	1456' of 12", and 18" SD pipe along SW 9th St.	$526,162	0	$0
X2	571' of 18", and 24" pipe along SW 10th St.	$213,816	0	$0
X3	1663' of 12", 24", 30", and 36" SD pipe along SW Minnie St.	$793,155	0	$0
Y1	497' of 12" SD pipe along SW 13th St.	$163,653	0	$0
AA1	675' of 18", and 24" SD pipe along SE Avery St.	$212,022	0	$0
AC1	655' of Culverts crossing Yaquina Bay Blvd.	$208,698	100	$208,698
AF1	1515' of 12", 18", and 24" pipe along SW 29th and SW Brant St.	$640,902	100	$640,902
AG1	Drainage ditch development and Rehabilitation	$1,693,568	100	$1,693,568
AG2	1551' of 15", 18", and 24" SD pipe along SW 35th St.	$459,808	100	$459,808
AJ1	55' of culvert crossing SE 35th St.	$37,156	100	$37,156
AL1	170' of 36" SD pipe crossing Hwy. 101 (Jack and Bore)	$102,117	75	$76,588
Total		**$14,347,295**		**$3,308,998**

3.6 Calculation of Storm Drainage Reimbursement SDC Charge

None of the projects in the stormwater CIP are to be considered for a reimbursement SDC. Therefore, the stormwater reimbursement SDC is $0.

3.7 Calculation of Storm Drainage Improvement SDC Charge

Calculation of the improvement SDC will be based upon the methodology and the establishment of the SDC eligible project costs as outlined earlier in this section. The following table provides a summary of the total cost of SDC eligible projects recommended in the Storm Water Master Plan that have not yet been constructed.

Table 3.7.1 – Improvement SDC Calculation Summary

SDC Calculations	
SDC Eligible Costs (See Table 3.1)	$3,308,998
Total Growth EDU's (See Section 3.2)	2,215
Maximum Improvement Stormwater SDC (Based on EDU's, $/EDU)	$1,494
Total Growth Impervious Area (See Sectoin 3.2)	6,040,305
Maximum Improvement Stormwater SDC (Based on area ($/sf)	$0.55

Based on this analysis, a typical EDU in Newport will pay around $1,494 for the improvement stormwater SDC based on an average impervious surface area of around 2,727 square feet per EDU. This equates to a unit charge of around $0.55 per square foot of impervious surface area.

3.8 SDC Credits for Storm Drainage SDC

An analysis of potential SDC credits should be included as part of any SDC methodology. Credits may be appropriate to offset financing costs that will be paid by all system customers including new customers. Credits are also appropriate for developers that construct or otherwise provide improvements to the system that are part of the current CIP project list. A brief description of potential SDC credit scenarios is provided below:

3.8.1 Improvement Offset Credit

In the case of a developer completing some or all of a CIP project, the credit provided should be equal to the value of the improvement made, though the credit cannot exceed the amount of SDC that the developer would have been required to pay.

For example: Assume that a developer undertakes a subdivision that would require him to pay $50,000 in SDC fees for the stormwater system. If the same developer undertakes all or a portion of a stormwater improvement project that appears on the CIP, the developer should be eligible for some level of SDC credit for the value of the improvement he has undertaken. However, the improvement offset credit cannot exceed the value of the SDC or, in this case, $50,000.

It should be noted that determination of improvement offset credits can require some judgment as development situations vary widely. The City should maintain an open policy when working with developers to identify fair and reasonable improvement offset credits when they apply.

It should also be reiterated that offset credits are not available for improvements undertaken by the developer that do not appear on the City’s CIP and are not part of the City’s SDC methodology.

3.8.2 Financing Credit - Project Costs and Potential Loan Amounts

As the City currently has a rate structure or user fee for the stormwater system totaling $7.50 a month, it is possible to develop a financing credit. If the City seeks to obtain funding for the stormwater CIP projects through loans to be paid back through increased user rates, an appropriate credit should be developed for that increase in user rates.

A potential financing credit will not be developed at this time for the stormwater system.

3.8.3 Impervious Surface Reduction Credit

In some cases, credits may be appropriate for development that incorporates improvements that are designed to reduce the impact of increased drainage on the stormwater system. These measures may include construction of cisterns, detention facilities, pervious surface technology, and other efforts designed to reduce runoff from a developed property.

In each case, the City would be required to review proposed mitigation measures and determine an appropriate SDC credit for impervious surface reduction. In no case should the credit be more than the value of the SDC charge would have been.

The City is not required to provide credits for these types of mitigating practices. Also, in the case of typical residential development, the cost of the impervious surface reducing efforts will likely be far greater than the stormwater SDC charge. However, in some commercial applications, there may be an advantage for a developer to incorporate these types of improvements into a project.

3.9 Storm SDC Summary

This Stormwater SDC update has been developed to provide the City of Newport with the methodology needed to establish the maximum defendable SDC for the stormwater system. The following table provides a summary of the information utilized to complete this analysis:

Table 3.9.1 – Stormwater System SDC Summary

SDC Component	SDC Amount
Improvement Fee	
\$/EDU	\$1,494
\$/ft^2	\$0.55
Reimbursement Fee	\$0.00
Credit Summary	N/A

The maximum defendable SDC for the stormwater system is around \$1494 per EDU or \$0.55 per square foot of impervious surface without the application of an SDC credit or compliance costs. It should be reiterated that this calculation represents the maximum SDC's that can be assessed and defended with proper methodology. The City has the autonomy to adjust this charge in any way they feel is appropriate. However, if adequate SDC fees are not collected and projects must be undertaken to satisfy growth requirements, funds will have to be obtained from other sources.

3.10 Storm SDC Assessment Schedule

SDC's are typically designated as one of two types, then assessed in accordance with the type designation. These two types are residential and non-residential, and a summary of the assessment process accompanying each type is provided below.

3.10.1 Residential Assessment Methods

The residential SDC types are typically assessed using an EDU based method. Under the EDU method, each residential customer is assumed to be one EDU, regardless of the size of the new home or residential improvements. This method is the easier to administer as it does not require the City to review plans and measure or calculate impervious surface.

The EDU method assumes all residential development is relatively equal in the eyes of the stormwater SDC methodology.

The alternative is for the City to continue to perform site plan reviews, measure and calculate impervious surface area, and charge each new residential development based on the impervious surface area that is being added to the system. If this method is chosen, the unit price of $0.55 per square foot should be used. This method requires additional effort by the City to administer the SDC assessment, but it provides for an equitable assessment method for all development.

3.10.2 Non-residential Assessment Methods

It is recommended that all non-residential development be assessed on a unit basis per square foot of impervious surface area. Using this method, a site plan for each new development must be reviewed to determine the amount of impervious surface being added. The resulting assessment will be equitable for each case presented to the City for consideration.

Specifically, non-residential development should be assessed at the incremental rate of $0.55 per square foot of impervious surface area added to a previously pervious site. Accommodations may be made, on a case-by-case basis, for efforts to mitigate runoff impacts. These mitigation efforts may include detention systems, pervious surface materials, and others.

Compliance Costs

4.1 Introduction

Oregon law includes provisions that allow SDC revenues to be used to offset costs incurred by local governments in complying with the provisions of SDC law, including expenses associated with developing SDC methodologies, master planning, administration and updating of CIP's, and other compliance related costs. Recent amendments to the law require annual accounting of SDC expenditures, including revenue collected and attributed to the costs of compliance. The expenses of this annual accounting process are also considered to be related to the costs of compliance and can, therefore, be paid for with SDC revenues.

4.2 Compliance Costs

Unlike reimbursement and improvement SDC's, compliance costs do not represent another category of system development charges. For the City of Newport, it is recommended that compliance costs be established as a "percentage" of the total SDC's that are likely to be assessed each year. The additional surcharge that is to be added to all SDC's will provide the funds necessary to administer each of the SDC programs and comply with current SDC laws and requirements.

The following sub-sections provide a brief description of the components that will make up the compliance cost methodology.

4.2.1 Auditing/Accounting Costs

As mentioned previously, the City will be required to complete annual accounting and auditing of all of the SDC programs that are implemented. The City must account for all revenues collected through SDC assessments, as well as all expenses and project costs that are fully or partially paid for with SDC funds, and all other debits or credits from the SDC funds.

For the purposes of this Study, it will be assumed that auditing and accounting expenses will not exceed $5,000 per year.

4.2.2 SDC Methodology

It will be assumed that the City will have to perform regular updates of their SDC methodology to account for increases in project costs (inflation), additions to the capital improvement plan (CIP), adjustments for project financing specifics as projects develop (i.e. interest rates, grants, etc.), population or growth rate changes, and other issues that may change the SDC charge for one or more of the individual SDC programs. These updates may be required, to a greater or lesser extent, on an annual basis.

It is also assumed that a full SDC methodology update will be required at least once each decade as planning efforts are updated. This major SDC methodology update may be required once every ten years and would ensure that the City's SDC methodology meets all current legal requirements as well as being coordinated with updated planning efforts and CIP's.

4.2.3 Infrastructure Planning Efforts

Most master planning and facilities efforts include a planning period of 20 years. However, in many cases, planning is updated before the end of the planning period. Changes in community needs, development pressures, regulatory changes, or other issues often prompt planning to be updated or repeated on a more regular basis than the planning period suggests.

For the purposes of establishing compliance costs, it is recommended that water and wastewater system planning be repeated on a schedule of at least once every 10 years. It may be that a major planning effort is required in year 1 and a less involved planning effort or update is appropriate for year 10. In any event, the City should be collecting revenues through the planning process that will allow them to update their planning documents as required.

It can be argued that 100 percent of the costs associated with planning should be considered SDC eligible. However, much of the efforts that go into infrastructure planning consist of assessing existing facilities, their capacities and condition, and the capabilities of the existing systems to provide service to existing and future customers. The planning efforts also include efforts to predict the infrastructure needs associated with growth and development. Therefore, the compliance cost associated with infrastructure planning should be shared in part by the SDC programs and in part by the existing users in the system.

For the purposes of this analysis, it is recommended that 50% of the planning costs be considered attributable to growth and are therefore, considered to be SDC eligible. The individual costs of these planning efforts are estimated in Table 4.2.5.

4.2.4 Total Estimated SDC Revenue

As it is recommended that compliance costs should be charged as a percentage surcharge of SDC revenues, the amount of SDC revenue that is anticipated to be collected must be established.

For this calculation, the current SDC values established for the City were used with the one exception of the storm drain SDC. This value was instead taken from section 3.9 and is $1,451. Once the annual compliance costs and annual revenue expected for SDC's is established, we can calculate the percentage surcharge that must be included to cover the annual compliance costs over and above the regular SDC revenues.

The growth component for each SDC program must be reviewed individually and an annual average growth unit established. For example, if it is determine that a water SDC program will add 2,000 new EDU's over 20 years, it should be assumed that the system will add an average of 100 EDU's each year to the system. Therefore, the compliance costs associated with the water SDC program should be paid as a percentage of the SDC revenues collected from the 100 new EDU's added to the system in any given year.

This same analysis should be repeated for each of the separate SDC programs. A summary of this analysis is provided below in Table 4.2.5.

4.2.5 Calculation of Compliance Expenses

The following table illustrates and summarizes the estimated compliance costs that will be associated with the proper administration of an SDC program in the City of Newport. These expenses include annual costs for accounting and administration as well as longer term costs for planning efforts.

Table 4.2.5 – Calculation of SDC Compliance Expenses
City of Newport SDC Program

Compliance Activity	Estimated Cost ($)	SDC Eligibility (%)	Frequency (years)	Annual ($)
General Accounting/Administration costs				
Auditing/Accounting	$5,000	100%	1	$5,000
SDC Methodology Administration & annual Adjustments	$10,000	100%	1	$10,000
SDC Mehodology Update	$65,000	100%	10	$6,500
Wastewater SDC Compliance Costs				
Wastewater Facilities Planning/Master Planning	$250,000	50%	10	$12,500
Water System Compliance Costs				
Water Master Planning	$100,000	50%	10	$5,000
Water Conservation and Mangement Planning	$50,000	50%	20	$1,250
Storm Drain Compliance Costs				
Storm Drain Master Planing	$150,000	50%	20	$3,750
Parks Complinace Costs				
Parks Master Planning	$75,000	50%	10	$3,750
Transportation Complinace Costs				
Tranportation Master Planning (TSP)	$180,000	50%	10	$9,000
Subtotal of Annual Costs	$885,000			$56,750

Based on this analysis, it is estimated to require in excess of $56,000 per year to properly administer the entire SDC program in Newport. This includes costs for planning as well as general administration.

4.2.6 Summary of SDC Revenue and Calculation of Compliance Surcharge

Within the 'Public Infrastructure SDC Methodology, 2007, HBH Consulting Engineers', an effort was made to establish growth potential, over a 20-year planning period, for each infrastructure sector (Storm, Water, Sewer, Traffic, and Parks). It was assumed that the growth rate for each sector occurred over the planning period, and a straight line growth rate for each sector was determined, and thereby the annual growth in each sector was calculated.

The estimated annual revenue within each infrastructure sector was then derived by multiplying the average cost per EDU by the growth expected in each sector.

Table 4.2.6 below summarizes the estimated revenue expected within each sector.

Table 4.2.6 – Calculation of Anticipated SDC Revenue by Sector
City of Newport SDC Program

Estimate of SDC Reviews	Added EDU's per Year	SDC Charge per EDU	Annual Revenue
Estimated Annual Wastewater SDC Revenues	142.43	$3,891	$554,195.13
Estimated Annual Water SDC Revenues	142.43	$2,366	$336,989.38
Estimated Annual Storm Drainage SDC Revenues	114	$1,494	$170,305.09
Estimated Annual Parks SDC Revenues	52.18	$2,591	$135,198.38
Estimated Annual Transportation SDC Revenues	170.91	$1,090	$186,291.90
Total Estimated SDC Revenue			$1,382,979.88
Compliance Cost Charge (Annual Cost/ Annual Revenue)			**4.10%**

By dividing the calculated compliance costs in Table 4.2.5 by the total estimated annual revenue in Table 4.2.6, we can calculate an appropriate SDC surcharge that is required to administer the SDC program in Newport.

