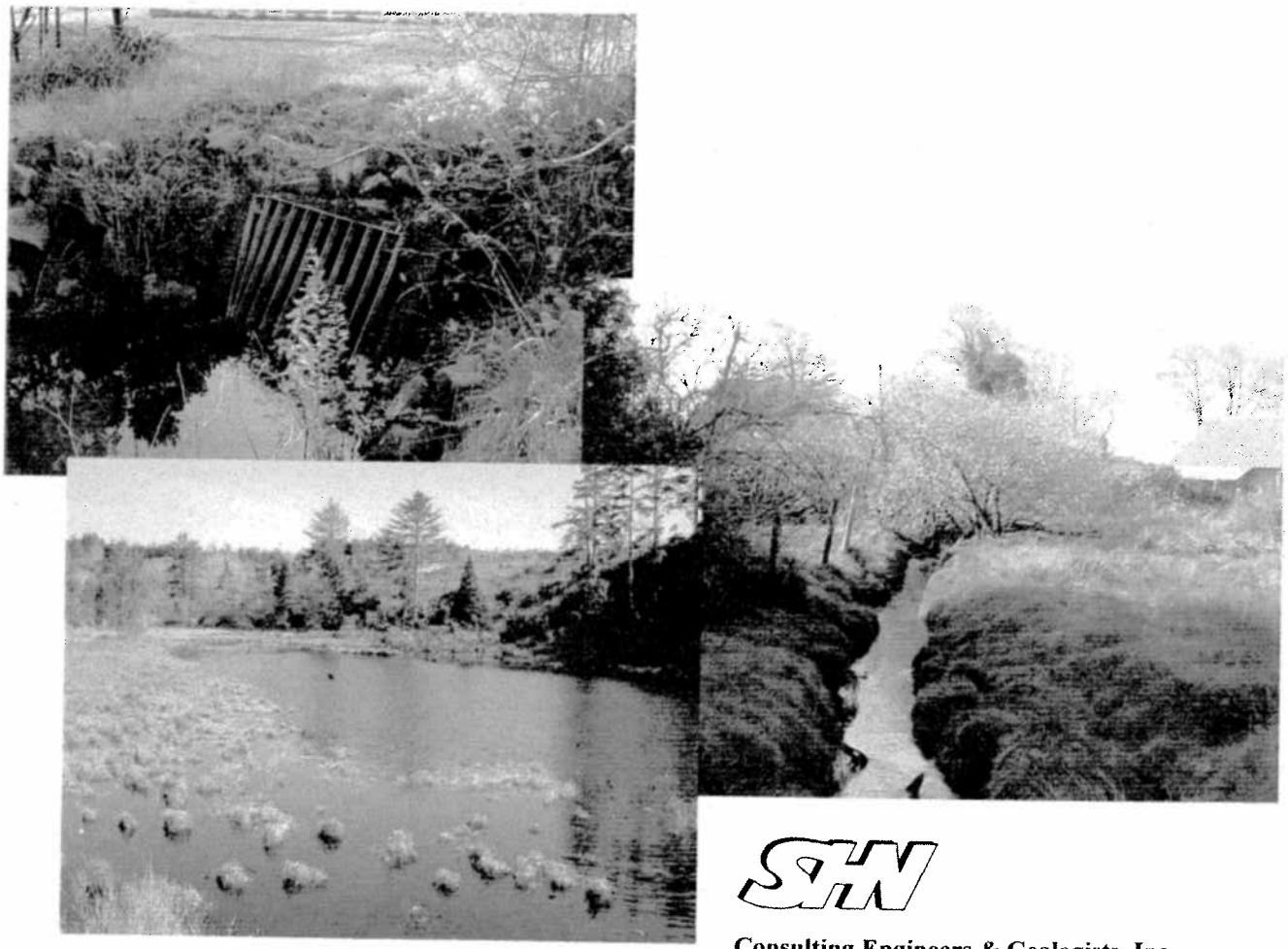
SOUTH BEACH STORM WATER MASTER PLAN

Prepared for:

Newport Development Commission



Consulting Engineers & Geologists, Inc.
365 North 4th Street
Coos Bay, OR 97420-2219
541/266-9890

June 2004

Reference: 002612

South Beach Storm Water Master Plan

City of Newport

Newport, Oregon

Prepared for:

Newport Development Commission

Prepared by:

Consulting Engineers & Geologists, Inc.
365 North 4th Street
Coos Bay, OR 97420-2219
541/266-9890

June 2004

C. Utilities Plan

In addition to the transportation improvements, the Neighborhood Plan also encourages more efficient use of public infrastructure. The existing water reservoir and wastewater treatment plant are located immediately adjacent to the land proposed for addition to the UGB and near the land proposed for conversion from industrial to other uses. This proximity will result in lower construction and maintenance costs, benefiting the City as a whole. The Land Use Plan proposes additional water and sewer infrastructure, along with storm drainage enhancements.

1. Sanitary Sewer

Expansion of the sewer system is required to provide wastewater service to areas proposed by the South Beach Land Use Plan. The recommended capital improvements identified as Phase I are necessary for providing service to the expanded UGB area east of Mike Miller Park. Phase II improvements address expansion of the sewer system to Idaho Point and the development areas located directly north of the airport. Future improvements for areas south of the South Beach Development and west of the airport and south to the Thiel Creek area have not been incorporated into this Plan but are identified in the existing Wastewater Facility Plan. The Phase I and Phase II improvements are discussed below. **See Exhibit 12.**

- ***Project #1 – 10" Sewer Trunk Line Urban Growth Boundary Road – Phase I***

Sewer service to the new UGB expansion area above Mike Miller Park will consist of 4,800 LF of new 10-inch and potentially 12-inch gravity main running north to 40th Street and 4,000 LF of new 8-inch gravity main running south to the south beach lift station. Routing of both mains should generally follow the alignment of the proposed UGB expansion area road. Each gravity main should also be designed to a depth that allows future developments to connect extensions of the collection system from the proposed residential, commercial, and community college development areas. The 10-inch line running north should flow by gravity to the existing 36-inch gravity interceptor which will allow collected flows to discharge to the influent pump station on Highway 101. The 8-inch line running south should flow by gravity directly to the south beach lift station. A small pump station may need to be constructed at the treatment plant to lift the flows received from the south interceptor into the headworks or the sewer should be extended down Mike Miller Road to connect into the influent pump station.

- ***Project #2 – 8-inch PVC Sewer -From Upper Idaho Point - Phase I***

Wastewater collected from the proposed 105 acre upper Idaho Point residential development should be collected through 3,800 LF of new 8-inch gravity main running west below the ridge line to the proposed north UGB road where it can be connected to the 10-inch UGB area sewer main. Portions of this development area on the north and westerly slopes of Idaho Point may require small pump stations or grinder pumping equipment with small diameter sewers to lift wastewater to the ridge line main collector sewer.

CAD FILE: NEWPORT_SE_UTILITY_BENKEMOORE_7_31_05.dwg
XREFS: 101197500 BOR

CITY OF NEWPORT
CONCEPTUAL LAND USE PLANNING PROJECT
LINCOLN COUNTY, OREGON
PROPOSED SANITARY SEWER & STORM SEWER IMPROVEMENTS

EXH. 12
DATE 8/2005
PROJECT NO. 00415.000

DSGN	SRD/JRC
DR	JRC
CHK	SRD
APVD	

NO	DATE	REVISION	BY

SHN CONSULTING ENGINEERS & GEOLOGISTS, INC.
365 N. 4th (Coos Bay, OR 97420) 541/266-0400 FAX: 541/266-0408

VERIFY SCALES
IF NOT 1" ON THIS SHEET ADJUST SCALES ACCORDINGLY

- ***Projects #4 – #5 - Idaho Point Sewer System – Phase II***

As development progresses east along the hilltop of the expanded UGB area, the Idaho Point area (Basin S 6) can be expected to experience development pressure. Expansion of sewer service into this area will be required to allow this growth to occur.

Sewer service could be provided to the Idaho Point area by routing 3,200 LF of 8-inch gravity main east along the ridge to the end of Idaho Point then west along 35th Street. A 350 gpm lift station and 3,800 LF of 6-inch force main running along 35th street should be constructed to convey flows collected from Idaho Point into the existing sewer system in Basin S5.

- ***Projects #6 - #8 – North Airport Sewer System – Phase II***

The South Beach Land Use Plan identifies the potential for development of residential property east of Highway 101 and north of the airport. Development of a sewer system in this area will be difficult, due to the steep terrain, deep canyons, and Henderson Creek tributaries. Onsite systems and lower density developments may be more appropriate for this development area.

If a public sewer system is extended into this development area, then approximately 4,100 lineal feet of 8-inch gravity main should be constructed to serve the north half of the 100-acre area. A 250 gpm lift station and 1,450 LF of 6-inch force main running along the old railroad right of way should also be constructed to lift flows up to the wastewater treatment plant. The remaining acreage proposed for development to the south will also require 8-inch gravity main and one or possibly two additional lift stations.

2. Water

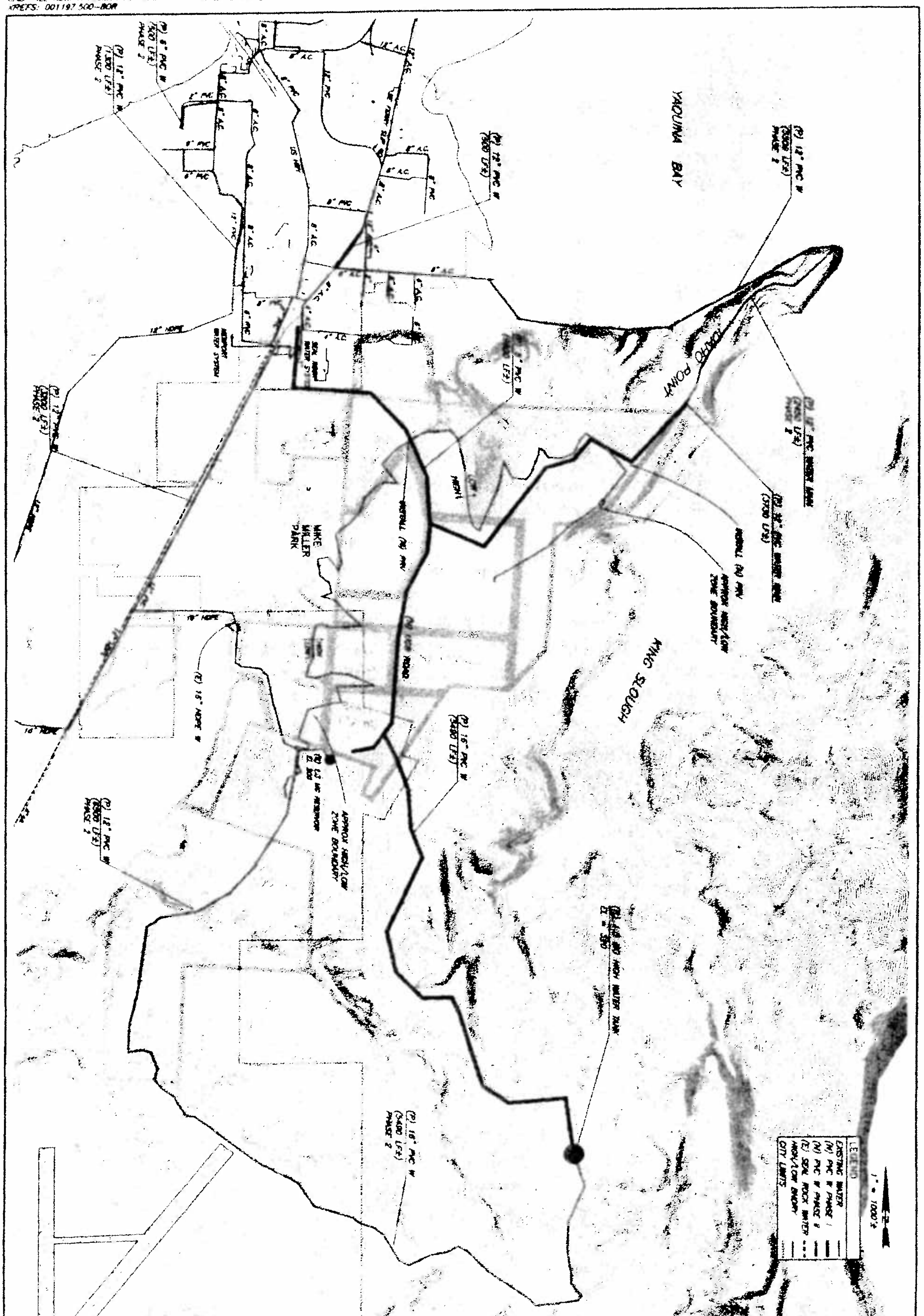
Improvements to the South Beach water system are identified according to short-term and long-term goals. The capital improvements recommended for the South Beach Development Lands Plan are summarized below. **See Exhibit 13.**

- ***Project #1. King Ridge 1.0 MG Reservoir (EL 320')***

The proposed South Beach developments will require construction of a new high level water system. This system will provide fire flows and potable water for human and commercial consumption. In order to service the recommended urban growth boundary additions and the airport, a new 1.0 MG water tank should be constructed on King Ridge (elevation = 320-ft +/-.) according to the guidance provided by the City's Water System Master Plan. The King Ridge water tank should be constructed at an elevation of 320 feet to provide complete coverage of all areas proposed for development.

According to preliminary calculations, the proposed new development will require a minimum of approximately 750,000 gallons of storage to maintain the minimum fire flow requirement of 3,000-gpm for 3-hours at the community college, commercial, and industrial sites. An additional 250,000 gallons of storage is also necessitated by the need to provide storage for subsequent phases of new development that may occur during the life of the new water storage tank.

CAD FILE NEWPORT SB UTILITY BENKENDORF_7_31_05.dwg
XREFS: 001197.500-BOR



CITY OF NEWPORT CONCEPTUAL LAND USE PLANNING PROJECT LINCOLN COUNTY, OREGON **PROPOSED WATER SYSTEM IMPROVEMENTS**	SHEET EXH. 13 DATE 8/2005 REF. NO. 004015.000	SHN CONSULTING ENGINEERS & GEOLOGISTS, INC. 365 N. 4th Coos Bay, OR 97420 (541)266-9690 FAX (541)266-9488	VERIFY SCALES

- ***Project #2. 16" Water Main to New High Water Tank***

Preliminary calculations and water modeling indicate that 5,500 lineal feet (LF) of 16-inch diameter water main should be constructed from the King Ridge tank to the new South Beach development areas. This water main is sized to maintain minimum fire flow requirements for the proposed commercial and institutional developments at the UGB expansion areas and the airport as discussed below.

- ***Project #3. 12" PVC Water Main Loop New Development***

Within the new UGB expansion area, approximately 9800 LF of 12-inch PVC water main should be constructed along the main road for the new development. This water main will connect to the existing 16" HDPE water main from the King Ridge tank to the existing 12-inch PVC water main located on Highway 101 to the north and the Mike Miller Park reservoir to the south. The 12-inch main will provide fire flows to the proposed new development including commercial, residential and the proposed community college. Pressure relieving valves will also need to be installed on the north and south ends of the loop.

- ***Project #4 - 12" PVC Water Main Loop New Development***

According to preliminary calculations, the approximately 3700 LF of 12" PVC water main through the proposed residential development west of King Slough and south of Idaho Point. Construction of this main will provide fire flows and residential pressures to new residential developments proposed for this area. In the long term, this water main should be extended to Idaho Point and then loop back along 35th Street on the North end of Idaho Point before connecting to the existing 12" water main at SE Chestnut and 35th Street.

- ***Project #5 – King Ridge pump station, 350 gpm***

Water from the existing Mike Miller Park reservoir will need to be pumped up to the King Ridge reservoir to create the new pressure zone recommended for these high elevation development areas. The Pump Station will be constructed to deliver water to the proposed King Ridge Tank while the tank floats on the system. Preliminary analysis indicates that a pump station should be capable of pumping 350 gpm at 120' of total dynamic head.

- ***Project #6 – 2-12" PRVs***

With the addition of the new high water tank at King Ridge, 2-12" PRVs will be required to back feed the lower pressure zone in the existing South Beach development area. The pressure reducing valves will need to be located on both the north and south ends of the UGB expansion loop road at an elevation of approximately 150-feet +. These valves will supplement the lower pressure zones during protracted (greater than 3-hour) fire fighting events.

- ***Project #7 – Newport Airport Water Main***

Approximately 5500 LF of 16" water main will be required to supply water to the

Newport Airport. According to preliminary calculations, this water main will provide the minimum required fire flows at the airport (3,000 gpm) plus potential consumptive use for developments around the airport. As part of Phase II, this water main will be looped back to the system with the construction of a 12" water main through the 100-acre residential development area just north of the airport.

- ***Project #8 – Miscellaneous South Beach Water System Improvements***

As indicated in Exhibit 13, some areas of South Beach are still served with 2", 3", and 4" water service lines. In these areas there is insufficient fire flow and likely degraded levels of water service due to losses in system pressure. Water modeling indicates that areas west of Highway 101 would have sufficient fire flow with the addition of a proposed 12-inch PVC water main located along Highway 101 connecting the existing 12" PVC South Beach State Park Loop to the new 6" PVC water main on SW 30th Street east of SW Coho Street (approximately 1300 LF of new 12" water main). However, adequate fire flow could also be obtained by replacing the existing 2" water line on SW 27th Street with a new 6" PVC water main (approximately 650 LF of new 6" water main).

3. Storm Sewer

The proposed changes to the urban growth boundary will increase the percent of impervious area at build out in basins 2, 5, & 6, as well as sub-basins 13-E and 15-E of basin 3. The percent of impervious area in the proposed residential areas in basin 2 was increased to 38% (assuming ¼ acre residential lots). The percent of impervious area in basins 3, 5, 6 and was increased to 25% (assuming ½ acre lots due to the steep terrain in these areas). The percent of impervious area for the proposed commercial and institutional areas in basins 5 & 6 was increased to 55% impervious. These run-off factor were developed in the storm water master plan based on existing development patterns.

The increased percent impervious area will increase the runoff, resulting in the following recommended changes to the existing storm water master plan:

- ***Project #2 – Culvert Replacement, Ditch Renovation (east of 35th Street)***

This project involves upsizing the existing 24-inch culvert under SE 35th Street and expanding the ditch that runs along side SE 35th Street.

Based upon preliminary calculations, the proposed Idaho Point residential area will increase flow to the culvert from an estimated 105 cfs to an estimated 135 cfs. The recommended culvert should therefore be upsized from a 42-inch culvert to an 54-inch culvert. The recommended ditch improvements should also be expanded accordingly.

The estimated economic impact of this change is that the project cost nearly doubles from $60,000 to $80,000.

- ***Project #5a - Alt 1 Redirect Drainage to Basin #7***

This project involves construction of a series of channels and culverts parallel to, and along the west side of the highway to convey flow south from the proposed box culvert under Highway 101 (ODOT #144) to the existing natural channel in Basin 7(4) (See Sub-

basin Figures 4.1.1 and 4.1.2 in the South Beach SWMP).

Based upon preliminary calculations, the proposed development will increase the flow under Highway 101 from 129 cfs to 237 cfs. The recommended culverts and adjoining ditches should therefore be upsized. The recommended box culvert under the highway should likely be upsized from a 3'x6' (57-inch equivalent) box culvert to a 4' x 7' (71-inch equivalent) box culvert.

The estimated economic impact of these design changes is to increase the cost of Project #5a from approximately $1.2 million to $1.5 million.

On the June 2004 Storm Water Master Plan capital improvement project list, several changes would need to be made in relationship to proposed changes in land use designations as part of the proposed South Beach Neighborhood Plan. Specifically, Project #2 (Culvert Replacement/Ditch Renovation on SE 35th Street – at an estimated increase of $20,000 from the $60,000 originally estimated) and #5a (Alternate 1 – Redirect Flow – an estimated increase of $300,000 from the $1.2 million originally estimated) proposed would need to be upsized to accommodate additional storm drainage from the proposed changes in the Comprehensive Plan as explained above. Project #6 (Airport Drainage Improvements – estimated at $1.426 million), however, would likely not be required as a project as the proposed improvements were necessary to serve an area of High-Density Residential east of the Airport (the proposed South Beach Neighborhood Plan adjusts the Urban Growth Boundary by moving the residential area to the north to abut the Idaho Point area and removes that property east of the Airport from the Urban Growth Boundary). The increase in the storm water capital improvement estimated costs to accommodate the proposed South Beach Neighborhood Concept Plan would be $320,000. With Project #6 likely not needed in the current planning horizon, however, the overall impact on the proposed storm water capital improvements would be a reduction of approximately $1.106 million in projected capital costs.

D. Urban Design Concepts

As part of the South Beach Neighborhood Plan development process, an analysis of existing urban design opportunities and recommendations for the South Beach area was completed and is included in the Appendix material. Based on the analysis completed and the public input received from the public and from the Ad Hoc Advisory Committee, the Plan includes a policy identifying general urban design goals that should be considered and encouraged in the South Beach neighborhood for new and infill development.

Gateways identifying entry into the South Beach area of Newport were also considered to be an urban design feature lacking at both the north and south end of the South Beach area. For the purposes of this Plan, the Ad Hoc Advisory Committee focused on the north gateway. The U.S. Highway 101 Urban Gateway Design Concept for the north entrance into the South Beach area is included as **Exhibit 14**. The City should work with the Oregon Department of

Transportation and should pursue funding and implementation of the proposed U.S. Highway 101 Urban Gateway Design Concept identified in Exhibit 14 as appropriate.

TABLE OF CONTENTS

1.0 Executive Summary

1.1 Introduction

The following document provides a comprehensive Storm Water Master Plan for the South Beach Area that the City of Newport and the Urban Renewal Zone can use to manage and systematically upgrade its storm drain system. Plan recommendations were based on the following:

- Discreet analysis of 13 drainage basins identified within the Study Area
- Evaluation of the City's rules and regulations related to storm drainage
- Solicitation of Local Stakeholder and Public input

Given current land-use regulations, growth projections, topographical constraints, and utilizing the represented storm water analysis method, seven major capital improvement projects and one management Plan were identified which address existing deficiencies and those associated with future development. The total cost for correcting system deficiencies and providing future capacity is estimated at $6.46 million. The projects identified have been prioritized to allow the City and Urban Renewal District to implement corrections.

Acquiring adequate funding for the recommended projects is a critical issue that must be resolved to ensure the success of the Plan. The recommended financial package targets funding acquired from the Urban Renewal Agency and the Federal Aviation Administration to address some of the major projects immediately. It is also recommended that the City form a citywide storm water utility to enforce development standards, maintain the storm system, and collect revenues. Conceptually, this utility should be based on the fundamental premise that the storm system is a City service - similar to the City's sewer and water systems. Monthly user fees and SDC's established by the utility should be based on the number of EDUs calculated by impervious surface area methodology rather than the current lot size methodology because it is a better measure of impact on the storm drain system.

The City's existing ordinances concerning storm drainage lack empowerment and do not adequately protect the existing drainage system from impacts of new development. Minimum design standards and requirements for developments are recommended.

1.2 Report Content

The report is comprised of the following seven sections.

Section 1.0 summarizes the Plan and recommendations.

Section 2.0 introduces the Master Plan by identifying the study need, the scope of work, and authorization.

Section 3.0 provides background information on the South Beach Area. Study Area characteristics are identified including climate, topography, geologic hazards, and land use issues.

Section 4.0 describes the analysis methods used for evaluation of storm drainage runoff in the basins. Discussion of the design storm used for this study is also presented

Section 5.0 identifies the 13 drainage basins within the Study Area, storm water facilities, and the location of existing drainage problems. A map of the Study Area is presented that identifies each of the drainage basins and the respective storm water facilities.

Section 6.0 describes how the analysis methods presented in Section 4 are used to analyze specific drainage basins in the Study Area. Corrections to system deficiencies for each basin are presented with itemized cost estimates. A map of the storm drainage system identifies how the future system will be configured to correct the problems discussed in Section 5.

Section 7.0 describes the Planning criteria used to develop the Plan recommendations. State and Federal environmental regulations, and local drainage regulations are discussed. The City's comprehensive land use Plan, (goals and policies) are reviewed along with zoning and development ordinances, which address storm drainage. The South Beach Storm Water Overlay Zone concept is presented and recommended in this section.

Section 8.0 describes the financial options available to the City. A list of project priorities is prepared to assist development of a financial package.

1.3 Conclusions

The South Beach Area of the City of Newport is a unique mixture of land uses, with a significant amount of publicly owned land (State and county parks, airport, marina, City's public facilities, etc.). Existing and future residential development represents a relatively small amount of area compared to the typical community, and most of the City's future industrial development has been planned to occur within the Study Area. Much of the planned industrial lands are faced with development challenges associated with being situated within wetlands or in topographically limiting areas.

The City must determine how to accommodate growth through infrastructure improvements and appropriate planning and regulation, and as such, has authorized preparation of this South Beach Storm Water Master Plan. The South Beach Area has had a couple of Storm Water Master Plans prepared in the past, which were too general to implement. Area property owners are now faced with a number of drainage issues, which constrain development. Issues include maintenance of existing drainage ways, impacts of development on existing structure capacities, drainage routing, and wetlands.

The existing Planning documents and storm drainage ordinances that may assist the City's staff in guiding future development are inadequate by today's standards. The ordinances simply lack the empowerment necessary to prevent development from overloading lower drainage systems.

The Study Area is situated on terrain varying from hilly to poorly drained low-lying flat lands. Given the topography and area drainage characteristics, runoff potential within the Study Area is high.

A total of 13 drainage basins were identified within the Study Area. Using the described method of storm water analyses, it is predicted that drainage systems in 6 of these basins need improvement. Improvements are estimated to cost approximately $ 6.4 million (less $130,000 for Wetland Management Plan).

The recommended improvements can be segregated into three distinct categories:

- Improvements necessary to correct existing problems, and;
- Improvements that benefit development by providing additional capacity for future drainage flows, and;
- Improvements, which are controlled by others.

Category 1 and 2 improvements represent 42 percent and 22 percent of the total project cost, respectively. Projects controlled by others represent 36 percent of the total project costs. Category 1 projects total $2.64 million, Category 2 projects total $1.4 million and Category 3 $2.2 million.

1.4 Recommendations

Based on the recommendations of this Master Plan, the City should:

- Adopt the Master Plan and implement the recommended projects.
- Submit the Master Plan to ODOT for reference to future projects involving ODOT drainage systems and ODOT right-of-way.
- Hold Council workshops that address the following:
  - Revenue sources for funding the City's component of the recommended improvements,
  - the formation of a storm water management utility, and
  - ordinances that empower the City with enforcement procedures and minimum drainage requirements for all future developments.
- Adopt the South Beach Storm Drainage Overlay Zone
- Adopt design and construction standards for future developments and City storm water improvements with applicable drainage system and sediment control Plan requirements.
- Adopt ordinances requiring developers to address storm drainage from point of origin to the point of ultimate discharge.

- Identify street, sewer, and water construction projects that may be coordinated with storm water improvements. Implement the Plan improvements as scheduled in Section 8 of the Master Plan or reprioritize and schedule projects to be coordinated with other City service improvements as required.

- Pursue property/right-of-way acquisition related to Basin3, for City assumption of maintenance of the west ditch/drainage channel

- Enforce the recommended development and construction standards once they have been adopted by ordinance.

- Once funds are available, initiate a preventative maintenance and BMP program encompassing the storm drainage system.

- Prepare a wetland management Plan for the South Beach Area, which locates and maps existing wetlands, evaluates development options and provides for enhancement opportunities.

2.0 Introduction

2.1 Background and Need

The City of Newport, population 9,650, is located on the central Pacific Coast of Oregon. The City limits extend approximately 5 miles north and 5 miles south of the Yaquina Bay and up to 2.5 miles inland. The portion of the City lying south of Yaquina Bay is typically referred to as the South Beach Area. In the 1970's and 80's, the South Beach Area was annexed into the City of Newport. Sewer and water services were extended across the Yaquina Bay to serve residents of the area. In 1983 an Urban Renewal District was created for the entire annexed area. The Development Commission, which is appointed by the Mayor and City Council, directs the projects within the District.

With the anticipation of continued growth in the South Beach Area, the Development Commission and the City both have determined that a storm drain Master Plan is needed. The Development Commission is interested in investing the Urban Renewal District's money in projects, which will promote the economic development and property values of the area. The City needs a Plan to establish requirements for developers to construct drainage facilities compatible with growth in the area; i.e. where drainage needs to be directed, what size and grade to set culverts and bridges, and what detention is required.

Two previous studies have been prepared for this area. First was the South Beach Urban Renewal Plan, which was adopted in 1983. This Plan, prepared by Kramer, Chin & Mayo, Inc., (KCM) of Seattle Washington includes a section on drainage issues. The authors divided the area into 15 drainage basins and calculated runoff for various storm frequencies using the rational method. They also identified existing culverts with associated diameter, length and material. The Plan recommended two alternatives for storm water control; 1) an open channel system, and; 2) a combined open channel/piped system. Both alternatives included some suggested projects. Subsequent to this Plan, promulgation and implementation of expanded Federal and State wetland regulations impacted much of the anticipated land use. Also, the Urban Growth Boundary was expanded.

CH2M Hill prepared the second study, "City of Newport Storm Sewer Facilities Plan," in 1990. This Plan covered not only the South Beach Area, but also the entire City. In this study the South Beach Area was divided into 11 drainage basins. Much of the work completed in the KCM Plan was updated and incorporated into the latter.

Some projects recommended by the two studies have been completed, while others are no longer considered feasible.

2.2 Scope of Engineering Services

SHN Consulting Engineers & Geologists, Inc. has been authorized by the City of Newport to provide Master Planning and engineering services as further described below. These services will develop a comprehensive South Beach Storm Water Master Plan for the South Beach Area that the City and the Urban Renewal District can use to manage and systematically upgrade its storm drain

system. The following scope describes the comprehensive approach to Planning and addressing storm drainage facilities.

Task 1. Project Scoping

This phase of the project involved primary team members sitting down with City staff and working out a thorough scope of work for the project. The initial scoping session more clearly defined the scope of work and anticipated outcomes of the study. This portion of the project also included a meeting with the airport manager and reconnaissance of the South Beach Area along with the storm drains to be evaluated on the airport.

Task 2. Information/Data Gathering

This portion of the project involved the gathering of facts and data, which are the basis for the Plan. Relevant documentation on file with the City was acquired, such as, aerial topographic maps, previous studies, utility maps, land use Planning information, regulations and ordinances, etc. Once all of the written documentation was reviewed and preliminary base maps were prepared, fieldwork ensued. Members of our team verified the documented information and data in the field and recorded pertinent information observed.

This information was used to identify the physical structures of the existing drainage system including approximate location, alignment, grade, size, materials etc., and identify drainage courses that may have been delineated as wetlands (based on existing wetland inventories). This portion of the scope also included delineating drainage basins, determining the design storm to be applied, and growth forecasting

Information was solicited from other stakeholders including property owners, resource agencies, ODOT, State Parks, etc. Four meetings were held to gather information; two general public meetings and two with identified Stakeholders. Information was also obtained through the use of an open-ended survey and interviews.

Task 3. Engineering Analysis of Storm System

The engineering analysis of the storm system includes the bulk of the technical evaluation related to this project. The Study Area was divided into drainage areas, and the existing components capacities were evaluated. The engineering team applied standard storm system modeling techniques to evaluate the existing and future build-out characteristics of the Study Area using a model based on the Soils Conservation Service (SCS) TR-55 model. This model varies somewhat from the methodology used in previous studies, which used the Rational (CIA) method to calculate a peak rate of runoff. With the SCS methodology, a time based estimate of both the peak rate and the volume of runoff generated for the design rainfall events is generated as a runoff hydrograph. This hydrograph and hydrographs from neighboring basins are routed through the drainage system, accumulating at intersecting segments until the peak runoff from the design storm has been passed and the effects on the drainage system considered. Using SCS methodology generally results in less conservative drainage facilities, improved storage sizing criteria, and better assessment of flooding and problem area locations.

Task 4. Analysis of Storm System Ordinances

The key factor involved with this work item was to first acquire an indication of the type and level of control the Development Commission/City of Newport wishes to exercise when working with the South Beach Storm System. Once that initial determination was made, existing regulatory ordinances were evaluated for effectiveness along with all interrelated Planning documents. Model ordinances and examples acquired from other Oregon communities were used to assist in drafting effective implementation ordinances. Suggested language and formats for preparing a storm drainage ordinance that included; defining authority, development requirements, construction standards and appropriate implementation parameters were produced for review.

Task 5. Alternative Development

Once all of the physical requirements for the major elements of the storm system were identified, various alternatives for meeting those requirements were prepared. Alternatives considered in the Plan include:

Infrastructure Improvements (piping, ditches, ponds, etc.)
Runoff Routing Options (where to go)
Development Requirements (what happens when development takes place)
Implementation Ordinances (controls for Planned growth and management)
Preliminary Cost Estimates Associated with Feasible Alternatives

At this stage, an initial evaluation took place with agency staff along with our team members as discussed in the following task synopsis.

Task 6. Alternative Evaluation

Alternative evaluation involved a more comprehensive review with City Staff to present and evaluate the proposed alternatives. Two meetings, one involving the public and one with the stakeholders were held for this task also. These meetings were directed around first reviewing derived conclusions, discussing options, working towards a solution oriented framework for the Plan, and coming up with final recommendations.

Final Master Plan Document

Following evaluation and selection of alternatives the final Master Plan was drafted along with example implementation ordinances. The document includes mapping, descriptions of analysis tools, recommendations, and a capital improvement plan as described in the deliverable section below.

The final draft was submitted to the Development Commission/City and appropriate reviewing agencies for a final review and recommendations for adjustment. Following this review, a final Plan was prepared and delivered to the Development Commission.

2.3 Authorization

SHN Consulting Engineers & Geologists, Inc. was retained by The City of Newport Development Commission to prepare a "South Beach Area South Beach Storm Water Master Plan." Services were provided in accordance with a Professional Services Contract between the two parties.

2.4 Funding Agency Acknowledgement

The City of Newport Development Commission funded this project, in whole.

3.0 Study Area

3.1 Background

Newport's South Beach Area is strategically important to the future of the City because it includes many acres of land lying within the Urban Growth Boundary -- land that has been designated for the future economic growth of the region. City Plans present a future vision of the South Beach Area with full urban services and facilities, and with industrial activities that contribute to the City's economic base and generate taxes that help pay for City services.

The South Beach Area includes land designated by the Comprehensive Plan for future commercial, industrial and residential growth, and for the expansion of public facilities. The City's Urban Renewal Plan addresses a number of problems that need to be resolved so that the South Beach Area can develop to its full potential; drainage has been identified as one of these problems. This Plan is being prepared on behalf of the Urban Renewal Agency to provide guidance concerning the City's role in resolving drainage issues and proposing future processes that will require private developers to address drainage as an important component of property development.

3.2 Study Area Characteristics

Location

The City of Newport is a coastal community located in Lincoln County. Renowned for its scenic vistas, the City lies approximately 135 miles south of Astoria, 114 miles southwest of Portland and 55 miles west of Corvallis. It is the largest city in Lincoln County and is the county seat. The South Beach Area of Newport is that portion of the City and its Urban Growth Boundary, which lies south of Yaquina Bay.

The Study Area for this Plan includes those storm water drainage basins located in the South Beach Area extending south from Yaquina Bay to, and including the basin associated with Moore Creek. This area encompasses residential, industrial, and commercially zoned properties along with forestlands and publicly owned lands. Figure 3.2.2 illustrates the extent of the Study Area.

NOT TO SCALE

SYMBOL LEGEND

- CITY LIMITS
- URBAN GROWTH AREA
- MAJOR BASIN BOUNDARY
- NATURAL WATER CHANNELS
- PONDS AND LAKES
- B 4 — MAJOR BASINS NUMBER

B 1
B 2
B 3
B 4
B 5
B 6
B 7
B 8
B 9
B 10
B 11
B 12
B 13

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY
0 1"

SHA
CONSULTING ENGINEERS & GEOLOGISTS, INC.
598 Anderson Ave. (541)266-9442
Coos Bay, Oregon 97420-0150 FAX (541)266-9496

NO.	DATE	REVISION	BY

DSGN RS
DR DBA
CHK RS
APVD SKD

CITY OF NEWPORT, OREGON
DEVELOPMENT COMMISSION
SOUTH BEACH STORM DRAINAGE MASTER PLAN

STUDY AREA & MAJOR BASIN MAP

SHEET FIGURE 3.2.2
DATE 08/06/03
PROJ. NO 002612

Climate

Information from the National Climatic Data Center station in Newport was used to develop the following summary of climatic conditions for the Study Area.

