APPENDIX F

PRIORITIZATION AND COST ESTIMATES FOR

RECOMMENDED CAPITAL PROJECTS

This appendix documents the County's prioritization system and its application to each recommended projects. It also includes cost estimates for all the projects.

In general, each recommendation is assigned a project number that represents the following:

- **Project Category:** Either PRG (Programmatic), CIP (Capital Improvement Project), or ST (Study).
- **Basin:** Basin number 1 for Browns Dash Point and 4 for Hylebos.
- **Sub-Basin:** BDP for Browns Dash Point, WH for West Fork of Hylebos Creek, EH for East Fork of Hylebos Creek, LH for Lower Hylebos Creek and SL for Surprise Lake.
- **Project Type:** CP for culvert and pipe, CR for culvert replacement, MNT for maintenance, OUT for outfall, and SBS for streambank/channel stabilization.
- **Project Order Number:** Number starting with 01 for each project type in each sub-basin.

PRIORITIZATION FOR RECOMMENDED CAPITAL PROJECTS

Projects were assigned scores based on four categories of benefits: flood reduction, water quality improvement, natural resource improvement & protection, and other factors.

1) FLOOD REDUCTION

Existing Conditions - Full points can be added to each applicable category.

a) Level of Flooding (check all that apply)
   1) Prevents inconvenience flooding – yards, driveways, minor streets where alternate route is readily available)
   2) Prevents hazard to public safety – This represents closure to arterial road, closure of road where no alternative access is readily available, risk of bridge damage, or flooding that will greatly exacerbate a water quality problem.
   3) Prevents risk to critical facilities – Critical facilities as defined in County Code include medical facilities, schools (including day-care structures), structures housing toxic or explosive substances, and structures with occupancy of greater than 5,000 people. This will also include sewer pump stations and water supply facilities.
   4) Prevents severe property damage (>$100,000/year)
   5) Prevents minor property damage (<$100,000/year)

b) Frequency of flood prevention (score one)
   1) Prevents annual flooding

2) Prevents flooding every 1 to 5 years
3) Prevents flooding every 5 to 25 years
4) Prevents flooding less that one in 25 years

c) Required Due to Flooding Liability – CIP is required by lawsuit, settlement, policy, code, or executive order.
d) Increases capacity of flood plain.
e) Correct Non-compliance with County Design Standard – To be applied when problems are related to public infrastructure such as culverts and ponds that do not conform to current County design standards.

Future Flood Hazard – This category recognizes that even under current regulations new developments have negative impacts on flooding and water quality by increasing the volume of runoff coming from a site and also the amount of pollutants which might not be captured in constructed water quality facilities. Within areas that are slated for growth under the Pierce County Comprehensive Plan it can be estimated that amount of change in these factors. As areas develop project costs such as land acquisition become increasingly expensive and therefore opportunities should be taken advantage of as early as possible to foresee future problems and build or preserve facilities. Scoring for this category should be based on the level of change an area is slated for and the protection that is deemed necessary for downstream environment.

f) Level of increase in flooding (peak rate or volume) or water quality problems that are anticipated due to landuse changes within the area of the problem. (score one)
   1) High
   2) Medium
   3) Low
g) Estimated opportunity to doing the project now in feasibility and cost benefit verses waiting and doing project later. (score one)
   1) High
   2) Medium
   3) Low

2) WATER QUALITY IMPROVEMENT

Although water quality improvements are often closely tied with decreased levels of flow, which were addressed in section 1, this section addresses individual water quality impacts and potential improvement. Each category should receive points if the project provides the benefits of that particular category.

a) Reduce sources of or Impacts from emission of fine sediments- Levels of fine sediments tend to increase as an area urbanizes. The most common source is construction sites where soils are disturbed and inadequate source controls are applied. Other sources include logging operations, dirt tracked onto roads from equipment and vehicles, pressure washing of buildings and vehicles, and sand applied to icy roads. Scoring in this category is based on the ability of the project to capture entrained sediment, or prevent sediment from entering system, or reducing scouring. Decreased or negative points could occur if the project had a

high potential of causing increased levels of sediment from the project site, or tended to pass through sediments from upstream.