Based on this analysis, it is recommended that compliance costs of approximately 4% of the SDC revenue be collected for each of the individual SDC programs. On average, this surcharge should produce enough revenue annually to assist the City with the compliance and administration of all of the SDC programs.

It should be noted that compliance costs should be shared between all infrastructure sectors. Therefore, when SDC's are collected, the City must deposit an appropriate amount into each SDC account taking care to separate the individual SDC charges as well as an appropriate portion of the compliance costs into each separate account.

APPENDIX A

SYSTEM DEVELOPMENT CHARGES

223.297 Policy. The purpose of ORS 223.297 to 223.314 is to provide a uniform framework for the imposition of system development charges by local governments, to provide equitable funding for orderly growth and development in Oregon's communities and to establish that the charges may be used only for capital improvements. [1989 c.449 §1; 1991 c.902 §25; 2003 c.765 §1; 2003 c.802 §17]

Note: 223.297 to 223.314 were added to and made a part of 223.205 to 223.295 by legislative action, but were not added to and made a part of the Bancroft Bonding Act. See section 10, chapter 449, Oregon Laws 1989.

223.299 Definitions for ORS 223.297 to 223.314. As used in ORS 223.297 to 223.314:

(1)(a) "Capital improvement" means facilities or assets used for the following:

(A) Water supply, treatment and distribution;

(B) Waste water collection, transmission, treatment and disposal;

(C) Drainage and flood control;

(D) Transportation; or

(E) Parks and recreation.

(b) "Capital improvement" does not include costs of the operation or routine maintenance of capital improvements.

(2) "Improvement fee" means a fee for costs associated with capital improvements to be constructed.

(3) "Reimbursement fee" means a fee for costs associated with capital improvements already constructed, or under construction when the fee is established, for which the local government determines that capacity exists.

(4)(a) "System development charge" means a reimbursement fee, an improvement fee or a combination thereof assessed or collected at the time of increased usage of a capital improvement or issuance of a development permit, building permit or connection to the capital improvement. "System development charge" includes that portion of a sewer or water system connection charge that is greater than the amount necessary to reimburse the local government for its average cost of inspecting and installing connections with water and sewer facilities.

(b) "System development charge" does not include any fees assessed or collected as part of a local improvement district or a charge in lieu of a local improvement district assessment, or the cost of complying with requirements or conditions imposed upon a land use decision, expedited land division or limited land use decision. [1989 c.449 §2; 1991 c.817 §29; 1991 c.902 §26; 1995 c.595 §28; 2003 c.765 §2a; 2003 c.802 §18]

Note: See note under 223.297.

223.300 [Repealed by 1975 c.642 §26]

223.301 Certain system development charges and methodologies prohibited. (1) As used in this section, "employer" means any person who contracts to pay remuneration for, and secures the right to direct and control the services of, any person.

(2) A local government may not establish or impose a system development charge that requires an employer to pay a reimbursement fee or an improvement fee based on:

(a) The number of individuals hired by the employer after a specified date; or

(b) A methodology that assumes that costs are necessarily incurred for capital improvements when an employer hires an additional employee.

(3) A methodology set forth in an ordinance or resolution that establishes an improvement fee or a reimbursement fee shall not include or incorporate any method or system under which the payment of the

fee or the amount of the fee is determined by the number of employees of an employer without regard to new construction, new development or new use of an existing structure by the employer. [1999 c.1098 §2; 2003 c.802 §19]

Note: See note under 223.297.

223.302 System development charges; use of revenues; review procedures. (1) Local governments are authorized to establish system development charges, but the revenues produced therefrom must be expended only in accordance with ORS 223.297 to 223.314. If a local government expends revenues from system development charges in violation of the limitations described in ORS 223.307, the local government shall replace the misspent amount with moneys derived from sources other than system development charges. Replacement moneys must be deposited in a fund designated for the system development charge revenues not later than one year following a determination that the funds were misspent.

(2) Local governments shall adopt administrative review procedures by which any citizen or other interested person may challenge an expenditure of system development charge revenues. Such procedures shall provide that such a challenge must be filed within two years of the expenditure of the system development charge revenues. The decision of the local government shall be judicially reviewed only as provided in ORS 34.010 to 34.100.

(3)(a) A local government must advise a person who makes a written objection to the calculation of a system development charge of the right to petition for review pursuant to ORS 34.010 to 34.100.

(b) If a local government has adopted an administrative review procedure for objections to the calculation of a system development charge, the local government shall provide adequate notice regarding the procedure for review to a person who makes a written objection to the calculation of a system development charge. [1989 c.449 §3; 1991 c.902 §27; 2001 c.662 §2; 2003 c.765 §3; 2003 c.802 §20]

Note: See note under 223.297.

223.304 Determination of amount of system development charges; methodology; credit allowed against charge; limitation of action contesting methodology for imposing charge; notification request. (1)(a) Reimbursement fees must be established or modified by ordinance or resolution setting forth a methodology that is, when applicable, based on:

(A) Ratemaking principles employed to finance publicly owned capital improvements;

(B) Prior contributions by existing users;

(C) Gifts or grants from federal or state government or private persons;

(D) The value of unused capacity available to future system users or the cost of the existing facilities; and

(E) Other relevant factors identified by the local government imposing the fee.

(b) The methodology for establishing or modifying a reimbursement fee must:

(A) Promote the objective of future system users contributing no more than an equitable share to the cost of existing facilities.

(B) Be available for public inspection.

(2) Improvement fees must:

(a) Be established or modified by ordinance or resolution setting forth a methodology that is available for public inspection and demonstrates consideration of:

(A) The projected cost of the capital improvements identified in the plan and list adopted pursuant to ORS 223.309 that are needed to increase the capacity of the systems to which the fee is related; and

(B) The need for increased capacity in the system to which the fee is related that will be required to serve the demands placed on the system by future users.

(b) Be calculated to obtain the cost of capital improvements for the projected need for available system capacity for future users.

(3) A local government may establish and impose a system development charge that is a combination of a reimbursement fee and an improvement fee, if the methodology demonstrates that the charge is not based on providing the same system capacity.

(4) The ordinance or resolution that establishes or modifies an improvement fee shall also provide for a credit against such fee for the construction of a qualified public improvement. A "qualified public improvement" means a capital improvement that is required as a condition of development approval, identified in the plan and list adopted pursuant to ORS 223.309 and either:

(a) Not located on or contiguous to property that is the subject of development approval; or

(b) Located in whole or in part on or contiguous to property that is the subject of development approval and required to be built larger or with greater capacity than is necessary for the particular development project to which the improvement fee is related.

(5)(a) The credit provided for in subsection (4) of this section is only for the improvement fee charged for the type of improvement being constructed, and credit for qualified public improvements under subsection (4)(b) of this section may be granted only for the cost of that portion of such improvement that exceeds the local government's minimum standard facility size or capacity needed to serve the particular development project or property. The applicant shall have the burden of demonstrating that a particular improvement qualifies for credit under subsection (4)(b) of this section.

(b) A local government may deny the credit provided for in subsection (4) of this section if the local government demonstrates:

(A) That the application does not meet the requirements of subsection (4) of this section; or

(B) By reference to the list adopted pursuant to ORS 223.309, that the improvement for which credit is sought was not included in the plan and list adopted pursuant to ORS 223.309.

(c) When the construction of a qualified public improvement gives rise to a credit amount greater than the improvement fee that would otherwise be levied against the project receiving development approval, the excess credit may be applied against improvement fees that accrue in subsequent phases of the original development project. This subsection does not prohibit a local government from providing a greater credit, or from establishing a system providing for the transferability of credits, or from providing a credit for a capital improvement not identified in the plan and list adopted pursuant to ORS 223.309, or from providing a share of the cost of such improvement by other means, if a local government so chooses.

(d) Credits must be used in the time specified in the ordinance but not later than 10 years from the date the credit is given.

(6) Any local government that proposes to establish or modify a system development charge shall maintain a list of persons who have made a written request for notification prior to adoption or amendment of a methodology for any system development charge.

(7)(a) Written notice must be mailed to persons on the list at least 90 days prior to the first hearing to establish or modify a system development charge, and the methodology supporting the system development charge must be available at least 60 days prior to the first hearing. The failure of a person on the list to receive a notice that was mailed does not invalidate the action of the local government. The local government may periodically delete names from the list, but at least 30 days prior to removing a name from the list shall notify the person whose name is to be deleted that a new written request for notification is required if the person wishes to remain on the notification list.

(b) Legal action intended to contest the methodology used for calculating a system development charge may not be filed after 60 days following adoption or modification of the system development charge ordinance or resolution by the local government. A person shall request judicial review of the methodology used for calculating a system development charge only as provided in ORS 34.010 to 34.100.

(8) A change in the amount of a reimbursement fee or an improvement fee is not a modification of the system development charge methodology if the change in amount is based on:

(a) A change in the cost of materials, labor or real property applied to projects or project capacity as set forth on the list adopted pursuant to ORS 223.309; or

(b) The periodic application of one or more specific cost indexes or other periodic data sources. A specific cost index or periodic data source must be:

(A) A relevant measurement of the average change in prices or costs over an identified time period for materials, labor, real property or a combination of the three;

(B) Published by a recognized organization or agency that produces the index or data source for reasons that are independent of the system development charge methodology; and

(C) Incorporated as part of the established methodology or identified and adopted in a separate ordinance, resolution or order. [1989 c.449 §4; 1991 c.902 §28; 1993 c.804 §20; 2001 c.662 §3; 2003 c.765 §§4a,5a; 2003 c.802 §21]

Note: See note under 223.297.

223.305 [Repealed by 1971 c.325 §1]

223.307 Authorized expenditure of system development charges. (1) Reimbursement fees may be spent only on capital improvements associated with the systems for which the fees are assessed including expenditures relating to repayment of indebtedness.

(2) Improvement fees may be spent only on capacity increasing capital improvements, including expenditures relating to repayment of debt for such improvements. An increase in system capacity may be established if a capital improvement increases the level of performance or service provided by existing facilities or provides new facilities. The portion of the improvements funded by improvement fees must be related to the need for increased capacity to provide service for future users.

(3) System development charges may not be expended for costs associated with the construction of administrative office facilities that are more than an incidental part of other capital improvements or for the expenses of the operation or maintenance of the facilities constructed with system development charge revenues.

(4) Any capital improvement being funded wholly or in part with system development charge revenues must be included in the plan and list adopted by a local government pursuant to ORS 223.309.

(5) Notwithstanding subsections (1) and (2) of this section, system development charge revenues may be expended on the costs of complying with the provisions of ORS 223.297 to 223.314, including the costs of developing system development charge methodologies and providing an annual accounting of system development charge expenditures. [1989 c.449 §5; 1991 c.902 §29; 2003 c.765 §6; 2003 c.802 §22]

Note: See note under 223.297.

223.309 Preparation of plan for capital improvements financed by system development charges; modification. (1) Prior to the establishment of a system development charge by ordinance or resolution, a local government shall prepare a capital improvement plan, public facilities plan, master plan or comparable plan that includes a list of the capital improvements that the local government intends to fund, in whole or in part, with revenues from an improvement fee and the estimated cost, timing and percentage of costs eligible to be funded with revenues from the improvement fee for each improvement.

(2) A local government that has prepared a plan and the list described in subsection (1) of this section may modify the plan and list at any time. If a system development charge will be increased by a proposed modification of the list to include a capacity increasing capital improvement, as described in ORS 223.307 (2):

(a) The local government shall provide, at least 30 days prior to the adoption of the modification, notice of the proposed modification to the persons who have requested written notice under ORS 223.304 (6).

(b) The local government shall hold a public hearing if the local government receives a written request for a hearing on the proposed modification within seven days of the date the proposed modification is scheduled for adoption.

(c) Notwithstanding ORS 294.160, a public hearing is not required if the local government does not receive a written request for a hearing.
(d) The decision of a local government to increase the system development charge by modifying the list may be judicially reviewed only as provided in ORS 34.010 to 34.100. [1989 c.449 §6; 1991 c.902 §30; 2001 c.662 §4; 2003 c.765 §7a; 2003 c.802 §23]

Note: See note under 223.297.

223.310 [Amended by 1957 c.397 §3; repealed by 1971 c.325 §1]

223.311 Deposit of system development charge revenues; annual accounting. (1) System development charge revenues must be deposited in accounts designated for such moneys. The local government shall provide an annual accounting, to be completed by January 1 of each year, for system development charges showing the total amount of system development charge revenues collected for each system and the projects that were funded in the previous fiscal year.
(2) The local government shall include in the annual accounting:
(a) A list of the amount spent on each project funded, in whole or in part, with system development charge revenues; and
(b) The amount of revenue collected by the local government from system development charges and attributed to the costs of complying with the provisions of ORS 223.297 to 223.314, as described in ORS 223.307. [1989 c.449 §7; 1991 c.902 §31; 2001 c.662 §5; 2003 c.765 §8a; 2003 c.802 §24]

Note: See note under 223.297.

223.312 [1957 c.95 §4; repealed by 1971 c.325 §1]

223.313 Application of ORS 223.297 to 223.314. (1) ORS 223.297 to 223.314 shall apply only to system development charges in effect on or after July 1, 1991.
(2) The provisions of ORS 223.297 to 223.314 shall not be applicable if they are construed to impair bond obligations for which system development charges have been pledged or to impair the ability of local governments to issue new bonds or other financing as provided by law for improvements allowed under ORS 223.297 to 223.314. [1989 c.449 §8; 1991 c.902 §32; 2003 c.802 §25]

Note: See note under 223.297.

223.314 Establishment or modification of system development charge not a land use decision. The establishment, modification or implementation of a system development charge, or a plan or list adopted pursuant to ORS 223.309, or any modification of a plan or list, is not a land use decision pursuant to ORS chapters 195 and 197. [1989 c.449 §9; 2001 c.662 §6; 2003 c.765 §9]

Note: See note under 223.297.