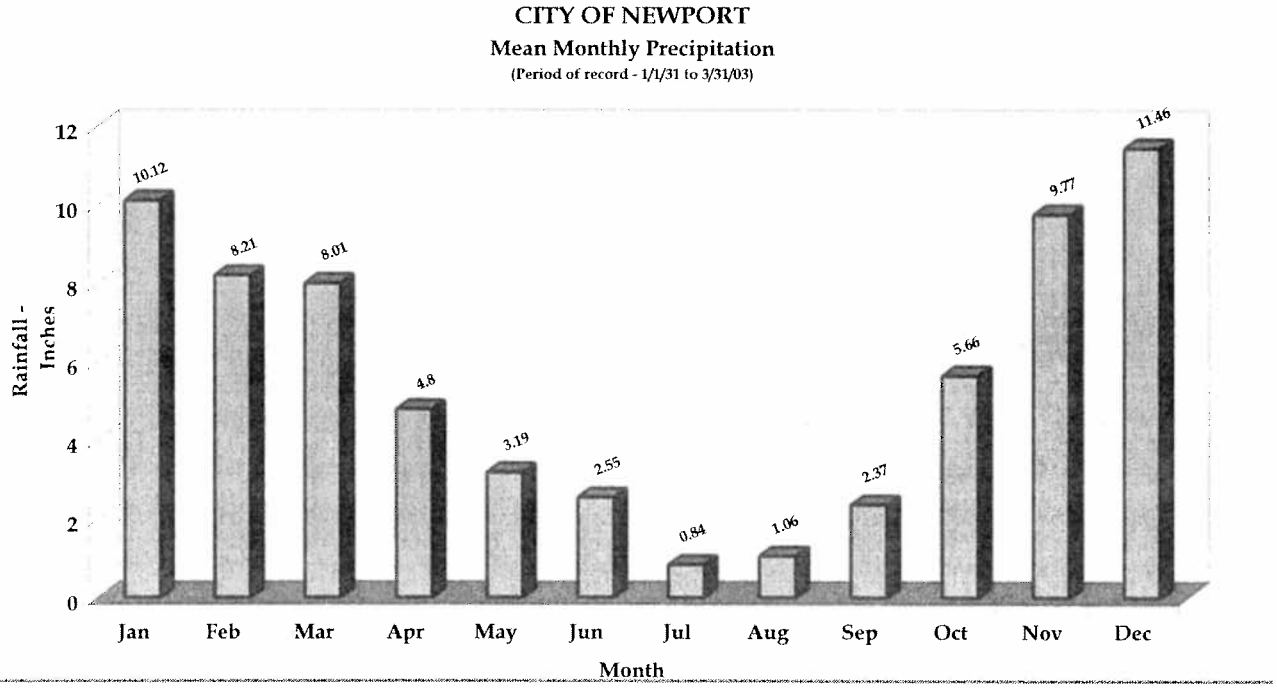
Regional weather patterns are affected by the presence of the Coast Range mountains to the east and the Pacific Ocean to the west; the area has a temperate climate with marked seasonal characteristics. In the late fall, winter, and early spring, the area is under the influence of marine air which results in damp, cloudy, and cool conditions.

Mean monthly temperatures (°F) for the winter and spring months are in the 40s and mean monthly precipitation totals range between six (6) and thirteen (13) inches. The late spring, summer, and early fall are typically warm, dry, and sunny; possibly resulting from the dry, continental nature of the upper level prevailing winds that cross the area. Mean monthly temperatures (°F) for the summer and fall months are in the 50's and mean monthly precipitation totals range from less than one (1) inch to approximately six (6) inches.

Precipitation

Area precipitation is directly related to ocean-formed storms and the prevailing weather patterns that bring these storms ashore. Annual rainfall in the area, based on National Oceanic and Atmospheric Administration (NOAA) data, is approximately seventy-five (75) inches, with most of this falling between November and March. Annually snowfall during the year is slight with the mean yearly total being two (2) inches. When snowfall occurs, it is generally during the December to March time period. A plot of the historical mean monthly precipitation for the Newport area is provided below in Figure 3.2.3.

Figure 3.2.3



Storm water drainage Planning is not necessarily concerned with the amount of annual rainfall occurring in a region; rather, storm water Planning is more concerned with the type, intensity, and the total daily rainfall of the storms. These elements, known as the design storm, are used to analyze the drainage system and its components. A further discussion of the South Beach design storm and its use to analyze drainage components is provided in Section 4.

Temperature

Mean daily temperatures (°F) during the winter months fluctuate between the low 50s and the high 30s, while mean daily temperatures (°F) during the summer months fluctuate between the low 60's and the high 40s. Temperatures of less than 20°F have been recorded during the months of December, January, and February; and, record highs in the 90s have occurred during the months of June, July, August, September, and October.

Wind

The presence of the Pacific Ocean to the west directly affects prevailing wind patterns in the region. Summer breezes blow from the northwest and winter winds gust from the southwest. Wind velocities average 10 to 15 miles per hour, but higher gusts are common. The strongest winds ordinarily develop during the winter months, while summer winds are normally lower in velocity.

Topography

The Study Area's elevation varies from sea level and rises to an elevation of 400 feet at the peak of the hills located east of the airport. Three named creeks, which drain to the Pacific Ocean, provide natural drainage in the southern half of the Study Area. The northern half of the Study Area is dominated by an ancient, low lying, river bed which drains into Yaquina Bay and is bisected by Highway 101, along with some minor streams which also drain into the bay or directly into the ocean.

Soils

Soils in the South Beach Area are primarily moderately draining silty loams overlying sandstone and basaltic rock formations. Steep slopes in the eastern portion of the Study Area are generally comprised of soils with high runoff potential and significant erosion potential. Moderate slopes within the more developed areas of the Study tend to have soils with moderate to slight runoff potential. Surfacing rock formations in select areas along Highway 101 tend to increase the overall runoff potential for soils within this region. Erosion potential for the moderate slopes is also slight to moderate. In the lower slopes and topographically depressed areas along the marine terraces, soils tend to have poor drainage characteristics. The low topographical relief tends to reduce runoff and erosion potential but increases the occurrence of water ponding, hydrated soils, and wetland characteristics. In some areas, ground water can be elevated above grade for significant periods throughout the year.

A complete summary of the soils characteristics and classifications of the major soil groups is provided in the Soil Survey of Lincoln County Area, Oregon, by John A. Shipman, Natural Resources Conservation Service.

Geologic Hazards

Geologic hazards are those hazards that, as a result of natural phenomena, result in damage or destruction of property. The proximity of the Pacific Ocean, the presence of underlying fault zones, and the physical characteristics of native rock formations create potential geologic hazards in the vicinity of the Study Area. Within the Study Area the following geologic hazards have been identified: earthquakes, landslides, Tsunamis (tidal wave), and coastal erosion.

Land Slides

The potential for landslides in the Study Area exists in areas along steep slopes east of Highway 101. Development and logging on this hillside should consider the relative stability of the slope prior to proceeding with the activity proposed. Storm water collection and conveyance, should consider the potential for landslides in-so-far as to not enhance the potential for slope instability.

Coastal Erosion

The potential for enhanced coastal erosion from the discharge of storm water outfalls should be considered in the development of storm water facilities. Discharge of high volumes of water, even from private property roof drains, can cause erosion of the sandy soils (Bandon fine sandy loam) typically found in several areas of Study Area. Once exposed, the sandy soils are subject to wind erosion compounding the erosive forces from the ocean wave action. Consequently, any improvements or alteration of outfalls should include precautions to prevent storm discharges from eroding coastal banks. Particular attention should be given to outfalls located in residential areas constructed on sandy soils.

3.3 Economic Conditions and Trends

Population growth and future development in the Study Area will likely be affected by regional economic conditions and trends. Considerable immigration has taken place within the region of Central Oregon Coast for the last decade and this growth is anticipated to accelerate in the immediate future.

3.4 Population and Service Projections

Projections for population growth are often utilized to estimate the future demand for City services, such as water and sewer. Typically, the future demand is based on an estimated number of residential homes, called average dwelling units, projected for the Planning horizon. However, residential units are only a portion of the future demand. Commercial, industrial, and institutional customers will also demand services. Accounting for these customer types requires comparing the demand for services from the respective customer with the demand from the average dwelling unit. The relationship is defined as the equivalent dwelling unit (EDU) methodology. An example of the EDU methodology follows.

The standard method for calculating storm water system EDU's is based on the impervious surface area for each property. This method is based on the assumption that each residential unit consists

of a lot divided into impervious area (roof tops, driveways, sheds, etc) and non-impervious area (lawns, gardens, etc). The typical lot size and the amount of impervious surface area are based on the average for the entire community. Determination of the typical residential lot size and impervious surface area can be calculated from a random survey of aerial photography and does not necessarily have to be based on the entire community.

Once established, the base impervious area for residential units is used to rate each commercial and industrial unit according to the amount of impervious area relative to the typical residential unit. As new development occurs, it is assumed that each new residential, commercial, or industrial unit increases storm water runoff proportional to the amount of impervious surface area developed with the respective property. Future residential units are rated as 1 EDU while commercial, multifamily, and industrial developments are rated according to the amount of impervious surface identified in engineering Plans. Using this method, future demands for storm system services and future SDC's can be based on estimated population growth rates for residential development with proportional growth in the commercial and industrial sectors.

In the case of Newport's South Beach Area, the correlation of population growth with future storm system requirements would not be accurate because existing and Planned land uses are not typical of an overall community or city. The Study Area contains a significant amount of publicly owned lands (Municipal Airport, State and local parks, Wastewater Treatment and Water Storage facilities, etc.), and while there are some residential developments, the majority of the developable area is planned for industrial and commercial uses. For purposes of this study, each drainage basin was evaluated for existing and potential development areas.

3.5 Land Use

General

The City has grown as a regional commercial center with an expanding tourism industry, but in order to continue to grow, additional heavy commercial and industrial land is needed. Industrial growth has long been planned for the South Beach Area where there is vacant land, but constraints to development cause these properties to be unsuitable for development. The South Beach Area is targeted to provide for the City's economic growth because buildable lands suitable for industrial growth are in short supply, and it is apparent that properties in the South Beach Area are currently underutilized.

South Beach currently has a mix of uses including recreational, public facilities, commercial, industrial and residential. South Beach properties within the Urban Renewal District include lands lying within the incorporated City limits, and lands lying outside the City under the jurisdiction of Lincoln County or UGB lands. The highway is the most dominant feature, providing the dividing point between east and west. Developed and undeveloped residential properties including but not limited to the South Shore residential/commercial development and South Beach State Park properties are located west of Highway 101. Industrial and commercial uses, the airport, and several tracts of land suitable for residential use lie within the UGB east of the highway. The Hatfield Marine Science Center, the Oregon Coast Aquarium and South Beach Marina are all located east of the highway and near the bridge in the most heavily developed area of South Beach. Table 2 in the Transportation Systems Plan shows improvement projects proposed for existing

streets, including a proposal to widen Highway 101 to four lanes between Yaquina Bay Bridge and SE 123rd Street. This improvement is shown with a 16 - 20 year priority.

Recent developments in the South Beach Area, (South Shore, the aquarium, the Hatfield Marine Science Center and Aquarium Village) have contributed to increased activity in the area, aesthetics have improved, and property owners have expressed growing interest in developing their individual properties.

Many vacant and underutilized lands adjacent to Highway 101 within the City's South Beach Area have seasonal standing water is due to poor drainage or jurisdictional wetlands. The standing water appears to be stagnant giving the appearance of an accumulation of ditch water, and resulting in an unattractive landscape.

Underutilized property does not produce revenue for property owners, and it does not contribute to the City's tax base at its full potential. The City of Newport is working to resolve problems and facilitate future development that will produce revenue and contribute taxes by addressing drainage and related water quality issues within this Plan. Implementation of this Plan will be a big step in the direction of making more land suitable and available for future development of the City.

Industrial Land Needs

The City's Urban Renewal Plan developed in 1983 addresses potential demand for approximately 470 acres of land in the South Beach Area. There are approximately 516 acres zoned for industrial and commercial development north of the airport and on the east side of Highway 101 in the South Beach Area including but not limited to the Newport Business Park. In addition, there are approximately 33 acres of land designated for commercial development including land south of the Yaquina Bay Bridge to the west of Highway 101 at the Newport Business Park Annex, and a portion of the property previously proposed for Wolf Tree development south of 98th Street on the east side of Highway 101.

The Yaquina Bay Economic Foundation's Inventory of Vacant Commercial and Industrial Land in Toledo and Newport prepared by SR Enterprises, April 1995 provided analysis concerning constraints resulting from an abundance of wetlands and the existence of steep slopes, noting that only about 90 acres of commercial and industrial land in the South Beach Area are vacant and buildable. However, when the report provided further analysis considering additional constraints and competing uses for relatively flat vacant properties, only about 45 acres were identified as vacant and available for industrial development.

The Urban Renewal Plan cites additional problems beyond the analysis including irregular parcels of land, inadequate access, inadequate utility service, poor drainage and underutilization of land resources. Net re-developable land supply is calculated at approximately nine acres in the commercial and industrial lands inventory. The problems resulting from lack of adequate drainage can exacerbate all the other identified problems because drainage patterns are not only the result of the natural functions and interrelationships of weather, topography and soils, but they are affected by all aspects of existing and future development. Underutilization of land resources in the South Beach Area is thus the result of a number natural phenomena and humanly induced problems that currently exist.

Urban Growth Boundary Lands

Lands within the Urban Growth Boundary that are Planned for future development of the City of Newport are under the jurisdiction of Lincoln County. These Urban Growth Boundary lands also encompass lands zoned for Planned Industrial, Public Facilities, and residential with lot sizes ranging from 6,000 square feet to two acres. In addition, there are lands lying within the jurisdiction of the Lincoln County Estuary Management Plan that have a Marine Waterway Zone designation, and forest lands with a Timber Conservation designation that is primarily for farm and forest use. County Planning staff have indicated that the majority of the residentially zoned land within the Urban Growth Boundary is already platted, although infilling will continue to occur.

The largest blocks of residentially zoned land under Lincoln County jurisdiction within the Urban Growth Boundary include the following:

A strip of residentially zoned properties west of highway 101 and the airport, and adjacent to the south end of the South Shore development includes properties that are already platted for single family dwellings with R-1 zoning that requires a minimum 6,000 square foot lot.

The residentially zoned property that leads east to Idaho Point could be developed into smaller lots for single-family dwellings, but properties on the east near the point are already platted in small lots. The zoning of the lands in the Idaho Point vicinity is also R-1 with a minimum 6,000 square foot lot.

In addition, residential land within the Urban Growth Boundary lies west of Highway 101 and adjacent to and north of the Lost Creek Recreation site. This land zoned R-4 with a minimum four-acre lot for a single-family dwelling is already platted. Residential lands lying southwest of the airport are not located within the Urban Growth Boundary or the City, though lands that are within the City limits surround them. Because of the County's zoning at the four-acre minimum, it is anticipated that when density increases to urban standards, annexation will be required.

Lands Outside of City Limits and UGB

Portions of the drainage basins studied extend outside of the areas contained within the City limits and Urban Growth Boundary. Because the runoff from these areas affects lands within the City limits and UGB, discussion of land use in these areas is pertinent. These lands are primarily zoned by the County with a Timber Conservation designation that is primarily for farm and forest use. Future development affects on the drainage basins associated with such lands were not considered, as they will likely remain as is.

Public Lands

Lands within the Study Area that are also contained within the City limits and Urban Growth Boundary include a significant amount of publicly owned properties. Those lands comprise approximately 1,300 of the 2,800 total acres contained within that described area. An approximate breakdown of the publicly owned properties is contained within the following table:

Table 3.5.1 Publicly Owned Property Within City Limits and UGB of Study Area		
Public Agency	**Approx. Area**	**Use**
Port of Newport	50 acres	Marina
State of Oregon	55 acres	Hatfield Marine Science Center
City of Newport	20 acres	Vacant (used to be drive-in theatre)
State of Oregon	326 acres	South Beach State Park
Lincoln County	40 acres	Mike Miller Park
City of Newport	141 acres	WWTP, Water Storage, City Parks
City of Newport	700 acres	Municipal Airport

Wetlands

Significant amounts of land contained within the low-lying basins in the Study Area (Basins 3, 6 & 7) have the presence of wetlands. Land within an urban area, which is adjacent to or near a major transportation route, such as Highway 101, is typically considered prime property for commercial and/or industrial type developments. The presence of wetlands on properties in the South Beach Area is a deterrent to any type of intensive land use development because of the time and expense associated with the State and Federal permitting requirements typically associated with fill in these areas.

Wetland areas are identified and delineated according to the 'triple parameter' described in the *US Army Corps of Engineers Wetlands Delineation* Manual (Environmental Laboratory, 1987). This method requires an area to possess a prevalence of hydrophytic vegetation, hydric soils, and wetland hydrology. Under normal circumstances, positive indicators of each of these three parameters must be present for an area to satisfy the criteria as jurisdictional wetlands.

Water is the critical, driving factor in wetland formation. For the purpose of delineating wetlands, an area is considered to possess wetland hydrology when the soil is saturated to the surface for more than 12.5 percent of the growing season. Areas saturated to the surface between 5 and 12.5 percent of the growing season are sometimes wetlands and sometimes uplands. Areas saturated to the surface for less than 5 percent of the growing season are not wetlands. The growing season is defined as the number of days between the last killing frost in the spring and the first killing frost in the fall, during an average year. For this site, that period has been defined as from January 29 to January 3 of the following year (NRCS, 1982). This corresponds to a 335-day growing season. Saturation to the surface must therefore occur for a minimum of 18 consecutive days (5 percent) during the growing season, but more likely for 42 consecutive days (12.5 percent) for wetland hydrology to occur.

The perception of some people is that wetlands are associated with lack of adequate storm drainage facilities. While storm water runoff and surface water are factors involved with establishing some of the wetland hydrology in Basins 3, 6 & 7 because of the low-lying nature of the basins, groundwater hydrology is the primary reason for the existence of the vast wetlands here. The fill activity associated with development throughout the years and surface water management

practices have most certainly altered the pre-development footprint of wetlands in South Beach. However, managing the quantity and quality of surface water run-off in the South Beach Area will, by itself, most likely make little difference in the current wetland inventory.

The Model Overlay Zone discussed in Section 7 encourages use of wetlands for open space, recognizing water is attractive to people and with proper development it can be a visual asset/enhancement for drawing people to the area.

4.0 Runoff Analysis

The term storm water typically refers to rainfall runoff, snowmelt runoff, and surface runoff and drainage. Effective storm management includes the accurate sizing of storm water conveyance systems specifically, culverts, catch basins, detention/retention ponds, and storm drainage pipelines. Sizing for conveyance systems is generally accomplished by estimating the instantaneous peak runoff from a specific storm event. For purposes of this study the Storm Water Management Model (SWMM) developed by the EPA was used to estimate peak runoff.

4.1 Basin Mapping and Characterization

The SWMM model computes flows as instantaneous values at the end of a time step and creates a plot or hydrograph of discharge versus time for each sub-basin. The characteristics of each drainage basin, which affect the run-off hydrograph and must be defined for input to the model, are:

- Width of sub-catchment,
- Area,
- Ground slope,
- Percentage of impervious area,
- Roughness (Manning's n),
- Depression storage: a factor that defines the extent to which run-off is not instantaneous, but is held in surface storage,
- Infiltration.

The South Beach Study Area can be divided into 13 drainage basins that were delineated by constructing drainage divides on a topographic base map. The City provided an area map with detailed topographic information. Since the City's map did not extend to the eastern boundaries of the drainage basins it was necessary to include information from a USGS topographic map of the area to create a complete base map of the Study Area.

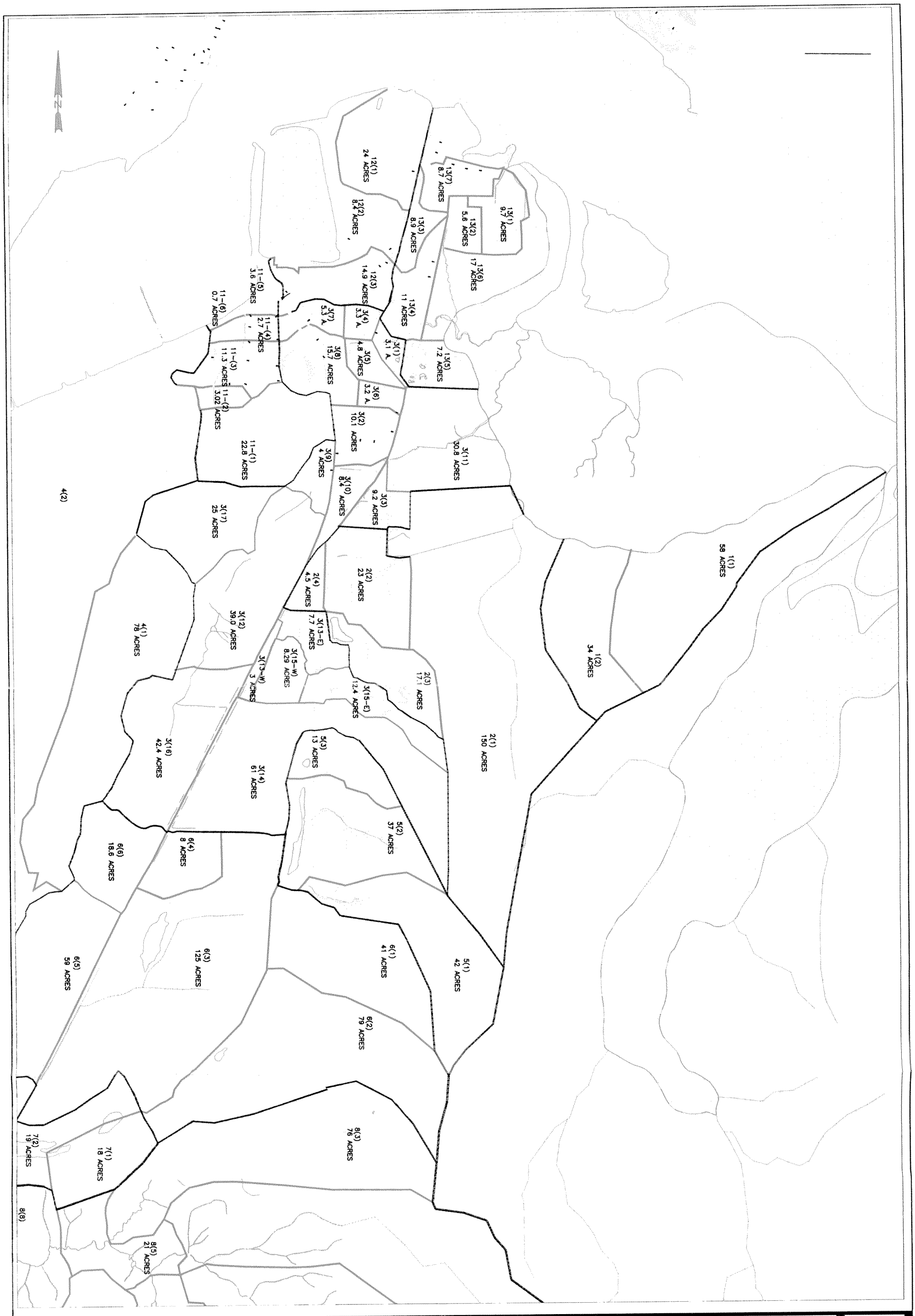
Each drainage basin was divided into sub-basins with similar slope, ground cover and land use. The drainage basins and sub-basins are shown in Figures 4.1.1 and 4.1.2.

Input of sub-basin information and hydraulic characteristics to the SWMM model is facilitated by a spreadsheet format, which makes it easy to enter the data for a large number of sub-basins and allows each sub-basin to be accurately characterized. The width, area and slope of each sub-basin were determined from the electronic base map.

The percent of impervious area is probably the most important parameter in characterizing each sub-basin. Percent imperviousness is largely a function of land use. Development will increase the percent of area that is impervious, and runoff will increase proportionally. The relationship of impervious area to land use and the impact on projected runoff following development is discussed in detail in Section 6.1.

The Manning's n factor for roughness is dependent to a large extent on ground cover and was determined from the base map and by observation of aerial photographs and site visits. The use of

Manning's n in the runoff flow equation is discussed in more detail in Section 4.2, Method of Analysis. This section also explains how the model uses depression storage and how infiltration is calculated.



PROJ. NO. 002612	DATE 01/20/04	SHEET FIGURE 4.1.1	CITY OF NEWPORT DEVELOPMENT COMMISSION SOUTH BEACH AREA STORM DRAINAGE BASIN/SUBBASIN MAP BASINS 1, 2, 3, 5, 11, 12, 13	DSGN DR CHK APVD	NO.	DATE	REVISION / BY

CONSULTING ENGINEERS & GEOLOGISTS, INC.
598 Anderson Ave. (541)266-9442
Coos Bay, Oregon 97420-0150 FAX (541)266-9496

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

400

2(1)
150 ACRES

5(1)
42 ACRES

5(2)
37 ACRES

6(1)
41 ACRES

6(2)
79 ACRES

8(3)
76 ACRES

8(1)
161 ACRES

8(2)
109 ACRES

9(1)
43 ACRES

9(2)
21 ACRES

9(3)
68 ACRES

9(4)
58 ACRES

10(1)
170 ACRES

10(2)
163 ACRES

9(5)
16 ACRES

9(6)
113 ACRES

9(7)
33 ACRES

9(8)
49 ACRES

10(4)
28 ACRES

10(3)
38 ACRES

5(3)
13 ACRES

3(14)
61 ACRES

6(3)
125 ACRES

6(4)
8 ACRES

3(16)
42.4 ACRES

6(6)
18.6 ACRES

6(5)
59 ACRES

8(4)
11.0 ACRES

8(6)
28 ACRES

8(5)
21 ACRES

7(1)
18 ACRES

8(7)
30 ACRES

9(10)
17 ACRES

9(9)
36.2 ACRES

10(5)
40 ACRES

10(6)
24 ACRES

9(11)
29 ACRES

10(7)
40 ACRES

7(2)
19 ACRES

8(8)
27 ACRES

7(3)
20 ACRES

7(4)
9.2 ACRES

8(9)
27 ACRES

9(12)
58 ACRES

9(14)
51 ACRES

9(13)
3 ACRES

10(10)
24 ACRES

10(8)
62 ACRES

10(9)
11 ACRES

10(14)
1.3 ACRES

10(13)
6.4 ACRES

10(11)
24 ACRES

10(12)
25 ACRES

8(8)
16 ACRES

N

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING 1"
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

CONSULTING ENGINEERS
& GEOLOGISTS, INC.
598 Anderson Ave. (541)266-9442
Coos Bay, Oregon 97420-0150 FAX (541)266-9496

NO.	DATE	REVISION	BY

DSGN
DR
CHK
APVD

CITY OF NEWPORT
DEVELOPMENT COMMISSION
SOUTH BEACH AREA STORM DRAINAGE
BASIN/SUBBASIN MAP
BASINS 6, 7, 8, 9, 10

SHEET
FIGURE
4.1.2

DATE 01/20/04

PROJ. NO.
002612

4.2 Method of Analysis

The Runoff Block of SWMM program was developed to simulate runoff from a drainage basin. Each basin is represented by a series of idealized sub-catchments and gutters or pipes. The program accepts rainfall input as a plot of rainfall intensity with time, and makes a step-by-step accounting of infiltration losses in pervious areas, surface detention, and overland flow and channel flow, leading to the calculation of a number of inlet hydrographs.

Simulation Period

The Runoff block may be run for periods ranging from minutes to years. It was possible to run a continuous simulation for the South Beach Study Area using rainfall data available from the Marine Science Center. Rainfall for the period from October 1999 through January 2000 was used as the basic rainfall input. At the end of this period the ground conditions simulated by the model approximate the saturated conditions that would be expected during a wet winter, and at this point rainfall based on a 24-hr design storm event is input.

Design storms are based on the statistical evaluation of rainfall events. A detailed description of their selection and how the rainfall pattern was simulated for input to the model is included in Section 4.4.

Calculations

When rainfall strikes the land surface it may initially distribute to fill depression storage, infiltrate to fill soil moisture and ground water, or travel as overland flow to a receiving stream. The runoff block uses the Manning's n equation for uniform flow and calculates the initial runoff flow as area times velocity. Velocity is defined as a function of roughness, slope and depth of flow. Values used to define the roughness coefficient for each sub-basin are included in Table 4.2.1.

Table 4.2.1
Manning's "n" Roughness Coefficient Used for Calculation of Overland Flow

Pervious Surfaces		Impervious Surfaces	
Description	**n**	**Description**	**n**
Dense shrubbery and forest litter	0.40	Asphalt	0.02
Dense turf	0.35	Gravel Surface	0.14
Light Turf	0.20		

The area used in the runoff equation is defined as the width of the catchment times depth of flow. The depth of rainfall is adjusted first by depression storage. This is a volume that must be filled prior to the occurrence of runoff. It represents a loss caused by surface ponding, wetting, interception and evaporation. During a continuous simulation the model simulates the filling up of depression storage. During periods of rainfall, depression storage quickly goes to zero and simulated runoff is instantaneous and subject only to losses from infiltration in the pervious areas.

The SWMM model provides two methods for calculation of infiltration. The Green -Ampt infiltration equation was chosen for the South Beach simulations because the parameters are based upon physical soil properties, making it easy to accurately characterize the drainage basins based on major soil types. From Lincoln County soil surveys it was determined that soils in the Study Area could be considered either sand or sandy loam. Appropriate values for the Green Ampt parameters of soil conductivity, porosity and capillary suction were defined for each sub-catchment based on published values for major soil types, and are included in Table 4.2.2.

Table 4.2.2
Green -Ampt Infiltration Equation Parameters

Parameter		Units	Sand	Sandy Loam
Su	Average Capillary Suction	ft/ water	4.00	8.000
Ks	Hydraulic Conductivity	ft/sec	0.45	0.300
IMD	Initial Moisture Deficit	ft/ft	0.34	0.330

Comparison with Other Methodologies

The results obtained with the SWMM model were verified by comparing the results to those obtained by applying the soil conservation service methodology (SCS) method for obtaining runoff.

The SCS methodology utilizes a synthetic rainfall distribution for a single storm. The simulated storm event is based upon synthesized rainfall distribution curves developed for different regions of the U.S. For example Newport and South Beach are in an area which is expected to have a (type IA Storm). The IA pattern is similar to the historical rainfall pattern, which was used to create the design storms for the SWMM. The storms used for both methods of calculating run-off are equivalent in terms of magnitude in inches per day.

To use the SCS method soil and ground covers are classified by curve numbers (CN) that have been derived empirically, to give accurate estimates of rainfall retained on the surface or generating run-off. Typical CN's are based on soil type, land use and percent impervious area.

Except for selection of an appropriate curve number and storm type for the SCS method, the parameters which are needed to characterize the basin for calculation of runoff with the SWMM Runoff model are also used for application of the SCS method. The graphical method outlined in Technical Release 55 (EPA, 1986) and the software program Hydo CAD were both used to calculate run-off for a number of the South Beach drainage basins. The magnitude of the run-off, which was calculated for these drainages, was equivalent to the results obtained with the SWMM model.

4.3 Design Storm

The final aspect of the runoff analysis is the selection of a design storm or storm frequency that will be applied to analyze and size the drainage system. The design storm is the precipitation total for a rainfall event that is expected to occur over a twenty-four hour period based on the statistical evaluation of historical rainfall events. Typical intervals for storm frequencies are 2, 5, 10, 25, 50, and 100. The 50-year recurrence interval storm is expected to occur once in a fifty-year period, with a 2% probability of occurrence in any one year. (a twenty-five year storm has 4% probability of occurrence in any one year, a ten year 10% and a 5 year 20%).

Selection

Economic factors must also be considered when selecting the design storm used in engineering analysis. A drainage system analyzed and sized for the 100-year storm event will result in a larger capacity drainage system than that required for a lesser storm. Similarly, the cost for facilities sized to handle the 100-year storm will be higher than the cost for facilities sized to handle a lesser storm. However, if facilities are sized for a too frequent storm, the cost of private property flooding, damage to public facilities, and the potential loss of life could be much higher than if larger facilities were constructed initially. Therefore, the cost-benefit ratio should be considered.

Selection of the design storm frequency for the South Beach Area will consider such economic and social factors when the required projects or flooding predicted to occur are significant. Since much of the City's drainage system is routed across Highway 101 and consequently, through ODOT's drainage system, ODOT guidance should be utilized as the final storm selection criteria. Based on the ODOT Hydraulics Manual, a 50-year recurrence design storm should be utilized for facilities draining through Highway 101. On smaller City streets, a 25-year storm could be utilized for the analysis of drainage facilities. In cases where roadway overtopping could be a problem, a larger storm, the 100-year storm, should be analyzed to determine if backwater-flooding problems would cause property damage.

Rainfall totals for 5, 10, 25, 50 and 100-year reoccurrence intervals have been determined from isopluvials for Oregon obtained from NOAA Atlas 2. Design Storm precipitation totals for South Beach are included with recommended design capacities in Table 4.3.1

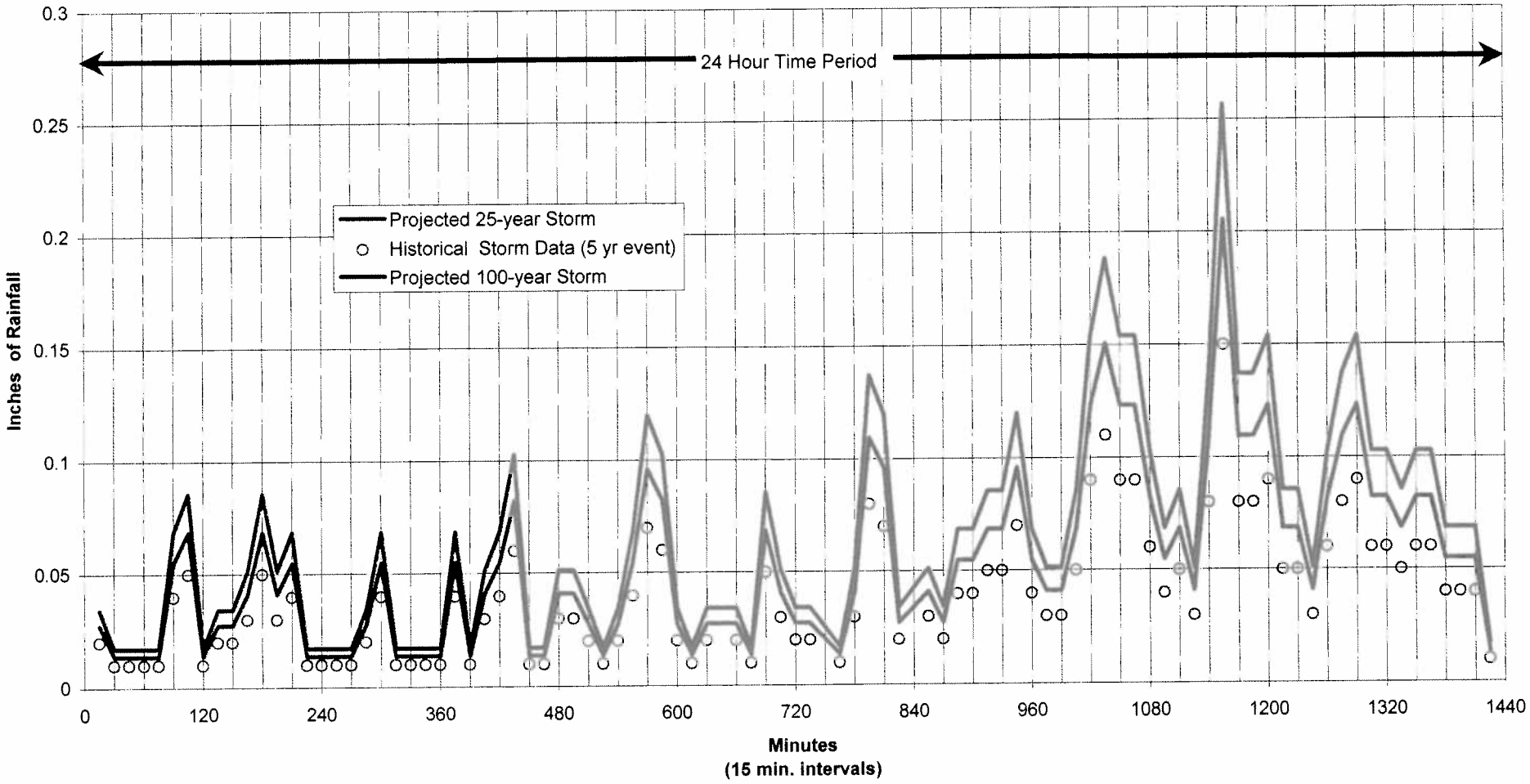
Table 4.3.1 Drainage System Design			
Drainage Facility		Design Storm	
Minor	Streets, gutters, inlets, catch basins & collector drains	10-Years	4.50-inch/24 hr
Major	Laterals less than 100 tributary acres	25-Years	5.00-inch/24 hr
Major	*Trunk > 100 Tributary acres	50-Years	5.60-inch/24 hr
Major	*Arterial Streets and Drainage System	50-Years	5.60-inch/24 hr
Major	Watercourses W/o Designated floodplain	50-Years	5.60-inch/24 hr
Major	Watercourses With Designated floodplain	100-Years	6.25-inch/24 hr
Major	Bridges	100-Years	6.25-inch/24 hr
Major	Detention facilities storage volume (on site)	25-Years	5.00-inch/24 hr
Major	Detention facilities storage volume	100-Years	6.25-inch/24 hr

* Surcharging contained within pipe system allowed

Application to SWMM Model

During the year that was used as input for the continuous SWMM Runoff simulation there was one day with rainfall that approached the 5-year storm in magnitude. On January 25 a rainfall of 3.65 inches was recorded during the 24-hr period. The rainfall pattern recorded on this day was used to create the design storms used in the SWMM model. Figure 4.3.1. is a graph which represents that storm cycle with the initial 5 year event and the calculated, representative 25 and 100 year storms.

