

## Stormwater Retrofit Cost-Effectiveness and Feasibility (RCEF) Analysis Methods and Timing

The 2014 *Highway Runoff Manual (HRM) Section 3-4.1* requires projects in the Puget Sound basin that have TDAs that exceed runoff treatment or flow control thresholds to retrofit existing impervious surfaces and existing pollution generating impervious surfaces (PGIS) for runoff flow control and treatment. Projects can retrofit existing impervious surfaces and existing PGIS up to a cost equal to 20% of the cost of meeting stormwater requirements for the new impervious surfaces and new PGIS (i.e., *20% cost obligation*). Projects also have the option to meet the 20% cost obligation as much as feasible and transfer funds equivalent to the unmet balance to fund offsite standalone stormwater retrofit projects. Project (medium and low priority only) have a third option which is to transfer the full 20% cost obligation to fund stand-alone stormwater retrofit projects. Projects must use this assessment process (referred to as the “RCEF analysis”) to determine the amount of money to request during scoping and again during the design phase. As such, it has two distinct phases:

- **Phase 1** occurs during project scoping. This phase involves estimating how much additional funding needs to be programmed by the project to meet the requirements of retrofitting the existing impervious surfaces and existing PGIS falling within the project limits.
- **Phase 2** occurs during project development near 60% project design completion. This phase refines the cost estimate generated in Phase 1. This information will be used to help further refine the percentage factors used to generate estimates in Phase 1. In addition, this information will be used to:
  - Determine if treating the existing impervious surfaces and existing PGIS within the project limits is feasible and cost effective; or
  - If not feasible or not cost effective, determine how much flow control and runoff treatment for existing impervious surfaces and existing PGIS can be done on the project up to the *20% cost obligation*; or
  - If not feasible or not cost effective and the project is in a medium or low priority stormwater retrofit location, determine how much funding will be transferred to the standalone stormwater retrofit fund.

This procedure, prepared under the direction of the Stormwater Policy Committee (SPC), provides guidelines for complying with mandatory retrofit requirements for the Puget Sound Basin described in *Section 3-4.1* of the HRM.

### RCEF Phase 1 (SCOPING)

The *RCEF Phase 1* Analysis generates an estimate of the amount of funding that should be added to the total project cost to meet the requirements of *Section 3-4.1* of the HRM. The scoping team shall use *Equation 1* during the project’s scoping phase to calculate the amount of funding to commit to meet the project’s stormwater retrofit obligation. The cost amount determined from *Equation 1* shall be added to the scoping estimate and reported in the project summary.

$$\left( \frac{(A \times B)_{\text{urban}}}{100} + \frac{(A \times B)_{\text{semi-urban}}}{100} + \frac{(A \times B)_{\text{rural}}}{100} \right) \times C = \text{additional stormwater retrofit cost} \quad (\text{Equation 1})$$

A = Predominant land use percentage factor (see Table 1)

B = Percentage of total project area

C = Project's total PE, Construction, and ROW estimated cost

**Table 1 Predominant Land Use Percentage Factor**

Percentage Factor	Project's Predominant Land Use
0.02	Urban
0.01	Semi-urban
0.005	Rural

*Urban* refers to areas within city limits. *Semi-urban* refers to areas beyond the city limits, but within an Urban Growth Area (UGA). *Rural* refers to areas outside the UGA. The UGA is available in ArcGIS on the environmental workbench.

### **RCEF Phase 2 (Project Level)**

The project office will complete the *RCEF Phase 2 Analysis* for all projects prior to completing the Master Deliverables List (MDL) Milestone PE.PD.22.05 "*Hydraulic Report Approved*", which generally occurs around the 60% project design completion per the *Deliverable Expectations Matrix* found at:

[http://www.wsdot.wa.gov/publications/fulltext/ProjectMgmt/DEM/DE\\_Matrix.pdf](http://www.wsdot.wa.gov/publications/fulltext/ProjectMgmt/DEM/DE_Matrix.pdf).

The *RCEF Phase 2 Analysis* prepares an estimate of the total cost for providing flow control and runoff treatment for the project's *new impervious surfaces and new PGIS* and the total cost for providing flow control and runoff treatment for the *existing impervious surfaces and existing PGIS* within the project limits. Both estimates are based on meeting the project's HRM Minimum Requirements. Refer to HRM *Section 3-4.1* for minimum requirements and retrofit obligation information.