b) Reduce sources of or impacts from emission of heavy metals – Metals are utilized in many products important to our daily lives. Certain metals, known as heavy metals, wear off of our car brakes and tires, and come from the paint and moss-killing roof strips and herbicides we use at our homes. These metals can cause severe health and reproductive problems in fish and animals that live in water and sediments that become contaminated by runoff. Because many heavy metals adhere to sediment the water quality facilities designed to capture sediments will also capture sediments.

c) Reduce sources of or impacts from emission of excess nutrients – In the context of water quality, nutrients are mainly compounds of nitrogen and phosphorus. When nutrients are allowed to enter waterbodies, undesirable effects such as algae overgrowth, oxygen depletion, channel clogging due to overgrowth of vegetation, and fish and animal death can occur. Sources of nutrients can include fertilizers, failing septic systems, and yard and animal wastes.

d) Reduce sources of or impacts from emission of oxygen demand – Degradable organic matter, such as yard, food and pet wastes, and some chemical wastes, can have a drastic effect on water quality if they are allowed to enter stormwater. As bacteria break down these substances, the oxygen in the water is consumed. This stresses and can eventually kill fish and other creatures in the water.

e) Reduce sources of or impacts emission of oil and grease – Oils and greases can be either petroleum based or food-related sources. Petroleum-based compounds can be immediately toxic to fish and wildlife, and if they reach our drinking water aquifers, will make us sick too. Food-based oils and greases may not be toxic to us, but they can coat fish gills and insects, and suffocate them.
Impervious surfaces within an urban area generate oil and grease from the uses surrounding that surface such as vehicles that use it. Because the impervious surface has no way to capture the oil and grease it is carried downstream with the runoff. There are both mechanical means such as oil/water separators and biological means such as bio-swales and wet ponds to remove the oil and grease from the runoff. Scoring for this category should be based on the effectiveness of the project to remove the pollutants.

f) Reduces sources of or emissions of pathogens such as fecal coliform. – Pathogens such as fecal chloroform are found in urbanizing areas as a result of animal waste, illicit hookup to the storm drainage system, and failing septic systems. Score in this category should be based on the project's ability to reduce the level of pathogens in the system by either correcting the cause or capturing and removing them form the water train.

g) Lowers water temperature/ provides more shade – Scoring for this category should be given if the project will lower temperature in the long term. (So consideration is given after landscaping matures)

3 NATURAL RESOURCE IMPROVEMENT & PROTECTION

a) Improves and/or protects habitat for aquatic species – Many factors affect habitat for aquatic species and are described below. To evaluate the score in this category for each project consider whether the project will improve or protect the following key aquatic-habitat features. In some instances a project may have an unintended consequence of degrading a factor, such as the tendency of some detention ponds to increase water temperature. This degrading factor should be weighed against improvement in other habitat features for whether a score is given in this category.