Figure 4.3.1: South Beach Design Storms
(Based upon historical 5-year event)



5.0 Existing Conditions & Public Involvement

5.1 General

The following section provides a brief description of the drainage facilities based upon field investigations, review of as-constructed drawings, previous studies and other available, pertinent information. Where possible, the location of drainage facilities and the elevations controlling the direction of flows were verified by existing Plans. Basin boundaries were delineated from available aerial photography, USGS mapping, field assessment of drainage patterns, and spot elevations from existing aerial topographic plans. The numbering system for the major drainage basins is reflective of the previous studies performed in this area. The boundaries are generally similar to past work; however, more accurate topographic mapping was used for this study resulting in some adjustments. The northernmost part of the Study Area previously all defined as Basin 3 (S3) has been separated out into two additional basins. It should be anticipated that future field surveys would find deviations in the facilities shown on the attached maps and described below.

The descriptions provided below are intended to provide background information on current development patterns for the analysis of storm water facilities. Recommended improvements resulting from this information provide a general guideline for estimating future improvements and their associated costs. Future developments or implementation of a recommended improvement should be preceded by a full field survey to verify the information contained in this Plan. Specific changes to the recommended improvements should be anticipated, though general concepts and line sizes should be accurate.

5.2 Drainage Basin Descriptions

A total of 13 Basins have been delineated for the Study Area in South Beach. Each basin is described below. Mapping of the extent of each basin and their respective drainage areas are represented in figures 4.1.1 and 4.1.2. Existing drainage facilities located by as-constructed information and field investigation are provided in Figure 5.3.1, (at the end of this section).

Basin 1

Basin 1 is best described as the northerly slope of Idaho Point and is bound by the ridgeline of that point to the south and Yaquina Bay to the North. The area is located outside of the Newport City limits with the northern two-thirds contained within the Urban Growth Boundary. The easterly half of the point, with exception of some of the steep slopes, has been developed as a residential neighborhood. Hydraulic flow in this basin is characterized by sheet flow from the southern ridge down to the perimeter road (SE 35th Street) located between the base of the slope and the Bay. The roadway at the base of the hillside cuts off the storm flow, collects and transports it in roadside ditches to culverts which discharge directly into the Bay. The ditches and culverts are adjacent to a county road.

Existing Problems: The drainage ditch and culvert system, which collects the hillside run-off, appears to have adequate capacity. The 18-inch culvert appears to be crushed on one end, which is restricting flow.

Future Development Issues: The potential for further development in this basin includes additional residential development. The estimated run-off from this area does not currently exceed the capacity of this culvert. However model simulation of developed conditions indicated an increase in runoff, which would exceed the capacity of this culvert.

Basin 2

Basin 2 is bound by Basin 1 and the ridgeline to the east; Basin 3 to the north and west; and Basin 5 to the southwest. Development in this area is situated in the northwest corner of the basin and consists primarily of industrial uses along with a small amount of residential and commercial. Almost all of the development is contained within that portion of the basin that is within the City limits. Approximately one-half of this basin is in the Urban Growth Area and one-half outside of the City and UGB, with development controlled by the County. In the undeveloped portion of this basin, hydraulic flow is characterized by sheet flow from the hillside, gradually becoming channelized stream flow and discharging into the Bay through a culvert under SE 35th Street The developed portion of the basin is located in the lower elevations and contains a small piped storm sewer system which discharges into a intertidal wetland that empties into the bay through a ditch and culvert under SE 35th Street.

Existing Problems: The existing culvert under SE 35th Street is a 24-inch CMP and one end of it has been crushed, restricting flow.

Future Development Issues: Future development in this basin would consist primarily of residential uses within the UGB and possibly some low density residential (1 house per five acres) in the land controlled by the County. This future development could alter and impact the existing hydrologic and hydraulic characteristics of the basin. Consequently, based on the drainage system design criteria the culvert should be sized for run-off from a 50-year design storm; the existing size is inadequate to accommodate such flow. The channel that conveys the combined sub-basin flows should be made deeper and wider to carry the increased run-off, which is projected.

Basin 3

Basin 3 encompasses the north one-half of the relatively flat, lowlands which is believed to be an ancient outlet channel to the Yaquina river which has filled in. This basin is bounded on the east by Basins 2 and 5; on the west by Basins 4 and 11; on the north by Basins 12 and 13; and on the south by Basins 4 and 6. Basin 3 contains a considerable amount of commercial and industrial development and is an important transportation corridor for the community, region and State, as Highway 101 passes through it. The geologic progression and development history of this area has had considerable affect on its ability to handle storm water run-off. It appears that prior to development this area was relatively flat ranging from 11 to 14-feet elevation. One of the first developments in the area was the installation of Highway 101, which bisected the area with the placement of a 4 - 6 foot fill for the roadway, and culverts placed at identified drainage ways. Throughout subsequent years, various commercial and industrial developments have occurred through the placement of fill materials in the old streambed to somewhat match the elevation of the highway. Along with fill and development, additional culverts were installed, streams were channelized, and some storm sewer piping was installed. Up until the most recent decades, typical

development took place with storm drainage and run-off management given only a cursory consideration, if any. Roadside ditches, culverts and open channels of minimal grade resulting in a slow moving system typify the hydrology in this basin. Because of the low elevations, the groundwater table does not appear to fluctuate far from the surface. Several ponds, (year around and seasonal) along with a considerable amount of jurisdictional wetlands are located here.

The majority of piped storm sewers within the Study Area are located in the intensely developed northerly one quarter of this basin.

Existing Problems: Several problems have been identified with this basin. Such problems appear to have occurred because of the combination of topographic and geologic characteristics coupled with fill and development taking place without significant consideration given to drainage. Existing problems associated with this basin are listed below:

There is a 450 ft. section of the existing 48-inch storm drain system, which is situated on private property. A portion of this pipe may be located under an existing building.

The outlets for the three sub-basins east of the highway, (3(13), 3(14) and 3(15)) as depicted on figure 4.1.1, are an 18- inch culvert (ODOT #142) and a 24-inch culvert near the intersection of the Highway and Mike Miller Park Road (ODOT# 143). Drainage from these sub-basins is a problem because flow is not adequately transported away from the highway culverts.

Ditches are inadequate and incomplete along the western edge of Highway 101.

Periodic sheet flows over portions of Highway 101 are due to the lack of an adequate drainage system in this area.

Channel/Stream maintenance of the natural channels in this basin is inconsistent due to the drainage ways passing through several private properties. Occasional back-up problems occurring from animal activities have also been identified as a recurring problem.

Future Development Issues: Future development in this basin would consist primarily of commercial and industrial uses located along the Highway 101 corridor. Problems identified with future development include:

At the northern end of Basin 3's primary drainage ditch a series of storm drains and open channels convey the flow under Highway 101 and Ferry Slip Road, finally discharging into the Bay through an intertidal channel. Run-off simulation results indicate that based on the development assumptions outlined in Section 5 and assuming a 50-year storm, a portion of the 48-inch storm system and outfall will be not have sufficient capacity after future growth occurs.

Basin 4

Basin 4's most predominant feature is that the majority of this large basin is made up of South Beach State Park. It is bordered on the north by the ocean outlet to the Yaquina River; on the west by the Pacific Ocean; and on the east by Basins 3, 6 and 11. A line of low beach dunes separates this basin from Basins 3 and 6, which encompass the ancient river outlet. The State Parks campground is

situated between the previously described line of dunes and another set of dunes. As you move further west in this basin, its characteristics are that of many Oregon beaches made up of a deflation Plane, fore dune and sandy beach. With the exception of the park's campsite and a few culverts located under the south jetty access road, hydraulic flow in this basin is characterized by natural run-off associated with dune and beach areas.

Existing Problems: No major drainage problems have been identified in this basin.

Future Development Issues: The potential for development in this basin is extremely limited and would only be in relation to State Park's purposes.

Basin 5

Basin 5 is the only major basin addressed in this study that does not have a direct outlet to the Yaquina River or Ocean. Storm water run-off from this basin is collected in ponds contained in Mike Miller Park, which eventually overflow into Basin 6. This basin is characterized by undeveloped hillside with a considerable amount of steep slopes. Hydraulic flow is characterized by sheet flow from the hillside collecting in the previously mentioned ponds

Existing Problems: No major drainage problems have been identified in this basin.

Future Development Issues: The potential for development in this basin is extremely limited due to steep slopes. Some low density residential could be established in some portions of the basin.

Basin 6

Basin 6 is defined by the southern half of the ancient river outlet and the contributing slopes lying in the easterly portion of this area. The basin is bordered on the north by Basins 3 and 5; on the east by the drainage basin defining ridgeline; on the south by Basins 7 and 8 and on the west by Basin 4. Development in this basin consists of a small amount of scattered residential buildings along Highway 101, the City's new wastewater treatment plant (along with a water storage reservoir) situated north east of Mike Miller Park, and a residential planned unit development (South Shore) located at the west end adjacent to the beach. Storm flows originating in the highlands to the east travel down gradient as sheet flow gradually becoming shallow concentrated flow, which is collected by open drainage channels, carried under the highway through two 24-inch diameter culverts, along more open channel flow and discharged onto the beach through a 60-inch diameter storm pipe which carries the flows through the South Shore development. Run-off from Basin 5 is also conveyed by this system to the ocean discharge.

The low lying area of this basin has similar characteristics of Basin 3; the roadside ditches, culverts and open channels of minimal grade result in a slow moving system. The low-lying areas also contain a considerable amount of jurisdictional wetland and several seasonal ponds.

Existing Problems: The primary problems with this basin are also consistent with those of Basin 3. The main existing problems associated with this basin are listed below:

All of Basin 5 & 6 and occasionally portions of Basin 3 drain through a privately owned system, which includes an outfall onto the beach. Because of liability and maintenance issues it is to the City's advantage to replace this line with a line in the public right-of-way. Replacing this line would ensure that there is adequate capacity and eliminate the issues arising from having a major storm sewer under private ownership

Future Development Issues: Future development in this basin would be limited due to several constraints:

- South Beach State Park owns a portion of property within this basin.
- Steep slopes exist on the hillside on the easterly portion of the basin.
- 25 - 30% of this basin is made up of jurisdictional wetlands.

A limited amount of development could take place in this basin. However, if wetlands could be managed, some commercial and industrial development could possibly occur along Highway 101. Hydraulic modeling predicts drainage problems in the following areas:

Basin 5 and 6 flows pass along natural drainage ways to the south then north passing through two 24-inch culverts under Highway 101 (ODOT #144). Modeling assumptions for analyzing the two 24-inch culverts under future build-out conditions include commercial development along the highway for Basin 6, and some residential development in Basin 5. Given these conditions the culverts will not have adequate capacity for all of the anticipated future development.

Run-off simulation predicts that the 60-inch storm sewer and ocean outfall on property owned by the South Shore development will be exceeded with full build-out conditions.

Basin 7

Basin 7 is one of the smaller drainage basins identified in the Study Area. It is bound by Basin 6 to the north and east, Basin 8 to the south, and the ocean beach to the west. Three large ponds dominate this basin. Two contain standing water throughout much of the year and one is seasonally flooded.

Existing Problems: No major drainage problems have been identified in this basin.

Future Development Issues: The potential for development beyond that associated with the growth of the portion of South Shore Planned unit development in this basin is extremely limited due to the remainder of undeveloped area being dominated by steep slopes and ponds. Some low density residential could be established in some portions of the basin.

Basin 8

Basin 8 is bound by Basins 6 and 7 to the north, a ridgeline to the east, Basin 9 to the south and the Pacific Ocean to the west. Basin 8 is the watershed for Henderson Creek characterized by a small amount of residential development west of Highway 101, wooded and clear-cut lands on slopes to the east and approximately 120 acres of farmed land located just north east of the airport (basin 9).

Hydraulic flow originates in the eastern highlands as sheet flow off of the hillsides, changing to shallow concentrated flow as the run-off is collected in the ravines, which define the creek. East of Highway 101 the creek levels out resulting in slower flows and some widening with some wetland establishment. The creek passes through a 6'x 6' box culvert as it is carried under the highway. From the highway the creek travels a short distance and discharges across the beach into the ocean.

Existing Problems: No major drainage problems have been identified in this basin.

Future Development Issues: The potential for development is extremely limited due to the remainder of undeveloped area being dominated by steep slopes. The area within this basin, which is currently being farmed, could be developed into more intensive land use activities such as residential. Also, some low density (one house per 5 acres) residential use could be established in some of the upper portions of the basin. It is not anticipated that future development of the basin will result in any major drainage issues.

Basin 9

Basin 9 is the largest contained within the Study Area and is located south of Basin 8, bordered by high ground to the east, Basin 10 to the south and the ocean to the west. Development in this basin is dominated by the presence of the Newport Municipal Airport situated just east of the highway. Other development consists of a residential subdivision located between Highway 101 and the ocean beach. Wooded and clear-cut lands on steep slopes characterize the eastern half of the basin. This basin is the watershed for Grant Creek. Hydraulic flow originates in the eastern highlands as sheet flow off of the hillsides, changing to shallow concentrated flow as the run-off is collected in the ravines, which define the creek. The creek is conveyed through two 48-inch diameter (almost parallel) culverts, which pass under the airport at the intersection of its two runways. Those two culverts were installed in the mid 1940's, are in excess of 1,100 feet in length and have up to 95-feet of cover over them. Downstream of the airport, the creek travels through some ponds, narrow wetland areas and passes under the highway through a 6-feet x 6-feet box culvert. From the highway the creek travels through some more wetland areas a short distance and discharges across the beach into the ocean. The airport has other storm sewer infrastructure associated with the facility, which includes catch basins sewer pipe, etc. The airport's storm management system discharges primarily into the Grant Creek system.

Existing Problems: A major issue identified in this basin is the lack of knowledge about the condition of the culverts, which carry Grant Creek under the airport. The condition of culverts needs evaluation due to the age, length and depth of the pipe and considering its location under such an important transportation facility. Failure of this system would be extremely detrimental to the economy of the area.

Future Development Issues: The potential for development in this basin is associated with the land to the east of the airport. The eastern one third of this basin consists of lands controlled by the county. The majority of that land is contained within the City's Urban Growth Boundary and is zoned for residential/destination resort type development. The remainder of the land under the jurisdiction of Lincoln County has the potential for low-density residential development (one residence per 5 acres). Over half of this basin area is property associated with the Airport and is owned by the City. Some of that land east of airport operations area (between the runways and the

UGB) has the potential for some type of development. The City does not have a solid Plan for what will happen on that property, possibly a business/industrial park or recreational facility (golf course) should a destination resort actually locate to the east.

Modeling shows that intensive development east of the airport would require the build up of water above the inlet to some level of ponding which would add a pressure head to the water traveling through the airport culverts to accommodate the increased run-off. Some type of slope treatment, such as erosion control mats or rock facing, would be necessary to accommodate ponding at the upstream inlet of the airport culverts.

Basin 10

Basin 10 is the watershed for Moore Creek and is located south of Basin 9, and is bound by high ground to the east and the ocean to the west. The upper reaches of this basin are steep slopes, heavily forested. The lower one-third of the basin contains the southern end of the municipal airport along with some residential subdivisions. Hydraulic flow originates in the eastern highlands as sheet flow off of the hillsides, changing to shallow concentrated flow as the run-off is collected in the ravines, which define the creek. East of Highway 101 the creek levels out resulting in slower flows and some widening with some wetland establishment. The creek passes through a 6-feetx6-feet box culvert as it is carried under the highway. From the highway the creek travels a short distance through some more wetland areas and discharges across the beach into the ocean.

Existing Problems: No major drainage problems have been identified in this basin.

Future Development Issues: The potential for development in this basin is once again associated with the land to the east of the airport. Over one half of the lands in the eastern portion of this basin are lands controlled by the county. As with Basin 9, some of that land is contained within the City's Urban Growth Boundary and is zoned for Residential/Destination Resort type development. The remainder of the county lands has the potential for low-density residential development (one residence per 5 acres). Approximately one quarter of this basin area is property associated with the Airport and is owned by the City. Land east of airport operations area (between the runways and the UGB) has the potential for limited development. Storm water run-off modeling of this basin does not indicate any future development problems.

Basin 11

Basin 11 is a small basin, which encompasses primarily the residential development located west of the highway, immediately south of Yaquina Bay, and north and east of South Beach State Park. Existing drainage facilities consist of roadside ditches, driveway and roadway culverts and open channel flow. Storm water from this basin is discharged, through a 24-inch culvert, which passes under South Jetty Road and discharges into the Yaquina River.

Existing Problems: Some of the run-off flow in this basin travels in open channels that pass through private property (through yard areas). Drainage needs to be directed through existing right-of-ways to facilitate maintenance.

Future Development Issues: The City has indicated a desire for paving existing streets in the residential areas, which are currently gravel roadways. Paving these streets would add approximately 10% additional impervious area in the basin. There also is the potential for a large commercial development on the property, which used to have a drive-in theatre located on it (also known as the Breeze & Bunn property). Run-off modeling has indicated that the 24-inch culvert under Jetty Way is currently at or near capacity. Increasing run-off through street paving or further land development will require changes and additions to the existing facilities to accommodate the need for the increase in system capacity.

Basin 12

Basin 12 is another small basin, which is located on the west side of the point protruding into the Bay at the extreme north end of the Study Area. Yaquina Bay to the North, the South Beach Marina to the west, and Marine Science Drive on the east and south are the boundaries, which define this basin. Because of its location the majority of storm run-off from this basin is discharged directly into the marina/bay.

Existing Problems: Some roadway edge ponding occurs in the vicinity of OSU Drive and Pacific Way. The existing collection system needs to pick up some of the low points in this area.

Future Development Issues: No future development problems are anticipated in this area.

Basin 13

Basin 13 is the other small basin, located on the East side of the point protruding into the bay at the extreme north end of the Study Area. It is bordered by Yaquina Bay to the north and east, Basin 12 to the west, and Basin 3 to the south. Run-off from this basin is also directed into the bay without much problem.

Existing Problems: No major drainage problems have been identified in this basin.

Future Development Issues: No future development problems are anticipated in this area.

5.3 Mapping of Existing System

Figure 5.3.1. shown on the following page depicts the Study Area's existing storm drainage structures.

NOT TO SCALE

SYMBOL LEGEND

- EXISTING STORMWATER STRUCTURES
- NATURAL WATER CHANNELS
- PONDS, LAKES AND WETLANDS

35TH ST. CULVERT
18" CMP

35TH ST. CULVERT
24" CMP

36" PVC SS
27" PVC SS
FERRY SLIP RD STM S
SE CHESTNUT STM. S
12" RC
FERRY SLIP RD
48" RC SS
ASH ST. STM S
24" HDPE
24" CMP
15" PVC SS
MARINA STM S.
15" PVC
18" PVC
24" RC
ODOT-141
(2) 36" RC
UNDER T.M. MOTORS
48" RC
SOUTH JETTY
24" RC
18" RC
8" RC
19" STL.
(2) 24" ADS
ODOT-142
18" RC
ODOT-143
24" RC
ODOT-144
(2) 24" RC
ODOT-145
24" RC
SOUTH SHORE CULVERT
60" RC
HENDERSON CR.
6' X 6' RC
AIRPORT STM S.
(2) 48" RC
GRANT CR.
6' x 6' RC
ODOT-146
18" RC
18" RC
ODOT-147
18" RC
MOORE CR.
6' X 6' RC
18" RC
18" RC

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY

CONSULTING ENGINEERS & GEOLOGISTS, INC.
598 Anderson Ave. Coos Bay, Oregon 97420-0150
(541)266-9442
FAX (541)266-9496

NO.	DATE	REVISION	BY

DSGN RS
DR DBA
CHK RS
APVD SKD

CITY OF NEWPORT, OREGON
DEVELOPMENT COMMISSION
SOUTH BEACH STORM DRAINAGE MASTER PLAN

SHEET
FIGURE 5.3.1

DATE 08/06/03

PROJ. NO.
002612

5.4 Public Involvement

Stakeholder Involvement

Throughout the development of the Plan, opportunities were provided for public involvement, agency involvement and property owner involvement. Interactions among stakeholders and members of the Planning Team are summarized as follows:

- Publicized meetings were held with the general public, agency representatives and property owners at the City Council Chambers as described within this Section.
- Meetings were held with several property owners on their individual properties in order to understand the patterns of drainage in relation to existing culverts and topography.
- There were numerous contacts with agency representatives.
- Information about the ongoing Planning process was provided in City newsletters and in the Media.
- Individual contacts and follow-up were made between members of the public and members of the Planning team.
- Planning Commission hearings will be held in the future to gather public input prior to adoption of zoning amendments that will implement the South Beach South Beach Storm Water Master Plan.
- When individual properties are proposed to be developed, there will be communications among property owners, the City and permitting agencies.

Stakeholder Meetings

November 22, 2002 - 1:30 p.m.
Council Chambers, Newport City Hall
This kick-off meeting was held to introduce the purpose, scope and methodology to be used in developing the Master Plan and to gather information concerning existing drainage controls, impacts of and impediments to development, flooding, wetlands and water quality. A copy of the presentation that was provided in Power Point along with the comments solicited from the participants at the meeting is included in Appendix B.

February 6, 2003
Meetings held at 3:30 and 7:30 p.m.
Council Chambers, Newport City Hall
The two meetings held on February 6 were structured to present information concerning modeling that the engineers were undertaking, and to provide examples of structural and nonstructural solutions for drainage. In addition there was group discussion of alternatives and funding at both meetings. A Power Point Program that was prepared by the City of Portland in regards to Best Management Practices was viewed. Handouts from the meeting, including the Power Point program, along with the comments solicited from the participants at the meeting are included in Appendix B.

March 27, 2003 - 7:30 p.m.
Council Chambers, Newport City Hall
The final meeting held on March 27 involved a discussion of structural problems and alternative solutions and identified land use Planning issues with proposed implementation measures. There was general discussion about the existing drainage system and facilities and about how to best implement storm drainage overlay zone. Draft documents including a DRAFT Land Use Element, a DRAFT South Beach South Beach Storm Water Master Plan Overlay Zone and DRAFT Performance Standards were discussed. Comments from Stakeholders are included in Appendix B.

Participants

Property Owners, Business Representatives, Members of the General Public:

David Allen
Jeff Bertuleit
Paul Brookhyser
John Chapman
Peter Gintner
Michael Goldfarb
Lloyd Grantham
Rod Hatch
Chuck McClain
Jim Lewis
David Roberts
Ken Shelton
Heather Stout, M.S.
Emma Velasco
Gary L. Smith
John Tharp
Alice Warner

Agency Contacts

Andrew J. Baldwin, Oregon Department of Transportation
Jessica Bondy, Lincoln County Department of Planning and Development
Jim Buisman, P.E., Lincoln County Road Department
Jack Dunaway, Oregon Department of Forestry
Gordon Dunkeld, Division of State Lands
Daryl Eldridge, Seal Rock Water District
Dana Field, Division of State Lands
Dave Henderson, South Beach State Park
Onno Husing, OCZMA
Shelly Joel, Seal Rock Water District
Dale Jordan, DLCD
Ruben Kretzschmar, DEQ
Matt Spangler, Lincoln County Department of Planning and Development
Tony Stein, ODFW
Dale Dawson, Central Lincoln PUD
Robert VanCreveld, Lincoln County SWCD
Terry Vaughn, Central Lincoln PUD
Bob Wood, Oregon Department of Transportation

City of Newport Staff

James Bassingthwaite, City Planner
Dennis Reno, Airport Supervisor
Lee Ritzman, Public Works Director
Sam I. Sasaki, Jr., City Manager
Lanny Schulze, Water Department
Sharon Seabrook, Administrative Secretary, Public Works
Dave White, Street Department

SHN/Shoji Consulting Team

Ronald F. Stillmaker, P.E., SHN Project Manager
Steven K. Donovan, P.E., Project Engineer
Susan Foreman, Engineering Tech.
Crystal Shoji, Planner & Facilitator

6.0 Recommended Improvements

6.1 Predevelopment and Post Development Conditions

Improvements to the storm drainage system, which resolve current problems while providing capacity for future growth, are presented in this section. The solutions presented are based on computer modeling analysis, as described in Section 4. The methodology used to characterize undeveloped and developed conditions for estimating peak runoff is described below.

Projecting Build-out Conditions

In order to establish future demands of the South Beach storm water system, zoning requirements and current development trends were considered. Zoning requirements provided the basis for generically establishing post-development runoff potential in areas currently vacant or undeveloped. Areas where there is the potential for specific types of development were defined in discussions with the City.

Table 6.1.1
% Impermeable as a Function of Land Use

Zoning Designation	Minimum Lot Size	% Impermeable
Residential R1	1/8 Acre	65
	1/4 Acre	38
	1/3 Acre	30
	1/2 Acre	25
Rural Residential (RR1-2)	1 Acre	20
Rural Residential (RR1-4)	2 Acre	15
	4 Acre	10
Commercial/Business (C-1)		55
Industrial (L-I)	5000 SF	55
Natural Resource (T-C)	40 Acres	1-10

Discharge Estimates for Existing and Future Conditions

Existing and future runoff characteristics for each basin were developed according to the methodology described above. Computer modeling was performed to predict discharge flows for existing and future conditions. A summary of the analyses, comparing current with projected land-use characteristics and the respective basin discharge flows, is provided below in Table 6.1.2.

Table 6.1.2 South Beach Predevelopment and Post development Flows								
					10-Year Storm		50-Year Storm	
Basin No.	Sub-basin No.	Area (Acres)	Percent of Impervious Area (Existing)	Percent of Impervious Area (Post Development)	Projected Flow (Exist. Conditions) (cfs)	Projected Flow (Post Development) (cfs)	Projected Flow (Exist. Conditions) (cfs)	Projected Flow (Post Development) (cfs)
1	1(1)	58	1	5	5.8	14.0	7.6	27.5
	1(2)	34	1	5	3.8	11.9	4.7	24.9
2	2(1)	150	1	5	14.4	43.8	18.6	62.5
	2(2)	28	20	55	12.6	18.7	24.8	26.8
	2(3)	17.1	1	5	2.1	7.8	2.8	10.6
	2(4)	4.5	15	55	1.5	3.7	4.0	5.2
3	3(1)	3.1	55	55	2.9	2.9	4.1	4.1
	3(2)	10.1	55	55	7.4	7.4	10.4	10.4
	3(3)	7.3	50	55	5.5	6.0	8.0	11.0
	3(4)	3.3	55	55	3.3	3.3	4.7	4.7
	3(5)	4.8	55	55	3.8	3.7	5.2	5.3
	3(6)	3.2	55	55	2.8	2.8	4/0	4.0
	3(7)	5.3	10	55	2.2	3.9	3.0	5.6
	3(8)	15.7	15	55	8.2	12.9	11.5	14.9
	3(9)	13.2	40	40	5.5	5.5	7.6	7.6
	3(10)	8.4	54	54	5.1	5.1	6.4	6.4
	3(11)	30.8	40	40	15.3	15.3	21.4	21.4
	3(12)	39	30	30	10.9	10.8	14.8	19.2
	3(13-E)	7.7	10	20	11.1	19.1	16.0	26.7
	3(13-W)	3	10	40	3.0	6.4	7.0	11.3
	3(14 upper)	20	1	12.5	2.2	8.8	2.9	12.6
	3(14 lower)	41	10	40	21.0	34.0	25.0	40.0
	3(14 total)	61	7	30.8	23.2	42.8	27.9	52.6
	3(15-E)	12.4	1	5	1.5	5.0	2.1	10.6
	3(15-W)	8.3	10	20	5.8	7.7	8.0	12.7
	3(16)	42.4	10	40	11.1	19.8	16.0	26.7
	3(17)	25	1	1	2.6	2.6	3.6	3.6
4	4(1)	103	1	1	2.7	5.0	4.2	5.3
	4(2)	42	1	1	3.8	3.8	4.8	4.8
5	5(1)	42	5	10	6.7	8.6	12.2	15.4
	5(2)	37	1	5	4.2	10.9	5.0	16.2
	5(3)	13	1	5	1.4	4.2	1.8	6.0
6	6(1)	41	1	5	4.6	12.5	5.6	18.0
	6(2)	79	1	10	8.3	24.4	10.4	27.7
	6(3)	116	1	5	11.2	25.1	14.4	36.5
	6(4)	8	1	25	0.9	6.4	1.1	9.4

Table 6.1.2 South Beach Predevelopment and Post development Flows								
					10-Year Storm		50-Year Storm	
Basin No.	Sub-basin No.	Area (Acres)	Percent of Impervious Area (Existing)	Percent of Impervious Area (Post Development)	Projected Flow (Exist. Conditions) (cfs)	Projected Flow (Post Development) (cfs)	Projected Flow (Exist. Conditions) (cfs)	Projected Flow (Post Development) (cfs)
	6(5)	59	1	33	6.5	41.2	8.1	59.1
	6(6)	18.6	10	40	5.6	9.3	7.9	13.2
7	7(1)	18	1	1	2.8	2.8	4.0	4.0
	7(2)	19	10	10	6.5	6.5	9.3	9.3
	7(3)	20	10	33	7.8	11.7	10.8	16.8
	7(4)	9.2	10	10	8.6	8.6	13.7	13.7
8	8(1)	161	1	1	12.7	12.7	17.9	17.9
	8(2)	109	1	7.8	9.5	22.3	12.5	32.4
	8(3)	75	1	1	7.5	7.5	9.6	9.6
	8(4)	11	70	70	20.0	20.0	28.8	28.8
	8(5)	21	1	1	2.7	2.7	4.1	4.1
	8(6)	28	1	1	3.3	3.3	4.7	4.7
	8(6)	37	1	1	2.6	2.6	3.5	3.5
	8(7)	30	70	70	31.0	31.0	42.0	42.0
	8(8)	27	5	5	12.4	12.4	16.5	17.2
	8(9)	16	10	10	16.2	15.7	21.7	21.7
9	9(1)	43	1	1	4.7	4.7	5.9	5.9
	9(2)	21	1	1	2.4	2.4	3.3	3.3
	9(3)	68	1	25.2	6.9	29.4	9.0	41.8
	9(4)	58	1	25	5.9	26.1	7.9	37.4
	9(5)	16	1	50	1.1	5.7	1.6	7.5
	9(6)	113	1	27.5	10.3	45.4	14.8	57.8
	9(7)	33	1	50	3.6	26.1	4.5	33.3
	9(8)	49	1	40	5.1	28.1	6.5	39.8
	9(9)	36.2	70	70	68.0	68.0	96.0	96.0
	9(10)	17	70	70	33.0	33.0	47.0	47.0
	9(11)	29	70	70	32.0	32.0	44.0	44.0
	9(12)	58	10	10	40.3	40.3	55.0	55.0
	9(13)	3	1	1	0.4	0.4	0.6	0.6
	9(14)	51	25	25	44.8	44.8	64.2	64.2
10	10(1)	170	1	1	14.0	14.0	20.3	20.3
	10(2)	163	1	1	14.0	14.0	20.1	20.1
	10(3)	38	1	1	4.1	4.1	5.3	5.3
	10(4)	28	1	1	3.0	3.0	3.9	3.9
	10(5)	9	70	70	18.0	18.0	25.0	25.0
	10(6)	24	1	1	2.6	2.6	4.2	4.2

Table 6.1.2 South Beach Predevelopment and Post development Flows								
					10-Year Storm		50-Year Storm	
Basin No.	Sub-basin No.	Area (Acres)	Percent of Impervious Area (Existing)	Percent of Impervious Area (Post Development)	Projected Flow (Exist. Conditions) (cfs)	Projected Flow (Post Development) (cfs)	Projected Flow (Exist. Conditions) (cfs)	Projected Flow (Post Development) (cfs)
	10(7)	40	100	100	30.0	30.0	40.7	40.7
	10(8)	62	1	33	6.7	36.0	8.3	51.5
	10(9)	11	15	15	11.0	11.0	19.0	19.0
	10(10)	24	33	1	15.6	2.5	21.9	3.6
	10(11)	24	25	25	23.7	23.7	33.9	33.9
	10(12)	25	25	25	21.0	21.0	30.2	30.2
	10(13)	6.4	1	1	0.9	0.9	1.3	1.3
	10(14)	1.5	1	1	0.2	0.2	0.6	0.6
11	11(1)	22	1	80	2.2	15.6	2.8	21.6
	11(2)	3.02	15	15	3.0	3.0	4.3	4.3
	11(3)	11.3	20	30	11.4	13.0	19.0	21.1
	11(4)	4.8	20	30	5.5	6.3	10.2	9.2
	11(5)	3.6	50	50	8.0	8.0	11.5	11.5
	11(6)	0.7	5	5	0.5	0.5	0.8	0.8
12	12(1)	24	70	70	20.4	20.4	28.1	28.5
	12(2)	14.6	95	95	13.6	13.5	18.6	18.6
	12(3)	14.9	80	80	18.5	18.5	26.2	26.2
13	13(1)	9.7	90	90	10.4	10.4	14.5	14.5
	13(2)	5.6	90	90	8.3	8.3	11.7	11.7
	13(3)	8.9	5	5	3.2	3.2	4.6	4.6
	13(4)	11.02	10	10	5.7	5.7	8.2	8.2
	13(5)	7.2	25	25	9.0	9.0	12.9	12.9
	13(6)	17	5	5	6.1	6.1	8.6	8.6
	13(7)	8.7	80	80	7.5	7.5	10.4	10.4

6.2 Basis for Cost Estimate

The cost estimates presented in this Plan will include four components, each of which is discussed in this section. The estimates presented are preliminary and are based on the level and detail of Planning presented in this document. As projects proceed and as site-specific information becomes available, cost estimates may require updating.

Construction Costs

The estimated construction costs in this Plan are based on actual construction bidding results from similar work, published cost guides, and other construction cost experience. Reference was made to the field investigation of the existing facilities to determine construction quantities, major

components, and locations of storm drains and culverts. Where required, estimates were based on preliminary layouts of the proposed improvements.

Future changes in the cost of labor, equipment, and materials may justify comparable changes in the cost estimates presented herein. For this reason, common engineering practices usually tie the cost estimates to a particular index, which varies in proportion to long-term changes in the national economy. The Engineering News Record (ENR) construction cost index is most commonly used. This index is based on an initial value of 100 beginning in the year 1913, with the index having a value of 5,521 as of January 2003.

Contingencies

A contingency factor equal to 20 percent of the estimated construction cost has been added. In recognition that the cost estimates presented are based on field investigations and conceptual layouts, allowances must be made for variations in final quantities, 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 actual project costs.

Engineering

The cost of engineering services for major projects typically include special investigations, a pre-design report, surveying, foundation exploration, preparation of contract drawings and specifications, bidding services, construction management, inspection, construction staking, start-up services, and the preparation of operation and maintenance manuals. Depending on the size and type of project, engineering costs may range from 15 to 25 percent of the contract cost when all of the above services are provided. The lower percentage applies to large projects without complicated mechanical systems. The higher percentage applies to small, complicated projects. The engineering costs for design and construction of the recommended projects are projected at 20 percent of the construction cost.

Legal and Administrative

An allowance of two percent of construction cost has been added for legal and administrative services. This allowance is intended to include internal project Planning and budgeting.

Resource Agency Permitting

Some of the proposed projects will take place in waters under the jurisdiction of the State of Oregon (Division of State Lands) and/or the United States (US Army Corps of Engineers). In order to perform projects, which take place in jurisdictional waters, permits must be acquired from the State and/or Federal governments. While it is difficult to predict the effort required to obtain permits from the resource agencies, an allowance of three percent of the construction costs has been added for permitting purposes. If significant issues, which need to be addressed, arise in the permitting process, costs could significantly increase.

Property Acquisition

An estimated cost for property acquisition and easements have not been included in the cost estimate with the exception of Project #3. It may be necessary to add additional costs for purchase of easements or properties for routing of some of the proposed storm drainage facilities.

6.3 Capacity of Existing Drainage Facilities

The capacity of major drainages facilities in the South Beach Area was determined based on information provided by the City of Newport, the Oregon Department of Transportation and some field investigation. Plans were available for the SE Ferry Slip Road culvert system, the Ash Street culvert, and the culverts under the airport at the time they were built. More general information including a profile provided by City staff was available for the central drainage channel in Basin 3 and for the series of 48 inch storm drains and channels which conveys the flow under Highway 101 and Ferry Slip Road finally discharging into the Bay through an intertidal channel.

Culverts are classified according to what controls the discharge capacity. If water can flow through and out of the culvert faster than it can enter the culvert is under "inlet control." If water can flow in faster than it can flow through and out, it is "under outlet control". Under inlet control, capacity depends only upon inlet conditions, pipe dimension and headwater depth. When culverts operate under outlet control, discharge is dependent upon all of the hydraulic factors upstream of the outlet including friction loss though the culvert. Where possible culverts are designed to operate under inlet control because they will have the maximum discharge under these conditions

An inventory of Highway 101 culverts provided by ODOT includes location, size, length, and estimated cover for each of the culverts. Unless the flow was limited by downstream conditions as determined by visual observation or it was known that slopes were less than 1%, it was assumed that the culverts under Highway 101 were operating under inlet control.

