APPENDIX 2A

Engineering and Economic Feasibility for Meeting the Highway Runoff Manual Minimum Requirements

Appendix 2A Contents

Appendix 2A — Engineering and Economic Feasibility for Meeting the Highway Runoff Manual Minimum Requirements

2A-1 Introduction

The goal of every project is to meet all of the Minimum Requirements in the *Highway Runoff Manual* (HRM). However, there are times when projects need to seek deviations or variances from the standards for various justifiable reasons. This appendix provides a tool to help you through the process of documenting a stormwater deviation or variance from the standards in the HRM.

The Engineering and Economic Feasibility (EEF) evaluation looks at many different site-specific factors and has you evaluate each one. The project could fall under more than one form of infeasibility due to site-specific factors, which would help to strengthen the case for a deviation. The EEF evaluation is not an all-inclusive list, however. There may be other factors that could be documented to support the stormwater deviation from HRM requirements.

Stormwater runoff from highways should be treated and controlled adjacent to or within the right of way (ROW) when transportation improvement projects are constructed and trigger the HRM's Minimum Requirements. However, various site-specific factors (such as lack of land availability, engineering constraints, health/safety issues associated with operations and maintenance activities, or other obstacles) could make meeting the requirements in the HRM difficult, if not impossible. The EEF evaluation presented in this appendix assists you in determining when site-specific factors could make constructing stormwater management facilities within or adjacent to the highway right of way infeasible. Consult with the Region Hydraulics Engineer and the Headquarters (HQ) Hydraulics Section prior to starting the EEF process for additional guidance regarding scope and documentation.

The process has three parts:

1. Use the EEF evaluation to describe the problem.
2. Put together an alternate proposal for how the design will meet the required stormwater obligations for the threshold discharge area (TDA) or project.
3. Present the EEF evaluation and proposed alternative to the Demonstrative Approach Team (DAT).

After approval from the DAT, you can then implement the proposed design deviation and ensure proper documentation in the project's Hydraulic Report. Contact the Highway Runoff Program in the HQ Hydraulics Section to initiate the demonstrative approach and engage the DAT.

2A-2 General Criteria: Engineering and Economic Feasibility of Constructing Stormwater Control Facilities

Consider the following four general criteria in the siting and selection of stormwater best management practices (BMPs). These criteria affect the feasibility of stormwater BMPs and are further explained in the EEF Evaluation Process in Section 2A-3.

- **Physical site limitations.** In many cases, the amount of available right of way determines which types of stormwater controls are feasible for the project. When additional right of way can be acquired at market value, or when eminent domain condemnations can be demonstrably justified, you should explore these options to acquire additional land for stormwater control facilities.1 Historically, condemning land specifically for wetland mitigation (also triggered by the federal Clean Water Act) has been extremely difficult; hence, this option for stormwater control facilities will likely encounter the same difficulties.

  Additional site constraints could include geographic limitations, steep slopes, soil instability, proximity to water bodies, presence of significant cultural resources, presence of hazardous materials, and shallow water tables.

- **Treatment effectiveness**. Generally, consider BMPs with the highest pollutant-removal efficiencies first. These practices may require more land area, thus affecting space limitations.

- **Costs and associated environmental benefits**. Generally, choose the most cost-effective method of meeting environmental requirements.

- **Legal and policy issues**. When selecting appropriate BMPs, also consider Washington State Department of Transportation (WSDOT) and Washington State Department of Ecology (Ecology) stormwater requirements and design criteria, local ordinances, Endangered Species Act concerns, and tort liability issues. If you consider watershed-based stormwater management options, you may need to overcome legal and policy issues discouraging this approach.

When identifying on-site treatment and control options, it is important to consider the site limitations preventing construction of stormwater control and treatment facilities. For physical or economic reasons, it may not be feasible to construct full-scale stormwater control facilities on site.

[1] Ecology has determined that low-impact development (LID) is infeasible if installing BMPs to meet the LID requirements cannot be done within existing right of way. This is not the case for water quality treatment or flow control requirements.

2A-3 Engineering and Economic Feasibility Evaluation Process

The goal of the EEF evaluation process is to document why presumptive BMPs are infeasible to meet some or all of the minimum requirements for the project or TDA. The following sections[2] are intended for use during the design stage to determine whether construction of stormwater control facilities is feasible within the immediate highway right of way. Factors that limit the feasibility of constructing in-ROW stormwater controls are listed, along with questions to help you determine the feasibility of constructing in-ROW stormwater treatment and control systems based on site conditions.