APPENDIX B

CITY OF NEWPORT

SYSTEM DEVELOPMENT CHARGE WORKSHEET

EFFECTIVE (date)	BUILDING PERMIT NO.:
NAME OF COMPANY:	
CONTACT PERSON & NUMBER:	
PROJECT NAME/ADDRESS:	
MAP & TAX LOT NUMBER:	
DEVELOPMENT TYPE/LAND USE:	
NEW DEVELOPED AREA (Square Feet):	
EXISTING DEVELOPED AREA (Square Feet):	
EQUIVALENT DWELLING UNITS (EDUs):	

A. STORM DRAINAGE # EDUs ______ X **$840** per EDU =

or: Impervious Surface ______ X **$0.31** per square foot = ______

Total Storm Drainage SDC **(a)**

B. WASTEWATER

EDUs ______ X **$3,891** = ______

Total Wastewater SDC **(b)**

C. WATER

EDUs ______ X **$2,366** = ______

Total Water SDC **(c)**

D. TRANSPORTATION

EDUs ______ X **$1,090** = ______

Total Transportation SDC **(d)**

E. PARKS

EDUs ______ X **$2,591** = ______ **Total Parks SDC** **(e)**

SUBTOTAL ______ **(f)**

(add items a, b, c, d & e)

F. ADMINISTRATIVE FEES

SDC SUBTOTAL **(f)** ______ X **4.18%** = ______ **(g)**

Plus Subtotal **(f)** ______

TOTAL SDC AMOUNT DUE [ ]

Date ______ **Signed** ______

(Contact Person of Project)

Print Name ______

Title ______

Received by ______ On (date): ______

1/2014

APPENDIX C

Stormwater SDCs

Data Summary

	Number of Cities	
Has stormwater SDC:	60	
Provided stormwater SDC rate information:	57	
Has stormwater residential development SDCs:	57	100%
Has stormwater nonresidential development SDCs:	54	95%
Has stormwater improvement fees:	51	89%
Has stormwater reimbursement fees:	24	42%
Has stormwater other fees:	15	26%
City collects and retains revenue for stormwater SDCs:	57	100%
Collects stormwater SDC revenue for another entity:	0	0%
Has adopted an SDC lower than calculated using their methodology:	11	19%

Table 4: Individual City Rates for Strormwater SDCs

Blue highlighted cities collect revenue for another entity (see footnotes for details).
Green highlighted cities have an adopted SDC lower than the fee calculated using their methodology.

Note: All amounts rounded to the nearest dollar. Basis of fee and footnotes are as reported by cities unless noted otherwise. Some have been edited for spelling and punctuation.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
Adair Village	$263			$263			2008	2013	Four projects included
Amity	*No specific SDC rate data provided.*								
Aumsville[1]	$1,050			$1,050.00+			2000	unknown	Residential = per unit Nonresidential = at least one single family equivalent SDC and an additional equivalent for each additional 9,268 square feet, or two-decimal portion thereof, of land being developed.
Bandon	$1,439	$1,641		$5,756	$6,564		2004	unknown	Square footage
Beaverton[2]	$945			$8,411			2012	2014	Fee shown is total SDC Residential = per dwelling unit (DU)

[1] This SDC only affects Basin 1-A, 1-B and 1-C in Aumsville.
[2] Clean Water Services may be creating a regional storm water SDC.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
									Nonresidential = per sq. ft.
Brookings[3]	$393	$547	$19	$3,692	$5,146	$177	2009	unknown	Impervious area
Brownsville	$1,970						2006	2016	
Cannon Beach	$944			$944			2010	2014	Calculated per equivalent dwelling unit (EDU)
Central Point	$1,000	$27	$36	$7,865	$250	$291	2010	2013	Each equivalent service unit (ESU) is charged $1,063. An ESU is 3,000 sq. ft. This parcel has 23,500 sq. ft. of impervious surface.
Columbia City	$250			$250			1991	none planned	Total impervious area
Coquille	$0	$228	$0	$0	$2,144	$0	2012	no plan/ anytime as needed	228 per EDU. EDU based on: SFD = 1, Duplex = 1.5, Commercial/Industrial/Institutional = Impervious areas (roofs, pavement, sidewalks, etc.) 2,500 sq. ft. = 1.0 EDU, Gravel 2,500 sq. ft. = 0.6 EDU, Compacted earth 2,500 = 0.4 EDU
Corvallis[4]	$68	$14	$0	$1,598	$329	$0	2004	TBD	Square footage of impervious surface
Cottage Grove	$568	$115	$11	$5,040	$1,022	$97	2013	2014	1 ESU = 1 single family unit or 2,650 square feet impervious
Culver	$1,750			$8,400			2008	unknown	EDUs
Dayton	$734	$392		$1,956	$1,044		1999		Water meter size
Depoe Bay[5]	$1,333			$6,625			2012	2013	Fee includes improvement and reimbursement. Fee per EDU, EDU defined as single residential unit or for nonresidential development one EDU = 10,000 sq.ft. property
Dundee	$974	$1,462		$9,149	$13,733		2009	2014	Commercial = Residential: 0.5844*impervious surface; Improvement: 0.3893*impervious surface
Eagle Point[6]	$1,843	$78	$39	$13,121	$558	$279	2009		ESU. One ESU is equal to 3,300 sq. ft. of impervious surface

[3] Automatic yearly increase based on Engineering News Record (ENR) construction cost index.
[4] Inflationary adjustments made annually as well as project list adjustments.
[5] Fee update annually on July 1st.
[6] SDC was phased in starting at $1,360 in 2009; up to $1,960 in 2013.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
Estacada	$628	$183		$5,875	$1,716		2012	2013	Impervious area - square footage
Eugene[7]	$295	$262		$2,391	$2,121		2011	2013	Residential: tiered rate based on building footprint Nonresidential: flat rate per square foot impervious surface area
Florence[8]	$2,050			$6,090			2005	2014	For nonresidential $11,289 per net acre or $8,467 per gross acre
Gervais	$1,427			$1,427			2003	n/a	lot
Grants Pass[9]			$472			$472	2013	2014	Flat fee per development permit. There is an additional area "Sand Creek District" that incurs a SDC of .32 cents per SF of development.
Halsey		$1,650			$4,000		2012	2013	Square feet of impervious surface
Happy Valley	$216						n/a	n/a	Building footprint square footage
Harrisburg	*No specific SDC rate data provided.*								
Hood River			$650 per EDU			$0.26 per sq. ft. of impervious surface	2007	2014	
Independence	$823			$9,729			2012	2013	Residential: per single family unit Commercial: per 1,000 sq. ft. impervious surface
Lafayette[10]	$0	$0		$0	$0		2000	2013	
Lake Oswego	$135			$1,047					Nonresidential fees are calculated by dividing the total impervious area by 3030 and multiplying by the fee (135)
Lincoln City[11]							2012	2013	$0.014 per square foot of impervious surface
Lowell	$568						2010	2014-15	
Madras	$64			$1,512			2010 (fee rate was lowered)	do not know when it will be	Based on square footage of impervious area. The city collects $193 per residential drainage equivalent (RDE) on new

[7] Updates to SDCs in 2011 and 2013 are inflationary adjustments.
[8] SDC for stormwater was established in 2005. SDC is adjusted annually using 20-city ENR construction cost index.
[9] The Storm Water and Open Space SDC is an incurred charge for the planning, acquisition and capital development of facilities to accommodate and control stormwater run, directly associated open space, and water quality control facilities to clean surface water run prior to return to natural surface water conveyances.
[10] City Council elected not to charge fee.
[11] Updated January 1st annually.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
								raised	development and $0.08 per sq. ft. of impervious surface added for additions to existing development. 1 RDE equals 3,000 sq. ft. of impervious area. For the residential it would be 1,000/3,000 x $193.00 = $64.33. For the office building it would be 47,000/2 = 23,500/3,000 x $193 = $1,511.83. This is collected as an improvement fee only.
Manzanita			$174			$174	1995	not planned	Cost per lot
Medford[12]	$574			$4,496			2010		Single family residence (SFR) lot is per lot. Non-SFR lots are charged $574 per 3,000 sq. ft. of impervious area.
Milwaukie	$813	$286	$85	$7,057	$2,482	$738	2006	2013	Stormwater SDC for each residential property is 1 unit. For nonresidential, the SDC is calculated on square footage of impervious surface. Each Stormwater SDC corresponds to 2,706 square feet of impervious surface (1 unit).
Monmouth	*No specific SDC rate data provided.*						1994	2015	$0.081 cents per square foot of impervious surface area
Mt. Angel[13]			$96			$96	1999	TBD	
Newberg			$311			$2,540	2013	2014	Base rate is per each EDU which equals 2,877 sq. ft.
Philomath	$1,277			$10,003			2013	2014	Based on an equivalent dwelling unit of 3,000 sq. ft. A single family dwelling is calculated as 3,000 sq. ft. Nonresidential is based on total impervious surface divided by 3,000 sq. ft. to arrive at total EDUs.
Phoenix[14]	$366	$465	$33	$3,719	$2,931	$263	2010		$864.15 base rate (Improvement

[12] Not all areas of the city are subject to Storm SDC fee.
[13] The city did not have a master plan in 1999 and therefore only had the admin fee.
[14] Adopted per Resolution 735.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
									fee = 55.93%; Reimbursement fee = 44.07%; Admin fee = 3.81%) SDC = Base rate*ESU (equivalent service unit - 1 ESU = 2,500 sq. ft.)
Rogue River	*No specific SDC rate data provided.*								
Roseburg	$940		4%	$7,363		$295	2005	2014	Square footage of impervious surface, 1 ERU = 3,000 sq. ft., $940 per ERU
Salem	$494			$3,640			2002	not sure	Residential has three categories: small, medium, and large that are based on typical impervious areas. Commercial is $0.1549 per sq. ft. of impervious area.
Shady Cove	$1,389	$95	$82				2010		Based on one EDU = 3,000 sq. ft. impervious area
Sheridan	$279			$3,055			2009	2014	Square footage of impervious surface
Silverton	$2,070	$0	$0	$1 per impervious sp. Ft.	$0	$0	2002	2013	Nonresidential based on impervious area square feet. Credit given for detention.
Springfield[15]	$732	$1,065	$90	$5,734	$8,343	$703	2012	2013	A straight fee on square footage of impervious area
St. Helens[16]	$260/$130 total			$4,277/$2,135 total			no recent changes	no planned changes	Square footage based ERU equals 1,000 sq. ft.
St. Paul	$1,000			$1,000			1999	unknown	Flat fee
Sublimity	$1,880			$13,760			2001		$13,760 per acre. Based on gross area per acre developed.
Talent[17]	$676	$541	$65	$5,289	$4,233	$508	2008	2014	Single family - Per EDU and all other based on impervious surface area at .4268
Tangent	$127	$0	$0	$2,985	$0	$0	2013	2018	Square footage of impervious area
The Dalles	$342			$3,420			2007	unknown	Square footage of impervious surface
Toledo	$863	$0	$105	$8,225	$0	$1,002	2012	2013	Residential is based on EDUs, nonresidential uses are based on square footage of impervious

[15] Reductions are available for engineered onsite infiltration systems that reduce run leaving the site (based on 10 year storm event).
[16] Fees are currently reduce by 50% to entice development.
[17] Single Family EDU is equivalent to 3,000 sq. ft. of impervious surface area.

CITY	RESIDENTIAL			NONRESIDENTIAL			UPDATES TO SDCS		BASIS OF FEE
	Improvement	Reimbursement	Other Fee	Improvement	Reimbursement	Other Fee	Last	Next	
									surface
Tualatin	$275	$0	$0	$2,448	$0	$0	unknown	unknown	Impervious surface = 2,640*$275
Veneta	$168			$1,372			2005	n/a	Residential: based upon size of house or use (i.e. small, medium & large) Nonresidential: based upon impervious surface x 0.05584
Vernonia[18]	$1,340			$5,360			2005	2013	4 EDU
Wilsonville	$624	$156		$5,264	$1,316		2012	under review	Nonresidential based on impervious surface area
Yachats	$1,062		$160	$1,062		$160	2013	2014	Based on EDU of SFD. Larger space covered=larger SDC.

[18] Dan Heffernan Company will review this SDC fee in 2013.

APPENDIX F – Design Standard Manual

City of Newport

LINCOLN COUNTY, OREGON

DIVISION 4:
DRAINAGE SYSTEM DESIGN STANDARDS MANUAL
Guidelines for Development

Draft

Effective: -----------, 2016

Section 1 – General Design Requirements

1.1 The purpose of this manual is to set standards for the design and construction of storm sewer and drainage system improvements to serve new and future development. This manual may be updated periodically and the design engineer shall ensure that they have the latest version.

1.2 Storm water, including street, roof, or footing drainage shall not discharge into the sanitary sewer system.

1.3 Materials and details shall conform to the requirements of this manual.

1.4 All applicable laws, codes, regulations, and permit requirements shall be complied with.

Section 2 – Design Plan Format

2.1 Refer to the City's "Engineering Policy – Guidelines for Development" document for additional requirements and submittal procedures.

Section 3 – Storm Sewer and Drainage System Design Requirements

3.1 Storm sewers and related appurtenances shall be provided for new subdivisions, land partitions, and industrial and commercial developments as determined necessary by the Public Works Director or representative.

3.2 The applicant shall provide stormwater and detention facilities for their development. This includes the stormwater mains, inlets, manholes, laterals for roof and foundation drains, detention systems (if required), control structures (if required), inflow and outflow devices (if required), and energy dissipaters (if required).

3.3 All storm sewer and drainage improvements will be designed in accordance with the City of Newport Design Standards Manual and current Storm Water Master Plan and shall meet all City standards.

3.4 The storm sewer and drainage improvements shall be designed to detain any increased runoff created through the development of the site, as well as convey any existing off-site surface water entering the site from other properties. Facilities shall be sized adequately to convey all necessary flows off site to an approved point of discharge.

3.5 The applicant shall submit hydrology/detention calculations to the Public Works Director or designee for review and approval. The applicant shall provide documentation to verify the accuracy of the hydrology and detention calculations.

3.6 The applicant shall show the 100-year overflow (storm) path and shall not design the flow to cross any developed properties.

3.7 Applicant shall account for all surface and stormwater drainage from the point of origin to the ultimate point of discharge to an appropriate receiving stream or storm drainage system. The impact to facilities downstream of the development must be identified to determine if improvements are required outside of the development. If required, applicant will increase the capacity of downstream facilities or, through detention and attenuation, hold drainage on site and release it in a controlled manner so as not to affect the capacity of the downstream facilities.

3.8 The applicant shall design and develop a system that provides for the future extension of the drainage facilities to the entire drainage basin taking into consideration current and projected “upstream” conditions.