The *RCEF Phase 2 Analysis* shall include costs for items in the project for the stormwater flow control and runoff treatment BMP design as well as those conveyance costs directly related to the stormwater design. It shall also include stormwater costs associated with preliminary engineering (PE), construction, and right of way (ROW). Stormwater conveyance costs include bid items associated with the conveyance of stormwater to the BMP and to the eventual discharge point. For example, costs would include the catch basins, pipes, and excavation for those structures conveying stormwater to the BMP and then to the eventual discharge location, which could be a city or county conveyance (e.g., storm sewer) system (pipe or ditch), receiving water body, dispersion area, or infiltration BMP.

Costs to exclude from the *RCEF Phase 2 Analysis* include those dealing with the designs of culverts passing off-site flow, pipe and ditch systems passing offsite flow, and fish passage barriers.

For projects in high, medium, and low stormwater retrofit priority locations<sup>1</sup>, the project team shall use the *RCEF Phase 2 Analysis* to determine if sufficient funds exist in the project budget to meet the project's retrofit obligation (see *Example 2*). The project will need to submit a funds request if the amount programmed into the project as a result of the *RCEF Phase 1 Analysis* is insufficient. If the amount of money programmed into the project as a result of the *RCEF Phase 1 Analysis* exceeds that which is needed to fulfill the project's retrofit obligation, then the project office would follow standard procedures for posting positive budget variances.

The project team shall include the *RCEF Phase 2 Analysis* results in the project's hydraulic report. The project office shall submit the below information directly to the HQ Hydraulics Office, Attention: Highway Runoff Program Manager (mail stop 47329):

- Total estimated cost (sum of the preliminary engineering, right of way, and construction costs) from the original Project Summary,
- Total cost of providing flow control and runoff treatment for the new impervious surfaces and new PGIS in the project (determined in RCEF Phase 2)
- Total cost of providing flow control and runoff treatment for the all of the existing impervious surfaces and existing PGIS in the project (determined in RCEF Phase 2)
- Total cost of project at the beginning of PS&E which is the sum of the engineer's estimate, preliminary engineering, and right of way

As more *RCEF Phase 2 Analyses* become available, the SPC will review the RCEF results and determine whether adjustments need to be made to the *Percentage Factors* in *Table 1*.

### **Transferring Funds to the Subprogram I-4, Stormwater Retrofit**

Funds can be transferred from the project to the Subprogram I-4 Stormwater Retrofit Account when the project is in a medium or low priority stormwater retrofit area and when it is not feasible or cost effective to treat the existing impervious surfaces and existing PGIS within the project limits. The transfer of funds shall occur when the project goes to AD. The project office initiates the funds transfer process by contacting the Region's program management office and specifying how much money needs to be transferred and when the transfer should happen.

### **Example 1 (Scoping Level): Semi-Urban/Rural Highway Roundabout Project**

#### *RCEF Phase 1 Analysis*

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<sup>1</sup> Contact the HQ ESO Stormwater and Watersheds Program for a list of high, medium, and low priority stormwater retrofit locations.

Scenario: Total project cost estimate at scoping (i.e., PE, Construction, and ROW phases) = \$6,500,000. The project’s predominant land uses are semi-urban (40%) and rural (60%), the project limits lie within the Puget Sound Basin in a low priority stormwater retrofit location, and the project (assume only 1 TDA) will add more than 35,000 square feet of new impervious surface.

Determine the total additional cost that needs to be added to the scope of work to meet the Puget Sound stormwater retrofits obligation per the HRM.

Solution: Select the appropriate percentage factor in *Table 1* based on the predominant land use results in the following calculation:

$$\left( \frac{(0.02 \times 0)\text{urban}}{100} + \frac{(0.01 \times 40)\text{semi-urban}}{100} + \frac{(0.005 \times 60)\text{rural}}{100} \right) \times \$6,500,000 = \$45,500$$

\$45,500 needs to be added to the scoping estimate to account for the Puget Sound stormwater retrofit obligation (i.e., runoff treatment and flow control) for the existing impervious surfaces and existing PGIS on the project.

