CHAPTER 8

CAPITAL IMPROVEMENTS AND PROGRAM PLAN

INTRODUCTION

This chapter discusses funding stormwater management capital improvements and program activities.

Capital improvements are proposed for existing drainage facilities and to add water quality treatment facilities to those existing drainage facilities.

This chapter also discusses existing and proposed stormwater management program activities. In order to fully account for necessary UGA stormwater management program activities and their costs, the analysis includes existing Public Works Department road drainage operation and maintenance activities and monitoring activities currently conducted by the Jefferson County Natural Resources Division and the Jefferson County Conservation District. New stormwater management program activities are also proposed. They include:

- Inspection private stormwater management facilities
- Public education and outreach activities.

FUNDING

Capital improvement projects for facilities located within County Road rights-of-way would continue to be funded in the Transportation Improvement Program. Operation and maintenance of drainage facilities located within County Road rights-of-way would continue to be funded out of the County Road operations budget. Operation and maintenance of drainage facilities located within on private parcels would continue to be funded by property owners, but the County would implement an stormwater management facility inspection program to ensure that facilities are maintained regularly and as per design. This program would be funded through a stormwater management fee. In addition, the Plan recommends funding capital improvements to the Port Hadlock Core storm sewer system and other Stormwater Management Program activities through stormwater management fees.

Stormwater management fees are authorized in RCW 36. They would be assessed based on an individual parcel's impervious surface area measured in Equivalent Residential Units (ERUs). All single-family residential parcels would be assumed to have 2,000 square feet of impervious surface or one Equivalent Residential Unit. ERUs for commercial and industrial designated parcels would be calculated by dividing the total

area of impervious surface by 2,000. County Roads and State Highways within the UGA would also be assessed a stormwater fee based on their ERUs. There are currently a total of 5,244 ERUs in the UGA.

The Plan proposes implementing a UGA-wide Stormwater Management Program that would conduct public education and outreach activities. The annual cost would be approximately $15,000. This Plan presents two options for funding the Program.

Option 1:
This option assumes that all developed parcels in the UGA, including single-family residences, contribute stormwater runoff and have water quality impacts. Therefore all developed parcels should pay an annual fee based on their ERUs to fund the UGA-wide Stormwater Management Program. There are currently 5,244 ERUs. The annual UGA-wide Program cost per ERU would be $2.86.

Option 2:
This option assumes that the UGA designation will significantly benefit only those parcels that are designated for commercial, industrial, and multi-family development. Therefore only those parcels should pay an annual fee based on their ERUs to fund the UGA-wide Stormwater Management Program activities. Single-family residential parcels would not be assessed a fee. There are currently 1,851 ERUs on commercial, industrial, and multi-family designated parcels. The annual UGA-wide Program cost per ERU would be $8.10.

The Plan proposes implementing a UGA Commercial Area Program to fund inspection of stormwater management facilities in those designations. Parcels designated for commercial, industrial, and multi-family development would be assessed an annual fee The inspection program cost would be approximately $10,000 per year. There are 1,851 ERUs on commercial, industrial, and multi-family designated parcels. The annual inspection program cost per ERU would be $5.40.

The Plan proposes that public roads and private parcels that discharge to the Port Hadlock Core storm sewer system would be assessed a fee to construct a treatment facility for the system and to replace the outfall. The treatment facility would cost approximately $10,000. There are currently 386 ERUs that discharge to the outfall. The cost per ERU to provide a treatment system would be $25.88. The estimated cost to replace the outfall is approximately $144,000. For planning purposes this work would be scheduled for 2011. The estimated cost in 2011 would be approximately $170,000. The Stormwater Management Plan projects 445 ERUs discharging to the Hadlock Core system in 2011. The cost per ERU to replace the outfall would be $382.

CAPITAL IMPROVEMENT PROJECTS

Jefferson County used two procedures to identify proposed Capital Improvement Program (CIP) projects. First, storm drainage problems identified by County staff and

the public were investigated. Capital improvements or other measures are recommended for these problems. Second, hydrologic and hydraulic modeling was conducted to determine if any storm drainage facilities are inadequately sized to convey the runoff generated by the 25-year and/or 100-year design storm event based on future land use conditions. The modeling indicated that all facilities are adequately sized.

It is important to keep in mind that whenever an inadequately sized pipe or channel is replaced or reconstructed, the improvement may transfer the capacity problem downstream. It is therefore strongly recommended that all improvements include flow control and water quality treatment as per the *Stormwater Management Manual*. Because the soils within the UGA have high hydraulic conductivity, infiltration is the preferred means of flow control.