3.9 The applicant’s engineer shall perform studies and prepare designs based on an engineering analysis which takes into consideration water quality issues, runoff rates, pipe flow capacity, hydraulic grade line, soil characteristics, pipe strength, and potential construction problems.

3.10 Other agencies (i.e. DEQ, ODOT, Lincoln County) may require some form of drainage review and impose additional drainage requirements that are separate from and in addition to those of the City. The applicant shall coordinate with these other agencies and resolve any conflicts or concerns in drainage requirements and water quality requirements. The City must receive copies of approval letters, review letters, and other relevant documentation as required.

3.11 Drainage Study

3.11.1 All developments that will increase or modify impervious surface area shall, if further study is not required by the criteria outlined below, submit a drainage study and plan for the development site that provides for system capacity design for a 25 year storm event. The time of concentration for the study shall be determined by using a 10-minute start time and calculated travel times in gutters, pipes and swales for each drainage basin on the development area. The drainage design shall be checked for overflow impacts that may occur in the 25-year storm event and shall include contingency measures to protect both on-site buildings and abutting properties.

3.11.2 A complete drainage study, as outlined below, shall be submitted for all developments that generate public and/or private storm drainage from more than one acre of land or generate peak flows in excess of 0.5 cfs. Developments or redevelopments that create 5,000 square feet of new impervious surface or modify an existing drainage system with capacity of 0.5 cfs or greater shall also submit a complete drainage study, as outlined below. All developments containing or adjacent to a floodplain, stream, wetland or natural resource area shall review and report their impact to those systems as part of the drainage study required for the development.

3.11.3 If required by the criteria stated above, a complete drainage study shall be provided for a development that is proposed within the City’s planning jurisdiction. The study shall include the following:

A. A hydrological study map, which shall include, at a minimum, the following:

1. The entire drainage basin, well defined, and an appropriate amount of area beyond the drainage basin limits; 100-foot minimum distance.
2. Streets important to the Study and the development and street names.

3. Flow arrows in streets and ditches.
4. Contours or spot elevations for verification of direction of overland flow and pipe cover. Contour intervals shall be as follows:

Slope (%)	Contour Interval (ft)
0-10	2
11-25	5
>25	10

5. Drainage areas of all sub-basins (list acres).
6. Collection points (nodes) at downstream limits of all sub-basins complete with node numbers.
7. A profile of the storm drain system showing invert elevations, manhole top and bottom elevations, existing utilities, and existing and finished ground line elevations.
8. Existing and proposed storm drain pipes and channels with sizes and or cross sections included.
9. Future pipes in the system, complete with proposed sizes, slopes, pipe cover, flow line elevations at manholes, etc.
10. City drainage master plan information (if available) such as node numbers, basin names (numbers), drainage boundaries, etc.
11. North arrow, scale, design firm (engineer) name and logo, designer, date, etc.
12. Environmentally sensitive areas (i.e. gullies, ravines, swales, wetlands, steep slopes, springs, creeks, etc.). For natural drainage features, show direction of flow.
13. 100-year flood plain with flood elevations and 100-year flood way, as applicable.

B. Hydrologic calculations to establish runoff volumes (see analysis method requirements and design event in following sections regarding drainage study types)

C. Hydraulic calculations to establish runoff volumes.

3.11.4 Unless specifically required by the City for a particular development, development applications will not be required to provide engineering level details for <u>on-site</u> (out of the right-of-way) pipe profiles or other specific details of the "private" side drainage system. Only information on new components in the right-of-way and connections into existing components must be provided.

3.11.5 **Drainage Study Types/Categories -** The level of detail and scope of work required for a particular drainage study will be governed by the following criteria:

A. Small Site Study – A small site study shall be required when <u>all</u> of the following criteria are met:

1. Study area less than 5 acres in size.
2. Study area drains into an established public system with available capacity for the peak flow based on the storm event frequency

required as described in the Hydraulic Calculations Section later in these Standards.

3. The development proposed is a residential development.
4. Study area does not contain and is not adjacent to a flood plain, stream, wetland or natural resource area.

B. Mid-Level Development Study – A mid-level drainage study shall be required when the criteria for a Small Site Study cannot be met and when all of the following criteria are met:

1. Study area less than 25 acres in size.
2. Study area drains to an established public system within the City Limits.
3. Study area does not contain and is not adjacent to a floodplain, stream, wetland or natural resource area.

C. Full Drainage Development Study – A full drainage study shall be required when the criteria for a Small Site Study and a Mid-Level Development Study cannot be met. Some examples of when a full study shall be required include, but are not limited to cases where any of the following conditions are met:

1. Study area greater than 25 acres in size.
2. Developments which require creation of a new outfall and/or exceed existing system capacity.
3. Study sites which contain or are adjacent to a floodplain, stream, wetland, natural resource area.
4. Any development which does not qualify for a Small Site or Mid-Level Development Study and which either generates peak flow in excess of 0.5 cfs or greater, or is a redevelopment or development which creates 5,000 square feet or more of new impervious area.

D. The Public Works Director or representative will make the final determination on the level of study required for any specific development.

3.11.6 Hydrologic Calculations – Hydrologic calculations for the various types/categories of drainage studies shall conform to the following minimum guidelines:

A. Small Site

1. Rational peak flow method. When the ‘C’ factor is 0.5 or greater, the time of concentration and the peak flow from the impervious areas shall be computed separately and compared to the combined area. The higher of the two peak flow rates shall then be used to size the conveyance.
2. Two-year storm event frequency for volumes up to 5 cfs.
3. Five-year storm event frequency for volumes from 5 cfs to 20 cfs.

B. Mid-Level Development

1. Unit Hydrograph Method
2. Storm event as Small Site and using the ten-year event for volumes of 20 cfs to 40 cfs.

3. 25-year storm event for detention facilities where necessary to meet downstream capacity issues.
4. 50-year storm event for volumes above 40 cfs.

D. Full Drainage Development
1. Unit Hydrograph Method.
2. Floodplain analysis if development impacts a floodplain.
3. Storm event as volumes outlined in Small and Mid-Level above and 100-year flood for areas in floodplain.

3.11.7 Hydraulic Calculations

A. In each instance, the method of hydraulic calculations shall be subject to Public Works Director or designee approval.

B. Site development improvement projects shall address on-site and off-site drainage concerns, both upstream and downstream of a project, including but not limited to:
1. Modifications to the existing on-site storm drainage facilities shall not restrict flows creating backwater onto off-site property to levels greater than the existing situation unless approved by the affected off-site property owners and the City. The affected property owner(s) shall agree to and sign an easement identifying the location of the backwater storage.
2. Storm drainage facilities shall be designed and constructed to accommodate all flows generated from upstream property and the most recent approved land use plan at full development.
3. The design of storm drainage facilities shall analyze the impact of restrictions downstream of the project site. Downstream restrictions that create on-site backwater shall be removed by the developer or the on-site backwater shall be addressed in the design of the development's storm system. The removal of downstream obstructions (i.e. control structures, undersized piping, etc) shall not be allowed if this removal creates downstream capacity problems.

D. Review of Downstream System
1. The design engineer for each development constructing new impervious surface of more than 5,000 square feet shall submit documentation, for review by the City, of the downstream capacity of any existing storm facilities impacted by the proposed development. The design engineer must perform an analysis of the drainage system downstream of the development to a point in the drainage system where the proposed development site constitutes ten percent or less of the total tributary drainage volume, but in no event less than ¼ mile.
2. If the capacity of any downstream public storm conveyance system or culvert is surpassed during the Event/CFS (Critical Flow Simulation) level requirements, due directly to the development, the developer shall correct (mitigate) the capacity problem or construct an on-site detention facility unless otherwise approved by the City.

3. If the projected increase in surface water runoff which will leave a proposed development will cause or contribute to damage from flooding to existing buildings or dwellings, the downstream stormwater system shall be enlarged to relieve the identified flooding condition prior to development, or the developer must construct an on-site detention facility.
4. Any increase in downstream flow shall be reviewed for erosion potential, defined as downstream channels, ravines, or slopes with evidence of erosion/incision sufficient to pose a sedimentation hazard to downstream conveyance systems or pose a landslide hazard by undercutting adjacent steep slopes.

3.12 Design of Stormwater Facilities

3.12.1 General.

A. The conveyance system shall be designed to convey and contain at least peak runoff for the Event/CFS design requirements. Structures for proposed pipe systems shall provide a minimum of one foot of freeboard between the hydraulic grade line and the top of the structure or finish grade above pipe for a 25-year peak rate of runoff. Surcharge in pipe systems shall not be allowed if it will cause flooding in portions of a habitable structure, including below-floor crawl spaces.

B. The design shall be supplemented with an overland conveyance component demonstrating how a 100-year event will be accommodated. This overland component shall not be allowed to flow through or inundate an existing building or dwelling.

3.12.2 Manhole Design

A. Manholes shall be provided at least every 500 feet, at every grade change, and at every change in alignment and junction of two or more lines. Manhole lids shall have a minimum of six inches clearance from the edge of a curb or gutter and shall not be in a wheel path of the traveled way. Final top elevation of manhole shall be set flush or not greater than ½” above the finish grade of surrounding area.

B. All manholes shall be a minimum of 48 inches in diameter.

C. Pipe crowns of branch or trunk lines entering and exiting junctions shall be at the same elevation. If a lateral is placed so its flow is directed against the main flow through the manhole or catch basin, the lateral invert shall be raised to match the crown of the mainline pipe.

D. Inside drop and water quality manholes shall be at least 60 inches in diameter with 42 inches of clear space.

E. All manholes shall have a minimum 12-inch ledge on one side of the channel in the base at an elevation of 0.8 of pipe height, except for water quality manholes.

F. Details shall be submitted with the plans where pipes into or out of a manhole are larger than 24 inches or where more than four mainline connections are made.

G. Connections to an existing manhole, elevation of the existing ledge, and elevations of existing inlets and outlets shall be submitted with the plans.

H. Connections are allowed directly into a manhole providing that they are properly channelized. No more than three side laterals shall be connected to a manhole unless otherwise approved by the City. There shall be a minimum of eight inches separating connections as measured from the outside diameter of the pipe.

I. A manhole may have a free inside drop of up to two feet. Drops over 24 inches must incorporate an appropriate drop assembly as shown in the included standard detail drawings.

J. Line manholes may be 'T' top design for pipe diameters 42 inches and larger where no side line connections are present or planned.

3.12.3 Water Quality Components

A. Water quality structures shall be an approved, manufactured unit. All capacity, efficiency, and operation and maintenance data shall be submitted at the time of plan review.

B. Each water quality component shall be designed for the runoff from the upstream watershed at build-out, based on the applicable comprehensive land use plan. No flow shall be introduced into the manhole in addition to the design amount.

C. Water quality manholes shall be a minimum of 60 inches in diameter. Other sized structures may be required depending on the type and extent of treatment desired.

D. Water quality manholes shall not be used in a submerged or surcharged system. The manufacturer's required head losses shall be accommodated for in the system design.

E. Water quality components will only be required if determined necessary by the Public Works Director or representative or as required by another agency (ODOT, DEQ, etc.)

F. Water quality components shall be required at last fixture before discharging into stream, lakes or tidal waters.

3.12.4 Piping and Conduit Design

A. Branch piping in the drainage system shall not be smaller than 10-inches in diameter.

B. Mainline piping shall be a minimum of 12-inches diameter.

C. Service laterals for single-family residences (catch basins, etc) shall be a minimum of 6-inches in diameter. All other laterals or branches shall be a minimum of 10-inches diameter. Exception can be made for roof drains which may be 3 or 4 inches in diameter. Drainage sleeves through curbs shall not exceed 3 inches in diameter.

D. All pipes shall be designed to achieve a minimum velocity of three feet per second (fps) at 0.5 part full based on the following table of ‘n” values.

Table 3.12.4A
Manning’s ‘n’ Values for Pipes

Material Type	Uniform Flow (Preliminary Design)	Backwater Flow (Capacity Verification)
Concrete pipe and Lined Corrugated PE pipe	.014	.012
Annular Corrugated Metal pipe:	-	
2-2/3” x ½” plain or fully coated	.028	.024
Paved invert	.021	.018
3” x 1” corrugation	.031	.027
6” x 2” corrugation (field bolted)	.035	.030
Helical 2-2/3” x ½” corrugation & corrugated PE pipe	.013	.011
Spiral rib metal pipe and PVC pipe	.013	.011
Ductile Iron pipe (cement lined)	.014	.012
Solid Wall PE pipe (butt fused only)	.009	.009
HDPE Smooth Walled Interior	.012	.010

#Note: Corrugated metal pipe must be pre-approved by City.

G. All pipes exceeding critical flow velocities shall have analysis data submitted showing the effects of hydraulic jump at manholes and downstream water levels for peak flow situations.

H. Pipe Location
1. All storm drain piping shall be located within the public right of way. Exceptions for systems with physical constraints precluding location within the public right-of-way may be granted at the discretion of the Public Works Director or representative.
    a. Storm pipe located not in a public right-of-way must have a maintained access road acceptance by the City.
2. Storm pipes shall not be located closer than ten feet from the edge of a public street right-of-way, unless otherwise approved by the Public Works Director or representative.
3. Easements for storm drainage pipes shall be a minimum of 15 feet in width with wider easements as required for pipes placed at depths greater than 8 feet such that a 1:1 theoretical slope from the pipe centerline would still daylight within the easement. All storm drainage pipes shall be located at the centerline of easements unless otherwise approved by the Public Works Director or representative.

4. Storm pipes shall be located so that manholes are not in the wheel path unless otherwise approved by the Public Works Director or representative.
5. Drainage laterals shall be provided on the down slope side of all lots in developments where drainage to the street cannot be provided.

I. Distance between drainage structures
   1. The maximum length of pipe between manholes, catch basins, or other drainage structures shall not exceed 500 feet for piping systems utilizing 24-inch diameter pipe and smaller.
   2. Large diameter trunk systems shall not exceed 600 feet between structures.