Based on type of control and available headwater, culvert capacities were estimated from monograms published by the Bureau of Public Roads. For culverts under outlet control and open channels, capacities were verified by applying Manning's equation for open channel flow or uniform flow in circular pipes.

The capacity of the existing drainage facilities is summarized in Table 6.3.1, where the capacity of each culvert is compared with estimated design flows based on the results of the runoff simulations for pre and post development condition. Design flows are estimated by summing the peak runoff from all sub basins, which drain into the culvert. These design flows will be conservative because they do not take into account attenuation effects created by the routing of flow through the drainage basin or attenuation of peak discharge due to storage in the system.

Table 6.3.1: Existing Drainage Structure Capacity Analyses

Existing Structure Description/Location	Size (inches)	Length (ft)	Depth of Surcharge over top of inlet pipe (ft)	Depth of Surcharge over inlet pipe invert (ft)	Control	Capacity (cfs)	Run-off 10-Year Storm Pre-Development (cfs)	Run-off 10-Year Storm Post-Development (cfs)	Run-off 50-Year Storm Pre-Development (cfs)	Run-off 50-Year Storm Post-Development (cfs)	Basin (subbasin)
Highway 101 - mile 140	24	100	10	12	Inlet	13	4	7	6	9	3(8)/2
Under Toby-Murray Motors & Hwy - mile 141	48 -2 (36) Hwy 101	1300		5	Outlet	60	30	39	42	57	3(9,12,16,17)
Under Toby-Murray w/3(14,15-E,15-W)	48 -2 (36) Hwy 101	1300		5	Outlet	60	60	94	80	133	3(9,12,14,15-E,15-W,16,17)
Newer ADS System Along Ferry Slip & outfall	48	425				60	35	44	48	63	3(9,10,12,16,17)
ADS System & outfall w/3(14,15-E,15-W)	48	425				60	66	99	84	139	3(9,10,12,14,15-E,15-W,16,17)
Proposed New Outfall							56	79	83	118	2(4), 3(3,9,10,12,13-E, 13-W,16,17)
Highway 101 - mile 142	18	125	3	4.5	outlet	15	3	6	7	11	3(13-W)
Highway 101 - mile 143 Existing	24	125	3	5	outlet	30	30	55	38	76	3(14,15-E,15-W)
Highway 101 - mile 144	24	70	3	5	Inlet	30	19	46	25	65	5(1-3), 6(1-4)
	24	70	3	5	Inlet	30	19	46	25	65	
	combined 2 -24's					60	37	92	50	129	
Highway 101 - mile 145*	24	95	9	11	Inlet	50	9	9	13	13	7(1,2)
Highway 101 - mile 146	18	100	5	6.5	Inlet	18	0.4	0.4	0.6	0.6	9(13)
Highway 101 - mile 147	18	100	12	13.5	Inlet	28	11	11	19	19	10(9)
Moore Creek	6' (Box)	100	40	9	Inlet	450	94	122	124	173	B10(1-8)
Grant Creek	6' (Box)	100	40	9	Inlet	450	214	341	296	472	B9(1-13)
Henderson Creek	6' (Box)	100	40	9	Inlet	450	102	113	136	177	B8(1-8)
Airport(N)	48	1150	30	34	outlet	175	54	118	75	162	9(1-9)
Airport (S)	48	1150	30	34	outlet	175	54	118	75	162	
Airport (sum)						350	108	235	149	323	
Airport(N)	48	1150	**	4	outlet	70	54	118	75	162	
Airport (S)	48	1150	**	4	outlet	70	54	118	75	162	
Airport (sum)						140	108	235	149	323	
Ferry Slip Rd	15	50	4	5.25	Inlet	20	9	9	14	14	B3(1,4,5)
	15	50	4	5.25	Inlet	20	13	20	19	24	B3(6,7,8)
	15	50	4	5.25	Inlet	20	7	7	10	10	B3(2)
Outfall	36	100	4	7		60	37	37	43	55	
South Shore (Without Portion of Basin 3)	60	770	2	7	**	130	49	143	66	201	B5,B6
South Shore (With Portion of Basin 3)	60	770	2	7	**	130	80	198	104	277	B5,B6 Plus 3(14,15-E,15-W)
South Jetty	24	40	2	4		40	20	22	33	35	B11(2,3,4) Considering Paved Streets
Event Center							2	16	3	22	B11(1)
Sum							22	38	36	57	
Idaho Pt Culvert						Crushed	29	70	46	100	B2(1,2,3)
PUD Existing	24	1400	varies	8	outlet	22	15	26	28	37	B2(2,3)

** Estimated Capacity With No Submergence

23 = Shaded Cell Indicates Design Storm for Given Structure

23 = Shaded Cell With Box Indicates Anticipated Capacity Deficiencies With Associated Structure

6.4 Recommended Improvements

Recommended improvements for each basin are briefly described in the following pages. An attempt has been made to describe the proposed improvements for each basin to allow associating the cost estimate to a particular area.

Basin 1

The 18-inch culvert under SE 35th Street halfway to Idaho Point conveys flow from the area designated as Basin 1(1). The estimated run-off from this area does not currently exceed the capacity of this culvert. However model simulation of developed conditions indicated an increase in runoff, which would exceed the capacity of this culvert

The assumptions used for hydrological modeling of developed conditions have been discussed in Section 4. It was assumed that in the upper regions of Basin 1 and 2 there will be some increased residential development and road building resulting in an average permeability of 12%. Because of the steepness of the upper slopes the increase in run-off is significant.

Table 6.4.1
Basin 1 Storm Drainage Improvements (Project #1)

Design Storm	Design Flow	Description	Units	Quantity	Unit Cost	Sub-Total
		Mobilization	LS	1	$ 2,500	$ 2,500
50-YR	25 cfs	24-inch Storm Drain	LF	100	$ 50	$ 5,000
		AC Patch	LF	50	$ 110	$ 5,500
					Estimated Construction cost	$ 13,000
					Engineering and Admin	$ 2,900
					Contingency	$ 2,600
					Project Total	**$ 18,500**

The existing culvert of corrugated metal (CMP) was observed to be in poor condition and bent out of round. It is recommended that this culvert be replaced with a 24-inch culvert with sufficient capacity for run-off following development. Based on the drainage system design criteria sited earlier the culvert should be sized for run-off from a 50-year design storm because the storm drain is a trunk line, conveying flow from a basin of more than 150 acres, and SE SE 35th Street provides the only access to properties on Idaho Point.

Basin 2

Basin 2 was divided into four sub-basins. Sub-basin 2(1) is currently undeveloped with the potential for some residential development in the future. Sub-basin 2(3) in the NW corner has a combination of industrial and commercial uses including the Central Lincoln Public Utilities District's (PUD) maintenance yard. Runoff from this sub-basin and Sub-basin 2(4), (an undeveloped area above it) and outside the City limits drain into an improved underground storm drainage system which discharges to a natural drainage channel to the east.

Flow from the three sub-basins is combined in a single ditch prior to flowing under SE 35th Street into an intertidal wetland and the bay. The existing culvert under SE 35th Street is a 24-inch CMP and one end of it has been crushed, restricting flow. It is recommended that this culvert be replaced with a culvert of sufficient capacity for run-off following development. Based on the drainage system design criteria the culvert should be sized for run-off from a 50-year design storm because the storm drain is a trunk line, conveying flow from more than 150 acres, and SE 35th Street to Idaho Point is a main arterial.

The channel that conveys the combined sub-basin flows should be made deeper and wider to carry the increased run-off, which is projected. Channel improvements will include re-grading. It will probably be necessary to provide some stability for the deepened channel by reinforcing it with rip-rap or lining with shotcrete.

Table 6.4.2
Basin 2 Storm Drainage Improvements (Project #2)

Design Storm	Design Flow	Description	Units	Unit Cost	Quantity	Sub-Total
		Mobilization	LS	$ 5451	1	$ 5,451
50-YR	12 cfs	Ditch Excavation	LF	$ 18	350	$ 6,300
50-YR	105 cfs	42-inch Storm Drain	LF	$ 210	50	$ 10,500
		AC Patch	LF	$ 110	50	$ 5,500
50-YR	105 cfs	Ditch Imp.	LF	$ 54	260	$ 14,040
					Estimated Construction cost	$ 41,791
					Resource Agency Permitting	$ 1,200
					Engineering and Admin	$ 9,195
					Contingency	$ 8,360
					Project Total	$ 60,456

Basin 3

Basin 3 is a large flat basin bisected by Highway 101 and containing much of the commercial and industrial development in South Beach. Note that the basin topology is described in some detail in Section 5.

To model runoff with some accuracy and to analyze different routing patterns Basin 3 was divided into numerous sub-basins. For clarity the following discussion of sub-basin routing and proposed improvements is illustrated in Figure 4.1.1.

Upper Sub-basins - 3(13), 3(14) & 3(15)

Runoff from the three upper sub-basins east of the highway, (3(13), 3(14) and 3(15)), is routed under the highway through two culverts, an 18- inch culvert (ODOT #142) and a 24-inch culvert (ODOT# 143, at the intersection with Mike Miller Road). The ODOT #142 culvert currently drains only a small portion of Sub-Basin 3(13) as topographic features and area development has limited its effectiveness. The majority of the runoff from Sub-Basin 3(13) appears to be contained within the basin by topography and barriers created by the highway on the west, and a private driveway

located to the north. This situation results in infiltration of the majority of runoff into local soils. However, during heavy rainfall events, excess runoff exceeds infiltration capacity and ultimately builds up to a point of running across the surface of Highway 101 and into Sub-Basin 3(12). The water running across the Highway during these events creates a traffic hazard.

The study proposes to install a culvert along the east side of Highway 101 that will reroute flow from Basin 3 (13), which currently drains to the west. This culvert should eliminate the current problems with periodic sheet flow over 101 due to the lack of an adequate drainage system in this area. This installation will also serve future development of vacant properties west of the Central Lincoln PUD property between the existing 24-inch and Highway 101. Draining that future development to the west is desirable because run-off simulation results indicate that the existing 24-inch storm system by the PUD will be at capacity during the ten-year design storm, assuming some additional development in Basin 2(2) and additional residential development in Basin 2(3).

The proposed culvert along the east side of Highway 101 that will reroute flow from Basin 3 (13) and will connect to a new storm sewer line on SE Ferry Slip Road between SE 35th Street and the outfall at a manhole on SE Ferry Slip Road/SE 35th Street, which is discussed later in this section.

The 24-inch diameter, ODOT #142 culvert, which carries runoff from Sub-Basins 3(14) and 3(15) across the Highway, has been estimated to be approaching its capacity at full development conditions. This study does not propose any improvements to the culver at this time, however, when the Highway is widened in the future, the capacity issue should be studied further.

Sub-basins West of Hwy 101

Through Stakeholder input and as represented in table 3.6.1 the drainage associated with Sub-Basins 3(9), 3(12), & 3(16) has been identified as a problem area, associated with the flows not being adequately transported through this system of natural drainage ways, ditches and culverts. Drainage, which is directed into Sub-Basin 3(16) from the 24" diameter ODOT #143 culvert (draining 3(14) & 3(15)), can be directed to the South through the roadside ditch adjacent to the highway that empties into Basin 6 or to the West and through the remainder of Basin 3 drainage ways to its discharge point. At the time of this study, a gravel berm had been installed immediately North of the outlet of ODOT #143 directing the drainage from Sub-Basins 3(14) & 3(15) to the South and into Basin #6. The direction, which those two sub-basins are drained, is a significant issue because the amount of drainage involved has considerable impact on the downstream structures in either direction. Flow evaluations and capacity analyses indicate that for the present time, this flow should be directed South and through the Basin 6 system as structural capacities shall be adequate for some time to accommodate the flow. An analysis of Basin 6 indicates that the 60" diameter storm drain passing through the South Shore development does have sufficient capacity at this time.

Because of the maintenance issues identified, (lack of consistent maintenance, keeping the channel clear of vegetation and wildlife activities), it is recommended that public ownership of the main drainage channel be pursued along with adequate right-of-way for access. Along with acquisition of the right-of-way, improvements recommenced include; installation of a 10' wide maintenance road adjacent to the channel; some re-channelization and channel rehabilitation. The costs for improving and maintaining this drainage channel are itemized below.

Table 6.4.3 Basin3 West Ditch Maintenance Program (Project #3)				
Description	Unit	Unit Price	Quantity	Cost
Mobilization	LS	$75,000	1	$ 75,000
Land Acquisition	SF	$ 2	128,398	$ 256,795
Clearing and Grubbing	Acre	$ 5,188	1.88	$ 9,776
Ditch Rehabilitation	LF	$ 18	7,500	$ 135,000
Maintenance Road Exc. and Grading	CY	$ 12	20,370	$ 246,481
Maintenance Road Surfacing	SF	$ 7	55,000	$ 357,500
Pipe Culvert Installation	LF	$ 98	40	$ 3,920
			Estimated Construction cost	**$1,084,472**
			Resource Agency Permitting	**$ 34,814**
			Eng. &Admin.	**$ 124,152**
			Contingency	**$ 190366**
			Project Total	**$ 1,433,804**

Flow from the upper Sub-basins, 3(13), 3(14) & 3(15), currently flows though Highway culvert #143, near the intersection with Mike Miller Park Road and is diverted into Basin 6 to the south. That flow to the South is inhibited because the ditches are inadequate and incomplete along the western edge of Highway 101. The City's Transportation System Plan has indicated the need to widen Highway 101 in this area in the future, and at that time ditches and culverts will need to be constructed.

SE 35th Street Culvert

It is proposed that a storm sewer be installed on the north edge of SE 35th Street between Ferry Slip and Chestnut where there is currently no storm system. Also, on the easterly end of SE 35th, in the vicinity of the assisted living complex, the series of ditches on the north side of the street connects to an existing culvert, which is collapsed. This badly damaged culvert will be replaced and the ditches more clearly defined as part of the Highway 101-SE Ferry Slip Road Improvements.

Outlet of Central Drainage Basins

At the northern end of Basin 3's primary drainage ditch a series of storm drains and open channels convey the flow under Highway 101 and Ferry Slip Road, finally discharging into the Bay through an intertidal channel. Two major issues with this portion of the system have been identified:

1. Run-off simulation results indicate that, based on the development assumptions outlined in Section 4, and considering a 50-year storm, the 48-inch storm systems East of the Highway (Outlet under Ferry Slip Road & the recently installed 48" ADS plastic pipe) will have insufficient capacity to accommodate anticipated future development and flows associated with recommended improvements (SE 35th Street Storm Sewer & East Highway drainage for Sub-basins 2(2) and 3(13)). Also, it appears the invert of the inlet to the 48" ADS pipe was installed above the outlet elevation of Highway culvert #141, the upstream portion of this system.

2. There is a 450 ft. section of the existing 48-inch storm drain system, which originates at the main drainage channel and extends under Highway 101 (culvert # 141), which is on private property belonging to Toby Murry Motors. Because of risks associated with having a major storm drainage structure under a building, along with access issues related to maintenance it is to the Owner's advantage to replace this line with a system located in public right-of-way. Replacing this line would ensure that there is adequate capacity and eliminate the issues arising from having a major storm sewer under private ownership.

Because of the uncertainties involved with forming a public/private partnership for funding the relocation of the storm sewer located on private property, two alternatives are presented for addressing the issues identified in this area. Both alternatives include a new outfall structure along with the proposed system located along a portion of the east side of the highway for draining Sub-basins 2(4) and 3(13), and the SE 35th St. Storm System.

If relocation of the storm sewer on private property is not an attainable solution, Alternative A proposes improvements to the open ditch downstream of Highway culvert #141 (adjacent to Flashback's Diner). Improvements would include re-grading the channel and designing a concrete structure to facilitate cleaning of the pool on the downstream end. Plant growth in the channel currently poses a maintenance problem and it is recommended that the channel be lined. One alternative for lining the channel includes the placement of pre-formed concrete mats. With this type of liner a small bobcat could be used to clean the channel on a regular basis. Alternative A does not include the acquisition of right-of-way and the City assuming ownership and maintenance of that portion of storm sewer situated on Toby Murry Motors property.

Improvements proposed for Alternative B include the relocation of the Storm Sewer on Toby Murry Motors Property. A new alignment for this improvement is suggested in Figure 6.4.1 B. However, the presence of existing underground sanitary sewer pipes may pose conflicts with this route. More thorough consideration and analyses will have to be performed in the engineering design phase of such a project.

NOTE: The feasibility of installation of the tide gate for the proposed alternatives will be determined during the final engineering design phase.

Table 6.4.4 A
Basin 3 Storm Drainage Improvements
Alternative #A -(Continue Use of Existing 48-inch Under Toby Murray Motors)
(Project #4A)

Storm	Capacity	Description	Unit	Price	Quant.	Cost
		Mobilization	LS			$64,267
50-Yr.	104 cfs	**Outlet**				
		Tide Gate	EA	$41,000	1	$41,000
		S.S. Arch 48-inch X 76-inch C.	LF	$600	60	$36,000
50-Yr.	60 cfs	**Renovate Flashback Channel**				
		Grade Channel	LF	$4	225	$900
		Ditch Lining	SF	$10	1800	$18,000
		Concrete Headwall	EA	$3,500	2	$7,000
50-Yr.	7 cfs	**SE 35th Street Culvert**				
		18-inch ADS	LF	$75	600	$45,000
		Catch Basin	EA	$750	3	$2,250
50-Yr.	44 cfs	**SE Ferry Slip Culvert**				
		S.S. 36-inch ADS	LF	$144	500	$72,000
		Manhole	EA	$3,800	1	$3,800
		Catch Basin	EA	750	1	$750
50-Yr.	37 cfs	**Highway 101 Culvert**				
		33-inch ADS	LF	$132	1,474	$194,568
		Asphalt R/Replacement	LF	$111	60	$6,660
		Manhole	EA	$3,800	1	$3,800
		Catch Basin	EA	$750	7	$5,250
50-Yr.	28 cfs	**Ditch Pvt. Rd (Basin 3-13)**				
		Ditch Excavation	LF	$18	1,500	$27,000
		27-inch	LF	$108	25	$2,700
					Project Sub-Total	**$530,945**
					Resource Agency Permitting	**$15,928**
					Eng. & Admin	**$116,808**
					Contingency	**$106,189**
					Project Total	**$769,870**

Table 6.4.4 B
Basin 3 Storm Drainage Improvements
Alternative B – (Reroute Storm Sewer from Under Toby Murry Motors)
(Project #4B)

Storm	Capacity	Description	Unit	Price	Quant.	Cost
		Mobilization	LS			$92,101
50-Yr.	104 cfs	**Outlet**				
		Tide Gate	EA	$41,000	1	$41,000
		S.S. Arch 48-inch X 76-inch C.	LF	$600	60	$36,000
50-Yr.	60 cfs	**New Bypass**				
		Highway Crossing	LF	$1,440	100	$144,000
		S. S. Arch 43-inch X 68-inch C	LF	$570	233	$132,810
		Headwall	EA	$1,600	1	$1,600
		Manhole	EA	$3,800	1	$3,800
		Catch Basin	EA	$750	1	$750
50-Yr.	7 cfs	**SE 35th Street Culvert**				
		18-inch ADS	LF	$75	600	$45,000
		Catch Basin	EA	$750	3	$2,250
50-Yr.	104 cfs	**SE Ferry Slip Culvert**				
		S. S. Arch 48-inch X 76-inch C.	LF	$344	500	$172,000
		Manhole	EA	$3,800	1	$3,800
		Catch Basin	EA	$750	4	$3,000
50-Yr.	37 cfs	**Highway 101 Culvert**				
		33-inch ADS	LF	$132	1,474	$194,568
		Asphalt R/Replacement	LF	$111	60	$6,660
		Manhole	EA	$3,800	1	$3,800
		Catch Basin	EA	$750	7	$5,250
50-Yr.	28 cfs	**Ditch Pvt. Rd (Basin 3-13)**				
		Ditch Excavation	LF	$18	1,500	$27,000
		27-inch	LF	$108	25	$2,700
					Project Sub-Total	**$825,988**
					Resource Agency Permitting	**$41,299**
					Eng. & Admin	**$181,717**
					Contingency	**$165,198**
					Project Total	**$1,214,202**

Basin 5 and 6

Storm water run-off from Basin 5 is collected in ponds contained in Mike Miller Park, which eventually overflow into Basin 6. Flow from Basin 5, and 6 flows along natural drainage ways to the south then west passing through two 24-inch culverts under Highway 101 (ODOT #144). Based on the result of run simulations these culverts have adequate capacity for run-off from a 50-year design storm given current conditions.

Modeling assumptions for analyzing the two 24-inch culverts under future build-out conditions include commercial development along the highway for Basin 6, and some residential development in Basin 5. Given these conditions the culverts will not have adequate capacity for all of the anticipated future development. It is recommended that these culverts be replaced with a box culvert.

Flow from these two culverts combines with flow originating from the portion of Basin 6 located west of highway 101 (and portions of drainage from sub-basins 3(14) & 3(15) that have been redirected south into Basin 6 by a temporary gravel weir located immediately west of ODOT #143) and flow through an existing 60-inch storm sewer to an ocean outfall. This 60 inch storm sewer is located on property owned by the South Shore development. It has sufficient excess capacity to handle the flows from the upper and northern basins given current conditions, but the run-off simulation predicts that this capacity will be exceeded with full build-out conditions.

Two alternatives for providing the required capacity were investigated and costs for each are presented in Table 6.4.5. Alternative A recommends that a series of channels and culverts be constructed parallel to, and along the west side of the highway to convey flow south from the proposed box culvert under Highway 101 (ODOT #144) to the existing natural channel in Basin 7(4) (see Sub-Basin Figure 4.1.2).

The natural channel in this portion of Basin 7 is very flat with a steep drop prior to the outfall. Some re-channelization and construction of a new outfall are included in the cost this alternative. Providing an adequate slope to the outfall assures that the water level will not increase significantly in the pond in 7(3) & 7(4) adjacent to this channel. As an alternative it may be preferable to utilize excess capacity in this pond and the pond connected to it on the east side of Highway 101. The water level changes associated with increased detention should be modeled in the design stage of this recommended improvement.

Alternative B proposes to install an additional storm line and outfall adjacent to the existing drainage structures to accommodate increased runoff from future growth. The parallel pipe would need to have a little more capacity than the existing 60 inch such as a 53"x83" arch pipe. A utility easement or right-of-way along the route of the existing storm sewer through South Shore would also have to be acquired to facilitate this alternative.

Table 6.4.5 A
Basin 6 Storm Drainage Improvements
Alternative A – (Reroute Storm Drainage to Basin 7)
(Project #5A)

Storm	Capacity	Description	Unit	Price	Amt.	Cost
		Mobilization	LS			$113,778
50-Yr	130 cfs	**Hwy Crossing**				
		Headwall Structure	EA	$4,695	1	$4,695
		Box Culvert 3-feet X 6-feet	LF	$1,140	85	$96,900
		Asphalt Re/Replacement	LF	$225	85	$19,125
50-Yr.	168 cfs	**Culvert Adjacent to 101**	LF			
		Inlet Structure	LF	$5,000	1	$5,000
		Box Culvert 4-feetX7-feet = 71-inch Di	LF	$650	500	$325,000
50-Yr.	168 cfs	**Ditch Adjacent to Highway 101**				
		Channel Excavation	LF	$56	500	$28,000
		Shot-crete Ditch Lining	SF	$12	13,500	$162,000
50-Yr.	168 cfs	**Rechannelization**				
		Channel Excavation	LF	$56	1300	$72,800
		Outfall Construction		$45,000	1	$45,000
					Project Sub-Total	**$872,298**
					Resource Agency Permitting	**$26,169**
					Eng. & Admin	**$191,906**
					Contingency	**$174,460**
					Project Total	**$1,264,832**

Table 6.4.5 B Basin 6 Storm Drainage Improvements Alternative B – (Parallel Storm Sewer & Outfall with South Shore) (Project #5B)						
Storm	**Capacity**	**Description**	**Unit**	**Price**	**Amt.**	**Cost**
		Mobilization	LS			$107,883
50-Yr	130 cfs	**Hwy Crossing**				
		Headwall Structure	EA	$4,695	1	$4,695
		Box Culvert 3-feet X 6-feet	LF	$1,140	85	$96,900
		Asphalt Re/Replacement	LF	$225	85	$19,125
50-Yr.	168 cfs	**Parallel Storm Sewer and Outfall**				
		Easement	SF	$6	12,000	$72,000
		Inlet Structure	EA	$8,000	1	$8,000
		Storm Sewer Arch 53-inch x 83-inch	LF	$650	800	$520,000
		Outfall Structure	EA	$25,000	1	$25,000
					Project Sub-Total	**$853,603**
					Resource Agency Permitting	**$25,608**
					Eng. & Admin	**$187,793**
					Contingency	**$170,721**
					Project Total	**$1,237,724**

Basin 9

Basin 9 is the drainage for Grant Creek and is the major drainage area associated with the Municipal Airport. The area directly east of the airport, Basins 9(5), 9(6), 9(7), 9(8) and 9(9), is an area of potential development for commercial and light industrial enterprises. To simulate developed conditions an assumed impervious area of 55% was applied to the estimated percentage of buildable areas in each of these sub-basins

The upper section of Basin 9 is zoned for residential development, and in the past there was been some interest in siting a destination resort in the area. Runoff simulations were based upon an impervious area following development of 25% for Basins 9(3) and 9(4).

Because of capacity limitations associated with the existing 48" diameter culverts carrying Grant Creek under the Airport, the projected increase in run-off for the area of the drainage above the airport, would result in submergence of the inlets during the 50-year design storm. Due to the existing topography in the vicinity of the inlets, the increased flow could result in pooling depths of 30 feet to adequately convey projected run-off, (See Existing Structural Analyses, 6.3.1).

The existing culverts under the airport were constructed in the 1940's and are made up of concrete pipe. With the extreme burial depth of the culverts and because they are lying underneath the

runways, it is impractical to replace them with a larger diameter structure. Therefore, to accommodate projected future growth, it is recommended that area immediately upstream of the inlets be used as a retention pond, allowing pooling to the depths necessary for the existing pipes to drain the area. Because of the age and type of pipe associated with the existing storm sewers, it recommended that the capacity and strength of those culverts be increased with the installation of a heavy walled plastic liner-using construct in place (trenchless) technology. The project also proposes installation of new headwalls and inlet structures along with slope protection for the pond area. It is important that installation of new inlets include an overflow structure to allow escape of retained storm water if inlets happened to become obstructed.

Table 6.4.6
Basin 9 Storm Drainage Improvements
Grant Creek Drainage Under The Airport
(Project #6)

Description	Unit	Price	Quant.	Cost
Mobilization	LS	$ 105,000	1	$105,000
Clean and Televise Existing 48" Sewer Pipes	LS	$25,000	1	$25,000
48" CIPP Liner - Heavy Wall	LF	$285	2400	$684,000
Inlet/Headwall/Overflow Structure	EA	$25,000	2	$50,000
Retention Pond Slope Protection	SY	$4	30000	$120,000
			Project Sub-Total	**$984,000**
			Resource Agency Permitting	**$29,520**
			Eng. & Admin	**$216,480**
			Contingency	**$196,800**
			Project Total	**$1,426,800**

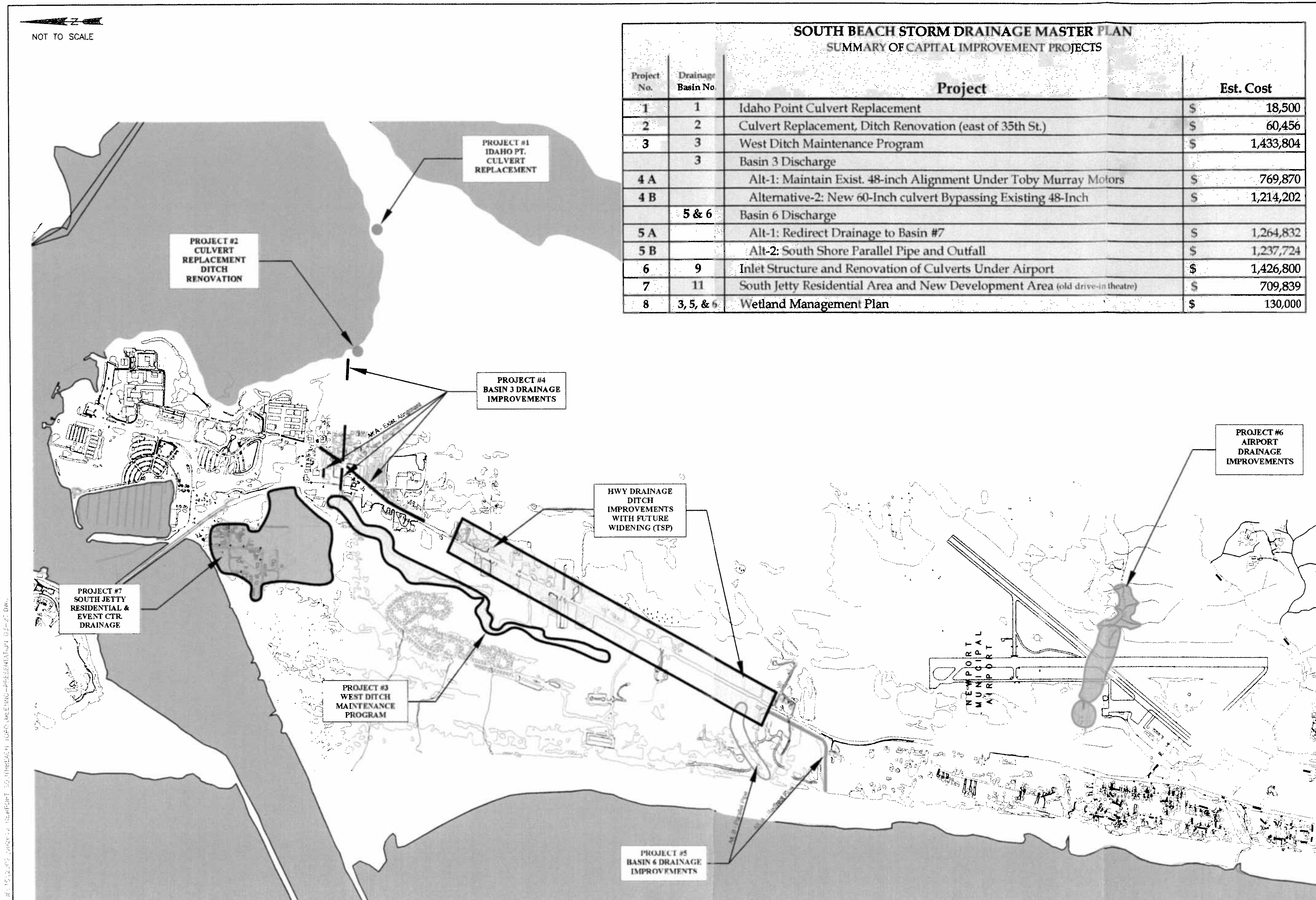
Basin 11

Proposed improvements in this basin are intended to facilitate the drainage generated by new commercial development at the old drive-in theatre site and future roadway/street improvements (paving) in the residential area. The land where the old drive-in theatre was located is currently undeveloped consisting of a relatively flat parcel which has been cleared of the majority of vegetation. Most, if not all, of rainfall in that undeveloped area is currently absorbed by the well-drained sandy soils. The recommended improvements take into consideration runoff based on a significant increase due to the amount of impervious area associated with structures and paved parking facilities associated with a commercial development. Project cost savings could be attained through performing some alternative materials or methods for handling on-site storm runoff. It is recommended that design/development of the Event Center consider use of porous pavement systems for the parking lot or storm water retention/detention facilities. Reducing the total amount or peak volumes of runoff through such methods would allow installation of downstream stormwater facilities with smaller capacities resulting in overall project cost savings. Proposed improvements do not take into consideration any on-site alternative materials or methods for reducing peak run-off associated with the commercial development.

The proposed improvements in the existing residential neighborhood of this basin include a combination of sewer pipes, ditches with manholes and catch basins at key intersections. The outfall into the river needs to be replaced to accommodate the increased capacity. The existing outfall is currently partially buried.

Table 6.4.7
Basin 11 Drainage Basin Improvements (Project #7)

Storm	Cap	Description	Unit	Price	Quant.	Cost
		Mobilization				$ 65,357
10-Yr	38 cfs	CULVERT: S. JETTY ROAD				
		Storm Sewer 36-inch ADS	LF	$ 148	75	$ 11,100
		Outlet Structure	LF	$ 6,500	1	$ 6,500
10-Yr	34 cfs	**Ditch: SW Brant Street**				
		Trench Excavation	LF	$ 32	500	$ 16,000
		Shot-Crete Ditch Lining	SF	$ 12	8000	$ 96,000
10-Yr	31 cfs	**Culvert: Private Property**				
		Easement	SF	$ 3	9,750	$ 29,250
		Storm Sewer 33-inch ADS	LF	$ 132	650	$ 85,800
		Catch Basins	EA	$ 750	4	$ 3,000
10-Yr	18 cfs	**Ditch: Base of Hill to SW Coho**				
		Easement	SF	$ 3	4,500	$ 13,500
		Trench Excavation	LF	$ 26	300	$ 7,800
		Shot-Crete Ditch Lining	SF	$ 12	4,800	$ 57,600
10-yr	15 cfs	**Old Drive-in Theatre Property Development**				
		Easement	SF	$ 3	2,531	$ 7,593
		Storm Sewer 27-inch ADS	LF	$ 130	750	$ 97,500
		Catch Basins	EA	$ 750	4	$ 3,000
					Estimated Construction cost	**$ 500,000**
					Eng. &Admin. 15%	**$ 110,000**
					Contingency 20%	**$ 100,000**
					Project Total	**$ 709,839**



SOUTH BEACH STORM DRAINAGE MASTER PLAN

SUMMARY OF CAPITAL IMPROVEMENT PROJECTS

Project No.	Drainage Basin No.	Project	Est. Cost
1	1	Idaho Point Culvert Replacement	$ 18,500
2	2	Culvert Replacement, Ditch Renovation (east of 35th St.)	$ 60,456
3	3	West Ditch Maintenance Program	$ 1,433,804
	3	Basin 3 Discharge	
4 A		Alt-1: Maintain Exist. 48-inch Alignment Under Toby Murray Motors	$ 769,870
4 B		Alternative-2: New 60-Inch culvert Bypassing Existing 48-Inch	$ 1,214,202
	5 & 6	Basin 6 Discharge	
5 A		Alt-1: Redirect Drainage to Basin #7	$ 1,264,832
5 B		Alt-2: South Shore Parallel Pipe and Outfall	$ 1,237,724
6	9	Inlet Structure and Renovation of Culverts Under Airport	$ 1,426,800
7	11	South Jetty Residential Area and New Development Area (old drive-in theatre)	$ 709,839
8	3, 5, & 6	Wetland Management Plan	$ 130,000

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

SHN CONSULTING ENGINEERS & GEOLOGISTS, INC.
558 Anderson Ave. Coos Bay, Oregon 97420-0150 (541)266-9442 FAX (541)266-9496

NO.	DATE	REVISION	BY

DSGN RS
DR DBA
CHK RS
APVD SKD

CITY OF NEWPORT, OREGON
DEVELOPMENT COMMISSION
SOUTH BEACH STORM DRAINAGE MASTER PLAN
D PROJECTS

SHEET FIGURE 6.4.1A
DATE 01/20/04
PROJ. NO. 002612

PROJECT #2

PROJECT #4

#4A

#4B

PROJECT #7

SYMBOL LEGEND

- PROPOSED NEW DITCH
- PROPOSED NEW MANHOLE
- PROPOSED NEW PIPE / CULVERT
- EXISTING STORM SEWERS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY
0" 1"

CONSULTING ENGINEERS & GEOLOGISTS, INC.
598 Anderson Ave. Coos Bay, Oregon 97420-0150
(541)266-9442 FAX (541)266-9496

NO.	DATE	REVISION	BY

DESIGN RS
DR DBA
CHK RS
APPD SKD

CITY OF NEWPORT, OREGON
DEVELOPMENT COMMISSION
SOUTH BEACH STORM DRAINAGE MASTER PLAN

NORTH BASIN IMPROVMENT PROJECTS

FIGURE 6.4.1 B

DATE 1/20/04

JOB NO. 002612

7.0 Regulatory and Planning

7.1 Regulatory Environment

Federal Regulations--NPDES, Storm Water Phase II Requirements

On December 8, 1999, the Unites States Environmental Protection Agency (EPA) published the storm water Phase II final rule in the *Federal Register*. The issuance of the rule started a clock that has municipalities, the industry, and storm water professionals racing to understand and evaluate its implications.

The Phase II rule is an extension of the National Pollutant Discharge Elimination System (NPDES) storm water program. The Phase I rule was issued in 1990 and covered medium and large municipal separate storm sewer systems (MS4's) in cities or jurisdictional entities serving populations over 100,000. In addition, operators of construction activities disturbing more than 5 acres and 11 categories of industrial activities were required to obtain permit coverage under Phase I.

Phase II extends NPDES storm water permit requirements to small MS4's and construction activities disturbing more than 1 acre. Unlike the Phase I monitoring requirements, however, the Phase II rule has taken a more flexible approach. Those municipalities regulated under Phase II will not have to establish pollutant characterization of storm water quality by conducting analytical testing. The implementation of storm water discharge management practices, or best management practices (BMP's), will likely be sufficient in order to meet compliance with the six minimum measure requirements of Phase II.

