CHAPTER 1

DRAINAGE REVIEW AND REQUIREMENTS

KING COUNTY, WASHINGTON

SURFACE WATER DESIGN MANUAL

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CHAPTER 1

DRAINAGE REVIEW AND REQUIREMENTS

This chapter describes the drainage review procedures and types, the drainage requirements, and the adjustment procedures necessary to implement surface water runoff policies codified in Chapter 9.04 of the King County Code (KCC). It also provides direction for implementing the more detailed procedures and design criteria found in subsequent chapters of this manual.

Chapter Organization

The information presented in Chapter 1 is organized into four main sections as follows:

- Section 1.1, "Drainage Review" (p. 1-11)
- Section 1.2, "Core Requirements" (p. 1-25)
- Section 1.3, "Special Requirements" (p. 1-99)
- Section 1.4, "Adjustment Process" (p. 1-107).

Each of these sections begins on an odd page so the user can insert tabs if desired for quicker reference.

Formatting of Chapter Text

The text of Chapter 1 and subsequent chapters has been formatted using the following conventions to aid the user in finding, understanding, and properly applying the thresholds, requirements, and procedures contained in this manual:

- **Italic** is used to highlight the following: (a) terms when they are first introduced and defined within the same paragraph; (b) special notes that supplement or clarify thresholds, requirements, and procedures; (c) sentences considered important for purposes of understanding thresholds, requirements, and procedures; and (d) titles of publications.
- **Bold italic** is used to highlight terms considered key to understanding and applying drainage review thresholds, requirements, and procedures. These are called "key terms" and are defined below. This convention applies after the key term is defined and does not necessarily apply to tables and figures.
- **Bold** is used to highlight words and phrases that are not key terms but are considered important to emphasize for purposes of finding and properly applying thresholds, requirements, and procedures.

Key Terms and Definitions *(a complete list of definitions follows Chapter 6)*

Proper application of the drainage review and requirements in this chapter requires an understanding of the following key terms and their definitions. Other key terms may be defined in subsequent chapters. All such key terms are highlighted in **bold italic** throughout the manual. Other important terms that are not key terms are defined in the text when they are first introduced. These are highlighted in italic when they

are first introduced but are not highlighted throughout the manual. All terms defined in this chapter are also found in the "Definitions" section of this manual as are other important terms defined throughout the Manual.

Agricultural project means any project located on, and proposing improvements consistent with, the permitted uses of land zoned for Agriculture (A zoned lands) as defined in KCC 21A.08.

Arterial – A high traffic-volume road or street primarily for through traffic. The term generally includes roads or streets considered collectors. It does not include local access roads which are generally limited to providing access to abutting property.

Bioretention – A flow control best management practice consisting of a shallow landscaped depression designed to temporarily store and promote infiltration of stormwater runoff. Standards for bioretention design, including soil mix, plants, storage volume and feasibility criteria, are specified in Appendix C of the King County Surface Water Design Manual.

Certified Erosion and Sediment Control Lead (CESCL) means an individual who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by the Washington Department of Ecology Department (Ecology). A CESCL is knowledgeable in the principles and practices of erosion and sediment control. The CESCL must have the skills to assess ***site*** conditions and construction activities that could impact the quality of stormwater and, the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges. Certification is obtained through an Ecology approved erosion and sediment control course.

Construct or modify means to install a new drainage pipe or ditch or make improvements to an existing drainage pipe or ditch, for purposes other than maintenance, that either serves to concentrate previously unconcentrated surface_water or stormwater runoff or serves to increase, decrease or redirect the conveyance of surface water or stormwater runoff. "Construct or modify" does not include installation or maintenance of a driveway culvert installed as part of a single-family residential building permit.

Civil engineer means a person licensed by the state of Washington as a professional engineer in civil engineering.

Conveyance system nuisance problem means a flooding or erosion problem that does not constitute a ***severe flooding problem*** or ***severe erosion problem*** and that results from the overflow of a constructed conveyance system for runoff events less than or equal to a 10-year event. Examples include inundation of a shoulder or lane of a roadway, overflows collecting in yards or pastures, shallow flows across driveways, minor flooding of crawl spaces or unheated garages/outbuildings, and minor erosion.

Critical aquifer recharge area is the critical area designation, defined and regulated in KCC 21A, that is applied to areas where extra protection of groundwater quantity and quality is needed because of known susceptibility to contamination and importance to drinking water supply. Such areas are delineated on the *King County Critical Aquifer Recharge Area Map* available at DPER or on the County's Geographic Information System (GIS). See the "Definitions" section for more details.

Critical Drainage Area means an area where the Department of Natural Resources and Parks (DNRP) has determined that additional drainage controls (beyond those in this manual) are needed to address a severe flooding, drainage, and/or erosion condition that poses an imminent likelihood of harm to the welfare and safety of the surrounding community. Critical Drainage Areas (CDAs) are formally adopted by administrative rule under the procedures specified in KCC 2.98. When CDAs are adopted, they are inserted in Reference Section 2 of this manual and their requirements are implemented through Special Requirement #1, Section 1.3.1.

Development means any activity that requires a permit or approval, including, but not limited to, a building permit, grading permit, shoreline substantial development permit, conditional use permit, special use permit, zoning variance or reclassification, subdivision, short subdivision, urban planned

development, binding site plan, site development permit, or right-of-way use permit. "Development" does not include a Class I, II, III, or IV-S forest practice conducted in accordance with Chapter 76.09 RCW and Title 222 WAC or a class IV-G non-conversion forest practice, as defined in KCC 21A.06, conducted in accordance with Chapter 76.09 RCW and Title 222 WAC and a county approved forest management plan.

Development review engineer-The Department of Permitting and Environmental Review (DPER) employee responsible for the conditioning, review, inspection, and approval of right-of-way use permits, and road and drainage improvements constructed as part of development permits administered by the department of permitting and environmental services.

Effective Impervious surface – Those impervious surfaces that are connected via sheet flow or discrete conveyance to a drainage system. Impervious surfaces are considered ineffective if: 1) the runoff is fully dispersed as described in Appendix C of this manual; 2) residential roof runoff is infiltrated in accordance with the full infiltration BMP described in Appendix C of this manual; or 3) approved continuous runoff modeling methods indicate that the entire runoff file is infiltrated.

Erodible or leachable materials, wastes, or chemicals are those materials or substances that, when exposed to rainfall, measurably alter the physical or chemical characteristics of the rainfall runoff (Examples include but are not limited to erodible soil, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, garbage dumpster leakage, commercial-scale vehicle and animal wash waste, galvanized structural, architectural, cabinet, and utility steel, architectural copper, bronze, brass, and lead, treated lumber, etc.).

Erosion hazard area is the critical area designation, defined and regulated in KCC 21A, that is applied to areas underlain by soils that are subject to severe erosion when disturbed. See the "Definitions" section for more details.

Exposed means subject to direct or blown-in precipitation and/or direct or blown in runoff. Not ***fully covered***.

Exposed area or ***exposed material*** means not covered sufficiently to shield from rainfall and stormwater runoff. At a minimum, full coverage to not be considered ***exposed*** requires a roof with enough overhang in conjunction with walls of sufficient height to prevent rainfall blow-in; and the walls must extend into the ground or to a berm or footing to prevent runoff from being blown in or from running onto the covered area.

Existing site conditions means those that existed prior to May 1979 (when King County first required flow control facilities) as determined from aerial photographs and, if necessary, knowledge of individuals familiar with the area, unless a drainage plan for land cover changes has been approved by the County since May 1979 as part of a ***development*** permit or approval. If so, *existing site conditions* are those created by the ***site*** improvements and drainage facilities constructed per the approved drainage plan.

Flood hazard area is the critical area designation, defined and regulated in KCC 21A, that is applied to areas subject to inundation by a 100-year flood event or areas at risk from channel migration. Flood hazard areas generally include, but are not limited to, aquatic areas (e.g., streams or lakes), wetlands, or closed depressions. See the "Definitions" section for more details.

Flow control BMP means a small scale drainage facility or feature that is part of a development site strategy to use processes such as infiltration, dispersion, storage, evaporation, transpiration, forest retention, and reduced impervious surface footprint to mimic pre-developed hydrology and minimize stormwater runoff.

Fully covered means covered sufficiently to shield from rainfall and stormwater runoff. At a minimum, full coverage requires a roof with enough overhang in conjunction with walls of sufficient height to prevent rainfall blow-in; and the walls must extend into the ground or to a berm or footing to prevent runoff from being blown in or from running onto the covered area. Not ***exposed***.

Fully dispersed means the runoff from an impervious surface or non-native pervious surface has dispersed per the criteria for fully dispersed surface in Section 1.2.3.2.

Groundwater protection areas include ***critical aquifer recharge areas*** as defined in KCC 21A, sole source aquifer areas as designated by the federal Environmental Protection Agency, and wellhead protection areas as mapped by the Washington State Department of Health.

High-use site means that area within a commercial or industrial site that typically generates or is subject to runoff containing high concentrations of oil due to high traffic turnover, on-site vehicle or heavy or stationary equipment use, or the frequent transfer of liquid petroleum or coal derivative products. High-use sites include:

1. That area of a commercial or industrial site that:
   a. has an expected average daily traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area; or
   b. is subject to petroleum storage or transfer in excess of 1,500 gallons per year, not including delivered heating oil at the end-user point of delivery; or
   c. is subject to use, storage, or maintenance of a fleet of 25 or more diesel or jet fuel (aviation turbine fuel) vehicles that are over 10 tons net weight (trucks, buses, trains, airplanes, tugs, mobile and fuel-driven or hydraulic stationary heavy equipment, etc.); or
2. The interior of any road intersection and that portion of lanes leading into the intersection subject to braking, turning, or stopping, with a measured ADT count of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway. Projects proposing primarily pedestrian or bicycle use improvements are excluded.

Historic site conditions means those that existed on the ***site*** prior to any development in the Puget Sound region. For lands not currently submerged (i.e., outside the ordinary high water mark of a lake, wetland, or stream), historic site conditions shall be assumed to be forest cover unless reasonable, historic, ***site***-specific information is provided to demonstrate a different vegetation cover. In some stream basins, as allowed per Section 1.2.3.1.B, historic site conditions for lands not currently submerged may be assumed to be 75% forest, 15% grass, and 10% impervious surface.

Impaired waterbody or impaired receiving water means where the receiving waterbody is either (1) listed as impaired for metals or organic pollutants according to Ecology's Water Quality Assessment categories 2, 4, or 5 - water or sediment, (2) is currently designated by the County as a metals or organic pollutant problem based on credible data indicating exceedance or concern for exceedance of the state's numeric water quality standard for turbidity as documented in the latest published list of King County-Identified WQ Problems (Reference Section 10) posted at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx, and/or (3) where subject to any other local, state, or federal cleanup plan.

Impervious surface means a hard surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions before development; or that causes water to run off the surface in greater quantities or at an increased rate of flow compared to the flow present under natural conditions prior to development (see also "new impervious surface"). Common impervious surfaces include, but are not limited to, roof, walkways, patios, driveways, parking lots, or storage areas, areas that are paved, graveled or made of packed or oiled earthen materials or other surfaces that similarly impede the natural infiltration of surface water or stormwater. For the purposes of applying the impervious surface thresholds and exemptions contained in this manual, permeable pavement, vegetated roofs, and pervious surfaces with underdrains designed to collect stormwater runoff are considered impervious surface while an open uncovered flow control or water quality facility is not. However, for the purposes of computing runoff, uncovered flow control or water quality facilities shall be modeled as impervious surfaces as specified in Chapter 3.

Land disturbing activity means any activity that results in a change in the existing soil cover, both vegetative and non-vegetative, or the existing soil topography. Land disturbing activities include, but are not limited to demolition, construction, clearing, grading, filling, excavation, and compaction. Land disturbing activity does not include tilling conducted as part of agricultural practices, landscape maintenance, or gardening.

Landscape management plan means a King County approved plan for defining the layout and long-term maintenance of landscaping features to minimize the use of pesticides and fertilizers to reduce their discharge, and to reduce the discharge of suspended solids and other pollutants.

Landslide hazard area is the critical area designation, defined and regulated in KCC 21A, that is applied to areas subject to severe risk of landslide due to topography, soil conditions, and geology. See the "Definitions" section for more details.

Landslide hazard drainage area means an area mapped by the County where it has been determined that overland flows from a project will pose a significant threat to health and safety because of its close proximity to a ***landslide hazard area*** that is on a slope steeper than 15%. Such areas are delineated on the Landslide Hazard Drainage Areas map adopted with this manual and found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx .

Low Impact Development (LID) **–** A stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

LID Best Management Practices **–** Distributed stormwater management practices, integrated into a project design, that emphasize pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration. LID BMPs are referred to as flow control BMPs in this manual and include, but are not limited to, bioretention, permeable pavements, limited infiltration systems, roof downspout controls, dispersion, soil quality and depth, and minimal excavation foundations.

LID Principles **–** Land use management strategies that emphasize conservation, use of on-site natural features, and site planning to minimize impervious surfaces, native vegetation loss, and stormwater runoff.

Maintenance means those usual activities taken to prevent a decline, lapse, or cessation in the use of currently serviceable structures, facilities, BMPs, equipment, or systems if there is no expansion of any of these, and there are no significant hydrologic impacts. Maintenance includes the repair or replacement of non-functional facilities and BMPs, and the replacement of existing structures with different types of structures, if the repair or replacement is required to meet current engineering standards or is required by one or more environmental permits and the functioning characteristics of the original facility or structure are not changed. For the purposes of applying this definition to the thresholds and requirements of this manual, DPER will determine whether the functioning characteristics of the original facility, structure, or BMP will remain sufficiently unchanged to consider replacement as maintenance. Drainage review is not required for projects proposing only maintenance.

Note*: The following pavement maintenance practices are not categorically exempt from drainage review: removing and replacing a paved surface to base course or lower (ie. "replaced impervious surfaces"), extending the edge of pavement or paving graveled shoulders, or resurfacing that meets the definition of "new impervious surface" in this manual.*

Major receiving water means a large receiving water that has been determined by King County to be safe for the direct discharge of increased runoff from a proposed project without a flow control facility, subject to the restrictions on such discharges set forth in Core Requirement #3, Section 1.2.3. A list of major receiving waters is provided in Section 1.2.3.1 (p. 1-41). Major receiving waters are also considered safe for application of Basic WQ treatment in place of otherwise required Enhanced Basic WQ treatment (see Section 1.2.8.1), except where the ***receiving water*** is either (1) listed as impaired for metals or organic pollutants according to Ecology's Water Quality Assessment categories 2, 4, or 5, or (2) is currently designated by the County as a metals or organic pollutant problem based on credible data indicating exceedance or concern for exceedance of the state's numeric water quality standard for turbidity as documented in the latest published list of King County-Identified WQ Problems (Reference Section 10) posted at: http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx, and/or (3) where subject to any other local, state, or federal cleanup plan. In any of these cases, the major receiving water exception for Enhanced Basic treatment is superseded by 1.2.2.3 Water Quality Problem Impact Mitigation for Metals (Type 4) and/or Organic Pollutants (Type 8).

Native vegetated surface means a surface in which the soil conditions, ground cover, and species of vegetation are like those of the original native condition for the ***site***. More specifically, this means (1) the soil is either undisturbed or has been treated according to the "native vegetated landscape" specifications in Appendix C, Section C.2.1.8; (2) the ground is either naturally covered with vegetation litter or has been top-dressed between plants with 4 inches of mulch consistent with the native vegetated landscape specifications in Appendix C; and (3) the vegetation is either (a) comprised predominantly of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and that reasonably could have been expected to occur naturally on the ***site*** or (b) comprised of plant species specified for a native vegetated landscape in Appendix C. Examples of these plant species include trees such as Douglas fir, western hemlock, western red cedar, alder, big-leaf maple and vine maple; shrubs such as willow, elderberry, salmonberry and salal; and herbaceous plants such as sword fern, foam flower, and fireweed.

Natural discharge area means an onsite area tributary to a single ***natural discharge location***.

Natural discharge location means the location where surface and storm water runoff leaves (or would leave if not infiltrated or retained) the ***site*** or ***project site*** under ***existing site conditions***.

New impervious surface means the addition of a hard or compacted surface like roofs, pavement, gravel, or dirt; or the addition of a more compacted surface, like paving over pre-existing dirt or gravel. Permeable pavement and vegetated roofs are considered new impervious surface for purposes of determining whether the thresholds for application of minimum requirements are exceeded, as are lawns, landscaping, sports fields, golf courses, and other areas that have modified runoff characteristics resulting from the addition of underdrains designed to collect stormwater runoff. Open, uncovered retention/detention facilities shall not be considered impervious surfaces for purposes of determining whether the thresholds for application of minimum requirements are exceeded. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling.

New pervious surface means the conversion of a ***native vegetated surface*** or other native surface to a non-native pervious surface (e.g., conversion of forest or meadow to pasture land, grass land, cultivated land, lawn, landscaping, bare soil, etc.), or any alteration of existing non-native pervious surface that significantly increases surface and storm water runoff (e.g., conversion of pasture land, grass land, or cultivated land to lawn, landscaping, or bare soil; or alteration of soil characteristics).

New PGIS means ***new impervious surface*** that is ***pollution-generating impervious surface*** or any alteration of existing pollution-generating impervious surface that changes the type of pollutants or results in increased pollution loads and/or concentrations.

New PGPS means ***new pervious surface*** that is ***pollution-generating pervious surface*** or any alteration of existing pollution-generating pervious surface that changes the type of pollutants or results in increased pollution loads and/or concentrations.

Permeable pavement – Pervious concrete, porous asphalt, permeable pavers or other forms of pervious or porous paving material intended to allow passage of water through the pavement section. It often includes an aggregate base that provides structural support and acts as a stormwater reservoir.

Pervious Surface – Any surface material that allows stormwater to infiltrate into the ground. Examples include lawn, landscape, pasture, and native vegetation areas. Note for purposes of threshold determination and runoff volume modeling for detention and treatment, vegetated roofs and permeable pavements are to be considered impervious surfaces along with lawns, landscaping, sports fields, golf courses, and other areas that have modified runoff characteristics resulting from the addition of underdrains.

Pollution-generating impervious surface* (*PGIS*)** means an impervious surface considered to be a significant source of pollutants in stormwater runoff. Such surfaces include those that are ***subject to vehicular use, industrial activities, or storage of ***erodible or leachable materials, wastes, or chemicals***, and that receive direct rainfall or the run-on or blow-in of rainfall. A covered parking area would be included if runoff from uphill could regularly run through it or if rainfall could regularly blow in and wet the pavement surface. PGIS includes metal roofs unless they are coated with an inert, non-leachable material (see Reference 11-E); or roofs that are exposed to the venting of significant amounts of dusts, mists, or fumes from manufacturing, commercial , or other indoor activities. PGIS includes vegetated roofs exposed to pesticides, fertilizers, or loss of soil. Other roofing types that may pose risk but are not currently regulated are listed in Reference 11-E. Lawns, landscaping, sports fields, golf courses, and other areas that have modified runoff characteristics resulting from the addition of underdrains that have the pollution generating characteristics described under the "pollution-generating pervious surface" definition are also considered ***PGIS***.

Pollution-generating pervious surface* (*PGPS*)** means a non-impervious surface considered to be a significant source of pollutants in surface and storm water runoff. Such surfaces include those that are ***subject to vehicular use, industrial activities, storage of ***erodible or leachable materials, wastes, or chemicals***, and that receive direct rainfall or the run-on or blow-in of rainfall; or subject to use of pesticides and fertilizers, or loss of soil. Such surfaces include, but are not limited to, the lawn and landscaped areas of residential, commercial, and industrial sites or land uses, golf courses, parks, sports fields (natural and artificial turf), cemeteries, and County-standard grassed modular grid pavement.

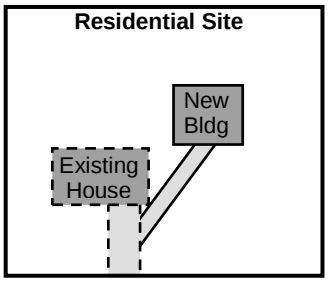
Project site means that portion of a ***site*** and any offsite areas subject to proposed project activities, alterations, and improvements including those required by this manual.

Rain Garden – A shallow, landscaped depression with compost-amended native soils and adapted plants. The depression is designed to pond and temporarily store stormwater runoff from adjacent areas, and to allow stormwater to pass through the amended soil profile.

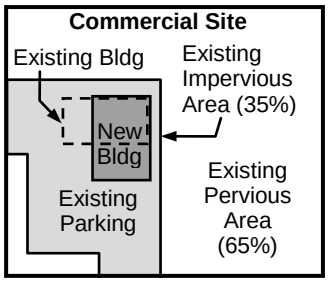
Receiving waters means bodies of water, surface water systems, or groundwater receiving water from upstream man-made or natural systems.

Redevelopment project means a project that proposes to add, replace, or modify impervious surfaces for purposes other than a residential subdivision or maintenance on a ***site*** that is already substantially developed in a manner consistent with its current zoning or with a legal non-conforming use, or has an existing impervious surface coverage of 35% or more. The following examples illustrate the application of this definition.

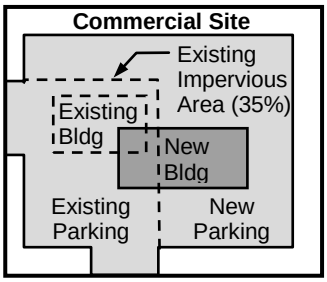
A Redevelopment Project that Adds New Impervious Surface



A Redevelopment Project that Replaces Impervious Surface



A Redev Project that Adds and Replaces Impervious Surface



Replaced impervious surface means any existing impervious surface on the ***project site*** that is proposed to be removed and re-established as impervious surface, excluding impervious surface removed for the sole purpose of installing utilities or performing maintenance on underground infrastructure. For structures, *removed* means the removal of buildings down to the foundation. For other impervious surfaces, *removed* means the removal down to base course or bare soil. For purposes of this definition, base course is the layer of crushed rock that typically underlies an asphalt or concrete pavement. It does not include the removal of pavement material through grinding or other surface modification unless the entire layer of PCC or AC is removed. Replaced impervious surface also includes impervious surface that is moved from one location to another on the project site where the following two conditions are met: (A) the area from which the impervious surface is moved from will be restored to the same or better runoff discharge characteristics as the area being covered by the moved impervious surface, and (B) impervious surface at the new location is either designated as non-pollution generating or the pollution generating characteristics remain unchanged compared to that of the original location.

Replaced PGIS means ***replaced impervious surface*** that is ***pollution-generating impervious surface***.

Sensitive lake means a designation applied by the County to lakes that are particularly prone to eutrophication from development-induced increases in phosphorus loading. Such lakes are identified on the Water Quality Applications Map adopted with this manual and found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx.

Severe building flooding problem means there is flooding of the *finished floor area*[1] of a *habitable building*,[2] or the electrical/heating system of a habitable building for runoff events less than or equal to a 100-year event. Examples include flooding of finished floors of homes and commercial or industrial buildings, or flooding of electrical/heating system components in the crawl space or garage of a home.

Severe erosion problem means there is an open drainage feature with evidence of or potential for erosion/incision sufficient to pose a sedimentation hazard to downstream conveyance systems or pose a landslide hazard by undercutting adjacent slopes. Severe erosion problems do not include roadway shoulder rilling or minor ditch erosion.

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[1] *Finished floor area*, for the purposes of defining ***severe building flooding problem***, means any enclosed area of a building that is designed to be served by the building's permanent heating or cooling system.

[2] *Habitable building* means any residential, commercial, or industrial building that is equipped with a permanent heating or cooling system and an electrical system.

Severe flooding problem means a ***severe building flooding problem*** or a ***severe roadway flooding problem***.

Severe roadway flooding problem means there is flooding over all lanes of a *roadway*,[3] or a *sole access driveway*[4] is severely impacted, for runoff events less than or equal to the 100-year event. A severely impacted sole access driveway is one in which flooding overtops a culverted section of the driveway, posing a threat of washout or unsafe access conditions due to indiscernible driveway edges, or flooding is deeper than 6 inches on the driveway, posing a severe impediment to emergency access.

Single family residential project means any project that (a) constructs or modifies a single family dwelling unit, (b) makes improvements (e.g., driveways, roads, outbuildings, play courts, etc.) or clears native vegetation on a lot that contains or will contain a single family dwelling unit, or (c) is a plat, short plat, or boundary line adjustment that creates or adjusts lots that will contain single family dwelling units.

Site means a single parcel; or, two or more contiguous parcels that are under common ownership or documented legal control; or a portion of a single parcel under documented legal control separate from the remaining parcel, used as a single parcel for a proposed project for purposes of applying for authority from King County to carry out a proposed project. For projects located primarily within dedicated rights-of-way, the length of the project site and the right-of-way boundaries define the site.

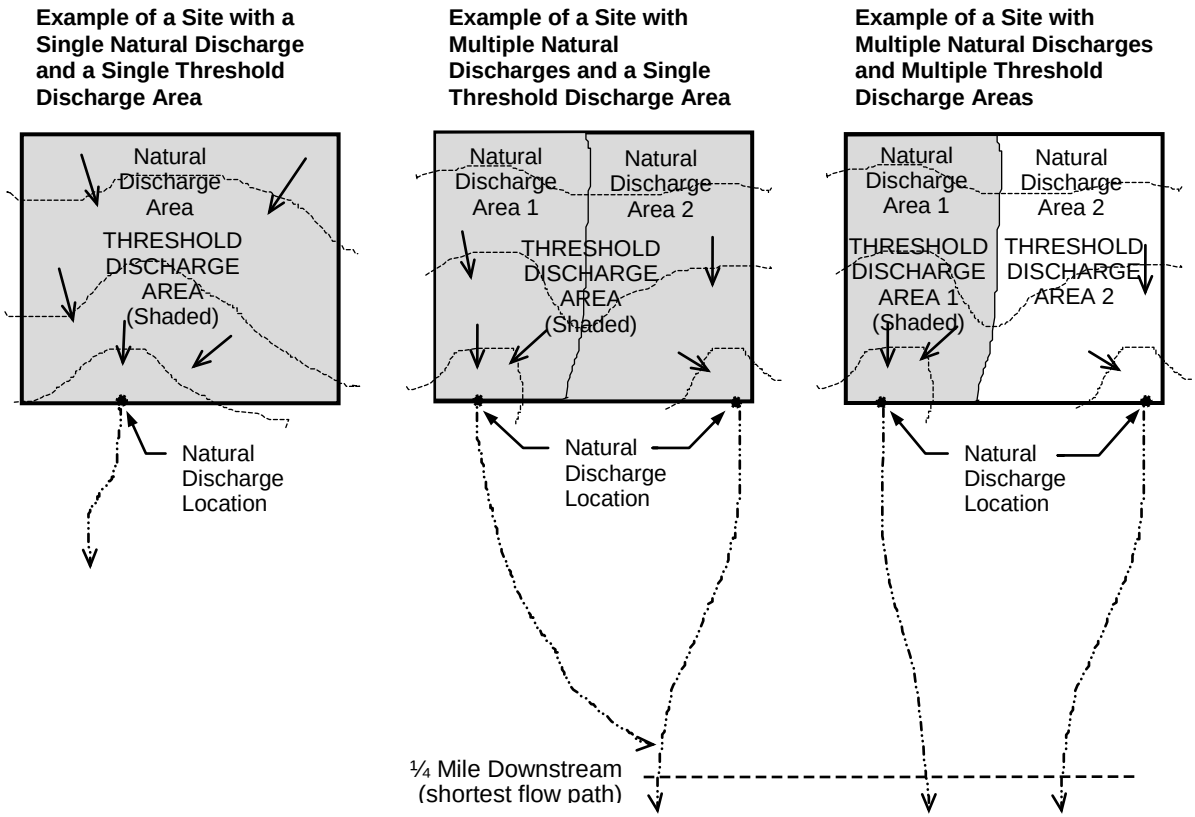
Steep slope hazard area is the critical area designation, defined and regulated in KCC 21A, that is applied to areas on a slope of 40% or more within a vertical elevation change of at least 10 feet. See the "Definitions" section for more details.

Subject to vehicular use means the surface is regularly used by motor vehicles including but not limited to motorcycles, cars, trucks, busses, aircraft, tractors, and heavy equipment. The following surfaces are considered regularly used by motor vehicles: roads, un-vegetated road shoulders, bike lanes within the traveled lane of a roadway, driveways, parking lots, unrestricted access fire lanes, vehicular equipment storage yards, and airport taxiways and runways. The following surfaces are not considered regularly used by motor vehicles: paved bicycle pathways separated from and not subject to drainage from roads for motor vehicles, fenced or restricted access fire lanes, and maintenance access roads with a recurring use of no more than one routine vehicle access per week.

[3] *Roadway*, for the purposes of this definition, means the traveled portion of any public or private road or street classified as such in the *King County Road Design and Construction Standards*.

[4] *Sole access driveway* means there is no other unobstructed, flood-free route for emergency access to a habitable building.

Threshold discharge area means an onsite area draining to a single ***natural discharge location***, or multiple ***natural discharge locations*** that combine within one-quarter-mile downstream (as determined by the shortest flowpath). The examples below illustrate this definition. This term is used to clarify how the thresholds, exemptions, and exceptions of this manual are applied to ***sites*** with multiple discharge locations.



Transportation redevelopment project means a stand-alone transportation improvement project that proposes to add, replace, or modify impervious surface, for purposes other than maintenance, within a length of dedicated public or private road right-of-way that has an existing impervious surface coverage of thirty-five percent or more. Road right-of-way improvements required as part of a subdivision, commercial, industrial or multifamily project may not be defined as a separate transportation redevelopment project.

1.1 DRAINAGE REVIEW

Drainage review is the evaluation by King County staff of a proposed project's compliance with the drainage requirements of this manual. The King County department responsible for drainage review is the Department of Permitting and Environmental Review (DPER) unless otherwise specified in KCC 9.04. Drainage review by DPER is an integral part of its permit review process for development projects. This section describes when and what type of drainage review is required for a proposed project and how to determine which drainage requirements apply.

The section covers the following topics related to drainage review:

- "Projects Requiring Drainage Review," Section 1.1.1 (p. 1-12)
- "Drainage Review Types and Requirements," Section 1.1.2 (p. 1-13)
- "Drainage Review Required By Other Agencies," Section 1.1.3 (p. 1-24)
- "Drainage Design Beyond Minimum Compliance," Section 1.1.4 (p. 1-24)

Guide to Using Section 1.1

The following steps are recommended for efficient use of Section 1.1:

1. Determine whether your proposed project is subject to the requirements of this manual by seeing if it meets any of the **thresholds for drainage review** specified in Section 1.1.1 (p. 1-12). Making this determination requires an understanding of the key terms defined at the beginning of this chapter.
2. If drainage review is required per Section 1.1.1, use the flow chart in Figure 1.1.2.A (p. 1-14) to determine what **type of drainage review** will be conducted by DPER. The type of drainage review defines the scope of drainage requirements that will apply to your project as summarized in Table 1.1.2.A (p. 1-15).
3. Check the more detailed threshold information in Section 1.1.2 (beginning on p. 1-13) to verify that you have determined the correct type of drainage review.
4. After verifying the type of drainage review, use the information in Section 1.1.2 to determine which **core requirements** (found in Section 1.2) and which **special requirements** (found in Section 1.3) must be evaluated for compliance by your project. To determine how to comply with each applicable core and special requirement, see the more detailed information on these requirements contained in Sections 1.2 and 1.3 of this chapter.

Note: For Steps 2 through 4, it is recommended that you arrange a predesign meeting with DPER permit review staff to confirm the type of drainage review and scope of drainage requirements that apply to your proposed project.

1.1.1 PROJECTS REQUIRING DRAINAGE REVIEW

Drainage review is required for any proposed project (except those proposing only **maintenance**) that is subject to a King County **development** permit or approval, including but not limited to those listed at right, AND that meets any one of the following conditions:

1. The project adds or will result in 2,000 square feet[5] or more of ***new impervious surface***, ***replaced impervious surface***, or ***new*** plus ***replaced impervious surface***, OR
2. The project proposes 7,000 square feet[5] or more of ***land disturbing activity***, OR
3. The project proposes to ***construct or modify*** a drainage pipe/ditch that is 12 inches or more in size/depth, or receives storm water runoff or surface water from a drainage pipe/ditch that is 12 inches or more in size/depth, OR
4. The project contains or is adjacent to a ***flood hazard area*** as defined in KCC 21A.06, OR
5. The project is located within a ***Critical Drainage Area.***[6] OR
6. The project is a ***redevelopment project*** proposing $100,000[7] or more of improvements to an existing ***high-use site***.

If drainage review is required for the proposed project, the type of drainage review must be determined based on project and site characteristics as described in Section 1.1.2. The type of drainage review defines the scope of drainage requirements that must be evaluated for compliance with this manual.

King County Permits and Approvals

Administrative Subdivision (Short Plat)
Binding Site Plan
Boundary Line Adjustment
Conditional Use*
Clearing
Commercial Building
Experimental Design Adjustment*
Formal Subdivision (plat)
Franchise Utility Right-of-Way Use
Grading
Right-of-Way Use
Shoreline Substantial Development*
Single Family Residential Building
Special Use*
Unclassified Use*
Urban Planned Development
Zoning Reclassification*
Zoning Variance*

Note: If the proposed project will require subsequent permits subject to drainage review, then DPER may allow the drainage review to be deferred until application for the later permits.

[5] The thresholds for ***new impervious surface, replaced impervious surface,*** and ***land disturbing activity*** shall be applied by ***project site*** and in accordance with the definitions of these surfaces and activities.

[6] See Reference Section 3 for a list of ***Critical Drainage Areas***.

[7] This is the "project valuation" as declared on the permit application submitted to DPER. The dollar amount of this threshold is considered to be as of January 8, 2001 and may be adjusted on an annual basis using the local consumer price index (CPI). *Note: January 8, 2001 is the effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon.*

1.1.2 DRAINAGE REVIEW TYPES AND REQUIREMENTS

For most projects resulting in 2,000 square feet or more of ***new*** plus ***replaced impervious surface***, the full range of core and special requirements contained in Sections 1.2 and 1.3 must be evaluated for compliance through the drainage review process. However, for some types of projects, the scope of requirements applied is narrowed to allow more efficient, customized review. Each of the following four drainage review types tailors the review process and application of drainage requirements to a project's size, location, type of development, and anticipated impacts to the local and regional surface water system:

- Simplified Drainage Review, Section 1.1.2.1 (p. 1-16)
- Targeted Drainage Review, Section 1.1.2.2 (p. 1-18)
- Directed Drainage Review, Section 1.1.2.3 (p. 1-21)
- Full Drainage Review, Section 1.1.2.4 (p. 1-22)
- Large Project Drainage Review, Section 1.1.2.5 (p. 1-23).

Each project requires only one of the above drainage review types, with the single exception that a project that qualifies for Simplified Drainage Review may also require Targeted Drainage Review. Figure 1.1.2.A (next page) can be used to determine which drainage review type is required. However, this may entail consulting the more detailed thresholds for each review type specified in the above-referenced sections.

Table 1.1.2.A (p. 1-15) can be used to quickly identify which requirements are applied in each type of drainage review. The applicant must evaluate the requirements "checked" for a particular drainage review type to determine what is necessary for compliance.

FIGURE 1.1.2.A FLOW CHART FOR DETERMINING TYPE OF DRAINAGE REVIEW REQUIRED

Is the project a ***single family residential*** or ***agricultural project*** that results in ≥2,000 sf of ***new*** plus ***replaced impervious surface*** or ≥7,000 sf of ***land disturbing activity***, results in less than 5,000 square feet of new plus replaced pollution generating impervious surface, results in less than ¾ acre of pollution generating pervious surfaces AND meets one of the following criteria?

- The project meets the Basic Exemption from flow control in Core Requirement #3. *Note the Basic Exemption thresholds are applied by project site.*
- *For projects inside the Urban Growth Area on predominately till soils:*
  The project results in no more than 7,947 square feet of target impervious surfaces* as defined in Section 1.1.2.1 AND proposed pervious area is equal to or less than 14,941 – 1.88 x (total target impervious surfaces)
- *For projects inside the Urban Growth Area on predominately outwash soils:*
  The project results in no more than 6,872 square feet of target impervious surfaces* as defined in Section 1.1.2.1 AND proposed pervious area is equal to or less than 20,343 – 2.96 x (total target impervious surfaces)
- *For outside the Urban Growth Area on predominately till soils:*
  The project results in no more than 5,074 square feet of target impervious surfaces* as defined in Section 1.1.2.1 AND proposed pervious area is equal to or less than 11,570 – 2.28 x (total target impervious surfaces)
- *For outside the Urban Growth Area on predominately outwash soils:*
  The project results in no more than 4,000 square feet of target impervious surfaces* as defined in Section 1.1.2.1 AND proposed pervious area is equal to or less than 10,720 – 2.68 x (total target impervious surfaces)
- *Is an agricultural project that qualifies for the "Impervious Surface Percentage Exemption For Agricultural Projects" detailed in Core Requirement 3*

Yes → SIMPLIFIED DRAINAGE REVIEW
Section 1.1.2.1
Note: The project may also be subject to Targeted Drainage Review as determined below.

No ↓

Is the project a ***single family residential*** or ***agricultural project*** that results in ≥2,000 sf of ***new*** plus ***replaced impervious surface*** or ≥7,000 sf of ***land disturbing activity AND*** *is not subject to Large Project Drainage Review as defined in Section 1.1.2.5*?

Yes → DIRECTED DRAINAGE REVIEW
Section 1.1.2.3

No ↓

Does the project result in ≥2,000 sf of ***new*** plus ***replaced impervious surface*** or ≥7,000 sf of ***land disturbing activity***?

No → Does the project have the characteristics of one or more of the following categories of projects (see more detailed threshold language on p. 1-15)?

1. Projects containing or adjacent to a ***flood***, ***erosion***, or ***steep slope hazard area***; or projects within a ***Critical Drainage Area*** or Landslide Hazard Drainage Area.
2. Projects proposing to ***construct or modify*** a drainage pipe/ditch that is 12" or larger or receives runoff from a 12" or larger drainage pipe/ditch.
3. ***Redevelopment projects*** proposing ≥$100,000 in improvements to an existing ***high-use site***.

No → Reassess whether drainage review is required per Section 1.1.1 (p. 1-9).

Yes → TARGETED DRAINAGE REVIEW
Section 1.1.2.2

Yes ↓

Is the project an Urban Planned Development (UPD), OR does it result in ≥50 acres of ***new impervious surface*** within a subbasin or multiple subbasins that are hydraulically connected, OR does it have a ***project site*** ≥50 acres within a ***critical aquifer recharge area***?