2A-3.1 Collect Project Site Data to Identify Limiting Factors

Depending on the complexity of the project or site conditions, some of the data listed below may not be required. Consult with the Region Hydraulics Engineer to determine applicable items.

1. Locate the proposed ROW and/or easement available for stormwater facilities.
2. Determine the topographic and land cover characteristics of contributing basin areas.
3. Estimate the required runoff treatment and flow control by completing the Stormwater Design and Documentation Spreadsheet: http://www.wsdot.wa.gov/nr/rdonlyres/6de749bc-209c-4bfd-80d9-bcc86dcb868a/0/stormwaterdesigndocumentation.xls
4. Determine the proximity of the project site to water bodies and locate existing outfalls.
5. Identify water bodies designated as "impaired" under the provision of Section 303(d) of the federal Clean Water Act, enacted by Public Law 92-500.
6. Identify water supply well locations and associated well protection zones.
7. Identify wildlife hazard management zones around airports.
8. Determine the soil properties at the proposed stormwater facility location. For infiltration facilities, verify the site meets the requirements in Section 4-5.1, Site Suitability Criteria.
9. Locate critical public infrastructure relative to the proposed ROW.
10. Identify and locate the existing land use in and adjacent to the ROW, including:
    - Protected cultural resources, historical sites, parklands, or wildlife and waterfowl refuges (Department of Transportation Act of 1966 §4[f] properties).

[2] Sections 2A-3.1 to 2A-3.7 may include items that are not applicable to the project or TDA. List the item as not applicable if that is the case. There may also be issues pertinent to the project that are not listed here but could be included to bolster the argument.

- Areas designated as sensitive by a federal, state, local, or tribal government. These areas include, but are not limited to: designated "critical water resources" as defined in 33 CFR Part 330, Nationwide Permit Program, "Critical habitat" as defined in Section 3 of the Endangered Species Act of 1973, and areas identified in local critical area ordinances or in an approved basin plan. (Additional items are described in the soil suitability criteria).

11. Identify location(s) of established structure(s) on or adjacent to the proposed ROW.
12. Identify slopes and location(s) of unstable slopes on or adjacent to the proposed ROW.
13. Identify the presence and location of hazardous or dangerous materials on or adjacent to the proposed ROW.
14. Identify and locate any old-growth or otherwise significant upland forest areas.
15. Identify and locate any well-established riparian tree canopies or vegetative buffers on or adjacent to the proposed ROW.
16. Identify the presence and distribution of 100-year floodplains on or adjacent to the established or acquirable ROW.
17. Verify the conveyance requirements specified in the *Hydraulics Manual* are met.
18. For bridge projects, determine whether the bridge structure can be drained to land by gravity feed.
19. Refer to Section 5-3.7, BMP Validation and Cost-Effectiveness, for costs for constructing and maintaining the conceptual stormwater control facilities for the drainage area.

2A-3.2 Infrastructure Limitations to Construction Feasibility

The density of the built environment adjacent to the established right of way may limit the amount of land available for acquisition to construct stormwater treatment and control systems. Once project limits, right of way, and stormwater runoff treatment and flow control needs are defined, you can determine whether it is feasible to construct stormwater management systems on site. Generally, you should avoid wet vaults when other BMP options are viable because of high construction and maintenance costs.

Consider the following questions when determining whether infrastructure or right of way limits the feasibility of designing and constructing stormwater BMPs within or adjacent to the right of way (in-ROW treatment). Each element evaluates potential fatal flaws that would preclude the feasibility of constructing stormwater management facilities within the proposed right of way.

1. Will stormwater facility construction relocate critical publically-owned infrastructure or facilities, such as schools, fire stations, police facilities, or major utility lines/ infrastructure?[3]
2. Is the land needed to site and construct the stormwater facility available at a reasonable cost and from a willing seller?
3. Can a multipurpose BMP be designed to fit within the proposed ROW and provide the required project runoff treatment and flow control?
4. Can a flow control treatment BMP be designed to fit in the proposed ROW?
5. Can a runoff treatment BMP be designed to fit in the proposed ROW?
6. Will the designated stormwater management area disturb or trespass on designated historical/archaeological sites or other significant cultural resources?[4]
7. Is it feasible to purchase adjoining properties?