The Phase II storm water rule automatically covers operators of MS4's who are located within an "urbanized area" which has a total population of 50,000 or more and a density of 1,000 persons per square mile. These urbanized areas usually include several different jurisdictions and are based on US census counts.

Along with the automatically designated MS4's, the Phase II rule also requires the NPDES Permitting Authority (DEQ) to establish criteria for including, at a minimum, those MS4's located in population areas of at least 10,000 if it determines that wet-weather flow discharges could cause an adverse impact on the quality of receiving waters. Oregon's NPDES permitting authority is the DEQ. DEQ may also include municipalities as designated MS4's with populations as low as 1,000. In most cases these designations must occur on or before December 9, 2002. Municipalities with these MS4's will have 180 days from designation to obtain permit coverage.

At this time the City of Newport is not a regulated MS4; however, the City wishes to follow some of the Phase II requirements, as they are good management tools for their system.

Municipal Permit Requirements

A municipality's individual permit application or notice of intent for coverage under a general permit must include descriptions of the BMP's, as well as their respective measurable goals, that will be used to meet the following six minimum measures.

Public Education and Outreach: This measure must include a program designed to educate the public about the impacts of storm water discharges on receiving waters and what individuals can do to prevent storm water pollution.

Public Participation and Involvement: This measure must include a procedure for giving the public an opportunity to actually participate in both the development and implementation of a storm water program.

Elicit Discharge Detection and Elimination: Regulated municipalities must develop a Plan with mechanisms designed to locate and eliminate discharges into storm sewers from sources other than storm water. This Plan must include a complete map of all outfalls and identification of locations and sources of any water entering a system.

Construction-Site Runoff Control: Regulated municipalities must have a regulatory mechanism in place for erosion and sediment control as well as BMP's for preventing or reducing other pollutants associated with construction activity. It is important to note that this measure does not relieve the requirements of a construction-site operator to obtain an independent NPDES permit for sites larger than 1 acre. The permitting authority, however, can specifically reference qualifying local programs in the NPDES general permit requirements so the construction operator doesn't need to follow two different sets of requirements.

Post-Construction Runoff Controls: Regulated municipalities must have a program requiring new and redevelopment projects to implement controls on sites, which will reduce pollutant loads in storm water runoff.

Pollution Prevention and Good Housekeeping: Regulated municipalities must have an operation and maintenance program to prevent or reduce pollutant runoff from municipal operations.

While the above six measures are the minimum required by EPA, the rule allows for States with NPDES permitting authority to develop permits that may require more stringent measures to meet water-quality requirements. In addition, municipalities may also develop storm water regulations that go beyond the requirements of Phase II.

BMP Selection

Since Phase II is a narrative rule that only requires the implementation of BMP's to achieve compliance, selection of the proper mix of BMP's appropriate to the municipality becomes critical. The Phase II rule requires that EPA and permitting authorities issue BMP menus for each minimum measure to assist MS4's in developing the storm water management program BMP "toolbox." These menus will include both structural and nonstructural BMP's.

Nonstructural BMP's may include:

- Educational materials;
- school storm water programs;
- public meetings and citizen groups;
- volunteer cleanups, monitoring programs, and Adopt-A-Storm Drain programs;
- illicit discharge detection programs; and
- regulatory ordinances and other regulatory mechanisms, including:
  - Prohibitions on non-storm discharges into separate storm sewers,
  - requirements for control of erosion, sediment, and other pollutants on construction sites,
  - site-Plan approval processes requiring post-construction storm water controls,
  - requirements for installation of controls at existing sites that are likely sources of pollutant runoff,
  - BMP operation and maintenance requirements with regulatory enforcement provisions,
  - procedures for inspecting and monitoring structural BMP's,
  - street sweeping, catch-basin cleaning, and organic yard waste controls,
  - training materials and municipal maintenance activities and schedules, and
  - recycling and pollution prevention programs.

Structural BMP's may include:

- Vegetative BMP's such as constructed wetlands, swales, filter strips, and rain gardens;
- infiltration BMP's (with pretreatment where necessary for groundwater and wellhead protection) such as basins, trenches, dry wells, sand filters, and porous pavement;
- detention and retention methods for controlling both volume and quality of water flow into MS4's and receiving waters;
- treatment controls such as separators, filtration devices, catch-basin inserts, and skimmers; and
- outfall and drain grates.

All of the above are just examples of BMP's that could be used to meet Phase II requirements. The rule does not set limits as to which BMP's can be used, and regulated municipalities can develop their own list to meet their needs if they wish.

7.2 Planning for the Future

The Newport Comprehensive Plan and the City's zoning propose commercial and light industrial development within the majority of the South Beach Area that remains to be developed. However, the South Beach Urban Renewal Plan of the City of Newport adopted September 12, 1983 indicates that the economic development potential of the area cannot be fully realized without improved facilities, improved access to properties, and resolution of drainage problems resulting from a high water table and poor drainage characteristics of soils. The Plan envisions expansion of facilities such as those for manufacturing, transportation communication utilities and trade within the South Beach Area. Drainage problems that now exist will be exacerbated as impervious surfaces such as roads, rooftops, buildings, parking lots, access ways and sidewalks begin to dominate the landscape, and divert natural drainage patterns.

In order for larger tracts of property to develop, and in order to improve conditions for existing developed properties, property owners will be required to participate in providing the necessary drainage infrastructure. This Section provides guidance for developing an overlay zone that prescribes structural and nonstructural solutions to be incorporated by builders and developers, and allows individual property owners to address runoff issues with their own engineers and present engineering Plans when they apply for City building and development permits. The proposed new South Beach Storm Water Overlay increases the level of regulatory oversight, and requires developers to provide infrastructure, but it also provides some opportunities that could reduce some of the costs of development.

7.3 Newport Comprehensive Plan

The City of Newport Comprehensive Plan, 1990 - 2010 has been acknowledged by the State of Oregon because it provides the goals and policies to implement the Statewide Planning Goals, while providing guidance for growth and development of the City. This South Beach Storm Water Master Plan is intended to be an extension of the City of Newport's Comprehensive Plan because it provides specific guidance for implementation of a number of the goals and policies set forth in the Comprehensive Plan. The Newport Comprehensive Plan policies support the development of this South Beach Storm Water Master Plan, and its proposed South Beach Storm Water Overlay zone. The following analysis of existing applicable land use policies references a number of goals, policies and implementation measures that are addressed in the Newport Comprehensive Plan. The proposed overlay zone provides the opportunity for property owners to solve drainage problems by meeting performance standards. No comprehensive plan amendments are envisioned to be necessary in order to implement the South Beach Storm Water Master Plan provided that engineering Plans for development provide the basis for adequate findings to be made at the time that new development is approved at the Planning Commission level. In the following section, the goals and policies of the Newport Comprehensive Plan that are determined to have priority for implementing this South Beach Storm Water Master Plan are included along with a discussion of their application.

Goals/Policies, Natural Features

Goal 1: To protect life and property, to reduce costs to the public, and to minimize damage to the natural resources of the coastal zone that might result from inappropriate development in environmentally hazardous areas.

Policy 6: Nonstructural solutions to problems of erosion or flooding shall be preferred to structural solutions. Where flood and erosion control structures are shown to be necessary, they shall be designed to minimize adverse impacts on water currents, erosion, and accretion patterns.

Policy 7: Engineering solutions or other measures to provide appropriate safeguards shall be required prior to issuance of building permits in identified hazardous areas if required by a geological report.

Because poor drainage contributes to hazardous conditions, this Plan and its proposed South Beach Storm Water Overlay zone provide engineering standards for development that will help resolve future problems. Both structural solutions such as pipes, ditches and pumps and nonstructural solutions such as guidance and regulations for the development of property are proposed within this Plan. The South Beach Storm Water Overlay Zone, a proposed nonstructural solution, includes a number of engineering specifications for structural solutions to be addressed at the time that property is developed.

Goals/Policies, Water Quality

Goal: To maintain a level of water quality that is consistent with State and Federal regulations.

Policy 2: Any development will be required to leave some amount of permeable surface as required by the Zoning Ordinance.

The South Beach Storm Water Overlay proposes to increase the amount of permeable surface for the South Beach Area, and allow for "skinny streets," shared driveways, porous parking lot paving materials and increased landscaping. When such opportunities are utilized, water quality will be enhanced.

Goals/Policies, Public Facilities Element, Storm Water Drainage

Goal: To provide a storm water drainage system with sufficient capacity to meet the present and future needs to the Newport urbanizable area.

Policy 2: The City will use existing, natural drainage systems to the greatest extent possible.

Goals/Policies, Natural Features

Goal 2: To protect and, where practical, enhance identified environmentally sensitive areas.

Policy 5: The City will complete the Goal 5 process for wetlands identified on the U.S. Fish and Wildlife Service Wetland Inventory maps by the next regularly scheduled periodic review.

Goals/Policies, Wetlands

Goal 1: To identify and regulate identified wetlands consistent with State and Federal laws.

Policy 2: The City shall, until more detailed information is developed, use the South Beach wetland study, the National Wetland Inventory, and other official sources for the identification of wetlands. That information shall be used to guide property owners in the development of their property.

Implementation Measure 1: The City shall complete the wetland study for South Beach. The study may be the basis for a wetland conservation Plan consistent with State law.

Implementation Measure 2: The City shall conduct a complete inventory of wetlands within the UGB prior to the next Periodic Review, subject to budgetary and time constraints.

This South Beach Storm Water Master Plan addresses natural drainage systems through its drainage basin concept. Both of the excerpts above make reference to the need for the wetland study for South Beach and also for a wetland inventory for Urban Growth Boundary (UGB) lands. The South Beach Area includes a number of UGB tracts. Future identification of wetlands and wetland mitigation sites can further assist the property owners in utilizing South Beach properties to their full potential.

Goals/Policies/Implementation Measures, Urbanization

Policy 2: (Excerpt does not reflect full context.)

1.) Urban development of land will be encouraged within the existing City limits. Annexations shall address the need for the land to be in the City.

2.) Urban facilities and services must be adequate in condition and capacity to accommodate the additional level of growth allowed in the City's Plans. Those facilities must be available or can be provided to a site before or concurrent with any annexations or Plan changes."

Policy 3: (Excerpt does not reflect full context.)

1.) The County shall consider recommendations and conditions suggested by the City and may make them conditions of approval.

Policy 4: The development of land in the urban area shall conform to the Plans, policies and ordinances of the City of Newport.

Goals and Policies, Public Facilities Element

Goal: To assure adequate Planning for public facilities to meet the changing needs of the City of Newport urbanizable area.

Policy 4: (Excerpt does not reflect full context.)

Development may be permitted for parcels without the essential services if:

The property owner enters into an agreement, that runs with the land and is therefore binding upon future owners, that the property will connect to the essential service when it is reasonably available; and the property owner signs an irrevocable consent to annex if outside the City limits and/or agrees to participate in a local improvement district for the essential service.

Policy 5: Upon the annexation of territory to the City of Newport, the City will be the provider of water and sewer service.

Within the Urbanization element, the City recognizes Lincoln County's zoning and control of lands within the UGB (unincorporated). City zoning is implemented when UGB lands are annexed to the City. Lincoln County currently has jurisdiction over these unincorporated areas of the UGB, but the City's interests are considered through a process where Lincoln County notifies the City of their land use decisions, and considers the recommendations and conditions suggested by the City. By utilizing Policy(s) 4 and 5 of the Goals and Policies of the Public Facilities element to address the City's needs for capital improvements for drainage, the City will assure equitable contributions from property owners of properties currently outside the City but within the City's UGB.

As pointed out in Section 3, portions of some of the drainage basins are contained within land under County Planning jurisdiction and outside of the City's UGB. Those lands are zoned Conservation Timber and are not anticipated to have any future development which will increase drainage or runoff affects in the Study Area.

Goals and Policies, Housing

(Excerpt does not reflect full context.)

Policy 3: The City shall encourage diversity and innovation in residential design, development and redevelopment that is consistent with community goals.

For residential zones within the South Beach Area, the proposed South Beach Storm Water Overlay provides for diversity and innovation through smart growth concepts including allowing for "skinny streets" and shared drives because these innovations are consistent with the goal of reducing runoff.

Goals and Policies, Newport Transportation Systems Plan

Goal: To provide a safe and efficient multi-modal transportation system consistent with the Transportation System Plan.

Policy 2: (Excerpt does not reflect full context.)

> Street System Plan (2.) The City does hereby adopt the classification system contained in the TSP as guidelines and shall develop implementing ordinances consistent with the classifications. However, the topography of the City of Newport limits the ability to develop streets that are totally consistent with the classification system at all times. It is therefore

imperative that the classification system be flexible in its application to account for specific circumstances.

Pedestrian System Plan (1.) The City shall provide a continuous pedestrian network consistent with the TSP to the greatest extent possible considering funding limitations, topographic constraints and existing development patterns.

Access management goals and policies are set forth for Highway 101 and other arterials within the City and spacing standards are provided. The proposals of the South Beach Storm Water Overlay (SBSDO) zone are consistent with the Transportation Systems Plan (TSP) goals. The South Beach Storm Water Overlay is an implementing ordinance that is proposed to take the topography and other natural features into consideration when developing and redeveloping property whether or not it fronts on an arterial. The SBSDO provides an opportunity for reducing the widths of proposed streets provided that there is no impediment to safety and traffic flow.

The City's TSP also makes reference to a continuous pedestrian network taking into consideration topographic constraints and existing developing patterns. The SBSDO's proposed standard requiring a network pathway to facilitate pedestrian movement allows for porous pavement systems and a network of pathways that could be implemented to replace specific sidewalk standards consistent with the TSP.

Reduced accesses are suggested in the TSP for traffic safety reasons. The SBSDO encourages the consolidation and reduction of accesses because this reduces impermeable surface, thus achieving the goals of the South Beach Storm Water Master Plan and furthers the goals of the TSP.

7.4 Newport Zoning Ordinance

The Zoning Ordinance and Zoning Map of the City of Newport provide the land use classifications and standards for development for all of the zoning of properties within the Newport City limits. In the South Beach Storm Water Master Plan Study Area, these zones include high-density residential, retail and tourist commercial, light industrial, public buildings and structures, public recreation and both water dependent and water related estuarine management units. Each zoning designation provides a listing of specific uses that are permitted within that particular zone. In addition, there are a number of regulations and standards that apply generally, a Table of Standards that provides site development requirements for lot areas, setbacks and lot coverage in all zones, and special standards and procedures. Several Overlay Zones are included within the section entitled Special Procedures.

Section 2.3.6: Parking, Loading and Access Requirements

This section provides parking space and loading requirements and provides standards for the design of parking lots. It requires a site Plan that shows the layout of the building, parking, landscaping, setbacks and other pertinent information at the time of development and prior to the issuance of building permits. However, Section 2-3-6.050 names special areas within the City that are not required to comply with the parking required by Section 2-3-6.

Shared parking is allowed in Section 2-3-6.040 subject to approval by the Planning Commission using the criteria and process for a Type 1 conditional use permit.

Surfacing for parking lots with more than five parking spaces is prescribed in Section 2-3-6.045 which requires surfacing with asphalt or concrete, allowing for other material that "will provide equivalent protection against potholes, erosion, and dust" if determined to have an equivalent level of stability and approved by the City Engineer.

Section 2.4.5: Landscaping Requirement

This section provides requirements to encourage Planting and retention of existing trees and other vegetation to enhance the appearance and prosperity of the City as a whole, and includes the following purposes that will be enhanced through the implementation of this South Beach Storm Water Master Plan:

Aid in air purification and storm water runoff retardation;

Reduce erosion;

To protect and enhance the natural beauty, environment and green space within the City of Newport;

To advance economic development;

Attract residents and promote tourism.

The landscaping requirements are for all new development including additions and remodels but single and two family residences are excluded.

Section 2.4.7.035: Appeal

This section has to do with appeals in geologic hazard areas. It is not relevant to the South Beach Storm Water Master Plan within the context of the existing Plan. However, it contains a procedure that could be utilized as an element of the SBSDO to resolve appeals when the engineering analysis provided by the engineer that is hired by the developer provides information that is accepted by the Planning commission in their findings, but is appealed by a third party who hires an engineer that provides technical information that conflicts with the engineering report submitted by the applicant. The procedure outlined in Section 2-4-7.035 includes a procedure where a panel of three registered engineering geologists reviews the information from the applicant and the appellant, and prepare a report addressing the technical issues. The cost is borne by the applicant and the appellant.

Section 2.4.7.045: Erosion and Sedimentation Discharge

This section provides the following suggested measures to prevent the discharge of erosion and sedimentation. The following italicized information is quoted directly from the Section 2-4-7.045.

1.) Minimal removal of vegetative cover, particularly trees.
2.) Temporary measures for controlling runoff, such as berms or holding ponds, particularly on slopes of 12% or greater.
3.) The Planting of permanent vegetative cover as soon as possible after construction.

For structures, driveways, parking areas, or other impervious surfaces in areas of 12% slope or greater, the release rate and sedimentation of storm water shall be controlled by the use of retention facilities as specified by the City Engineer. The retention facilities shall be designed for storms having a 20-year recurrence frequency. Storm waters shall be directed into drainage with adequate capacity so as not to flood adjacent or downstream property.

In all areas of the City the Building Official or City Engineer may require adequate culverts or other drainage facilities to be installed as a condition of a building permit.

7.5 Newport Land Development Ordinances

The City of Newport currently has two ordinances that address land development including storm drainage considerations:

Ordinance #1285 - provides procedures and standards for land development including partitioning and subdivisions.

Ordinance #1311 – adopts chapter 70 of the Uniform Building Code, which addresses site grading and excavation.

Both ordinances are extremely limited in providing standards and guidelines for storm drainage facilities associated with land development. Ordinance #1285 contains the following improvement requirements for addressing storm drainage:

3-3-2.010. Surface Drainage and Storm Sewer System. Drainage facilities shall be provided within the subdivision and to connect the subdivision drainage-to-drainage ways of storm sewers outside the subdivision. Design of drainage within the subdivision shall take into account the capacity and grade necessary to maintain unrestricted flow from areas draining through the subdivision and to allow extension of the system to serve such areas.

Ordinance #1311 contains the following section addressing storm drainage:

Section 6. (c) Drainage generally. All graded sites shall be developed so as to provide control of storm and surface waters. All drainage provisions shall be subject to the approval of the City building official and shall be of such design as to carry storm and surface waters to the nearest practical street, storm drain or natural water course, a safe and adequate place to deposit and receive such waters.

To promote consistency in addressing storm drainage by future development, it is recommended that the City adopt more thorough design and performance standards. Appendix D suggested language for such standards.

7.6 South Beach Storm Water Overlay Zone (SBSDO)

As discussed previously within this section, this Plan proposes a new overlay zone entitled the South Beach Storm Water Overlay (SBSDO) applicable to all of the underlying zone designations. The example SBSDO is provided in Appendix C.

The purpose of the overlay is to manage storm water runoff in a consistent and coordinated manner. The overlay concept imposes additional requirements above those required by the underlying zones in order to deal with the situation of storm drainage.

The priorities of the SBSDO are to reduce and manage storm water runoff as development occurs within the specified South Beach Area. This can be done by relaxing existing current standards that contribute to increased runoff when there is full development, and by utilizing on and/or offsite detention facilities. The proposed SBSDO may require the involvement of a registered engineer at the time of development and redevelopment of property. The analysis provided by the engineer can be used as the basis for the applicant's design of the property. The SBSDO proposes performance standards for the South Beach Area that can be achieved by providing adequate infrastructure for runoff, utilizing landscaping that contributes to reductions in runoff rather than increases in runoff, and reducing impervious surfaces.

Parking Lots and Access

The SBSDO encourages utilization of porous paving materials to manage quantities and improve the water quality of runoff. While porous surfacing is now allowed subject to the approval of the City engineer based upon the City engineer's determination of stability, the ordinance does not provide an incentive for using porous surfacing materials. The SBSDO allows for the engineering analysis of individual proposed developments in order to encourage more intensive development through the reduction of impervious surface. Development with shared access drives also provides an opportunity to reduce impervious surface.

Landscaping

The existing Newport Zoning Ordinance has comprehensive landscaping requirements for new development and additions to existing development or remodels to apply to all The SBSDO proposes landscaping that will thrive in the coastal climate without irrigation. In addition, this Plan suggests that additional landscaping can help achieve the goal of reducing runoff and provides the incentive for developers of commercial, residential and industrial properties to utilize landscaping to help reduce the need for costly on-site infrastructure.

Appeals Involving Dispute of Technical Engineering Information

Because the SBSDO relies on technical analysis and information that is submitted by the applicant's selected registered engineer, an appeal process that allows for review by a panel of registered engineers may be appropriate. The process set forth in Section 2-4-7.035 of the Newport Zoning Ordinance could be adapted to allow for a panel of engineers to review technical information that has been submitted by both the applicant and the appellant in regards to drainage calculations and proposals for transport and detention of runoff as part of the appeal process. This could be used when the Planning Commission has relied upon a report prepared by a registered engineer who is working for the applicant to make their own findings, or when the Planning Commission's relies on an engineering report submitted by opponents to the project.

Erosion and Sedimentation Discharge

It is suggested that the South Beach Storm Water Overlay area be added to the language of Section 2-4-7.045of the Newport Zoning Ordinance so that the language within the ordinance that specifies means to prevent the discharge of erosion and sedimentation applies throughout the overlay zone area.

Streets and Pedestrian Way's

The SBSDO allows the applicant to propose street pavement widths that are less than those set forth in the City's Land Development Ordinance because the SBSDO is an element of a special purpose neighborhood Plan, and the reduction in street pavement widths could be part of the storm drain management Plan. The applicant will have the burden of proof for determining that all proposed streets and pedestrian ways are safe and efficient as required by the Newport Comprehensive Plan and addressed in the SBSDO.

8.0 Financing and Prioritizing

8.1 General

Evaluating funding options and deciding which combination of revenue sources is most appropriate for any community is dependent on a number of criteria, including:

Political Acceptance: Elected officials or other persons responsible for adopting a storm water-funding program must compare any proposed funding package to other local needs and resources.

Fairness and Equity: The degree to which the funding package is linked to a payee's specific contribution to storm runoff problems (i.e. is someone paying for a service not received?).

Administrative Simplicity: The ease of administering the funding package.

Feasibility of Implementation: The relative ease or difficulty of making a funding package operational.

Legal Defensibility: The probability of the funding package being challenged and defended in the courts.

Revenue Generating Capacity: The ability of the funding package to produce sufficient revenue for the program.

Dedicated Funding Source: The ability of the funding package to be available in future years is to maintain an ongoing program.

Developing a funding and financing strategy will likely involve a number of funding sources. The City could initiate a public involvement process, which would provide input about local attitudes towards storm water spending levels and funding sources. The ability to inform the public about the need for the program and obtain the necessary community support may determine whether elected officials approve a funding package. A good way to inform the public about what they will receive for their fee is to do a level of service analysis. Costs associated with different elements of service can then be communicated clearly. If there were objections to the rate, it would then be easier to negotiate specific program changes and cost reductions with users.

8.2 O, M & R and Capital Improvements

Upon considering financing of a complete Storm Water Management Plan, two primary areas of funding are needed. A source or sources of funds are required to finance 1) ongoing operation, maintenance and replacement (O, M & R) and 2) Capital Improvements. The following is a list of the application of the funding options:

Operation, Maintenance and Replacement

- General operating funds (property taxes)
- User (utility) fees
- Plan review and inspection fees
- Special assessments
- State Gas Tax revenue sharing (must be by law associated with streets)

Capital Improvements

- General obligation bonds
- Revenue bonds (based upon user fees, systems development fees, tax increment revenues or anticipated, and excess, State gas tax revenues)
- State/Federal Grants
- Special Improvement Districts

Operation, Maintenance and Replacement

While listed as funding sources for O, M & R, use of City general fund monies or State Gas Tax shared revenues is extremely limited. A City's general funds are used primarily for other City services and increasing taxes for storm water purposes is usually impractical or politically unfeasible. State Gas Tax shared revenues are used for Street O, M, & R and associated storm systems. Annual resources from State shared gas tax revenues are limited and do not typically provide sufficient funds to meet the demands associated with local street maintenance.

Within the Study Area, an ongoing O, M & R program is pretty much non-existent with expenditures taking place primarily for emergency cleaning and/or repairs. Such a scenario is typical of many communities when considering storm systems. The method, which is currently being used within Oregon by many cities, and being considered and initiated by several more, is funding storm system O, M & R requirements through a utility user fee type program. Storm water utilities collect monthly user fees based upon amount of runoff produced on a property, which is associated to its impervious area. While such a system could probably work quite well for the City of Newport, on the whole, a storm water utility is not recommended for the Study Area alone.

As discussed in Section 3, the South Beach Area does not contain a mix of land uses typically associated with an entire community. The Study Area includes a significant amount of publicly owned properties, land contained within the Urban Growth Boundary and other lands under County jurisdiction. The Study Area also contains a significant number of, disconnected drainage basins that drain directly to the ocean or river with minimal improved drainage facilities. With those features, it would be difficult to apply a uniform user fee system for the entire South Beach Area on an equitable basis. However, while there still could be some contention regarding equitability related to the Study Area, the City of Newport should investigate initiation of a citywide storm water utility, which would include South Beach.

Capital Improvements

Capital improvements to the City of Newport's South Beach storm drainage system are recommended in Section 6. This section presents financing options, a prioritized list and schedule of improvements.

In general, cities have a difficult time implementing storm drainage improvements. Other City services, such as water and sewer, often require a higher priority and utilize available public works funds. Storm water issues are either deprioritized or corrections are attempted for isolated problem areas where a systemic approach should be applied. It will become increasingly difficult for the City to ignore storm water issues since pressure for new developments will continue. As this development occurs, it will place an even greater strain on the existing drainage system, potentially escalating the cost of improvements. Without sufficient funding and a commitment from the City to implement this Plan, it will not be possible to correct drainage problems. If the improvements are not implemented, drainage problems may worsen, the City may face higher costs in the future, or the City may have to discourage growth.

Unfortunately, financing options for storm drainage improvements are limited. Grants are generally not available to assist cities for funding storm water projects. Most improvements have to be funded from systems development charges, loans, local improvement districts, urban renewal programs, or through other City funds. The options available to the City of Newport are:

- Debt financing through issuance of revenue or general obligation bonds for storm water improvement.
- Involve residents in each basin and form local improvement districts to fund the projects respective to each neighborhood.
- Form a storm water utility and charge each user for storm water as a City service.
- Construct improvements related to future development through systems development charges.

Each of these items is discussed later in this section. However, it is first necessary to differentiate the portion of improvement costs required to correct system deficiencies and provide capacity for future development.

8.2 Project Costs Associated With Future Development

Modeling performed for existing and future conditions identified the component of runoff generated from existing and future development. Consequently, costs attributed to increasing line sizes, constructing new storm drains, and siting new outfalls can be directly attributed to future developments. These costs should be segregated to allow systems development charges to pay for improvements that provide a direct benefit to future growth.

In certain areas, the City could attempt to charge developers for the cost associated with the improvements that are required for the respective development. However, this approach may

discourage development in key areas of South Beach where most of the City's funds will be allocated to correct existing problems. Instead, developers may attempt to avoid paying for improvements by locating in remote areas of the City. Remote developments should be discouraged because the City's cost for providing other services will increase, operating costs will be higher, a sprawling community will result, and new problems will be created before the existing problems are fully addressed. It is recommended, therefore, that the City distribute improvement costs related to development among all the developers. Systems development charges provide the City with the mechanism to distribute costs.

A breakdown of project costs and the percentages relative to development in current vacant buildable lands is provided in Table 8.2.1. Based on the information presented, approximately 44 percent ($2,839,138) of the total improvement costs will correct existing problems and should not be associated with future development. Approximately 22 percent ($1,394,832) of the total costs provide additional capacity for future development and could be funded through a citywide systems development charge or because it is development related, through Urban Renewal funds. Approximately 34 percent of the proposed projects are controlled by other jurisdictions or property owners, ($78,956 - Lincoln County, $1,426,800 - Municipal Airport, $444,332 - Private property Owner) and should be funded by them.

In addition to the capital projects related to structural issues, one of the major development constraints identified in the South Beach Area is the presence of jurisdictional wetlands. Significant amounts of land contained within the low-lying basins in the Study Area (Basins 3, 6 & 7) have the presence of wetlands. Land within an urban area, which is adjacent to or near a major transportation route, such as Highway 101, is typically considered prime property for commercial and/or industrial type developments. The presence of wetlands on properties in the South Beach Area is a deterrent to any type of intensive land use development because of the time and expense associated with the State and Federal permitting requirements typically associated with fill in these areas.

In order to provide guidance to the City and property owners for proper development planning in the South Beach area, it is recommended that a wetland management/development Plan be performed. Such a Plan could include the following elements:

- Identification and mapping of wetlands in the area to first inventory what is there.
- Evaluate development options for wetland areas, which would include mitigation opportunities and costs.
- Address wetland enhancement possibilities and opportunities related to improving esthetics and livability, which could add to the development attraction of the area.

Because of the complexities associated with acquiring the required permits for development in wetlands and considering the area contains multiple public and private properties, one overall plan is necessary to facilitate development. Without a single plan for the area, individual development would be discouraged and unlikely to occur due to the cost of wetland development permitting and risks associated with the uncertainties of obtaining the desired permit.

It is estimated that such a study would cost $130,000.

ENR wo4 ~ 7308

Table 8.2.1

SOUTH BEACH STORM DRAINAGE MASTER PLAN

Associated City and Future Development Improvement Costs

Project No.	Drainage Basin No.	Project	Est. Cost	City Portion		Portion For Future Development		Portion Related to Other		NOTE
				%	Cost	%	Cost	%	Cost	
1	1	Idaho Point Culvert Replacement	$ 18,500					100%	$ 18,500	1
2	2	Culvert Replacement, Ditch Renovation (east of 35th St.)	$ 60,456					100%	$ 60,456	1
3	3	West Ditch Maintenance Program	$ 1,433,804	100%	$ 1,433,804					
	3	Basin 3 Discharge								
4 A		Alt-A: Maintain Exist. 48-inch Alignment Under Toby Murray Motors	$ 769,870	100%	$ 769,870					
4 B		Alt-B: New 60-Inch culvert Bypassing Existing 48-Inch	$ 1,214,202	63%	$ 769,870			37%	$ 444,332	2
	5 & 6	Basin 6 Discharge								
5 A		Alt-A: Redirect Drainage to Basin #7	$ 1,264,832			100%	$ 1,264,832			
5 B		Alt-B: South Shore Parrallel Pipe and Outfall	$ 1,237,724			100%	$ 1,237,724			
6	9	Inlet Structure and Renovation of Culverts Under Airport	$ 1,426,800					100%	$ 1,426,800	3
7	11	South Jetty Residential Area and New Development Area (old drive-in theatre)	$ 709,839	61%	$ 433,002			39%	$ 276,837	4
8	3, 6, & 7	Wetland Management Plan	$ 130,000	0%	$ -	100%	$ 130,000			
TOTAL (With projects 4B & 5A - recommended alternatives)			$ 6,258,433	42%	$ 2,636,676	22%	$ 1,394,832	36%	$ 2,226,925	

Note 1: Improvements contained withIn UGB - currently under jurisdiciton of the County

Note 2: These costs are the portion which are directly related to the relocation of the existing line that is under Toby Murry Motors and would be anticipated to have property owner participation.

Note 3: Project is related to culverts owned and operated by the Airport

Note 4: This portion of the project cost is associated with the proportion of Event Center Runoff for the entire system

8.3 Project Financing Options

The City of Newport should proceed with financial arrangements for the recommended projects. Funding sources to assist the City construct storm drainage improvements are the following.

Debt Financing:

Typically used for capital-intensive projects, local governments can issue debt to finance public facilities.

General Obligation Bonds (GO): General obligation bonds have traditionally been the financial tool most often used to finance major utility improvements, which benefit an entire community. Bonds are structured around the community's taxing authority and are retired through property taxes, or user fees, according to an equitable distribution of the bonded indebtedness across the community's assessed valuation.

Revenue Bonds: Revenue bonds are similar to GO bonds except that retirement of the bonded indebtedness is made from revenue anticipated from the utility. In comparison, revenue bonds are more easily accessed than GO bonds because they do not always require a vote of the utilities populous. However, the security of a revenue bond is lower than a GO bond, generally resulting in higher interest rates. Currently, the City does not have a storm water utility; consequently, revenue for loan repayment would have to be generated through sewer user and, Systems Development Change (SDC) fees or those associated with the urban renewal program.

Local Improvement District (LID)

Affected property owners who will be responsible for securing and repaying the debt incurred through a project can form local improvement district or multiple LID's. The LID formation process typically requires public hearings, at which, a remonstrance (no vote) of two thirds of the influenced area can halt the process. A successful LID area would result in liens against the LID properties at the end of the project. A LID could be formed for each of the basins identified in the study. Equitable distribution of costs would be based on each EDU in the basin contributing their share of the cost for the recommended improvement. However, certain areas would not contribute to projects, since not all sections of the Study Area require improvements. Areas with high improvement costs may not approve LID formation; consequently, improvements in these basins could not be constructed solely with LID funds. Where project costs would appear to make a LID improbable, other funding mechanisms could be used in conjunction with a LID to help spread the costs around.

Some drawbacks for using the LID process with drainage systems is that the focus of a specific LID may be with the affected area only and may overlook appropriate upstream and/or downstream affects of a project. On the other hand, if a LID is associated with only a portion of a drainage area, it may be considered unfair for the benefiting property owners to pay for the costs of analyzing upstream and/or downstream issues outside of the district boundaries.

Federal, State or Regional Grant and Loans

Grant or loan funds may be available for some elements of the storm water program. Grants and loans are usually applicable to specific projects and not to on-going activities, such as operations and maintenance. Most grant and loan programs were set up for job creation activities or addressing wastewater or water system deficiencies. Experiences with grant and loan programs indicate that storm water system improvements are typically not funded. Some examples of grant and loan programs available in the State are:

Program	Qualifying Req's.
EDA Public Works Program	Job Creation
RDA Waste Disposal Programs	Fewer than 10,000 pop/needed
Community Development Block Grant	Benefit low and moderate income
Special Public Works Fund	Job Creation
Technical Assistance & Training Prog.	Under 10,000-pop/technical assist. needed
FAA, AIP	Airport improvements

City General Fund

The City's Budgeted General Fund Monies are used for many municipal programs. If storm water programs are funded from the General Fund, the programs are at risk in each budget cycle. In addition, in order to increase funding levels for the program, other local government services may be affected or a general tax increase may be required. As with other typical municipal utilities (sewer, water, etc.), General Fund Monies should not be relied upon for funding storm water improvements or operations.

Special District

A special district or storm water district could be formed which would provide identified services within a specific boundary. A special district may be an appropriate funding mechanism for O, M & R and capital improvements, which can be clearly identified as impacting a specifically definable area.

The source of special district funds would be through assessments of properties within the district and controlled by representatives of that district. Revenue collected would be dedicated to constructing and eventually maintaining the recommended projects. The term for the special assessment could be set over a limited time period (ten to 20 years) or indefinitely. As monies accumulate, the district would allocate funds to complete each element of this Plan. The advantage of a special district is that it could encompass properties within both Lincoln County and the City of Newport's jurisdiction. The advantage of forming a special district to deal with the drainage issues in the South Beach area is that the District can encompass properties that are within the jurisdictional boundaries, allowing problems to be addressed on a basin wide basis.

Storm Water Utility

Storm Water Management Utilities (SWU) are becoming more common as communities search for methods to fund public works projects that involve storm drainage systems. Similar to a sewer and water system, the SWU considers the City's storm drainage system as a public facility that provides a service.

The formation of the SWU utility allows a City to collect charges from ratepayers and assess SDC's to new developments. The basis for charges is, however, not as simple as water or sewer since consumption is not the concern. Instead of consumption based billing, an SWU assesses rates on the basis of runoff generation. Runoff generation is based on the equivalent dwelling unit (EDU) methodology as described in Section 3. One EDU is assumed to be the impervious area typical of residential property. The typical impervious area includes a house, driveway, yard, and any storage sheds. Each residential EDU is charged a flat rate for monthly service, while industry, commercial establishments, and institutional facilities are charged according to the amount of impervious area (basis for number of EDU's) at the facility. Typically, this calculation involves determination of impervious area by aerial photography. If, for example, a shopping center and its parking lot have five times more impervious area than a typical house, then the center would be charged five times the EDU rate. Once established, a SWU rate system is easily updated since changes to a community's EDU count only occur when a new development is constructed or an old building is destroyed.

There are multiple advantages of a SWU utility formation. The SWU can enforce development standards, set minimum storm drainage requirements for new developments, address litter or storm water pollution, and maintain storm water facilities. Once formed, the SWU collects revenue from customers based on the impervious surface EDU methodology. The steady revenue allows the City to acquire loans for large-scale improvements using revenue bonds issued by the SWU or by raising rates in preparation of future projects without having to seek loans. New developments impacting the existing drainage system are also addressed by the SWU through SDC's based on an equitable share of costs and services.