- ***Riparian Condition.*** Riparian vegetation influences salmon habitat by providing a buffer from upslope activities that can reduce inputs of nutrients and sediments. Riparian vegetation also connects terrestrial and aquatic communities, stabilizes streambanks, and provides vegetative litter and nutrients to the aquatic food web.
- ***Substrate composition and Embeddedness.*** The surface substrate composition is intended to provide an indication of the habitat quality for salmon spawning. Embeddedness represents the percent that interstitial spaces are filled with small grain particles and is used as a measure of fine sediment concentrations in the substrate (May et al. 1997). Embeddedness can affect salmon incubation, emergence, and rearing, as well as benthic biota by decreasing dissolved oxygen concentrations and the available living space
- ***Passage barriers.*** Accessibility to habitat for spawning and rearing is assessed based on the physical conditions that limit access to habitat (WDFW 1999), which would otherwise be used based on channel type and location within the stream network. Barriers include physical constraints such as culverts, velocity, flow, and also could include water quality barriers.
- ***Pool frequency.*** Pool frequency is assessed by the number of pools within a reach. Pools can be encountered on the main channel and on side channels of a stream. Pools provide habitat for juvenile salmon particularly over-wintering habitat.
- ***Large woody debris –*** Large woody debris (LWD) is a ubiquitous component in streams of the Pacific Northwest. LWD performs critical functions in forested lowland streams, including dissipation of flow energy, streambank protection, streambed stabilization, sediment storage, and providing instream cover and habitat diversity.
- ***Water Temperature -*** The primary means nature uses to keep the water in streams cooled is through the vegetative canopy to shade the water. Also when movement of runoff is by shallow groundwater the water is protected from the warming effects of the sun. When areas are urbanized the effects of clearing vegetation and reducing runoff from becoming groundwater by creating impervious areas has a warming effect on waterbodies. Scoring in this category should be based on the project's ability to restore some of the natural systems to cool the waterbodies.

b) Improves and/or protects habitat for terrestrial species - Habitat for terrestrial species could include wetlands, forested areas, or prairie land. Scoring for Improvements could be partial for preservation, especially when existing regulations do not offer necessary protection of habitat.

Increased score would be given for enhancement of existing native features or improvement of hydrology.

c) Increase proportion of native plants – Scores for this category recognize the added benefits native species offer to habitat. The score given in this category should be proportional to the effort given increasing the percentage of native plants on a site. Preservation of native plants should not be included in this category because it is specifically looking at improvement in the native plant population.

d) Improves flow regime – Flow regime refers to the rate and volume of runoff from a site. In a natural system much of the rainfall was intercepted in the canopy of the forest and native vegetation or was retained on a sight in small natural depressions. In addition the soil cover that had accumulated over the years had the ability to act like a sponge and retain water to be used by the vegetation and evaporated over time. As land is developed many of these natural functions are interrupted by vegetation being removed, grading smoothing out natural depressions, impervious surfaces covering large quantities of a site, and connecting drainage courses with ditch systems and pipes. This alters the flow regime by producing increased number of peak flow events downstream along with increased volume of runoff from a site. Also shallow groundwater flow is reduced which decreases the base flow of streams during the summer.

Scoring on this category should be base on how much the project restores features of the natural flow regime.

e) Increases channel stability/reduces excess erosion - Bank erosion is a natural process. The location and extent of eroding banks varies naturally according to channel type and under natural conditions is an important process that helps maintain areas of spawning gravel. However, streambank erosion is also typically increased beyond natural levels in urbanized areas. Indicators of bank instability include active erosion (exposed soil and sideslope failures) and artificial streambank protection (levees and riprap). There are a variety of ways to increase channel stability and some may be more favorable then others. Perennial vegetation growing along the bankfull width can provide bank protection and increase bank stability and may be one of the more preferred methods. Armoring a bank with riprap or some other source of protection may stabilize a slope but may score lower because it is not in line with natural methods and usually doesn't solve the source of the problem.

f) Increase the extent of salmonid spawning habitat – Although points have already been given for improvement of habitat for aquatic species this category specifically reflects the opening up of previously closed habitat through the removal of a blockage. The scoring on this category will be based on the following equation
(Q= [Good (ft) * 0.75*Fair (ft)]/ [Total (ft)]

- Good and Fair habitat locations are identified using the Tri-County Urban Stream Baseline Evaluation Method.

- The Length of Good and Fair habitat refers to length of each type habitat upstream of the project until the next upstream barrier.
- Total length refers to the total length of the stream from the project to the next upstream barrier.

Note: Projects should mention in their description whether there are any barriers downstream of the project that should be improved first.

i) Salmonids other than cutthroat trout present - indicates the presence of less common and/or endangered or threatened salmonids in the project area.