No → FULL DRAINAGE REVIEW
Section 1.1.2.4

Yes → LARGE PROJECT DRAINAGE REVIEW
Section 1.1.2.5

TABLE 1.1.2.A REQUIREMENTS APPLIED UNDER EACH DRAINAGE REVIEW TYPE

Simplified	***Single family residential projects*** and ***agricultural projects*** that result in ≥2,000 sf of ***new*** plus ***replaced impervious surface*** or ≥7,000 sf of ***land disturbing activity*** but do not exceed the new plus replaced PGIS, new PGPS, and ***new pervious surface*** thresholds specified in Sec. 1.1.2.1; OR is an agricultural project that qualifies for the "Impervious Surface Percentage Exemption For Agricultural Projects".
Directed	***Single family residential projects*** and ***agricultural projects*** that result in ≥2,000 sf of ***new*** plus ***replaced impervious surface*** or ≥7,000 sf of ***land disturbing activity*** that are not subject to Simplified Drainage Review or Large Project Drainage Review
Targeted	Projects that **are not** subject to Directed, Full or Large Project Drainage Review, AND have characteristics of **one or more** of the following categories of projects: 1. Projects containing or adjacent to a ***flood***, ***erosion***, or ***steep slope hazard area***; projects within a ***Critical Drainage Area*** or Landslide Hazard Drainage Area. 2. Projects that ***construct or modify*** a drainage pipe/ditch that is 12" or larger or receive runoff from a 12" or larger drainage pipe/ditch. 3. ***Redevelopment projects*** with ≥$100,000 in improvements to a ***high-use site.***(1)
Full	All projects that result in ≥2,000 sf of ***new*** plus ***replaced impervious surface*** or ≥7,000 sf of ***land disturbing activity*** but are not subject to Simplified Drainage Review, Directed Drainage Review , OR Large Project Drainage Review.
Large Project	UPDs, OR projects that result in ≥50 acres of ***new impervious*** within a sub-basin or multiple sub- basins that are hydraulically connected, OR ***project sites*** ≥50 acres within a ***critical aquifer recharge area***.

	DRAINAGE REVIEW TYPE						
	Simplified	**Directed**	**Targeted**			**Full**	**Large Project**
			Categ 1	**Categ 2**	**Categ 3**		
SIMPLIFIED DRAINAGE REQUIREMENTS	**SEE NOTE 4**						
CORE REQUIREMENT #1 Discharge at Natural Location	✓(4)	✓(2,3)	*(2)	✓		✓	✓
CORE REQUIREMENT #2 Offsite Analysis	✓(4)	✓(2,3)	*(2)	✓(3)		✓(3)	✓(3)
CORE REQUIREMENT #3 Flow Control	✓(4)	✓(2,3)	*(2)			✓(3)	✓(3)
CORE REQUIREMENT #4 Conveyance System	✓(4)	✓(2,3)	*(2)	✓		✓	✓
CORE REQUIREMENT #5 Erosion & Sediment Control	✓(4)	✓(2,3)	✓	✓	✓	✓	✓
CORE REQUIREMENT #6 Maintenance & Operations	✓(4)	✓(2,3)	*(2)	✓	✓	✓	✓
CORE REQUIREMENT #7 Financial Guarantees & Liability	✓(4)	✓(2,3)	*(2)	✓(3)	✓(3)	✓(3)	✓(3)
CORE REQUIREMENT #8 Water Quality	✓(4)	✓(2,3)	*(2)			✓(3)	✓(3)
CORE REQUIREMENT #9 Flow Control BMPs	✓(4)	✓				✓	✓
SPECIAL REQUIREMENT #1 Other Adopted Requirements	✓(4)	✓(2,3)	✓(3)			✓(3)	✓(3)
SPECIAL REQUIREMENT #2 Flood Hazard Area Delineation	✓(4)	✓(2,3)	✓(3)			✓(3)	✓(3)
SPECIAL REQUIREMENT #3 Flood Protection Facilities	✓(4)	✓(2,3)	✓(3)			✓(3)	✓(3)
SPECIAL REQUIREMENT #4 Source Control	✓(4)	✓(2,3)	✓(3)	✓(3)	✓(3)	✓(3)	✓(3)
SPECIAL REQUIREMENT #5 Oil Control	✓(4)	✓(2,3)			✓(3)	✓(3)	✓(3)

(1) Category 3 projects installing oil controls that construct or modify a 12-inch pipe/ditch are also Category 2 projects.

(2) May be applied by DPER based on project or ***site***-specific conditions. Documentation of compliance required.

(3) These requirements have exemptions or thresholds that may preclude or limit their application to a specific project.

(4) A proposed project subject to Simplified Drainage Review that complies with the Simplified drainage requirements detailed in Appendix C is presumed to comply with all the core and special requirements in Sections 1.2 and 1.3 except those requirements that would apply to the project if it is subject to Targeted Drainage Review as specified in Section 1.1.2.2.

1.1.2.1 SIMPLIFIED DRAINAGE REVIEW

Simplified Drainage Review is for small residential building projects, clearing projects or small ***agricultural projects*** that meet the threshold requirements below. The core and special requirements applied under Full Drainage Review are replaced with simplified drainage requirements that can be applied by a non-engineer. These requirements include simple stormwater dispersion, infiltration, and ***site*** design techniques called flow control Best Management Practices (BMPs), which provide the necessary mitigation of flow and water quality impacts for small projects. Also included are simple measures for erosion and sediment control (ESC). This simplified form of drainage review acknowledges that drainage impacts for many small project proposals can be effectively mitigated without construction of costly flow control and water quality facilities.

The Simplified Drainage Review process minimizes the time and effort required to design, submit, review, and approve drainage facilities for these proposals. In most cases, the requirements can be met with submittals prepared by contractors, architects, or homeowners without the involvement of a ***civil engineer***.

Note: some projects subject to Simplified Drainage Review may also require Targeted Drainage Review if they meet any of the threshold criteria in Section 1.1.2.2.

Threshold

THRESHOLD

Simplified Drainage Review is required for any ***single family residential project*** or ***agricultural project*** that will result in 2,000 square feet[8] or more of ***new impervious surface***, ***replaced impervious surface***, or ***new*** plus ***replaced impervious surface***, or 7,000 square feet[8] or more of ***land disturbing activity***, AND that meets the following criteria:

The project will result in less than 5,000 square feet of new plus replaced pollution generating impervious surface, will result in less than ¾ acre of new pollution generating pervious surfaces, AND meets one of the following six additional criteria:

1. **The project meets the Basic Exemption from flow control in Core Requirement #3.** *Note the Basic Exemption thresholds are applied by project site.*
2. **<u>For projects inside the Urban Growth Area on predominately till soils</u>:**
   The project results in no more than 7,947 square feet of target impervious surfaces as defined below AND proposed pervious area is equal to or less than 14,941 – 1.88 x (total target impervious surfaces).
3. **<u>For projects inside the Urban Growth Area on predominately outwash soils</u>:**
   The project results in no more than 6,872 square feet of target impervious surfaces as defined below AND proposed pervious area is equal to or less than 20,343 – 2.96 x (total target impervious surfaces).
4. **<u>For outside the Urban Growth Area on predominately till soils</u>:**
   The project results in no more than 5,074 square feet of target impervious surfaces as defined below AND proposed pervious area is equal to or less than 11,570 – 2.28 x (total target impervious surfaces).
5. **<u>For outside the Urban Growth Area on predominately outwash soils</u>:**
   The project results in no more than 4,000 square feet of target impervious surfaces as defined below AND proposed pervious area is equal to or less than 10,720 – 2.68 x (total target impervious surfaces).
6. **<u>For Agricultural Projects</u>**:
   The project is an agricultural project that qualifies for "Impervious Surface Percentage Exemption For Agricultural Projects" as cited in Core Requirement 3 (Flow Control Facilities).

[8] The thresholds of 2,000 and 7,000 square feet shall be applied by project site. All other thresholds specified in terms of square feet of impervious or pervious surface shall be applied by ***threshold discharge area*** and in accordance with the definitions of these surfaces in Section 1.1. *Note: the calculation of total impervious surface added on after January 8, 2001 may exclude any such added impervious surface that is confirmed by DPER engineering staff to be already mitigated by a County approved and inspected flow control facility or BMP.*

Determination of target impervious surface

- <u>If the project is a New Development project,</u>
  then target impervious surfaces include new ***plus proposed replaced impervious surface*** plus existing impervious surface added on or after January 8, 2001.

- <u>If the project is a Redevelopment project</u> ***where***
  - New impervious surface is less than 5,000 square feet ***or***
  - Valuation of improvements is less than 50% of the **assessed value** of the existing site improvements,

  then target impervious surfaces include new impervious surface plus existing impervious added on or after January 8, 2001.

- <u>If the project is a Redevelopment project</u> ***where***
  - New impervious surface is greater than or equal to 5,000 square feet ***and***
  - Valuation of improvements is greater than or equal to 50% of the **assessed value** of the existing site improvements,

  then target impervious surfaces include new ***plus proposed replaced impervious surface*** plus existing impervious surface added on or after January 8, 2001.

Note: for the purposes applying this threshold to a proposed single family residential subdivision (i.e., plat or short plat project), the impervious surface coverage assumed on each created lot shall be 4,000 square feet (8,000 square feet if the ***site*** *is zoned as RA) or the maximum allowed by KCC 21A.12.030, whichever is less. A lower impervious surface coverage may be assumed for any lot in which the lower impervious surface coverage is set as the maximum through a declaration of covenant recorded for the lot. Also, the* ***new pervious surface*** *assumed on each created lot shall be the entire lot area, except the assumed impervious portion and any portion in which native conditions are preserved by a clearing limit per KCC 16.82, a covenant or easement recorded for the lot, or a tract dedicated by the proposed subdivision.*

Scope of Requirements

REQMTS

IF Simplified Drainage Review is required, THEN the proposed project must comply with the simplified project submittal and drainage design requirements detailed in *Simplified Drainage Requirements* adopted as Appendix C to this manual. These requirements include simplified BMPs/measures for flow control and erosion and sediment control.

Presumption of Compliance with Core and Special Requirements

The simplified drainage requirements applied under Simplified Drainage Review are considered sufficient to meet the overall intent of the core and special requirements in Sections 1.2 and 1.3, except under certain conditions when a proposed project has characteristics that trigger Targeted Drainage Review (see the threshold for Targeted Drainage Review in Section 1.1.2.2, p. 1-18) and may require the involvement of a ***civil engineer***. Therefore, any proposed project that is subject to Simplified Drainage Review as determined above and complies with the Simplified drainage requirements detailed in Appendix C is presumed to comply with all the core and special requirements in Sections 1.2 and 1.3 **except** those requirements that would apply to the project if it is subject to Targeted Drainage Review as specified in Section 1.1.2.2 (p. 1-18).

1.1.2.2 TARGETED DRAINAGE REVIEW

Targeted Drainage Review (TDR) is an abbreviated evaluation by DPER permit review staff of a proposed project's compliance with selected core and special requirements. Projects subject to this type of drainage review are typically Simplified Drainage Review proposals or other small projects that have ***site***-specific or project-specific drainage concerns that must be addressed by a ***civil engineer*** or DPER engineering review staff. Under Targeted Drainage Review, engineering costs associated with drainage design and review are kept to a minimum because the review includes only those requirements that would apply to the particular project.

Threshold

THRESHOLD

Targeted Drainage Review is required for any proposed project that is subject to drainage review as determined in Section 1.1.1, but is not subject to Directed, Full or Large Project Drainage Review as determined in Sections 1.1.2.3, 1.1.2.4 and 1.1.2.5, AND that has the characteristics of one or more of the following project categories:

- **TDR Project Category #1:** Projects that contain or are adjacent to a ***flood hazard area***, ***erosion hazard area***, or ***steep slope hazard area*** as defined in KCC 21A.06; OR projects located within a ***Critical Drainage Area*** or ***Landslide Hazard Drainage Area***. *Note: at the discretion of DPER, this category may also include any project in Simplified Drainage Review that has a design or* ***site****-specific issue that must be addressed by a* ***civil engineer****.*

- **TDR Project Category #2:** Projects that propose to ***construct or modify*** a drainage pipe/ditch that is 12 inches or more in size/depth or receives surface and storm water runoff from a drainage pipe/ditch that is 12 inches or more in size/depth.

- **TDR Project Category #3:** ***Redevelopment projects*** that propose $100,000 or more of improvements to an existing ***high-use site***.

Scope of Requirements

REQMTS

IF Targeted Drainage Review is required, THEN the applicant must demonstrate that the proposed project complies with the selected core and special requirements corresponding to the project category or categories that best match the proposed project. The project categories and applicable requirements for each are described below and summarized in Table 1.1.2.A (p. 1-15).

Note: If the proposed project has the characteristics of more than one project category, the requirements of each applicable category shall apply.

Compliance with these requirements requires the submittal of engineering plans and calculations stamped by a ***civil engineer***, unless deemed unnecessary by DPER. The engineer need only demonstrate compliance with those core and special requirements that have been predetermined to be applicable based on specific project characteristics as detailed below. The procedures and requirements for submitting engineering plans and calculations can be found in Section 2.3.

TDR Project Category #1

This category includes projects that are too small to trigger application of most core requirements, but may be subject to ***site***-specific floodplain or drainage requirements related to certain critical areas, or other area-specific drainage requirements adopted by the County. Such projects primarily include ***single family residential projects*** and ***agricultural projects*** in Simplified Drainage Review.

REQUIREMENTS

IF the proposed project meets the characteristics of TDR Project Category #1, THEN the applicant must demonstrate that the project complies with the following five requirements:

- Core Requirement #5: Erosion and Sediment Control, Section 1.2.5 (p. 1-60)
- Special Requirement #1: Other Adopted Area-Specific Requirements, Section 1.3.1 (p. 1-99)
- Special Requirement #2: Floodplain/Floodway Analysis, Section 1.3.2 (p. 1-101)
- Special Requirement #3: Flood Protection Facilities, Section 1.3.3 (p. 1-102)
- Special Requirement #4: Source Control, Section 1.3.4 (p. 1-103)

In addition, **DPER may require** the applicant to demonstrate compliance with any one or more of the **remaining seven core requirements** in Section 1.2 based on project or ***site***-specific conditions. For example, if the proposed project discharges to an ***erosion*** or ***steep slope hazard area*** as defined in KCC 21A.06, DPER may require compliance with "Core Requirement #1: Discharge at the Natural Location" (Section 1.2.1, p. 1-25). This may in turn require compliance with "Core Requirement #2: Offsite Analysis" (Section 1.2.2, p. 1-27) if a tightline is required by Core Requirement #1. If a tightline is found to be infeasible, DPER may instead require a flow control facility per "Core Requirement #3: Flow Control" (Section 1.2.3, p. 1-38). If a tightline is feasible, "Core Requirement #4: Conveyance System" (Section 1.2.4, p. 1-55) would be required to ensure proper size and design. Any required flow control facility or tightline system may also trigger compliance with "Core Requirement #6: Maintenance and Operations" (Section 1.2.6, p. 1-65), "Core Requirement #7: Financial Guarantees and Liability" (Section 1.2.7, p. 1-66), and possibly "Core Requirement #8, Water Quality" (Section 1.2.8, p. 1-68) if runoff from ***pollution-generating impervious surfaces*** is collected.

The applicant may also need to address compliance with any applicable critical areas requirements in KCC 21A as determined by DPER.

TDR Project Category #2

This category is intended to apply selected core and special requirements to those projects that propose to ***construct or modify*** a drainage system of specified size, but are not adding sufficient impervious surface to trigger Full Drainage Review or Large Project Drainage Review.

REQUIREMENTS

IF the proposed project meets the characteristics of TDR Project Category #2, THEN the applicant must demonstrate that the proposed project complies with the following requirements:

- Core Requirement #1: Discharge at the Natural Location, Section 1.2.1 (p. 1-25)
- Core Requirement #2: Offsite Analysis, Section 1.2.2 (p. 1-27)
- Core Requirement #4: Conveyance System, Section 1.2.4 (p. 1-55)
- Core Requirement #5: Erosion and Sediment Control, Section 1.2.5 (p. 1-60)
- Core Requirement #6: Maintenance and Operations, Section 1.2.6 (p. 1-65)
- Core Requirement #7: Financial Guarantees and Liability, Section 1.2.7 (p. 1-66)
- Special Requirement #4: Source Control, Section 1.3.4 (p. 1-103).

TDR Project Category #3

This category is intended to improve water quality by applying source control and oil control requirements to ***redevelopment projects*** located on the most intensively used ***sites*** developed prior to current water quality requirements. These are referred to as ***high-use sites***.

REQUIREMENTS

IF the proposed project meets the characteristics of TDR Project Category #3, THEN the applicant must demonstrate that the proposed project complies with the following requirements:

- Core Requirement #5: Erosion and Sediment Control, Section 1.2.5 (p. 1-60)
- Core Requirement #6: Maintenance and Operations, Section 1.2.6 (p. 1-65)
- Core Requirement #7: Financial Guarantees and Liability, Section 1.2.7 (p. 1-66)
- Special Requirement #4: Source Control, Section 1.3.4 (p. 1-103)
- Special Requirement #5: Oil Control, Section 1.3.5 (p. 1-105).

Note: In some cases, DPER may determine that application of these requirements does not require submittal of engineering plans and calculations stamped by a ***civil engineer****. For example, if catch basin inserts are proposed to meet oil control requirements, engineered plans and calculations may not be necessary. A plot plan showing catch basin locations may suffice.*

1.1.2.3 DIRECTED DRAINAGE REVIEW

Directed Drainage Review (DDR) is an evaluation of a proposed agricultural or single family residential project by DPER permit review staff to determine a specialized list of submittal (plans, technical reports, etc.) and engineering requirements that ensures compliance with all core and special requirements of the KCSWDM. Projects subject to this type of drainage review are agricultural and single family residential projects that do not qualify for Simplified Drainage Review.

DPER staff will review proposals and determine the following: whether the project is exempt from a given core or special requirement based on exemptions and exceptions listed in the KCSDM; whether a pre-engineered solution is available and feasible for meeting a given core or special requirement; whether a licensed civil engineer is required to comply with a given core or special requirement; and the type of technical report and plan submittal required to document compliance with the core and special requirements. Depending upon a project's site specific conditions, DDR may result in requirements for engineering or documentation that range from following the requirements of Appendix C to those required for full drainage review. DPER will provide and/or require documentation of the DDR process and decision making to be included in the project file that demonstrates how compliance with all core and special requirements in the KCSWDM is achieved.

Under Directed Drainage Review, engineering costs associated with drainage design and review are minimized because the review is tailored to the particular project.

THRESHOLD

Threshold

Directed Drainage Review is required for any proposed single family residential or agricultural project that is subject to drainage review as determined in Section 1.1.1 (p. 1-12) but is not subject to Simplified Drainage Review or Large Project Drainage Review as determined in Sections 1.1.2.1 and Section 1.1.2.5.

Scope of Requirements

REQMTS

IF Directed Review is required, THEN the proposed project must comply with the following requirements:

All nine core requirements in Section 1.2

All five special requirements in Section 1.3

Engineering plans and calculations stamped by a ***civil engineer*** may be required be submitted to demonstrate compliance with these requirements. The procedures and requirements for submittal of engineering plans and calculations are as directed by DPER in the DDR process.

1.1.2.4 FULL DRAINAGE REVIEW

Full Drainage Review is the evaluation by King County staff (DPER unless otherwise specified in KCC 9.04) of a proposed project's compliance with the full range of core and special requirements in this chapter. This review addresses the impacts associated with changing land cover on typical ***sites***.

Threshold

THRESHOLD

Full Drainage Review is required for any proposed project, including a ***redevelopment project***, that is subject to drainage review as determined in Section 1.1.1 (p. 1-12), OR that meets one or more of the following criteria:

- The project will result in 2,000 square feet[9] or more of ***new impervious surface***, ***replaced impervious surface***, or ***new*** plus ***replaced impervious surface*** but is not subject to Simplified Drainage Review or Directed Drainage Review as determined in Sections 1.1.2.1 (p. 1-16) and 1.1.2.3 (p. 1-21), OR
- The project will result in 7,000 square feet[9] or more of ***land disturbing activity*** but is not subject to Simplified Drainage Review or Directed Drainage Review as determined in Sections 1.1.2.1 and 1.1.2.3.

Scope of Requirements

REQMTS

IF Full Drainage Review is required, THEN the applicant must demonstrate that the proposed project complies with the following requirements:

- All nine core requirements in Section 1.2
- All five special requirements in Section 1.3

Engineering plans and calculations stamped by a ***civil engineer*** must be submitted to demonstrate compliance with these requirements. The procedures and requirements for submittal of engineering plans and calculations are found in Section 2.3.

[9] The thresholds of 2,000, 5,000, and 7,000 square feet shall be applied by ***project site***.

1.1.2.5 LARGE PROJECT DRAINAGE REVIEW

Large Project Drainage Review is applied to development proposals that are large and/or involve resources or problems of special sensitivity or complexity. Because of the large size and complexities involved, there is usually a greater risk of significant impact or irreparable damage to sensitive resources. Such proposals often require a more definitive approach to drainage requirements than that prescribed by the core and special requirements in Sections 1.2 and 1.3; it may be appropriate to collect additional information about ***site*** resources, use more sophisticated models, and prepare special studies not specified in this manual. Large Project Drainage Review entails preparation of a **master drainage plan (MDP)** or limited scope MDP that is reviewed and approved by DPER.

Threshold

THRESHOLD

Large Project Drainage Review is required for any proposed project that is subject to drainage review as determined in Section 1.1.1 (p. 1-12), AND that meets any one of the following criteria:

- The project is designated for an **Urban Planned Development (UPD)** on the King County Comprehensive Plan Land Use Map, OR
- The project would, at full buildout, result in 50 acres or more of ***new impervious surface*** within a single subbasin or multiple subbasins that are *hydraulically connected*[10] across subbasin boundaries, OR
- The ***project site*** is 50 acres or more (including growth reserve areas) within a ***critical aquifer recharge area*** as defined in KCC 21A.06.

Scope of Requirements

REQUIREMENTS

IF Large Project Drainage Review is required, THEN the applicant must do the following:

1. Prepare a **MDP**, limited scope MDP, or special study in accordance with the process and requirements described in the MDP guidelines, *Master Drainage Planning for Large or Complex Site Developments*, available from DNRP or DPER. The MDP or special study shall be completed, or a schedule for completion identified and agreed to by DPER, prior to permit approval. *Note: Generally, it is most efficient for the MDP process to parallel the state Environmental Policy Act (SEPA) process.*
2. Demonstrate that the proposed project complies with all the core and special requirements in Sections 1.2 and 1.3, with some **potential modifications as follows:**
   - Core Requirement #2, Offsite Analysis, is typically modified during MDP scoping.
   - Core Requirement #3, Flow Control, may be modified to require more sophisticated hydrologic modeling.
   - Core Requirement #5, ESC, may be modified to require enhanced construction monitoring.
   - Core Requirement #7, Financial Guarantees and Liability, may be modified to implement a monitoring fund.
   - Special pre- and post-development monitoring may also be required if deemed necessary by DPER to adequately characterize sensitive ***site*** and downstream resources, and to ensure that onsite drainage controls and mitigation measures are effective in protecting sensitive or critical resources. Detailed guidelines for monitoring are appended to the MDP guidelines referenced above.

[10] *Hydraulically connected* means connected through surface flow or water features such as wetlands or lakes.

1.1.3 DRAINAGE REVIEW REQUIRED BY OTHER AGENCIES

Drainage review for a proposed project's impact on surface and storm waters may be addressed by processes or requirements apart from King County's. Agencies such as those listed below may require some form of drainage review and impose drainage requirements that are separate from and in addition to King County's drainage requirements. The applicant is responsible for coordinating with these agencies and resolving any conflicts in drainage requirements. *Note: King County is required to advise the Muckleshoot Indian Tribe of development proposals affecting certain critical areas or water bodies bearing anadromous fish.*

Agency	Permit/Approval
Seattle/King County Department of Public Health	Onsite Sewage Disposal and Well permits
Washington State	
Department of Transportation	Developer/Local Agency Agreement
Department of Fish and Wildlife	Hydraulic Project Approval
Department of Ecology	Short Term Water Quality Modification Approval Dam Safety permit NPDES Stormwater permit
Department of Natural Resources	Forest Practices Class IV permit
United States Army Corps of Engineers	Sections 10, 401, and 404 permits

1.1.4 DRAINAGE DESIGN BEYOND MINIMUM COMPLIANCE

This manual presents King County's minimum standards for engineering and design of drainage facilities. While the County believes these standards are appropriate for a wide range of development proposals, compliance solely with these requirements does not relieve the professional engineer submitting designs of his or her responsibility to ensure drainage facilities are engineered to provide adequate protection for natural resources and public and private property.

Compliance with the standards in this manual does not necessarily mitigate all probable and significant environmental impacts to aquatic biota. Fishery resources and other living components of aquatic systems are affected by a complex set of factors. While employing a specific flow control standard may prevent stream channel erosion or instability, other factors affecting fish and other biotic resources (e.g., increases in stream flow velocities) are not directly addressed by this manual. Likewise, some wetlands, including bogs, are adapted to a very constant hydrologic regime. Even the most stringent flow control standard employed by this manual does not prevent increases in runoff volume, which can adversely affect wetland plant communities by increasing the duration and magnitude of water level fluctuations. Thus, compliance with this manual should not be construed as mitigating all probable and significant stormwater impacts to aquatic biota in streams and wetlands; additional mitigation may be required.

In addition, the requirements in this manual target the types of impacts associated with the most typical land development projects occurring in the lowland areas of the County. Applying these requirements to vastly different types of projects, such as rock quarries or dairy farms, or in different climatic situations, such as ski areas, may result in poorer mitigation of impacts. Therefore, different mitigation may be required.

Additional mitigation may also be required to compensate for loss of critical area habitat functions associated with reducing standard buffer widths and clearing restrictions as allowed through the approval of Rural Stewardship Plans and Farm Management Plans per KCC 21A.24 and KCC 16.82.

1.2 CORE REQUIREMENTS

This section details the following nine core requirements:

- "Core Requirement #1: Discharge at the Natural Location," Section 1.2.1
- "Core Requirement #2: Offsite Analysis," Section 1.2.2 (p. 1-27)
- "Core Requirement #3: Flow Control," Section 1.2.3 (p. 1-38)
- "Core Requirement #4: Conveyance System," Section 1.2.4 (p. 1-55)
- "Core Requirement #5: Erosion and Sediment Control," Section 1.2.5 (p. 1-60)
- "Core Requirement #6: Maintenance and Operations," Section 1.2.6 (p. 1-65)
- "Core Requirement #7: Financial Guarantees and Liability," Section 1.2.7 (p. 1-66)
- "Core Requirement #8: Water Quality," Section 1.2.8 (p. 1-68)
- “Core Requirement #9: Flow Control BMPs”, Section 1.2.9 (p. 1-83)

1.2.1 CORE REQUIREMENT #1: DISCHARGE AT THE NATURAL LOCATION

REQUIREMENT

All storm water runoff and surface water from a project must be discharged at the natural location so as not to be diverted onto or away from downstream properties. The manner in which stormwater runoff and surface water are discharged from the ***project site*** must not create a significant adverse impact to downhill properties or drainage facilities (see "Discharge Requirements" below). Drainage facilities as described above means a constructed or engineered feature that collects, conveys, stores, treats, or otherwise manages surface water or stormwater runoff. “Drainage facility” includes, but is not limited to, a constructed or engineered stream, lake, wetland, or closed depression, or a pipe, channel, ditch, gutter, flow control facility, flow control BMP, water quality facility, erosion and sediment control facility, and any other structure and appurtenance that provides for drainage. *Note: Projects that do not discharge all **project site** runoff at the natural location will require an approved adjustment of this requirement (see Section 1.4). DPER may waive this adjustment, however, for projects in which only a small portion of the **project site** does not discharge runoff at the natural location and the runoff from that portion is unconcentrated and poses no significant adverse impact to downstream properties.*

Intent: To prevent adverse impacts to downstream properties caused by diversion of flow from one flowpath to another, and to discharge in a manner that does not significantly impact downhill properties or drainage systems. Diversions can cause greater impacts (from greater runoff volumes) than would otherwise occur from new development discharging runoff at the natural location. Diversions can also impact properties that rely on runoff water to replenish wells and ornamental or fish ponds.

❑ DISCHARGE REQUIREMENTS

Proposed projects must comply with the following discharge requirements (1, 2, and 3) as applicable:

1. Where no conveyance system exists at the abutting downstream property line and the natural (existing) discharge is unconcentrated, any runoff concentrated by the proposed project must be discharged as follows:

a) IF the 100-year peak discharge[11] is less than or equal to 0.2 cfs under existing conditions and will remain less than or equal to 0.2 cfs under developed conditions, THEN the concentrated runoff may be discharged onto a rock pad or to any other system that serves to disperse flows.

b) IF the 100-year peak discharge is less than or equal to 0.5 cfs under existing conditions and will remain less than or equal to 0.5 cfs under developed conditions, THEN the concentrated runoff may be discharged through a dispersal trench or other dispersal system provided the applicant can demonstrate that there will be no significant adverse impact to downhill properties or drainage systems.

c) IF the 100-year peak discharge is greater than 0.5 cfs for either existing or developed conditions, or if a significant adverse impact to downhill properties or drainage systems is likely, THEN a conveyance system must be provided to convey the concentrated runoff across the downstream properties to an acceptable discharge point.[12] Drainage easements for this conveyance system must be secured from downstream property owners and recorded prior to engineering plan approval.

2. IF a proposed project, or any ***natural discharge area*** within a project, is located within a ***Landslide Hazard Drainage Area*** and drains over the erodible soils of a ***landslide hazard area*** with slopes steeper than 15%, THEN a **tightline system must be provided** through the ***landslide hazard area*** to an acceptable discharge point unless one of the following exceptions applies. The tightline system must comply with the design requirements in Core Requirement #4 and in Section 4.2.2 unless otherwise approved by DPER. Drainage easements for this system must be secured from downstream property owners and recorded prior to engineering plan approval.

   Exceptions: A tightline is not required for any ***natural discharge location*** where DPER approves an alternative system based on a geotechnical evaluation/recommendation from a licensed geotechnical engineer that considers cumulative impacts on the hazard area under built out conditions AND one of the following conditions can be met:

   a) Less than 2,000 square feet of ***new impervious surface*** will be added within the ***natural discharge area***, OR

   b) The developed conditions runoff from the ***natural discharge area*** is less than 0.1 cfs for the 100-year runoff event and will be infiltrated for runoff events up to and including the 100-year event, OR

   c) The *developed conditions runoff volume*[13] from the ***natural discharge area*** is less than 50% of the existing conditions runoff volume from other areas draining to the location where runoff from the ***natural discharge area*** enters the ***landslide hazard area*** onto slopes steeper than 15%, AND the provisions of Discharge Requirement 1 are met, OR

   d) DPER determines that a tightline system is not physically feasible or will create a significant adverse impact based on a soils report by a geotechnical engineer.

3. For projects adjacent to or containing a ***landslide***, ***steep slope***, or ***erosion hazard area*** as defined in KCC 21A.06, the applicant must demonstrate that onsite drainage facilities and/or flow control BMPs will not create a significant adverse impact to downhill properties or drainage systems.

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[11] Peak discharges for applying this requirement are determined using the approved runoff model with 15-minute time steps as detailed in Chapter 3.

[12] *Acceptable discharge point* means an enclosed drainage system (i.e., pipe system, culvert, or tightline) or open drainage feature (e.g., ditch, channel, swale, stream, river, pond, lake, or wetland) where concentrated runoff can be discharged without creating a significant adverse impact.

[13] For the purposes of applying this exception, the *developed conditions runoff volume* is the average annual runoff volume as computed per Chapter 3. The analysis is performed using the entire period of record. The total volume is divided by the number of full water years being analyzed to determine the annual average runoff volume. Any areas assumed not to be cleared when computing the developed conditions runoff volume must be set aside in an open space tract or covenant in order for the proposed project to qualify for this exception. Preservation of existing forested areas in Landslide Hazard Drainage Areas is encouraged.

1.2.2 CORE REQUIREMENT #2: OFFSITE ANALYSIS

REQMT

All proposed projects must submit an offsite analysis report that assesses potential offsite drainage and water quality impacts associated with development of the ***project site,*** and that proposes appropriate mitigation of those impacts. The initial permit submittal shall include, at minimum, a **Level 1 downstream analysis** as described in Section 1.2.2.1 below. If impacts are identified, the proposed projects shall meet any applicable problem-specific requirements specified in Section 1.2.2.2 (p. 1-32) for mitigation of impacts to drainage problems and Section 1.2.2.3 (p. 1-35) for mitigation of impacts to water quality problems.

Intent: To identify and evaluate offsite flooding, erosion, and water quality problems that may be created or aggravated by the proposed project, and to ensure appropriate measures are provided for preventing creation or aggravation of those problems. In addition, this requirement is intended to ensure appropriate provisions are made, as needed, to mitigate other identified impacts associated with the quantity and quality of surface and storm water runoff from the ***project site*** (e.g., impacts to the hydrology of a wetland as may be identified by a "critical area report" per KCC 21A.24.110).

The primary component of an offsite analysis report is the **downstream analysis**, which examines the drainage system within one-quarter mile downstream of the ***project site*** or farther as described in Section 1.2.2.1 below. It is intended to identify existing or potential/predictable downstream flooding, erosion, and water quality problems so that appropriate mitigation, as specified in Sections 1.2.2.2 and 1.2.2.3, can be provided to prevent aggravation of these problems. A secondary component of the offsite analysis report is an **evaluation of the upstream drainage system** to verify and document that significant flooding and erosion impacts will not occur as a result of the proposed project. The evaluation must extend upstream to a point where any backwater effects created by the project cease.

❑ EXEMPTION FROM CORE REQUIREMENT #2

With the exception of:

- Projects that trigger Core Requirement #3 (Flow Control Facilities) which must at minimum perform offsite analysis sufficient to identify and address “Downstream Drainage Problems Requiring Special Attention (Section 1.2.2.1.1), Problem Type 4 (Potential Impacts to Wetland Hydrology problem)”, and
- Projects that trigger Core Requirement # 8 (Water Quality Facilities) which must at minimum perform offsite analysis sufficient to identify and address “Downstream Water Quality Problems Requiring Special Attention (Section 1.2.2.1.2)”,

a proposed project is exempt from Core Requirement #2 if any one of the following is true:

1. DPER determines there is sufficient information for them to conclude that the project will not have a significant adverse impact on the downstream and/or upstream drainage system, OR
2. The project adds less than 2,000 square feet of ***new impervious surface***, AND less than ¾ acre of ***new pervious surface***, AND does not ***construct or modify*** a drainage pipe/ditch that is 12 inches or more in size/depth or that receives runoff from a drainage pipe/ditch that is 12 inches or more in size/depth, AND does not contain or lie adjacent to a ***landslide***, ***steep slope***, or ***erosion hazard area*** as defined in KCC 21A.06, OR
3. The project does not change the rate, volume, duration, or location of discharges to and from the ***project site*** (e.g., where existing impervious surface is replaced with other impervious surface having similar runoff-generating characteristics, or where pipe/ditch modifications do not change existing discharge characteristics).

1.2.2.1 DOWNSTREAM ANALYSIS

The level of downstream analysis required depends on specific ***site*** and downstream conditions. Each project submittal must include at least a Level 1 downstream analysis. Upon review of the Level 1 analysis, DPER may require a Level 2 or Level 3 analysis. If conditions warrant, additional, more detailed analysis may be required.

The **Level 1 downstream analysis** is a qualitative survey of each downstream system and is the first step in identifying flooding problems, erosion problems, or potential impacts to wetland hydrology problems as described below under "Downstream Drainage Problems Requiring Special Attention." The Level 1 analysis also identifies water quality problems as described below under "Downstream Water Quality Problems Requiring Special Attention." Each Level 1 analysis is composed of four tasks at a minimum:

- **Task 1**: Define and map the study area
- **Task 2**: Review all available information on the study area
- **Task 3**: Field inspect the study area
- **Task 4**: Describe the drainage system, and its existing and predicted drainage and water quality problems.

Upon review of the Level 1 analysis, DPER may require a Level 2 or 3 downstream analysis, depending on the presence of existing or predicted flooding, erosion, or nuisance problems identified in the Level 1 analysis.

Levels 2 and 3 downstream analysis quantify downstream flooding, erosion, or nuisance problems by providing information on the severity and frequency of an existing problem or the likelihood of creating a new problem. A Level 2 analysis is a rough quantitative analysis (non-survey field data, uniform flow analysis). Level 3 is a more precise analysis (e.g., survey field data, backwater analysis) of significant problems. If conditions warrant, additional, more detailed analysis may be required beyond Level 3. For Levels 2 and 3 downstream analyses, an additional **Task 5**, addressing mitigation of existing and potential flooding, erosion, or nuisance problems, will be required.

Extent of Downstream Analysis

The downstream analysis must consider the existing conveyance system(s) for a **minimum flowpath distance downstream** of one-quarter mile and beyond that, as needed, to reach a point where the ***project site*** area constitutes less than 15% of the tributary area. This minimum distance **may be increased** as follows:

- **Task 2** of a Level 1 downstream analysis (described in detail in Section 2.3.1.1) is a review of all available information on the downstream area and is intended to identify existing drainage and water quality problems. *In all cases, this information review shall extend one mile downstream of the* ***project site***. The existence of flooding or erosion problems further downstream may extend the one-quarter-mile/15% minimum distance for other tasks to allow evaluation of impacts from the proposed development upon the identified flooding or erosion problems. The existence of documented water quality problems beyond the one-quarter-mile/15% distance may in some cases require additional mitigation of impacts as determined necessary by DPER based on the type and severity of problem.
- If a project's impacts to flooding or erosion problems are mitigated by improvements to the downstream conveyance system, the downstream analysis will extend a minimum of one-quarter mile beyond the improvement. This is necessary because many such improvements result in a reduction of stormwater storage or an increase in peak flows from the problem location.
- At their discretion, DPER may extend the downstream analysis beyond the minimum distance specified above on the reasonable expectation of drainage or water quality impacts.

A detailed description of the scope of offsite analysis and submittal requirements is provided in Section 2.3.1.1. Hydrologic analysis methods and requirements for Levels 2 and 3 downstream analyses are contained in Chapter 3; hydraulic analysis methods are contained in Chapter 4.

1.2.2.1.1 DOWNSTREAM DRAINAGE PROBLEMS REQUIRING SPECIAL ATTENTION

While the area-specific flow control facility requirement in Core Requirement #3 (Section 1.2.3.1) serves to minimize the creation and aggravation of many types of downstream drainage problems, there are some types that are more sensitive to creation/aggravation than others depending on the nature or severity of the problem and which flow control facility standard is being applied. In particular, there are four types of downstream drainage problems for which the County has determined that the nature and/or severity of the problem warrants additional attention through the downstream analysis and possibly additional mitigation to ensure no creation/aggravation:

1. ***Conveyance system nuisance problem***
2. ***Severe erosion problem***
3. ***Severe flooding problem***.
4. ***Potential Impacts to Wetland Hydrology problem***.