2A-3.3 Geographic and Geotechnical Limitations to Construction Feasibility

A project's topography and/or proximity to wetlands, sensitive water bodies, shorelines, riverfront areas, or steep slopes may physically or structurally preclude construction of BMPs on site within required engineering standards. In situ geotechnical conditions can also limit the feasibility of constructing BMPs within the right of way (for example, the project is on unstable slopes, high shrink/swell soils, or karst topography). Refer to Section 4-5 to determine whether geography or geotechnical limits affect the feasibility of designing stormwater BMPs within the proposed ROW.

2A-3.4 Hydraulic Limitations to Construction Feasibility

Hydraulic limitations can include the lack of hydraulic head necessary to effectively operate stormwater control facilities or areas with very shallow water tables, such as floodplains or seasonal wetlands. Consider alternatives such as spill control devices and frequent cleaning of road or bridge surfaces with high-efficiency vacuum sweepers in these areas in lieu of standard treatment facilities. Consider the following questions when determining the hydraulic feasibility of a project:

1. Have the conveyance requirements described in the *Hydraulics Manual* been satisfied?
2. For bridge projects, is it feasible to convey stormwater to on-land stormwater facilities by gravity feed and meet the design spread requirements in Figure 5-4.1 of the *Hydraulics Manual*?

[3] When you identify the location and nature of the critical public infrastructure(s), you are required to provide documentation to justify not constructing the BMP in the right of way.

[4] Review any projects involving disturbance of ground surfaces not previously disturbed for cultural resource study needs (such as site file searches at the Washington State Office of Archaeology and Historic Preservation, on-site surveys, and subsurface testing). Federal involvement (such as funding, permits, and lands) requires compliance with Section 106 of the National Historic Preservation Act and implementation of regulations in 36 CFR 800.

2A-3.5 Environmental or Health Risk Limitations to Construction Feasibility

Areas with intensive historic levels of industrial or commercial activity may have significant levels of soil, water, or fill contamination, which would prevent highway construction work from being conducted in a safe manner (as specified in the Washington Industrial Safety and Health Act or federal Occupational Safety and Health Administration regulations), or may be the subject of overriding Resource Conservation and Recovery Act (RCRA), state Model Toxics Control Act (MTCA), or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations. Such significant safety, health, and environmental limitations would generally preclude construction of stormwater facilities on a particular site.

Consider the following questions for all sites:

1. Does the proposed stormwater management area contain soils or materials designated as Hazardous/Dangerous Waste or require cleanup action as defined by RCRA or MTCA regulations?

   Generally, it is not feasible to construct stormwater facilities in these locations without putting a worker's health in jeopardy; the site may release acutely toxic substances to surface waters during construction and impact groundwater. Infiltration of stormwater may mobilize or accentuate the migration of hazardous material located below the facility even if soils at the surface or near the surface are clean or removed.

2. Will construction of stormwater control facilities require removal of well-established riparian tree canopies or vegetative buffers?

   Consider benefits to the environment if trees are retrained to include water storage, sequester water/pollutants, and shade streams.

3. Will construction of stormwater control facilities require removal of critical habitat for listed endangered and threatened species?

   Removal of critical habitat will, at a minimum, require a Section 7 Consultation and may result in a take of endangered or threatened species, making the proposed location not feasible.

4. Is the established or acquired ROW for stormwater control facilities located within a 100-year flood plain?

   Determine whether it is feasible to install stormwater control facilities within the flood plain.

2A-3.6 Maintenance Limitations to Construction Feasibility

Maintenance is essential to the performance of runoff treatment and flow control BMPs; therefore, it needs to be discussed and reviewed with the local maintenance office prior to finalizing the design. Maintenance considerations to address during the design process include: specific site restrictions that prevent access, long-term operation and maintenance costs, and necessary equipment and training. Complete the Maintenance Checklist found on the HRM website and review it with the area maintenance office. If no suitable, approved stormwater BMPs can be constructed and maintained, document the reasons in the EEF evaluation.

2A-3.7 Cost Limitations to Construction Feasibility

Critical factors found to affect stormwater management costs include the location and setting of projects relative to neighborhoods, streams, and wetlands. In addition, projects with poor soil conditions or high water tables generally have considerably higher costs for treating stormwater within the right of way. It is incumbent upon your project manager to consider all project costs and balance them to maximize the benefit-to-cost ratio. In some cases, the costs to treat stormwater, relative to the overall project costs, may seem out of proportion to the benefit. In these cases, your project team shall document the costs in the EEF evaluation.