Table 8-1 summarizes the recommended capital improvements. The cost estimates in the CIP were developed to be conservative and adequate for planning purposes. Also, as stated in Chapter 5, no field surveying was conducted during the development of this Plan. Capital improvement projects should include surveys to ensure the most accurate and effective design for the project. For all recommended projects it is assumed that the existing pipe slope will be utilized in the future. However, the most optimum slope should be analyzed in order to provide maximum pipe capacity. Typical estimated costs are presented in Appendix E.

The projects presented here are those identified from computer numeric modeling and discussions with County Public Works Department staff, and public comments. These projects are ranked based on the severity of the problem as outlined in Chapter 5. Other drainage problems may arise in the future that need to be addressed at that time. The Stormwater Management Plan will need to be updated as development and regulatory requirements change.

MOORE STREET STORM DRAINAGE IMPROVEMENTS

The existing storm drainage conveyance system on 4th Avenue and Moore Street in Irondale consists of surface flow collected by a thickened edge on both edges of the roads. A Type 1 catch basin collects the surface runoff from the southerly side of Moore Street. A 15-inch diameter pipe conveys the flow under the road where it combines with the runoff from the northerly side of Moore Street and flows in a heavily vegetated open channel access private property. Beyond the open channel, the flow enters an 18-inch diameter corrugated metal (CMP) pipe that leads to a heavily vegetated swale on property owned by the Washington Department of Fish and Wildlife and discharges to the beach.

Shallow subsurface drainage is intercepted by the roadway on both sides of Moore Street. Since there is not a roadway ditch, the drainage flows parallel to the roadway until, at several points, it overtops the thickened edge and flows onto the street. It then flows down the gutter line to the end of the street. This is particularly a problem where drainage from 3rd Avenue flows on to the north side of Moore Street.

There are no water quality facilities in this basin. The basin zoning is entirely residential with asphalt and gravel roads. Expected pollutants in the storm runoff are typical for residential areas. These include fertilizers, vehicle fluids, pet waste, and sediment. Water quality sampling by Jefferson County during October 2003 indicates the presence of pollutants. See Table 6-1.

The following is a description of work included in the proposed Capital Improvement Project for Moore Street:

- Install approximately 850 lineal feet of 12-inch diameter corrugated polyethylene pipe (CPEP), or equivalent, under the southern gutter of the road. Space Type 1 catch basins a maximum of 150 lineal feet, with 12-inch diameter pipe crossings at each catch basin junction that connects to catch basins on the north side and will capture shallow subsurface flow on to the roadway at the 3rd Avenue intersection.

- Install approximately 130 lineal feet of 18-inch diameter corrugated polyethylene pipe (CPEP) or equivalent at the east end of Moore Street to cross under the road and convey runoff to a biofiltration swale before the outfall into Port Townsend Bay.

- Construct a biofiltration swale before the outfall such that a Manning's "n" of 0.24 is achieved, limiting the maximum flow velocity during the 6-month, 24-hour design storm to less than 1 foot per second. Per the *Stormwater Management Manual*, the minimum swale length should be 100 feet, with a minimum hydraulic residence time of 22 minutes. Since the existing swale area is approximately 100 feet long the minimum hydraulic residence time, can be achieved by grading to the bottom width to 6 feet with side slopes of 3.5:1. The maximum flow depth used in the calculation is 4 inches. The flow velocity in the outfall swale during the 100-year, 24-hour design storm is 0.67 fps. The maximum velocity allowed by the DOE Manual is 5 fps.

The cost estimate for the Moore Street conveyance system, not including the outfall, is $208,000, which includes 7.7% sales tax, a 20% construction contingency, a 15% design cost, and a 10% construction inspection cost. The cost estimate for the Moore Street Outfall is $42,000 and includes sales tax, construction contingency, design cost, and construction inspection.

PORT HADLOCK CORE STORM DRAINAGE IMPROVEMENTS

The existing storm drainage conveyance system in the Port Hadlock Core serves State Highways, County Roads, and private parcels. It consists of curb and gutter and a series of Type 2 catch basins connected by 18-inch diameter storm pipe. Recent improvements included installation of 24-inch diameter concrete pipe to convey storm drainage beyond the southeast corner of the intersection. The system was constructed as a sealed storm sewer and is approximately 17 years old. It ties into an 18-inch diameter corrugated metal pipe (CMP) that discharges to a drainage ditch, the Lower Hadlock Road ditch, and an

18-inch diameter culvert under Lower Hadlock Road that discharges to the Lower Hadlock lagoon and Port Townsend Bay. During smaller rainfall events, runoff infiltrates in the drainage ditch and does not reach Port Townsend Bay.