These four types of downstream drainage problem are further described below and precisely defined at the beginning of Chapter 1.

Conveyance System Nuisance Problem (Type 1)

Conveyance system nuisance problems are minor but chronic flooding or erosion problems that result from the overflow of a constructed conveyance system that is substandard or has become too small as a result of upstream development (see p. 1-2 for a precise definition). Such problems warrant additional attention because of their chronic nature and because they result from the failure of a conveyance system to provide a minimum acceptable level of protection.

If a ***conveyance system nuisance problem*** is identified or predicted downstream, the need for additional mitigation must be evaluated as specified in Section 1.2.2.2 under "Drainage Problem-Specific Mitigation Requirements" (p. 1-34). This may entail additional onsite flow control or other measures as needed to prevent creation or significant aggravation of the problem.

For any other nuisance problem that may be identified downstream, this manual does not require mitigation beyond the area-specific flow control facility requirement applied in Core Requirement #3 (Section 1.2.3.1) because preventing aggravation of such problems (e.g., those caused by the elevated water surfaces of ponds, lakes, wetlands, and closed depressions or those involving downstream erosion) can require two to three times as much onsite detention volume, which is considered unwarranted for nuisance problems. However, if under some unusual circumstance, the aggravation of such a nuisance problem is determined by DPER to be a significant adverse impact, additional mitigation may be required.

Severe Erosion Problem (Type 2)

Severe erosion problems can be caused by conveyance system overflows or the concentration of runoff into erosion-sensitive open drainage features (see p. 1-8 for a precise definition). ***Severe erosion problems*** warrant additional attention because they pose a significant threat either to health and safety or to public or private property.

If a ***severe erosion problem*** is identified or predicted downstream, additional mitigation must be considered as specified in Section 1.2.2.2 under "Drainage Problem-Specific Mitigation Requirements" (p. 1-34). This may entail additional onsite flow control or other measures as needed to prevent creation or aggravation of the problem.

Severe Flooding Problem (Type 3)

Severe flooding problems (i.e., a ***severe building flooding problem*** or ***severe roadway flooding problem***) can be caused by conveyance system overflows or the elevated water surfaces of ponds, lakes, wetlands, or closed depressions (see p. 1-9 for precise definitions). ***Severe flooding problems*** warrant additional attention because they pose a significant threat either to health and safety or to public or private property.

If a ***severe flooding problem*** is identified or predicted downstream, the need for additional mitigation must be evaluated as specified in Section 1.2.2.2 under "Drainage Problem-Specific Mitigation Requirements" (p. 1-34). This may entail consideration of additional onsite flow control or other measures as needed to prevent creation or significant aggravation of the problem.

Potential Impacts to Wetlands Hydrology Problem (Type 4)

Potential impacts to wetlands hydrology can be caused by changes in the rate, duration, and quantity of stormwater discharged from the project site to a wetland.

Where wetlands are identified on the site, the applicant shall submit a critical area report at a level determined by DPER to adequately evaluate the proposal and probable impacts.

Where wetlands are identified off the site AND the project is not exempt from Core Requirement 3, the applicant shall submit a critical area report at a level determined by DPER to adequately evaluate the proposal and probable impacts.

Based upon the critical area report, DPER will determine if the quantity of surface and storm water runoff from a proposed project or ***threshold discharge area*** within a proposed project could significantly alter the hydrology of a wetland-- in which case, DPER will require (as described in Section 1.2.2.2 under “Drainage Problem-Specific Mitigation Requirements”), implementation of additional flow control or other measures to mitigate the adverse impacts of this alteration in accordance with the wetland hydrology protection guidelines in Reference Section 5.

1.2.2.1.2 DOWNSTREAM WATER QUALITY PROBLEMS REQUIRING SPECIAL ATTENTION

A *water quality problem*, for the purposes of impact mitigation in this manual, is a situation in which a waterbody of the State is documented by the Federal Government, State, or County to be exceeding or at concern of exceeding the State's numeric water quality standards, or is subject to a federal, state, or county cleanup program or action. Water quality problems and associated water quality standards encompass surface water, groundwater, and sediment quality. The goal of this manual is to prevent creation or significant aggravation of such problems to the maximum extent practicable. While the area-specific water quality facility requirement in Section 1.2.8.1, the source controls required in Section 1.3.4, and the oil controls required in Section 1.3.5 all serve to minimize the creation and aggravation of many types of downstream water quality problems, there are some types that are either not addressed by these requirements (e.g., temperature problems) or warrant additional measures/considerations to minimize the proposed project's impacts to the maximum extent practicable. In particular, there are currently 7 types of downstream water quality problems for which the County has determined that additional attention needs to be given to preventing or minimizing increases in the pollutant or pollutants of concern discharging from the ***site***. These are as follows:

1. Bacteria Problem
2. Dissolved Oxygen Problem
3. Temperature Problem
4. Metals Problem
5. Phosphorus Problem
6. Turbidity Problem
7. High pH Problem

These problems are defined below and the mitigation of impacts to them is addressed in Section 1.2.2.3.

Bacteria Problem (Type 1)

A *bacteria problem* is defined as a stream reach, lake, or other waterbody of the state that is either (1) currently **designated by the state as a Category 5, 4, or 2 Waterbody** due to exceedance or concern for exceedance of the state's numeric water quality standard for **fecal coliform** as documented in the state's Water Quality Assessment 303(d)/305(b) Integrated Report and as displayed in WA Ecology's electronic database and map viewer[14] of these waterbodies, or (2) is currently **designated by the County as a bacteria problem** based on credible data indicating exceedance or concern for exceedance of the state's numeric water quality standard for **fecal coliform** as documented in the latest published list of King County-Identified WQ Problems (Reference Section 10) posted at King County's Surface Water Design Manual web page[15].

Dissolved Oxygen (DO) Problem (Type 2)

A *dissolved oxygen problem* is defined as a stream reach, lake, or other waterbody of the state that is either (1) currently **designated by the state as a Category 5, 4, or 2 Waterbody** due to exceedance or concern for exceedance of the state's numeric water quality standard for dissolved oxygen as documented in the state's Water Quality Assessment 303(d)/305(b) Integrated Report and as displayed in WA Ecology's electronic database and map viewer[14] of these waterbodies, or (2) is currently **designated by the County as a DO problem** based on credible data indicating exceedance or concern for exceedance of the state's numeric water quality standard for dissolved oxygen as documented in the latest published list of King County-Identified WQ Problems (Reference Section 10) posted at King County's Surface Water Design Manual web page[15].

Temperature Problem (Type 3)

A *temperature problem* is defined as a stream reach, lake, or other waterbody of the state that is either (1) currently **designated by the state as a Category 5, 4, or 2 Waterbody** due to exceedance or concern for exceedance of the state's numeric water quality standard for temperature as documented in the state's Water Quality Assessment 303(d)/305(b) Integrated Report and as displayed in WA Ecology's electronic database and map viewer[14] of these waterbodies, or (2) is currently **designated by the County as a temperature problem** based on credible data indicating exceedance or concern for exceedance of the state's numeric water quality standard for temperature as documented in the latest published list of King County-Identified WQ Problems (Reference Section 10) posted at King County's Surface Water Design Manual web page[15].[15]

Metals Problem (Type 4)

A *metals problem* is defined as a stream reach, lake, or other waterbody of the state that is either (1) currently **designated by the state as a Category 5, 4, or 2 Waterbody** due to exceedance or concern for exceedance of the state's numeric water quality standards for metals (**e.g., copper, zinc, lead, mercury, etc.**) as documented in the state's Water Quality Assessment 303(d)/305(b) Integrated Report and as displayed in WA Ecology's electronic database and map viewer[14] of these waterbodies, or (2) is currently **designated by the County as a metals problem** based on credible data indicating exceedance or concern for exceedance of the state's numeric water quality standards for metals (**e.g., copper, zinc, lead, mercury, etc.**) as documented in the latest published list of King County-Identified WQ Problems (Reference Section 10) posted at King County's Surface Water Design Manual web page[15].

Phosphorus Problem (Type 5)

A *phosphorus problem* is defined as a stream reach, lake, or other waterbody of the state that is either (1)

[14] The link to the Query Tool is https://fortress.wa.gov/ecy/wats/approvedsearch.aspx; select all appropriate mediums. The Map Tool is at https://fortress.wa.gov/ecy/wqamapviewer/default.aspx?res=1280x1024

[15] http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx .

currently **designated by the state as a Category 5, 4, or 2 Waterbody** due to exceedance or concern for exceedance of the state's numeric action standard for **total phosphorus** as documented in the state's Water Quality Assessment 303(d)/305(b) Integrated Report and as displayed in WA Ecology's electronic database and map viewer[16][14] of these waterbodies, or (2) is currently **designated by the County as a nutrient problem** based on credible data indicating exceedance or concern for exceedance of the state's numeric action standard for **total phosphorus** as documented in the latest published list of King County-Identified WQ Problems (Reference Section 10) posted at King County's Surface Water Design Manual web page[17].[15]

Turbidity Problem (Type 6)

A *turbidity problem* is defined as a stream reach, lake, or other waterbody of the state that is either (1) currently **designated by the state as a Category 5, 4, or 2 Waterbody** due to exceedance or concern for exceedance of the state's numeric water quality standard for turbidity as documented in the state's Water Quality Assessment 303(d)/305(b) Integrated Report and as displayed in WA Ecology's electronic database and map viewer[16][14] of these waterbodies, or (2) is currently **designated by the County as a turbidity problem** based on credible data indicating exceedance or concern for exceedance of the state's numeric water quality standard for turbidity as documented in the latest published list of King County-Identified WQ Problems (Reference Section 10) posted at King County's Surface Water Design Manual web page[17].[15]

High pH Problem (Type 7)

A *High pH problem* is defined as a stream reach, lake, or other waterbody of the state that is either (1) currently **designated by the state as a Category 5, 4, or 2 Waterbody** due to exceedance or concern for exceedance of the state's numeric water quality standard for high pH as documented in the state's Water Quality Assessment 303(d)/305(b) Integrated Report and as displayed in WA Ecology's electronic database and map viewer[16][14] of these waterbodies, or (2) is currently **designated by the County as a pH problem** based on credible data indicating exceedance or concern for exceedance of the state's numeric water quality standard for pH as documented in the latest published list of King County-Identified WQ Problems (Reference Section 10) posted at King County's Surface Water Design Manual web page[17].[15]

1.2.2.2 DRAINAGE PROBLEM IMPACT MITIGATION

*A proposed project must not significantly aggravate existing downstream drainage problems or create new problems as a result of developing the **site**.* This manual does not require development proposals to fix or otherwise reduce the severity of existing downstream drainage problems, although doing so may be an acceptable mitigation.

Principles of Impact Mitigation for Drainage Problems

Aggravation of an existing downstream drainage problem means increasing the frequency of occurrence and/or severity of the problem. Increasing peak flows at the location of a problem caused by conveyance system overflows can increase the frequency of the problem's occurrence. Increasing durations of flows at or above the overflow return frequency can increase the severity of the problem by increasing the depth and duration of flooding. Controlling peaks and durations through onsite detention can prevent aggravation of such problems by releasing the increased volumes from development at return frequencies below the conveyance overflow return frequency, which limits their effect to just causing the conveyance system to flow full for a longer period of time.

When a problem is caused by high water-surface elevations of a volume-sensitive water body, such as a lake, wetland, or closed depression, aggravation is the same as for problems caused by conveyance

[16] The link to the Query Tool is https://fortress.wa.gov/ecy/wats/approvedsearch.aspx ; select all appropriate mediums. The Map Tool is at https://fortress.wa.gov/ecy/wqamapviewer/default.aspx?res=1280x1024

[17] http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx

overflows. Increasing the volume of flows to a volume-sensitive water body can increase the frequency of the problem's occurrence. Increasing the duration of flows for a range of return frequencies both above and below the problem return frequency can increase the severity of the problem; mitigating these impacts requires control of flow durations for a range of return frequencies both above and below the problem return frequency. The net effect of this duration control is to release the increased volumes from development only at water surface elevations below that causing the problem, which in turn can cause an increase in these lower, but more frequently occurring, water surface elevations. This underscores an unavoidable impact of development upstream of volume-sensitive water bodies: the increased volumes generated by the development will cause some range of increase in water surface elevations, no matter what detention standard is applied.

Creating a new drainage problem means increasing peak flows and/or volumes so that after development, the frequency of conveyance overflows or water surface elevations exceeds the thresholds for the various problem types discussed in Section 1.2.2.1. For example, application of the Level 1 flow control standard requires matching the ***existing site conditions*** 2- and 10-year peak flows. The 100-year peak flow is only partially attenuated, and the flow increase may be enough to cause a ***severe flooding problem*** as described on page 1-30. The potential for causing a new problem is often identified during the Level 1 downstream analysis, where the observation of a reduction in downstream pipe sizes, for example, may be enough to predict creation of a new problem. A Level 2 or 3 analysis will typically be required to verify the capacity of the system and determine whether 100-year flows can be safely conveyed.

Significance of Impacts to Existing Drainage Problems

The determination of whether additional onsite mitigation or other measures are needed to address an existing downstream drainage problem depends on the significance of the proposed project's predicted impact on that problem. For some identified problems, DPER will make the determination as to whether the project's impact is significant enough to require additional mitigation. For Type 1, 2, and 3 downstream drainage problems described in Section 1.2.2.1.1, this threshold of significant impact or aggravation is defined below. For a Type 4, "***Potential Impacts to Wetland Hydrology problem***", DPER will make this determination based on required critical area report findings, the wetland hydrology protection guidelines found in Reference Section 5, the project's relative contribution to the identified wetland's hydrology, and the mitigation proposed in meeting other requirements (e.g. flow control facilities and flow control BMPs).

For ***conveyance system nuisance problems***, the problem is considered significantly aggravated if there is any increase in the project's contribution to the frequency of occurrence and/or severity of the problem for runoff events less than or equal to the 10-year event. *Note: Increases in the project's contribution to this type of problem are considered to be prevented if sufficient onsite flow control and/or offsite improvements are provided as specified in Table 1.2.3.A (p. 1-40).*

For ***severe erosion problems***, the problem is considered significantly aggravated if there is any increase in the project's existing contribution to the *flow duration*[18] of peak flows ranging from 50% of the 2-year peak flow up to the full 50-year peak flow at the eroded area. *Note: Increases in the project's contribution to this type of problem are considered to be prevented if Level 2 flow control or offsite improvements are provided as specified in Table 1.2.3.A (p. 1-40).*

For ***severe building flooding problems***, the problem is considered significantly aggravated if there is any increase in the project's existing contribution[19] to the frequency, depth, or duration of the problem for

[18] *Flow duration* means the aggregate time that peak flows are at or above a particular flow rate (e.g., the amount of time over the last 50 years that peak flows were at or above the 2-year flow rate). *Note: flow duration is not considered to be increased if it is within the tolerances specified in Chapter 3.*

[19] Increases in the project's contribution are considered to be prevented if sufficient onsite flow control and/or offsite improvements are provided as specified for ***severe flooding problems*** in Table 1.2.3.A (p. 1-49). For ***severe flooding problems*** located within the mapped 100-year floodplain of a ***major receiving water*** (see Table 1.2.3.B, p. 1-51) or the mapped 100-year floodplain of a major stream for which there is an adopted basin plan, increases in the project's contribution are considered negligible (zero) regardless of the flow control standard being applied, unless DPER determines there is a potential for increased flooding separate from that associated with the existing 100-year floodplain.

runoff events less than or equal to the 100-year event.

For ***severe roadway flooding problems***, the problem is considered significantly aggravated if any of the following thresholds are exceeded and there is any increase in the project's existing contribution[19] to the frequency, depth, or duration of the problem for runoff events less than or equal to the 100-year event:

- The *existing flooding*[20] over all lanes of a **roadway** or overtopping the culverted section of a **sole access driveway** is predicted to increase in depth more than a quarter-inch or 10% (whichever is greater) for the 100-year runoff event.
- The existing flooding over all lanes of a **roadway** or severely impacting a **sole access driveway** is more than 6 inches deep or faster than 5 feet per second for runoff events less than or equal to the 100-year event. A **severely impacted sole access driveway** is one in which flooding overtops a culverted section of the driveway, posing a threat of washout or unsafe access conditions due to indiscernible driveway edges, or flooding is deeper than 6 inches on the driveway, posing a severe impediment to emergency access.
- The existing flooding over all lanes of a *sole access roadway*[21] is more than 3 inches deep or faster than 5 feet per second for runoff events less than or equal to the 100-year event, or is at any depth for runoff events less than or equal to the 10-year event.

❑ DRAINAGE PROBLEM-SPECIFIC MITIGATION REQUIREMENTS

1. IF a proposed project or ***threshold discharge area*** within a project drains to one or more of Type 1, Type 2, or Type 3 downstream drainage problems described in Section 1.2.2.1 (pages 1-29 and 1-30) as identified through a downstream analysis, THEN the applicant must do one of the following:

   a) Submit a Level 2 or Level 3 downstream analysis per Section 2.3.1 demonstrating that the proposed project will not create or significantly aggravate the identified downstream drainage problem(s), OR

   b) Show that the ***natural discharge area*** or ***threshold discharge area*** draining to the identified problem(s) qualifies for an exemption from Core Requirement #3: Flow Control (Section 1.2.3, p. 1-38) or an exception from the applicable area-specific flow control facility requirement per Section 1.2.3.1 (p. 1-39), OR

   c) Document that the applicable area-specific flow control facility requirement specified in Core Requirement #3 is adequate to prevent creation or significant aggravation of the identified downstream drainage problem(s) as indicated in Table 1.2.3.A (p. 1-40) with the phrase, "No additional flow control needed," OR

   d) Provide additional onsite flow control necessary to prevent creation or significant aggravation of the downstream drainage problem(s) as specified in Table 1.2.3.A (p. 1-40) and further detailed in Section 3.3.5, OR

   e) Provide offsite improvements necessary to prevent creation or significant aggravation of the identified downstream drainage problem(s) as detailed in Chapter 3 unless identified as not necessary in Table 1.2.3.A (p. 1-40), OR

   f) Provide a combination of additional onsite flow control and offsite improvements sufficient to prevent creation or significant aggravation of the downstream drainage problem(s) as demonstrated by a Level 2 or Level 3 downstream analysis.

2. IF it is identified that the manner of discharge from a proposed project may create a significant adverse impact as described in Core Requirement #1, THEN DPER may require the applicant to implement additional measures or demonstrate that the impact will not occur.

[20] *Existing flooding*, for the purposes of this definition, means flooding over all lanes of the roadway or driveway has occurred in the past and can be verified by County records, County personnel, photographs, or other physical evidence.

[21] *Sole access roadway* means there is no other flood-free route for emergency access to one or more dwelling units.

3. IF it is identified through a critical area review as described under "**Potential Impacts to Wetlands Hydrology Problem (Type 4)"**, that the quantity of surface and storm water runoff from a proposed project or ***threshold discharge area*** within a proposed project could significantly alter the hydrology of a wetland (Type 4 problem), THEN DPER shall require the applicant to implement additional flow control or other measures to mitigate the adverse impacts of this alteration in accordance with the wetland hydrology protection guidelines in Reference Section 5.

Intent: To ensure provisions are made (if necessary) to prevent creation or significant aggravation of the four types of downstream drainage problems requiring special attention by this manual, and to ensure compliance with the discharge requirements of Core Requirement #1.

In addressing downstream drainage problems per Problem-Specific Mitigation Requirement 1 above, additional onsite flow control will often be the easiest provision to implement. This involves designing the required onsite flow control facility to meet an additional set of performance criteria targeted to prevent significant aggravation of specific downstream drainage problems. To save time and analysis, a set of predetermined flow control performance criteria corresponding to each of the three types of downstream drainage problems is provided in Table 1.2.3.A (p. 1-40) and described in more detail in Chapter 3.

Note that in some cases the area-specific flow control facility requirement applicable to the proposed project per Section 1.2.3.1 (p. 1-39) is already sufficient to prevent significant aggravation of many of the defined downstream drainage problem types. Such situations are noted in Table 1.2.3.A (p. 1-40) as not needing additional onsite flow control or offsite improvements. For example, if the project is located within a Conservation Flow Control Area subject to the Level 2 flow control standard per Section 1.2.3.1.B (p. 1-44), and a ***conveyance system nuisance problem*** is identified through offsite analysis per Core Requirement #2, no additional onsite flow control is needed, and no offsite improvements are necessary.

1.2.2.3 WATER QUALITY PROBLEM IMPACT MITIGATION

As stated in Section 1.2.2.1, the goal of this manual is to prevent creation and/or significant aggravation of water quality problems to the maximum extent practicable. This is accomplished through a number of mitigation requirements, including (1) the area-specific water quality facility requirement in Section 1.2.8.1, (2) any mitigation required by other adopted area-specific requirements per Special Requirement #1, Section 1.3.1, (3) the source controls required in Special Requirement #4, Section 1.3.4, (4) the oil control required in Special Requirement #5, Section 1.3.5, and (5) the water quality problem-specific mitigation requirements presented in this section. *Note that this manual does not require development proposals to fix or otherwise reduce the severity of existing downstream water quality problems, although doing so may be an acceptable mitigation.*

❑ WATER QUALITY PROBLEM-SPECIFIC MITIGATION REQUIREMENTS

IF a proposed project drains to one or more of the 7 types of downstream water quality problems defined in Section 1.2.2.1 as identified through a downstream analysis, THEN the applicant must comply with the following problem-specific mitigation requirements that apply. *Note that DPER may require additional measures if the opportunity exists to further mitigate the pollutants of concern associated with these types of problems.*

Bacteria Problem (Type 1)

IF the proposed project drains to a bacteria problem located within the quarter mile/15% distance downstream (or beyond as deemed necessary by DPER), THEN the following requirements must be met as applicable:

1. IF a water quality facility is required per Core Requirement #8, THEN a **sand filter** or **stormwater wetland** shall be used to meet the area-specific water quality facility requirement. Sand filters are the preferred option. Other treatment options for meeting the area-specific facility requirement may be used in lieu of a sand filter or stormwater wetland only if combined with an **emerging technology**

treatment method that provides equivalent removal of fecal coliform as demonstrated through an experimental design adjustment per Section 1.4.

2. IF the proposed project is a residential subdivision, THEN **signage** shall be provided in the subdivision's public areas (i.e., recreation/open space areas and right-of-way) requesting that pet waste be picked up in order to protect downstream water quality. The extent and location of this signage shall be reviewed and approved by DPER.
3. IF the proposed project is a multifamily development with a recreation/open area or is a park improvement, THEN **signage** shall be provided requesting that pet waste be picked up in order to protect downstream water quality. The extent and location of this signage shall be reviewed and approved by DPER.

Dissolved Oxygen (DO) Problem (Type 2)

IF the proposed project drains to a DO problem located within the quarter mile/15% distance downstream (or beyond as deemed necessary by DPER), THEN the following requirements must be met as applicable:

1. IF the proposed project includes a wetpond or wetvault, THEN the **wetpool depth** shall not exceed 6 feet, AND the outflow system shall include a measure designed to **promote aeration** of the facility's discharges for 2-year runoff events and smaller. One way to do this is to create a drop in flow elevation within a manhole by placing the outlet invert of the incoming pipe a minimum of 12 inches above the 2-year headwater elevation of the outgoing pipe. Alternatively, if the outflow system discharges to an open channel, the same drop in flow elevation could be achieved by placing the outlet invert a minimum of 12 inches above the 2-year tailwater elevation created by the channel. Other equivalent approaches may be used as approved by DPER.
2. IF the proposed project includes a wetvault, THEN the required **ventilation area** specified in Chapter 6 shall be doubled.
3. IF the DO problem is documented to be caused by **excessive phosphorus** and a water quality facility is required per Core Requirement #8, THEN a water quality facility option from the **Sensitive Lake Protection menu** shall be a component of the required treatment system.

Temperature Problem (Type 3)

IF the proposed project drains to a temperature problem located within the quarter mile/15% distance downstream (or beyond as deemed necessary by DPER), THEN the following requirements must be met as applicable:

1. IF a water quality facility is required per Core Requirement #8, THEN use of a **wetpond is prohibited** unless it will be at least 50% shaded at midday in the summer or its discharges will flow through 200 feet or more of open channel that is at least 50% shaded at midday in the summer. DPER shall review and approve the extent and location of this shading.
2. IF the proposed project includes open drainage features, THEN vegetation or other means shall be used where practicable to **maximize shading** of the drainage features, except bioswales and filter strips. The extent and location of this shading shall be reviewed and approved by DPER.

Metals Problem (Type 4)

IF the proposed project drains to a metals problem located within the quarter mile/15% distance downstream (or beyond as deemed necessary by DPER), THEN the following requirements must be met as applicable:

1. IF a water quality facility is required per Core Requirement #8, THEN a water quality facility option from the **Enhanced Basic WQ menu** shall be a component of the project's required treatment system.

2. IF the proposed project is a residential subdivision, THEN a **covenant** shall be recorded for each lot and common area tract prohibiting use of **leachable heavy metals** (e.g., galvanized metals) that will be exposed to the weather (use the covenant in Reference Section 8-Q).
3. IF the proposed project includes road right-of-way improvements, THEN use of **leachable heavy metals** (e.g., galvanized metals) that will be exposed to the weather (e.g., **guard rails, street lights**, etc.) shall be avoided.

Phosphorus Problem (Type 5)

IF the proposed project drains to a phosphorus problem located within the quarter mile/15% distance downstream (or beyond as deemed necessary by DPER), THEN the following requirements must be met as applicable:

1. IF a water quality facility is required per Core Requirement #8, THEN the project shall be assumed to be located within a designated Sensitive Lake WQ Treatment Area for the purposes of applying the area-specific water quality treatment requirement in Section 1.2.8.1.
2. For the purposes of applying the Erosion and Sediment Control Standards in Appendix D, the project shall be assumed to be located within a designated Sensitive Lake WQ Treatment Area.

Turbidity Problem (Type 6)

IF the proposed project drains to a turbidity problem located within the quarter mile/15% distance downstream (or beyond as deemed necessary by DPER) AND the downstream flow path from the ***project site*** to the turbidity problem is through a landslide hazard area, steep slope hazard area, erosion hazard area or any actively eroding area, THEN the project shall provide a tightline system through the area in accordance with the same criteria and exceptions specified in Core Requirement #1, **Discharge Requirement 2** for projects located within a designated Landslide Hazard Drainage Area. Other means for safely conveying ***project site*** discharges through the area of concern for erosion may be proposed subject to approval by DPER.

High pH Problem (Type 7)

IF the proposed project drains to a pH problem located within the quarter mile/15% distance downstream (or beyond as deemed necessary by DPER) AND the proposed project includes a concrete vault structure for stormwater control purposes, THEN the vault's submerged surfaces shall be coated or otherwise treated to prevent alteration of pH.

1.2.3 CORE REQUIREMENT #3: FLOW CONTROL FACILITIES

REQUIREMENT

All proposed projects, including ***redevelopment projects***, must provide onsite flow control facilities to mitigate the impacts of storm and surface water runoff generated by ***new impervious surface***, ***new pervious surface***, and ***replaced impervious surface*** targeted for flow mitigation as specified in the following sections. **Flow control facilities** must be provided and designed to perform as specified by the area-specific flow control facility requirement in Section 1.2.3.1 (p. 1-39) and in accordance with the applicable flow control facility implementation requirements in Section 1.2.3.2 (p. 1-50).

Intent: To ensure the minimum level of control needed to protect downstream properties and resources from increases in peak, duration, and volume of runoff generated by new development. The level of control varies depending on location and downstream conditions identified under Core Requirement #2.

❑ EXEMPTION FROM CORE REQUIREMENT #3

There is a single exemption from the flow control provisions of Core Requirement #3:

Basic Exemption

A proposed project is exempt if it meets the following criteria:

a) Less than 5,000 square feet of ***new*** plus ***replaced impervious surface*** will be created, AND

b) Less than ¾ acres of ***new pervious surface*** will be added.

1.2.3.1 AREA-SPECIFIC FLOW CONTROL FACILITY REQUIREMENT

REQMT

Projects subject to Core Requirement #3 must provide flow control facilities as specified by the area-specific facility requirements and exceptions for the **designated flow control area** in which the proposed project or ***threshold discharge area*** of the proposed project is located as described in Subsections A, B, and C below.

Guide to Applying the Area-Specific Flow Control Facility Requirement

The flow control facility requirement varies across the county landscape according to the *flow control area* within which the project or a ***threshold discharge area*** of the project is located. Flow control areas are designated by the county to target the level of flow control performance to the broad protection needs of specific basins or subbasins. There are currently three such flow control areas, which are depicted on the Flow Control Applications Map adopted with this manual and found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx .

These are the **Basic Flow Control Areas**, **Conservation Flow Control Areas**, and **Flood Problem Flow Control Areas**. Each flow control area has an area-specific set of minimum flow control facility performance criteria, design assumptions, surfaces that must be mitigated, and exceptions. These provisions all comprise what is referred to as the "area-specific flow control facility requirement."

Note that the minimum required performance of the facility as specified by this requirement may need to be increased to ensure that downstream drainage problems are not created or significantly aggravated as set forth in Section 1.2.2.2, "Drainage Problem-Specific Mitigation Requirements" (p. 1-34). Table 1.2.3.A (p. 1-40) provides a quick guide for selecting the flow control performance criteria necessary to meet both the area-specific flow control facility requirement and the problem-specific mitigation requirement. This is further explained in Step 4 below.

For efficient application of the flow control facility requirement, the following steps are recommended:

1. Check the Direct Discharge Exemption on Page 1-41 to determine if and/or which portions of your project are exempt from the flow control facility requirement. If exempt from the flow control facility requirement, proceed to Step 6.
2. Use the Flow Control Applications Map to determine the flow control area in which your project is located.
3. Consult the detailed requirement and exception language for the identified flow control area to determine if and how the flow control facility requirement applies to your project. This requirement and exception language is detailed on subsequent pages for each of the three flow control areas depicted on the Flow Control Applications Map. If a flow control facility is not applicable per the area-specific exceptions, proceed to Step 6.
4. If downstream drainage problems were identified through offsite analysis per Core Requirement #2 and are proposed to be addressed through onsite flow control, use Table 1.2.3.A (p. 1-40) to determine if and what additional flow control performance is necessary to mitigate impacts (i.e., to prevent creation or aggravation of the identified problems).
5. Use Section 1.2.3.2 (p. 1-50) to identify the applicable requirements for implementing the flow control facility requirement. These requirements cover facility siting, analysis and design, unusual situations, and other site-specific considerations.
6. Use Core Requirement 9 to identify the flow control BMPs that must be applied to your ***project site*** regardless of whether a flow control facility is required.

TABLE 1.2.3.A
SUMMARY OF FLOW CONTROL PERFORMANCE CRITERIA ACCEPTABLE FOR IMPACT MITIGATION[1]

IDENTIFIED PROBLEM DOWNSTREAM	AREA-SPECIFIC FLOW CONTROL FACILITY REQUIREMENT		
	Basic Flow Control (FC) Areas	**Conservation FC Areas**	**Flood Problem FC Areas**
No Problem Identified Apply the minimum area-specific flow control performance criteria.	Apply the Level 1 flow control standard, which matches ***existing site conditions*** 2- and 10-year peaks	Apply the ***historic site conditions*** Level 2 flow control standard, which matches historic durations for 50% of 2-yr through 50-year peaks AND matches historic 2- and 10-year peaks	Apply the ***existing*** or ***historic site conditions*** Level 2 flow control standard (whichever is appropriate based on downstream flow control area) AND match ***existing site conditions*** 100-year peaks
Type 1 Drainage Problem ***Conveyance System Nuisance Problem***	Additional Flow Control Hold 10-year peak to overflow T_r peak[2][3]	*No additional flow control or other mitigation is needed*	*No additional flow control or other mitigation is needed*
Type 2 Drainage Problem ***Severe Erosion Problem***	Additional Flow Control Apply the ***existing site conditions*** Level 2 flow control standard[3][4]	*No additional flow control is needed, but other mitigation may be required*[4]	*No additional flow control is needed, but other mitigation may be required*[4]
Type 3 Drainage Problem ***Severe Flooding Problem***	Additional Flow Control Apply the ***existing site conditions*** Level 3 flow control standard to peak flows above the overflow T_r peak. If flooding is from a closed depression, make design adjustments as needed to meet the "special provision for closed depressions"[3][5]	Additional Flow Control Apply the ***historic site conditions*** Level 3 flow control standard. If flooding is from a closed depression, make design adjustments as needed to meet the "special provision for closed depressions"[3][5]	Additional Flow Control If flooding is from a closed depression, make design adjustments as needed to meet the "special provision for closed depressions" [3][5]
Type 4 Potential Impact to Wetland Hydrology as Determined through a Critical Area Review per KCC 21A.24.100 or Offsite Analysis	Additional Flow Control DPER may require design adjustments per the wetland hydrology protection guidelines in Reference Section 5	Additional Flow Control DPER may require design adjustments per the wetland hydrology protection guidelines in Reference Section 5	Additional Flow Control DPER may require design adjustments per the wetland hydrology protection guide-lines in Reference Section 5

Notes:

(1) More than one set of problem-specific performance criteria may apply if two or more downstream drainage problems are identified through offsite analysis per Core Requirement #2. If this happens, the performance goals of each applicable problem-specific criterion must be met. This can require extensive, time-consuming analysis to implement multiple sets of outflow performance criteria if additional onsite flow control is the only viable option for mitigating impacts to these problems. In these cases, it may be easier and more prudent to implement the ***historic site conditions*** Level 3 flow control standard in place of the otherwise required area-specific standard. Use of the historic Level 3 flow control standard satisfies the specified performance criteria for all the area-specific and problem-specific requirements except if adjustments are required per the special provision for closed depressions described below in Note 5.

(2) Overflow T_r is the return period of conveyance system overflow. To determine T_r requires a minimum Level 2 downstream analysis as detailed in Section 2.3.1.1. To avoid this analysis, a T_r of 2 years may be assumed.

(3) Offsite improvements may be implemented in lieu of or in combination with additional flow control as allowed in Section 1.2.2.2 (p. 1-32) and detailed in Section 3.3.5.

(4) A tightline system may be required regardless of the flow control standard being applied if needed to meet the discharge requirements of Core Requirement #1 (p. 1-25) or the outfall requirements of Core Requirement #4 (p. 1-58), or if deemed necessary by DPER where the risk of severe damage is high.

(5) **Special Provision for Closed Depressions with a Severe Flooding Problem:**
IF the proposed project discharges by overland flow or conveyance system to a closed depression experiencing a ***severe flooding problem*** AND the amount of ***new impervious surface*** area proposed by the project is greater than or equal to 10% of the 100-year water surface area of the closed depression, THEN use the "point of compliance analysis technique" described in Section 3.3.6 to verify that water surface levels are not increasing for the return frequencies at which flooding occurs, up to and including the 100-year frequency. If necessary, iteratively adjust onsite flow control performance to prevent increases. *Note: The point of compliance analysis relies on certain field measurements taken directly at the closed depression (e.g., soils tests, topography, etc.). If permission to enter private property for such measurements is denied, DPER may waive this provision and apply the* ***existing site conditions*** *Level 3 flow control standard with a mandatory 20% safety factor on the storage volume.*

❑ DIRECT DISCHARGE EXEMPTION

Any onsite **natural drainage area** is exempt from the flow control facility requirement if the area drains to one of the ***major receiving waters*** listed in Table 1.2.3.B at right, AND meets the following criteria for *direct discharge*[23] to that receiving water:

a) The **flowpath** from the ***project site*** discharge point to the edge of the 100-year floodplain of the major receiving water will be **no longer than a quarter mile**, except for discharges to Lake Sammamish, Lake Washington, and Puget Sound, AND

b) The conveyance system between the ***project site*** and the ***major receiving water*** will extend to the ordinary high water mark, and will be **comprised of manmade conveyance elements** (pipes, ditches, etc.) and will be within public right-of-way or a public or private drainage easement, AND

c) The conveyance system will have **adequate capacity**[24] per Core Requirement #4, Conveyance System, for the entire contributing drainage area, assuming **build-out conditions** to current zoning for the *equivalent area* portion (defined in Figure 1.2.3.A, below) and existing conditions for the remaining area, AND

d) The conveyance system will be adequately **stabilized to prevent erosion**, assuming the same basin conditions as assumed in Criteria (c) above, AND

e) The direct discharge proposal will not **divert flows** from or increase flows to an **existing wetland or stream** sufficient to cause a significant adverse impact.

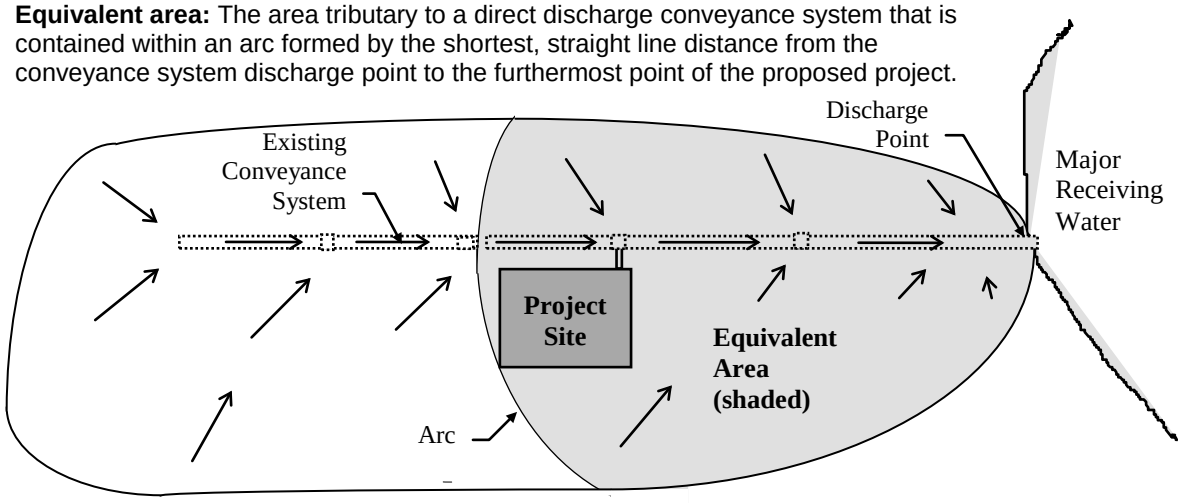
TABLE 1.2.3.B
MAJOR RECEIVING WATERS

- Cedar River downstream of Taylor Creek confluence
- Green/Duwamish River below River Mile 6 (S. Boeing Access Road)
- Snoqualmie River mainstem downstream of Middle Fork Snoqualmie River confluence
- Middle Fork Snoqualmie River downstream of Rainy Creek confluence
- Sammamish River[22]
- White/Stuck River downstream of Huckleberry Creek confluence
- South Fork Skykomish River downstream of Tye and Foss River confluences
- Lake Sammamish
- Lake Washington
- Puget Sound

*Note: The **major receiving waters** listed above do not include side adjacent or associated channels, spring- or groundwater-fed streams, or wetlands.*

FIGURE 1.2.3.A EQUIVALENT AREA DEFINITION AND ILLUSTRATION

Equivalent area: The area tributary to a direct discharge conveyance system that is contained within an arc formed by the shortest, straight line distance from the conveyance system discharge point to the furthermost point of the proposed project.