Disadvantages of the SWU are the additional bookkeeping and fund transfers required to keep the SWU independent from other City services. Since the storm drainage system is addressed as an independent service, funds cannot be co-mingled with other City services, particularly sewer. Ratepayers might also view the SWU as another level of government bureaucracy and may need to be reminded that the City cannot be expected to provide free services.

Systems Development Charges

In accordance with Oregon Revised Statutes (ORS) 223.97 through 223.314, system development charges (SDC's) can be assessed for improvements directly relating to a development and for new users who are, in effect, "buying in" to the existing system. Presently, the City of Newport collects SDC's for water, and sewer based on an improvement fee, or fees directly related to improvements specific to the development. Buy in costs are difficult to establish and even more difficult to defend if a developer challenges the basis.

Systems development charges were derived to help cities finance capital improvements required by development. A SDC fee is collected for each piece of property developed. This fee is used to finance some or all capital improvements and municipal services required by the development. SDC's will continue to be one of the funding tools available to the City.

8.4 Recommended Funding

The City currently has no established, storm water specific programs available to address the capital projects recommended in this report. There are programs administered by other governmental agencies, which allow the City to apply for funding. Such programs have monies available for projects, which achieve specific results prescribed by a particular program. In order for the City to perform all of the proposed capital projects, funding for some of the projects may be requested through existing programs, and new revenue sources need to be implemented. It is recommended that the City combine existing funding sources along with initiating a citywide System Development Charge and a special assessment based on the formation of Storm Water Utility to budget for completing all of the proposed projects.

If it is not feasible for the City to establish a SDC and Storm Drainage Utility Fee Program for the entire Study area, however, it is recommended that the City investigate the establishment of a Storm Water Utility District for Basins 2, 3, 5, 6, 7, 11, 12 &13. Those basins are the primary focus of existing and future development in the South Beach Area and contain the majority of existing storm drainage structures. The special district could provide funding for major projects along with O, M & R. The recommendation is being proposed for either the citywide drainage programs or a special district because a conflict would likely arise if both were pursued. It would more advantageous to the City to establish SDC's and a Utility Fee program as the City would maintain control and a wider range of funding options would be available for the South Beach Area.

Available Funding Programs

South Beach Urban Renewal

The South Beach Urban Renewal District is interested in investing the Urban Renewal District's money in projects, which will promote the economic development and raise property values of the area. This report has been funded by the Urban Renewal District to help identify storm water drainage issues, which may be funded through their program. Projects identified through this study do meet the interests of the Urban Renewal Agency.

Federal Aviation Administration - Airport Improvement Program

The Federal Aviation Administration (FAA) has funding programs available for smaller communities related to airport development. The FAA's Airport Improvement Program (AIP) typically pays up to 90% of project costs identified by the local airport as an improvement necessary for airfield safety or accommodate demonstrate growth requirements. The FAA under authorization from Congress distributes funds each year. A portion of the annual distribution is allocated to a discretionary fund available for small general service airports, such as Newport. One of the major projects proposed in this study is associated with the two 48-inch diameter culverts,

which carry Grant Creek under the airport. Viability of the two culverts is an airport safety issue and funding should be pursued through the FAA's AIP, discretionary program funding program.

8.5 Improvement Priorities and Scheduling

This Plan identifies relatively few improvement projects (seven) for the Study Area because of the following reasons:

Existing drainage structures and facilities are not extensive in the Study Area
Several of the drainage basins are autonomous with no identified existing or growth related problems (Basins 4, 8, & 10)
The majority of future projects would be site specific as development occurs.

Seven projects have been identified to improve South Beach's existing storm drainage system. Some are required to correct existing system deficiencies; while other projects will not be implemented until money is available at the time that or an impending development requires the upgrade. Therefore, the South Beach Storm Water Master Plan includes a list of project priorities (found in Table 7.6.1), from which, the City can systematically implement Plan improvements.

Prioritization

General

The most difficult problem in capital improvement Planning is that of establishing priorities for the various proposed improvements. Within a limited budget, is a new storm sewer main replacement or cleaning equipment of greater importance? Project prioritization is always a difficult issue. Prioritization is often determined by the political process rather than technical merits. Many programs try to remove any bias by developing a weighted average process based on various criteria. The scoring and weighting are always subjective. Typical criteria include:

- Health and safety
- Preservation of property
- Environmental impact
- Cost effective ratio
- Political or geographic dispersion
- Short and long-term benefit
- Public awareness
- Previous commitments and promises
- Chance of success of the proposed solution

While the rating decisions have some subjective aspects to them, they give a guideline for giving some thought to each project and help steer the prioritization. Along with general criteria, some area specific issues may be included in making priority decisions. The following area specific issues were used when evaluating the proposed projects:

Correction of Existing Problems

Areas within South Beach that experience flooding because of system deficiencies will be given high priorities. Exception areas may exist where flooding problems occur, but impacts to residential property are limited to only the most intense rainfall events.

Jurisdictional Control

Projects 1 & 2 are located outside of City limits and involve replacement of existing, damaged culverts. The culverts are located under a County roadway and under jurisdiction of Lincoln County. Funding and management of these projects should be requested of the County.

ODOT Right-of-way Construction

Projects 4 and 5 will involve ODOT. These projects will generally have higher costs and require a greater level of Planning than City projects. Consequently, projects involving the highway have been given a lower priority to allow coordinating storm drainage improvements with other highway-related projects.

Coordination with Other Projects

Storm water projects that can be coordinated with other Planned improvements should be scheduled to allow simultaneous construction. Projects identified by this study include development of the South Beach Exposition Center, improvement of the streets in the South Jetty residential area and widening of Highway 101.

South Beach Urban Renewal District Goals

The South Beach Urban Renewal District is interested in investing the Urban Renewal District's money in projects that will promote the economic development and property values of the area. Since the Urban Renewal District is a funding source for projects, a higher priority was given to projects, which would meet their goals.

Priority Standards

Also useful in project prioritization is a set of standards against which proposed improvements can be compared. Such standards typically consist of the following:

Essential, or highest priority. These include projects that are required to complete or make fully useable a major public improvement; projects that would remedy a condition dangerous to health, welfare and safety of the public; projects that would provide facilities for a critically needed community program; projects needed to correct an inequitable distribution of public improvements in the past; and project vital to the immediate development or redevelopment of a desirable industrial, commercial or residential district.

Desirable, or second priority. These include project that would benefit the community; projects that are considered proper for a large progressive community competing with other cities; and projects whose validity of Planning and validity of timing have been established.

Acceptable, or third priority. These are projects that are adequately planned but not absolutely required by the community if budget reductions are necessary.

Deferrable, or lowest priority. These projects are those, which are definitely recommended for postponement or elimination from the capital budget or CIP because they pose serious questions of community need, adequate Planning or proper timing.

Priority Rating

Three of the eight proposed projects (#1, #2, & #6) are recommended for funding or management by other sources than City or urban renewal funding. The remaining five projects are substantial in costs and prioritization of these projects becomes important to the City for planning purposes.

A matrix was constructed using some of the factors/issues outlined previously. Because projects #1, #2, & #6 would be funded with other sources, they were assigned a low priority. Projects #8 (Wetland Management Plan) & #4B (Basin 3) were considered to have the greatest impact on the future growth and economic development in the area and were therefore given the highest priorities. Project #7 (Events Center, South Jetty Neighborhood) was given a higher priority than the remaining projects because of its imminent development.

Priorities for constructing the recommended improvements are provided in Table 8.5.1.

Table 8.5.1 Priority Matrix							
			Prioritization Factors				
Project No.	Priority Rating	Major Issues	Correct Problems	Urban Renewal Goals	ODOT	Coordinate w/Other Projects	Allows for Future Dev.
1	8	County Jurisdiction					
2	7	County Jurisdiction	X	X			
3	5	Maintenance of Drainage Way	X	X			
4B	2	Drainage realignment & Growth	X	X	X	X	X
5A	4	Drainage realignment & Growth		X	X	X	X
6	6	AIP eligible	X	X			X
7	3	Events Center & Neighborhood appearance	X			X	
8	1	Wetland Management Plan	X	X	X	X	X

Appendix A
Definitions of Common Terms Related To Storm Water

Definitions of Common Terms Related To Storm Water

Best Available Treatment (BAT)/Best Control Technology (BCT): A level of technology based on the very best (State of the art) control and treatment measures that have been developed or are capable of being developed and that are economically achievable within the appropriate industrial category.

Best Management Practices (BMP's): Activities or structural improvements that help reduce the quantity and improve the quality of storm water runoff. BMP's include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Clean Water Act (Water Quality Act): (formerly the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972). Public law 92-500; 33 U.S.C. 1251 et seq.; legislation which provides statutory authority for the NPDES program. Also know as the Federal Water Pollution Control Act.

Conveyance: The process of water moving from one place to another.

Discharge: The volume of water (and suspended sediment if surface water) that passes a given location within a given period of time.

Erosion: When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road-building, and timber harvesting.

Excavation: The process of removing earth, stone, or other materials from land.

Grading: The cutting and/or filling of the land surface to a desired slope or elevation.

Illicit Connection: Any discharge to a municipal separate storm sewer that is not composed entirely of storm water and is not authorized by an NPDES permit, with some exceptions (e.g., discharges due to fire fighting activities).

Industrial Activity: Any activity, which is directly, related to manufacturing, processing or raw materials storage areas at an industrial Plant.

Large Municipal Separate Storm Sewer System (MS4): An MS4 located in an incorporated place or county with a population of 250,000 or more, as determined by the latest U.S. Census

Light Manufacturing Facilities: Described under Category (xi) of the definition of "storm water discharges associated with industrial activity." [40 CFR 122.26(b)(14)(xi)] Under the Phase I NPDES Storm Water Program, these facilities were eligible for exemption from storm water permitting requirements if certain areas and activities were not exposed to storm water. As a result of the Phase II Final Rule, these facilities must now certify to a condition of no exposure.

Maximum Extent Practicable (MEP): A standard for water quality that applies to all MS4 operators regulated under the NPDES Storm Water Program. Since no precise definition of MEP exists, it allows for maximum flexibility on the part of MS4 operators as they develop and implement their programs.

Medium Municipal Separate Storm Sewer System (MS4): MS4 located in an incorporated place or county with a population of 100,000 or more but less than 250,000, as determined by the latest U.S. Census.

Municipal Separate Storm Sewer System (MS4): A publicly-owned conveyance or system of conveyances that discharges to waters of the U.S. and is designed or used for collecting or conveying storm water, is not a combined sewer, and is not part of a publicly-owned treatment works (POTW).

No Exposure: All industrial materials or activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product.

Non-point Source (NPS) Pollutants: Pollutants from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.

Notice of Intent (NOI): An application to notify the permitting authority of a facility's intention to be covered by a general permit; exempts a facility from having to submit an individual or group application.

NPDES: "National Pollutant Discharge Elimination System" the name of the surface water quality program authorized by Congress as part of the 1987 Clean Water Act. This is EPA's program to control the discharge of pollutants to waters of the United States (see 40 CFR 122.2).

Operation and Maintenance (O, M & R) Expenditures: The operating and maintenance costs associated with the continual workings of a project.

Outfall: The point where wastewater or drainage discharges from a sewer pipe, ditch, or other conveyance to a receiving body of water.

Permitting Authority (PA): The NPDES-authorized State agency or EPA regional office that administers the NPDES Storm Water Program. PA's issue permits, provide compliance assistance, and inspect and enforce the program.

Physically Interconnected MS4: T his means that one MS4 is connected to a second MS4 in such a way that it allows for direct discharges into the second system.

Point Source Pollutant: Pollutants from a single, identifiable source such as a factory or refinery.

Pollutant Loading: The total quantity of pollutants in storm water runoff.

Qualifying Local Program: A local, State or Tribal municipal storm water management program that imposes, at a minimum, the relevant requirements of one or more of the minimum control measures includes in 122.34(b).

Regulated MS4: Any MS4 covered by the NPDES Storm Water Program (regulated small, medium, or large MS4's).

Retrofit: The modification of storm water management systems through the construction and/or enhancement of wet ponds, wetland Plantings, or other BMP's designed to improve water quality

Runoff: Drainage or flood discharge that leaves an area as surface flow or as pipeline flow. Has reached a channel or pipeline by either surface or sub-surface routes.

Sanitary Sewer: A system of underground pipes that carries sanitary waste or process wastewater to a treatment Plant.

Sediment: Soil, sand, and minerals washed from land into water, usually after rain. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic Plants.

Sheet Flow: The portion of precipitation that moves initially as overland flow in very shallow depths before eventually reaching a stream channel.

Site Plan: A graphical representation of a layout of buildings and facilities on a parcel of land.

Site Runoff: Any drainage or flood discharge that is released from a specified area.

Small Municipal Separate Storm Sewer System (MS4): Any MS4 that is not regulated under Phase I of the NPDES Storm Water Program and Federally-owned MS4's.

Stakeholder: An entity that holds a special interest in an issue or program -- such as the storm water program -- since it is or may be affected by it.

Storm Drain: A slotted opening leading to an underground pipe or an open ditch for carrying surface runoff.

Storm Water: Precipitation that accumulates in natural and/or constructed storage and storm water systems during and immediately following a storm event.

Storm Water Management: Functions associated with Planning, designing, constructing, maintaining, financing, and regulating the facilities (both constructed and natural) that collect, store, control, and/or convey storm water.

Storm Water Pollution Prevention Plan (SWPPP): A Plan to describe a process whereby a facility thoroughly evaluates potential pollutant sources at a site and selects and implements appropriate measures designed to prevent or control the discharge of pollutants in storm water runoff.

Surface Water: Water that remains on the surface of the ground, including rivers, lakes, reservoirs, streams, wetlands, impoundments, seas, estuaries, etc.

Total Maximum Daily Load (TMDL): The maximum amount of pollutants that can released into a water body without adversely affecting the water quality.

Tool Box: A term to describe the activities and materials that EPA Plans to perform/produce to facilitate implementation of the storm water program in an effective and cost-efficient manner. The eight components include: 1)fact sheets; 2) guidance documents; 3) menu of BMP's; 4) compliance assistance; 5) information clearing house; 6) training and outreach efforts; 7) technical research; and 8) support for demonstration projects.

Urbanized Area (UA): A Bureau of the Census determination of a central place (or places) and the adjacent densely settled surrounding territory that together have a minimum residential population of 50,000 people and a minimum average density of 1,000 people/square mile. This is a simplified definition of a UA; the full definition is very complex.

Urban Runoff: Storm water from urban areas, which tends to contain heavy concentrations of pollutants from urban activities.

Watershed: That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Wet Weather Flows: Water entering storm drains during rainstorms/wet weather events.

Appendix B
Stakeholder/Public Involvement

South Beach Storm Water Master Plan
For Newport's South Beach Area
Stakeholders' Meeting Agenda

November 22, 2002 - 1:30 p.m.
Council Chambers, Newport City Hall

I. Introduction of City Officials, Consulting Team and Participants

II. Goal of this Meeting

III. Purpose, Scope, and Study Area of this Master Plan

IV. Methodology for this Master Plan

V. Discussion of Issues

- Drainage Controls
- Development Impacts/Impediments
- Temporary Flooding
- Wetlands
- Water Quality

VI. Applicable Plans currently Existing or Underway

VII. Suggested Solutions

VIII. Next Steps

Stakeholder Comments

The comments in this summary were gathered from those present at a stakeholders' meeting held November 22, 2002 at 1:30 p.m. at the Council Chambers, Newport City Hall, and from other discussions with stakeholders and residents. The issues that are identified have not been prioritized or evaluated; the following list is thus a combination of facts, perceptions and suggestions.

Drainage Controls

- The South Shore Plan provided for one 5 foot culvert; however more drainage was added. The 5 foot culvert picks up drainage, and then dumps it to the ocean. The pipe runs full seasonally.
- Nutria plugs up the system. The South Beach Homeowners' Association maintains downstream drainage.
- Beaver dams cause blockage in the system.
- People are concerned about wildlife.
- ODOT has no Plans for enlarging culverts.
- Moore Creek culvert was lengthened by ODOT.
- The State (?) used to dig out the South Shore area to deal with the accumulation of driftwood.
- The Oregon Watershed Enhancement Board may fund improvements for fish passage.
- A drainage area north of Yachats provides an example.
- Maintenance is the #1 issue.
- Newport Business Plaza's two foot culvert cannot handle the drainage. Jeff B. has been working on the problems.

- Toby Murry Motors' culvert is angled and it raises the water table; it has 36 inch pipe, and another pipe just upstream needs maintenance. Jeff B. has been working on the problems.
- The east side of the highway has no drainage east of Toby Murry Motors on the Richmond property across the street from Halco welding.
- Land owned by Will Emory including roads east of South Shore development has beaver dams that cause problems.
- There are problems with old culverts and the pond system by the railroad.
- There are options as to which way drainage should go at 50th Street - Mike Miller Road.
- Porous concrete has been used as a solution in the Salt Lake Basin to reduce the amount of impervious surface.

Wetlands and Water Quality Issues

- Economic benefits could come from enhancing wetlands.
- A pond for rearing fish (Stoker Dam) has problems at the point of the culvert between the PUD and the Stoker property. Stoker Dam affects neighboring properties by raising the water table.
- When there is no flow the water goes stagnant due to collection of debris.
- Excrement from iron bacteria appears to be oil on the surface of stagnant water (DEQ has information).
- Groundwater is affected by the tides. We need a baseline to predict flooding (See Jeff).
- Water quality is important.
- Various parties are draining oil and gas into Yaquina Bay. There is visible oil and gas in the runoff where the pipe comes out on property that is connected to the waterway leading to the Bay just south of the Aquarium Village buildings.
- Gas station fuel tank areas need to have runoff directed to an oil/water separator before the runoff enters the storm water system.

- We should have State of the art facilities and techniques to ensure that liquid flowing into the Bay and its tributaries is clean.

Development Impacts & Impediments

- Impervious surface needs to be predicted at full development to understand the drainage problems to the full extent. Road improvements, buildings and parking lots will all increase impervious infrastructure.
- To date, the main impediment has been the lack of a Plan.
- The Transportation Systems Plan should be overlaid on the drainage Plan. Three lanes are proposed for one area of Highway 101.
- Highway 101 from South Beach to 123rd Street is scheduled for improvements in 2005. Planning is currently underway.
- The highway needs to be widened, but wetlands and drainage problems cause conflicts.
- Developers need certainty in regards to the placement of culverts and drainage infrastructure.
- Central Lincoln PUD can provide mapping of infrastructure at Aquarium Village.
- Some perceive that Seal Rock Water District cannot build until City water issues are resolved.
- A community expo/events center of approximately 40 - 45,000 square feet is proposed.

Other

- A Local Improvement District exists for properties between Coho Street and SW 27th - 29th.
- Do not over-engineer. Keep it simple!

South Beach Storm Water Master Plan
for Newport's South Beach Area
Meeting Agenda

February 6, 2003 - 7:30 p.m.
Council Chambers, Newport City Hall

I. Introductions

II. Expectations for this Meeting

III. Description of Study Area and Example Model of One Basin

IV. Areas of Concern

V. General Solutions

Structural: examples include pipes, ditches, pumps, ponds

Nonstructural and Best Management Practices: examples include activities that minimize impervious surface; regulated through zoning and subdivision ordinances

VI. Expectations for Site Specific Development

VII. Discussion of Alternatives

VIII. Funding Alternatives for Infrastructure

VIII. Meeting Wrap-up and Next Steps

The next meeting for input and information regarding this Plan is scheduled for March 27, 2003 at 7:30 p.m. at the Newport City Council Chambers, Newport City Hall.

Public and Agency Comments

The comments in this summary were gathered from those present meetings held February 6, 2003 at 3:30 p.m. and 7:30 p.m. at the Council Chambers, Newport City Hall, and from other communications with stakeholders and residents. The issues that are identified have not been prioritized or evaluated; the following list is thus a combination of facts, perceptions and suggestions.

Implementation Measures

- Requirements that are implemented for water detention should be specific to the property involved, and not implemented for all lower areas.
- Formation of a drainage zone may be necessary in order to include residents who are outside of the City in regards to ground solutions and funding for infrastructure.
- It is important for the consulting team to identify the drainage pathways so that property owners will contribute to a unified drainage Plan for the South Beach Area.
- The City may not have the manpower or expertise to review engineering Plans. The ordinances should provide guidance to the engineers or other professionals who will be working for the property owners so that development can occur according to a Plan without extensive oversight from the City.
- The size of the parcel should be the trigger that will determine when the more stringent implementation measures apply. For example, when units of land are being developed into several lots, the developer should comply with more stringent requirements than when a property owner is getting a building permit for one residence or commercial use on a minimum sized lot.
- Requirements for development of property could be performance based so that there are incentives for development. Encourage developers to show that their development will not exacerbate drainage problems, but will instead contribute to solving drainage problems.
- A citywide storm water utility fee is an option.
- The City of Newport already has a citywide storm system Systems Development Charge in place.

Infrastructure for a working system needs to be developed. Without such a working system, drainage requirements for individual properties will not work.

- We need to get the drainage infrastructure and a Plan in place so that we can begin to develop the South Beach property because property that is vacant does not produce revenue for the property owners or for the City. The bottleneck is lack of infrastructure.
- We need to know how much development there will be to determine the extent of the problem.
- Forming a drainage zone prior to development will cause a financial hardship for property owners because doing so will result in people paying more taxes on vacant land. We need to propose a phased project with investment in a logical order.
- There is a need to assure that the Urban Growth Boundary lands under the jurisdiction of Lincoln County comply with the drainage Plan that is developed; otherwise the Plan will be incomplete and ineffective.
- We should prioritize projects that facilitate development of properties. An example would be creating ponds for drainage.
- We should consider a system which allows for smaller properties that are already developed to pay a higher SDC charge, and for larger property owners to help by providing improvements when property is developed.
- We need to complete a wetland study with the following components: 1) coordinate with DSL; 2) coordinate with DLCD re: Goal 5 protections; 3) complete former wetland projects (mitigation sites) before draining and filling new ones; 4) protect valuable wetlands prior to taking on wetland enhancement because it is often not very successful.
- Take into consideration both water quality and water quantity and carry out a wetland inventory and an inventory of potential wetland mitigation sites to determine where development can go. Seek financial assistance from DSL for technical assistance, and to prepare the Local Wetland Inventory.

Other Concerns

- There is a triangular shaped parcel of property south of Ferry Slip Road that does not have drainage; the water sheets across the road.
- The water level is rising over time.

South Beach Storm Water Master Plan
for Newport's South Beach Area
Meeting Agenda

March 27, 2003 - 7:30 p.m.
Council Chambers, Newport City Hall

I. Introductions

II. Expectations for this Meeting

III. Structural Problems and Alternative Solutions

- The Drainage System and Facilities
- Mapping and Analysis
- Cost Estimates

IV. Discussion of Future Processes

V. Identified Land Use Planning Issues and Proposed Implementation Measures

- Current Planning
- Options
- Proposed Overlay Zone
- Proposed Prescriptive and Performance Based Standards

VI. General Discussion, Wrap-up and Next Steps

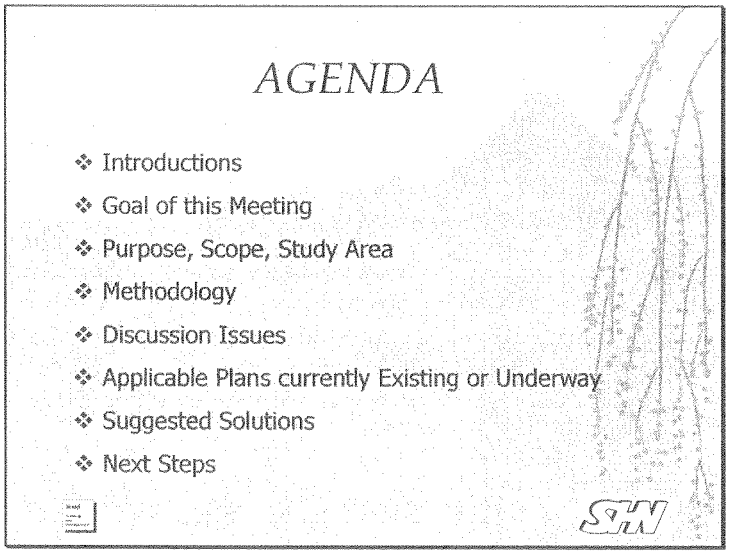
Shoji
Planning
and
Development

Strategic Planning. City Planning. Facilitation. Public Involvement.
P.O. Box 462, Coos Bay, OR 97420 Phone: 541-267-2491 Fax: 541-267-4457 shoji@ucinet.com

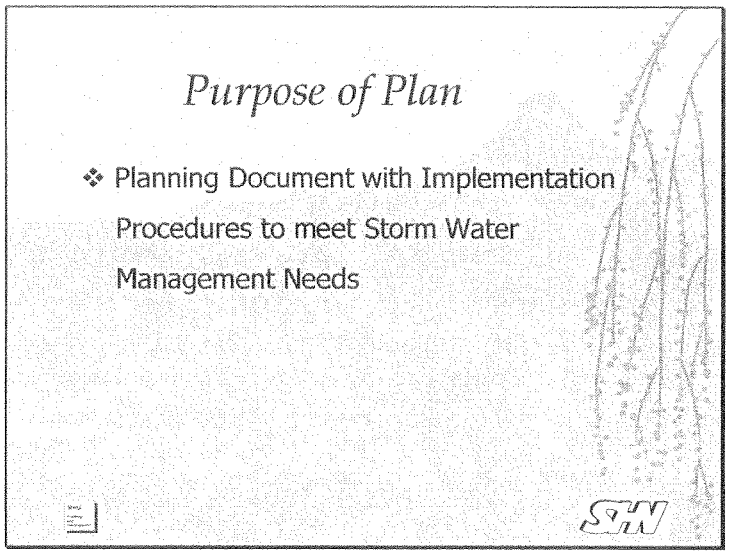
PowerPoint Slide Show For First Public Meeting

Slide 1

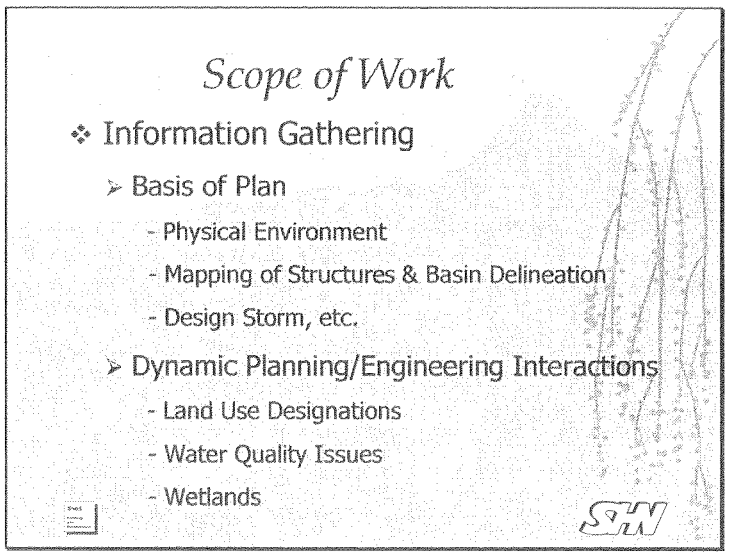
Slide 2



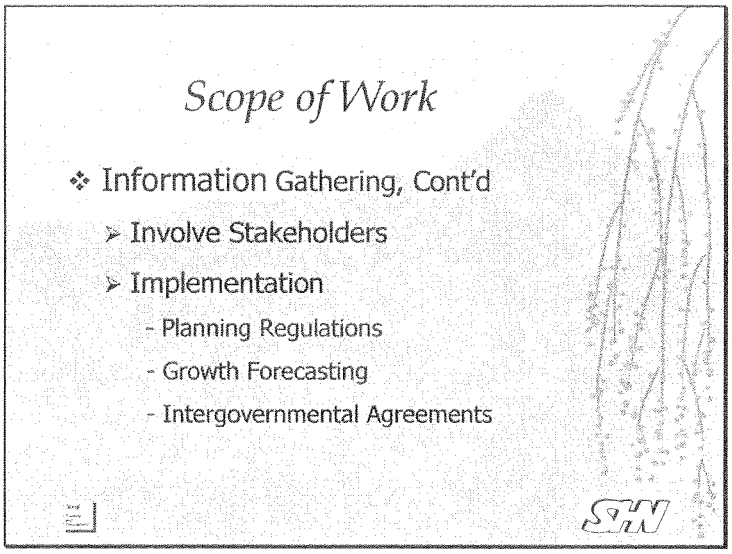
Slide 3



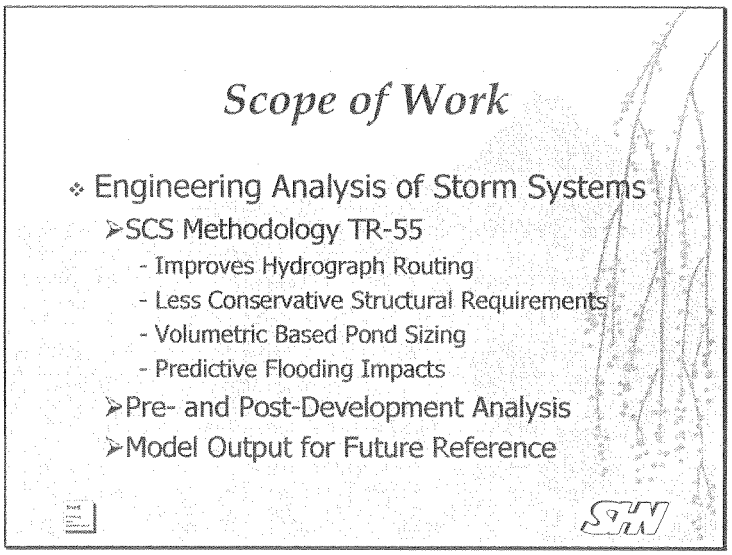
Slide 4



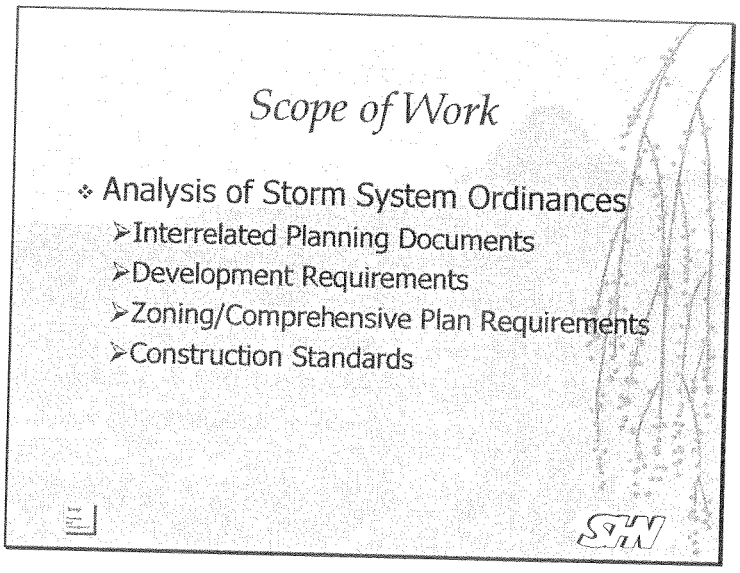
Slide 5



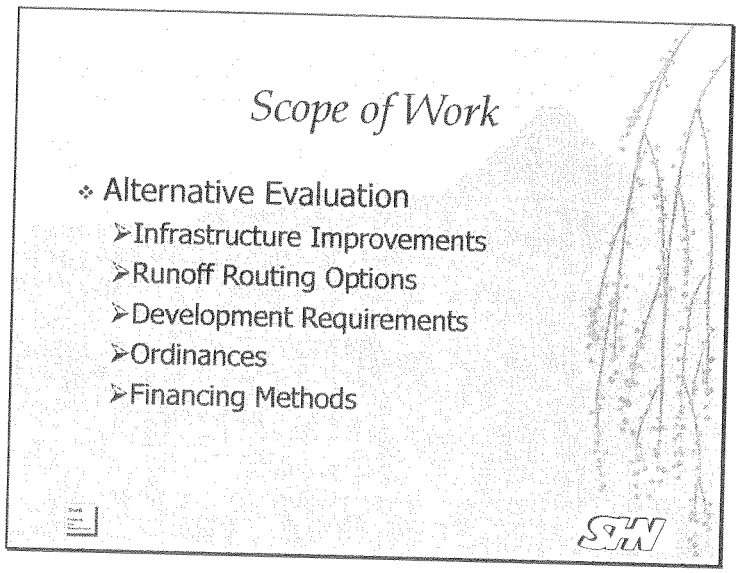
Slide 6



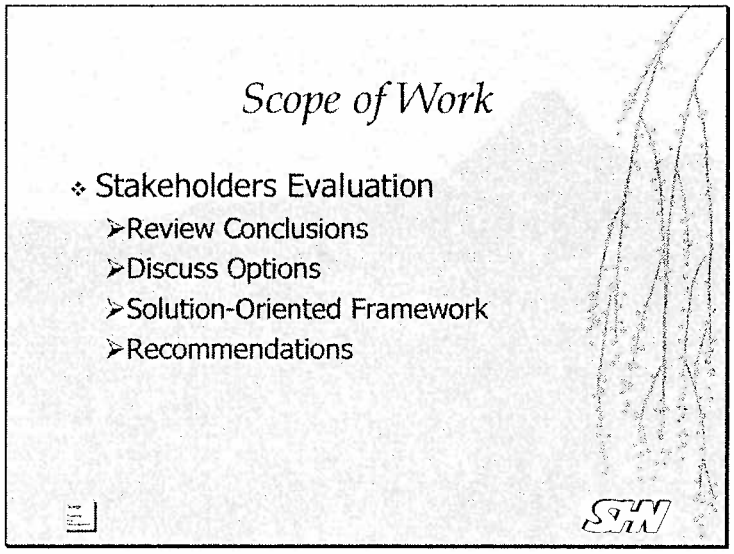
Slide 7



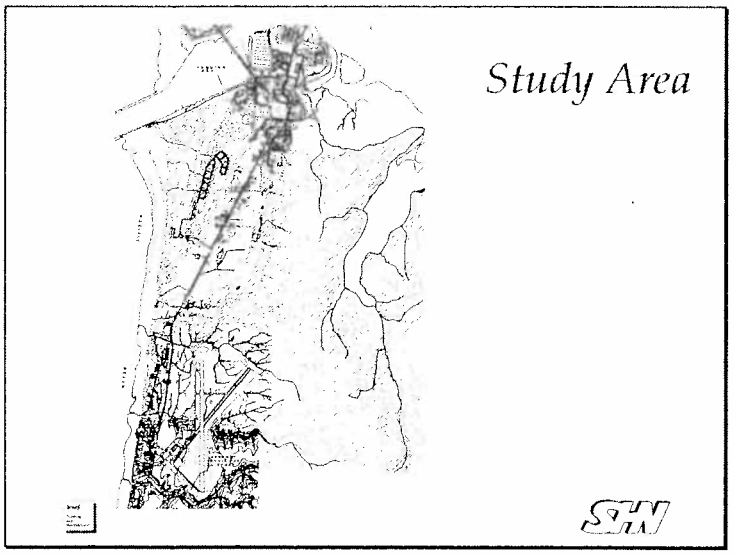
Slide 8



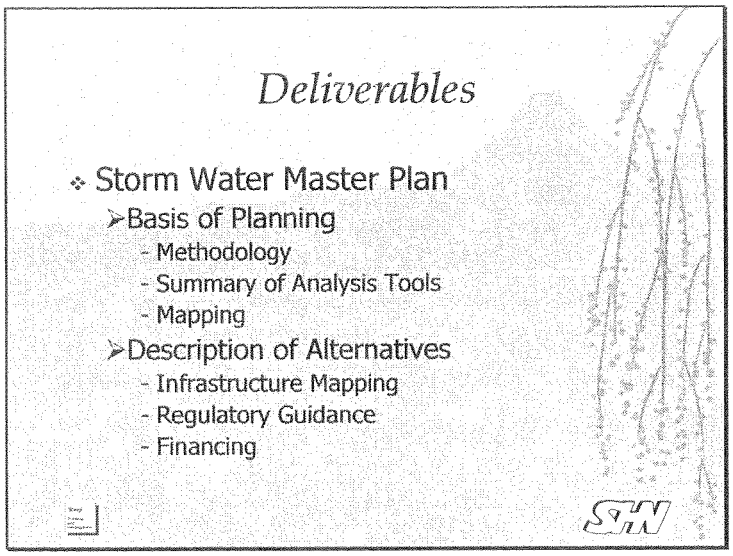
Slide 9



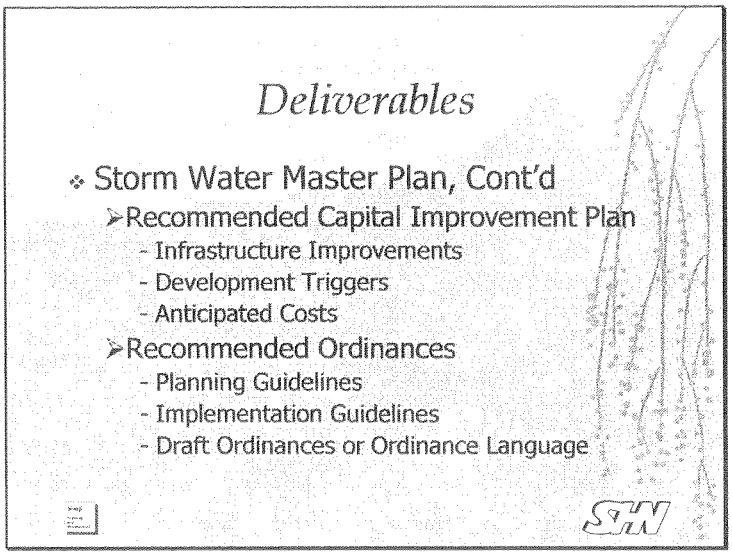
Slide 10



Slide 11



Slide 12



Public and Agency Comments

The comments in this summary were gathered from those present meetings held March 27, 2003 at 7:30 p.m. at the Council Chambers, Newport City Hall, and from other communications with stakeholders and residents. The issues that are identified have not been prioritized or evaluated; the following list is thus a combination of facts, perceptions and suggestions.

