Priority Rating

Stormwater Outfall Prioritization Scheme
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Introduction

The prioritization system, which compares the impacts of one outfall to another and makes a determination of their overall impacts, was developed in the *Prioritization Method for Retrofitting Highways with Stormwater BMPs*, prepared by the Water Quality Unit of WSDOT in 1993. The system was adapted from one used in the *WSDOT Stormwater Runoff Management Report c1992.*

Methodology

The initial step in the prioritization process was to make a "first cut" of all the outfalls inventoried in the Outfall Inventory and Field Screening Project. The outfalls were divided into high, medium, or low priority categories, based on the best professional judgment of the inventory crews. The outfalls in the high priority category were then ordered according to the surface area of road drained, the pollutant loading of the highway and the size, uses and sensitivity of the receiving water body (i.e., factors A, B, C, and D described below).

As a result of the first cut the outfalls are divided as follows, approximately 29 percent are high priority, 16 percent are medium priority, and 55 percent are low priority. The highest priority outfalls tended to be located on roads with high ADT such as SR 5, and discharge to small creeks or aquifers.

Extensive research was conducted on the highest priority outfalls from within the high category, in order to determine watershed characteristics and potential environmental impacts. Recommended BMP retrofits, as listed in the *Highway Runoff Manual*, were developed for each of these outfalls, or groups of outfalls. A retrofit should serve to reduce existing pollutant loading, or potential pollutant loading to a sensitive water resource, and could include the construction of a new BMP (e.g., a biofiltration swale and wet pond) or modification of an existing structure (e.g., changing an asphalt lined open channel to a biofiltration swale). The complete prioritization method, as described below, was then applied to these sites to obtain a score and final rank.

The equation and factors used in making the prioritization and BMP planning decisions are:

$$\text{Score} = (A + B) + (C1 \times D) + C2 + [(E1 + E2 + E3 + E4) \times E5] + E6 + F.$$

Where:

- A = Type and size of receiving water body.
- B = Beneficial uses of receiving water body.
- C = Pollutant loading.
- D = Percentage contribution of highway runoff to watershed.
- E = Cost/pollution benefit.
- F = Values trade-off.

These factors are described more fully below.

Type and Size of Receiving Water Body

The type and size of the water body to which stormwater was being discharged to was determined and assigned a value based upon the characteristics and ranking system described below. This ranking system was adopted from the *WSDOT 1992 Stormwater Runoff Management Report* that was written by Entranco (Entranco Report). Storm water pollutants will have a greater effect on a small stream than on a large stream as the dilution factor is smaller. Therefore, a small stream would be assigned a higher impact value than a large stream. The maximum point designation for water body type is 10.

Type of Water Body	Value (A)
Groundwater	10
Small Stream	8
Small Lake	6
Sensitive Wetland	6
Large Stream	5
Large Lake	3
River	2
Wetlands	2
Tidelands	2

A small stream was defined as an intermittent or unnamed tributary or creek less than five miles in length. In urbanized areas these were often channelized or flowed inside pipes. A large stream was generally greater than five miles in length and a river was identified as such maps. Streams were identified using USGS topographic maps, Thomas Guides, WSDOT County maps, Right of Way Maps, and by contacting city and county officials.

A small lake or pond was defined as being less than 300 acres in area (approximately 0.5 square mile), and a large lake greater than 300 acres in area.

Wetlands were identified using Wetlands Inventory Maps, Basin Plans, NWI Maps and Sensitive Area Maps. A sensitive wetland was defined as having unique or rare characteristics such as those found in a bog or containing rare, endangered, or threatened species.

Beneficial Uses of Receiving Waterbody

This category was used to determine how water was being used or had designated uses for. Beneficial uses were ranked by importance and included drinking water, public health, fisheries, and aesthetics. These were obtained from the Department of Ecology's *1992 Statewide Water Quality Assessment 305(B) Report.* For water bodies not listed in the report, beneficial uses were obtained from cities, counties, and basin reports.

A waterbody may have several uses, for example, it may be used by salmon and be located adjacent to a county park. This would designate it as being beneficial for both fisheries and aesthetics. Fisheries would be selected as a primary beneficial use, as it receives a higher ranking than aesthetics and it would receive 12 points. These uses were designated both as prevention and "standards violated" (SV). If a violation was already present with any of the assigned uses, it received a higher value than areas where use degradation needs to be prevented.