[22] *Projects discharging directly to the Sammamish River must infiltrate runoff to the extent feasible before discharge to the River.*

[23] *Direct discharge* means undetained discharge from a proposed project to a ***major receiving water***.

[24] *Note: If the conveyance system is an existing King County-owned system, the County may charge a special use fee.*

❑ IMPERVIOUS SURFACE PERCENTAGE EXEMPTION FOR AGRICULTURAL PROJECTS

For agricultural projects located within an Agricultural Production District (APD), Farmland Preservation Program (FPP), or site zoned A, any onsite threshold discharge area is exempt from the flow control facility requirement if it meets all of the following conditions:

a) The total (new, replaced, and existing) amount of impervious surface that is not fully dispersed per the criteria on page 1-46 must be no more than 4% of the threshold discharge area, AND

b) New impervious surfaces and new pervious surfaces must not disturb, impact, or replace native vegetation, AND

c) Flow control BMPs must be applied to new impervious surfaces as specified in Core Requirement 9, AND

d) All impervious surface area, except 10,000 square feet of it, must be set back from its natural location of discharge from the site at least 100 feet for every 10,000 square feet of total impervious surface and its runoff must be discharged in an unconcentrated manner that promotes infiltration and evapotranspiration, AND

e) Increased runoff from the new impervious surface and new pervious surface must not significantly impact a critical area, severe flooding problem, or severe erosion problem, AND

f) The manner in which runoff is discharged from the project site must not create a significant adverse impact per core requirement #1.

A. BASIC FLOW CONTROL AREAS

Basic Flow Control Areas are designated in two ways. Basic Flow Control Areas refer to areas that discharge to a closed conveyance system, which discharges eventually to water bodies that are designated as ***major receiving waters***. Basic Flow Control Areas are also designated by King County, with approval from the state Department of Ecology, where the County has determined that maintaining peak flows is sufficient to protect natural and constructed conveyance systems. The latter method is usually based on the findings of a plan or study that has determined that such conveyance systems are not sensitive to development-induced increases in runoff volume and durations. Basic Flow Control Areas are delineated on the Flow Control Applications Map adopted with this manual and found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx.

Note: For projects located at or near the delineated boundary of the Basic Flow Control Area, **site**-specific topography or drainage information may be needed to determine whether a project or any **threshold discharge area** of a project is indeed within the flow control area. Any **threshold discharge area** is considered to be within the Basic Flow Control Area if the **threshold discharge area** drains to a waterbody or drainage system that is clearly within the mapped Basic Flow Control Area.

REQMT

Within Basic Flow Control Areas, required flow control facilities must comply with the following minimum requirements for facility performance and mitigation of targeted surfaces, except where such requirements or the facility requirement itself is waived or reduced by the area-specific exceptions at the end of this subsection.

Minimum Required Performance

Facilities **in Basic Flow Control Areas** must comply with the following flow control performance standards and assumptions unless modified by offsite analysis per Core Requirement #2 (see Table 1.2.3.A, p. 1-40):

Level 1 Flow Control: Match the developed peak discharge rates to ***existing site conditions*** peak discharge rates for 2- and 10-year return periods.

Reduced Level 1 Flow Control: A modified version of this standard, controlling only the 10-year frequency peak flow rate, is allowed if the applicant demonstrates both of the following:

- The proposed ***project site*** discharges to a conveyance system not subject to erosion that extends from the project discharge point to one of the ***major receiving waters*** listed on Page 1-41, AND
- There is no evidence of capacity problems along this conveyance system as determined by offsite analysis per Core Requirement #2, or such problems will be resolved prior to project construction.

Intent

The Level 1 flow control standard is intended to protect flow-carrying capacity and limit increased erosion within the downstream conveyance system for runoff events less than or equal to the 10-year event. Matching the 2- and 10-year peak flows is intended to prevent increases in return-frequency peak flows less than or equal to the 10-year peak flow down to the 2-year peak flow. This level of control is also intended to prevent creation of new ***conveyance system nuisance problems*** as described in Section1.2.2.1.

Effectiveness in Addressing Downstream Drainage Problems

While the Level 1 flow control standard provides reasonable protection from many development-induced conveyance problems (up to the 10-year event), it does not prevent increases in runoff volumes or flow durations that tend to aggravate the three types of downstream drainage problems described in Section 1.2.2.1. Consequently, if one or more of these problems are identified through offsite analysis per Core Requirement #2, additional onsite flow control and/or offsite improvements will likely be required (see "Drainage Problem-Specific Mitigation Requirements" in Section 1.2.2.2, p. 1-34).

Target Surfaces

Facilities **in Basic Flow Control Areas** must mitigate (either directly or in effect) the runoff from the following target surfaces within the ***threshold discharge area*** for which the facility is required:

1. ***New impervious surface*** that is **not *fully dispersed*** per the criteria on Page 1-51 or not farmland dispersed as specified in Appendix C. For individual lots within residential subdivision projects, the extent of ***new impervious surface*** shall be assumed as specified in Chapter 3. *Note, any **new impervious surface** such as a bridge or boardwalk that spans the ordinary high water of a stream, pond, or lake may be excluded as a target surface if the runoff from such span is conveyed to the ordinary high water area in accordance with Criteria (b), (c), (d), and (e) of the "Direct Discharge Exemption" (p 1-41).*
2. ***New pervious surface*** that is **not *fully dispersed*** or not farmland dispersed as specified in Appendix C. For individual lots within residential subdivision projects, the extent of ***new pervious surface*** shall be assumed to be the entire lot area, except the assumed impervious portion and any portion in which native conditions are preserved by covenant, tract, or easement. In addition, the ***new pervious surface*** on individual lots shall be assumed to be 100% grass if located within the Urban Growth Area (UGA) and 50% grass/50% pasture if located outside the UGA.

Exceptions

The following exceptions apply only **in Basic Flow Control Areas**:

1. The facility requirement in Basic Flow Control Areas is waived for any ***threshold discharge area*** in which the target surfaces subject to this requirement will generate **no more than a 0.15-cfs increase** (when modeled using 15 minute time steps) or **no more than a 0.1-cfs increase** (when modeled using 1 hour time steps) in the ***existing site conditions*** 100-year peak flow (modeled using same time step unit (e.g. hourly or 15 minute) used to calculate the developed flow). *Note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Core Requirement 9, Table 1.2.9.A.*
2. The facility requirement in Basic Flow Control Areas may be waived for any ***threshold discharge area*** of a ***redevelopment project*** in which all of the following criteria are met:
   a) The target surfaces subject to the Basic Flow Control Areas facility requirement will generate no more than a **0.15-cfs increase** (when modeled using 15 minute time steps) or **no more than a 0.1-cfs increase** (when modeled using 1 hour time steps) in the ***existing site conditions*** 100-year peak flow (modeled using same time step unit (e.g. hourly or 15 minute) used to calculate the developed flow) at any ***natural discharge location*** from the ***project site*** (*note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Core Requirement 9, Table 1.2.9.A*, AND
   b) The increased runoff from target surfaces will not significantly impact a critical area, ***severe flooding problem***, or ***severe erosion problem***.

B. CONSERVATION FLOW CONTROL AREAS

Conservation Flow Control Areas cover all of unincorporated King County except where the County has determined that control of flow durations and peaks to ***historic site conditions*** is not necessary to protect or allow for the restoration of water quality or habitat functions essential to salmonids. Conservation Flow Control Areas are the default designation until a County-approved plan or study has determined that natural and manmade conveyance systems within the area designated are not sensitive to development-induced increases in runoff volume and durations. Most Conservation Flow Control Areas are delineated on the Flow Control Applications Map adopted with this manual and found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx.

Any unincorporated areas of King County not shown on this map shall be assumed to be Conservation Flow Control Areas unless they drain entirely by non-erodible manmade conveyance to a ***major receiving water*** (listed on page 1-41), in which case they will be assumed to be Basic Flow Control Areas.

Note: For projects located at or near the delineated boundary of the Conservation Flow Control Area, ***site-****specific topography or drainage information may be needed to verify that a project or any* ***threshold discharge area*** *of a project is within the flow control area. Any* ***threshold discharge area*** *is considered to be within the Conservation Flow Control Area if the* ***threshold discharge area*** *drains to a waterbody or drainage system that is clearly within the mapped Conservation Flow Control Area. However, any* ***threshold discharge area*** *that drains entirely by non-erodible manmade conveyance to a* ***major receiving water*** *(listed on page 1-41) may be assumed to be located within and subject to the facility requirements and exceptions of a Basic Flow Control Area.*

REQMT

Within Conservation Flow Control Areas, required flow control facilities must comply with the following minimum requirements for facility performance and mitigation of targeted surfaces, except where such requirements or the facility requirement itself is waived or reduced by the area-specific exceptions at the end of this subsection.

Minimum Required Performance

Facilities **in Conservation Flow Control Areas** must comply with the following flow control performance standard and assumptions unless modified by offsite analysis per Core Requirement #2 (see Table 1.2.3.A, p. 1-40):

Level 2 Flow Control: Match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. Also match developed peak discharge rates to predeveloped peak discharge rates for the 2- and 10-year return periods. Assume ***historic site conditions*** as the predeveloped condition.

Intent

The Level 2 flow control standard assuming ***historic site conditions*** is intended to limit the amount of time that erosive flows are at work generating erosion and sedimentation within natural and constructed drainage systems. Such control is effective in preventing development-induced increases in natural erosion rates and reducing existing erosion rates where they may have been increased by past development of the ***site***. This is accomplished by maintaining at historic predevelopment levels the aggregate time that developed flows exceed an erosion-causing threshold (i.e., 50% of the historic 2-year peak flow). Maintaining natural erosion rates within streams and their tributary areas is important for preventing increases in stream channel erosion and sediment loading that are detrimental to salmonid habitat and production.

Effectiveness in Addressing Downstream Drainage Problems

While the Level 2 flow control standard assuming ***historic site conditions*** provides a reasonable level of protection for preventing most development-induced problems, it does not necessarily prevent increases in ***existing site conditions*** 100-year peak flows that can aggravate ***severe flooding problems*** as described in Core Requirement #2, nor does it necessarily prevent aggravation of all ***severe erosion problems***. Consequently, if one or more of these problems are identified through offsite analysis per Core Requirement #2, additional onsite flow control and/or offsite improvements will likely be required (see "Drainage Problem-Specific Mitigation Requirements" in Section 1.2.2.2, p. 1-34).

Target Surfaces

Facilities **in Conservation Flow Control Areas**[25] must mitigate (either directly or in effect) the runoff from the following target developed surfaces within the ***threshold discharge area*** for which the facility is required:

1. ***New impervious surface*** that is **not *fully dispersed*** per the criteria on Page 1-51 or not farmland dispersed as specified in Appendix C. For individual lots within residential subdivision projects, the extent of ***new impervious surface*** shall be assumed as specified in Chapter 3. *Note, any **new impervious surface** such as a bridge or boardwalk that spans the ordinary high water of a stream, pond, or lake may be excluded as a target surface if the runoff from such span is conveyed to the ordinary high water area in accordance with Criteria (b), (c), (d), and (e) of the "Direct Discharge Exemption" (p 1-41).*
2. ***New pervious surface*** that is **not *fully dispersed*** or not farmland dispersed as specified in Appendix C. For individual lots within residential subdivision projects, the extent of ***new pervious surface*** shall be assumed to be the entire lot area, except the assumed impervious portion and any portion in which native conditions are preserved by covenant, tract, or easement. In addition, the ***new pervious surface*** on individual lots shall be assumed to be 100% grass if located within the Urban Growth Area (UGA) and 50% grass/50% pasture if located outside the UGA.

[25] *Note: Any **threshold discharge area** that appears to be located within a Conservation Flow Control Area according to the Flow Control Applications Map but drains entirely by non-erodible manmade conveyance to a **major receiving water** (listed on page 1-51) is considered to be located within a Basic Flow Control Area.*

3. **Existing impervious surface** added since January 8, 2001 that is **not *fully dispersed*** or not farmland dispersed as specified in Appendix C, and not yet mitigated with a County-approved flow control facility or flow control BMP. *Note: January 8, 2001 is the effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon.*

4. ***Replaced impervious surface*** that is **not *fully dispersed*** or not farmland dispersed as specified in Appendix C on a non-redevelopment project in which the total of new plus replaced impervious surface is 5,000 square feet or more, OR new pervious surface is ¾ acre or more.

5. ***Replaced impervious surface*** that is **not *fully dispersed*** on a ***transportation redevelopment project*** in which ***new impervious surface*** is 5,000 square feet or more and totals 50% or more of the existing impervious surface within the project limits.

6. ***Replaced impervious surface*** that is **not *fully dispersed*** or not farmland dispersed as specified in Appendix C, on a **parcel *redevelopment project*** in which the total of new plus ***replaced impervious surface*** is 5,000 square feet or more and whose valuation of proposed improvements (including interior improvements and excluding required mitigation improvements) exceeds 50% of the assessed value of the existing ***site*** improvements.

Exceptions

The following exceptions apply only **in Conservation Flow Control Areas**25:

1. The ***historic site conditions*** **assumption** for application of Level 2 flow control may be reduced through a basin plan or study approved by King County DNRP and the Washington State Department of Ecology. One possible reduction is to an assumption of 75% forest, 15% grass, and 10% impervious surface (75/15/10 conditions) or ***existing site conditions***, whichever generates the lowest 100-year peak flow. Another possible change that could be made through a County and Ecology approved basin plan or study is to the lowest peak flow (50% of the 2-year peak flow) above which discharge durations must be matched. This peak flow, known as the geomorphic threshold of bed load movement, may be changed based on the actual channel conditions necessary to protect or allow for restoration of water body beneficial uses and habitat functions essential to salmonids.

2. The facility requirement in Conservation Flow Control Areas is waived for any ***threshold discharge area*** in which there is **no more than a 0.15-cfs difference** (when modeled using 15 minute time steps) or **no more than a 0.1-cfs difference** (when modeled using 1 hour time steps) in the sum of developed 100-year peak flows for those target surfaces subject to this requirement and the sum of ***historic site conditions*** 100-year peak flows (modeled using same time step unit (e.g. hourly or 15 minute) used to calculate the developed flow) for the same surface areas. Agricultural zoned projects in current agricultural use may use ***existing site conditions*** as the predeveloped condition for purposes of this exception calculation. *Note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Core Requirement 9, Table 1.2.9.A.*

3. The facility requirement in Conservation Flow Control Areas may be reduced or waived for any ***threshold discharge area*** where a **plan or study** approved by the County and Ecology shows that a lower standard (e.g., Level 1 flow control) is sufficient or no facility is necessary to protect or allow for restoration of water body beneficial uses and habitat functions essential to salmonids.

4. The facility requirement in Conservation Flow Control Areas as applied to ***replaced impervious surface*** may be waived if the County has adopted a plan and implementation schedule approved by state Department of Ecology for fulfilling this requirement in **regional facilities**.

5. The facility requirement in Conservation Flow Control Areas as applied to ***replaced impervious surface*** may be reduced by DPER using the procedures detailed in Sections 1.4.3 and 1.4.4 of the adjustment process, if the **cost of flow control facilities** to mitigate all target surfaces exceeds that necessary to mitigate only for ***new impervious surface*** plus ***new pervious surface*** and also exceeds $^{1}/_{3}$ of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate equivalent surfaces on a new ***development site***, whichever is less.

The amount of reduction shall be limited such that the **cost of flow control facilities** is at least equal to that necessary to mitigate only for ***new impervious surface*** plus ***new pervious surface***, and beyond this amount, is no greater than $^{1}/_{3}$ of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate equivalent surfaces on a new ***development site***, whichever is less.

C. FLOOD PROBLEM FLOW CONTROL AREAS

Flood Problem Flow Control Areas are designated by King County where the County has determined that a higher average level of flow control is needed to prevent aggravation of existing documented flooding problems. Such areas are delineated on the Flow Control Applications Map, and are listed on the map by name of lake, wetland code number (from the *King County Wetlands Inventory*), or approximate address. The map is found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx.

Note: For projects located at or near the delineated boundary of the Flood Problem Flow Control Area, **site**-specific topography or drainage information may be needed to verify that a project or any **threshold discharge area** of a project is within the flow control area. Any **threshold discharge area** is considered to be within the Flood Problem Flow Control Area if the **threshold discharge area** drains to a waterbody or drainage system that is clearly within the mapped Flood Problem Flow Control Area.

REQMT

Within Flood Problem Flow Control Areas, required flow control facilities must comply with the following minimum requirements for facility performance and mitigation of targeted surfaces, except where such requirements or the facility requirement itself is waived or reduced by the area-specific exceptions at the end of this subsection.

Minimum Required Performance

Facilities **in Flood Problem Flow Control Areas** must comply with the following flow control performance standard and assumptions unless modified by offsite analysis per Core Requirement #2 (see Table 1.2.3.A, p. 1-40):

Level 3 Flow Control: Apply the Level 2 flow control standard, AND match the developed 100-year peak discharge rate to the predeveloped 100-year peak discharge rate. If the Flood Problem Flow Control Area is located within a Conservation Flow Control Area and does not drain entirely by non-erodible manmade conveyance to a ***major receiving water*** (listed on page 1-41), then ***historic site conditions*** shall be assumed as the predeveloped condition except for the purposes of matching 100-year peak discharge rates. For all other situations and for the purposes of matching 100-year peak discharge rates, ***existing site conditions*** may be assumed.

Intent

The Level 3 flow control standard is intended to prevent significant increases in existing water surface levels for 2-year through 100-year return frequencies. Such increases are expected to occur as the volume of runoff discharging to the water body is increased by upstream development. Because inflow rates to these water bodies are typically much higher than the outflow rates, increased runoff volumes from upstream development are, in effect, stacked on top of existing volumes in the water body, resulting in higher water surface levels. The duration-matching and 100-year peak-matching criteria of the Level 3 flow control standard counteract this stacking effect by slowing the arrival of additional runoff volumes. Because it can prevent significant aggravation of existing flooding, the Level 3 standard is also applicable to other flow control areas where ***severe flooding problems*** have been identified per Core Requirement #2.

Effectiveness in Addressing Downstream Drainage Problems

If the Level 3 flow control standard is implemented onsite, no additional measures are required to prevent aggravation of the three types of downstream drainage problems described in Core Requirement #2. The one exception is for a wetland or lake that is a closed depression with a ***severe flooding problem***, and the proposed project is adding impervious surface area amounting to more than 10% of the 100-year water surface area of the closed depression. In this case, additional onsite flow control or offsite improvements may be necessary as determined by a "point of compliance analysis" (see "Special Provision for Closed Depressions" in Table 1.2.3.A (p. 1-40), and see Section 3.3.6, "Point of Compliance Analysis").

Target Surfaces

Facilities **in Flood Problem Flow Control Areas** must mitigate (either directly or in effect) the runoff from the following target developed surfaces within the ***threshold discharge area*** for which the facility is required:

1. If the Flood Problem Flow Control Area is **located within a Conservation Flow Control Area**, then the target surfaces are the same as those required for facilities in Conservation Flow Control Areas (see p. 1-44) unless otherwise allowed by the area-specific exceptions for Conservation Flow Control Areas. *Note: Any Flood Problem Flow Control Area that appears to be located within a Conservation Flow Control Area identified on the Flow Control Applications Map, but drains entirely by non-erodible manmade conveyance to a* ***major receiving water*** *(listed on page 1-41), is considered to be located within a Basic Flow Control Area*.
2. If the Flood Problem Flow Control Area is **located within a Basic Flow Control Area** or drains entirely by non-erodible manmade conveyance to a ***major receiving water***, then the target surfaces are the same as those required for facilities in Basic Flow Control Areas (see p. 1-42).

Exceptions

The following exceptions apply only **in Flood Problem Flow Control Areas**:

1. If the Flood Problem Flow Control Area **is located within a Conservation Flow Control Area**, then the facility requirement is waived for any ***threshold discharge area*** in which there is **no more than a 0.15-cfs difference** (when modeled using 15 minute time steps) or **no more than a 0.1-cfs difference** (when modeled using 1 hour time steps) in the sum of developed 100-year peak flows for the target surfaces subject to this requirement and the sum of ***historic site conditions*** 100-year peak flows (modeled using same time step unit (e.g. hourly or 15 minute) used to calculate the developed flow) for the same surface areas. Agricultural zoned projects in current agricultural use may use ***existing site conditions*** as the predeveloped condition for purposes of this exception calculation.

   Note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Core Requirement 9, Table 1.2.9.A. Also, any Flood Problem Flow Control Area that appears to be located within a Conservation Flow Control Area identified on the Flow Control Applications Map, but drains entirely by non-erodible manmade conveyance to a ***major receiving water*** *(listed on page 1-41), is considered to be located within a Basic Flow Control Area*.

2. If the Flood Problem Flow Control Area **is located within a Basic Flow Control Area**, then the facility requirement is waived for any ***threshold discharge area*** in which the target surfaces subject to this requirement will generate **no more than a 0.15-cfs increase** (when modeled using 15 minute time steps) or **no more than a 0.1-cfs increase** (when modeled using 1 hour time steps) in the ***existing site conditions*** 100-year peak flow (modeled using same time step unit (e.g. hourly or 15 minute) used to calculate the developed flow.

   Note: for the purposes of this calculation, target surfaces served by flow control BMPs per Appendix C may be modeled in accordance with the flow control BMP facility sizing credits in Core Requirement 9, Table 1.2.9.A.

3. Any required application of the Flood Problem Flow Control Areas facility requirement to ***replaced impervious surface*** may be waived if the County has adopted a plan and implementation schedule approved by the state Department of Ecology for fulfilling this requirement with regional facilities.

4. Any required application of the Flood Problem Flow Control Areas facility requirement to ***replaced impervious surface*** may be reduced by DPER using the procedures detailed in Sections 1.4.3 and 1.4.4 of the adjustment process, if the **cost of flow control facilities** to mitigate all target surfaces exceeds that necessary to mitigate only for ***new impervious surface*** plus ***new pervious surface*** and also exceeds $^1/_3$ of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate the same surfaces on a new ***development site***, whichever is less. The amount of reduction allowed by this exception shall be limited such that the **cost of flow control facilities** is at least equal to that necessary to mitigate only for ***new impervious surface*** plus ***new pervious surface***, and beyond this amount, is no greater than $^1/_3$ of the valuation of proposed improvements (including interior improvements) or twice the cost of a facility to mitigate equivalent surfaces on a new ***development site***, whichever is less.

5. Any required application of the Flood Problem Flow Control Areas facility requirement to ***replaced impervious surface*** may assume ***existing site conditions*** as the predeveloped condition for the purposes of matching the developed 100-year peak discharge rate to the predeveloped 100-year peak discharge rate.

1.2.3.2 FLOW CONTROL FACILITY IMPLEMENTATION REQUIREMENTS

Flow control facilities shall be designed and implemented in accordance with the following requirements, allowances, and flexible compliance provisions:

A. ONSITE VS. OFFSITE IMPLEMENTATION

All required flow control facilities must be implemented onsite except where the requirements below can be met by direct discharge to a regional or shared facility constructed to provide flow control for the proposed project. Regional facilities are typically constructed as part of a County-approved plan or study (e.g., basin plan, stormwater compliance plan, or master drainage plan). Shared facilities may be constructed under a County-developed shared facility drainage plan or under an agreement between two or more private developers.

1. The regional or shared facility must be of adequate size and design to meet the **current** flow control requirements for the proposed project. *Note: the current flow control requirements are those specified by Core Requirement #3 of this manual unless superseded by other adopted area-specific flow control requirements per Special Requirement #1 (see Section 1.3.1).* In some cases where the current flow control requirements differ from those used to originally design the regional or shared facility, additional analysis and possible retrofitting of the facility may be required to ensure adequate size and design. In other cases where the current flow control requirements are not significantly different or are less stringent, adequate size and design may already be documented by an adopted King County basin plan or master drainage plan, an approved shared facility drainage plan, or a detailed drainage analysis approved by the County for a separate permitted development.
2. The regional or shared facility must be fully operational at the time of construction of the proposed project. In the case of a shared facility, the proposed project must comply with the terms and conditions of all contracts, agreements, and permits associated with the shared facility. If the offsite facility is an existing King County-owned facility, the County may charge a special use fee equal to or based on the property value of the detention capacity being used.
3. The conveyance system between the ***project site*** and the regional facility must meet the same criteria specified for direct discharge to a ***major receiving water*** except for Criterion (a) (see "Direct Discharge Exemption" on page 1-41). In the case of a shared facility, the criteria are the same, except the conveyance system need only have adequate capacity and erosion protection for buildout of the *participating portion*[26] of the contributing drainage area.

B. METHODS OF ANALYSIS AND DESIGN

Flow control facilities must be analyzed and designed using a continuous flow simulation method such as HSPF (Hydrologic Simulation Program FORTRAN) or the simplified HSPF-based runoff files method. An overview of the runoff files method is found in Chapter 3. Specifications for use of the approved modeling software is provided in the software documentation and augmented with limited SWDM-specific guidance in Reference 6-D. Detailed design specifications for flow control facilities are found in Chapter 5.

C. SIZING CREDITS FOR FULLY DISPERSED SURFACES

A ***fully dispersed*** surface (either impervious or non-native pervious) is one that conforms to the BMP strategy for "full dispersion" detailed in Appendix C, Section C.2.1. This strategy calls for minimizing the area of onsite developed surface relative to ***native vegetated surface***, together with the application of dispersion techniques that utilize the natural retention/detention capacity of the ***native vegetated surface*** to mitigate the runoff effects of the developed surfaces. Developed surfaces conforming to this strategy are considered to have a negligible impact downstream, and therefore, may be modeled as forest and are not

[26] The *participating portion* includes those properties that have agreements for use of the shared facility.

subject to the area-specific flow control facility requirement (Section 1.2.3.1) or the area-specific water quality facility requirement (Section 1.2.8.1). In order for developed surfaces to qualify as ***fully dispersed***, they must meet the basic criteria listed below and further detailed in Appendix C, Section C.2.1.

Criteria for Fully Dispersed Surfaces

1. The **total area of impervious surface** being ***fully dispersed*** must be no more than 15% of the total area of ***native vegetated surface*** being preserved by a clearing limit per KCC 16.82 or by recorded tract, easement, or covenant within the same ***threshold discharge area***. The total area of impervious surface plus *non-native pervious surface*[27] being ***fully dispersed*** must be no more than 35% of a ***threshold discharge area***.

2. The runoff from a ***fully dispersed*** surface must be discharged using one of the following **dispersion devices** in accordance with the design specifications and maximum area of ***fully dispersed*** surface for each device set forth in Appendix C, Section C.2.1:

   a) **Splash blocks**

   b) **Rock pads**

   c) **Gravel filled trenches**

   d) **Sheet flow**

   *Note: The dispersion device must be situated so as to discharge within the same **threshold discharge area** of the surface it serves.*

3. A **native vegetated flowpath segment** of at least 100 feet in length (25 feet for sheet flow from a non-native pervious surface) must be available along the flowpath that runoff would follow upon discharge from a dispersion device listed in Minimum Requirement 2 above. The native vegetated flowpath segment **must meet all of the following criteria:**

   a) The flowpath segment must be over ***native vegetated surface***.

   b) The flowpath segment must be **onsite or an offsite tract or easement area** reserved for such dispersion.

   c) The **slope** of the flowpath segment must be **no steeper than 15%** for any 20-foot reach of the flowpath segment.

   d) The flowpath segment must be located **between the dispersion device and any downstream drainage feature** such as a pipe, ditch, stream, river, pond, lake, or wetland.

   e) The flowpath segments for adjacent dispersion devices must comply with the **minimum spacing requirements** in Appendix C, Section C.2.1. These requirements do not allow overlap of flowpath segments, except in the case where **sheet flow from a non-native pervious surface** overlaps with the flowpath of any dispersion device listed in Minimum Requirement 2 above. In this case, the longer of the two overlapping flowpath segments must be extended at least 1 foot for every 3 feet of distance along the most representative path that runoff would travel from the upstream end to the discharge end of the non-native pervious surface.

4. On ***sites* with septic systems**, the discharge of runoff from dispersion devices must not be upgradient of the drainfield. This requirement may be waived by DPER if ***site*** topography clearly prohibits flows from intersecting the drainfield.

5. The dispersion of runoff must not create **flooding or erosion impacts** as determined by DPER. If runoff is proposed to be discharged toward a ***landslide hazard area***, ***erosion hazard area***, ***or steep slope hazard area*** (i.e., slopes steeper than 20%), DPER may require the applicant to have the proposal evaluated by a geotechnical engineer, engineering geologist, or the DPER staff geologist.

[27] *Non-native pervious surface* means a pervious surface that does not meet the definition of a ***native vegetated surface***.

D. SIZING CREDITS FOR USE OF FLOW CONTROL BMPS

Projects that implement flow control BMPs as detailed in Core Requirement 9 and Appendix C, whether required or optional, may use the flow control BMP modeling credits as described and allowed in Section 1.2.9.4 and Table 1.2.9.A.

E. MITIGATION OF TARGET SURFACES THAT BYPASS FACILITY

On some ***sites***, topography may make it difficult or costly to collect all target surface runoff for discharge to the onsite flow control facility. Therefore, some project runoff subject to flow control may bypass required onsite flow control facilities provided that all of the following conditions are met:

1. The **point of convergence** for runoff discharged from the bypassed target surfaces and from the project's flow control facility must be within **a quarter-mile downstream**[28] of the facility's ***project site*** discharge point, AND
2. The increase in the ***existing site conditions*** **100-year peak discharge** from the area of bypassed target surfaces must not exceed 0.4 cfs, AND
3. Runoff from the bypassed target surfaces **must not create a significant adverse impact** to downstream drainage systems, salmonid habitat, or properties as determined by DPER, AND
4. **Water quality requirements** applicable to the bypassed target surfaces must be met, AND
5. **Compensatory mitigation by a flow control facility** must be provided so that the net effect at the point of convergence downstream is the same with or without the bypass. This mitigation may be waived if the ***existing site conditions*** 100-year peak discharge from the area of bypassed target surfaces is increased by no more than 0.1 cfs (modeled using 1 hour time steps) or no more than 0.15 cfs (modeled using 15 minute time steps) and **flow control BMPs** as detailed in Appendix C are applied to all impervious surfaces within the area of bypassed target surfaces. One or combination of the following methods may be used to provide compensatory mitigation by a flow control facility subject to permission/approvals from other parties as deemed necessary by DPER:
   a) Design the project's flow control facility or retrofit an existing offsite flow control facility as needed to achieve the desired effect at the point of convergence, OR
   b) Design the project's flow control facility or provide/retrofit an offsite flow control facility to mitigate an existing developed area (either onsite or offsite) that has runoff characteristics (i.e., peak flow and volume) equivalent to those of the bypassed target surfaces but is currently not mitigated or required to be mitigated to the same flow control performance requirement as the bypassed target surfaces.

F. BYPASS OF RUNOFF FROM NON-TARGET SURFACES

The performance of flow control facilities can be compromised if the contributing area, beyond that which must be mitigated by the facility, is too large. Therefore, IF the existing 100-year peak flow rate from any upstream area (not targeted for mitigation) is greater than 50% of the 100-year developed peak flow rate (undetained) for the area that must be mitigated, THEN the runoff from the upstream area must bypass the facility. The bypass of upstream runoff must be designed so that all of the following conditions are met:

1. Any existing contribution of flows to an **onsite wetland** must be maintained, AND
2. Upstream flows that are **naturally attenuated** by natural detention on the ***project site*** under predeveloped conditions must remain attenuated, either by natural means or by providing additional onsite detention so that peak flows do not increase, AND

[28] Note: DPER may allow this distance to be extended beyond a quarter mile to the point where the ***project site*** area constitutes less than 15% of the tributary area.

3. Upstream flows that are **dispersed or unconcentrated** on the ***project site*** under predeveloped conditions must be discharged in a safe manner as described in Core Requirement #1 under "Discharge Requirements" (p. 1-25).

G. MITIGATION TRADES

A project's flow control facility may be designed to mitigate an existing developed non-target surface area (either onsite or offsite) in trade for not mitigating part or all of the project's target surface area, provided that all of the following conditions are met:

1. The **existing developed non-target surface area** (i.e., an area of existing impervious surface and/or non-native pervious surface) must have runoff discharge characteristics (i.e., peak flow and volume) equivalent to those of the target surface area for which mitigation is being traded and must not be currently mitigated to the same flow control performance requirement as the target surface area, AND
2. Runoff from both the target surface area being traded and the flow control facility **must converge prior to discharge** of the runoff from the target surface area being traded onto private property without an easement or through any area subject to erosion, AND
3. The **net effect** in terms of flow control at the point of convergence downstream must be the same with or without the mitigation trade, AND
4. The undetained runoff from the target surface area being traded **must not create a significant adverse impact** to downstream drainage systems, salmonid habitat, or properties prior to convergence with runoff from the flow control facility.

H. MANIFOLD DETENTION FACILITIES

A *manifold detention facility* is a single detention facility designed to take the place of two or more otherwise required detention facilities. It combines the runoff from two or more onsite drainage areas having separate ***natural discharge locations***, and redistributes the runoff back to the ***natural discharge locations*** following detention. Because manifold detention facilities divert flows from one ***natural discharge location*** to another and then back, they are not allowed except by an approved adjustment (see Section 1.4).

I. FACILITY REQUIREMENT IN LANDSLIDE HAZARD DRAINAGE AREAS

Proposed projects subject to Discharge Requirement 2 in Core Requirement #1 (see p. 1-26) must provide a tightline system except where DPER approves an alternative system based on a geotechnical analysis that considers cumulative impacts from the project and surrounding areas under full built- out conditions, AND one of the following conditions can be met:

a) Less than 2,000 square feet of ***new impervious surface*** will be added within the ***natural discharge area***, OR

b) The developed conditions runoff from the ***natural discharge area*** is less than 0.1 cfs for the 100-year runoff event and will be infiltrated for runoff events up to and including the 100-year event, OR

c) The *developed conditions runoff volume*[29] from the ***natural discharge area*** is less than 50% of the existing conditions runoff volume from other areas draining to the location where runoff from the ***natural discharge area*** enters the ***landslide hazard area*** onto slopes steeper than 15%, AND the provisions of Discharge Requirement 1 are met, OR

[29] For the purposes of applying this exception, the *developed conditions runoff volume* is the average annual runoff volume as computed with the approved model per Chapter 3. The total volume is divided by the number of full water years being analyzed to determine the annual average runoff volume. Any areas assumed not to be cleared when computing the developed conditions runoff volume must be set aside in an open space tract or covenant in order for the proposed project to qualify for this exception. Preservation of existing forested areas in Landslide Hazard Drainage Areas is encouraged.

d) DPER determines that a tightline system is not physically feasible or will create a significant adverse impact based on a soils report by a geotechnical engineer.

Systems proposed as an alternative to the required tightline must meet all of the following requirements:

1. Approval by DPER shall be based on a geotechnical analysis that considers cumulative impacts from the project and surrounding areas under full built-out conditions.
2. Proposed facilities, FCBMPs, and dispersal systems must meet all applicable feasibility and setback requirements contained in the SWDM.
3. Facility outflows must meet the discharge dispersal requirements specified in Discharge Requirement 1 of Core Requirement #1 (p. 1-25).
4. The geotechnical analysis and proposed system design must address facility overflows and recommend additional measures, factors of safety in facility design, etc. based on an evaluation of risk of slope instability or failure and potential impacts to life, structures, and property.
5. For projects adjacent to or containing a ***landslide***, ***steep slope***, or ***erosion hazard area*** as defined in KCC 21A.06, the applicant must demonstrate that onsite drainage facilities and/or flow control BMPs will not create a significant adverse impact to downhill properties or drainage systems.

1.2.4 CORE REQUIREMENT #4: CONVEYANCE SYSTEM

REQUIREMENT

All engineered conveyance system elements for proposed projects must be analyzed, designed, and constructed to provide a minimum level of protection against overtopping, flooding, erosion, and structural failure as specified in the following groups of requirements:

- "Conveyance Requirements for New Systems," Section 1.2.4.1 (below)
- "Conveyance Requirements for Existing Systems," Section 1.2.4.2 (p. 1-56)
- "Conveyance System Implementation Requirements," Section 1.2.4.3 (p. 1-57)

Intent: To ensure proper design and construction of engineered conveyance system elements. *Conveyance systems* are natural and engineered drainage facilities that provide for the collection and transport of surface water or stormwater runoff. This core requirement applies to the engineered elements of conveyance systems (primarily pipes, culverts, and ditches/channels).

1.2.4.1 CONVEYANCE REQUIREMENTS FOR NEW SYSTEMS

All *new conveyance system elements*,[30] both onsite and offsite, shall be analyzed, designed, and constructed according to the following requirements. Also see Section 4.1 for route design and easement requirements.

Pipe Systems

1. New pipe systems shall be designed with sufficient capacity to convey and contain (at minimum) the 25-year peak flow, assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas.
2. Pipe system structures may overtop for runoff events that exceed the 25-year design capacity, provided the overflow from a 100-year runoff event does not create or aggravate a ***severe flooding problem*** or ***severe erosion problem*** as described in Core Requirement #2, Section 1.2.2 (p. 1-27). Any overflow occurring onsite for runoff events up to and including the 100-year event must discharge at the natural location for the ***project site***. In residential subdivisions, this overflow must be contained within an onsite drainage easement, tract, covenant, or public right-of-way.
3. The upstream end of a pipe system that receives runoff from an open drainage feature (pond, ditch, etc.) shall be analyzed and sized as a culvert as described below.

Culverts

1. New culverts shall be designed with sufficient capacity to meet the headwater requirements in Section 4.3.1 and convey (at minimum) the 25-year peak flow, assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas.
2. New culverts must also convey as much of the 100-year peak flow as is necessary to preclude creating or aggravating a ***severe flooding problem*** or ***severe erosion problem*** as described in Core Requirement #2, Section 1.2.2 (p. 1-27). Any overflow occurring onsite for runoff events up to and including the 100-year event must discharge at the natural location for the ***project site***. In residential subdivisions, this overflow must be contained within an onsite drainage easement, tract, covenant, or public right-of-way.
3. New culverts proposed in streams with salmonids shall be designed to provide for fish passage as detailed in Section 4.3.2. *Note: The County's critical areas regulations (KCC 21A.24) or the state Department of Fish and Wildlife may require a bridge to facilitate fish passage.*

[30] *New conveyance system elements* are those that are proposed to be constructed where there are no existing constructed conveyance elements.