Existing underground utilities could conflict with storm water facilities.

There is a water district pipeline and phone cable along the west side of the highway.

The consulting team should be careful not to list priorities in order because projects such as the airport culvert will not produce revenue while development in other locations could have a positive impact on City revenues. Rather than using#1, #2, and #3 for priorities, it would be good to just have a list of priority projects – perhaps noted as high, medium and low priority.

The dotted line that is shown in the State park is important.

The SE 35th Street proposal is good because sewer and water mains already exist.

A new road is plotted to connect with Anchor Way west of the Highway and behind Toby Murry Motors and Chuck's Saw Shop. A water main goes through this property along the section that is plotted for the road; the water could be channeled along the plotted road for managing drainage.

There is underground infrastructure along Mike Miller Trail.

We need to be clear about how the overlay zone will affect land in the UGB. How will it apply?

A drainage zone could be the proper entity to implement the Plan in that it can cross-jurisdictional boundaries.

One option for financing infrastructure would be to require a greater SDC for smaller properties and require larger entities to develop the necessary infrastructure.

We need to be clear about how the overlay zone will affect the removal and demolition of existing structures, and how it will apply in the case of redevelopment.

The overlay zone should not be restrictive on existing residential lots. There should be a threshold level of impervious surface that triggers the need for Storm Water Management Plan, and also a certain size of lot that is exempt.

A pre-application conference would be helpful when there is development proposed within the South Beach Area.

Creating a wetland along the railroad should be a priority if doing so creates more developable property.

The consulting team needs to let the property owners know by e-mail when the Plan is passed on to the City.

Appendix C
Draft South Beach Storm Drainage Overlay Zone

Example South Beach South Beach Storm Water Master Plan Overlay Zone

This example South Beach South Beach Storm Water Master Plan Overlay Zone is proposed to provide guidance for the City of Newport in adopting appropriate regulations and incentives to manage storm drainage in the South Beach Area.

1.10 South Beach South Beach Storm Water Master Plan Area Defined.

The South Beach South Beach Storm Water Master Plan Area is shown on Figure 3.2.2 which depicts basins that are addressed within the South Beach Master Plan. Such area shall be indicated on the Zoning Map of the City of Newport with the letters SBSDO.

1.20 Development Consistent With South Beach Storm Drainage Overlay Zone.

All new development and redevelopment shall be consistent with the engineering and planning guidelines established for the South Beach Storm Water Master Plan Area. For purposes of this section, development means land division, subdivision, Planned destination resorts, or new structures for residential, commercial or industrial use or any combination thereof located on a parcel or tract or contiguous parcels or tracts of land in a common ownership. "New" and "redevelopment" refers to any "man-made" change to improved or unimproved real State including, but not limited to the placement and expansion of buildings or other structures, dredging, filling, grading, or paving.

1.30 Purpose.

The purpose of the SBSDO is to address the control and management of storm water to minimize the detrimental effects of surface water runoff at the time of new development and redevelopment of property within the specified area. The SBSDO will provide the standards and conditions to provide for conveyance of surface water in streams, creeks and channels that exist on a site at the time of development, and to address pollution reduction and flow control for storm water generated from new and redevelopment.

1.40 Definitions.

For the purposes of the South Beach Storm Drainage Overlay Zone, the following words and phrases shall have the meanings respectively ascribed to them by this Section. Words and phrases not ascribed a meaning within this Overlay Zone shall have the meanings ascribed by the Newport City Zoning Ordinance, the Newport Land Development Ordinance or other applicable City ordinances.

Best Management Practices or BMP's. State-of-the-art technology applied to activities, prohibitions, maintenance procedures, and other management practices that provide strategic approaches to reduce runoff and/or improve water quality.

Detention. Temporary storage of Storm water runoff.

Development. The division of a parcel of land into two or more parcels; the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any structure; any mining, excavation, landfill or land disturbance; and any use or extension of the use of land. Development includes new development and redevelopment.

Dredging. A method for deepening streams, swamps, or coastal waters by removing solids from the bottom.

Drip Line. An imaginary ground line around a tree that defines the limits of the tree canopy.

Evapotranspiration. Use of water by Plants.

Filling. The process of depositing fills in low-lying marshy or water areas to create usable land.

Grading. Any stripping, cutting, filling or stockpiling of earth or land, including the land in its cut or filled condition to create new average elevations of land around a building or the percentage of rise or descent of a sloping surface.

Hazardous Substance. Any substance or material that by reason of its toxic, caustic, corrosive, abrasive, or otherwise injurious properties may be detrimental or deleterious to the health of any person handling or otherwise coming into contact with such material or substance. The U.S. Environmental Protection Agency has a list of hazardous wastes.

Infiltration. The flow of water into soil material or Storm water inflow into the sanitary sewer system.

Impervious surface. Any material that prevents absorption of Storm water into the ground. Examples include rooftops, paved and graveled parking lots but do not include retention and detention basins.

Mitigation. Methods used to alleviate or lessen the impact of development. This may include soil erosion measures, replacement of wetlands, or contributions for expanded public facilities.

Nonstructural. Refers to regulations and incentives that provide solutions to problems.

Pervious Surface. Any material that permits full or partial absorption of Storm water into previously unimproved land.

Pollutant. Any introduced gas, liquid or solid that makes deteriorates water quality.

Pollution. The presence of matter or energy whose nature, location or quantity produces undesired environmental effects.

Porous Pavement System. This is an arrangement of interlocking, prefabricated, perforated blocks, laid on a soil base and providing a stable pervious surface for pedestrian or low-volume vehicular traffic.

Runoff. The portion of rainfall, irrigation water, and any other liquids that flow across ground surface and eventually return to streams.

Storm Sewer. A conduit that collects and transports runoff.

Storm water Detention. Any storm drainage technique that retards or detains runoff, such as a detention or retention basin, parking lots storage, rooftop storage, porous pavement, dry wells, or any combination thereof. See Detention Basin; Retention Basin.

Storm Water Management Plan. A Plan for the development or redevelopment of property that addresses the control and management of Storm water to minimize the detrimental effects of surface water runoff, and meets the standards, requirements and criteria set forth in this Overlay Zone.

Structural. Having to do with the built environment such as pipes, ditches, pumps and culverts.

Qualified professional. An Oregon Licensed Civil Engineer under whose direction Plans, profiles and details for work are prepared and submitted to the City for review and approval. For public projects, the project engineer will be the City Engineer or other consulting engineer contracted by the City.

Xeriscape. Attractive, sustainable landscape that conserves water, and is based upon sound horticultural practices.

1.5 Procedures.

When an application is subject to a public hearing due to the requirements of the underlying zone, the City's Public Works Department and Design Review Committee shall review the proposed development for applicability of the SBSDO prior to the Planning Commission's public hearing. The Design Review Committee and the Public Works Director shall forward their recommendations to the Planning Commission.

1.6 Applicability.

No permit for construction of new development or redevelopment within the SBSDO shall be issued until a Storm Water Management Plan is approved for the property. Development and redevelopment projects shall not be phased or segmented in such a manner to avoid the requirements of this Overlay Zone. Zoning and land development standards applicable in the underlying zoning designations shall apply except where the SBSDO provides additional standards above those required by the underlying zone or where specific exemptions are set forth. Permanent drainage facilities that comply with the Storm Water Design/Performance Standards set forth in Appendix D shall be installed in conjunction with the following activities:

1. New and redevelopment projects include partitions and subdivisions, Planned developments, and all single-family and two-family dwellings, multi-family dwellings, commercial uses, industrial uses and institutional uses that create new impervious surface totaling 5,500 thousand square feet or more within any twelve month period.
2. Any construction project that would change a point of discharge of surface water or the quantity of discharge, or that would discharge surface water at a higher velocity than the rate of discharge before construction, or that would add to pollution of surface waters.

3. Construction or reconstruction of public roads and temporary detours.

4. Construction projects in or adjacent to any existing stream or other surface watercourses including intermittent streams.

5. Construction projects in or adjacent to the one-hundred year floodplain.

6. The City Engineer has the authority to waive a Storm Water Management Plan for single- and two-family dwellings on 5 acre lots provided that the siting of the dwelling is determined to have minimal impact.

7. On properties where a Storm Water Management Plan has been approved as a condition of land partitioning, subdivision, or approval of planned development no additional Storm Water Management Plan or Storm water analysis shall be required as a condition of a building permit for single- or two-family residential construction.

1.7 Contents of Storm Water Management Plan.

Where a South Beach Storm Water Master Plan is applicable under this ordinance, the applicant shall submit an analysis and propose structural and nonstructural solutions to storm drainage on the site as follows:

1. An explanation and analysis of the following prepared by a qualified professional:

   A. Storm water mitigation strategies to increase infiltration and evapotranspiration and reduce the amount of Storm water runoff generated from the site.

   B. An analysis of flow reduction methods including, infiltration, and detention and techniques.

2. A landscaping Plan with an analysis of vegetative and other treatment methods used to reduce pollutants.

3. Calculations of the amount of impervious surface before development, and the amount of impervious surface after development.

4. Statement of consistency with the objectives of the South Beach South Beach Storm Water Master Plan.

5. Wetlands identified through the ORS wetlands notification process shall be delineated and mitigation strategies shall be implemented as necessary in accordance with State and Federal guidelines.

Requirements for Development.

All development shall be planned, designed, constructed and maintained to:

1. Be consistent with the City's Comprehensive Plan, the South Beach Storm Water Master Plan, the Newport Zoning Ordinance, and all other City codes and policies except where standards within this SBSDO provide specific exemptions based upon performance standards related to drainage, or where more stringent standards are required by the Overlay Zone.

2. Be of adequate design to safely manage all volumes of water generated upstream and on the site to an approved point of disposal.

3. Provide points of disposal for Storm water generated by future development upstream.

4. Prevent the capacity of downstream channels and storm drainage facilities from being exceeded.

5. Prevent the uncontrolled or irresponsible discharge of Storm water onto adjoining public or private property.

6. Maintain the highest feasible level of water quality.

7. Maintain the runoff characteristics of the original undeveloped drainage basin, where feasible, as determined by the Public Works Director.

8. Maximize efficient use of the City of Newport's natural drainage system including streams, seasonal draws and wetlands.

9. Have sufficient structural strength to resist erosion and all external loads that may be imposed.

10. Be designed using materials that ensure a minimum practical design life of fifty years.

11. Be designed in a manner that allows economical ongoing maintenance of Storm water drainage facilities.

12. Meet the requirements of DEQ and be registered with DEQ as appropriate.

13. Allow reduced widths for new streets or new street extensions below those required within the street classification system of the Newport Comprehensive Plan to reduce impervious surfaces, if it is determined by the Planning Commission that the reduced width will not

impede the flow of traffic, be injurious to the public safety, reduce the livability of the neighborhood, or compromise pedestrian, bicycle and traffic convenience and accessibility

14. Encourage consolidated access for adjacent properties with access to individual properties minimized to reduce impervious surface consistent with the guidelines in the Transportation Systems Plan.

15. Allow networks of well marked connected pathways paved with a porous pavement systems that will facilitate pedestrian movement throughout the year to replace sidewalk requirements provided that the network of pathways provides all the convenience and accessibility of any sidewalk system required by the land development ordinance.

16. Encourage enhancement of wetlands as storm retention ponds, and for purposes of open space and recreational use in planned developments where such ponds are maintained by a homeowners' association.

17. Off Street Parking shall be designed as follows:

    A. New and redeveloped parking lots greater than 2,200 square feet or 55 spaces or shall include onsite surface water management.

    B. Vegetative treatment shall be provided within area reserved for landscaping. Exceptions based on site restrictions, such as slope or impermeable soils, shall be documented and approved by Public Works Director.

    C. Alternative paving techniques shall be encouraged for off-street parking areas to reduce the total impervious surface of the site. Suitable alternative paving materials, their installation and maintenance will be determined by the Public Works Director.

    D. Parking areas using pollution reduction and flow control facilities or alternative paving materials pursuant to this section will not be included in the calculation of the total impervious surface of the site when there is less than 10% net increase in off-site runoff from the parking area.

    E. Ten percent (10%) of combined parking areas shall be landscaped with trees or shrubs. Where parking areas are required and/or selected to provide water quality treatment on site, the resulting best management practice including, but not limited to bioretention areas and filter strips will count towards the total required landscaping, but such treatment facilities shall not replace the requirements for Plantings of trees or shrubs.

18. Landscaping shall be designed to provide for an enhanced visual environment and to reduce surface water runoff. Storm water mitigation strategies, such as retention of existing trees, use of xeriscape or native vegetation to provide for low maintenance landscaping materials, and the use of porous paving surfaces are encouraged:

    A. Landscaping using native or other low maintenance Plants, swales, filter strips, ponds and wetlands shall count towards total percentage of landscaping required on site, and shall be designed to increase infiltration and reduce the amount of surface water runoff from the site.

B. When 100 percent of the area defined by the drip line of the tree is preserved, the square footage within the drip line shall count towards the percentage of required landscaping.

C. Areas containing mature native vegetation shall require no provision for irrigation except where the City determines that the subject area needs irrigation due to altered soil, slope, drainage or other conditions related to development.

D. Plants identified as noxious weeds the Oregon Department of Agriculture shall not be included as part of the landscaping Plan.

E.

Infiltration Facilities Restricted in High Risk Areas.

The City of Newport reserves the right to restrict the use of infiltration facilities in high risk areas including those with slopes over 12%, unstable soils, high water tables, or sites identified to be contaminated by hazardous substances.

Bonding.

Applicants shall provide a performance bond or similar surety acceptable to the City of Newport to assure successful installation and initial maintenance of surface pollution reduction and flow control facilities. During construction and for a period of one year thereafter, the bond shall be in favor of the City of Newport, and in an amount of the anticipated construction cost.

Contingency for System Failure.

If the storm drainage system fails due to lack of maintenance or breakage, and there are impacts to downstream water quality or quantity as a result of the failure, the City of Newport may perform the necessary maintenance or repair and charge the owner of the facility for the costs associated with the maintenance and repair that has been performed.

Pollution Reduction and Flow Control Standards.

Storm water treatment and detention facilities receiving Storm water from impervious surface areas less than 15,000 square feet may be designed in accordance with sizing and construction standards for combined facilities. More than one such facility can be installed on site as long as each facility receives Storm water from an area less than the stated threshold.

Post Construction Plans.

When required as a condition of approval, post construction Plans shall be submitted within one month of completion of construction as follows:

1. As-built Plans, stamped by a qualified professional, indicating that all storm water mitigation and management strategies are installed per approved Plans and approved changes.

2. Maintenance Plans for all Storm water facilities installed to comply with this ordinance. The maintenance program must be approved by the Newport Public Works Director with proof of maintenance provided annually.

Appendix D

Storm Drainage Design/Performance Standards

South Beach Water Master Plan
For Newport's South Beach Area

Storm Drainage Design/Performance Standards

Storm drainage design within a development area must include provisions to adequately control runoff from all public and private streets and the roof, footing, and area drains of residential, multi-family, commercial, or industrial buildings. The design must ensure future extension of the drainage system to the entire drainage basin in conformance with these Designs Standards. These provisions include:

a. Surface or subsurface drainage, caused or effected by the changing of the natural grade of the existing ground or removal of natural ground cover or placement of impervious surfaces, shall not be allowed to flow over adjacent public or private property in a volume or location materially different from that which existed before development occurred, but shall be collected and conveyed in an approved manner to an approved point of disposal.

b. Surface water entering the subject property shall be received at the naturally occurring locations and surface water exiting the subject property shall be discharged at the natural locations with adequate energy dissipaters within the subject property to minimize downstream damage and with no diversion at any of these points.

c. The approved point of disposal for all storm water may be a storm drain, dry wells, existing open channel, creek, detention, or retention pond approved by the Public Works Director. Acceptance of suggested systems will depend upon the prevailing site conditions, capacity of existing downstream facilities, and feasibility of the alternate design.

d. When private property must be crossed in order to reach an approved point of disposal, it shall be the developer's responsibility to acquire a recorded drainage easement of dimensions. The drainage facility installed must be closed conduit system. Temporary drainage ditch facilities, when approved, must be engineered to contain the storm water without causing erosion or other adverse effects to the private property.

e. The design peak discharge from the subject property may not be increased from conditions existing prior to the proposed development except where it can be satisfactorily demonstrated by the applicant that there is no adverse impact.

f. Retention/detention facilities will be required where necessary to maintain surface water discharge rates at or below the existing design storm peak discharge except where it can be demonstrated by the applicant that no adverse impart will result from not providing said facilities. Retention/detention facilities will only be allowed for large area developments as approved by the City Engineer and will come under the ownership, operation and maintenance of the City's Public Works after satisfactorily installed.

g. Minimum width of an access easement from an existing public road to a drainage facility shall be fifteen (15) feet.

h. Drainage from roofs, footing, and downspouts may drain directly to a street through the curb under the following circumstances:

   1. The building pad ground elevation is at least two (2) feet above the existing street curb, and

   2. The existing street is adequately crowned to avoid sheet flow across the street. This requirement will be waived if curb and gutter exists or installed.

i. Vegetation shall be established on areas disturbed by/or on areas of construction as necessary to minimize erosion. All storm system designs shall make adequate provisions foe collecting all storm water runoff. The system shall accommodate all runoff from upstream tributary areas whether or not such areas are within the proposed development. The amount of runoff to be accommodated shall be based upon ultimate development of all upstream tributary areas.

   Where storm drains are constructed on slopes greater than 20%, in areas designated as hazardous or where there are site conditions that may cause damage to improvements, slippage or slides or determined by the Public Works Director, a soils and/or geologic report may be required.

Erosion Control Standards:

a. **Slopes.** The faces of cut and fill slopes shall be prepared and maintained to control against erosion. This control may consist of effective Planting, matting or covering. The protection for the slopes shall be installed as soon as practicable and prior to calling for final approval. Where cut slopes are not subject to erosion due to the erosion-resistant character of the materials, such protection may be omitted.

b. **Other Devices.** Where necessary, check dams, cribbing, rip-rap or other devices or methods shall be employed to control erosion and provide safety.

c. **Construction.** Temporary erosion control facilities shall be used to protect against erosion during construction. See requirements.

d. **Development.** Shall provide erosion control methods to limit the removal of soil materials by storm runoff during the construction phases of the project.

Where the finished graded surface has a greater than 20% slope, or as required, soil stabilization fabric shall be placed over the entire disturbed area.

Proposed storm drain systems shall not discharge flows into inadequate downstream systems unless approved by the Public Works Director.

Public storm lines shall be located within the public right-of-way a directed by the Public Works Director. The lines are placed in the public right-of-way for ease of maintenance access, control of the facility, operation of the facility, and to provide required replacement and/or repair:

1. Storm drain lines shall generally be located five 5 feet (south or east) from right-of-way to centerline. All changes in direction of pipe shall be made at an approved structure.

2. Storm drain lines shall not be curved between structures. If unusual circumstances are present, as determined by the Public Works Director, small diameter storm drains may be curved. Such curves shall conform to the street curvature.

Floodplain information, delineating the 100-year floodplain limits, shall be shown where it occurs within the development. Floodplain limits shall be based on maps prepared by the UPS. Army Corps of Engineers and the Federal Emergency Management Agency (F.E.M.A). Where better information is available, the Designer Engineer shall use it.

Site Drainage Plans

Existing Drainage Plan – Provide a topographical contour map defining existing conditions to include the following minimum information:

1. Two-foot (2-feet) contour intervals, slopes over 10% may use five-foot (5-feet) intervals extend Contours a minimum of 100 feet beyond property.

2. All structures, buildings, parking lots, and utilities on the property.

3. Isolation of all existing drainage facilities and water courses, including wetlands and flood plain areas.

Locations of all subsurface water outlets (e.g. – springs). Show arrows to indicate direction of flow for all drainage information.

Proposed Drainage Plan – Show proposed site grading and drainage facilities on a topographical contour map. Unless the detail for proposed improvements will obscure the conditions show on the existing drainage Plan, proposed site grading and drainage may be shown on the existing drainage Plan. The following minimum information shall also be shown.

1. Finished contours of the property after development shall be at two-foot (2-feet) contour intervals, slopes over 10% may use five-foot (5-feet) intervals, extend contours a minimum of 100 feet beyond property.

2. Percent grade, for graded slopes, elevations, dimensions and locations for all graded slopes.

3. Cut/fill areas' structural fill placement areas erosion/sedimentation control methods reseeding areas.

4. All proposed drainage facilities – public and private systems; drainage ditches, culverts.

Drainage Calculations – Furnish such supporting information as required of these Design Standards.

Detention Requirements – All proposed development will be required to use adequate drainage management practices. Developments located within a Master Planned drainage basin will follow the recommendations adopted to that Plan. Developments not located within Master Planned drainage basins will minimize the rate and amount of runoff to receiving systems and streams.

Pipe Materials and Size

Public storm drains may be constructed of the following materials: Concrete, Ductile Iron, PVC, and HDPE.

When pipe has less than minimum cover, the pipe shall be ductile iron.

Public and private storm drainpipe shall meet the appropriate sections of the Uniform Plumbing Code.

All public storm drain lateral lines to catch basins and other inlet structures shall be a minimum of ten inches (10-inch) in diameter. All public storm drain main lines shall be a minimum of twelve inches (12-inch) in diameter.

Minimum Design Criteria

Storm Frequency – All public storm drain systems shall be designed for the design storm recurrence interval in the following table:

Drainage System Design Capacity

Drainage System Element	Design Storm Recurrence Interval (Years)
Minor:	
Streets, curbs, gutters, inlets	
Catch basins and connector drains	10
Major:	
Laterals (collectors)	
< 100 tributary acres	25
Trunk	
> 100 tributary acres	50*
Arterial Streets and Drainage System	
in or under Arterial Streets	50*
Watercourses:	
Without designated floodplain	50
With designated floodplain	100
Bridges	100
Detention Facilities:	
Storage volume (on site)	25
Storage volume	100
Discharge rate	function of downstream capacity

***Surcharging** contained within pipe system will be allowed.

Time of Concentration – Overland flow to runoff to the initial catchment point into the storm drain system shall be a minimum of ten (10) minutes.

Velocity and Slope – All storm drains shall be on a grade, which produces a mean velocity, when flowing full, of at least three feet (3-feet) per second.

Manning Equations – When calculating minimum pipe slopes and velocities, the design engineer shall use the Manning pipe friction formula.

Pipe Coefficient – The storm drainpipe roughness coefficient to be used in the Manning formula shall not be less than 0.013.

Storm Water Flows – For areas under 100 acres, the "Rational" formula shall be used. For areas over 100 acres, a hydrographic based formula shall be used. A hydrograph method shall be used to size detention facilities. Detention facilities outfall control structures shall be sized to consider capacities of downstream facilities.

Alignment and Cover

Right-Of-Way Location

Storm drain lines shall generally be located five (5) feet (south or east) from right-of-way to centerline. All changes in direction of pipe shall be made at an approved structure, except as provided in the subsequent section.

Curvature

Storm drain lines shall not be curved between structures. If unusual circumstances are present, as determined by the Public Works Director, small diameter storm drains may be curved. Such curves shall conform to the street curvature.

Minimum Cover

All storm drains shall be laid at a depth sufficient to protect against damage by traffic and to drain building footings where practical. Sufficient depth shall mean the minimum cover from the top of the pipe to finish grade at the storm drain alignment.
Minimum cover shall be thirty inches: 30-inch) above the top of the pipe in paved areas and thirty-six inches (36-inch; at all other locations. Less than minimum cover shall be allowed only, if unusual circumstances are present, as determined by the Public Works Director.

The design engineer must show that sufficient depth is provided at the boundary of the development to properly drain the remainder of the upstream basin area tributary to the site.

Easements

a. When it is necessary to locate storm drains in easements, the storm drain shall be centered in the easement. All storm drain easements shall be exclusive and shall not be used for any purpose, which would interfere with the unrestricted use of the storm drain line. Exceptions to this requirement will be reviewed on a case-by-case basis, (e.g., a utility corridor in a new subdivision).

b. Easements for storm drain lines thirty-six inches (36-inch) or less in diameter shall have a minimum width of fifteen feet (15-feet). All pipelines greater than thirty-six inches (36) in diameter shall have a minimum width of twenty feet (20'). Larger widths may be required for special circumstances, such as excessively deep pipe or location of building to the easement.

c. Open channels shall have easements sufficient in width to cover the 100-year Floodplain Line when a 100-year design storm is required or fifteen feet (15-inch; from the waterway centerline or ten feet (10-inch from the top of the recognized bank, whichever is greater. A fifteen-foot (15-feet) wide access easement shall be provided on both sides of the channel for channel widths greater than fourteen feet (14-feet) at the top of the recognized bank.

open ditch or other means to whatever temporary facility is necessary to remove silt prior to discharge to downstream properties.

3. Prior to initial clearing and grading of construction site, an evaluation of the following factors must be earned out:

   a. Soil Erodibility - Soil credibility should be identified using Soil Conservation Service credibility ratings. Erosion control techniques shall be designed accordingly.

   b. Slope and Runoff- Cleared areas will require protection from erosion.

   c. Cover - Erosion protection will be required for all disturbed areas. Temporary facilities may include silt fences; drain barriers, gravel entries, ditches, surface stabilization or other devices as necessary. Temporary/permanent hydro-seeding or acceptable seeding and mulching must be provided whenever perennial cover cannot be established on sites, which will be exposed after September 1 or prior to June 1.

Private Drainage Systems

Subdivisions

When subdivision lots drain to the rear, it may be necessary to provide a private drainage system in private easements. This system shall be for collection of roof drains, footing drains and surface runoff. This system shall be designed to meet the Uniform Plumbing Code requirements.

Subsurface Drainage

Subsurface drains (under drains) shall be provided at the following locations:

a. For all existing springs and field tile intercepted during construction activity for other facilities, i.e. sewer, water, mains, street excavations, foundations, etc. Subsurface drains are not needed if the tile is removed.

b. Where high ground water exists or when it is necessary to reduce the piezometric surface to an acceptable level to prevent land slippage or under floor flooding of buildings.

d. The drainage line installed shall begin at a clean out and terminate at an approved point of disposal. Open-jointed storm drain lines will not be considered as an acceptable solution.

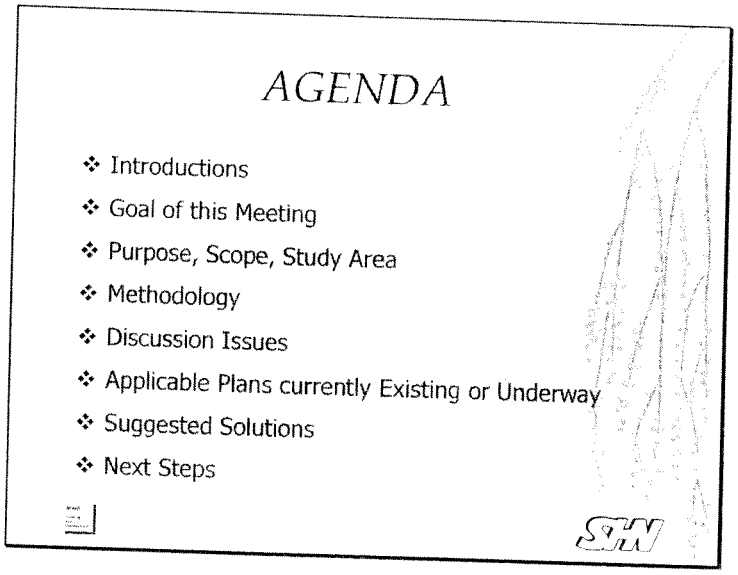
Water Quality

Storm water runoff will be treated prior to being discharged from the site under the following criteria.

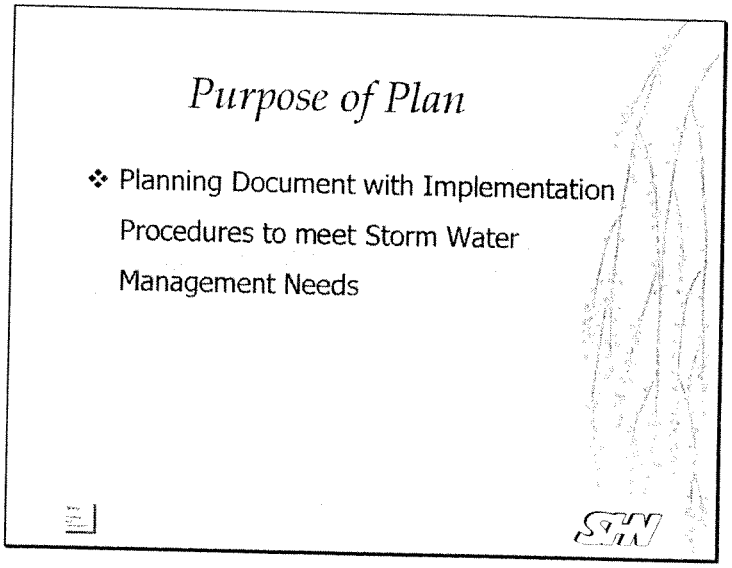
PowerPoint Slide Show For First Public Meeting

Slide 1

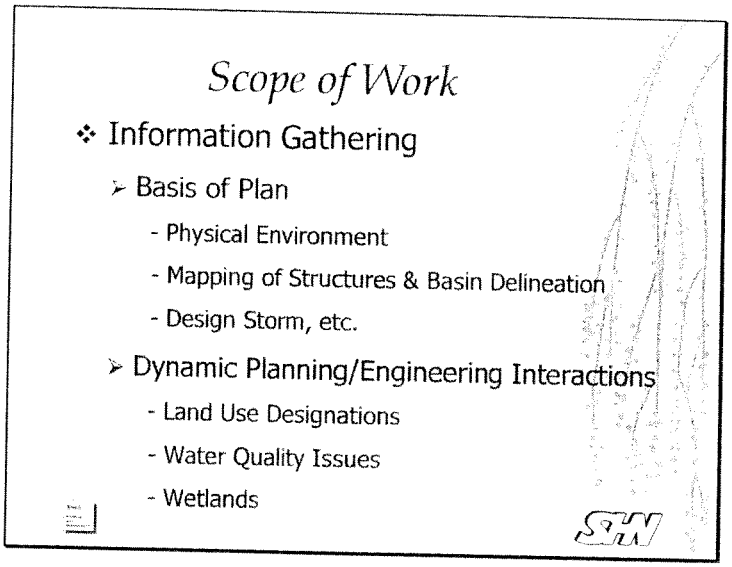
Slide 2



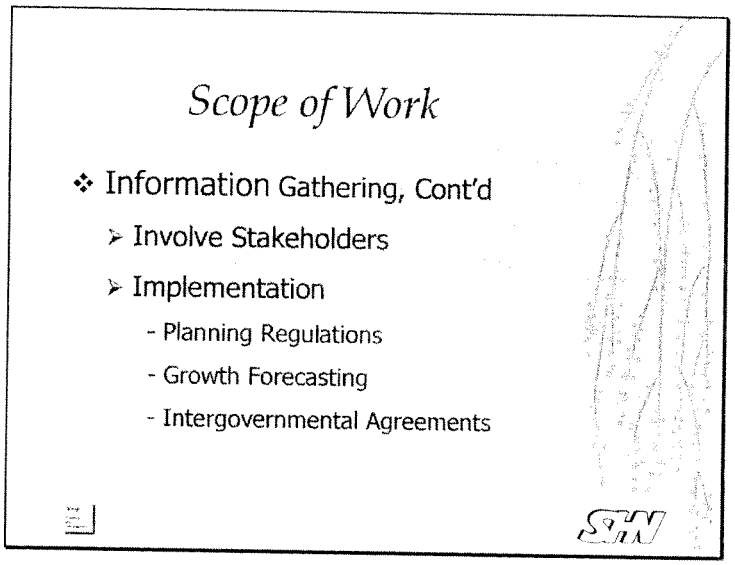
Slide 3



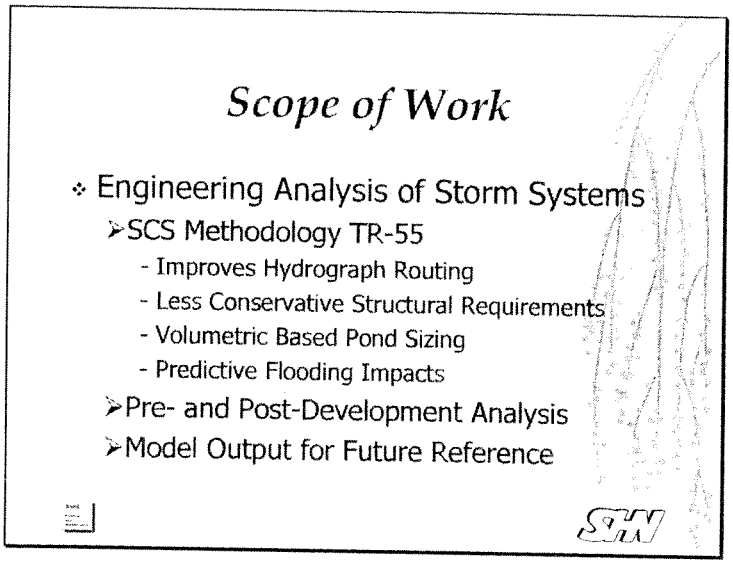
Slide 4



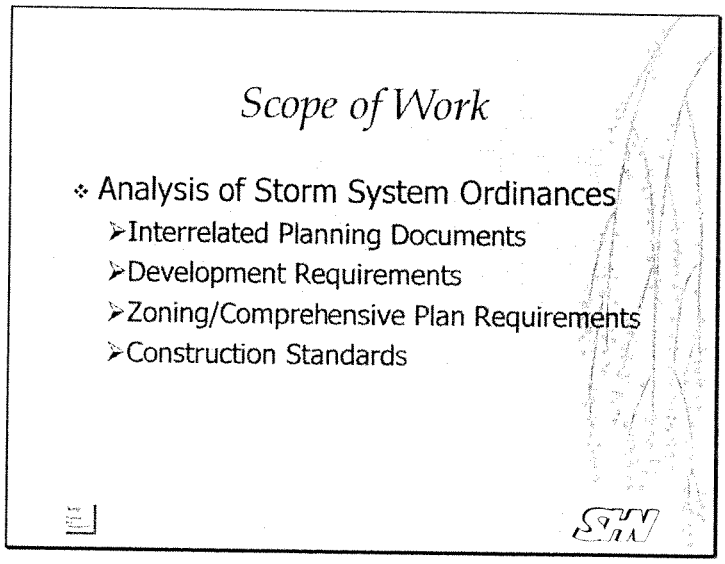
Slide 5



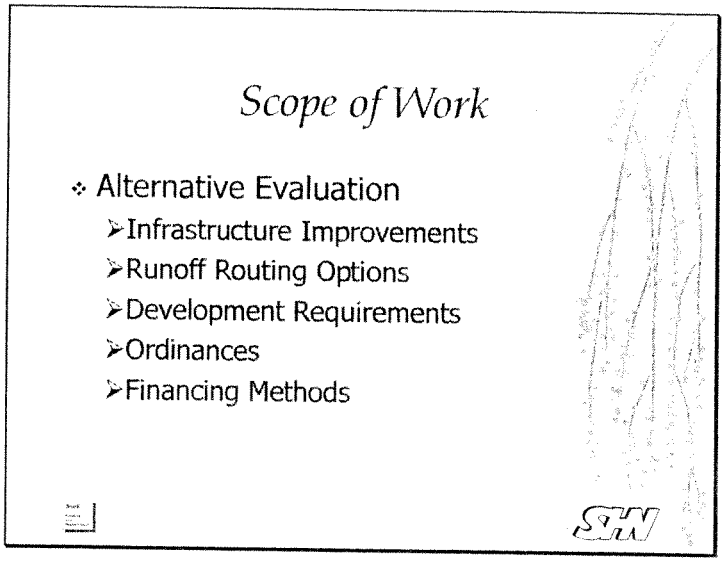
Slide 6



Slide 7



Slide 8



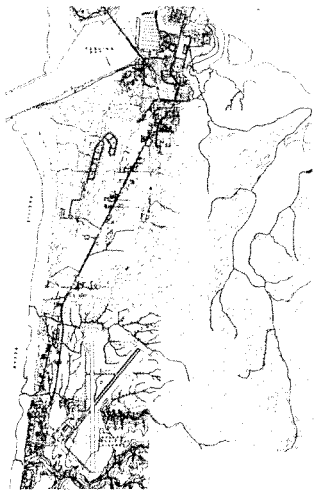
Slide 9

Scope of Work

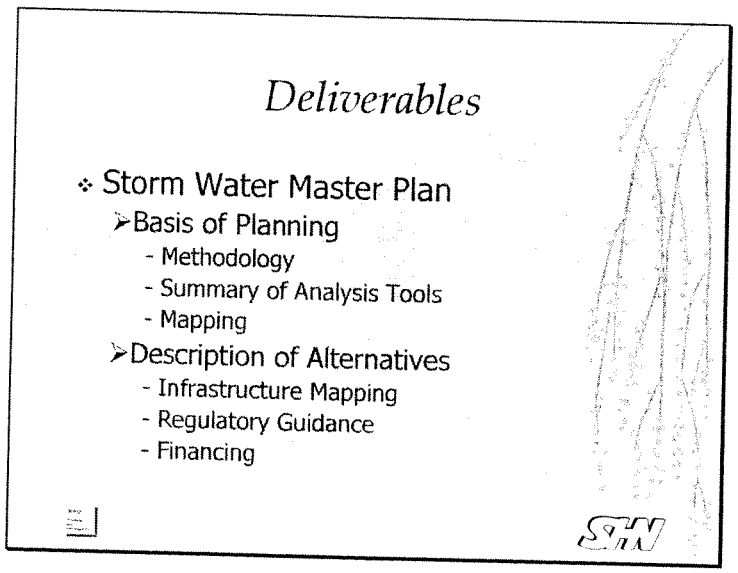
- Stakeholders Evaluation
  - Review Conclusions
  - Discuss Options
  - Solution-Oriented Framework
  - Recommendations