J. Pipe shall be laid on a straight alignment at a uniform grade rate from structure to structure.

K. Pipe Cover
   1. Pipe cover shall be measured from the finished ground elevation to the top of the outside surface of the pipe in areas located outside paved areas.
   2. In paved areas, the pipe cover shall be measured from the lowest point of the gutter section to the top outside surface of the pipe.
   3. Minimum pipe cover shall be 18-inches for reinforced pipe and 36-inches for plain concrete and plastic pipe materials unless otherwise specified.
   4. Engineered solutions and manufacturer supported submittals may be accepted for pipe or specific installations not able to meet these conditions.

L. Perforated or “French drain” systems shall be engineered and submitted to the Public Works Director or representative for approval.

3.12.5 Catch Basin/Inlet Design

A. Trash racks, debris barriers, and/or removable oil and grease traps and 18-inch sumps shall be installed on all inlets to the public storm system.

B. All inlet and catch basin openings shall be designed to accept flow from a ten-year storm event. Grates shall, as far as practical, be designed to avoid failure due to accumulation of debris.

C. All catch basins and area drains shall be designed with an 18-inch deep sump as specified by the Uniform Plumbing Code.

D. A mainline storm pipe shall not pass through a sumped catch basin, unless approved as a manhole /inlet combination.

E. Flows in streets during the two-year event shall not run deeper than four inches against a curb or extend more than two feet into the travel lane. Streets classed as collector and above and streets in commercial areas shall meet the above requirements for the ten-year event. Inlets in sag location shall be designed with no more than one-foot of depth during the 25-year event.

F. A catch basin shall be provided just prior to curb returns on streets with a centerline gradient of three percent or more and a street gutter drainage run of 100 feet or more.

G. Catch basins may connect to main storm lines with a tee connection when the main storm line is at least one size larger than the catch basin line. When the catch basin line is the same size as the main storm line, the connections shall be made at a manhole or other approved structure. The maximum length of pipeline between the catch basin and the mainline shall be 60-feet for 12-inch pipe. Oversize basins (one 30-inch inside dimension) shall be installed when a tee connection is used.

H. A main storm line shall not pass through a field inlet or ditch inlet.

I. Ditch inlets shall be located at the upper terminus of a main storm line or shall connect to a main storm line only at a manhole.

3.12.6 Channels and Ditches

A. Vegetation lined channels are to be used whenever possible.

B. Rock-lined channels shall be used where a vegetative lining cannot provide adequate protection from erosive velocities.

C. Constructed open channels shall be sized to pass the required flows and have side slopes no steeper than 3:1. Any proposed constructed channel improvement that does not meet these requirements may be required to be piped, as determined by the Public Works Director or representative.

D. Channels designed to handle the runoff from a development shall be constructed from the development to an existing public drainage conveyance system with an established outfall to a receiving water body.

E. Channels shall not contain protruding pipes, culverts, or other structures that reduce or hinder the flow characteristics of the channel, except for structures which are required and designed to dissipate velocities. Channels shall be designed to prevent scouring and erosion.

F. Channel protection shall be as in the following table:

Table 3.12.6A
Channel Protection for Channel Construction

Velocity Greater than (FPS)	Velocity Less than or equal to (FPS)	Required Protection	Thickness (ft)	Min. Height Above Design Water Surface (ft)
0	5	Vegetative Lining	N/A	0.5
5	8	Rip Rap Class 50	1	1
8	12	Rip Rap Class 100	2	2
12	20	Gabion or Velocity Dissipaters	Varies	2

G. Access roads or other suitable access ways for maintenance purposes shall be provided when channels do not abut public right-of-way. Access shall be provided along one side of channel, as necessary for vehicular maintenance access.

H. Access roads shall have a maximum grade of 15 percent and a maximum cross slope of 3 percent.

I. A 40-foot minimum outside turning radius shall be provided on the access road.

L. Access roads shall be a minimum of 15 feet wide on curved sections and 12 feet wide on straight sections.

M. Access roads less than 400 feet in length shall have a turn-around unless approved by the Public Works Director or representative.

N. Access roads shall be designed and constructed to support a 20-ton vehicle under all weather conditions.

O. The roads shall be constructed of gravel, crushed rock, or asphalt.

P. Roadside ditches shall be constructed with a maximum depth of two feet as measured from the shoulder of the road.

Q. Side slopes shall be 3:1 or less.

R. Ditch velocities, when flowing full, shall not exceed the erosive velocity limits of the soil or the lining in the ditch.

3.12.7 Storm Drain Outfalls

A. All outfalls shall conform to the requirements of all federal, state, and local regulations.

B. Outfalls shall be above the mean low water level except as approved by the Public Works Director or designee. Installation of tide gates may be required when the outfall is in a tailwater condition.

C. Erosion must be prevented at the outfall. All outfalls shall be provided with a rock splash or other approved erosion control protection measure. Mechanisms which reduce velocity prior to discharge from an outfall are encouraged and may be required. Examples are drop manholes, energy dissipaters, and rapid expansion into pipes of much larger size.

D. Other forms of energy dissipation may include stilling basins, drop pools, hydraulic jump basins, baffled aprons, or bucket aprons, shall be provided for outfalls with velocities at design flow greater than 10 FPS.

E. If required, tidegates, flapgates, or other outlet gates will be installed on specified outfalls. Gates will meet the requirements of the Oregon Department of Fish and Wildlife (ODFW), National Oceanic and Atmospheric Administration (NOAA), and other agencies as applicable. Permitting outfalls shall be the responsibility of the Applicant.

3.12.8 On-site Detention Design - General

A. Mitigation of the impacts of new development on the downstream drainage system can be accomplished through on-site detention systems or by improving the capacity of the downstream conveyance system.

B. On-site detention facilities shall be constructed when any of the following conditions exist:
   1. An identified downstream deficiency along with upstream detention, rather than downstream conveyance system enlargement, is determined to be the more effective solution.
   2. There is an identified regional detention site within the boundary of the development.
   3. The need for pre-treatment of stormwater discharge dictates that flows be detained for water quality processes.
   4. There is a need to mitigate flow impacts on receiving streams.
   5. There is a need for additional detention due to an increase in impermeable surface area.

C. When required, on-site stormwater detention facilities shall be designed to capture run-off so the run-off rates from the site after development do not exceed the predevelopment conditions, based upon a 25-year, 24-hour return storm. Volume and duration of predevelopment conditions will be considered.

D. When required, due to an identified downstream deficiency, on-site stormwater detention facilities shall be designed so that peak run-off rates will not exceed predevelopment rates for the specific range of storms that cause the downstream deficiency.

E. Construction of on-site detention shall not be allowed as an option if such a detention facility would have an adverse effect upon receiving waters in the basin or sub-basin in the event of flooding, or would increase the likelihood or severity of flooding problems downstream of the site.

F. Impervious Area Calculations
   1. For single family and duplex residential subdivisions, stormwater quantity detention facilities shall be used for all impervious areas created by the subdivisions, including all streets, residences on individual lots at a rate of 2,640 square feet of impervious surface area per dwelling unit, and other impervious areas. Such facilities shall be constructed with the subdivisions public improvements.
   2. For all development other than single family and duplex, the sizing of stormwater detention facilities shall be based on the impervious area to be created by the development, including structures and all streets and impervious areas. Impervious surfaces shall be determined based upon building permits, construction plans, aerial mapping, or other appropriate methods as deemed reliable by the Public Works Director or representative.

3.12.9 Detention Pond Design

A. Detention ponds and other open impoundment facilities such as landscape areas, open playing fields, and parklands, shall comply with the requirements of ORS 537, in general, and more specifically, ORS 537.4.

B. Facility Geometrics
   1. Interior side slopes up to the maximum water surface shall be no steeper than 3H:1V. If interior slopes need to be mowed, the slope shall be 4H:1V
   2. Exterior side slopes shall not be steeper than 2H:1V unless analyzed for stability by a geotechnical engineer.
   3. Ponds walls and/or dikes may be retaining walls, provided that the design is prepared and stamped by a registered professional engineer and that a fence is provided along the top of the wall and that at least 25 percent of the pond perimeter will be a vegetated soil slope of not greater than 3H:1V.
   4. Pond bottoms shall be level, and shall be located a minimum of 0.5 feet below the inlet and outlet to provide sediment storage.
   5. Outlet control systems shall utilize gates, valves, weirs, or other control structures and systems to control the outflow from the pond so that the downstream systems are not overwhelmed. If desired, water must be capable of being held in the pond indefinitely.

C. Overflow/Emergency Spillway
   1. A pond overflow system shall provide controlled discharge of the design storm event for developed contributing area without overtopping any part of the pond embankment for exceeding the capacity of the emergency spillway.
   2. The design shall provide controlled discharge directly into the downstream conveyance system.
   3. An emergency overflow spillway (secondary overflow) shall be provided to safely pass the 100-year, 24-hour design storm event over the pond embankment in the event of control structure failure and for storm/runoff events exceeding design.

4. The spillway shall be located to direct overflows safely towards the downstream conveyance system.
5. The emergency overflow shall be stabilized with riprap or other approved means and shall extend to the toe of each face of the berm embankment.

D. Access/Maintenance

1. Pond access easements and roads shall be provided when the ponds do not abut public right-of-way. Access roads shall provide access to the control structure and along one or both sides of pond as necessary for vehicular maintenance and as determined by the Public Works Director or representative.
2. Access roads shall have a maximum grade of 15 percent and a maximum cross slope of 3 percent.
3. 40 foot minimum outside turning radius shall be provided on the access road.
4. Access roads shall be a minimum of 15 feet wide on curved sections and 12 feet wide on straight sections.
5. Access roads less than 400 feet in length shall have a turn around unless approved by the Public Works Director or representative.
6. Access roads shall be designed and constructed to support a 20-ton vehicle under all weather conditions.
7. The roads shall be constructed of gravel, crushed rock, or asphalt.

E. Slope Stabilization (Detention ponds)

1. Pond berm embankment higher than six-feet shall be designed by a geotechnical engineer.
2. The berm embankment shall have a minimum 15-foot top width, where necessary, for maintenance access; otherwise, top width may vary as recommended by the design engineer, but in no case shall top width be less than four feet.
3. The toe of the exterior slope of the pond berm shall be no closer than five feet from the tract or easement property line.
4. The pond berm embankment shall be constructed on native consolidated (or adequately compacted and stable fill soils analyzed by a geotechnical engineer) free of loose surface soil materials, roots and other organic debris.
5. The pond berm embankments shall be constructed by excavating a ‘key’ equal to 50 percent of the berm embankment cross-sectional height and width or as designed by a geotechnical engineer.
6. The berm embankment shall be constructed on compacted soil (95 percent minimum dry density per AASHTO T99, placed in 6-inch lifts, with the following characteristics:
   a. A minimum of 30% clay
   b. A maximum of 60% sand
   c. A maximum of 60% silt
   d. With nominal gravel content
   e. Or as designed by a geotechnical engineer.
7. Anti-seepage collars shall be placed on pipes in berm embankments that impound water greater than four feet in depth at the design water surface.

8. Exposed earth on the pond bottom and side slopes shall be seeded with seed mixture approved by the Public Works Director or designee.

3.12.10 Miscellaneous

A. Other facilities may be utilized for emergency or alternative detention structures when approved by the Public Works Director or designee. Examples include:
    1. Parking lots
    2. Roof structures
    3. Underground piping, vaults, or tanks
    4. Infiltration facilities
    5. Injection wells
    6. Parks, fields, or other recreational areas
    7. etc.

B. Storm water pump stations shall only be provided when gravity service cannot be practically provided. Prior approval from the City is required.

C. Any alternative detention facility must meet all the local, state, and federal design requirements and be approved by the Public Works Director or designee.

Section 4 – Construction Provisions

4.1 All work within the public right-of-way shall be conducted by a licensed and bonded contractor. This requirement shall be stated on the construction drawings.

4.2 City shall be notified at least 3 working days in advance prior to commencing construction work.

4.3 Traffic control shall be signed, flagged and conducted in a manner conforming to ODOT standards (Manual of Uniform Traffic Control Devices, MUTCD) and approved by the City, where appropriate. If road closures or detours are anticipated, prior approval from the City and ODOT officials must be obtained, as appropriate.

4.4 Safety Requirements. The contractor is responsible for observing the safety of the work and all persons and property coming into contact with the work. The contractor shall conduct his work in a manner complying with the requirements prescribed by Occupational Safety and Health Administration (OSHA).

4.5 Progress. Construction shall proceed in a systematic manner to minimize public inconvenience and disruption of services. All excavations, embankments, stockpiles, waste areas, etc. shall be kept protected. All roads, ditches, etc. shall be kept free from debris and shall be continually cleaned during the work. Dust control measures shall be employed as required and directed by the City.

4.6 Protection of Existing Improvements. Contractor shall contact the Utility Notification Center (811) at least 48 hours in advance of digging operations to get approximate locations for buried utilities. Exact locations of buried facilities may not be known or shown and contractor is responsible to pot-hole carefully in advance of the work to avoid such facilities. Contractor shall coordinate with all utilities and notify them immediately in the event of any damage. Contractor shall protect, repair, and replace any damaged utilities as directed by the persons responsible for such utility. All landscape, grass, shrubs, signs, pavements, mail boxes, driveways, culverts, gravel surfacing, fencing, etc. shall be protected from damage and returned to conditions as good, or better than existed prior to construction. All costs for protection, repair, and replacement of all existing items shall be borne entirely by the contractor. Contractor shall obtain a release from any property owners for any claims of injury or property damage prior to final acceptance of the work by the City.

4.7 All existing survey monuments and control shall be protected, including individual property corner monuments. Any such monuments destroyed or altered during construction shall be restored by the contractor or developer in accordance with Oregon Revised Statutes as applicable.

4.8 Any temporary disruption to water or sewer service must be coordinated with, and approved by the City and kept to the minimum length of time necessary. City shall be notified at least 2 working days in advance of when an approved shut-down is desired. Contractor shall not operate any valves or hydrants without the City's approval.

4.9 Trench foundation grades shall be constructed to within 0.1 feet of the grade shown in the plans. Surface tolerances shall be within 0.02 feet of plan elevation at any one point.

4.10 For pipelines, vertical deviation from true grade shall not exceed 0.02 feet (0.24 inch). Horizontal tolerance for deviation from line shall be 0.03125 feet (3/8 inch). Depressions or bellies which create the potential for solids deposition are not allowed.