Ditches/Channels

1. New ditches/channels shall be designed with sufficient capacity to convey and contain, at minimum, the 25-year peak flow, assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas.
2. New ditches/channels must also convey as much of the 100-year peak flow as is necessary to preclude creating or aggravating a ***severe flooding problem*** or ***severe erosion problem*** as described in Core Requirement #2, Section 1.2.2 (p. 1-27). Any overflow occurring onsite for runoff events up to and including the 100-year event must discharge at the natural location for the ***project site***. In residential subdivisions, such overflow must be contained within an onsite drainage easement, tract, covenant, or public right-of-way.

Tightline Systems Traversing Steep Slopes

New tightline conveyance systems traversing slopes that are steeper than 15% and greater than 20 feet in height, or are within a ***steep slope hazard area*** as defined in KCC 21A.06, shall be designed with sufficient capacity to convey and contain (at minimum) the 100-year peak flow, assuming *full build-out conditions*[31] for all tributary areas, both onsite and offsite. Tightline systems shall be designed as detailed in Section 4.2.2.

Bridges

New bridges shall be designed to accommodate the 100-year peak flow as specified in Section 4.3.3 and in accordance with the floodplain development standards in KCC 21A.24.

1.2.4.2 CONVEYANCE REQUIREMENTS FOR EXISTING SYSTEMS

The following conveyance requirements for existing systems are less rigorous than those for new systems to allow some salvaging of existing systems that are in useable condition. Existing systems may be utilized if they are capable of providing a minimum level of protection as-is or with minor modifications.

Existing Onsite Conveyance Systems

No Change in Flow Characteristics: Existing onsite conveyance systems that will not experience a change in flow characteristics (e.g., peak flows or volume of flows) as a result of the proposed project need not be analyzed for conveyance capacity.

Change in Flow Characteristics: Existing onsite conveyance systems that will experience a change in flow characteristics as a result of the proposed project must comply with the following conveyance requirements:

1. The existing system must be analyzed and shown to have sufficient capacity to convey and contain (at minimum) the 10-year peak flow assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas.
2. The applicant must demonstrate that the 100-year peak flow to the existing system will not create or aggravate a ***severe flooding problem*** or ***severe erosion problem*** as described in Core Requirement #2, Section 1.2.2 (p. 1-27).
3. Minor modifications may be made to the conveyance system to achieve the required capacity stated above. Examples of minor modifications include raising a catch-basin rim, replacing or relaying a section of pipe to match the capacity of other pipes in the system, improving a pipe inlet, or enlarging a short, constricted reach of ditch or channel.

[31] *Full build-out conditions* means the tributary area is developed to its full zoning potential except where there are existing sensitive areas, open space tracts, and/or native growth protection easements/covenants.

4. Modifications to an existing conveyance system or element that acts to attenuate peak flows, due to the presence of detention storage upstream, shall be made in a manner that does not significantly increase peak flows downstream. For example, if water is detained in a pond upstream of a restrictive road culvert, then installing an overflow system for the culvert should prevent overtopping of the road without significantly reducing existing detention storage.

Existing Offsite Conveyance Systems

1. Existing offsite conveyance systems need not be analyzed for conveyance capacity except as required by Core Requirement #2, or if offsite improvements or direct discharge are proposed per Core Requirement #3.
2. Improvements made to existing offsite conveyance systems to address the drainage problem-specific mitigation requirements in Section 1.2.2.2 (p. 1-34) need only change existing conveyance capacity sufficient to prevent aggravation of the drainage problem(s) being addressed.
3. Existing offsite conveyance systems proposed to be used for direct discharge to a ***major receiving water*** per Core Requirement #3 (p. 1-41) shall meet the same conveyance requirements specified in Section 1.2.4.1 (p. 1-55) for new systems.

1.2.4.3 CONVEYANCE SYSTEM IMPLEMENTATION REQUIREMENTS

Conveyance systems shall be designed and implemented in accordance with the following requirements, allowances, and flexible compliance provisions:

A. METHODS OF ANALYSIS AND DESIGN

Properly sized conveyance elements provide sufficient hydraulic capacity to convey peak flows of the return frequencies indicated in Sections 1.2.4.1 and 1.2.4.2. Conveyance capacity shall be demonstrated using the methods of analysis detailed in Chapter 4. Design flows for sizing conveyance systems shall be determined using the appropriate runoff computation method specified in Section 3.2.

B. COMPOSITION

Where feasible, conveyance systems shall be constructed of vegetation-lined channels, as opposed to pipe systems. Vegetative channels shall generally be considered feasible if all of the following conditions are present:

1. The channel gradient generally does not exceed 5 percent, AND
2. No modifications to currently adopted standard roadway cross sections in the *King County Road Design and Construction Standards* are necessitated by the channel, AND
3. The channel will be accessible for maintenance (see Section 1.2.6), AND
4. The channel will not be subject to erosion.

Exceptions: The following are exceptions to the requirement for vegetative channels*:*

- Conveyance systems proposed under roadways, driveways, or parking areas
- Conveyance systems proposed between houses in urban-zoned plats and short plats
- Conveyance systems conveying roof runoff only.

C. INTERFLOW AND INTERCEPTION

Interflow is near-surface groundwater that moves laterally through the soil horizon following the hydraulic gradient of underlying relatively impermeable soils. When interflow is expressed on the surface, it is termed a *spring* or *seepage*. Any significant springs or seepage areas that impact a roadway or structure

proposed by the project must be intercepted and directed into a conveyance system. Where roadways may impede the passage of interflow to downstream wetlands or streams, provision for passage of unconcentrated flows must be made.

D. PROVISION FOR LOT DRAINAGE WITHIN SUBDIVISIONS

Within *subdivision projects*,[32] provision must be made for the safe conveyance of runoff from the discharge location of each lot to the subdivision's main conveyance system or road drainage system. This may include, but is not limited to, **provisional stub-outs** from an enclosed roadway drainage system to the edge of the road right-of-way at each created lot, or lot-line pipes or ditches that collect lot drainage and convey it to the subdivision's main conveyance system or road drainage system.

E. OUTFALLS

An *outfall* is defined as a point where collected and concentrated surface and storm water runoff is discharged from a pipe system or culvert.

Energy Dissipation: At a minimum, rock erosion protection is required at outfalls from all drainage systems and elements except where DPER determines that erosion protection is being provided by other means or is not needed. Details on outfall structures are included in Section 4.2.2.

New Point Discharges Over Steep Slopes: Proposed outfalls that will discharge runoff in a location where the natural (existing) discharge is unconcentrated over a slope steeper than 15% and greater than 20 feet in height, or over a ***steep slope hazard area*** (as defined in KCC 21A.06), must meet the following criteria:

- A tightline conveyance system must be constructed to convey the runoff to the bottom of the slope unless other measures are approved by DPER based on an evaluation/report by a licensed geotechnical engineer.
- The geotechnical analysis must consider cumulative impacts from the project and surrounding areas under full built-out conditions.
- Tightline systems must be designed so that existing baseflow conditions are not significantly changed and adequate energy dissipation is provided at the bottom of the slope.
- Where alternative measures (e.g. dispersal trench) to the tightline system are approved upstream of a ***landslide hazard area*** or ***steep slope hazard area***, they may be placed no closer than 50 feet from the top of the hazard area slope based on an evaluation/report by a licensed geotechnical engineer.

F. OUTFALLS TO THE GREEN RIVER

New stormwater outfalls or modifications to existing stormwater outfalls discharging to the Green River between River Mile 6 (South Boeing Access Road) and SR 18 are **allowed only through the adjustment process**. These outfalls must comply with requirements of the *Green River Pump Operations Procedure Plan*, which establishes storage volumes and release rate criteria for developments proposing to ***construct or modify*** outfalls. Copies of the plan are available from DNRP.

G. SPILL CONTROL

Projects proposing to construct or replace onsite conveyance system elements that receive runoff from non-roof-top ***pollution-generating impervious surface*** must provide a spill control device as detailed in Section 4.2.1.1 prior to discharge from the ***site*** or into a *natural onsite drainage feature.*[33] More specifically, this requirement applies whenever a proposed project does either of the following:

[32] For purposes of this requirement, the term *subdivision project* refers to any project that creates a short plat, plat, or binding site plan.

[33] *Natural onsite drainage feature* means a natural swale, channel, stream, closed depression, wetland, or lake.

- Constructs a new onsite conveyance system that receives runoff from non-roof-top ***pollution-generating impervious surface***, OR
- Removes and replaces an existing onsite conveyance system element that receives runoff from 5,000 square feet or more of non-roof-top ***pollution-generating impervious surface*** onsite.

The intent of this device is to temporarily detain oil or other floatable pollutants before they enter the downstream drainage system in the event of an accidental spill or illegal dumping. It may consist of a tee section in a manhole or catch basin, or an equivalent alternative as specified in Section 4.2.1.1. *Note that in addition to this spill control requirement to protect offsite and natural drainage systems, there are other spill control requirements in this manual for discharges to certain water quality facilities and all infiltration facilities (see the design criteria for water quality facilities in Chapter 6 and the general requirements for infiltration facilities in Section 5.2). The application of these requirements must be such that all stated intents are satisfied.*

H. GROUNDWATER PROTECTION

Any reach of new ditch or channel proposed by a project in which the untreated runoff from 5,000 square feet or more of ***pollution-generating impervious surface*** or ¾ acre or more of pollution-generating pervious surface comes into direct contact with an outwash soil must be **lined** with either:

a) a **low permeability liner** or a **treatment liner** consistent with the specifications for such liners in Section 6.2.4, OR

b) an imported soil **compacted till liner** meeting the following specifications:

- Liner thickness shall be 18 inches after compaction.
- Imported soils must meet the gradation listed for compacted till liner in Section 6.2.4.
- Soil should be placed in 6-inch lifts.
- Soil shall be compacted to no less than 95% minimum dry density, modified proctor method (ASTM D-1557).

The intent of this requirement is to reduce the likelihood that pollutants will be discharged to groundwater when untreated runoff is conveyed in ditches or channels constructed in soils with high infiltration rates.

I. PUMP SYSTEMS

Pump systems may be used to convey water from one location or elevation to another within the ***project site*** provided they meet the design criteria specified for such systems in Section 4.2.3 and will be privately owned and maintained.

Pump systems discharging flows from the ***project site*** that would not have discharged by gravity flow under ***existing site conditions*** will require an approved adjustment to Core Requirement #1 (see Section 1.4, "Adjustment Process"). These pump systems will be considered only when they are necessary to prevent creation or aggravation of a flooding or erosion problem as specified in Section 1.2.2. Pump systems discharging to the Green River between River Mile 6 (South Boeing Access Road) and SR 18 must also comply with the *Green River Pump Operations Procedure Plan*.

1.2.5 CORE REQUIREMENT #5: CONSTRUCTION STORMWATER POLLUTION PREVENTION

REQUIREMENT

All proposed projects that will clear, grade, or otherwise disturb the ***site*** must provide erosion and sediment controls to prevent, to the maximum extent practicable, the transport of sediment from the ***project site*** to downstream drainage facilities, water resources, and adjacent properties. All proposed projects that will conduct construction activities onsite or offsite must provide stormwater pollution prevention and spill controls to prevent, reduce, or eliminate the discharge of pollutants to onsite or adjacent stormwater systems or watercourses. To prevent sediment transport and pollutant discharges as well as other impacts related to land-disturbing and construction activities, **Erosion and Sediment Control (ESC)** measures and **Stormwater Pollution Prevention and Spill Control (SWPPS)** measures that are appropriate to the ***project site*** must be applied through a comprehensive **Construction Stormwater Pollution Prevention (CSWPP) plan** as described in Sections 1.2.5.1 and 1.2.5.3 and shall perform as described in Section 1.2.5.2. In addition, these measures, both temporary and permanent, shall be implemented consistent with the requirements in Section 1.2.5.3 that apply to the proposed project.

Intent:

- To prevent the transport of sediment and other impacts, like increased runoff, related to land disturbing activities. Erosion of disturbed areas on construction sites can result in excessive sediment transport to adjacent properties and to surface waters. This sediment can result in major adverse impacts, such as flooding from obstructed drainage ways, smothering of salmonid spawning beds, algal blooms in lakes, and exceedances of state water quality standards for turbidity. These impacts can also result from the increased runoff generated by land disturbing activities on construction sites.
- To prevent, reduce, or eliminate the discharge of pollutants to onsite or adjacent stormwater systems or watercourses from construction-related activities such as materials delivery and storage, onsite equipment fueling and maintenance, demolition of existing buildings and disposition of demolition materials and other waste, and concrete handling, washout and disposal.

1.2.5.1 CSWPP MEASURES

Construction Stormwater Pollution Prevention (CSWPP) measures include **Erosion and Sediment Control (ESC)** measures and **Stormwater Pollution Prevention and Spill (SWPPS)** measures.

ESC MEASURES

Each of the following categories of ESC measures must be considered for application to the ***project site*** as detailed in the *Erosion and Sediment Control (ESC) Standards*. The ESC standards are located in the King County *Construction Stormwater Pollution Prevention Standards* adopted as Appendix D of this manual:

1. Clearing Limits
2. Cover Measures
3. Perimeter Protection
4. Traffic Area Stabilization
5. Sediment Retention
6. Surface Water Collection
7. Dewatering Control
8. Dust Control
9. Flow Control

10. Control Pollutants (also see SWPPS Measures below)
11. Protect Existing and Proposed Flow Control BMPs
12. Maintain BMPs
13. Manage the Project

SWPPS MEASURES

Each of the following categories of SWPPS measures must be considered for application to the ***project site*** as detailed in the *Stormwater Pollution Prevention and Spill Control (SWPPS) Standards*. The SWPPS standards are located in the King County *Construction Stormwater Pollution Prevention Standards* adopted as Appendix D of this manual:

- Follow effective pollutant handling and disposal procedures.
- Provide cover and containment for materials, fuel and other pollutants.
- Manage the project site to maximize pollutant control and minimize pollutant sources.
- Protect from spills and drips of petroleum products and other pollutants.
- Avoid overapplication or untimely application of chemicals and fertilizers.
- Prevent or treat contamination of stormwater runoff by pH modifying sources.

1.2.5.2 CSWPP PERFORMANCE AND COMPLIANCE PROVISIONS

The changing conditions typical of construction sites call for frequent field adjustments of existing ESC and SWPPS measures or additional ESC and SWPPS measures in order to meet required performance. In some cases, strict adherence to specified measures may not be necessary or practicable based on ***site*** conditions or project type. In other cases, immediate action may be needed to avoid severe impacts. Therefore, careful attention must be paid to ESC and SWPPS performance and compliance in accordance with the following provisions:

A. CSWPP SUPERVISOR

For projects in Targeted, Full or Large Project Drainage Review, or projects in Directed Drainage Review as determined by the DPER permit reviewer, the **applicant must designate a CSWPP supervisor** who shall be responsible for the performance, maintenance, and review of ESC and SWPPS measures and for compliance with all permit conditions relating to CSWPP as described in the *CSWPP Standards*. The applicant's selection of a CSWPP supervisor must be approved by King County. This approval may be rescinded for non-compliance, requiring the applicant to select another CSWPP supervisor and obtain County approval prior to continuing work on the project site. For projects that disturb one acre or more of land, the CSWPP supervisor must be a **Certified Professional in Erosion and Sediment Control** (see www.cpesc.net for more information) or a **Certified Erosion and Sediment Control Lead** whose certification is recognized by King County.[34] King County may also require a certified ESC professional for sites smaller than one acre of disturbance if DDES determines that onsite ESC measures are inadequately installed, located, or maintained.

For larger, more sensitive sites, King County may require a certified ESC professional with several years of experience in construction supervision/inspection and a background in geology, soil science, or agronomy (See Appendix D, Section D.2.3.1 for more information).

[34] King County recognition of certification means that the individual has taken a King County-approved third party training program and has passed the King County-approved test for that training program.

B. MONITORING OF DISCHARGES

The CSWPP supervisor shall have a turbidity meter onsite and shall use it to monitor surface and storm water discharges from the ***project site*** and into onsite wetlands, streams, or lakes whenever runoff occurs from onsite activities and during storm events. If the ***project site*** is subject to a NPDES general permit for construction issued by the Washington State Department of Ecology (*Ecology*), then the project must comply with the monitoring requirements of that permit.

The CSWPP supervisor shall also use the specific SWPPS control BMP procedures for monitoring surface and stormwater discharge for pollutants and acceptable discharge levels. The CSWPP supervisor shall keep logs as required by the procedures of all measurements taken onsite and make them available to DPER on request.

C. ESC PERFORMANCE

ESC measures shall be applied/installed and maintained to prevent, to the maximum extent practicable, the transport of sediment from the ***project site*** to downstream drainage systems or surface waters or into onsite wetlands, streams, or lakes or onto adjacent properties. This performance is intended to be achieved through proper selection, installation, and operation of the above ESC measures as detailed in the *CSWPP Standards* (detached Appendix D) and approved by the County. However, the CSWPP supervisor or the County may determine at any time during construction that the approved measures are not sufficient and that additional action is required based on one of the following criteria:

1. IF a turbidity test of surface and storm water discharges leaving the ***project site*** is greater than the benchmark value of 25 NTU (nephelometric turbidity units) set by the Washington State Department of Ecology, but less than 250 NTU, the CSWPP Supervisor shall do all of the following:
   a) Review the ESC plan for compliance and make appropriate revisions within 7 days of the discharge that exceeded the benchmark of 25 NTU, AND
   b) Fully implement and maintain appropriate ESC measures as soon as possible but no later than 10 days after the discharge that exceeded the benchmark, AND
   c) Document ESC implementation and maintenance in the ***site*** log book.
2. IF a turbidity test of surface or storm water entering onsite wetlands, streams, or lakes indicates a turbidity level greater than 5 NTU above background when the background turbidity is 50 NTU or less, or 10% above background when the background turbidity is greater than 50 NTU, then corrective actions and/or additional measures beyond those specified in Section 1.2.5.1 shall be implemented as deemed necessary by the County inspector or onsite CSWPP supervisor.
3. IF discharge turbidity is 250 NTU or greater, the CSWPP Supervisor shall do all of the following:
   a) Notify the County by telephone, AND
   b) Review the ESC plan for compliance and make appropriate revisions within 7 days of the discharge that exceeded the benchmark of 25 NTU, AND
   c) Fully implement and maintain appropriate ESC measures as soon as possible but no later than 10 days after the discharge that exceeded the benchmark, AND
   d) Document ESC implementation and maintenance in the ***site*** log book. AND
   e) Continue to sample discharges until turbidity is 25 NTU or lower, or the turbidity is no more than 10% over background turbidity.
4. IF the County determines that the condition of the construction site poses a **hazard to adjacent property** or may **adversely impact drainage facilities or water resources**, THEN additional measures beyond those specified in Section 1.2.5.1 may be required by the County.

D. SWPPS PERFORMANCE

SWPPS measures shall be applied/installed and maintained so as to prevent, reduce, or eliminate the discharge of pollutants to onsite or adjacent stormwater systems or watercourses or onto adjacent properties. This performance is intended to be achieved through proper selection, installation, and operation of the above SWPPS measures as detailed in the *CSWPP Standards* (detached Appendix D) and approved by the County. However, the CSWPP supervisor designated per Section 1.2.5.2.A or the County may determine at any time during construction that such approved measures are not sufficient and additional action is required based on the criteria described in the specific SWPPS BMP standard and/or conditions of an approved adjustment:

E. FLEXIBLE COMPLIANCE

Some projects may meet the intent of Core Requirement #5 while varying from specific CSWPP requirements contained here and in the *CSWPP Standards*. If a project is designed and constructed to meet the intent of this core requirement, the County may determine that strict adherence to a specific ESC requirement is unnecessary; an approved adjustment (see Section 1.4) is not required in these circumstances. Certain types of projects are particularly suited to this greater level of flexibility, for instance, projects on relatively flat, well drained soils, projects that are constructed in closed depressions, or projects that only disturb a small percentage of a forested site may meet the intent of this requirement with very few ESC measures. However, SWPPS requirements may actually be emphasized on well-drained soils, particularly in groundwater or well-protection protection areas, or in close proximity to water bodies. More information on intent and general ESC and SWPPS principles is contained in the *CSWPP Standards* in Appendix D.

F. ROADS AND UTILITIES

Road and utility projects often pose difficult erosion control challenges because they frequently cross surface waters and are long and narrow with limited area available to treat and store sediment-laden water. Because of these factors, road and utility projects are allowed greater flexibility in meeting the intent of Core Requirement #5 as described in the *CSWPP Standards*.

G. ALTERNATIVE AND EXPERIMENTAL MEASURES

All measures proposed for erosion and sediment control shall conform to the details and specifications in the *CSWPP Standards* unless an alternative is approved by King County, and if the alternative is a new technology, it must also be approved through Ecology's CTAPE program (see "Alternative and Experimental Measures" in the *CSWPP Standards*, detached Appendix D).

1.2.5.3 CSWPP IMPLEMENTATION REQUIREMENTS

Proposed projects must identify, install, and maintain required erosion and sediment control and stormwater pollution prevention and spill control measures consistent with the following requirements:

A. CSWPP PLAN

As specified in Chapter 2, all proposed projects must submit a **CSWPP plan** for implementing CSWPP measures. The CSWPP plan is comprised of the **ESC plan and the SWPPS plan**. The **ESC plan** must show the location and details of all ESC measures as specified in Chapter 2 and the *CSWPP Standards* and shall include a **CSWPP report**, which contains additional directions and supporting information like a detailed construction sequence as proposed by the design engineer and any calculations or information necessary to size ESC measures and demonstrate compliance with Core Requirement #5. The CSWPP plan shall also contain plan notes that outline specific permit conditions as outlined in Appendix D Section D.4.2 Standard ESC and SWPPS Plan Notes. The County may require large, complex projects to phase construction and to submit multiple ESC plans for the different stages of construction. New CSWPP plans

are not required for changes that are necessary during construction, unless required by the County inspector.

B. WET SEASON CONSTRUCTION

During the wet season (October 1 to April 30) any ***site*** with exposed soils shall be subject to the "Wet Season Requirements" contained in the *ESC Standards*. In addition to the ESC cover measures, these provisions include covering any newly-seeded areas with mulch and seeding as much disturbed area as possible during the first week of October to provide grass cover for the wet season. Other ESC measures such as baker tanks and portable sand filters may be required for use during the wet season. A separate "Wet Season" ESC plan shall be submitted and approved by the County before continuing work on any ***site*** during the wet season.

C. CONSTRUCTION WITHIN CRITICAL AREAS AND BUFFERS

Any construction that will result in disturbed areas on or within a stream or associated buffer, within a wetland or associated buffer, or within 50 feet of a lake shall be subject to the "Critical Area Restrictions" contained in the *CSWPP Standards*. These provisions include phasing the project whenever possible so that construction in these areas is limited to the dry season.

D. MAINTENANCE

All ESC and SWPPS measures shall be maintained and reviewed on a regular basis as prescribed in the *CSWPP Standards*.

E. FINAL STABILIZATION

Prior to obtaining final construction approval, the ***site*** shall be stabilized, structural ESC and SWPPS measures (such as silt fences, sediment traps and concrete waste collection pits) shall be removed, and drainage facilities shall be cleaned as specified in the *CSWPP Standards*. A separate ESC plan describing final stabilization may be required by the County prior to implementation.

F. CONSIDERATION OF OTHER REQUIRED PERMITS

Consideration should be given to the requirements and conditions that may be applied by other agencies as part of other permits required for land-disturbing activities. In particular, the following permits may be required and should be considered when implementing CSWPP measures:

- A **Class IV Special Forest Practices Permit** is required by the Washington State Department of Natural Resources for projects that will clear more than two acres of forest or 5,000 board feet of timber. All such clearing is also subject to the State Environmental Policy Act (RCW 43.21C) and will require SEPA review. King County assumes lead agency status for Class IV permits, and the application may be consolidated with the associated King County development permit or approval.
- A **NPDES General Permit for Construction** (pursuant to the Washington State Department of Ecology's Construction Stormwater General Permit) is required for projects that will disturb one or more acres for purposes of constructing or allowing for construction of a development, or projects disturbing less than one acre that are part of a *larger common plan of sale*[35] that will ultimately disturb one or more acres.

[35] ***Common plan of development or sale*** means a site where multiple separate and distinct construction activities may take place at different times or on different schedules, but still under a single plan. Examples include: 1) phased projects and projects with multiple filings or lots, even if the separate phases or filings/lots will be constructed under separate contract or by separate owners (e.g. a development where lots are sold to separate builders); 2) a development plan that may be phased over multiple years, but is still under a consistent plan for long-term development; and 3) projects in a contiguous area that may be unrelated but still under the same contract, such as construction of a building extension and a new parking lot at the same facility.

1.2.6 CORE REQUIREMENT #6: MAINTENANCE AND OPERATIONS

REQMT

Maintenance and operation of all drainage facilities is the responsibility of the applicant or property owner, except those facilities for which King County assumes maintenance and operation as described below and in KCC 9.04.115 and KCC 9.04.120. Drainage facilities must be maintained and operated in accordance with the maintenance standards in Appendix A of this manual, or other maintenance standards as approved by King County.

Intent: To ensure that the maintenance responsibility for drainage facilities is clearly assigned and that these facilities will be properly maintained and operated in perpetuity.

Drainage Facilities to be Maintained by King County

King County will assume maintenance and operation of the following drainage facilities[36] for any residential subdivision with two or more lots, and any similar development where at least two-thirds of the developed contributing area is from single family or townhouse residential structures on individual lots, except where King County grants an adjustment per Section 1.4, allowing the facilities to be maintained by the homeowners association:

- Flow control and water quality facilities within a tract or right-of-way dedicated to King County.
- Flow control BMP devices within a tract or right-of-way dedicated to King County.
- Where serving public improvements, flow control BMP vegetated flow paths for full dispersion within an easement that includes provisions for access and maintenance. King County maintenance of these vegetated flow paths will be limited to their FCBMP functionality. All other maintenance shall remain the responsibility of the owner(s).
- The conveyance system within improved public road right-of-way.

Note: King County may assume maintenance of facilities serving any mix of developments as part of a shared facilities plan. See Reference Section 4-D for further guidance regarding the County's assumption of maintenance responsibility for shared facilities.

King County **will assume maintenance** and operation of these facilities **two years after final construction approval** by DPER and an inspection by the County to ensure the facilities have been properly maintained and are operating as designed.

Flow control and water quality facilities and **flow control BMP devices** to be maintained and operated by King County must be located in a tract or right-of-way dedicated to King County. Required vegetated flow paths for full dispersion and basic dispersion BMPs require a recorded declaration of covenant that stipulates restrictions on use AND shall be located in an easement that includes provisions for access and maintenance. King County maintenance of these vegetated flow paths will be limited to their FCBMP functionality. All other maintenance shall remain the responsibility of the owner(s). Access roads serving these facilities must also be located in the tract or right-of-way and must be connected to an improved public road right-of-way. Underground flow control or water quality facilities (tanks or vaults) may be allowed in private rights-of-way or roads if the easement includes provisions for facility access and maintenance.

Conveyance systems to be maintained and operated by King County must be located in a drainage easement, tract, or right-of-way granted to King County. *Note: King County does not normally assume maintenance responsibility for conveyance systems that are outside of improved public road right-of-way.*

Drainage Facilities to be Maintained by Private Parties

All drainage facilities maintained privately or by other public agencies, except flow control BMPs, must

[36] *Note: King County does not assume maintenance of individual lot drainage systems or drainage stub-outs serving single family residential lot downspout, footing, or yard drains.*

be maintained as specified in **Appendix A**, "Maintenance Requirements for Flow Control, Conveyance, and WQ Facilities," and as further prescribed in **Chapter 6** for water quality facilities, unless otherwise approved by King County DNRP. A copy of the **Operation and Maintenance Manual** submitted as part of the permit application (see Section 2.3.1) shall be retained on ***site*** and shall be transferred with the property to the new owner. A log of maintenance activity indicating when cleaning occurred and where waste was disposed of shall also be kept by the owner and be available for inspection by the County.

All privately maintained **flow control BMPs** must be maintained as specified in the ***site*/lot's** declaration of covenant and grant of easement per Section 1.2.9.

King County may inspect all privately maintained drainage facilities for compliance with these requirements. If the property owner(s) fails to maintain their facilities to the acceptable standards, the County may issue a written notice specifying the required remedial actions and requiring a schedule for timely completion of the actions. If these actions are not performed in a timely manner, the County may enter the property to perform the actions needed and bill the property owner(s) for the cost of the actions. If a hazard to public safety exists, the County may perform remedial actions without written notice.

If the proposed project is a commercial, industrial, or multifamily development or redevelopment, or a single family residential building permit, a **drainage facility declaration of covenant and grant of easement** (see Reference Section 8-J) must be recorded at the King County Office of Records and Elections prior to engineering plan approval. Whenever a flow control or water quality facility or flow control BMP is proposed to be located on a parcel separate from the parcel or parcels containing the target surfaces mitigated by the facility or BMP, provisions must be made to ensure that the owner or owners of the target surfaces have a perpetual right to operate and maintain the facility. This may be done either by recording an easement granting this right to the owner(s) of the target surfaces, or by conveying the land on which the facility sits (or an interest therein) to the owner(s) of target surfaces.

If the proposed project is a **residential subdivision development**, all privately maintained conveyance systems or other drainage facilities that convey flows through private property must be located in a **drainage easement dedicated to convey surface and storm water**. Individual owners of the properties containing these easements must maintain the drainage facilities through their property. The legal instrument creating drainage easements on private property must contain language that requires a private property owner to obtain written approval from King County prior to removing vegetation (except by routine mowing) from any drainage easement containing open, vegetated drainage facilities (such as swales, channels, ditches, ponds, etc.). See Reference Section 8-L, "Drainage Easement," for guidance.

1.2.7 CORE REQUIREMENT #7: FINANCIAL GUARANTEES AND LIABILITY

REQUIREMENT

All drainage facilities constructed or modified for projects must comply with the financial guarantee requirements in King County Ordinance 12020 and the liability requirements of King County Code 9.04.100, excepting those privately maintained flow control BMPs not serving a private road designed for 2 or more lots. There are **two types of financial guarantees** for projects constructing or modifying drainage facilities. These are as follows:

- The *drainage facilities restoration and site stabilization guarantee*
- The *drainage defect and maintenance guarantee.*

Intent: To ensure financial guarantees are posted to sufficiently cover the cost of correcting, if necessary, incomplete or substandard drainage facility construction work, and to warrant for two years the satisfactory performance and maintenance of those newly-constructed drainage facilities to be assumed by King County for maintenance and operation. Core Requirement #7 is also intended to ensure that a liability policy is provided that protects the proponent and the County from any damages relating to the construction or maintenance of required drainage facilities by private parties.

Drainage Facilities Restoration and Site Stabilization Financial Guarantee

Before starting construction, the applicant who must construct drainage facilities, pursuant to the drainage requirements in this manual and KCC 9.04.050, must post a drainage facilities restoration and site stabilization financial guarantee. This guarantee must be an amount sufficient to cover the cost of corrective work performed specifically for the given project on or off the ***site***. *Note: DPER may waive this guarantee on projects proposing only minor modifications or improvements to the drainage system (e.g., catch basin inserts, spill control devices, pipe replacements, etc.). In addition, this guarantee may be combined with other required guarantees as allowed in Ordinance 12020.*

Before King County will release the project's drainage facilities restoration and site stabilization financial guarantee, the applicant must do the following:

1. Construct the drainage facilities
2. Receive final construction approval from DPER
3. Pay all required fees.

Drainage Defect and Maintenance Financial Guarantee

For any constructed or modified drainage facilities to be maintained and operated by King County, the applicant must do the following:

1. Post a drainage defect and maintenance financial guarantee for a period of two years (see Reference Section 8-I, "Maintenance and Defect Agreement").
2. Maintain the drainage facilities (per the maintenance standards in Appendix A) during the two-year period following posting of the guarantee.

Before King County will release the drainage defect and maintenance financial guarantee and assume maintenance and operation of drainage facilities, the applicant must do the following:

1. For plats, record the final plat.
2. For tracts containing drainage facilities to be maintained by King County and not located within the final plat, deed the tract to King County and set property corners in conformance with state surveying standards.
3. For easements containing drainage facilities to be maintained by King County and not located within the final plat, provide easement documents and set temporary survey markers to delineate the easement location.
4. Receive a final County inspection to ensure the drainage facilities have been properly maintained and are operating as designed.
5. Correct any defects noted in the final inspection.

1.2.8 CORE REQUIREMENT #8: WATER QUALITY FACILITIES

REQMT

All proposed projects, including ***redevelopment projects***, must provide water quality (WQ) facilities to treat the runoff from those new and replaced ***pollution-generating impervious surfaces*** and new ***pollution-generating pervious surfaces*** targeted for treatment as specified in the following sections. These facilities shall be selected from a menu of water quality facility options specified by the area-specific facility requirements in Section 1.2.8.1 (p. 1-71) and implemented according to the applicable WQ implementation requirements in Section 1.2.8.2 (p. 1-80).

Intent: To require an efficient, cost-effective level of water quality treatment tailored to the sensitivities and resource protection needs of the downstream receiving water to which the ***project site*** drains, or, in the case of infiltration, protection of the receiving groundwater system.

Guide to Applying Core Requirement #8

Core Requirement #8 requires that WQ facilities be provided to remove pollutants from runoff discharging from a ***project site*** in accordance with one of the three area-specific WQ facility requirements found in Section 1.2.8.1 (p. 1-71). At a minimum, basic treatment is required for all PGIS and PGPS as specified once given threshold areas are reached or exceeded. Each area-specific facility requirement applies to one of three geographic areas of unincorporated King County, called "WQ treatment areas." Such areas are designated by King County to tailor the levels of treatment to the protection needs of specific waterbodies and resources. The three areas are **Basic WQ Treatment Areas**, **Sensitive Lake WQ Treatment Areas**, and **Sphagnum Bog WQ Treatment Areas**. Sensitive Lake and Sphagnum Bog treatment requirements are above and beyond Basic. The areas are depicted on the WQ Applications Map adopted with this manual and found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx.

The facility requirement for each WQ treatment area includes an area-specific menu of water quality facility options, the types of surfaces from which runoff must be treated ("target surfaces"), and any exceptions to the menu and surfaces requirements.

Within each WQ treatment area, certain land uses require ***Enhanced Basic*** treatment to address the likelihood of elevated heavy metals levels, or ***Enhanced Basic*** treatment may also be required under certain circumstances it would not otherwise be required, but where receiving waters are impaired.

For efficient application of Core Requirement #8, the following steps are recommended:

1. Check the exemption language on page 1-69 to determine if or which ***threshold discharge areas*** of the ***project site*** must provide WQ facilities per Core Requirement #8.
2. Use the WQ Applications Map and any necessary ***site***-specific information to determine the WQ treatment area in which your project is located. Because the basin boundaries of Sphagnum Bog WQ Treatment Areas are not delineated on the WQ Applications Map, you may find that your project is located in one of these as well as another WQ treatment area. If this happens, the requirements of the Sphagnum Bog WQ Treatment Area take precedence.
3. Comply with the requirements specified in Section 1.2.8.1 (p. 1-71) for the WQ treatment area you identified above.
4. Consult Section 1.2.8.2 (p. 1-80) for other design requirements, allowances, and flexible compliance provisions related to implementing water quality treatment.
5. Consult Sections 1.2.2, Core Requirement #2: Offsite Analysis, 1.2.2.1, Downstream Analysis, and 1.2.2.1.2, Downstream Water Quality Problems Requiring Special Attention.

Other Important Information about Core Requirement #8

Core Requirement #8 is the primary component of an overall water quality protection strategy required by this manual. Other requirements include the following:

- Core Requirement #4: **Conveyance System, Spill Control Provisions**, Section 1.2.4 (p. 1-58) — This provision generally applies whenever a project constructs or replaces onsite conveyance system elements that receive runoff from ***pollution-generating impervious surfaces***. The provision requires that runoff from such impervious surfaces be routed through a spill control device prior to discharge from the ***project site*** or into a natural onsite drainage feature.
- Core Requirement #4: **Conveyance System, Groundwater Protection**, Section 1.2.4 (p. 1-59) — This provision requires that ditches/channels be lined as needed to reduce the risk of groundwater contamination when they convey runoff from ***pollution-generating impervious surfaces*** that comes into direct contact with an outwash soil.
- Special Requirement #4: **Source Control**, Section 1.3.4 (p. 1-103) — This requirement applies water quality source controls from the *King County Stormwater Pollution Prevention Manual* to commercial, industrial, and multifamily projects.
- Special Requirement #5: **Oil Control**, Section 1.3.5 (p. 1-105) — This requirement applies special oil controls to those projects proposing to develop or redevelop a ***high-use site***.

❑ EXEMPTIONS FROM CORE REQUIREMENT #8

There are four possible exemptions from the requirement to provide **a water quality facility** per Core Requirement #8:

1. Surface Area Exemption

A proposed non-redevelopment project or any ***threshold discharge area*** within the ***site*** of such a project is exempt if it meets all of the following criteria:

a) Less than 5,000 square feet of ***new*** **plus** ***replaced PGIS*** that is **not** ***fully dispersed*** will be created, AND

b) Less than ¾ acre of ***new PGPS*** that is **not** ***fully dispersed*** will be added.

2. Surface Exemption for Transportation Redevelopment Projects

A proposed ***transportation redevelopment project*** or any ***threshold discharge area*** within the ***site*** of such a project is exempt if it meets all of the following criteria:

a) The **total** ***new impervious surface*** within the project limits is less than 50% of the existing impervious surface, AND

b) Less than 5,000 square feet of ***new PGIS*** that is **not** ***fully dispersed*** will be added, AND

c) Less than ¾ acre of ***new PGPS*** that is **not** ***fully dispersed*** will be added.

3. Cost Exemption for Parcel Redevelopment Projects

A proposed ***redevelopment project*** on a single or multiple parcel ***site*** or any ***threshold discharge area*** within the ***site*** of such a project is exempt if it meets all of the following criteria:

a) The **total valuation** of the project's proposed improvements (including interior improvements and excluding required mitigation improvements) is less than 50% of the assessed value of the existing ***site*** improvements, AND

b) Less than 5,000 square feet of ***new PGIS*** that is **not** ***fully dispersed*** will be added, AND

c) Less than ¾ acre of ***new PGPS*** that is **not** ***fully dispersed*** will be added.