The conveyance system is adequately sized for the 25-year, 24-hour design storm. Minor flooding occurs downstream of the Hadlock intersection during the 100-year, 24-hour design storm. The location of the flooding is where the 24-inch diameter concrete pipe transitions to the 18-inch diameter CMP pipe.

The 18-inch CMP and drainage ditch are on a County drainage easement. The CMP was constructed by a private party. It is deeply buried. It may not have been constructed to appropriate specifications and may need repair or replacement during the 20-year planning horizon. Due to the depth of the pipe, replacement with system at a shallower depth using catch basins is recommended.

The system does not provide water quality treatment for stormwater runoff. The basin zoning is primarily commercial with some residential. Expected pollutants in the storm runoff are typical for commercial areas. These include primarily vehicle fluids, fertilizers, pet waste, and sediment. Water quality sampling by Jefferson County during October 2003 indicates the presence of pollutants. See Table 6-1.

There are several options for treatment of stormwater runoff. Facilities that would be appropriate for use in the commercially zoned area include sand filter ponds and vaults, catch basin inserts, biofiltration swales, and wet ponds and vaults (permanent pool retention facilities). The cost of these facilities depends on their size, but generally, the least expensive water quality facilities are vegetated swales and catch basin inserts. The next least expensive options are sand filter ponds and wet ponds. The most expensive options are sand filter or wet pond vaults. (See Appendix E for costs of typical treatment facilities.) These costs do not include land and/or easement acquisition, which may alter the financial feasibility.

The approach to water quality treatment in the commercial zone of the UGA can be regional or private. Since commercial development is allowed 85% impervious coverage, the most likely water quality facilities utilized in private development would be catch basin inserts and vault structures, depending on the size of the development. Catch basin inserts (canisters) are relatively inexpensive, but can only handle small flow rates. Mid-sized developments may require multiple canisters and small vaults for water quality treatment. Larger developments would likely require the installation of a sand filter vault structure.

Regional water quality treatment can be achieved by directing all flows from the basin to one location where the water is treated close to the basin's outfall. Such a location is available in the ditches upstream from and along side Lower Hadlock Road where it appears that there is adequate room for a vegetated swale. Design of a treatment swale should take into account the flow rates from the entire basin for both the 6-month and

100-year, 24-hour design storm events. Since the swale would be located at the bottom of a moderately steep hillside, energy dissipation would be required prior to flows entering the swale. Higher flows would bypass the swale or be attenuated such that the flow is small enough to be adequately treated.

Hadlock intersection storm drain system capacity and treatment should consider opportunities to avoid system expansion, minimize the volume to be treated, and increase groundwater recharge by retrofitting existing development to infiltrate runoff from non-pollution generating surfaces. Modeling of the existing storm drainage system shows that projected build-out of the basin will not exceed the capacity of the existing system; therefore, detention of increased flows from new development is not necessary to maintain the integrity of the system. However, the DOE Manual has various thresholds for detention and water quality treatment. New development within the basin should be required to install detention facilities to limit the burden on the existing storm system as the pipes and other facilities age. Non-pollution generating impervious surfaces (i.e., roofs, landscaped and vegetated areas) should be tight-lined to infiltration facilities such as drywells and infiltration galleries as the primary method of limiting increased runoff from new development.

Since the soils in the drainage basin have a high hydraulic conductivity, they are useful for infiltration. Infiltration is recommended by the Department of Ecology where it is practical. Use of drywells and infiltration galleries is encouraged, and will reduce the flow to the storm drainage system. Similar to water quality facilities, drywells and infiltration galleries vary in cost depending on the size of a development. In general, these facilities are much less expensive than vault structures and moderately less expensive than open ponds. (See Appendix E for cost for typical flow control facilities.)

As discussed above, water quality can be approached on a project or regional basis. When treated on a regional basis, some water quality treatment should still be required at the source of the runoff to separate oils and sediment generated from pollution generating impervious surfaces (i.e., roads, parking lots, driveways, sidewalks). Facilities capable of separating oils and sediment range from oil/water separators commonly used at gas stations, service yards, and large parking lots to vegetated swales that allow sediments to settle out prior to entering the tight-lined storm system.

Development of stormwater management facilities would also require Jefferson County or some other public agency to develop a program to inspect, maintain, and repair those facilities. This issue is discussed in below and in Chapter 7 and Chapter 8. Stormwater management maintenance programs such as street sweeping and catch basin cleaning can reduce the need for runoff treatment facilities.

COUNTY ROAD DRAINAGE IMPROVEMENTS

It is anticipated that approximately 25 drywells on local access County Roads will need to be replaced with treatment facilities, catch basins, and infiltration chambers during the 20-year planning period. Drywells typically fail due to clogging in less than 20 years if not properly maintained. A regular maintenance program is necessary to achieve the full design life of the drywells.