4.11 Compaction testing equipment (nuclear gauge) shall be furnished and operated by the contractor or an independent testing firm shall be retained by the contractor or developer to perform compaction testing. Testing shall conform to the ODOT Manual of Field Testing Procedures (MFTP). Compaction testing shall be conducted in the presence of the City's inspector, representative or developers engineer. Sufficient tests will be taken to ensure that the materials and compaction efforts being used are adequate to obtain the required density. Several tests shall be taken on each lift placed during the first day of backfill operations. Additional tests will be taken periodically during the work. At minimum, 2 compaction tests shall be taken for each trenchline (manhole to manhole). Alternate materials or methods will be required if adequate compaction is not being obtained. In no case shall pipe laying continue if inadequate compaction results until a resolution is provided.

4.12 Construction staking will be provided by the Developer's Engineer for establishing the location of the system. Offset stakes shall be placed at no more than 100 foot intervals along the mainline and at each manhole. Each lateral location shall be staked.

4.13 Open trench length at any time shall not exceed 100 feet unless otherwise approved. Related resurfacing shall be completed within 800 feet of the open trench limit.

Section 5 – Storm Sewer and Drainage System Materials

5.1 All materials shall be newly manufactured. No rebuilt, reconditioned or used material will be allowed.

5.2 Oregon Standard Specifications (OSS) – Means the 2008 Oregon Standard Specifications for Construction produced by ODOT and APWA, including latest revisions.

5.3 Concrete shall conform to OSS Section 00440, Commercial Grade Concrete. Compressive field strength shall not be less than 3,000 psi at 28 days. Maximum aggregate size shall be 1½-inches. Slump shall be between 2 and 4 inches.

5.4 Non-Shrink Grout. Grout shall be Sika 212, Euco N-S, Five Star, or approved equal nonmetallic cementitious commercial grout exhibiting zero shrinkage per ASTM C827. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Nonshrink grout shall be placed and packed only with the use of an approved commercial bonding agent. Unused grout shall be discarded after 20 minutes.

5.5 Manholes

5.5.1 Manholes shall conform to ASTM C478-03 with yard permeability tests passing ASTM C497-03 prior to delivery. Manhole steps shall be plastic with ½” grade 60 steel reinforcing bar encapsulated with injection molded copolymer polypropylene with serrated surfaces. Preformed gaskets shall be Ram-Nek, Kent-Seal No. 2, or approved equal.

5.5.2 Manhole Frames and Covers. Casting shall be tough, close-grained gray iron, smooth and clean, free from blisters, blowholes and all defects and conforming to ASTM A48, Class 30. All bearing surfaces shall be planed, ground or machined to ensure flat, true surfaces. Watertight frames and covers shall be installed at all locations subject to flooding or ponding. Tamperproof frames and covers required in off-street areas and easements. Cap screws for bolt-down covers shall be stainless steel with 60,000 psi minimum tensile strength conforming to ASTM A453.

5.6 Trench Backfill Materials

5.6.1 Foundation Stabilization: 3”-0 to 6”-0 aggregate base rock meeting OSS Sections 00641 and 02630. Required when native trench foundation material contains groundwater, or is unsuitable to provide a firm foundation in the opinion of the Public Works Director or representative.

5.6.2 Pipe Bedding and Zone: ¾”-0 dense-graded aggregate, uniformly graded from coarse to fine and meeting OSS Section 02630.10. Clean sand may be substituted for pipe zone.

5.6.3 Class A Backfill: Native or common excavated material, free from organic or other deleterious material, free from rock larger than 3-inches, and which meets the characteristics required for the specific surface loading or other criteria of the backfill zone in the opinion of the Public Works Director or representative. If stockpiled material becomes saturated or unsuitable, Class B, C or D Backfill shall be substituted.

5.6.4 Class B Backfill: ¾”-0 dense graded aggregate, uniformly graded from coarse to fine and meeting OSS Section 02630.10.

5.6.5 Class C Backfill: Clean sand with no particles larger than ¼-inch.

5.6.6 Class D Backfill: Pit run or bar run material, well graded from coarse to fine, with maximum aggregate size of 3 inches.

5.6.7 Class E Backfill (CLSM): Controlled Low-Strength Material (cement slurry) conforming to OSS Section 00442.

5.6.8 Compaction: Material (except Class E Backfill) shall be compacted in multiple lifts (6-inch maximum lift) to obtain 95% of the maximum dry density as determined by AASHTO T-99.

5.6.9 All Backfill within public right-of-ways or within 5 feet of a traveled surface shall be Class B Backfill, except where Class E Backfill is required under pavements as required by the City or State.

5.7 Storm Drain Pipe Materials – Design engineer to determine the most appropriate material for the project. Approval of the Public Works Director or representative is required for pipe material choices.

5.7.1 PVC gravity pipe, 4- through 15-inch nominal diameter shall be rubber gasketed, SDR35 minimum, conforming to all requirements of ASTM D3034 in accordance with ASTM D1784. Pipe shall integral wall-thickened bells with bonded-in elastomeric gaskets meeting ASTM F477.

5.7.2 PVC gravity pipe, 18- through 27-inch nominal diameter shall be rubber gasketed, SDR35 minimum, conforming to all requirements of ASTM F679 in accordance with ASTM D1784. Pipe shall integral wall-thickened bells with bonded-in elastomeric gaskets meeting ASTM F477.

5.7.3 HDPE gravity pipe shall meet the requirements of AASHTO M-294. Pipe end connections shall be water-tight with rubber or neoprene bell and spigot ends. HDPE shall be corrugated outer walls with smooth and flat inner walls.

5.7.4 Aluminum CMP culverts shall be aluminum spiral ribbed, with 2-2/3” x ½” corrugations and conforming to AASHTO M-196. Gauge of pipe shall be per manufacturer recommendations and approved by Public Works Director or designee.

5.7.5 Reinforced Concrete Pipe shall conform to ASTM C-76 Class IV. Joints shall be bell and spigot with rubber gaskets.

5.8 Fittings

5.8.1 PVC fittings for gravity pipe shall be rubber gasketed sewer fittings meeting ASTM D3034, SDR 35, ASTM F477, and ASTM D3212.

5.8.2 Other fittings shall include tees, bends, and plugs and shall be of the same material as the mainline pipe.

5.8.3 Manhole Connections

5.8.3.1 Connections to precast manhole sections shall be accurately core-drilled and shall utilize a properly sized flexible rubber boot providing a watertight seal. Adapter shall be factory tested for watertightness up to 10.8 psi. Kor-N-Seal as manufactured by NPC, Inc. or approved equal.

5.8.3.2 Connections to cast-in-place concrete shall be made with a rubber water-stop grout ring. Ring shall clamp to pipe with stainless steel clamp and have water-stop ribs. Water-stop Grouting Ring by Press-Seal Gasket Corp., or approved equal.

5.8.4 Connections for aluminum CMP piping shall be made with 12-inch wide dimple bands of the same material and gauge as the run of pipe. Use minimum of 20' long CMP sections, except for end run.

5.9 Catch Basins

5.9.1 Precast basins and inlets shall be of Portland cement concrete conforming to AASHTO M199M/M (ASTM C478).

5.9.2 Cast-in-place concrete basins and inlets will be allowed. CIP basins will meet the requirements of commercial grade concrete as specified in Section 00440 of the 2008 Oregon Standard Specifications including latest versions of. CIP units shall be equivalent or superior to the specified precast units.

5.9.3 Frames, grates, and covers shall meet the requirements of AASHTO M227, Class 65. Casting shall be tough, close-grained gray iron, smooth and clean, free from blisters, blowholes and all defects. All bearing surfaces shall be planed, ground or machined to ensure flat, true surfaces.

Section 6 – Storm Sewer and Drainage System Installation (Workmanship)

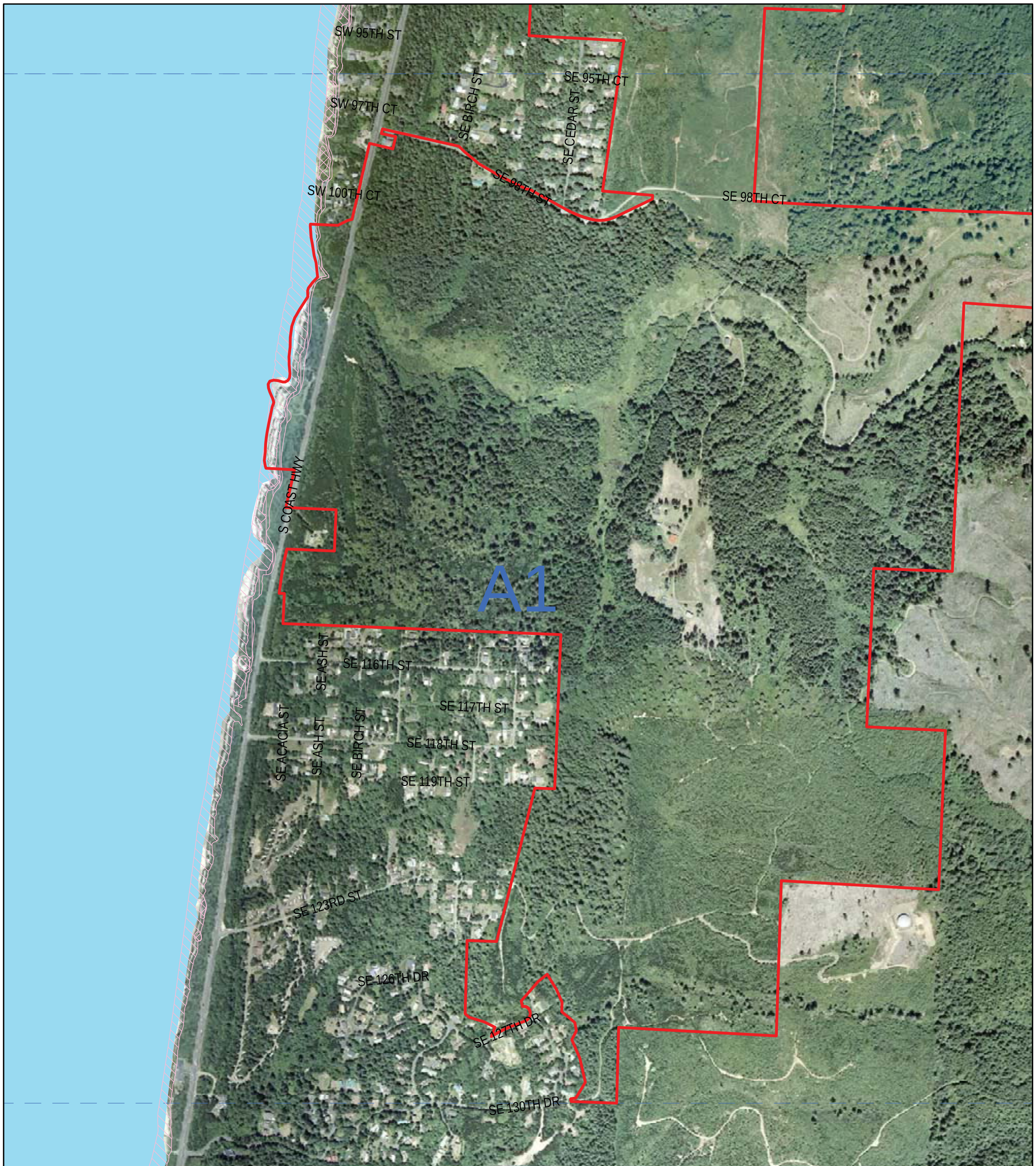
6.1 Prepare trench in accordance with the standard detail in a safe manner. Place and compact foundation stabilization materials as required. Notify City to allow for inspection of the trench bottom.

6.2 Place and compact pipe bedding material before placing pipe in the trench. Dig depression for pipe bells to provide uniform bearing along the entire pipe length. Thoroughly compact bedding material to prevent future bellies.

6.3 Prior to lowering pipe into the trench, the Engineer or City representative will check for damage to the pipe. The Contractor shall repair or replace, as directed, all damaged or flawed pipe prior to installation.

6.4 Place materials in the pipe zone in layers not greater than 6 inches thick and in a manner that equalizes the pressure on the pipe and minimizes stress. As required under the haunches of pipe and areas not accessible to mechanical tampers or to testing, compact with hand methods to ensure thorough contact between the material and the pipe. Before

APPENDIX G – Geological Hazard Maps



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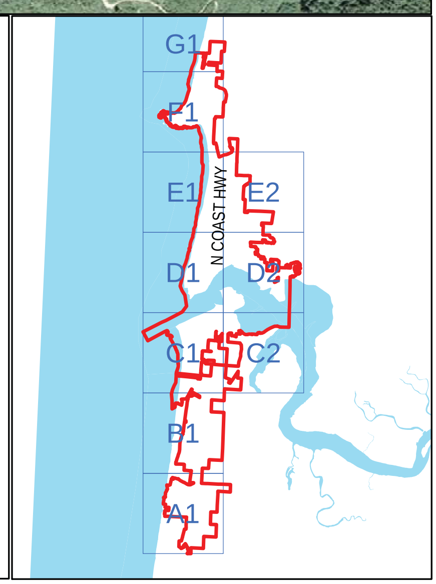

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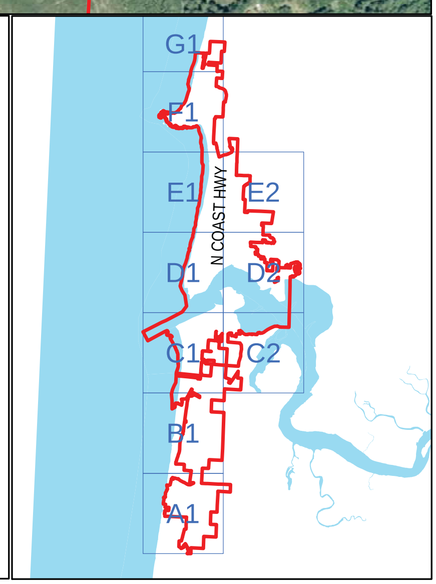