4. Soil Treatment Exemption

A proposed project or any drainage area within a project is exempt:

- If the runoff from ***pollution-generating impervious and pollution generating pervious surfaces*** is infiltrated in a facility per Section 5.2.1 in soils that meet the groundwater protection soil quality, depth, and infiltration rate criteria given in Section 5.2.1; except for areas that are within one-quarter-mile of a *sensitive lake*[37].

[37] See Sensitive Lake in **Key Terms and Definitions**. Sensitive Lake is a designation applied by the County to lakes that are particularly prone to eutrophication from development-induced increases in phosphorus loading. Such lakes are identified on the Water Quality Applications Map adopted with this manual and found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx

1.2.8.1 AREA-SPECIFIC WATER QUALITY FACILITY REQUIREMENT

REQUIREMENT

Projects subject to Core Requirement #8 must provide a water quality facility selected from a menu of water quality facility options identified in the area-specific facility requirements and exceptions for the WQ treatment area in which the proposed project or ***threshold discharge area*** of the proposed project is located. These WQ treatment areas are listed below and their requirements and exceptions are detailed in the following subsections:

A. Basic WQ Treatment Areas

B. Sensitive Lake WQ Treatment Areas

C. Sphagnum Bog WQ Treatment Areas.

Intent: To apply an appropriate level of water quality treatment based on the sensitivities of receiving waters for the drainage area in which the project lies. These drainage areas are identified as WQ treatment areas on the WQ Applications Map adopted with this manual. In addition to a minimum basic standard, which applies broadly to most geographic areas, special menus are provided for land uses that generate the highest concentrations of metals in stormwater and for ***sites*** within the watersheds of sensitive lakes, and sphagnum bog wetlands.

A. BASIC WQ TREATMENT AREAS

Basic WQ Treatment Areas are designated by King County where a general, cost-effective level of treatment is sufficient for most land uses. Some land uses, however, will need an increased level of treatment because they generate high concentrations of metals in stormwater runoff and acute concentrations of metals in streams are toxic to fish. The water quality facility requirements for Basic WQ Treatment Areas provide for this increase in treatment. Basic WQ Treatment Areas are delineated on the WQ Applications Map adopted with this manual and found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx . Any unincorporated areas of King County not shown on this map shall be assumed to be Basic WQ Treatment Areas.

Note: For projects located at or near the delineated boundary of the Basic WQ Treatment Area, ***site-****specific topography or drainage information may be needed to verify that the project or any* ***threshold discharge area*** *of the project is within the WQ treatment area. Any* ***threshold discharge area*** *is considered to be within the Basic WQ Treatment Area if the* ***threshold discharge area*** *drains to a waterbody or drainage system that is clearly within the mapped Basic WQ Treatment Area. The only* ***exception*** *to this is if the* ***threshold discharge area*** *also drains to a sphagnum bog wetland larger than 0.25 acres in size as described in Subsection C, "Sphagnum Bog WQ Treatment Areas" (p. 1-77). In this case, the* ***threshold discharge area*** *is considered to be located within a Sphagnum Bog WQ Treatment Area and is subject to the facility requirement of that area only (i.e., required treatment menu, target surfaces, and exceptions).*

Required Treatment Menu

REQUIREMENT

Within Basic WQ Treatment Areas, a water quality facility option from the **Basic WQ menu** shall be used to treat runoff from the surfaces listed under "Target Surfaces" below, except where such treatment is waived or reduced by the area-specific exceptions at the end of this subsection and except where the Enhanced Basic WQ menu is applicable as follows.

If 50% or more of the runoff that drains to any proposed water quality facility is from one or more of the **following land uses**, then the **Enhanced Basic WQ menu** shall be used in place of the Basic WQ menu for the design of this facility, except if such treatment is waived or reduced by the area-specific exceptions at the end of this subsection:

REQUIREMENT

1. Residential subdivision development in which the actual density of single family units is equal to or greater than 8 units per acre of developed area.
2. Commercial, industrial, or multifamily land use.
3. A road with an expected average daily traffic (ADT) count of 2,000 or more vehicles or expected to serve 200 or more homes. *Note: those roads defined in the King County Road Design and Construction Standards as urban subaccess streets, rural subaccess streets, urban minor access streets – residential, rural minor access streets – residential, urban subcollectors, and rural subcollectors all serve less than 100 homes by definition.*

Treatment Goal and Options

The treatment goal for facility options in the **Basic WQ menu** is 80% removal of total suspended solids (TSS) for flows or volumes up to and including the WQ design flow or volume for a typical rainfall year, assuming typical pollutant concentrations in urban runoff[38]. TSS is the general performance indicator for basic water quality protection because it is the most obvious pollutant of concern. TSS is not a single pollutant —it is a general term for a highly variable mixture of solid pollutants with variable particle size and particle density distributions, and to one degree or another containing a variety of sorbed dissolvable pollutants. The Basic WQ menu includes facilities such as wetponds, combined detention/wetponds, bioswales, vegetated filter strips, and sand filters. See Chapter 6 for specific facility choices and design details. Additional facility designs may appear in Reference 14 in the future.

The treatment goal for facility options in the **Enhanced Basic WQ menu** is to accomplish better removal of heavy metals and potentially other toxic materials than can be achieved by basic treatment, while still meeting the basic treatment goal of 80% TSS removal,. The specific target performance is > 30% reduction of dissolved copper and > 60% removal of dissolved zinc. Dissolved copper and zinc are indicators of a wider range of metals typically found in urban runoff that are potentially toxic to fish and other aquatic life. The Enhanced Basic WQ menu includes options for use of a basic-sized stormwater wetland, a large sand filter, or a combination of two facilities in series. See Chapter 6 for specific facility options and designs. Additional facility designs may appear in Reference 14 in the future.

Intent

The **Basic WQ menu** is intended to be applied to both stormwater discharges draining to surface waters and those infiltrating into soils that do not provide adequate groundwater protection (see Exemptions 4 and 5 from Core Requirement #8). Overall, the 80% TSS removal objective, in conjunction with special requirements for source control and ***high-use site*** controls, should result in good stormwater quality for all but the most sensitive water bodies. Increased water quality treatment is necessary for developments that generate the highest concentrations of metals and for developments that drain to sensitive lakes and sphagnum bog wetlands.

Facility options in the **Enhanced Basic WQ menu** are intended to remove more metals than expected from those in the Basic WQ menu. Lower metal concentrations reduce the risk to fish from exposure to both chronic and acute toxic concentrations of metals such as copper and zinc, and very low concentration copper deleterious olfactory effects. As the toxicity of metals depends on their concentration, this standard is most effective for ***project sites*** with a larger proportion of ***pollution-generating impervious surface*** like roadways and medium to high density subdivisions. The Enhanced Basic WQ menu is intended to apply to all such ***project sites*** that drain by surface flows to a fish-bearing stream. However, projects that drain entirely by pipe to the ***major receiving waters*** listed on page 1-41 may be excused from the increased treatment and may revert to the Basic WQ menu because concentration effects are of less concern as the overall flow volume increases; however, this

[38] The influent concentration range for demonstrated pollutant removal is 100 to 200 mg/L. For influent concentrations lower than 100mg/l the effluent goal is equal to or less than 20 mg/l.. For influent concentrations greater than 200 mg/l, the goal is greater than 80% TSS removal.

exception is not applicable for WQ impaired segments per Section 1.2.2.1: Downstream Analysis, and 1.2.2.1.2: Downstream Water Quality Problems Requiring Special Attention, Metals Problem (Type 4).

Target Surfaces

Facilities **in Basic WQ Treatment Areas** must treat (either directly or in effect) the runoff from the following target surfaces within the ***threshold discharge area*** for which the facility is required:

1. ***New PGIS*** that is **not *fully dispersed*** per the Criteria for Fully Dispersed Surfaces (p. 1-51) in Core Requirement #3, or **not *farmland dispersed*** as specified in Appendix C. For individual lots within residential subdivision projects, the extent of ***new PGIS*** shall be assumed based on expected driveway size as approved by DPER.
2. ***New PGPS*** that is **not *fully dispersed*** and from which there will be a concentrated surface discharge in a natural channel or man-made conveyance system from the ***site,*** or **not *farmland dispersed*** as specified in Appendix C. For individual lots within residential subdivision projects, the extent of ***new pervious surface*** shall be assumed to be the entire lot area, except the assumed impervious portion as specified in Chapter 3 and any portion in which native conditions are preserved by covenant, tract, or easement.
3. **Existing impervious surface** added since January 8, 2001 that is **not *fully dispersed,*** or **not *farmland dispersed*** as specified in Appendix C, and not yet mitigated with a County-approved water quality facility or flow control BMP. *Note: January 8, 2001 is the effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon.*
4. ***Replaced PGIS*** that is **not *fully dispersed*** or **not *farmland dispersed*** as specified in Appendix C on a non-redevelopment project.
5. ***Replaced PGIS*** that is **not *fully dispersed*** on a ***transportation redevelopment project*** in which ***new impervious surface*** is 5,000 square feet or more and totals 50% or more of the existing impervious surface within the project limits.
6. ***Replaced PGIS*** that is **not *fully dispersed,*** or **not *farmland dispersed*** as specified in Appendix C, on a **parcel *redevelopment project*** in which the total of new plus ***replaced impervious surface*** is 5,000 square feet or more and whose valuation of proposed improvements (including interior improvements and excluding required mitigation improvements) exceeds 50% of the assessed value of the existing ***site*** improvements.

Exceptions

The following exceptions apply only **in Basic WQ Treatment Areas**:

1. The facility requirement **in Basic WQ Treatment Areas** as applied to **target *PGPS*** may be waived altogether for:
   - an ***agricultural project*** if there is a good faith agreement with the King Conservation District to implement a farm management plan for agricultural uses per KCC 21A.24 and KCC 16.82, developed with King Conservation District; or
   - for other land uses, DPER approves a ***landscape management plan*** (LMP) that controls solids, pesticides, fertilizers, and other erodible or leachable materials leaving the ***site***.

     LMP requirements can be found in Reference Section 4-C. LMP submittal requirements are given in Section 2.3.1.5.
2. The **Enhanced Basic WQ menu** as specified above for certain land uses may be reduced to the **Basic WQ menu** for treatment of any runoff that is infiltrated per the standards of Section 5.2. <u>This exception is not allowed</u> where infiltrating within one-quarter-mile of a fresh water designated for aquatic life use or that has an existing aquatic life use into soils that do not meet the groundwater protection standards described in Section 5.2.1.

3. The **Enhanced Basic WQ menu** as specified above for certain land uses may be reduced to the **Basic WQ menu** for treatment of any runoff that is discharged directly, via a non-fish-bearing conveyance system, all the way to the ordinary high water mark of a stream with a mean annual flow of 1,000 cfs or more (at the discharge point of the conveyance system) or a lake that is 300 acres or larger. This exception does not apply where the receiving water is impaired as described in the full description of **major receiving water** in the **Definitions** section or is **impaired for metals** according to **Downstream Analysis**.
4. The **Enhanced Basic WQ menu** as specified above for treating runoff from a commercial land use may be reduced to the **Basic WQ menu** if all of the following criteria are met:
   a) A facility from the Enhanced Basic WQ menu is not feasible, AND
   b) No leachable heavy metals are currently used or proposed to be used in areas of the ***site***, exposed to the weather, AND
   c) A covenant is recorded that prohibits future such use of leachable , heavy metals on the ***site*** (use the covenant in Reference Section 8-Q), AND
   d) Less than 50% of the runoff draining to the proposed water quality facility is from any area of the ***site*** comprised of one or both of the following land uses:
      - Commercial land use with an expected ADT of 100 or more vehicles per 1,000 square feet of gross building area.
      - Commercial land use involved with vehicle repair, maintenance, or sales.
5. The facility requirement as applied to ***replaced PGIS*** may be waived if the County has adopted a plan and implementation schedule for fulfilling this requirement using **regional facilities**.

B. SENSITIVE LAKE WQ TREATMENT AREAS

Sensitive Lake WQ Treatment Areas are designated by King County in the watersheds of lakes that have a combination of water quality characteristics and watershed development potential that makes them particularly prone to eutrophication induced by development. Such areas are delineated on the WQ Applications Map adopted with this manual and found online at http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx or viewed via King County's iMap Interactive Mapping Tool at http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx .

Note: For projects located at or near the delineated boundary of the Sensitive Lake WQ Treatment Area, **site**-specific topography or drainage information may be needed to verify that the project or any **threshold discharge area** of the project is within the WQ treatment area. Any **threshold discharge area** is considered to be within the Sensitive Lake WQ Treatment Area if the **threshold discharge area** drains to the sensitive lake itself or to any waterbody or drainage system that is clearly within the mapped Sensitive Lake WQ Treatment Area. The only **exception** to this is if the **threshold discharge area** also drains to a sphagnum bog wetland larger than 0.25 acres in size as described in Subsection D, "Sphagnum Bog WQ Treatment Areas" (p. 1-77). In this case, the requirements of Sphagnum Bog WQ Treatment Areas (i.e., required treatment menu, target surfaces, and exceptions) shall apply to the **threshold discharge area**.

REQUIREMENT

Required Treatment Menu

Within Sensitive Lake WQ Treatment Areas, a water quality facility option from the **Sensitive Lake Protection menu** shall be used to treat runoff from the surfaces listed under "Target Surfaces" below, except where such treatment is waived or reduced by the area-specific exceptions at the end of this subsection and except where the Enhanced Basic WQ menu is applicable as follows. If 50% or more of the runoff that drains to any proposed water quality facility is from one or more of the **following land uses**, then a water quality facility option common to both the **Sensitive Lake Protection menu and**

REQUIREMENT

Enhanced Basic WQ menu shall be used for the design of this facility, except if such treatment is waived or reduced by the area-specific exceptions at the end of this subsection:

1. Residential subdivision development in which the actual density of single family units is equal to or greater than 8 units per acre of developed area.
2. Commercial, industrial, or multifamily land use.
3. A road with an expected average daily traffic (ADT) count of 2,000 or more vehicles or expected to serve 200 or more homes. *Note: those roads defined in the King County Road Design and Construction Standards as urban subaccess streets, rural subaccess streets, urban minor access streets – residential, rural minor access streets – residential, urban subcollectors, and rural subcollectors all serve less than 100 homes by definition.*

Treatment Goal and Options

The treatment goal for facility options in the Sensitive Lake Protection menu is 50% annual average total phosphorus (TP) removal assuming typical pollutant concentrations in urban runoff.[39] This goal was chosen as a realistic and cost-effective level of phosphorus removal. The Sensitive Lake Protection menu includes options for using either Basic WQ facilities of larger size, combinations of two facilities in series,[40] or a single facility in combination with land use planning elements that reduce phosphorus. See Chapter 6 for specific facility options and design details.

On some developments or portions thereof that have surface uses that generate the highest concentrations of metals in stormwater runoff, the treatment goal is expanded to include > 30% reduction of dissolved copper and > 60% removal of dissolved zinc. This expanded goal requires use of a water quality facility option that is common to both the Sensitive Lake Protection menu and the Enhanced Basic menu.

Intent

A project discharging runoff via surface flow contributes phosphorus loading to a sensitive lake regardless of distance from the lake. If discharge is via infiltration through coarse soils, it is also possible that phosphorus would be transported through the ground for some distance without attenuation. This groundwater transport distance is considered to be typically no more than one-quarter mile. Therefore, onsite treatment using the **Sensitive Lake Protection menu** is required prior to infiltration within one-quarter mile of a sensitive lake. Infiltration through finer soils is expected to provide significant attenuation of TP, so the general groundwater protection criteria specified in Reference 11-B under "Soil Treatment Exemption" are considered sufficient for infiltration through finer soils.

Where the treatment goal is expanded to include > 30% reduction of dissolved copper and > 60% removal of dissolved zinc, the facility options common to both the Sensitive Lake Protection menu and the Enhanced Basic WQ menu should meet this goal as well as the lake protection goal of 50% removal of annual average total phosphorous. The intent behind the enhanced heavy metals removal goal and why it is applied is described on Page 1-72.

Target Surfaces

Facilities **in Sensitive Lake WQ Treatment Areas** must mitigate (either directly or in effect) the runoff from the following target surfaces within the ***threshold discharge area*** for which the facility is required:

1. ***New PGIS*** that is **not *fully dispersed*** per the Criteria for Fully Dispersed Surfaces (p. 1-51) in Core Requirement #3, or **not *farmland dispersed*** as specified in Appendix C. For individual lots within residential subdivision projects, the extent of ***new PGIS*** shall be assumed based on expected driveway size as approved by DPER.

[39] Phosphorus concentrations of between 0.10 and 0.50 mg/L are considered typical of Seattle area runoff (Table 1, "Water Quality Thresholds Decision paper," King County Surface Water Management Division, April 1994).

[40] *In series* means that the entire treatment water volume flows from one facility to the other in turn.

2. ***New PGPS*** that is **not *fully dispersed*** and from which there will be a concentrated surface discharge in a natural channel or man-made conveyance system from the ***site,*** or **not *farmland dispersed*** as specified in Appendix C. For individual lots within residential subdivision projects, the extent of ***new pervious surface*** shall be assumed to be the entire lot area, except the assumed impervious portion as specified in Chapter 3 and any portion in which native conditions are preserved by covenant, tract, or easement. *Note: where the runoff from **target PGPS** is separated from the runoff from **target PGIS**, the Basic WQ menu may be used in place of the Sensitive Lake Protection menu for treatment of runoff from the **target PGPS** (see the area-specific exceptions at the end of this subsection).*
3. **Existing impervious surface** added since January 8, 2001 that is **not *fully dispersed,*** or **not *farmland dispersed*** as specified in Appendix C, and not yet mitigated with a County-approved water quality facility or flow control BMP. *Note: January 8, 2001 is the effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon.*
4. ***Replaced PGIS*** that is **not *fully dispersed,*** or **not *farmland dispersed*** as specified in Appendix C, on a non-redevelopment project.
5. ***Replaced PGIS*** that is **not *fully dispersed*** on a ***transportation redevelopment project*** in which ***new impervious surface*** is 5,000 square feet or more and totals 50% or more of the existing impervious surface within the project limits.
6. ***Replaced PGIS*** that is **not *fully dispersed,*** or **not *farmland dispersed*** as specified in Appendix C, on a **parcel *redevelopment project*** in which the total of new plus ***replaced impervious surface*** is 5,000 square feet or more and whose valuation of proposed improvements (including interior improvements and excluding required mitigation improvements) exceeds 50% of the assessed value of the existing ***site*** improvements.

Exceptions

The following exceptions apply only **in Sensitive Lake WQ Treatment Areas**:

1. The **Basic WQ menu** may be used in place of the **Sensitive Lake Protection menu** for treatment of any **runoff that is infiltrated** according to the standards in Section 5.2. <u>This exception is not allowed</u> where infiltrating within one-quarter-mile of a phosphorous sensitive receiving water or a tributary to that receiving water into soils that do not meet the groundwater protection standards described in Section 5.2.1.
2. Application of the **Enhanced Basic WQ menu** as specified above for certain land uses may be waived for treatment of any runoff that is infiltrated according to the standards in Section 5.2. <u>This exception is not allowed</u> where infiltrating within one-quarter-mile of a fresh water designated for aquatic life use or that has an existing aquatic life use into soils that do not meet the groundwater protection standards described in Section 5.2.1.
3. Application of the **Enhanced Basic WQ menu** as specified above for certain land uses may be waived for treatment of any runoff that is discharged, via a non-fish-bearing conveyance system, all the way to the ordinary high water mark of a stream with a mean annual flow of 1,000 cfs or more (at the discharge point of the conveyance system) or a lake that is 300 acres or larger. <u>This exception is not applicable f</u>or WQ impaired segments per Section 1.2.2.1: Downstream Analysis, and 1.2.2.1.2: Downstream Water Quality Problems Requiring Special Attention, Metals Problem (Type 4).
4. The **Enhanced Basic WQ menu** as specified above for treating runoff from a commercial land use may be waived if the all of the following criteria are met:
   a) No leachable metals (e.g., galvanized metals) are currently used or proposed to be used in areas of the ***site***, exposed to the weather, AND
   b) A covenant is recorded that prohibits future such use of leachable metals on the ***site***, exposed to the weather (use the covenant in Reference Section 8-Q), AND

c) Less than 50% of the runoff draining to the proposed water quality facility is from any area of the ***site*** comprised of one or both of the following land uses:

- Commercial land use with an expected ADT of 100 or more vehicles per 1,000 square feet of gross building area.
- Commercial land use involved with vehicle repair, maintenance, or sales.

5. The **Basic WQ menu** may be used for treatment of any runoff from **target *PGPS*** that is treated separately from the runoff from **target *PGIS***.
6. The facility requirement as applied to **target *PGPS*** may be waived altogether for an ***agricultural project*** if there is a **farm management plan** for agricultural uses per KCC 21A.24 and KCC 16.82, or for other land uses DPER approves a ***landscape management plan*** (LMP) that controls solids, pesticides, fertilizers, and other erodible or leachable materials leaving the ***site*** .
7. The facility requirement as applied to ***replaced PGIS*** may be waived if the County has adopted a plan and implementation schedule for fulfilling this requirement using **regional facilities**.

Note: If a lake management plan has been prepared and adopted by King County, additional treatment and/or other water quality measures may be required as specified in the plan and pursuant to Special Requirement #1, Section 1.3.1 (p. 1-99).

C. SPHAGNUM BOG WQ TREATMENT AREAS

Sphagnum Bog WQ Treatment Areas are areas of King County from which runoff drains to or otherwise comes into contact with the vegetation of a ***sphagnum bog wetland***[41] **larger than 0.25 acres in *size***.[42] These wetlands support unique vegetation communities, and they tend to develop in areas where water movement is minimized. Although sphagnum bog wetlands are typically isolated from significant sources of surface and ground water and receive their main water supply from rainfall, there are instances where they are components of larger wetlands and may be subject to inundation by those wetlands during high intensity or long duration runoff events. Sphagnum bog wetlands are generally uncommon in the Puget Sound area; of all the inventoried wetlands in King County, only a small percentage have sphagnum bog wetland components.[43]

Only a portion of all sphagnum bog wetlands have been identified and mapped by King County. Consequently, many of these wetlands and their contributing drainage areas must be identified during the wetland identification and delineation for a ***project site*** and during offsite analysis as required in Core Requirement #2. A list of identified sphagnum bog wetlands is included on the WQ Applications Map and in the 1997 King County Bog Inventory, updated November 2002; however, if a wetland that meets the definition of a sphagnum bog wetland is found downstream of a ***project site*** and runoff from the ***project site*** drains to or otherwise comes into contact with the wetland's vegetation, the ***project site*** is considered to be within a Sphagnum Bog WQ Treatment Area whether the wetland is listed or not.

*Note: Any **threshold discharge area** from which runoff drains to or comes into contact with the vegetation of a sphagnum bog wetland larger than 0.25 acres in size is considered to be within a Sphagnum Bog WQ Treatment Area regardless of the WQ treatment area indicated by the WQ Applications Map.*

Required Treatment Menu

REQMT

A treatment option from the **Sphagnum Bog Protection menu** shall be used to treat runoff from the target surfaces specified below, except where this mitigation is waived or reduced by the area-specific exceptions at the end of this subsection.

[41] A *sphagnum bog wetland* is defined as a wetland dominated by sphagnum moss and which has an associated acid-loving plant community. See the "Definitions" section for more details on how King County defines a sphagnum bog wetland.

[42] The *size* of a sphagnum bog wetland is defined by the boundaries of the sphagnum bog plant community.

[43] Approximately 3% of wetlands in the 1990 sensitive areas inventory are either sphagnum bog wetlands or include portions of a lake or wetland with sphagnum bog wetland characteristics.

Treatment Goals and Options

The treatment goals for protection of sphagnum bog wetlands include the control of nutrients, alkalinity, and pH. Although these goals may change as additional information about these wetlands becomes available, target pollutant removals for sphagnum bog protection are currently as follows:

- Total phosphorus reduction of 50%
- Nitrate + nitrite reduction of 40%
- pH below 6.5
- Alkalinity below 10 mg $CaCO_3$/L.

Facility options to meet these goals are limited; therefore, the County discourages developments from discharging runoff to sphagnum bog wetlands. Where infiltration of developed area runoff is not feasible or applicable per Section 5.2, water quality facility options include a *treatment train*[44] of two or three facilities in series. One of the facilities in the train must be a sand filter. The order of facilities in the treatment train is important; see Chapter 6 for specific facility options and design details.

Intent

Sphagnum bog wetlands support unique vegetation communities that are extremely sensitive to changes in alkalinity and nutrients from surface water inputs. The most effective way to prevent these changes is to infiltrate or redirect developed area runoff so it does not come into contact with the vegetation of a sphagnum bog wetland. However, this is not practicable for most development projects due to soil constraints precluding infiltration (see Section 5.2) and the onerous nature of bypassing runoff around a wetland. Therefore, where runoff contact with sphagnum bog vegetation cannot be avoided, the bog protection menu seeks to minimize certain changes in the chemistry of developed area runoff to protect this unique vegetation. This menu applies not only to runoff that drains directly to a sphagnum bog wetland but to runoff that otherwise comes into contact with the bog's vegetation, such as through inundation of the bog by an adjacent water body during high intensity or long duration runoff events.

While water quality facility options emphasize reduction of mineral elements (alkalinity) and nutrients in the runoff, little is known about their ability to reduce alkalinity or to actually protect sphagnum-based plant communities. In addition, the effect of frequent water level changes on the sphagnum plant community is also unknown but could be damaging. Hence, it is best to avoid discharge to sphagnum bog wetlands whenever possible. Permeable pavements that are tributary to sphagnum bog wetlands should be types other than Portland cement (PCC) permeable pavement, if feasible.

Target Surfaces

Facilities **in Sphagnum Bog WQ Treatment Areas** must mitigate (either directly or in effect) the runoff from the following target surfaces within the ***threshold discharge area*** for which the facility is required:

1. ***New PGIS*** that is **not *fully dispersed*** per the Criteria for Fully Dispersed Surfaces (p. 1-51) in Core Requirement #3, or **not *farmland dispersed*** as specified in Appendix C . For individual lots within residential subdivision projects, the extent of ***new PGIS*** shall be assumed based on expected driveway size as approved by DPER.
2. ***New PGPS*** that is **not *fully dispersed*** and from which there will be a concentrated surface discharge in a natural channel or man-made conveyance system from the ***site,*** or **not *farmland dispersed*** as specified in Appendix C. For individual lots within residential subdivision projects, the extent of ***new pervious surface*** shall be assumed to be the entire lot area, except the assumed impervious portion as

[44] A *treatment train* is a combination of two or more treatment BMPs connected in series (i.e., the design water volume passes through each facility in turn).

specified in Chapter 3 and any portion in which native conditions are preserved by covenant, tract, or easement.

3. **Existing impervious surface** added since January 8, 2001 that is **not *fully dispersed*** or **not *farmland dispersed*** as specified in Appendix C and not yet mitigated with a County-approved water quality facility or flow control BMP. *Note: January 8, 2001 is the effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon.*
4. Replaced PGIS that is **not *fully dispersed,*** or **not *farmland dispersed*** as specified in Appendix C, on a non-redevelopment project.
5. ***Replaced PGIS*** that is **not *fully dispersed*** on a ***transportation redevelopment project*** in which ***new impervious surface*** is 5,000 square feet or more and totals 50% or more of the existing impervious surface within the project limits.
6. ***Replaced PGIS*** that is **not *fully dispersed*** or **not *farmland dispersed*** as specified in Appendix C on a **parcel *redevelopment project*** in which the total of new plus ***replaced impervious surface*** is 5,000 square feet or more and whose valuation of proposed improvements (including interior improvements and excluding required mitigation improvements) exceeds 50% of the assessed value of the existing ***site*** improvements.

Exceptions

The following exceptions apply only **in Sphagnum Bog WQ Treatment Areas**:

1. The **Basic WQ menu** may be used in place of the Sphagnum Bog Protection menu for treatment of any **runoff that is infiltrated** in a facility per Section 5.2. <u>This exception is not allowed</u> where infiltrating within one-quarter-mile of a phosphorous sensitive receiving water or a tributary to that receiving water into soils that do not meet the groundwater protection standards described in Section 5.2.1. If the infiltration facility is located in soils not meeting the groundwater protection standards described in Section 5.2.1, and within the prescribed distance of a sensitive lake, then the Sensitive Lake Protection menu shall be used.
2. The facility requirement for Sphagnum Bog WQ Treatment Areas may be reduced to that of the surrounding WQ treatment area (i.e., either the Basic WQ Treatment Area or Sensitive Lake Treatment Area, whichever contains the Sphagnum Bog WQ Treatment Area) for treatment of any ***replaced PGIS*** **runoff**.

*Note: Unlike other WQ treatment areas, the facility requirement for Sphagnum Bog WQ Treatment Areas as applied to **target PGPS** may **not** be waived through a **farm management plan** or **landscape management plan**.*

1.2.8.2 WATER QUALITY IMPLEMENTATION REQUIREMENTS

Water quality facilities shall be designed and implemented in accordance with the following requirements, allowances, and flexible compliance provisions:

A. METHODS OF ANALYSIS AND DESIGN

Water quality facilities shall be analyzed and designed as detailed in Chapter 6.

B. SITING OF WATER QUALITY FACILITIES

Required water quality facilities shall be located so as to treat the runoff from all target surfaces, except as allowed below under "Treatment Trades" and "Untreated Discharges."

Any other onsite or offsite runoff draining to a proposed water quality facility must be treated whether it is from a **target pollution-generating surface** or not and regardless of whether the runoff has already been treated by another facility. The facility must be sized for all flows/volumes entering the facility. This is because treatment effectiveness is determined in part by the total volume of runoff entering the facility.

C. TREATMENT TRADES

The runoff from **target pollution-generating surfaces** may be released untreated if an existing non-targeted pollution-generating surface of equivalent size and pollutant characteristics lying within the same watershed or stream reach tributary area is treated on the ***project site***. Such substitution is subject to the following restrictions:

1. The existing non-targeted pollution-generating surface is not currently being treated, is not required to be treated by any phase of the proposed project, is not subject to NPDES or other permit requirements, and is not under a compliance order or other regulatory action, AND
2. The proposal is reviewed and approved by DPER.

D. UNTREATED DISCHARGES

If ***site*** topographic constraints are such that runoff from a **target pollution-generating surface** must be pumped to be treated by the required water quality facility, then DPER may allow the area's runoff to be released untreated (except for those ***project sites*** draining to a sphagnum bog wetland) provided that all of the following conditions are met:

1. Treatment of the constrained area by filter strip, bioswale, or a linear sand filter is not feasible, and a **treatment trade** as described above is not possible.
2. The untreated target surface is less than 5,000 square feet of ***new plus replaced PGIS***.
3. Any **target *PGPS*** within the area to be released untreated shall be addressed with a ***landscape management plan*** (LMP), which must be submitted to and approved by DPER. The LMP applies to the entire site and all drainage area tributary to the site within one or more contiguous parcels under the same ownership or documented legal control.

E. USE OF EXPERIMENTAL WATER QUALITY FACILITIES

Water quality facilities other than those identified in Chapter 6, Reference 14-A, or Reference 14-B may be allowed on an experimental basis if it can be demonstrated that they are likely to meet the pollutant removal goal for the applicable receiving water. Use of such facilities requires an experimental design adjustment, which requires approval by King County according to Section 1.4, "Adjustment Process" (p. 1-107), Section 6.7, "Alternative Facilities", and Reference 8-F, Section 2.0, Experimental Design Adjustment Process and Requirements. Any new treatment technologies must be approved through the state Department of

Ecology's *TAPE*[45] or *CTAPE*[46] program before the technology can be considered by King County. Monitoring will be required, the nature of which will depend on the pre-existing Ecology use-level designation, the number of existing facilities of this design for which monitoring data already exists, and review of the monitoring results from those facilities. When sufficient data on performance and maintenance requirements have been collected and if both are acceptable, the new facility may be added to the appropriate water quality menu for common use through a blanket adjustment or update of this manual. Criteria may be set, which if not met, may require replacement of the facility with a standard facility from SWDM Chapter 6.

F. OWNER RESPONSIBILITY FOR WATER QUALITY

Regardless of the means by which a property owner chooses to meet the water quality requirements of this manual – whether a water quality facility, a train of facilities, a treatment trade or an experimental water quality facility – it is the responsibility of the property owner to ensure that runoff from their ***site*** does not create water quality problems or degrade beneficial uses downstream. It is also the responsibility of the property owner to ensure that the discharge from their property is not in violation of state and federal laws.

[45] Ecology W, 2011. Technical Guidance Manual for Evaluating Emerging Stormwater Treatment Technologies: Technology Assessment Protocol – Ecology (TAPE), Publication No. 11-10-061, 2011 ed. Washington State Department of Ecology, Lacey, WA, pp. 1-73. https://fortress.wa.gov/ecy/publications/summarypages/1110061.html

[46] Chemical Technology Assessment Protocol- Ecology

1.2.9 CORE REQUIREMENT #9: FLOW CONTROL BMPS

REQUIREMENT

All proposed projects, including ***redevelopment projects***, must provide onsite flow control BMPs to mitigate the impacts of storm and surface water runoff generated by ***new impervious surface***, ***new pervious surface***, existing impervious surfaces, and ***replaced impervious surface*** targeted for mitigation as specified in the following sections. Flow control BMPs must be selected and applied according to the basic requirements, procedures, and provisions detailed in this section and the design specifications for each BMP in Appendix C, Section C.2.

Flow control BMPs are methods and designs for dispersing, infiltrating, or otherwise reducing or preventing development-related increases in runoff at or near the sources of those increases. Flow control BMPs include, but are not limited to, preservation and use of ***native vegetated surfaces*** to fully disperse runoff; use of other pervious surfaces to disperse runoff; roof downspout infiltration; permeable pavements; bioretention; limited infiltration systems; and reduction of development footprint.

Intent: To provide mitigation of hydrologic impacts that are not possible/practical to mitigate with a flow control facility. Such impacts include increases in runoff volumes and flashiness and decreases in groundwater recharge. Increased runoff volume and flashiness leads to higher and more variable stream velocities at low flows and more frequent water level fluctuations in streams and wetlands. This causes wash-out and stranding of aquatic species, algal scour and washout of organic matter, loss of vegetation diversity and habitat quality, and disruption of cues for spawning, egg hatching, and migration. Decreased groundwater recharge reduces water supply for human use and summer base flows in streams, which is critical to water temperature, salmonid use of smaller streams, and the habitat quality of mainstem side channels and wetlands used for spawning, rearing, and flood refuge. Flow control BMPs seek to reduce runoff volumes and flashiness and increase groundwater recharge by reducing imperviousness and making use of the pervious portions of ***development sites*** to maximize infiltration and retention of stormwater onsite. Thus, the goal is to apply flow control BMPs to ***new*** impervious surfaces, new pervious surfaces, ***replaced impervious surfaces, and*** existing impervious surfaces added since January 8, 2001 (*effective date of the ESA 4(d) Rule for Puget Sound Chinook salmon)* to the maximum extent feasible without causing flooding or erosion impacts.

❑ EXEMPTION FROM CORE REQUIREMENT #9

There is a single exemption from the flow control BMP provisions of Core Requirement #9:

1. Basic Exemption

A proposed project is exempt if it meets the following criteria:

a) Less than 2,000 square feet of ***new*** plus ***replaced impervious surface*** will be created, AND

b) Less than 7,000 square feet of land disturbing activity will occur.

1.2.9.1 FLOW CONTROL BMP REQUIREMENTS OVERVIEW

Projects that are subject to Core Requirement #9 must apply flow control BMPs to either supplement the flow mitigation provided by required flow control facilities or provide flow mitigation where flow control facilities are not required. All such flow control BMPs are detailed in Appendix C of this manual. Flow control BMPs must be implemented per the requirements and approach detailed in Sections 1.2.9.2 and 1.2.9.3 below for individual lots and subdivisions or road improvement projects, respectively. As described within Sections 1.2.9.2 and 1.2.9.3, there are two methods of satisfying the FCBMP requirement: (1) application of BMPs to the maximum extent feasible using lists specific to the project location, size, and impervious coverage; or (2) using a continuous runoff model to demonstrate compliance with the Low Impact Development (LID) Performance Standard, described below. Demonstrating compliance with the LID Performance Standard using modeling is the required method for

projects located outside the Urban Growth Area (UGA) boundary that are on sites 5 acres or larger in size, and is an optional method for all other projects.

A. Target surfaces

Target surfaces for application of Core Requirement #9 (FCBMPs) include new impervious surfaces, new pervious surfaces, replaced impervious surfaces, and any existing impervious surfaces added on or after January 8, 2001 (the effective date of the Endangered Species Act "take prohibition" issued by the federal government to protect Puget Sound Chinook salmon) not already mitigated with an approved FCBMP or flow control facility.

Projects that trigger Core Requirement #9 by disturbing 7,000 square feet or more of land, but where new plus replaced impervious is less than 2,000 square feet, may consider basic dispersion as an equal choice for treating the target impervious surfaces alongside full infiltration, limited infiltration, bioretention, and permeable pavement FCBMPs. These projects are not required to meet the minimum BMP implementation requirements described in “Small Lot BMP Requirements” and “Large Lot BMP Requirements,” (Requirement #5 on both lists), and are not required to comply with Core Requirement #6.

Any impervious surface served by an infiltration facility designed in accordance with the flow control facility requirement (Section 1.2.3.1), the facility implementation requirements (Section 1.2.3.2), and the design criteria for infiltration facilities (Section 5.2) is exempt from the flow control BMPs requirement.

Any impervious or pervious surface served by the farmland dispersion BMP detailed in Appendix C, Section C.2.5, is exempt from the flow control BMPs requirement. Note that new pervious areas that are farmland dispersed are still required to comply with KCC 16.82.100 (F) and (G) as required to protect the soil moisture holding capacity.

Projects or threshold discharge areas of projects qualifying as exempt from the flow control facility requirement using the Direct Discharge Exemption in accordance with Section 1.2.3.1 do not have to achieve the Low Impact Development (LID) performance standard (described below), nor consider bioretention, permeable pavement, and full dispersion. However, the soil moisture holding capacity of **new pervious surfaces** on those projects (or portions of projects) must be protected in accordance with KCC 16.82.100 (F) and (G); full infiltration as detailed in Appendix C, Section C.2.2, Basic Dispersion per Appendix C, Section C.2.4, and perforated pipe connection as detailed in Appendix C, Section C.2.11 must be implemented for roofs, if feasible; and Basic Dispersion per Appendix C, Section C.2.4 must be implemented for other impervious surfaces, if feasible.

B. Low Impact Development Performance Standard

The LID Performance Standard is defined as follows:

For the target surfaces subject to Core Requirement #9, *Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow to 50% of the 2-year peak flow. Assume* ***historic site conditions*** *as the predeveloped condition.*

Projects that are either required or opt to demonstrate compliance with the LID Performance Standard using a continuous runoff model must protect the soil moisture capacity of new pervious in accordance with KCC16.82.100 (F) and (G).