4. OTHER FACTORS

a) Provides recreational or multiple use opportunities –

b) Enhances visual aesthetics of area.

c) Provides public educational opportunities

d) Is a highly visible project or has been on the CIP needs list multiple years but hasn't ever ranked high enough to put on the priority list.

The worksheets that follow document the project's or program's potential for flood reduction, improvement of water quality, aquatic habitat protection, and other benefits using approximately 40 criteria. Table F-1 shows the resulting score for each project or program. The top 25% of the projects were designated high-priority, 50% become medium-priority, and the remaining 25% are assigned low-priority.

Table F-1
Project Prioritization Scores

Project Number	Project Name	Rating Score
CIP01-BDP1-CP01	Spring Street NE - Install Drainage Pipe to Reduce Erosion	211
CIP01-BDP4-CP01	Dry Gulch and Varco Rd - Increase Storm Drain Capacity	215
CIP01-BDP5-CP01	Hyada Blvd at Wan-I-Da Ave. and La Hal Da Ave NE – Replace culvert and pipe	164
CIP01-BDP6-CP01	Wa-Tau-Ga Avenue Cul-de-Sac - Storm Drain Replacement	181
CIP01-BDP6-CP02	Layman Terrace - Culvert and Storm Drain Replacement	80

Table F-1
Project Prioritization Scores

Project Number	Project Name	Rating Score
CIP01-BDP6-MNT01	Tok-A-Lou Avenue near Ton-A-Wan-Da Avenue - Replace outfall	126
CIP01-BDP6-OUT01	Catch Basin at Tok-A-Lou Avenue	186
CIP01-BDP8-CP01	Northwood Avenue NE - Trash Racks for System Maintenance	82
CIP04-LH1-CP01	66th Avenue and 8th St - Storm Drain Replacement	171
CIP04-LH1-RST01	Hylebos Creek Restoration	287
CIP04-WH1-CP02	66th Avenue near 1st Street Ct - New Storm Drain	202
PRG01-01	Coordinate with Tacoma-Pierce County Health Department to Prioritize Septic System Inspections	180
PRG01-02	Check for Cross-Connections when Constructing New Drainage Projects in Browns-Dash Point Basin	226

COST ESTIMATES FOR RECOMMENDED CAPITAL PROJECTS

This appendix also contains cost estimates and project descriptions for the recommended capital improvement projects. The cost estimates were prepared from conceptual designs using unit costs and template spreadsheets provided by the County that are based on 2003 costs. These costs should be adjusted as needed for inflation from that date to the expected year of construction.

Some unit costs were modified to address site-specific conditions such as limited access or special construction requirements. A number of new unit items, such as catch basins, inlet structures, and restoration of adjacent improvements, were added to the templates to reflect other site-specific issues that could impact the costs. Additional worksheets are provided showing the basis for the channel armoring and temporary access road construction unit prices. These prices were developed because the cost estimate template provided by the County did not include those items.

The templates provide an estimate for the cost of drainage easements for work on private property (outside the right of way). Although some of the sites may have easements in-place, it

was assumed that new easements must be acquired for the work and maintenance access. The cost for the easements were set at $1.50 per square foot.

Engineering and administrative costs were based on the schedule provided in the CIP worksheet templates. Engineering design and administration costs were typically 20 percent of the estimated construction cost. However, the engineering and administrative costs were adjusted to as high as 50 percent of the construction cost for the projects that were considered more complicated due to coordination with property improvements, and environmental and permitting constraints. Typically a contingency factor of 20 percent was used for the estimates. However, for more complicated projects, the contingency was increased to 35 percent.

The contingency factor is included to allow for higher costs due to changes in scope as the project is designed, changes in quantities, and unforeseen conditions such as relocation of existing utilities or poor soils. Other costs included in the contingency include the additional costs for special handling and disposal of excavated materials with elevated levels of arsenic or other heavy metals. Although the published data suggests that some of the sites may be contaminated, there is not enough information to identify specific contaminant levels and the associated costs for mitigation and clean-up.