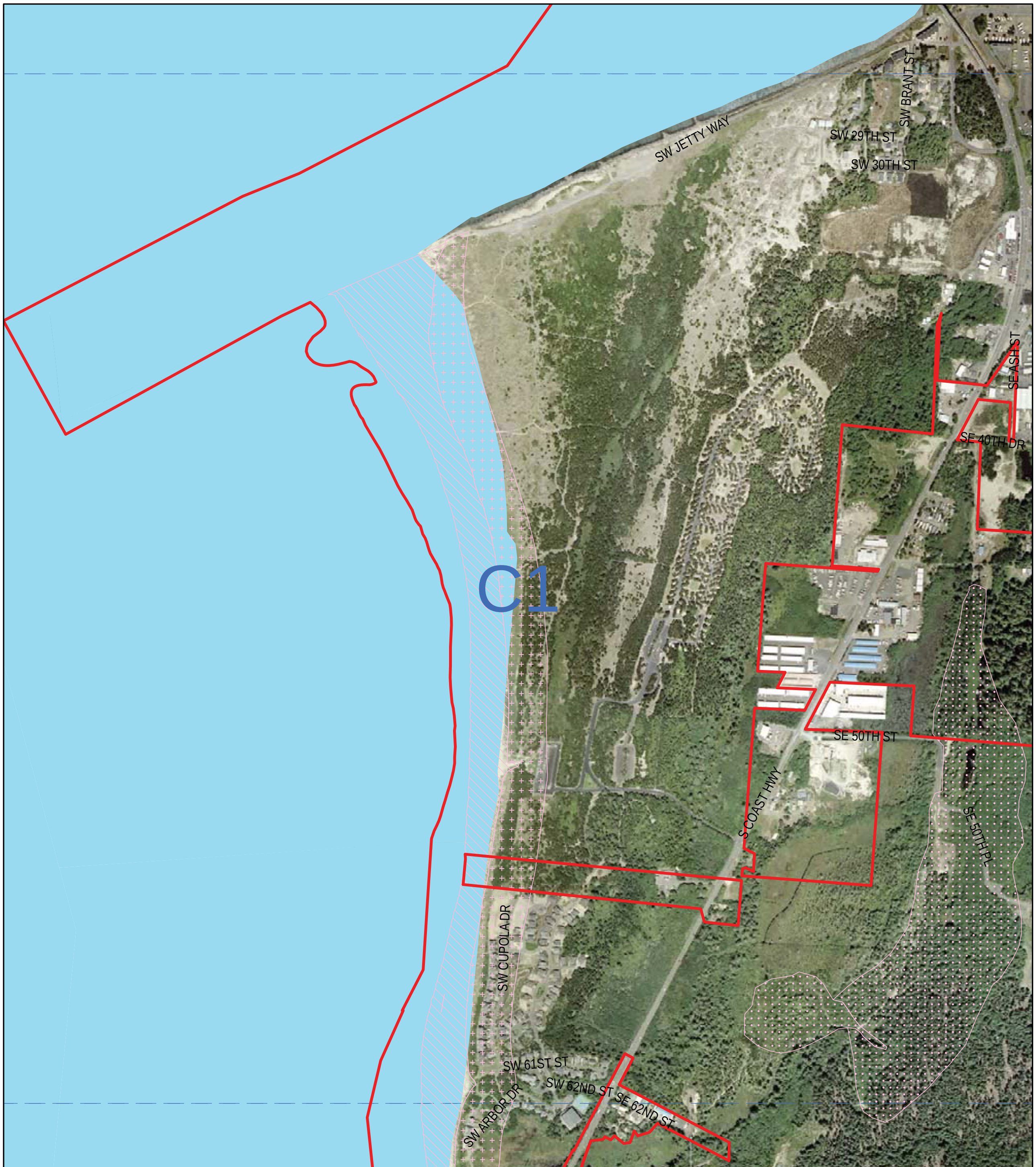

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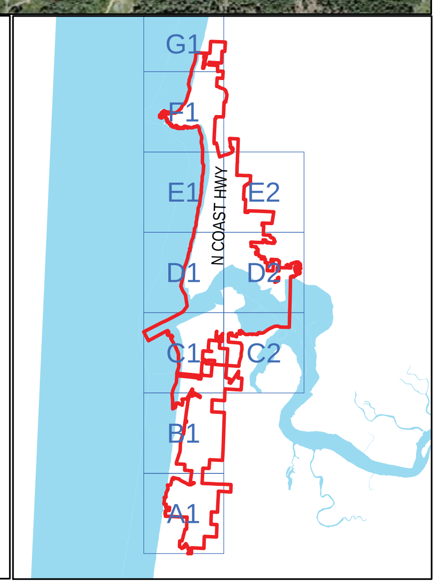

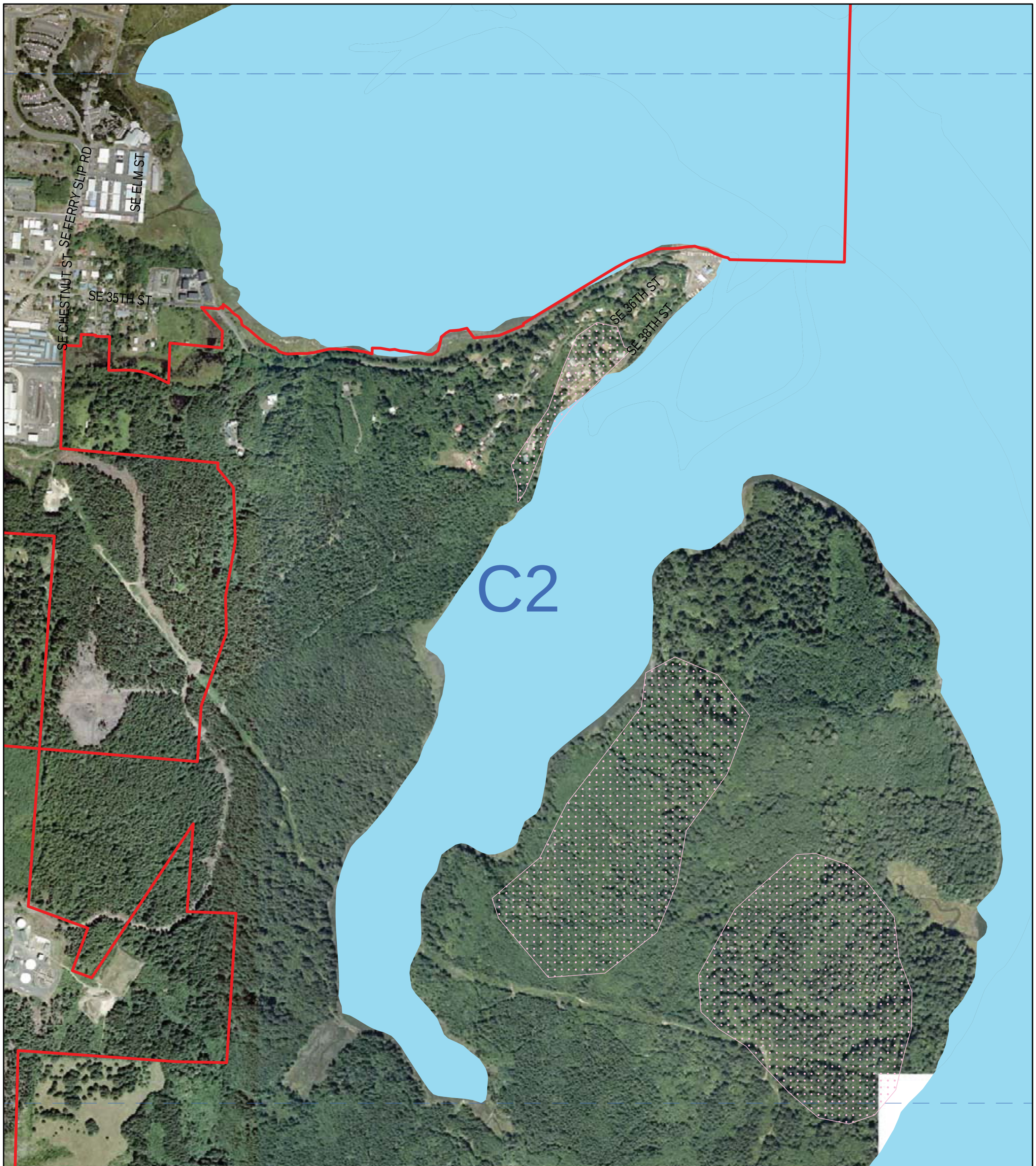

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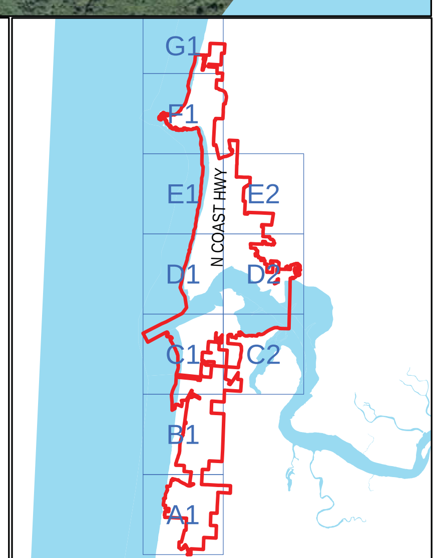

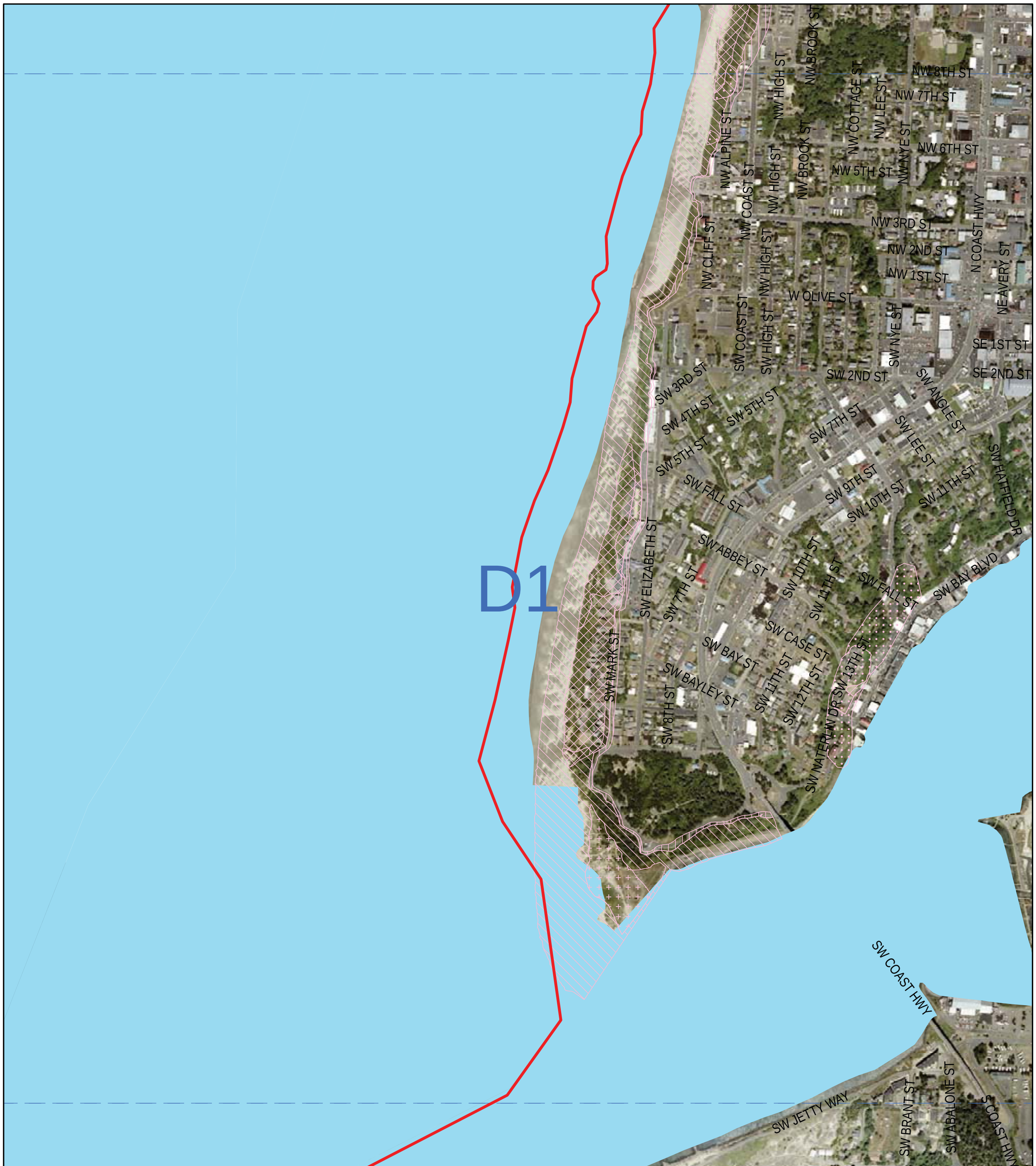

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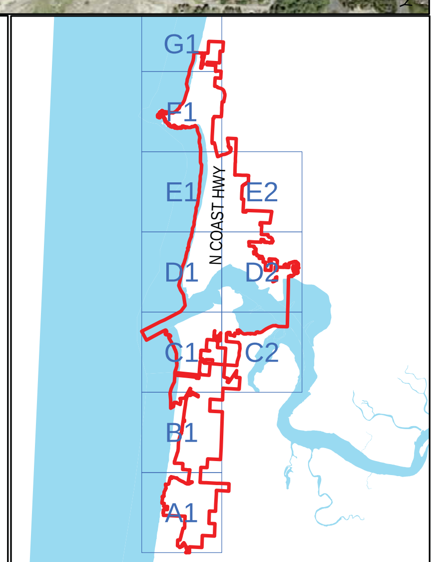