Projects that are required or opt to model compliance with the LID Performance Standard are still subject to meeting applicable area specific flow control requirements as determined in Core Requirement #3 (Section 1.2.3).

Note that when demonstrating compliance with the LID Performance Standard, flow control BMPs are modeled explicitly, utilizing design infiltration rates as determined and selected per Section 5.2.1. However, when modeling flow control facility sizing, water quality facility sizing, and the peak flow exceptions from the area-specific flow control facility requirement in Sections 1.2.3.1.A, B, and C, these BMPs are not modeled explicitly , but may use modeling credits as allowed and subject to the limitations

described in Section 1.2.9.4 and Table 1.2.9.A. FCBMPs used to demonstrate compliance with the LID Performance Standard must meet the implementation requirements described in Section 1.2.9.4.

C. Where demonstrating compliance with the LID Performance Standard is Required

Subdivision and road improvement projects on sites/lots 5 acres or larger that are **located outside the UGA** are required to demonstrate compliance with the LID Performance Standard -- the only exception being that single family residential projects (excluding subdivisions creating 10 lots or more) may opt to fully comply with requirements described in Section 1.2.9.3.3, "Large Rural Subdivision and Large Rural Road Improvement Projects BMP Requirements".

Non-subdivision projects making improvements on an individual site/lot **5 acres or larger** that are **located outside the UGA** are required to either demonstrate compliance with the LID Performance Standard or fully comply with requirements described in Section 1.2.9.2.3, "Large Rural Lot BMP Requirements".

Other project types that are not subject to this modeling requirement may opt to use it in lieu of the BMP selection and application requirements described in Sections 1.2.9.2 and 1.2.9.3 below.

D. Implementation

Four kinds of implementation for the FCBMP requirement are described in this section as follows:

1. For **non-subdivision projects making improvements on an individual site/lot**, implementation of this requirement shall be in accordance with the "Individual Lot BMP Requirements" in Section 1.2.9.2, which specify the selection of BMPs and the extent of their application on the site/lot. This required implementation of flow control BMPs must occur as part of the proposed project and provisions must be made for their future maintenance as specified in Section 1.2.9.2. As allowed in Sections 1.2.3 and 1.2.8, credits for the application of flow control BMPs per Table 1.2.9.A may be used to reduce the size of a required flow control facility, reduce the size of a water quality facility, qualify for a flow control facility exception or bypass of target surfaces, or reduce the target surfaces subject to flow control or water quality facility requirements.
2. **Subdivision projects and road improvement projects on sites that are 5 acres or larger AND located outside the Urban Growth Area (UGA)** are required to demonstrate using an approved continuous runoff model compliance with the LID Performance Standard described above—the only exception being that single family residential projects (excluding subdivisions creating 10 lots or more) may opt to fully comply with requirements described in Section 1.2.9.3.3, "Large Rural Subdivision and Large Rural Road Improvement Projects BMP Requirements". For subdivision projects subject to this requirement, flow control BMPs for associated plat infrastructure improvements (roads, sidewalks, etc.) and for the individual lots must be carefully planned in order to achieve the aforementioned standard. Flow control BMPs associated with plat infrastructure improvements on these projects must be installed concurrent with the construction of those improvements, while BMPs associated with the individual lot improvements may be delayed until construction on the lots as long as provisions are made to assure their implementation as specified in Section 1.2.9.4. For road improvement projects subject to this requirement, implementation of flow control BMPs must occur as part of the proposed project. As allowed in Sections 1.2.3 and 1.2.8, credits for the application of flow control BMPs per Table 1.2.9.A may be used to reduce the size of a required flow control facility, reduce the size of a water quality facility, qualify for a flow control facility exception or bypass of target surfaces, or reduce the target surfaces subject to flow control or water quality facility requirements. To use these credits, flow control BMPs must be implemented as part of the proposed project and provisions must be made for their future maintenance as specified in Section 1.2.9.4. For subdivision projects proposing to take credit for future implementation of BMPs on individual lots, provisions must be made to assure their implementation as specified in Section 1.2.9.4.
3. **For subdivision projects on sites less than 5 acres in size OR within the UGA**, implementation of flow control BMPs for associated plat infrastructure improvements (e.g. roads, sidewalks) shall be

done per Section 1.2.9.4 and must occur concurrently and as part of the proposed project, while BMPs associated with the individual lot improvements may be delayed until construction on the lots. As allowed in Sections 1.2.3 and 1.2.8, credits for the application of flow control BMPs per Table 1.2.9.A. may be used to reduce the size of a required flow control facility, reduce the size of a water quality facility, qualify for a flow control facility exception or bypass of target surfaces, or reduce the target surfaces subject to flow control or water quality facility requirements. To use these credits, flow control BMPs must be implemented as part of the proposed project and provisions must be made for their future maintenance as specified in Section 1.2.9.4. For subdivision projects proposing to take credit for future implementation of BMPs on individual lots, provisions must be made to assure their implementation as specified in Section 1.2.9.4.

4. **For road improvement projects on sites less than 5 acres in size OR within the UGA**, implementation of flow control BMPs must occur as part of the proposed project. As allowed in Sections 1.2.3 and 1.2.8, credits for the application of flow control BMPs per Table 1.2.9.A may be used to reduce the size of a required flow control facility, reduce the size of a water quality facility, qualify for a flow control facility exception or bypass of target surfaces, or reduce the target surfaces subject to flow control or water quality facility requirements. To use these credits, flow control BMPs must be implemented as part of the proposed project and provisions must be made for their future maintenance as specified in Section 1.2.9.4.

The information presented in this section is organized as follows:

- Section 1.2.9.2, "Individual Lot BMP Requirements"

  "Small Lot BMP Requirements," Section 1.2.9.2.1

  "Large Lot BMP Requirements," Section 1.2.9.2.2

  "Large Rural Lot BMP Requirements," Section 1.2.9.2.3

  "Implementation Requirements for Individual Lot BMPs," Section 1.2.9.2.4

- Section 1.2.9.3, "Subdivision and Road Improvement Projects BMP Requirements"

  "Small Subdivision and Urban Subdivision Projects BMP Requirements ," Section 1.2.9.3.1

  "Small Road Improvement and Urban Road Improvement Projects BMP Requirements," Section 1.2.9.3.2

  "Large Rural Subdivision and Large Rural Road Improvement Projects BMP Requirements," Section 1.2.9.3.3

- Section 1.2.9.4, "Requirements for Use of BMP Credits "

  "Use of Credits by Subdivision Projects," Section 1.2.9.4.1

  "Use of Credits by Projects within Rights-of-Way," Section 1.2.9.4.2

1.2.9.2 INDIVIDUAL LOT BMP REQUIREMENTS

For projects on individual ***sites*/lots**, flow control BMPs must be selected and applied according to the individual lot BMP requirements in this section. For purposes of applying flow control BMPs to individual ***sites*/lots**, three categories of requirements have been established based on the size of ***site*/lot** subject to improvements by the project, the extent of impervious surface coverage resulting from the project on the ***site*/lot, and the location of the project relative to Urban Growth Area boundaries**. These categories of requirements are as follows:

- Small Lot BMP Requirements (for ***sites*/lots** <22,000 square feet)
- Large Lot BMP Requirements (for ***sites*/lots** ≥22,000 square feet and **either** less than 5 acres or inside the UGA)
- Large Rural Lot BMP Requirements (for ***sites*/lots** ≥ 5 acres and located outside the UGA)

Flow control BMPs must be applied in the order of preference and to the extent specified for the category of individual lot requirements applicable to the proposed project as described in the following subsections. *Note: for lots created by a previous subdivision, some or all of these requirements may have been addressed by flow control BMPs installed on the lots or within common areas, tracts, or road right-of-way. In some cases, the type of BMPs required for a subdivision lot have already been established by a recorded covenant on the lot. See Section 1.2.9.4 for more information on pre-installed or pre-determined BMPs in subdivisions.*

1.2.9.2.1 SMALL LOT BMP REQUIREMENTS

IF the proposed project is on a ***site*/lot smaller than 22,000 square feet**, THEN flow control BMPs must be applied as specified in the requirements below OR the project must demonstrate compliance with the LID Performance Standard (described in Section 1.2.9.1.B, p. 1-83) using an approved continuous runoff model. Projects on small lots are typically single family residential improvements (e.g., homes, outbuildings, etc.) but could be a small commercial development.

1. The feasibility and applicability of full dispersion as detailed in Appendix C, Section C.2.1 must be evaluated for all target impervious surfaces. If feasible and applicable, **full dispersion** must be implemented as part of the proposed project. Typically, small lot full dispersion will be applicable only in subdivisions where enough forest was preserved by tract, easement, or covenant to meet the minimum requirements for full dispersion in Appendix C, Section C.2.1.1
2. Where full dispersion of target impervious roof areas is not feasible or applicable, or will cause flooding or erosion impacts, the feasibility and applicability of full infiltration as detailed in Appendix C, Section C.2.2 must be evaluated (*note, this will require a soils report for the **site/lot***). If feasible and applicable, **full infiltration of roof runoff** must be implemented as part of the proposed project.
3. All target impervious surfaces not mitigated by Requirements 1 and 2 above, must be mitigated to the maximum extent feasible using one or more BMPs from the following list. Use of a given BMP is subject to evaluation of its feasibility and applicability as detailed in Appendix C. Feasible BMPs are required to be implemented. The BMPs listed below may be located anywhere on the ***site*/lot** subject to the limitations and design specifications for each BMP. These BMPs must be implemented as part of the proposed project.
    - **Full Infiltration** per Appendix C, Section C.2.2, or per Section 5.2, whichever is applicable
    - **Limited Infiltration** per Appendix C, Section C.2.3,
    - **Bioretention** per Appendix C, Section C.2.6, sized as follows:
        - <u>Inside the UGA (Rainfall region SeaTac 1.0 and less):</u> In till soils, provide bioretention volume based on 0.6 inches of equivalent storage depth; in outwash soils provide bioretention volume based on 0.1 inches of equivalent storage depth,

- Inside the UGA (Rainfall regions greater than SeaTac 1.0): In till soils, provide bioretention volume based on 0.8 inches of equivalent storage depth; in outwash soils, provide bioretention volume based on 0.4 inches of equivalent storage depth,
- Outside the UGA: In till soils, provide bioretention volume based on 1.9 inches of equivalent storage depth; in outwash soils provide bioretention volume based on 1.0 inches of equivalent storage depth,

- **Permeable Pavement** per Appendix C, Section C.2.7,

4. All target impervious surfaces not mitigated by Requirements 1,2 and 3 above, must be mitigated to the maximum extent feasible using the Basic Dispersion BMP described below. Use of Basic Dispersion is subject to evaluation of its feasibility and applicability as detailed in Appendix C. Feasible BMPs are required to be implemented. Basic Dispersion BMPs may be located anywhere on the ***site*/lot** subject to the limitations and design specifications cited in Appendix C. The BMP must be implemented as part of the proposed project.

   - **Basic Dispersion** per Appendix C, Section C.2.4,

5. BMPs must be implemented, at minimum, for an impervious area equal to at least 10% of the ***site*/lot** for ***site*/lot sizes up to 11,000 square feet** and at least 20% of the ***site*/lot** for ***site*/lot sizes between 11,000 and 22,000 square feet**. If these minimum areas are not mitigated using feasible BMPs from Requirements 1, 2, 3, and 4 above, either a fee in lieu of the required minimum BMPs must be paid (requires that King County Water and Land Resources Division has established a program for determining and utilizing the fees for stormwater focused retrofit projects) OR one or more BMPs from the following list are required to be implemented to achieve compliance. These BMPs must be implemented as part of the proposed project.

   - **Reduced Impervious Surface Credit** per Appendix C, Section C.2.9,
   - **Native Growth Retention Credit** per Appendix C, Section C.2.10.

6. The soil moisture holding capacity of **new pervious surfaces** must be protected in accordance with KCC 16.82.100 (F) and (G). KCC 16.82.100(F) requires that the duff layer or native topsoil be retained to the maximum extent practicable. KCC 16.82.100(G) requires soil amendment to mitigate for lost moisture holding capacity where compaction or removal of some or all of the duff layer or underlying topsoil has occurred. The amendment must be such that the replaced topsoil is a minimum of 8 inches thick, unless the applicant demonstrates that a different thickness will provide conditions equivalent to the soil moisture holding capacity native to the site. The replaced topsoil must have an organic content of 5-10% dry weight and a pH suitable for the proposed surface vegetation (for most soils in King County, 4 inches of well-rotted compost tilled into the top 8 inches of soil is sufficient to achieve the organic content standard.) The amendment must take place between May 1 and October 1. The specifications for compost for soil amendment can be found in Reference 11-C.

7. Any proposed connection of roof downspouts to the *local drainage system* must be via a **perforated pipe connection** as detailed in Appendix C, Section C.2.11.

1.2.9.2.2 LARGE LOT BMP REQUIREMENTS

IF the proposed project is on a ***site*/lot** that is **22,000 square feet or larger, but is not a Large Rural Lot as defined in Section 1.2.9.2.3,** THEN flow control BMPs must be applied as specified in the requirements below OR the project must demonstrate compliance with the LID Performance Standard (described in Section 1.2.9.1.B, p. 1-83) using an approved continuous runoff model.

1. The feasibility and applicability of **full dispersion** as detailed in Appendix C, Section C.2.1 must be evaluated for all ***target impervious surfaces***. If feasible and applicable for any such surface, then full dispersion must be applied to that surface and implemented as part of the proposed project. Typically, full dispersion will be applicable only on the largest ***sites*/lots** where there may be enough forest area

available within a ***threshold discharge area*** to meet the 15% ratio of ***fully dispersed*** impervious area to ***native vegetated surface***.

2. Where full dispersion of target impervious roof areas is not feasible or applicable, or will cause flooding or erosion impacts, the feasibility and applicability of **full infiltration of roof runoff** must be evaluated in accordance with Appendix C, Section C.2.2, or Section 5.2, whichever is applicable based on the type of project.[47] If feasible and applicable, full infiltration of roof runoff must be implemented as part of the proposed project.

3. All target impervious surfaces not mitigated by Requirements 1 and 2 above, must be mitigated to the maximum extent feasible using one or more BMPs from the following list. Use of a given BMP is subject to evaluation of its feasibility and applicability as detailed in Appendix C. Feasible BMPs are required to be implemented. The BMPs listed below may be located anywhere on the site/lot subject to the limitations and design specifications for each BMP. These BMPs must be implemented as part of the proposed project.

   - **Full Infiltration** per Section C.2.2, or per Section 5.2, whichever is applicable
   - **Limited Infiltration** per Appendix C, Section C.2.3,
   - **Bioretention** per Appendix C, Section C.2.6, sized as follows:
     - <u>Inside the UGA (Rainfall region SeaTac 1.0 and less):</u> In till soils, provide bioretention volume based on 0.6 inches of equivalent storage depth; in outwash soils provide bioretention volume based on 0.1 inches of equivalent storage depth
     - <u>Inside the UGA (Rainfall regions greater than SeaTac 1.0):</u> In till soils, provide bioretention volume based on 0.8 inches of equivalent storage depth; in outwash soils, provide bioretention volume based on 0.4 inches of equivalent storage depth,
     - <u>Outside the UGA</u>: In till soils, provide bioretention volume based on 1.9 inches of equivalent storage depth; in outwash soils provide bioretention volume based on 1.0 inches of equivalent storage depth,
   - **Permeable Pavement** per Appendix C, Section C.2.7,

4. All target impervious surfaces not mitigated by Requirements 1,2 and 3 above, must be mitigated to the maximum extent feasible using the Basic Dispersion BMP described below. Use of Basic Dispersion is subject to evaluation of its feasibility and applicability as detailed in Appendix C. Feasible BMPs are required to be implemented. Basic Dispersion BMPs may be located anywhere on the ***site*/lot** subject the limitations and design specifications cited in Appendix C. The BMP must be implemented as part of the proposed project.

   - **Basic Dispersion** per Appendix C, Section C.2.4,

5. BMPs must be implemented, at minimum, for impervious area amounts defined as follows. For projects that will result in an impervious surface coverage on the buildable portion of the site/lot of less than 45%, flow control BMPs must be applied to 50% of target impervious surfaces. For projects that will result in an impervious surface coverage 45-65% on the buildable portion of the site/lot, flow control BMPs must be applied to 50% of target impervious surfaces reduced by 1.5% for each 1% of impervious surface coverage above 45% (e.g. impervious coverage of 55% results in a requirement of FCBMPs applied to 35% of target impervious surfaces). For projects that will result in an impervious surface coverage greater than 65% on the buildable portion of the site/lot, flow control BMPs must be applied to 20% of the target impervious surfaces or to an impervious area equal to at least 10% of the site/lot, whichever is less. The buildable portion of the site/lot is the total area of the site/lot minus any critical areas and minus 200 ft. buffer areas from **a steep slope hazard**, **landslide hazard area**, or

[47] For projects subject to Simplified Drainage Review, and for any ***single family residential project*** subject to Full or Large Project Drainage Review, the design requirements and specifications in Appendix C, Section C.2.2 may be used for evaluation and design of full infiltration on individual lots. For all other projects, full infiltration must be evaluated and designed in accordance with the infiltration facility standards in Section 5.2.

erosion hazard area. If these minimum areas are not mitigated using feasible BMPs from Requirements 1, 2, 3, and 4 above, either a fee in lieu of the required minimum BMPs must be paid (requires that King County Water and Land Resources Division has established a program for determining and utilizing the fees for stormwater focused retrofit projects) OR one or more BMPs from the following list are required to be implemented to achieve compliance. These BMPs must be implemented as part of the proposed project.

- **Reduced Impervious Surface Credit** per Appendix C, Section C.2.9,
- **Native Growth Retention Credit** per Appendix C, Section C.2.10.

6. The soil moisture holding capacity of **new pervious surfaces** must be protected in accordance with KCC 16.82.100 (F) and (G). KCC 16.82.100(F) requires that the duff layer or native topsoil be retained to the maximum extent practicable. KCC 16.82.100(G) requires soil amendment to mitigate for lost moisture holding capacity where compaction or removal of some or all of the duff layer or underlying topsoil has occurred. The amendment must be such that the replaced topsoil is a minimum of 8 inches thick, unless the applicant demonstrates that a different thickness will provide conditions equivalent to the soil moisture holding capacity native to the site. The replaced topsoil must have an organic content of 5-10% dry weight and a pH suitable for the proposed surface vegetation (for most soils in King County, 4 inches of well-rotted compost tilled into the top 8 inches of soil is sufficient to achieve the organic content standard.) The amendment must take place between May 1 and October 1. The specifications for compost for soil amendment can be found in Reference 11-C.
7. Any proposed connection of roof downspouts to the drainage system must be via a **perforated pipe connection** as detailed in Appendix C, Section C.2.11.

1.2.9.2.3 LARGE RURAL LOT BMP REQUIREMENTS

IF the proposed project is on a ***site*/lot** that is **5 acres or larger and is located outside the Urban Growth Area (UGA),** THEN the project must demonstrate compliance with the LID Performance Standard (described in Section 1.2.9.1.B, p. 1-83) using an approved continuous runoff model.

As an alternative to demonstrating compliance with the LID Performance Standard via modeling as described above, agricultural projects and single family residential projects (excluding subdivisions creating 10 lots or more) are given the option to apply flow control BMPs as specified in the requirements below.

1. The feasibility and applicability of full dispersion as detailed in Section C.2.1 must be evaluated for all target impervious surfaces. If feasible and applicable, **full dispersion** must be implemented as part of the proposed project. Typically, full dispersion will be applicable only to ***sites*/lots** or portions of ***sites*/lots** where enough forest is preserved by a clearing limit per KCC 16.82 or by recorded tract, easement, or covenant to meet the minimum requirements for full dispersion in Section C.2.1.1.
2. Where full dispersion of target impervious roof areas is not feasible or applicable, or will cause flooding or erosion impacts, the feasibility and applicability of **full infiltration of roof runoff** must be evaluated in accordance with Section C.2.2, or Section 5.2, whichever is applicable based on the type of project.[48] If feasible and applicable, full infiltration of roof runoff must be implemented as part of the proposed project.
3. All target impervious surfaces not mitigated by Requirements 1 and 2 above, must be mitigated using one or more BMPs from the following list. Use of a given BMP is subject to evaluation of its feasibility and applicability as detailed in Appendix C. The BMPs listed below may be located

[48] For projects subject to Simplified Drainage Review, and for any ***single family residential project*** subject to Full, Directed, or Large Project Drainage Review, the design requirements and specifications in Appendix C, Section C.2.2 may be used for evaluation and design of full infiltration on individual lots. For all other projects and any project proposing a full infiltration system serving more than one lot, full infiltration must be evaluated and designed in accordance with the infiltration facility standards in Section 5.2.

anywhere on the site/lot subject to the limitations and design specifications for each BMP. These BMPs must be implemented as part of the proposed project.

- **Full Infiltration** per Section C.2.2, or per Section 5.2, whichever is applicable,
- **Limited Infiltration** per Section C.2.3,
- **Bioretention** per Section C.2.6, sized as follows: In till soils, provide bioretention volume based on 1.9 inches of equivalent storage depth; in outwash soils, provide bioretention volume based on 1.0 inches of equivalent storage depth,
- **Basic Dispersion** per Section C.2.4 followed by **Bioretention** per Section C.2.6, with bioretention sized as follows: In till soils, provide bioretention volume based on 0.9 inches of equivalent storage depth; in outwash soils, provide bioretention volume based on 0.2 inches of equivalent storage depth,
- **Permeable Pavement** per Section C.2.7,

4. The soil moisture holding capacity of **new pervious surfaces** must be protected in accordance with KCC 16.82.100 (F) and (G). KCC 16.82.100(F) requires that the duff layer or native topsoil be retained to the maximum extent practicable. KCC 16.82.100(G) requires soil amendment to mitigate for lost moisture holding capacity where compaction or removal of some or all of the duff layer or underlying topsoil has occurred. The amendment must be such that the replaced topsoil is a minimum of 8 inches thick, unless the applicant demonstrates that a different thickness will provide conditions equivalent to the soil moisture holding capacity native to the site. The replaced topsoil must have an organic content of 5-10% dry weight and a pH suitable for the proposed surface vegetation (for most soils in King County, 4 inches of well-rotted compost tilled into the top 8 inches of soil is sufficient to achieve the organic content standard.) The amendment must take place between May 1 and October 1. The specifications for compost for soil amendment can be found in Reference 11-C.

5. BMPs must be applied to all new pervious surfaces according to the order of preference and extent of application specified in the following requirements:

   A. The feasibility and applicability of full dispersion as detailed in Section C.2.1 (p. C-26) must be evaluated for all new pervious surface. If feasible and applicable, full dispersion must be implemented as part of the proposed project. Typically, full dispersion will be applicable only to sites/lots or portions of sites/lots where enough forest is preserved by a clearing limit per KCC 16.82 or by recorded tract, easement, or covenant to meet the minimum requirements for full dispersion in Section C.2.1.1 (p. C-26).

   B. For that portion of new pervious surface not addressed in Requirement A above, one or more of the following BMPs must be implemented as part of the proposed project.

      - **Basic Dispersion** per Section C.2.4, onto native vegetated surfaces only
      - **Bioretention** per Appendix C, Section C.2.6, sized as follows: In till soils, provide bioretention volume based on 0.7 inches of equivalent storage depth; in outwash soils, provide bioretention volume based on 0.006 inches of equivalent storage depth
      - **Limited Infiltration** per Section C.2.3

1.2.9.2.4 IMPLEMENTATION REQUIREMENTS FOR INDIVIDUAL LOT BMPS

The flow control BMPs required in Sections 1.2.9.2 above must be implemented in accordance with the following requirements:

1. **Implementation Responsibility.** All flow control BMPs required for the ***site*/lot** must be implemented (installed) by the applicant as part of the proposed project unless they have already implemented as part of a subdivision project that created the lot per Section 1.2.9.4.

2. **Maintenance Responsibility.** Maintenance of all required flow control BMPs is the responsibility of the owner of the ***site*/lot** served by these BMPs. The responsibility for such maintenance must be clearly assigned to the current and future owners of the ***site*/lot** through a "declaration of covenant and grant of easement" as described in Requirement 3 below.

3. **Declaration of Covenant and Grant of Easement.** To ensure future maintenance of flow control BMPs and allow for County inspection of BMPs, a declaration of covenant and grant of easement must be recorded for each ***site*/lot** that contains flow control BMPs. A draft of the proposed covenant must be reviewed and approved by DPER prior to recording. All required covenants must be recorded prior to final construction approval for the proposed project. If the individual ***site*/lot** contains or will contain flow control or water quality facilities, then the drainage facility covenant in Reference Section 8-J (or equivalent) must be used. Otherwise, the flow control BMP covenant in Reference Section 8-M (or equivalent) must be used, and is designed to achieve the following:

   a) Provide **notice** to future owners of the presence of flow control BMPs on the lot and the responsibility of the owner to retain, uphold, and protect the flow control BMP devices, features, pathways, limits, and restrictions.

   b) Include as an **exhibit**, a *recordable version*[49] of the following drainage plan information:

      - The **flow control BMP site plan** showing all developed surfaces (impervious and pervious) and the location and dimensions of flow control BMP devices, features, flowpaths (if applicable), and limits of native growth retention areas (if applicable). This plan(s) must be to scale and include ***site*** topography in accordance with the specifications for such plans in Appendix C, Section C.4.2. Also indicate any areas where County access is excluded (see paragraph 3.d below). *Note: DPER may waive this element if, for example, the only flow control BMP proposed is a limit on impervious surface (reduced footprint).*

      - The **flow control BMP design and maintenance details** for each flow control BMP per Appendix C, Section C.4.3. This includes a diagram (if applicable) of each flow control BMP device or feature and written maintenance and operation instructions and restrictions for each device, feature, flowpath (if applicable), native growth retention area (if applicable) and impervious surface coverage (if applicable). See Reference M for prepared 8-1/2”x11” maintenance instruction sheets. See http://www.kingcounty.gov/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx for downloadable BMP details.

      Assure the exhibits are correctly cross-referenced in the declaration of covenant (the site plan is typically Exhibit A and the design/maintenance details are typically Exhibit B).

   c) Require that each flow control BMP be operated and **maintained at the owner's expense** in accordance with the above exhibit.

   d) Grant King County or its successor the **right to enter** the property at reasonable times for purposes of inspecting the flow control BMPs and to perform any corrective maintenance, repair, restoration, or mitigation work on the flow control BMPs that has not been performed by the property owner within a reasonable time set by DNRP, and to charge the property owner for the cost of any maintenance, repair, restoration, or mitigation work performed by King County.

      The right to enter typically applies to the entire property, but occasionally excepts areas on the property agreed upon by the County to be excluded from access. Such areas are to be shown on the site plan described above.

[49] *Recordable version* means one that meets King County's "Standard Formatting Requirements for Recording Documents" pursuant to RCW 36.18.010 and 65.04.045, available online at http://your.kingcounty.gov/recelec/records/docs/formatting_requirements.pdf or from the King County Recorder's Office. These requirements include specifications for such things as page size ($8^1/_2$" x 14" or smaller), font size (at least 8-point), and margin width (1" on all sides of every page if there is a standard cover sheet).

e) Prohibit any **modification or removal** of flow control BMPs without written approval from King County. In cases where the modification or removal is done under a King County development permit, the approval must be obtained from DPER (or its successor) and a covenant must be recorded to reflect the changes. In all other cases, the approval must be obtained from DNRP (or its successor) and a covenant must be recorded to reflect the changes. Approval will be granted only if equivalent protection in terms of hydrologic performance is provided by other means.

4. **Timing of Implementation.** All required flow control BMPs must be installed prior to final inspection approval of constructed improvements. For BMPs that rely on vegetation, the vegetation must be planted and starting to grow prior to final construction approval.

5. **Acceptance standards.** Flow control BMPs may be inspected during and/or following construction. Approval of the constructed BMPs will be based on verification that the materials and placement appear to meet the specifications and that the BMPs appear to function as designed. Onsite observations may be used to verify that materials are as specified and material receipts checked. Performance may be evaluated by a ***site*** visit while it is raining or by testing with a bucket of water or garden hose to check pavement permeability or proper connection to BMP devices/features, etc.

6. **Drainage concerns.** If DPER determines that there is a potential for drainage impacts to a neighboring property, then additional measures may be required. Some flow control BMPs may not be appropriate in certain situations, and will not be allowed by DPER where they may cause drainage problems.

7. **Geotechnical concerns.** A geotechnical engineer, engineering geologist, or DPER staff geologist must evaluate and approve flow control BMPs that are proposed: (A) on slopes steeper than 15%; (B) within a setback from the top of slope equal to the total vertical height of the slope area that is steeper than 15%; or (C) within 200 feet of a ***steep slope hazard area***, ***erosion hazard area***, or ***landslide hazard area.*** In addition, DPER may require review by a geotechnical engineer or engineering geologist of any proposed BMP that infiltrates, disperses, or directs overflow adjacent to or towards a steep ***slope hazard area***, ***erosion hazard area***, or ***landslide hazard area.*** DPER may also require some projects to route flows down or around such slopes using non-perforated pipes. Some flow control BMPs may not be appropriate for these locations, and will not be allowed by DPER where flows may cause erosion problems.

8. **Sewage system concerns.** If DPER determines that there is a potential conflict between onsite sewage systems and flow control BMPs, additional measures may be required. Some projects may need to route flows past onsite sewage systems using non-perforated pipes. Also, some flow control BMPs may not be appropriate for these ***sites***, and will not be allowed where sewage systems may be impacted.

1.2.9.3 SUBDIVISION AND ROAD IMPROVEMENT PROJECTS BMP REQUIREMENTS

For subdivision and road improvement projects, flow control BMPs must be selected and applied according to the subdivision and road improvement projects BMP requirements in this section. For purposes of applying flow control BMPs to these projects, three categories of requirements have been established based on the size of ***site*/lot** subject to improvements by the project **and the location of the project relative to Urban Growth Area boundaries**. These categories of requirements are as follows:

- **Small Subdivision and Urban Subdivision Projects BMP Requirements** (Inside UGA OR on sites/lots less than 5 acres)
- **Small Road Improvement and Urban Road Improvement Projects BMP Requirements** (Inside UGA OR on sites/lots less than 5 acres)
- **Large Rural Subdivision and Large Rural Road Improvement Projects BMP Requirements** (Outside UGA AND on sites/lots 5 acres or larger)

Flow control BMPs must be applied in the order of preference and to the extent specified for the category of requirements applicable to the proposed project as described in the following subsections.

1.2.9.3.1 SMALL SUBDIVISION AND URBAN SUBDIVISION PROJECTS BMP REQUIREMENTS

IF the proposed project is a **subdivision project** that is **within the UGA OR is on a site/parcel less than 5 acres in size**, THEN Flow control BMPs for plat infrastructure improvements (e.g. road and sidewalk etc.) of these projects shall meet the requirements described in Section 1.2.9.3.2 below for "Small Road Improvement and Urban Road Improvement Project BMP Requirements". Implementation of flow control BMPs required for/on the individual lots of the subdivision may be deferred until a permit is obtained for construction on each lot and is therefore optional. However, if the applicant wishes to implement or make provision for implementation of BMPs for the lot improvements as part of the subdivision project for purposes of receiving BMP modeling credits, the individual lot BMP requirements described in Section 1.2.9.2 and implementation requirements for subdivision projects described Section 1.2.9.4.1 must be met.

1.2.9.3.2 SMALL ROAD IMPROVEMENT AND URBAN ROAD IMPROVEMENT PROJECTS BMP REQUIREMENTS

IF the proposed project is a **road improvement project** that is **within the UGA or is on a site/parcel less than 5 acres in size**, THEN flow control BMPs must be applied as specified in the requirements below.

1. The feasibility and applicability of full dispersion as detailed in Appendix C, Section C.2.1 must be evaluated for all target impervious surfaces. If feasible and applicable, **full dispersion** must be implemented as part of the proposed project. Typically, small lot full dispersion will be applicable only in subdivisions where enough forest was preserved by tract, easement, or covenant to meet the minimum requirements for full dispersion in Appendix C, Section C.2.1.1
2. All target impervious surfaces not mitigated by Requirement 1 above, must be mitigated to the maximum extent feasible using one or more BMPs from the following list. Use of a given BMP is subject to evaluation of its feasibility and applicability as detailed in Appendix C. Infeasible BMPs are not required to be implemented. The BMPs listed below may be located anywhere on the ***site*/lot** subject to the limitations and design specifications for each BMP. These BMPs must be implemented as part of the proposed project.
   - **Full Infiltration** per Section C.2.2, or per Section 5.2, whichever is applicable
   - **Limited Infiltration** per Appendix C, Section C.2.3,
   - **Bioretention** per Appendix C, Section C.2.6, sized as follows:
     - <u>Inside the UGA (Rainfall region SeaTac 1.0 and less):</u> In till soils, provide bioretention volume based on 0.6 inches of equivalent storage depth; in outwash soils provide bioretention volume based on 0.1 inches of equivalent storage depth,
     - <u>Inside the UGA (Rainfall regions greater than SeaTac 1.0):</u> In till soils, provide bioretention volume based on 0.8 inches of equivalent storage depth; in outwash soils, provide bioretention volume based on 0.4 inches of equivalent storage depth,
     - <u>Outside the UGA</u>: In till soils, provide bioretention volume based on 1.9 inches of equivalent storage depth; in outwash soils provide bioretention volume based on 1.0 inches of equivalent storage depth,
   - **Permeable Pavement** per Appendix C, Section C.2.7,
3. All target impervious surfaces not mitigated by Requirements 1 and 2 above, must be mitigated to the maximum extent feasible using the Basic Dispersion BMP described below. Use of Basic Dispersion is subject to evaluation of its feasibility and applicability as detailed in Appendix C. Infeasible BMPs are not required to be implemented. Basic Dispersion BMPs may be located anywhere on the ***site*/lot**

subject to the limitations and design specifications cited in Appendix C. The BMPs must be implemented as part of the proposed project.

- **Basic Dispersion** per Appendix C, Section C.2.4,

4. The soil moisture holding capacity of **new pervious surfaces** must be protected in accordance with KCC 16.82.100 (F) and (G). KCC 16.82.100(F) requires that the duff layer or native topsoil be retained to the maximum extent practicable. KCC 16.82.100(G) requires soil amendment to mitigate for lost moisture holding capacity where compaction or removal of some or all of the duff layer or underlying topsoil has occurred. The amendment must be such that the replaced topsoil is a minimum of 8 inches thick, unless the applicant demonstrates that a different thickness will provide conditions equivalent to the soil moisture holding capacity native to the site. The replaced topsoil must have an organic content of 5-10% dry weight and a pH suitable for the proposed surface vegetation (for most soils in King County, 4 inches of well-rotted compost tilled into the top 8 inches of soil is sufficient to achieve the organic content standard.) The amendment must take place between May 1 and October 1. The specifications for compost for soil amendment can be found in Reference 11-C.

1.2.9.3.3 LARGE RURAL SUBDIVISION AND LARGE RURAL ROAD IMPROVEMENT PROJECTS BMP REQUIREMENTS

IF the proposed project is a **subdivision or road improvement project** that is **outside the UGA and is on a site/parcel 5 acres or greater in size**, THEN flow control BMPs must be implemented in order to achieve compliance with the LID Performance Standard and demonstrated using an approved continuous runoff model. As an alternative to the modeling requirement, single family residential projects (excluding subdivisions creating 10 lots or more) can opt to fully comply with the following BMP requirements:

- Requirements for BMPs described under Section 1.2.9.2.3, “Large Rural Lots” (p.1-89) must be met for each of the individual lots of the subdivision. Implementation is required per Section 1.2.9.4 either concurrent with the subdivision project or deferred as long as provisions made for implementation as described in Section 1.2.9.4.
- Requirements 3, 4, and 5 described under Section 1.2.9.2.3, “Large Rural Lots” (p.1-89) must be met for the subdivision plat infrastructure improvements (e.g. road, sidewalks). Implementation must be concurrent with the project.

1.2.9.4 REQUIREMENTS FOR USE OF BMP CREDITS

Projects that implement flow control BMPs, whether required or optional, may use the flow control BMP credits described in this section subject to the implementation requirements in Section 1.2.9.2.4 (p.1-90) (for Individual Lots), Section 1.2.9.4.1 below (for Subdivision Projects), and Section 1.2.9.4.2 below (for Right of Way Projects).

Two kinds of credits are available. First, any impervious surface served by a flow control BMP that meets the design specifications for that BMP in Appendix C may be modeled as indicated in Table 1.2.9.A (below). Such credits may be used in the following situations:

1. To compute post-development runoff time series when sizing required flow control facilities.
2. To compute post-development 100-year peak flows when assessing any of the peak flow exceptions from the area-specific flow control facility requirement in Sections 1.2.3.1.A, B, and C.
3. To compute post-development runoff time series when sizing required flow rate based water quality facilities (e.g. bioswales) and to re-characterize post developed land types when sizing volume based water quality facilities (e.g. wetponds, wetvaults).

Use of credits for water quality facility sizing as described above is limited to BMPs that are treating flows downstream from the BMP and tributary to a required water quality facility.

Second, any impervious or non-native pervious surface that is ***fully dispersed*** per the full dispersion criteria in Section 1.2.3.2.C is **not** considered a target surface of the area-specific flow control facility requirement (Section 1.2.3.1) or the area-specific water quality facility requirement (Section 1.2.8.1).

TABLE 1.2.9.A FLOW CONTROL BMP FACILITY SIZING CREDITS[1]

Flow Control BMP Type	Facility Sizing Credit
Full dispersion	Model fully dispersed surface as forest[2]
Full infiltration[3]	Subtract impervious area that is fully infiltrated
Limited infiltration	Model tributary impervious surface as 90% impervious, 10% grass
Basic dispersion	Model dispersed impervious surface as 90% impervious, 10% grass
Farmland dispersion	Dispersed areas are considered non-targeted for flow control. Dispersed areas on sites with farm management plans are considered non-targeted for water quality treatment
Bioretention	Model tributary impervious surface as 90% impervious, 10% grass
Permeable pavement (unlined with no underdrain)	Model permeable pavement area as 50% impervious, 50% grass
Grassed modular grid pavement	Model modular grid pavement as all grass
Rainwater harvesting	Credit only allowed via and as specified in an approved drainage adjustment that details conditions of use.
Restricted footprint	Model footprint as restricted
Wheel strip driveways	Model credited area as 50% impervious, 50% grass
Minimum disturbance foundation	Model foundation area as 50% impervious, 50% grass
Open grid decking over pervious area	Model deck area as 50% impervious, 50% grass
Native growth retention credit	Model mitigated impervious area as 50% impervious, 50% grass
Perforated pipe connection	None

Notes:

(1) These credits do not apply when determining eligibility for exemptions from Core Requirement #3, Core Requirement #8, or exceptions from the flow control or water quality facility requirements unless otherwise noted in the exemption or exception. Explicit modeling of BMP infiltration for facility sizing is not allowed. When applying modeling credits for flow control facility sizing, infiltrative BMPs tributary to the facility that are included in the modeling scenario (including the permeable pavement element with area reduced to 50% impervious area fraction, or other BMPs (e.g., bioretention, trenches, drywells) treating upstream runoff) must have the infiltration option *turned off* during the flow routing analysis for facility sizing to avoid double-counting the BMP infiltration benefit. Alternatively, the permeable pavement BMP with infiltration turned off may be represented by an impervious area land use element of equivalent area.