**Example 2 (Scoping and Project Level): Urban/Semi-urban Highway Roundabout Project**

*RCEF Phase 1 Analysis (Scoping)*

Scenario: Total project cost estimate at scoping (i.e., PE, Construction, and ROW shown on the Project Summary) = \$6,500,000. The project’s predominant land uses are *Urban* (60%) and *Semi-Urban* (40%), the project limits lie within the Puget Sound Basin in a medium priority stormwater retrofit location, and the project (assume only 1 TDA) will add more than 35,000 square feet of new impervious surface.

Determine the total additional cost that needs to be added to the scope of work to meet the Puget Sound stormwater retrofit obligation per the HRM.

Solution: Select the appropriate *percentage factor* in *Table 1* based on the predominant land use results in the following calculation:

$$\left( \frac{(0.02 \times 60)\text{urban}}{100} + \frac{(0.01 \times 40)\text{semi-urban}}{100} + \frac{(0.005 \times 0)\text{rural}}{100} \right) \times \$6,500,000 = \$104,000$$

\$104,000 needs to be added to the scoping estimate to account for the Puget Sound stormwater retrofit obligation (i.e., runoff treatment and flow control) for the existing impervious surfaces and existing PGIS on the project. This amount shall be verified in the *RCEF Phase 2 Analysis*.

*RCEF Phase 2 Analysis (Project)*

Scenario: Assume the total cost for runoff treatment and flow control (i.e., stormwater management) of the new impervious surfaces and new PGIS on the project (30,000

square feet) per HRM Minimum Requirements = \$600,000. Assume the total cost for runoff treatment and flow control of all existing impervious surfaces and existing PGIS on the project (70,000 square feet for full retrofit) = \$150,000. The total cost for treating the new plus the existing impervious and PGIS (100,000 square feet) is \$750,000.

Determine the following:

- 1) Is the amount scoped in the *RCEF Phase 1 Analysis* adequate? If not, secure additional funding.
- 2) Is the full retrofit feasible and cost-effective? See *HRM Section 3-4.1* if a full retrofit is not feasible or cost-effective.

Solution: Providing a full retrofit for the existing impervious surfaces and existing PGIS within the project boundary **is feasible**; however, providing a full retrofit for the existing impervious surfaces and existing PGIS on the project **is not cost-effective** (i.e., ratio of total cost of existing/total cost of new must be less than 0.2).

Cost-Effective stormwater management = (Total stormwater management cost for existing impervious and existing PGIS)/(HRM Minimum Requirement stormwater cost for new impervious and new PGIS) < 0.2

$\$150,000/\$600,000 = 0.25$  (therefore, not cost-effective)

Since the full retrofit is not cost-effective, the additional funds the project office needs to request from program management is  $(\$600,000 \times 0.2) - \$104,000 = \$16,000$ . This is the additional funding needed to make up the shortfall between the amount of money determined in *RCEF Phase 1 Analysis* vs. the cost determined in *RCEF Phase 2 Analysis*.

The full retrofit is feasible, but not cost-effective. Following *HRM Section 3-4.1*, the designer has three options:

1. Retrofit the amount of existing impervious surface and existing PGIS within the project limits that can be retrofitted for the amount of money equal to 20% of the cost to meet the HRM requirements for the new impervious surfaces and new PGIS, as outlined in the paragraphs above. For this example, provide flow control and runoff treatment for as much existing pavement as possible for  $(\$600,000 \times 0.2) = \$120,000$ .
2. Transfer an amount of money, equal to 20% of the cost to meet the HRM requirements for the new impervious surfaces and new PGIS  $(\$600,000 \times 0.2 = \$120,000)$ , as outlined in the paragraphs above, to fund stand-alone stormwater retrofit projects (*Subprogram I-4 Stormwater Retrofit Account*). This funds transfer shall happen when the project goes to AD. Note this option is not available for projects in high priority stormwater retrofit locations.
3. Retrofit as much as possible to the extent feasible within the project limits and transfer funds equivalent to the unmet balance of the 20% cost obligation to fund

stand-alone stormwater retrofit projects (*Subprogram I-4 Stormwater Retrofit Account*). This funds transfer shall happen when the project goes to AD.