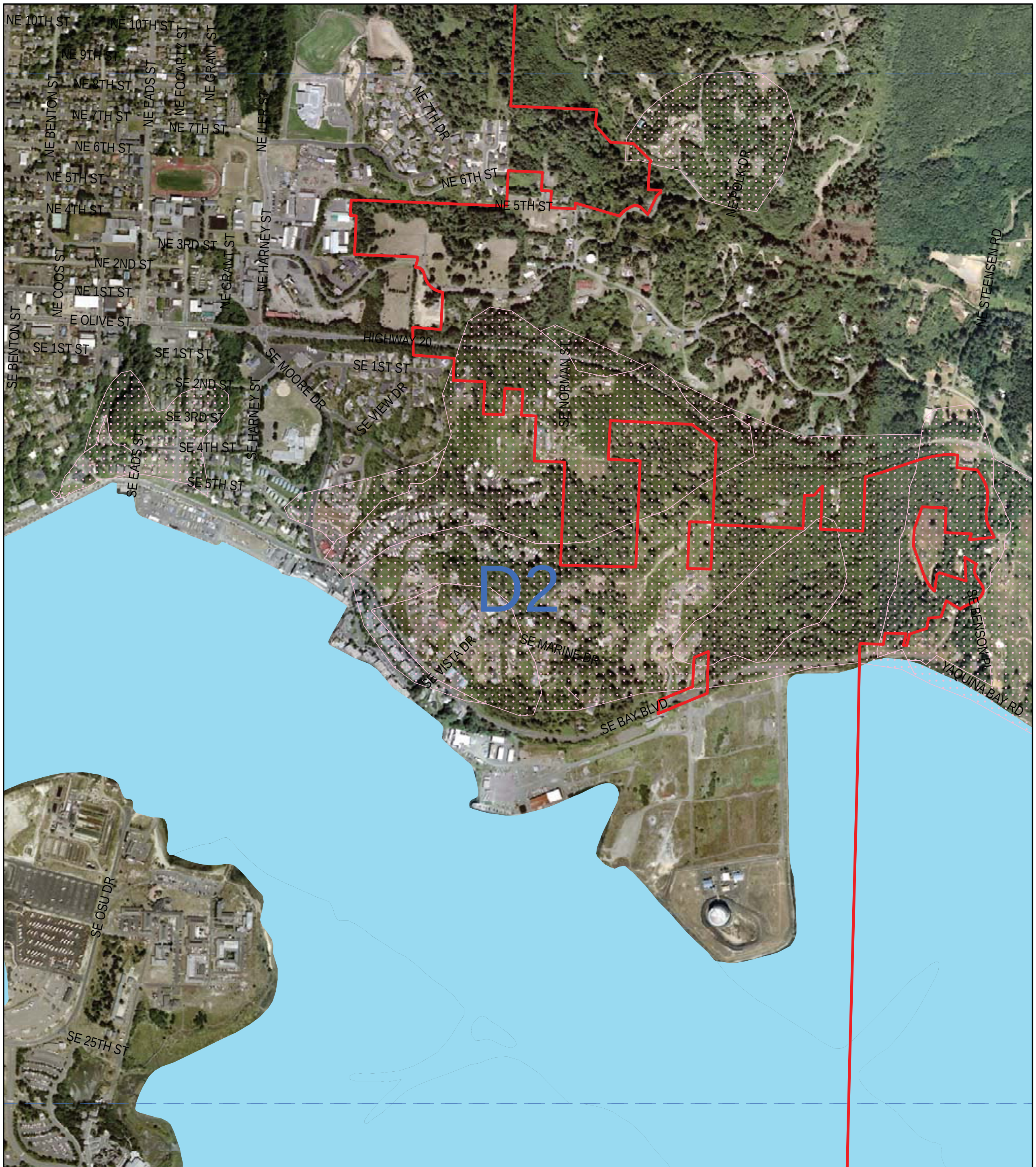

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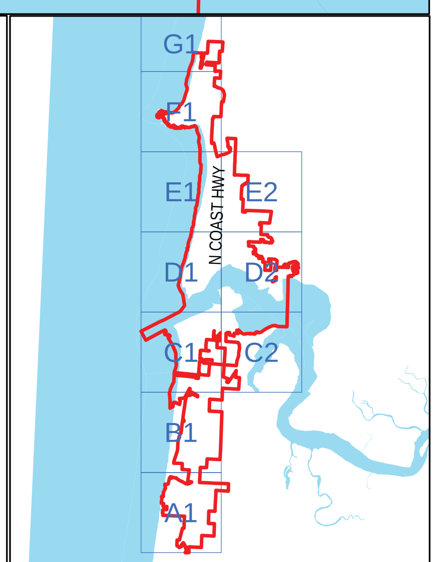

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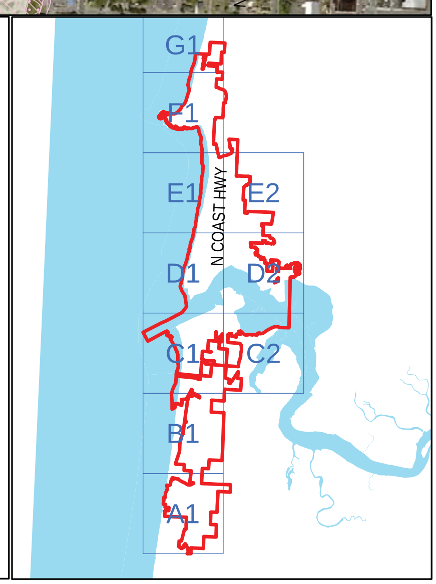

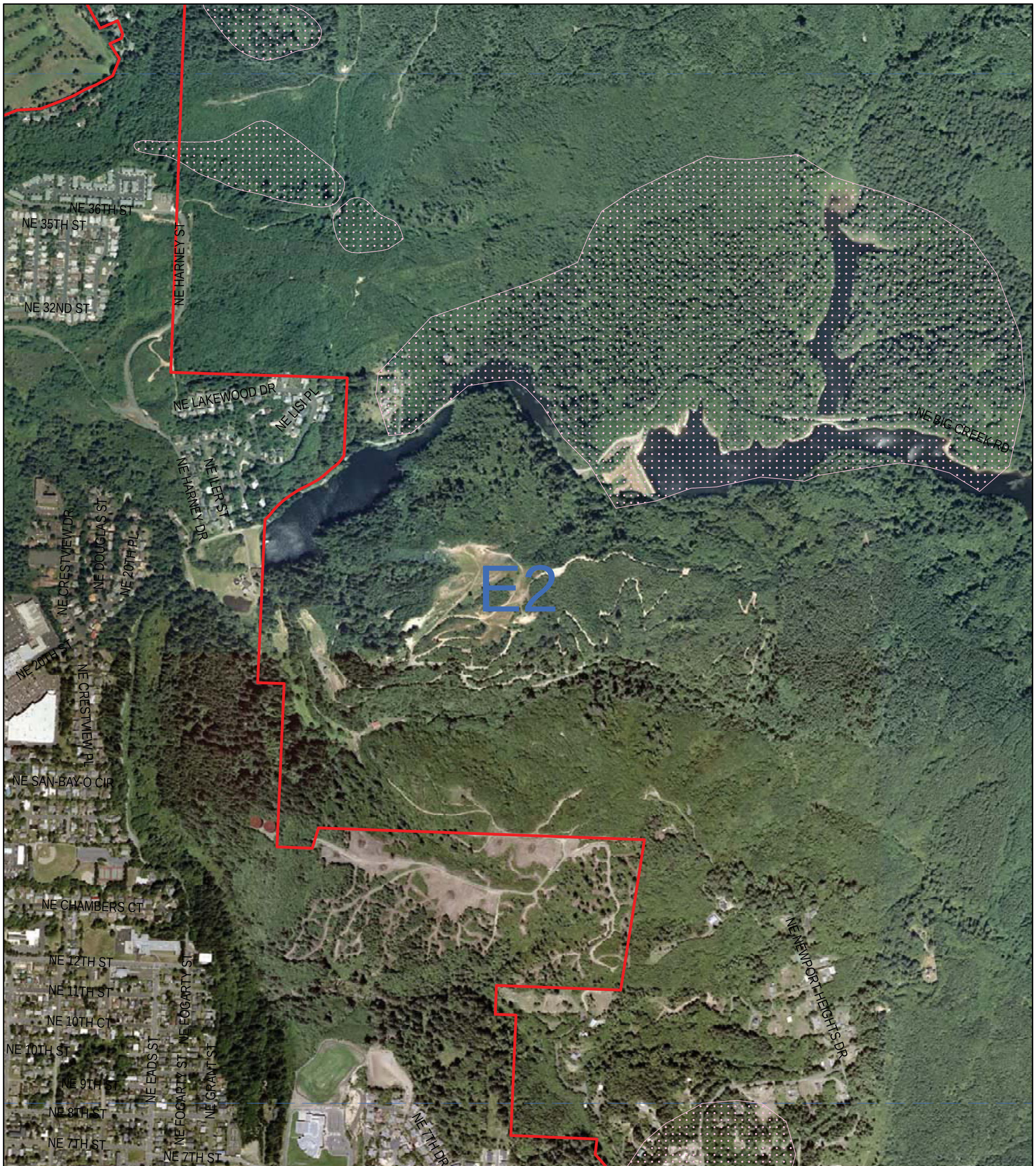

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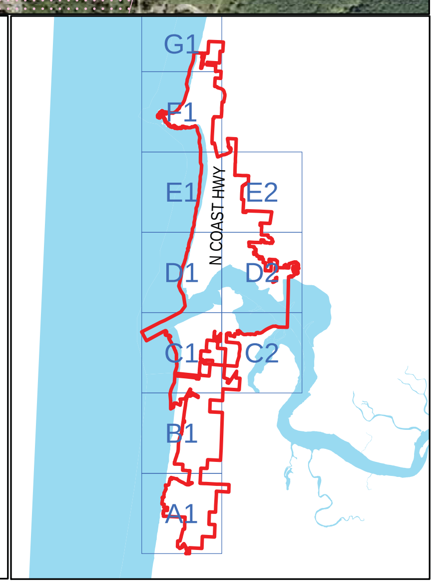

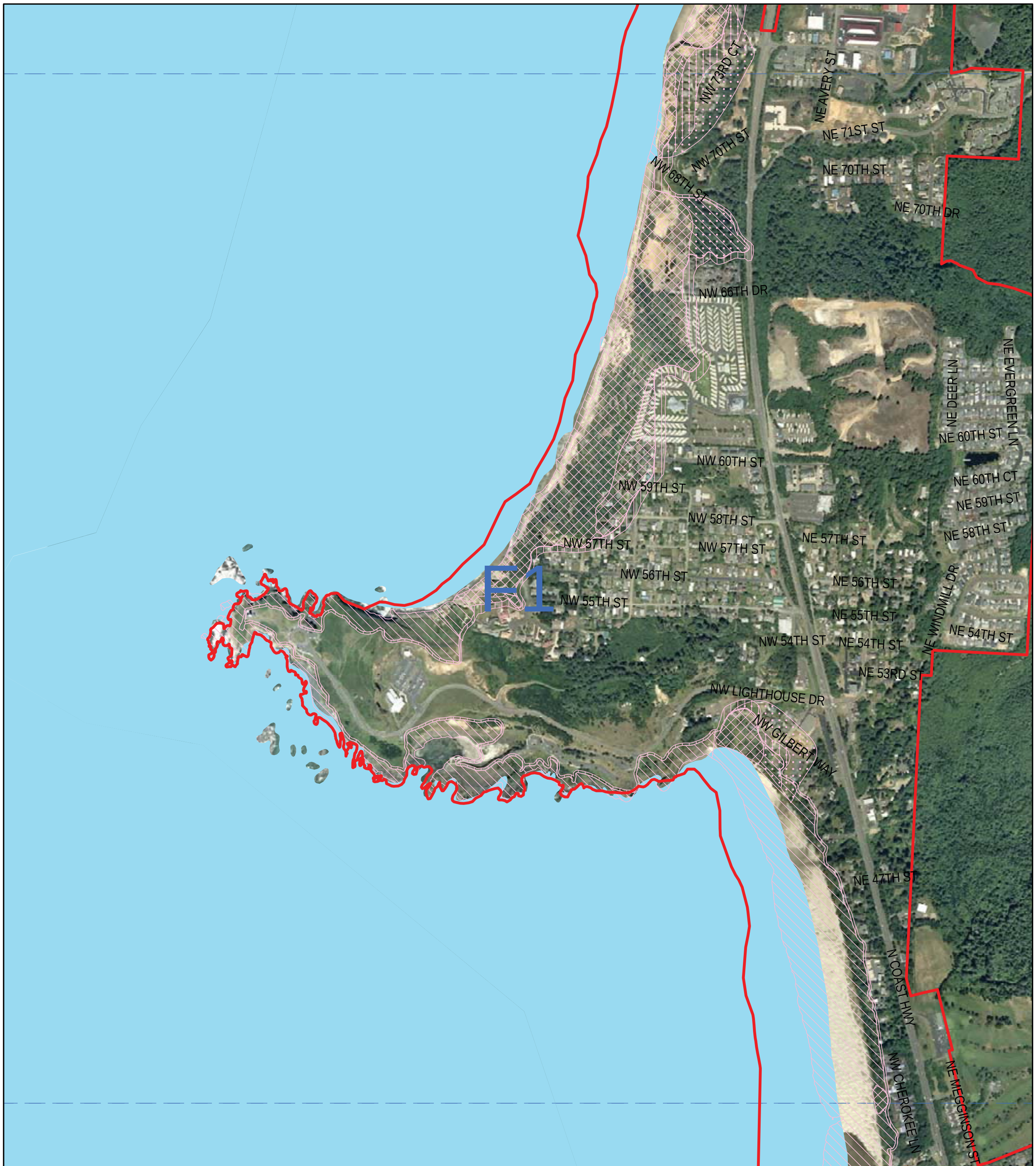

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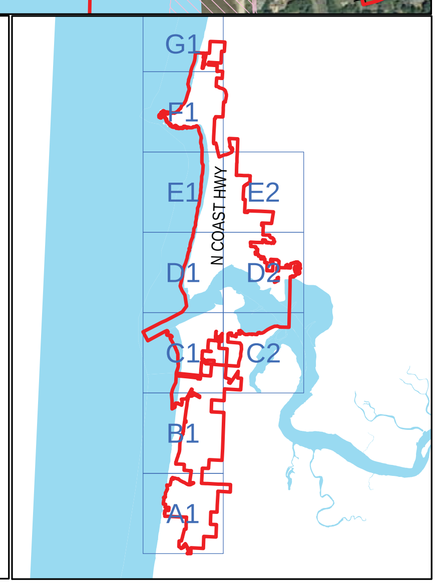

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