All new County Road drainage facilities should provide treatment before infiltration. This requirement is particularly important in aquifer recharge areas and areas with susceptible soils.

STORMWATER MANAGEMENT PROGRAM

The County's goal for stormwater management in the UGA is to minimize the adverse effects of stormwater runoff from the UGA. The analysis conducted for this Plan demonstrates that the urban development can occur without significant impacts from stormwater runoff. However, in addition to providing adequate stormwater management facilities, this will require developing and implementing a UGA Stormwater Management Program that includes:

- Inspection of private stormwater management facilities to ensure that they are adequately maintained, repaired, and replaced;
- Updating the stormwater management facility base map and inventory
- Public education and outreach activities;
- On-going water quality monitoring; and
- Stream gauging on Chimacum Creek.

The first three components are discussed in detail in Chapter 7. An estimated annual cost for these activities is shown below in Table 8-1.

As the UGA develops, it will be necessary to conduct water quality monitoring and stream gauging on Chimacum Creek to determine if the stormwater management measures that are implemented are successful. If there is significant water quality degradation or increased storm flows in Chimacum Creek, these activities will alert the County and enable it to adapt it's stormwater management measures appropriately to address the problem.

As noted in Chapter 7, the Jefferson County Conservation District currently conducts water quality monitoring on Chimacum Creek at two sites immediately upstream from the UGA and one site downstream from the Irondale Road. The District has stated that due to projected revenue constraints, it may be necessary to find new revenue in order to continue this activity. The cost of this activity is included in the Stormwater Management Program funding. The Jefferson County Natural Resources Division currently conducts stream gauging that is funded by a grant from the Washington Department of Ecology. It

is anticipated that this funding will continue for the foreseeable future. This activity is included in the Stormwater Management Program to provide an accounting of the total program costs, but would not be funded through the UGA Stormwater Management Program. Anticipated expenditures and funding sources are provided in Table 8-1 Capital Facilities and Program Plan Expenditures and Funding below.

Table 8-1

Irondale and Port Hadlock UGA Stormwater Management Plan
Capital Improvements and Program Plan Expenditures and Funding: 2005 - 2024

Capital Improvement Projects	Cost	Year Planned	2005-2010 Cost	2011-2024 Cost	Funding Source / Notes
Moore Street Drainage	$208,000	2011		$ 208,000	Transportation Improvement Program
Moore Street Outfall	$ 42,000	2005	$ 42,000		TIP, WA Dept. of Fish and Wildlife
Replace 25 Drywells in County Roads	$375,000	2005-2024	$112,500	$ 262,500	TIP
Port Hadlock Core Water Quality Treatment Facility	$ 10,000	2005	$ 10,000		
Port Hadlock Core ERUs			386		Existing ERUs
Port Hadlock Core Treatment Cost per ERU			**$25.88**		**SWM Fee-Port Hadlock Core**
Port Hadlock Core Conveyance Replacement	$144,000	2011		$ 170,000	
Port Hadlock Core ERUs				445	Estimated ERUs in 2011
Port Hadlock Core Project Cost per ERU				**$382.00**	**SWM Fee-Port Hadlock Core**

TABLE 8-1 – (continued)

Irondale and Port Hadlock UGA Stormwater Management Plan
Capital Improvements and Program Plan Expenditures and Funding: 2005 - 2024

Program Activities	Cost	Year Planned	2005-2010 Cost	2011-2024 Cost	Funding Source / Notes
Programs - Commercial Areas					
SWM Facility Inspection	$ 10,000	Annual	$ 60,000	$ 140,000	
Commercial Area ERUs	1,851				
Commercial Area Annual Program Cost / ERU	$5.40				**SWM Program Fee - Commercial Areas**
Programs - UGA-wide					
Public Education	$10,000	Annual	$ 60,000	$ 140,000	SWM Program Fee options
Sampling and Water Quality Monitoring	$ 5,000	Annual	$ 25,000	$ 70,000	Jefferson County Conservation District
Stream Gauging - Chimacum Creek	($ 5,000)	Annual	($ 30,000)	($ 70,000)	JC Natural Resources - Ecology grant
Total	$15,000		$ 85,000	$ 210,000	SWM Program Fee options
Option 1: Assess Program Costs to All ERUs in UGA					
Total ERUs in UGA	5,244				
Option 1 Annual Cost per ERU	**$2.86**				**SWM Program Fee - All UGA**
Option 2: Assess Program Costs to Commercial ERUs					
ERUs in Commercial, Industrial, and MFR Designations	1,851				
Option 2 Annual Cost per ERU	**$8.10**				**SWM Program Fee - Commercial Areas**