The maximum point value for beneficial uses was 20.

Beneficial Use	Value (B)
Drinking Water SV	20
Prevention	18
Public Health SV	16
Prevention	14
Fisheries SV	12
Prevention	10
Aesthetics	4
Flood Protection	4

Pollutant Loading

Pollutant loading is a measure of the potential amount of contaminants from WSDOT right of way that mix with runoff and could impact surface water bodies. The loading is based upon the average daily traffic (ADT) which represents the amount of traffic that travels on all lanes on a designated portion of roadway in both directions during a 24-hour period. This information was collected from WSDOT's *1992 Annual Traffic Report*. The pollutant loading at each site was ranked as follows:

Amount	Value (C - 1)
Low (0-10,000 ADT)	1
Medium (10,001-50,000 ADT)	2
High (50,001-100,000 ADT)	3
Very High (100,001+)	4

The maximum point value was 4. The potential amount of pollution from a road with an ADT of 5,000 vehicles is significantly less than one with an ADT of 150,000.

Add 1 point to the overall score if there is significant off-site pollutant loading, i.e., off-site pollutants are entering WSDOT stormwater system (C - 2).

Percentage contribution of Highway Runoff to the Watershed

A measure of the stormwater drainage from the highway was determined by the amount of impervious area within WSDOT right of way draining an outfall. This was calculated by multiplying the total length of roadway being drained by the width of the road. For example, if 5,000 feet of runoff is being collected from two lanes of roadway (each 12 feet wide) and a shoulder (10 feet wide) the equation would read as:

$$5{,}000 \text{ feet} \times (2 \text{ lanes} \times 12 \text{ feet}) \times (10 \text{ feet}) = 170{,}000 \text{ square feet.}$$

The total drainage area of the water body that the outfall is discharging to was determined from the King and Snohomish County Basin Plans for watersheds or from the USGS publication *Drainage-Area Data for Western Washington*. For areas not listed in these publications, topographic maps were used, and the drainage boundary was estimated using a planimeter. The drainage area was then divided into areas based upon prevalent types of land uses. These were assigned one of the following runoff coefficients:

Land Use	Coefficient
Rural	0.50
Suburban/urban	0.90
WSDOT highway	1.00

The maximum rank for percent highway drainage was five and was determined as:

Percent Highway Drainage	Value (D)
>5%	5
2-5%	4
1-2%	3
0.5-1%	2
<0.5%	1

Two outfalls receiving stormwater runoff from the same area of roadway could have very different impacts on the receiving water body. If one of the outfalls was discharging directly into a large water body, such as the Snohomish or Duwamish River, it would contribute a much smaller proportion of highway runoff to the total drainage area of the river compared to an outfall discharging to a small creek. Therefore, the outfall discharging to the small creek would receive more points.

Cost/Pollution Benefit:

This factor weighs the overall cost of the BMP retrofit against its benefit to the receiving waterbody. It incorporates a co-efficient to consider the size of the waterbody as a measure of its sensitivity to pollution. Factors used in considering cost/pollution benefits are:

- Right of way cost (E1)
- BMP capital cost (E2)
- Type of conveyance structure (E3)
- Receiving water body characteristics (E4)
- Water quality multiplier (E5)
- Future construction plans (E6)
  E (cost/pollution benefit) = [(E1 + E2 + E3 + E4) X E5] + E6
- Right of way cost **(E1)**

Right-of-way cost	Points (E1)
WSDOT owned land	4
Rural (Low cost)	3
Suburban/transitional	2
Urban (High Cost)	1
Prohibitive	0

Prohibitive costs would be those areas that are totally developed and real estate prices are high. Purchasing land would usually mean buying buildings as well. These include areas such as downtown Seattle or Everett.

- BMP capital cost **(E2)**

BMP costs were estimated from recently built structures and from costs in the EPA document *Guidance Specifying Management Measures For Sources of Nonpoint Pollution in Coastal Waters* (*January 1993).* There are many factors that need to be considered in the cost of a BMP such as location, size, grading, and construction materials used. Costs can vary significantly from one site to the next therefore, these are preliminary estimates only. Additional research will be needed to determine a more accurate cost.