Slide 10

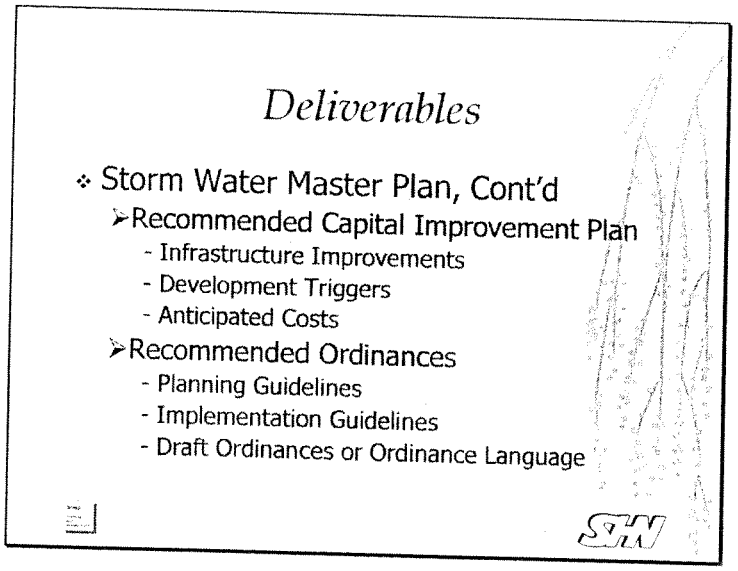
Study Area



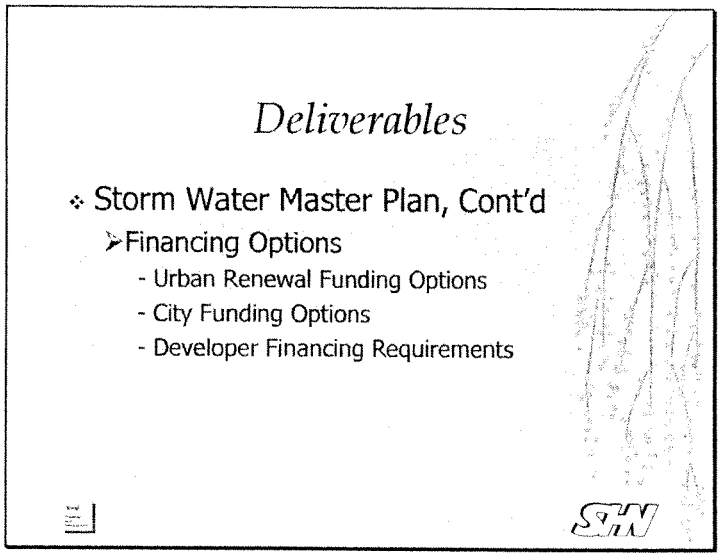
Slide 11



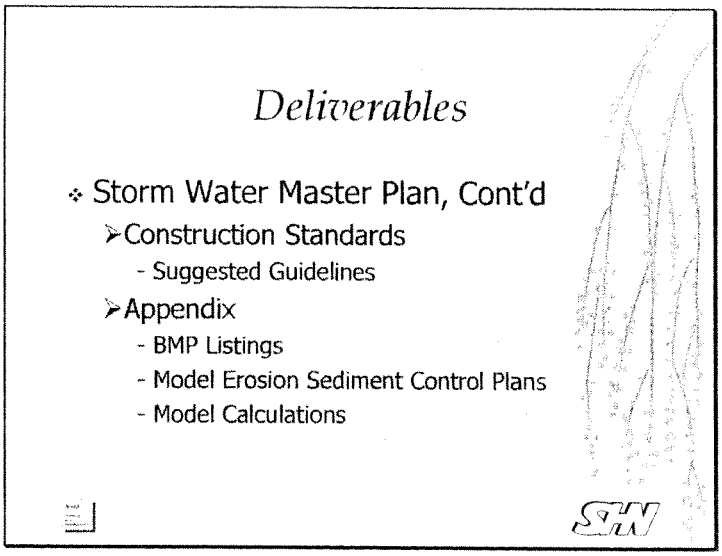
Slide 12



Slide 13



Slide 14



Public and Agency Comments

The comments in this summary were gathered from those present meetings held March 27, 2003 at 7:30 p.m. at the Council Chambers, Newport City Hall, and from other communications with stakeholders and residents. The issues that are identified have not been prioritized or evaluated; the following list is thus a combination of facts, perceptions and suggestions.

Existing underground utilities could conflict with storm water facilities.

There is a water district pipeline and phone cable along the west side of the highway.

The consulting team should be careful not to list priorities in order because projects such as the airport culvert will not produce revenue while development in other locations could have a positive impact on City revenues. Rather than using#1, #2, and #3 for priorities, it would be good to just have a list of priority projects – perhaps noted as high, medium and low priority.

The dotted line that is shown in the State park is important.

The SE 35th Street proposal is good because sewer and water mains already exist.

A new road is plotted to connect with Anchor Way west of the Highway and behind Toby Murry Motors and Chuck's Saw Shop. A water main goes through this property along the section that is plotted for the road; the water could be channeled along the plotted road for managing drainage.

There is underground infrastructure along Mike Miller Trail.

We need to be clear about how the overlay zone will affect land in the UGB. How will it apply?

A drainage zone could be the proper entity to implement the Plan in that it can cross-jurisdictional boundaries.

One option for financing infrastructure would be to require a greater SDC for smaller properties and require larger entities to develop the necessary infrastructure.

We need to be clear about how the overlay zone will affect the removal and demolition of existing structures, and how it will apply in the case of redevelopment.

The overlay zone should not be restrictive on existing residential lots. There should be a threshold level of impervious surface that triggers the need for Storm Water Management Plan, and also a certain size of lot that is exempt.

A pre-application conference would be helpful when there is development proposed within the South Beach Area.

Creating a wetland along the railroad should be a priority if doing so creates more developable property.

The consulting team needs to let the property owners know by e-mail when the Plan is passed on to the City.

Appendix C
Draft South Beach Storm Drainage Overlay Zone

Example South Beach South Beach Storm Water Master Plan Overlay Zone

This example South Beach South Beach Storm Water Master Plan Overlay Zone is proposed to provide guidance for the City of Newport in adopting appropriate regulations and incentives to manage storm drainage in the South Beach Area.

1.10 South Beach South Beach Storm Water Master Plan Area Defined.

The South Beach South Beach Storm Water Master Plan Area is shown on Figure 3.2.2 which depicts basins that are addressed within the South Beach Master Plan. Such area shall be indicated on the Zoning Map of the City of Newport with the letters SBSDO.

1.20 Development Consistent With South Beach Storm Drainage Overlay Zone.

All new development and redevelopment shall be consistent with the engineering and planning guidelines established for the South Beach Storm Water Master Plan Area. For purposes of this section, development means land division, subdivision, Planned destination resorts, or new structures for residential, commercial or industrial use or any combination thereof located on a parcel or tract or contiguous parcels or tracts of land in a common ownership. "New" and "redevelopment" refers to any "man-made" change to improved or unimproved real State including, but not limited to the placement and expansion of buildings or other structures, dredging, filling, grading, or paving.

1.30 Purpose.

The purpose of the SBSDO is to address the control and management of storm water to minimize the detrimental effects of surface water runoff at the time of new development and redevelopment of property within the specified area. The SBSDO will provide the standards and conditions to provide for conveyance of surface water in streams, creeks and channels that exist on a site at the time of development, and to address pollution reduction and flow control for storm water generated from new and redevelopment.

1.40 Definitions.

For the purposes of the South Beach Storm Drainage Overlay Zone, the following words and phrases shall have the meanings respectively ascribed to them by this Section. Words and phrases not ascribed a meaning within this Overlay Zone shall have the meanings ascribed by the Newport City Zoning Ordinance, the Newport Land Development Ordinance or other applicable City ordinances.

Best Management Practices or BMP's. State-of-the-art technology applied to activities, prohibitions, maintenance procedures, and other management practices that provide strategic approaches to reduce runoff and/or improve water quality.

Detention. Temporary storage of Storm water runoff.

Development. The division of a parcel of land into two or more parcels; the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any structure; any mining, excavation, landfill or land disturbance; and any use or extension of the use of land. Development includes new development and redevelopment.

Dredging. A method for deepening streams, swamps, or coastal waters by removing solids from the bottom.

Drip Line. An imaginary ground line around a tree that defines the limits of the tree canopy.

Evapotranspiration. Use of water by Plants.

Filling. The process of depositing fills in low-lying marshy or water areas to create usable land.

Grading. Any stripping, cutting, filling or stockpiling of earth or land, including the land in its cut or filled condition to create new average elevations of land around a building or the percentage of rise or descent of a sloping surface.

Hazardous Substance. Any substance or material that by reason of its toxic, caustic, corrosive, abrasive, or otherwise injurious properties may be detrimental or deleterious to the health of any person handling or otherwise coming into contact with such material or substance. The U.S. Environmental Protection Agency has a list of hazardous wastes.

Infiltration. The flow of water into soil material or Storm water inflow into the sanitary sewer system.

Impervious surface. Any material that prevents absorption of Storm water into the ground. Examples include rooftops, paved and graveled parking lots but do not include retention and detention basins.

Mitigation. Methods used to alleviate or lessen the impact of development. This may include soil erosion measures, replacement of wetlands, or contributions for expanded public facilities.

Nonstructural. Refers to regulations and incentives that provide solutions to problems.

Pervious Surface. Any material that permits full or partial absorption of Storm water into previously unimproved land.

Pollutant. Any introduced gas, liquid or solid that makes deteriorates water quality.

Pollution. The presence of matter or energy whose nature, location or quantity produces undesired environmental effects.

Porous Pavement System. This is an arrangement of interlocking, prefabricated, perforated blocks, laid on a soil base and providing a stable pervious surface for pedestrian or low-volume vehicular traffic.

Runoff. The portion of rainfall, irrigation water, and any other liquids that flow across ground surface and eventually return to streams.

Storm Sewer. A conduit that collects and transports runoff.

Storm water Detention. Any storm drainage technique that retards or detains runoff, such as a detention or retention basin, parking lots storage, rooftop storage, porous pavement, dry wells, or any combination thereof. See Detention Basin; Retention Basin.

Storm Water Management Plan. A Plan for the development or redevelopment of property that addresses the control and management of Storm water to minimize the detrimental effects of surface water runoff, and meets the standards, requirements and criteria set forth in this Overlay Zone.

Structural. Having to do with the built environment such as pipes, ditches, pumps and culverts.

Qualified professional. An Oregon Licensed Civil Engineer under whose direction Plans, profiles and details for work are prepared and submitted to the City for review and approval. For public projects, the project engineer will be the City Engineer or other consulting engineer contracted by the City.

Xeriscape. Attractive, sustainable landscape that conserves water, and is based upon sound horticultural practices.

1.5 Procedures.

When an application is subject to a public hearing due to the requirements of the underlying zone, the City's Public Works Department and Design Review Committee shall review the proposed development for applicability of the SBSDO prior to the Planning Commission's public hearing. The Design Review Committee and the Public Works Director shall forward their recommendations to the Planning Commission.

1.6 Applicability.

No permit for construction of new development or redevelopment within the SBSDO shall be issued until a Storm Water Management Plan is approved for the property. Development and redevelopment projects shall not be phased or segmented in such a manner to avoid the requirements of this Overlay Zone. Zoning and land development standards applicable in the underlying zoning designations shall apply except where the SBSDO provides additional standards above those required by the underlying zone or where specific exemptions are set forth. Permanent drainage facilities that comply with the Storm Water Design/Performance Standards set forth in Appendix D shall be installed in conjunction with the following activities:

1. New and redevelopment projects include partitions and subdivisions, Planned developments, and all single-family and two-family dwellings, multi-family dwellings, commercial uses, industrial uses and institutional uses that create new impervious surface totaling 5,500 thousand square feet or more within any twelve month period.
2. Any construction project that would change a point of discharge of surface water or the quantity of discharge, or that would discharge surface water at a higher velocity than the rate of discharge before construction, or that would add to pollution of surface waters.

3. Construction or reconstruction of public roads and temporary detours.

4. Construction projects in or adjacent to any existing stream or other surface watercourses including intermittent streams.

5. Construction projects in or adjacent to the one-hundred year floodplain.

6. The City Engineer has the authority to waive a Storm Water Management Plan for single- and two-family dwellings on 5 acre lots provided that the siting of the dwelling is determined to have minimal impact.

7. On properties where a Storm Water Management Plan has been approved as a condition of land partitioning, subdivision, or approval of planned development no additional Storm Water Management Plan or Storm water analysis shall be required as a condition of a building permit for single- or two-family residential construction.

1.7 Contents of Storm Water Management Plan.

Where a South Beach Storm Water Master Plan is applicable under this ordinance, the applicant shall submit an analysis and propose structural and nonstructural solutions to storm drainage on the site as follows:

1. An explanation and analysis of the following prepared by a qualified professional:

   A. Storm water mitigation strategies to increase infiltration and evapotranspiration and reduce the amount of Storm water runoff generated from the site.

   B. An analysis of flow reduction methods including, infiltration, and detention and techniques.

2. A landscaping Plan with an analysis of vegetative and other treatment methods used to reduce pollutants.

3. Calculations of the amount of impervious surface before development, and the amount of impervious surface after development.

4. Statement of consistency with the objectives of the South Beach South Beach Storm Water Master Plan.

5. Wetlands identified through the ORS wetlands notification process shall be delineated and mitigation strategies shall be implemented as necessary in accordance with State and Federal guidelines.

Requirements for Development.

All development shall be planned, designed, constructed and maintained to:

1. Be consistent with the City's Comprehensive Plan, the South Beach Storm Water Master Plan, the Newport Zoning Ordinance, and all other City codes and policies except where standards within this SBSDO provide specific exemptions based upon performance standards related to drainage, or where more stringent standards are required by the Overlay Zone.

2. Be of adequate design to safely manage all volumes of water generated upstream and on the site to an approved point of disposal.

3. Provide points of disposal for Storm water generated by future development upstream.

4. Prevent the capacity of downstream channels and storm drainage facilities from being exceeded.

5. Prevent the uncontrolled or irresponsible discharge of Storm water onto adjoining public or private property.

6. Maintain the highest feasible level of water quality.

7. Maintain the runoff characteristics of the original undeveloped drainage basin, where feasible, as determined by the Public Works Director.

8. Maximize efficient use of the City of Newport's natural drainage system including streams, seasonal draws and wetlands.

9. Have sufficient structural strength to resist erosion and all external loads that may be imposed.

10. Be designed using materials that ensure a minimum practical design life of fifty years.

11. Be designed in a manner that allows economical ongoing maintenance of Storm water drainage facilities.

12. Meet the requirements of DEQ and be registered with DEQ as appropriate.

13. Allow reduced widths for new streets or new street extensions below those required within the street classification system of the Newport Comprehensive Plan to reduce impervious surfaces, if it is determined by the Planning Commission that the reduced width will not

impede the flow of traffic, be injurious to the public safety, reduce the livability of the neighborhood, or compromise pedestrian, bicycle and traffic convenience and accessibility

14. Encourage consolidated access for adjacent properties with access to individual properties minimized to reduce impervious surface consistent with the guidelines in the Transportation Systems Plan.

15. Allow networks of well marked connected pathways paved with a porous pavement systems that will facilitate pedestrian movement throughout the year to replace sidewalk requirements provided that the network of pathways provides all the convenience and accessibility of any sidewalk system required by the land development ordinance.

16. Encourage enhancement of wetlands as storm retention ponds, and for purposes of open space and recreational use in planned developments where such ponds are maintained by a homeowners' association.

17. Off Street Parking shall be designed as follows:

    A. New and redeveloped parking lots greater than 2,200 square feet or 55 spaces or shall include onsite surface water management.
    B. Vegetative treatment shall be provided within area reserved for landscaping. Exceptions based on site restrictions, such as slope or impermeable soils, shall be documented and approved by Public Works Director.
    C. Alternative paving techniques shall be encouraged for off-street parking areas to reduce the total impervious surface of the site. Suitable alternative paving materials, their installation and maintenance will be determined by the Public Works Director.
    D. Parking areas using pollution reduction and flow control facilities or alternative paving materials pursuant to this section will not be included in the calculation of the total impervious surface of the site when there is less than 10% net increase in off-site runoff from the parking area.
    E. Ten percent (10%) of combined parking areas shall be landscaped with trees or shrubs. Where parking areas are required and/or selected to provide water quality treatment on site, the resulting best management practice including, but not limited to bioretention areas and filter strips will count towards the total required landscaping, but such treatment facilities shall not replace the requirements for Plantings of trees or shrubs.

18. Landscaping shall be designed to provide for an enhanced visual environment and to reduce surface water runoff. Storm water mitigation strategies, such as retention of existing trees, use of xeriscape or native vegetation to provide for low maintenance landscaping materials, and the use of porous paving surfaces are encouraged:

    A. Landscaping using native or other low maintenance Plants, swales, filter strips, ponds and wetlands shall count towards total percentage of landscaping required on site, and shall be designed to increase infiltration and reduce the amount of surface water runoff from the site.

B. When 100 percent of the area defined by the drip line of the tree is preserved, the square footage within the drip line shall count towards the percentage of required landscaping.

C. Areas containing mature native vegetation shall require no provision for irrigation except where the City determines that the subject area needs irrigation due to altered soil, slope, drainage or other conditions related to development.

D. Plants identified as noxious weeds the Oregon Department of Agriculture shall not be included as part of the landscaping Plan.

E.

Infiltration Facilities Restricted in High Risk Areas.

The City of Newport reserves the right to restrict the use of infiltration facilities in high risk areas including those with slopes over 12%, unstable soils, high water tables, or sites identified to be contaminated by hazardous substances.

Bonding.

Applicants shall provide a performance bond or similar surety acceptable to the City of Newport to assure successful installation and initial maintenance of surface pollution reduction and flow control facilities. During construction and for a period of one year thereafter, the bond shall be in favor of the City of Newport, and in an amount of the anticipated construction cost.

Contingency for System Failure.

If the storm drainage system fails due to lack of maintenance or breakage, and there are impacts to downstream water quality or quantity as a result of the failure, the City of Newport may perform the necessary maintenance or repair and charge the owner of the facility for the costs associated with the maintenance and repair that has been performed.

Pollution Reduction and Flow Control Standards.

Storm water treatment and detention facilities receiving Storm water from impervious surface areas less than 15,000 square feet may be designed in accordance with sizing and construction standards for combined facilities. More than one such facility can be installed on site as long as each facility receives Storm water from an area less than the stated threshold.

Post Construction Plans.

When required as a condition of approval, post construction Plans shall be submitted within one month of completion of construction as follows:

1. As-built Plans, stamped by a qualified professional, indicating that all storm water mitigation and management strategies are installed per approved Plans and approved changes.

2. Maintenance Plans for all Storm water facilities installed to comply with this ordinance. The maintenance program must be approved by the Newport Public Works Director with proof of maintenance provided annually.

Appendix D
Storm Drainage Design/Performance Standards

South Beach Water Master Plan
For Newport's South Beach Area

Storm Drainage Design/Performance Standards

Storm drainage design within a development area must include provisions to adequately control runoff from all public and private streets and the roof, footing, and area drains of residential, multi-family, commercial, or industrial buildings. The design must ensure future extension of the drainage system to the entire drainage basin in conformance with these Designs Standards. These provisions include:

a. Surface or subsurface drainage, caused or effected by the changing of the natural grade of the existing ground or removal of natural ground cover or placement of impervious surfaces, shall not be allowed to flow over adjacent public or private property in a volume or location materially different from that which existed before development occurred, but shall be collected and conveyed in an approved manner to an approved point of disposal.

b. Surface water entering the subject property shall be received at the naturally occurring locations and surface water exiting the subject property shall be discharged at the natural locations with adequate energy dissipaters within the subject property to minimize downstream damage and with no diversion at any of these points.

c. The approved point of disposal for all storm water may be a storm drain, dry wells, existing open channel, creek, detention, or retention pond approved by the Public Works Director. Acceptance of suggested systems will depend upon the prevailing site conditions, capacity of existing downstream facilities, and feasibility of the alternate design.

d. When private property must be crossed in order to reach an approved point of disposal, it shall be the developer's responsibility to acquire a recorded drainage easement of dimensions. The drainage facility installed must be closed conduit system. Temporary drainage ditch facilities, when approved, must be engineered to contain the storm water without causing erosion or other adverse effects to the private property.

e. The design peak discharge from the subject property may not be increased from conditions existing prior to the proposed development except where it can be satisfactorily demonstrated by the applicant that there is no adverse impact.

f. Retention/detention facilities will be required where necessary to maintain surface water discharge rates at or below the existing design storm peak discharge except where it can be demonstrated by the applicant that no adverse impart will result from not providing said facilities. Retention/detention facilities will only be allowed for large area developments as approved by the City Engineer and will come under the ownership, operation and maintenance of the City's Public Works after satisfactorily installed.

g. Minimum width of an access easement from an existing public road to a drainage facility shall be fifteen (15) feet.

h. Drainage from roofs, footing, and downspouts may drain directly to a street through the curb under the following circumstances:

   1. The building pad ground elevation is at least two (2) feet above the existing street curb, and

   2. The existing street is adequately crowned to avoid sheet flow across the street. This requirement will be waived if curb and gutter exists or installed.

i. Vegetation shall be established on areas disturbed by/or on areas of construction as necessary to minimize erosion. All storm system designs shall make adequate provisions foe collecting all storm water runoff. The system shall accommodate all runoff from upstream tributary areas whether or not such areas are within the proposed development. The amount of runoff to be accommodated shall be based upon ultimate development of all upstream tributary areas.

   Where storm drains are constructed on slopes greater than 20%, in areas designated as hazardous or where there are site conditions that may cause damage to improvements, slippage or slides or determined by the Public Works Director, a soils and/or geologic report may be required.

Erosion Control Standards:

a. **Slopes.** The faces of cut and fill slopes shall be prepared and maintained to control against erosion. This control may consist of effective Planting, matting or covering. The protection for the slopes shall be installed as soon as practicable and prior to calling for final approval. Where cut slopes are not subject to erosion due to the erosion-resistant character of the materials, such protection may be omitted.

b. **Other Devices.** Where necessary, check dams, cribbing, rip-rap or other devices or methods shall be employed to control erosion and provide safety.

c. **Construction.** Temporary erosion control facilities shall be used to protect against erosion during construction. See requirements.

d. **Development.** Shall provide erosion control methods to limit the removal of soil materials by storm runoff during the construction phases of the project.

Where the finished graded surface has a greater than 20% slope, or as required, soil stabilization fabric shall be placed over the entire disturbed area.

Proposed storm drain systems shall not discharge flows into inadequate downstream systems unless approved by the Public Works Director.

Public storm lines shall be located within the public right-of-way a directed by the Public Works Director. The lines are placed in the public right-of-way for ease of maintenance access, control of the facility, operation of the facility, and to provide required replacement and/or repair:

1. Storm drain lines shall generally be located five 5 feet (south or east) from right-of-way to centerline. All changes in direction of pipe shall be made at an approved structure.

2. Storm drain lines shall not be curved between structures. If unusual circumstances are present, as determined by the Public Works Director, small diameter storm drains may be curved. Such curves shall conform to the street curvature.

Floodplain information, delineating the 100-year floodplain limits, shall be shown where it occurs within the development. Floodplain limits shall be based on maps prepared by the UPS. Army Corps of Engineers and the Federal Emergency Management Agency (F.E.M.A). Where better information is available, the Designer Engineer shall use it.

Site Drainage Plans

Existing Drainage Plan - Provide a topographical contour map defining existing conditions to include the following minimum information:

1. Two-foot (2-feet) contour intervals, slopes over 10% may use five-foot (5-feet) intervals extend Contours a minimum of 100 feet beyond property.

2. All structures, buildings, parking lots, and utilities on the property.

3. Isolation of all existing drainage facilities and water courses, including wetlands and flood plain areas.

Locations of all subsurface water outlets (e.g. - springs). Show arrows to indicate direction of flow for all drainage information.

Proposed Drainage Plan - Show proposed site grading and drainage facilities on a topographical contour map. Unless the detail for proposed improvements will obscure the conditions show on the existing drainage Plan, proposed site grading and drainage may be shown on the existing drainage Plan. The following minimum information shall also be shown.

1. Finished contours of the property after development shall be at two-foot (2-feet) contour intervals, slopes over 10% may use five-foot (5-feet) intervals, extend contours a minimum of 100 feet beyond property.

2. Percent grade, for graded slopes, elevations, dimensions and locations for all graded slopes.

3. Cut/fill areas' structural fill placement areas erosion/sedimentation control methods reseeding areas.

4. All proposed drainage facilities - public and private systems; drainage ditches, culverts.

Drainage Calculations - Furnish such supporting information as required of these Design Standards.

Detention Requirements - All proposed development will be required to use adequate drainage management practices. Developments located within a Master Planned drainage basin will follow the recommendations adopted to that Plan. Developments not located within Master Planned drainage basins will minimize the rate and amount of runoff to receiving systems and streams.

Pipe Materials and Size

Public storm drains may be constructed of the following materials: Concrete, Ductile Iron, PVC, and HDPE.

When pipe has less than minimum cover, the pipe shall be ductile iron.

Public and private storm drainpipe shall meet the appropriate sections of the Uniform Plumbing Code.

All public storm drain lateral lines to catch basins and other inlet structures shall be a minimum of ten inches (10-inch) in diameter. All public storm drain main lines shall be a minimum of twelve inches (12-inch) in diameter.

Minimum Design Criteria

Storm Frequency - All public storm drain systems shall be designed for the design storm recurrence interval in the following table:

Drainage System Design Capacity

Drainage System Element	Design Storm Recurrence Interval (Years)
Minor:	
Streets, curbs, gutters, inlets	
Catch basins and connector drains	10
Major:	
Laterals (collectors)	
< 100 tributary acres	25
Trunk	
> 100 tributary acres	50*
Arterial Streets and Drainage System in or under Arterial Streets	50*
Watercourses:	
Without designated floodplain	50
With designated floodplain	100
Bridges	100
Detention Facilities:	
Storage volume (on site)	25
Storage volume	100
Discharge rate	function of downstream capacity

***Surcharging** contained within pipe system will be allowed.

Time of Concentration – Overland flow to runoff to the initial catchment point into the storm drain system shall be a minimum of ten (10) minutes.

Velocity and Slope – All storm drains shall be on a grade, which produces a mean velocity, when flowing full, of at least three feet (3-feet) per second.

Manning Equations – When calculating minimum pipe slopes and velocities, the design engineer shall use the Manning pipe friction formula.

Pipe Coefficient – The storm drainpipe roughness coefficient to be used in the Manning formula shall not be less than 0.013.

Storm Water Flows – For areas under 100 acres, the "Rational" formula shall be used. For areas over 100 acres, a hydrographic based formula shall be used. A hydrograph method shall be used to size detention facilities. Detention facilities outfall control structures shall be sized to consider capacities of downstream facilities.

Alignment and Cover

Right-Of-Way Location

Storm drain lines shall generally be located five (5) feet (south or east) from right-of-way to centerline. All changes in direction of pipe shall be made at an approved structure, except as provided in the subsequent section.

Curvature

Storm drain lines shall not be curved between structures. If unusual circumstances are present, as determined by the Public Works Director, small diameter storm drains may be curved. Such curves shall conform to the street curvature.

Minimum Cover

All storm drains shall be laid at a depth sufficient to protect against damage by traffic and to drain building footings where practical. Sufficient depth shall mean the minimum cover from the top of the pipe to finish grade at the storm drain alignment.
Minimum cover shall be thirty inches: 30-inch) above the top of the pipe in paved areas and thirty-six inches (36-inch; at all other locations. Less than minimum cover shall be allowed only, if unusual circumstances are present, as determined by the Public Works Director.

The design engineer must show that sufficient depth is provided at the boundary of the development to properly drain the remainder of the upstream basin area tributary to the site.

Easements

a. When it is necessary to locate storm drains in easements, the storm drain shall be centered in the easement. All storm drain easements shall be exclusive and shall not be used for any purpose, which would interfere with the unrestricted use of the storm drain line. Exceptions to this requirement will be reviewed on a case-by-case basis, (e.g., a utility corridor in a new subdivision).

b. Easements for storm drain lines thirty-six inches (36-inch) or less in diameter shall have a minimum width of fifteen feet (15-feet). All pipelines greater than thirty-six inches (36) in diameter shall have a minimum width of twenty feet (20'). Larger widths may be required for special circumstances, such as excessively deep pipe or location of building to the easement.

c. Open channels shall have easements sufficient in width to cover the 100-year Floodplain Line when a 100-year design storm is required or fifteen feet (15-inch; from the waterway centerline or ten feet (10-inch from the top of the recognized bank, whichever is greater. A fifteen-foot (15-feet) wide access easement shall be provided on both sides of the channel for channel widths greater than fourteen feet (14-feet) at the top of the recognized bank.

d. Easement locations for public storm drain serving a PUD, apartment complex, or commercial/industrial development shall be in parking lots, private drives, or similar open areas which will permit unobstructed vehicle access for maintenance.

e. Structures cannot be built over the easements, and trees and large bushes cannot be Planted in the easement

f. All easements must be furnished to the City for review and approval prior to recording.

Relation to Watercourses

Storm drain lines shall enter a creek or drainage channel at 90° or less to the direction of flow. The outlet shall have a head wall and scour pad or rip rap to prevent erosion of the existing bank or channel bottom. The size of pipe or channel being entered will govern which protective measures are required. All protective measures must conform to the requirements of the Erosion Control Section of these Design Standards.

Structure Location

Manholes

Manholes shall be located at all changes in slope, alignment, pipe size, and at all pipe junctions with present or future storm drains. Manhole spacing shall not be greater than 400 feet. Standard manholes are required when rim to crown of pipe elevations exceed four feet (4-feet) at pipe junctions. Flattop manholes shall be used when rim to crown of pipe elevations are less than four feet (4-feet). When the downstream pipe size increases, the crown of all upstream pipes shall not be lower than the crown of the larger downstream pipe.

Catch Basins

Catch basins shall be located in streets at the curb line to receive storm water runoff and convey it to the main storm drain

Catch basins shall be located at the following locations but in no case be spaced further than 300 feet:

a. At curb returns on the upstream side of an intersection.

b. At the ends of all dead-end streets with a descending grade.

c. At intermediate locations so that storm flows at the curb line do not exceed three feet (3-feet) in width (measured from the curb face; or three inches 3) in depth (measured at the curb face,) whichever is less.

d. At all low points.

e. On street grades grater than 10 % the maximum spacing shall be 150 feet.

f. On street grades less than 1% the maximum spacing shall be 150 feet.

g. Catch basin inlets and grates shall be positioned to avoid conflict with wheelchair ramps.

Catch basins shall be capable of intercepting, completely, the design storm flows at the curb.

Dry Wells

Where there are no natural or constructed drain ways, or an existing storm water system, dry wells can be used as a discharge point with the approval of the Public Works Director. Dry well systems shall be constructed with two manholes. The collector pipes shall discharge into the first manhole, which shall be constructed as an oil-water separator and settling basin. Liquid will then flow to the second manhole, which shall be a perforated manhole. The second manhole shall extend down to river rock or to the natural water table.

Anchor Blocks

For storm drain pipes greater than four (4) inches in diameter, concrete anchor blocks shall be required if the slopes are greater than twenty (20) percent. Anchor blocks shall key into trench sides. Spacing for anchor blocks is as follows:

SPACING FOR ANCHOR BLOCK FOR ALL SIZE PIPE

Slope (percent)	Minimum Spacing (ft.)
0 -19.99	No anchor required
20 - 34.99	35
35 -50.99	25
51 -OR-MORE	15 OR SPECIAL DESIGN

Water Bars

Where the finished graded surface has aslope greater than or equal to 3 units horizontal to 1 unit vertical or as required, water bars shall be installed. The water bars shall be sloped slightly to drain runoff water away from the pipeline alignment. Water bars shall have a maximum spacing of forty (40) feet.

Storm Detention

Development Not Requiring Detention

In general, developments meeting the following criteria will not be required to provide detention:

a. Land divisions of less than four lots.

b. Multi-family developments of less than four units.

c. Commercial and industrial development where the construction of a new facility or expansion of an existing facility will not increase the impervious area by more than 5,000 square feet.

Detention Volume

When detention is required, the volume to be detained shall be based on the following: The rate of runoff from a developed site during a 25-year recurrence interval storm shall not exceed the pre-development rate of runoff released based on a 10-year recurrence interval storm.

Emergency Overflow

The Design Engineer shall assess the impacts of system failure for on-site detention. Overflows may occur due to rainfall intensity, which exceeds the design storm, debris blockage of storm drain system, or some other reason. If a system overflows, it shall not cause inundation of neighboring properties. Potential overflow routes shall be protected from erosion by adequate means.

Detention Facilities

Detention volume storage methods in order of preference are the following:

g. Surface storage

h. Underground storage Detention Facilities - Detention facilities, which are intended to be transferred to the City, shall be designed with good access for maintenance and shall have access right-of-way deeded to the City. A maintenance Plan for the detention facility shall be submitted.

Erosion Control

Developments shall provide erosion control methods to limit the removal of soil materials by storm runoff during the construction phases of a project.

Erosion Control - Application

1. For subdivision plats, the applicant also shall utilize temporary erosion control measures during installation of plat improvements and by subsequent builders during construction of dwellings and other lot improvements.

2. Prior to the initial clearing and grading of any land development, provisions shall be made for the interception of all potential silt-laden runoff that could result from said clearing and grading. Said interception shall preclude any silt-laden runoff from discharging from the proposed land development to downstream properties unless previously approved by the Public Works Director. Said interception shall cause all silt-laden runoff to be conveyed by

open ditch or other means to whatever temporary facility is necessary to remove silt prior to discharge to downstream properties.

3. Prior to initial clearing and grading of construction site, an evaluation of the following factors must be earned out:

   a. Soil Erodibility - Soil credibility should be identified using Soil Conservation Service credibility ratings. Erosion control techniques shall be designed accordingly.

   b. Slope and Runoff- Cleared areas will require protection from erosion.

   c. Cover - Erosion protection will be required for all disturbed areas. Temporary facilities may include silt fences; drain barriers, gravel entries, ditches, surface stabilization or other devices as necessary. Temporary/permanent hydro-seeding or acceptable seeding and mulching must be provided whenever perennial cover cannot be established on sites, which will be exposed after September 1 or prior to June 1.

Private Drainage Systems

Subdivisions

When subdivision lots drain to the rear, it may be necessary to provide a private drainage system in private easements. This system shall be for collection of roof drains, footing drains and surface runoff. This system shall be designed to meet the Uniform Plumbing Code requirements.

Subsurface Drainage

Subsurface drains (under drains) shall be provided at the following locations:

a. For all existing springs and field tile intercepted during construction activity for other facilities, i.e. sewer, water, mains, street excavations, foundations, etc. Subsurface drains are not needed if the tile is removed.

b. Where high ground water exists or when it is necessary to reduce the piezometric surface to an acceptable level to prevent land slippage or under floor flooding of buildings.

d. The drainage line installed shall begin at a clean out and terminate at an approved point of disposal. Open-jointed storm drain lines will not be considered as an acceptable solution.

Water Quality

Storm water runoff will be treated prior to being discharged from the site under the following criteria.

a. No water quality treatment will be required for those developments not requiring detention, as defined previously.

b. The treatment volume will be the runoff from a 0.36-inch rainfall distributed over four hours.

c. Treatment facilities may be incorporated into other facilities required within this section (i.e. detention ponds).

d. A maintenance schedule or Plan should be included with the design calculations. The Plan can be part of the detention pond maintenance.