BMP construction Cost	Points
0 - $25,000	
Low ($15,000 or less)	4
Medium ($25,000 - $75,000)	3
High ($75,000 - $150,000)	2
Very high ($150,000+)	1

Low cost BMPs might include biofiltration swales or retrofitting an existing BMP to improve its performance. Assign low cost when maintenance is chosen as a BMP in lieu of a structural BMP. Medium cost BMP is a wet pond with a biofiltration swale or an ecology ditch. High cost BMP would be a large wet pond with a biofiltration swale. Very high cost BMP would be a vault or a very large wet pond with a biofiltration swale (sequential BMPs).

- Type of Conveyance Structure **(E3)**

Conveyance Structure	Points
Impermeable(Pipe/asphalt)	4
Soil	3
Vegetation	1

- Water quality of receiving water body **(E4)**

Water Quality of Receiving Water Body	Points
303(d) Listed	5
305(b) Listed	5
Sensitive Ground Water	5
Class B	4
Class A	3
Class AA or Marine	2

- Water Quality Multiplier **(E5)**

Use 0.5 multiplier for outfalls that discharge into:

Marine waters or inter-tidal waters,

A stream or river which enters marine water within ½ mile of the discharge,

A lake with more than 300 surface acres unless the lake is nutrient limited or a drinking water supply,

Class 3 or 4 wetland. (E5 = 0.5)

Use the 1.0 multiplier for outfalls that discharge into:

All other surface water,

Class I or II wetland,

Sensitive groundwater system. (E5 = 1)

Wetland classes refer to the classification system used by the Department of Ecology unless locally adopted sensitive ordinances are in-place and more stringent. Lake descriptions are obtained from the publication Lakes of Washington: Volume 1 Western Washington, 3rd edition, published by the Department of Ecology, 1973. A sensitive ground water area is either, a designated Sole Source Aquifer, a Ground Water Management Area, or a Wellhead Protection Area.

- Future Construction plans **(E6)**

Information on construction projected for the next ten years (1994-2003) was collected from WSDOTs Project Development Division. Points are determined from:

If the outfall is within the boundaries of a planned construction project, or (E6 = 3)

There are no projects planned in the area. The BMP would be a stand-alone project. (E6 = 1)

This is based on the assumption that is less expensive to construct a retrofit BMP while construction is underway. Due to rapid population growth in King and Snohomish counties, many of the roads in the urbanized areas of the inventory area have construction planned.

Values Trade Off

This factor assesses how local environmental and societal implications, such as legal obligations or local watershed action plans, influence construction or maintenance of BMP retrofits. This is determined using three main factors:

- Watershed opportunities
- Permit or legal obligations
- Other factors
- Watershed opportunities

1. The outfall has been identified as a problem in a Watershed Action Plan. (F1 = 3)
2. The site presents a cost sharing opportunity with another agency or jurisdiction. (F2 = 4)
3. Governmental or nongovernmental entity is providing active financial support for watershed improvement. Issues and relations with these bodies can lead to positive transactions and provide an overall improvement in water quality. (F3 = 2)
4. Public Relations/Educational opportunity. The BMP retrofit is in a highly visible location, allowing for signs to be erected to explain the benefits of BMPs tot the public. (F4 = 2)

- Permit or legal obligations

1. A permit obligation. The site falls within WSDOT's jurisdiction in a NPDES permit area. (F5 = 4)
2. Litigation. A court decision has mandated water quality standards for the receiving waterbody. (F6 = 4)

- Other factors

No points were given if construction of the BMP:

1. Conflicts with local government direction or other watershed action plans. There is a negative environmental trade-off such as it is necessary to cut old growth timber.
2. Is a nonconforming or conflicting use, such a BMP requiring a security fence in a residential neighborhood or maintenance vehicles are prohibited in a residential neighborhood. (F7 = 0)

One point was given if construction of the BMP:

1. Did not exacerbate other problems,
2. Complemented local government actions or plans or other watershed action plans,
3. Could be used for other beneficial uses, such as community open space or for recreation. (F7 = 1)

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