(2) Surface shall be modeled using the soil type found at that location on the site.

(3) For any project subject to Simplified Drainage Review, and for any single family residential project subject to Directed, Full or Large Project Drainage Review, the design requirements and specifications in Appendix C, Section C.2.2 may be used for design of full infiltration on individual lots. For all other projects, including any project where full infiltration is proposed to serve more than one lot, full infiltration must be designed in accordance with infiltration facility standards in Section 5.2.

1.2.9.4.1 USE OF CREDITS BY SUBDIVISION PROJECTS

If a proposed project is a *subdivision project*,[50] implementation of flow control BMPs for plat infrastructure improvements (e.g. road, sidewalk, or other non-lot improvements) is required concurrent with the subdivision improvements. Implementation of flow control BMPs on the individual lots of the subdivision may be deferred until a permit is obtained for construction on each lot and is therefore optional as part of the subdivision project.

In order to receive the modeling credits (noted above) for flow control BMPs required for plat infrastructure improvements (e.g. road, sidewalk, or other non-lot improvements), and/or for individual lot BMPs where the applicant elects to implement or make provision for implementation of individual lot BMPs as part of the subdivision project, the following requirements must be met depending on where the BMPs are located on the ***site***.

A. Subdivision Implementation of BMPs within Road Right-of-Way

These are flow control BMPs installed within public or private road right-of-way as part of the construction of street and drainage improvements for the subdivision. To receive credit for these BMPs, the subdivision project must meet all of the following requirements:

1. The BMPs must serve impervious surface located only within the road right-of-way.
2. The BMPs must be shown on the **site improvement plans** submitted with the engineering plans for the proposed project as specified in Section 2.3.1.2.
3. If the road right-of-way will be maintained by King County, the BMPs must be approved by the King County Department of Transportation through a **road variance** prior to engineering plan approval.
4. If the road right-of-way will be privately maintained, provision must be made for future **maintenance** of the BMPs in accordance with Core Requirement #6, Section 1.2.6. As specified in Core Requirement #6, King County will assume maintenance of such BMPs in certain cases.
5. If King County will be assuming maintenance of the BMPs, the BMPs must comply with the drainage facility **financial guarantee and liability requirements** in Core Requirement #7, Section 1.2.7.

B. Subdivision Implementation of BMPs within Dedicated Tracts

These are flow control BMPs installed on or associated with the features (e.g., forest) of common area tracts dedicated by the subdivision. Such BMPs may serve future improvements on lots, common area improvements, or road right-of-way improvements. To receive credit for these BMPs, the subdivision project must meet all of the following requirements:

1. The BMPs must be shown on the **site improvement plans** submitted with the engineering plans for the proposed project as specified in Section 2.3.1.2.
2. Provision must be made for future **maintenance** of the BMPs in accordance with Core Requirement #6, Section 1.2.6. When maintenance by King County is specified by Core Requirement #6, King County will assume maintenance of BMP devices (e.g. dispersion trenches) that are within a tract dedicated to King County for drainage purposes. King County will not assume maintenance of BMP devices located in common areas dedicated for purposes other than just drainage (e.g., play areas, parks, etc.). Where King County maintenance is specified by Core 6, the County will assume maintenance for FCBMP vegetated flow paths that are within an easement that allows for inspection and maintenance by the County. King County maintenance of these vegetated flow paths will be limited to their FCBMP functionality. All other maintenance shall remain the responsibility of the owner(s).

[50] For purposes of applying flow control BMPs, the term *subdivision* or *subdivision project* refers to any project that is a short plat, plat, or binding site plan.

3. BMPs to be maintained by King County in accordance with Core Requirement #6 must comply with the drainage facility **financial guarantee and liability requirements** in Core Requirement #7, Section 1.2.7.

4. If the BMPs installed within a dedicated tract satisfy some or all of the BMP requirements for individual lots per Section 1.2.9.2, then a **note** must be placed on the **recorded documents** for the subdivision indicating those lots for which BMPs have been provided.

C. Subdivision Implementation of BMPs on Individual Lots

These are flow control BMPs installed on a subdivision's proposed lots as part of the subdivision project. For example, the subdivision developer may elect to pre-install some or all of the flow control BMPs required by the individual lot BMP requirements in Section 1.2.9.2. To receive credits for these BMPs, the subdivision project must meet all of the following requirements:

1. The flow control BMPs must be installed and implemented in accordance with the individual lot BMP requirements in Section 1.2.9.2. This includes recording a **declaration of covenant and grant of easement** for each lot with BMPs as specified in Implementation Requirement 3 of Section 1.2.9.2.4. If not all of the required BMPs are installed on a lot as part of the subdivision project, language must be included in the covenant notifying the future lot owner of additional required BMPs.

2. BMPs to be installed on individual lots as part of the subdivision project must be shown on the **site improvement plans** submitted with the engineering plans for the proposed project as specified in Section 2.3.1.2.

D. Subdivision Future Implementation of BMPs on Individual Lots

These are flow control BMPs stipulated to be installed on some or all of a subdivision's proposed lots by a declaration of covenant recorded for each such lot. To receive credits for these BMPs, the subdivision project must meet all of the following requirements:

1. Demonstrate through a lot-specific assessment that the flow control BMPs stipulated for each lot are **feasible and applicable** according to the individual lot BMP requirements in Section 1.2.9.2 and the BMP design specifications in Appendix C. This lot-specific assessment must be included in the TIR submitted with engineering plans for the subdivision. The assessment shall include any soils reports, calculations, or other information necessary to select and properly apply BMPs.

2. Record a **declaration of covenant and grant of easement** for each lot stipulating the type or types of BMP being proposed for credit. This covenant must be as specified in Implementation Requirement 3 of Section 1.2.9.2.4, except as follows:

   a) The **FCBMP site plan**(s) may be waived depending on the BMPs proposed or may be conceptual, showing only the information necessary to stipulate the type or types of BMP being proposed for credit. For example, if the BMP is full dispersion, the approximate location of future impervious surface and the limits of the "native vegetated flowpath segment" (see Appendix C, Section C.2.1) must be shown. If the BMP is full infiltration, the approximate location of future impervious surface, septic drain field (if applicable), and infiltration devices must be shown. For all other BMPs, the "design and maintenance details" (see Item b below) for each proposed BMP per Appendix C may be sufficient as determined by DPER.

   b) The **FCBMP design and maintenance details** must include the dimensions of all proposed devices, features, and flowpaths, expressed as unit amounts per square foot of impervious surface served or as a percentage of the lot size or impervious surface created.

   c) The **notice** to future lot owners must indicate that they are responsible to install the flow control BMP or BMPs stipulated for the lot prior to final inspection approval of constructed lot improvements. Alternative BMPs that provide equivalent performance may be proposed at the time of permit application for proposed lot improvements. In any case, a revised covenant will need to be recorded to reflect the final approved BMPs and site improvement plan(s).

3. If **single family residential lots** are being created, a **note** must be placed on the **recorded documents** for the subdivision indicating the following:

   "Single family residences and other improvements constructed on the lots created by this subdivision must implement the flow control best management practices (BMPs) stipulated in the drainage plan declaration of covenant and grant of easement recorded for each lot. Compliance with this stipulation must be addressed in the small project drainage plan submitted for drainage review when application is made for a single family residential building permit for the lot."

4. If **commercial lots** are being created, a **note** must be placed on the **recorded documents** for the subdivision indicating the following:

   "Improvements constructed on the lots created by this subdivision must implement the flow control best management practices (BMPs) stipulated in the drainage plan declaration of covenant and grant of easement recorded for each lot. Compliance with this stipulation must be addressed in the engineering plans submitted for drainage review when application is made for a permit to make improvements to the lot."

5. If a **binding site plan** is being created, a **note** must be placed on the **recorded documents** for the subdivision indicating the following:

   "Improvements constructed on the lots created by this binding site plan must implement the flow control best management practices (BMPs) stipulated in the drainage plan declaration of covenant and grant of easement recorded for each lot. Compliance with this stipulation must be addressed in the engineering plans submitted for drainage review when application is made for a permit to make improvements to the lot."

1.2.9.4.2 USE OF CREDITS BY PROJECTS WITHIN RIGHTS-OF-WAY

If a proposed project is located primarily within an established public or private right-of-way, implementation of flow control BMPs is as required per Section 1.2.9.3. To receive credit for these BMPs, the project must meet all of the following requirements:

1. The BMPs must serve **impervious surface** located only within the right-of-way.
2. If the right-of-way is **road right-of-way** that will be maintained by King County, the BMPs must be approved by the King County Department of Transportation through a **road variance** prior to engineering plan approval.
3. If the right-of-way will be privately maintained, provision must be made for future **maintenance** of the BMPs in accordance with Core Requirement #6, Section 1.2.6. As specified in Core Requirement #6, King County will assume maintenance of such BMPs in certain cases.
4. If King County will be assuming maintenance of the BMPs, the BMPs must comply with the drainage facility **financial guarantee and liability requirements** in Core Requirement #7, Section 1.2.7.

1.3 SPECIAL REQUIREMENTS

This section details the following five special drainage requirements that may apply to the proposed project depending on its location or ***site***-specific characteristics:

- "Special Requirement #1: Other Adopted Area-Specific Requirements," Section 1.3.1
- "Special Requirement #2: Flood Hazard Area Delineation," Section 1.3.2 (p. 1-101)
- "Special Requirement #3: Flood Protection Facilities," Section 1.3.3 (p. 1-102)
- "Special Requirement #4: Source Control," Section 1.3.4 (p. 1-103)
- "Special Requirement #5: Oil Control," Section 1.3.5 (p. 1-105).

1.3.1 SPECIAL REQUIREMENT #1: OTHER ADOPTED AREA-SPECIFIC REQUIREMENTS

This manual is one of several adopted regulations in King County that apply requirements for controlling drainage on an area-specific basis. The areal clearing restrictions for RA-zoned parcels in KCC 16.82.150 (see Reference Section 3-A) is an example of zoning and land use restrictions used to reduce drainage impacts in certain areas of the County. Other adopted area-specific regulations include requirements that have a more direct bearing on the drainage design of a proposed project. These regulations include the following:

- **Critical Drainage Areas (CDAs):** DNRP establishes CDAs in areas where flooding and/or erosion conditions present an imminent likelihood of harm to the welfare and safety of the surrounding community. The special requirements in CDAs typically include more restrictive flow control and clearing standards. Maps showing CDA boundaries are available from DNRP or DPER.
- **Master Drainage Plans (MDPs):** MDPs are comprehensive drainage plans prepared for urban planned developments (UPDs) or other large, complex projects (described in Section 1.1.2.5). Projects covered by a MDP must meet any adopted requirements specific to that plan.
- **Basin Plans (BPs):** The King County Council adopts basin plans to provide for the comprehensive assessment of resources and to accommodate growth while controlling adverse impacts to the environment. A basin plan may recommend specific land uses, regional capital projects, and special drainage requirements for future development within the basin area it covers.
- **Salmon Conservation Plans (SCPs):** Salmon conservation plans are comprehensive, ecosystem-based plans intended to identify and assess the means to protect and restore salmon habitat through mechanisms such as habitat improvements, regulations, incentives, BMPs, land acquisition, and public education activities. These plans are developed in collaboration with other jurisdictions within a water resource inventory area (WRIA) designated by the state under WAC 173-500-040 and spanning several basins or subbasins.
- **Stormwater Compliance Plans (SWCPs):** Stormwater compliance plans are a subbasin or outfall specific assessment of the quantity and/or quality of King County's municipal separate storm sewer system discharges to determine actions necessary for compliance with the National Pollutant Discharge Elimination System (NPDES) General Municipal Stormwater Permit issued by the state Department of Ecology pursuant to the federal Clean Water Act. These plans/studies may recommend capital projects, flow control standards, water quality controls, public education activities, or other actions deemed necessary for compliance with the Clean Water Act and RCW 90.48, Water Pollution Control.
- **Lake Management Plans (LMPs):** The King County Council adopts lake management plans to provide for comprehensive assessment of resources and to accommodate growth while controlling

adverse impacts from nutrient loading to selected lakes. A lake management plan may recommend nutrient control through special drainage and source control requirements for proposed projects within the area it covers.

- **Flood Hazard Management Plan (FHMPs):** The King County Flood Hazard Management Plan and related updates is a regional plan prepared in accordance with RCW 86.12.200 and is a functional element of the King County Comprehensive Plan for the purpose of reducing flood risks. It includes (1) policies to guide floodplain land use and flood risk reduction activities; (2) geographically based descriptions of hazards and associated strategic vision; (3) program and project recommendations, including capital improvement projects, maintenance, relocation and elevation of homes, flood warning improvements, and river planning activities; and (4) implementation priorities for program and project recommendations. The FHMP is updated every 5 years.
- **Shared Facility Drainage Plans (SFDPs):** SFDPs are approved by King County to allow two or more projects to share drainage facilities required by this manual. Projects covered by a SFDP must meet any specific requirements of that plan.

Threshold	Requirement
IF a proposed project is in a designated ***Critical Drainage Area*** or in an area included in an adopted master drainage plan, basin plan, salmon conservation plan, stormwater compliance plan, flood hazard management plan, lake management plan, or shared facility drainage plan . . .	THEN the proposed project shall comply with the drainage requirements of the ***Critical Drainage Area***, master drainage plan, basin plan, salmon conservation plan, stormwater compliance plan, flood hazard management plan, lake management plan, or shared facility drainage plan, respectively.

Application of this Requirement

The drainage requirements of adopted CDAs, MDPs, BPs, SCPs, SWCPs, FHMPs, LMPs, and SFDPs shall be applied in addition to the drainage requirements of this manual unless otherwise specified in the adopted regulation. Where conflicts occur between the two, the drainage requirements of the adopted area-specific regulation shall supersede those in this manual.

Examples of drainage requirements found in other adopted area-specific regulations include the following:

- More or less stringent flow control
- More extensive water quality controls
- Forest retention requirements
- Infiltration restrictions
- Groundwater recharge provisions
- Discharge to a constructed regional flow control or conveyance facility.

Adjustments to vary from the specific drainage requirements mandated by CDAs, BPs, SCPs, SWCPs, FHMPs, and LMPs may be pursued through the adjustment process described in Section 1.4 of this manual. Copies of all adopted CDAs, basin plans, SCPs, SWCPs, FHMPs, and lake management plans are available from DNRP or DPER.

Projects covered by SFDPs shall demonstrate that the shared facility will be available by the time the project is constructed and that all onsite requirements are met. Projects covered by a SFDP are still required to provide any onsite controls necessary to comply with drainage requirements not addressed by the shared facility.

1.3.2 SPECIAL REQUIREMENT #2: FLOOD HAZARD AREA DELINEATION

Flood hazard areas are composed of the 100-year floodplain, zero-rise flood fringe, zero-rise floodway, FEMA floodway, and channel migration zones as described in KCC 21A.24. If a proposed project contains or is adjacent to a ***flood hazard area*** as determined by DPER, this special requirement requires the project to determine those components that are applicable and delineate them on the project's site improvement plans and recorded maps.

Floodplains are subject to inundation during extreme events. The 100-year floodplain, and floodway if applicable, is delineated in order to minimize flooding impacts to new development and to prevent aggravation of existing flooding problems by new development. Regulations and restrictions concerning development within a 100-year floodplain are found in the critical areas code, KCC 21A.24 and in the shorelines code, KCC 21A.25.

Channel migration zones are areas within the lateral extent of likely stream channel movement that are subject to risk due to stream bank destabilization, rapid stream incision, stream bank erosion and shifts in the location of stream channels, as shown on King County's Channel Migration Zone maps. The channel migration zone includes two additional components, the *severe channel migration hazard area*, which includes the present channel width plus the area at greatest risk of lateral movement, and the *moderate channel migration hazard area*, which is the remaining portion of the channel migration zone. Regulations and restrictions concerning development within channel migration zones and their hazard area components are found in the critical areas code, KCC 21A.24.

Threshold	Requirement
IF a proposed project contains or is adjacent to a ***flood hazard area*** for a river, stream, lake, wetland, closed depression, marine shoreline, or a King County-mapped channel migration zone, or if other King County regulations require study of flood hazards related to the proposed project . . .	THEN the 100-year floodplain, and applicable floodway, shall be determined and their boundaries, together with the boundaries of the severe and moderate channel migration hazard area (if applicable), shall be delineated on the site improvement plans and profiles, and on any final subdivision maps prepared for the proposed project.

Application of this Requirement

The applicant is required to use the best available floodplain/floodway data when delineating the 100-year floodplain and floodway boundaries on site improvement plans and profiles, and on any final subdivision maps. The **floodplain/floodway delineation** used by the applicant shall be in accordance with KCC 21A.24, KCC 21A.25, and associated public rules. If floodplain/floodway data and delineation does not exist, then a floodplain/floodway analysis shall be prepared by the applicant as described in Section 4.4.2, "Floodplain/Floodway Analysis."

Projects or related flood studies that are expected to result in a change to base flood elevations published in FEMA Flood Insurance Studies and Rate Maps, must also comply with FEMA regulations 44CFR, part 65 and the Analysis and Mapping Procedures for Non-accredited Levee Systems, including requirements for providing letters of map revisions.

If the ***site*** is located within a **channel migration zone** mapped by King County, the proposed development must comply with KCC 21A.24 and associated public rules.

1.3.3 SPECIAL REQUIREMENT #3: FLOOD PROTECTION FACILITIES

Flood protection facilities, such as **levees** and **revetments** require a high level of confidence in their structural integrity and performance. Proper analysis, design, and construction are necessary to protect against the potentially catastrophic consequences if such facilities should fail.

Threshold	Requirement
IF a proposed project will: • rely on an existing flood protection facility (such as a levee or revetment) for protection against hazards posed by erosion or inundation, OR • modify or construct a new flood protection facility . . .	THEN the applicant shall demonstrate that the flood protection facility, as determined by a licensed professional engineer, conforms with siting, structural stability, environmental, and all other relevant standards cited in the following regulations and documents: • Washington State *Integrated Streambank Protection Guidelines*, • Corps of Engineers *Manual for Design and Construction of Levees* (EM 1110-2-1913), • KCC 21A.24, KCC 21A.25, KCC16.85 and • Special Requirement #1 (specifically the King County Flood Hazard Management Plan) AND, flood containment levees shall meet or exceed the professional engineering standards summarized in FEMA National Flood Insurance mapping regulations (44 CFR, subsection 65.10) or FEMA's Analysis and Mapping Procedures for non-Accredited Levee Systems.

Application of this Requirement

Conformance with the requirements listed above shall be addressed in the Technical Information Report submitted with the project's engineering plans (see Section 2.3.1.1).

Conformance also requires that certain **easement requirements** (outlined in Section 4.1) be met in order to allow County access to the facility. If the proposed project contains an existing King County flood protection facility or proposes to rely on a King County flood protection facility, the applicant shall provide an easement to King County consistent with the river protection easement requirements outlined in Section 4.1.

1.3.4 SPECIAL REQUIREMENT #4: SOURCE CONTROLS

Water quality source controls prevent rainfall and runoff water from coming into contact with pollutants, thereby reducing the likelihood that pollutants will enter public waterways and violate water quality standards or County stormwater discharge permit limits. A *Stormwater Pollution Prevention Manual* was prepared for citizens, businesses, and industries to identify and implement source controls for activities that often pollute water bodies. King County provides advice about source control implementation upon request. The County may, however, require mandatory source controls at any time through formal code enforcement if complaints or studies reveal water quality violations or problems.

Threshold	Requirement
IF a proposed project requires a commercial building or commercial ***site*** development permit . . .	THEN water quality source controls applicable to the proposed project shall be applied as described below in accordance with the *King County Stormwater Pollution Prevention Manual* and King County Code 9.12.

Application of this Requirement

When applicable per the *Stormwater Pollution Prevention Manual*, **structural source control measures**, such as car wash pads or dumpster area roofing, shall be applied to the entire ***site*** containing the proposed project, not just the ***project site***. If the applicant is a tenant or lessee for only a portion of the ***site***, DPER may limit the entire ***site*** application of structural source controls to only that portion of the ***site*** occupied or leased by the applicant. All applicable structural source control measures shall be shown on the site improvement plans submitted for engineering review and approval. Other, **nonstructural source control measures**, such as covering storage piles with plastic or isolating areas where pollutants are used or stored, are to be implemented after occupancy and need not be addressed during the plan review process. All commercial, industrial, and multifamily projects (irrespective of size) undergoing drainage review are required to implement applicable source controls.

Activities That May Result In Structural Improvements

There are a number of activities that may require structures and/or specific drainage configurations in order to protect stormwater and maintain compliance with county code. Roof structures, wheel washes, cement pads, shutoff valves, containment berms and indoor mop sinks are all examples of things that need to be in place prior to commencing the activity. These may require building permits and other approvals prior to construction.

Below are some highlighted activities and the numbered BMP activity sheets in the *Stormwater Pollution Prevention Manual* that provide more detail:

Commercial Composting
Structural improvements: paved composting and storage pads, leachate collection system, lined collection ponds, wheel wash system

- A-24 Commercial Composting

Fueling of equipment and vehicles
Structural improvements: Portland cement pads, roofs, spill control devices, trench drains, oil/water separators

- A-17 Fueling Operations
- A-48 Older Fueling Operations

Horse stables
Structural improvements: Wash racks connected to sanitary sewer or separate infiltration area, manure containment areas

- A- 35 Livestock

Mining of sand or gravel
Structural improvements: Wheel wash system and track-out control, catch basin inserts

- A-41 Wheel Wash System

Painting, Finishing, & Coating of Vehicles & Equipment
Structural improvements: Permitted, enclosed paint booths

- A-22 Painting, Finishing, & Coating of Vehicles, Products, & Equipment

Restaurants and food trucks
Structural improvements: Indoor sinks for mat and rack washing and mop and wastewater disposal.

- A-8 Storage of Solid and Food Wastes
- A-12 Cleaning of Cooking Equipment

Outdoor storage of erodible materials, e.g. compost, bark, sand, etc.
Structural improvements: Wheel wash system and track-out control, berms, containment areas, covering, catchbasin inserts

- A-41 Wheel Wash and Tire Bath Track-Out Control

Outdoor storage or processing of galvanized materials
Structural improvements: Roofs or other covering, stormwater collection and treatment system

- A-21 Manufacturing and Post-Processing of Metal Products

Storage of liquid materials
Structural improvements: Secondary containment, roofed structures, spill control devices

- A-2 Storage of Liquid Materials in Stationary Tanks
- A-3 Storage of Any Liquid Materials in Portable Containers

Utility Corridor Maintenance
Structural improvements: Road stabilization

- A-45 Maintenance of Public & Private Utility Corridors & Facilities

Washing of cars, trucks and equipment (not just commercial car washes)
Structural improvements: Dedicated wash pads, sewer connection, holding tanks, catch basin inserts

- A-13 Vehicle washing

Wood Treatment & Preserving
Structural improvements: Paved, contained and covered storage and processing areas

- A-23 Wood Treatment & Preserving

1.3.5 SPECIAL REQUIREMENT #5: OIL CONTROL

Projects proposing to develop or redevelop a ***high-use site*** must provide oil controls in addition to any other water quality controls required by this manual. Such ***sites*** typically generate high concentrations of oil due to high traffic turnover, on-site vehicle or heavy or stationary equipment use, some business operations, e.g. automotive recycling, or the frequent transfer of liquid petroleum or coal derivative products.

The traffic threshold in the definition above focuses on vehicle turnover per square foot of building area (trip generation) rather than ADT alone because oil leakage is greatest when engines are idling or cooling. In general, all-day parking areas are not intended to be captured by these thresholds except those for diesel vehicles, which tend to leak oil more than non-diesel vehicles. The petroleum storage and transfer stipulation is intended to address regular transfer operations like service stations, not occasional filling of heating oil tanks.

Threshold	Requirement
IF a proposed project: • develops a ***site*** that will have ***high-use site*** characteristics, OR • is a ***redevelopment project*** proposing $100,000 or more of improvements to an existing ***high-use site,*** OR • is a ***redevelopment project*** that results in new plus replaced pollution generating impervious surfaces of 5,000 square feet or more or new pollution generating pervious surface of ¾ acre or more improvements to an existing ***high-use site*** …	THEN the project must treat runoff from the high-use portion of the ***site*** using oil control treatment options from the High-Use menu (described below and detailed in Chapter 6).

High-Use Menu

High-use oil control options are selected to capture and detain oil and associated pollutants. The goal of this treatment is no visible sheen on runoff leaving the facility, or less than 10 mg/L total petroleum hydrocarbons (TPH) in the runoff, depending on the facility option used. Oil control options include facilities that are small, handle only a limited tributary area, and require frequent maintenance, as well as facilities that treat larger areas and generally have less frequent maintenance needs. Facility choices include catch basin inserts, linear sand filters, and oil/water separators. See Chapter 6 for specific facility choices and design details.

Application of this Requirement

For ***high-use sites*** located within a larger commercial center, only the impervious surface associated with the high-use portion of the ***site*** is subject to treatment requirements. If common parking for multiple businesses is provided, treatment shall be applied to the number of parking stalls required for the high-use business only. However, if the treatment collection area also receives runoff from other areas, the water quality facility must be sized to treat all water passing through it.

High-use roadway intersections shall treat the intersection itself, plus lanes where vehicles accumulate during the signal cycle, including all lanes, from the beginning of the left turn pocket (see Figure 1.3.5.A below). If no left turn pocket exists, the treatable area shall begin at a distance of 75 feet from the stop line. If runoff from the intersection drains to more than two collection areas that do not combine within the intersection, treatment may be limited to any two of the collection areas. Oil control facilities shall be

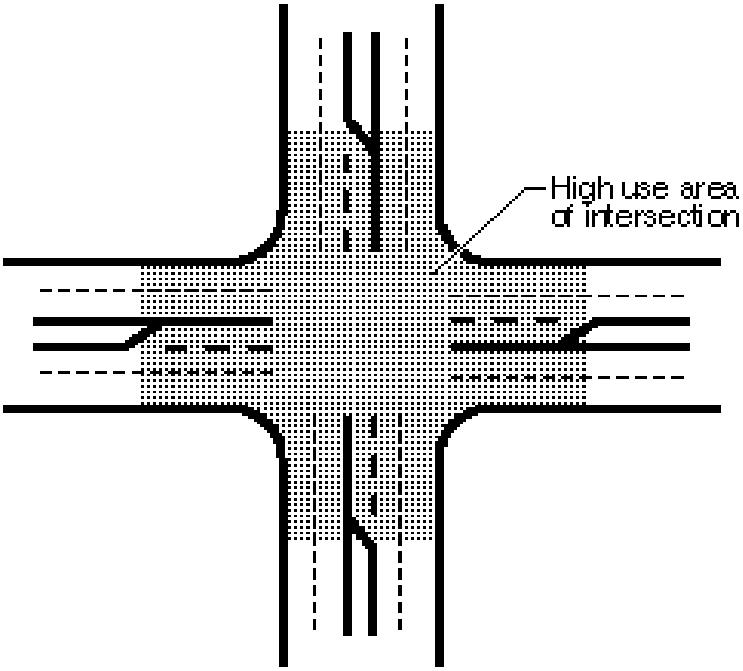
designed for all flows tributary to the oil control facility including flow from otherwise exempt areas that are not bypassed around the facility.

Note: For oil control facilities to be located in public road right-of-way and maintained by King County, only coalescing plate or baffle oil/water separators shall be used unless otherwise approved through an adjustment. Catch basin inserts are not allowed for oil control.

Methods of Analysis

The traffic threshold for the High-Use menu shall be estimated using information from *Trip Generation*, published by the Institute of Transportation Engineers, from a traffic study prepared by a professional engineer or transportation specialist with experience in traffic estimation, or from documented data from the King County Department of Transportation.

FIGURE 1.3.5.A TREATABLE AREAS FOR HIGH-USE ROAD INTERSECTIONS



1.4 ADJUSTMENT PROCESS

For proposed projects subject to drainage review by the Department of Development and Environmental Services (DPER), this process is provided for the occasions when a project proponent desires to vary from one of the core or special requirements, or any other specific requirement or standard contained in this manual. Proposed adjustments should be approved prior to final permit approval, but they may be accepted up to the time King County approves final construction or accepts drainage facilities for maintenance. The adjustment application form (one standard form serves all types of adjustments except for blanket adjustments) is included in Reference Section 8-F.

Types of Adjustments

To facilitate the adjustment process and timely review of adjustment proposals, the following types of adjustments are provided:

- **Standard Adjustments:** These are adjustments of the standards and requirements contained in the following chapters and sections of this manual:
  - * Chapter 1, "Drainage Review and Requirements"
  - * Chapter 2, "Drainage Plan Submittal"
  - * Chapter 3, "Hydrologic Analysis and Design"
  - * Chapter 4, "Conveyance System Analysis and Design"
  - * Chapter 5, "Flow Control Design"
  - * Chapter 6, "Water Quality Design"
  - * Appendix A, "Maintenance Requirements for Flow Control, Conveyance, and WQ Facilities"
  - * Appendix B, "Master Drainage Plans."
  - * Appendix C, “Simplified Drainage Requirements” (detached)
  - * Appendix D, “Construction Stormwater Pollution Prevention Standards” (detached).

  Requests for standard adjustments will be accepted only for permits pending approval or approved permits that have not yet expired.
- **Experimental Design Adjustments:** This type of adjustment is used for proposing new designs or methods that are not covered in this manual, that are not uniquely ***site*** specific, and that do not have sufficient data to establish functional equivalence.
- **Blanket Adjustments:** This type of adjustment may be established by the County based on approval of any of the above-mentioned adjustments. Blanket adjustments are usually based on previously approved adjustments that can be applied routinely or globally to all projects where appropriate. Blanket adjustments are also used to effect minor changes or corrections to manual design requirements or to add new designs and methodologies to this manual.

1.4.1 ADJUSTMENT AUTHORITY

The Department of Development and Environmental Services (DPER) shall have full authority to determine if and what type of adjustment is required for any proposed project subject to drainage review by DPER. The authority to grant adjustments for such projects is distributed as follows:

- DPER shall have full authority to approve or deny standard adjustments, except those involving outfalls or pump discharges to the Green River between River Mile 6 and SR 18 per Section 1.2.4.2.F and 1.2.4.2.I. DPER decisions on those adjustments are subject to approval by the King County Flood Control District.
- DNRP shall have full authority to approve or deny experimental design adjustments.
- Both DPER and DNRP must approve blanket adjustments.

At any time, this adjustment authority may be transferred between DPER and DNRP through a memorandum or an amendment to this manual. This memorandum or amendment must include specific guidelines for deferral of adjustment authority.

1.4.2 CRITERIA FOR GRANTING ADJUSTMENTS

Adjustments to the requirements in this manual may be granted provided that granting the adjustment will achieve the following:

1. Produce a compensating or comparable result that is in the public interest, AND
2. Meet the objectives of safety, function, appearance, environmental protection, and maintainability based on sound engineering judgment.

Also, the granting of any adjustment that would be in conflict with the requirements of any other King County department will require review and concurrence with that department.

Criteria Exception

If it can be demonstrated that meeting the above criteria for producing a compensating or comparable result will deny reasonable use of a property, approval of the adjustment will require an adjustment **criteria exception** to be approved by the director of DPER or DNRP (whoever is approving the adjustment). An adjustment that requires a criteria exception may be granted following legal public notice of the adjustment request, the director's proposed decision on the request, and a written finding of fact that documents the following:

1. There are special physical circumstances or conditions affecting the property such that strict application of the criteria for producing a compensating or comparable result would deprive the applicant of all reasonable use of the parcel of land in question, and every effort has been made to find creative ways to meet the intent of the requirement for which the adjustment is sought, AND
2. Granting the adjustment for the individual property in question will not create a significant adverse impact to public health, welfare, water quality, and properties downstream or nearby, AND
3. The adjustment requires the best practicable alternative for achieving the spirit and intent of the requirement in question.

In addition, the written finding of fact must include the following information:

- The current (pre-project) use of the ***site***.
- How application of the requirement for which an adjustment is being requested denies reasonable use of the ***site*** compared to the restrictions that existed under the 2009 *Surface Water Design Manual*.
- The possible remaining uses of the ***site*** if the criteria exception were not granted.

- The uses of the ***site*** that would have been allowed under the 2009 *Surface Water Design Manual*.
- A comparison of the estimated amount and percentage of value loss as a result of the requirements of this manual versus the estimated amount and percentage of value loss as a result of requirements that existed under the 2009 *Surface Water Design Manual*.
- The feasibility for the owner to alter the project to apply the requirements of this manual.

Experimental Design Adjustments

Experimental Design Adjustments may be required for departures from design specifications in flow control facilities (Chapter 5); and are required for alternatives to water quality facilities listed in Chapter 6 and Reference 14-A (Approved Proprietary Facilities) or Reference 14-B (Approved Public Domain Facilities), and alternatives to erosion and sediment control (ESC) facilities in Appendix D.

Experimental design adjustments may be approved by DNRP on a limited basis if, upon evaluation, DNRP agrees the following criteria are met:

- The facility has already been approved by Ecology; for water quality approved through Ecology's TAPE[51] or CTAPE[52] program as applicable, and has General Use Level Designation (GULD) approval or Conditional approval (CULD). Approval by Ecology does not by itself constitute or ensure approval by King County.
- Ecology's approval documentation indicates that maintenance is required no more frequently than annually for flow control and water quality facilities excluding temporary construction ESC facilities.
- DNRP believes that technical reports and data suggest facility performance could be replicated. DNRP must have access to the full technical report(s) submitted to Ecology for TAPE or CTAPE approval depending on technology and use, and may require any other reports or data referred to but not provided.
- The Applicant agrees to monitoring as described in Reference 8-F; a monitoring quality assurance project plan has been submitted to DNRP for review and has been approved by DNRP; and the Consultant providing the monitoring has provided the Applicant and DNRP with a cost analysis of the monitoring program.
- For Basic treatment water quality facilities only, if the facility has already been approved by Ecology through Ecology's TAPE program, and has General Use Level Designation (GULD), additional TSS removal monitoring will not be required, but DNRP may require other monitoring, e.g. constructability, durability, and/or maintenance monitoring. DNRP may limit the number of installations until it is satisfied that the facility type is viable.
- If review of Ecology's basis for granting GULD is found to be flawed and DNRP then finds GULD should not have been issued, DNRP may rescind its approval for new installations of the facility in King County.
- An experimental adjustment for ESC does not absolve the Applicant from meeting the requirements of 1.2.5.2.C, ESC Performance.
- Conditions for approval of experimental design adjustments may include a requirement for setting aside an extra area and posting a financial guarantee for construction of a conventional facility should the experimental facility fail. Once satisfactory durability, operation, and performance of the experimental facility are verified, the set aside area could be developed and the financial guarantee released.

[51] Technology Assessment Protocol – Ecology

[52] Chemical Technology Assessment Protocol – Ecology

1.4.3 ADJUSTMENT APPLICATION PROCESS

Standard Adjustments

The application process for standard adjustments is as follows:

- Requests for standard adjustments will be accepted only for permits pending approval or approved permits that have not yet expired.
- The completed adjustment request application forms must be submitted to DPER along with sufficient engineering information (described in Chapter 2) to evaluate the request. The application shall note the specific requirement for which the adjustment is sought.
- If the adjustment request involves use of a previously unapproved construction material or construction practice, the applicant should submit documentation that includes, but is not limited to, a record of successful use by other agencies and/or evidence of meeting criteria for quality and performance, such as that for the American Association of State Highway and Transportation Officials (AASHTO) and the American Society of Testing and Materials (ASTM).
- If the adjustment requires a criteria exception, additional engineering or other information may be required by DPER to document that denial of reasonable use would occur, that every effort was made to achieve compliance, and that the best practicable alternative will not cause significant adverse impact.
- A fee reduction may be requested if it is demonstrated that the adjustment request requires little or no engineering review.

Experimental Design Adjustments

The application process is the same as for standard adjustments except that requests will be accepted prior to permit application, and engineering information detailed in Reference 8-F shall be included in the submittals.

Blanket Adjustments

There is no application process for establishing blanket adjustments because they are initiated and issued solely by the County.

1.4.4 ADJUSTMENT REVIEW PROCESS

All adjustments (a.k.a., variances from KCC 9.04) are classified as Type 1 land use decisions in King County Code, Title 20.20, and as such, are governed by the review procedures and time lines set forth in KCC 20.20. Consistent with these procedures, the general steps of the review process for specific types of adjustments are presented as follows.

Standard Adjustments

- DPER staff will review the adjustment request application forms and documentation for completeness and inform the applicant in writing as to whether additional information is required from the applicant in order to complete the review. The applicant will also be informed if DPER determines that special technical support is required from DNRP in cases where the adjustment involves a major policy issue or potentially impacts a DNRP drainage facility.
- The Development Review Engineer of DPER will review and either approve or deny the adjustment request following DPER's determination that all necessary information has been received from the applicant.

- If a criteria exception is required for the adjustment, DPER will issue a legal public notice of the adjustment request that indicates the director's proposed decision on the request, including the written finding of fact specified in Section 1.4.2 (p. 1-108). The public notice will include a 15-working-day public comment period within which a request for reconsideration may be made to the DPER director as described in Section 1.4.5. Absent a request for reconsideration, the director's decision becomes final after the two week public comment period.
- Approvals of standard adjustments will expire upon expiration of the permit to which they apply.

Experimental Design Adjustments

- The County will consider any flow control adjustment request, but will only consider experimental design adjustments for water quality facilities that have been approved by WA Ecology's TAPE program, and chemical treatment facilities whether for water quality (Core Requirement #8) or erosion and sediment control (Core Requirement #5) that have been approved by WA Ecology's CTAPE program.
- DPER staff will refer requests for experimental design adjustments to DNRP staff, along with any recommendations.
- DNRP staff will review the submitted material and any DPER staff recommendations, and inform the applicant as to whether additional information is required in order to complete the review. DNRP will also give the applicant an estimate of the time needed to complete the review. There is no guarantee that an experimental adjustment will be granted, but if it is, monitoring will be required for any water quality treatment experimental adjustment and for any ESC adjustment utilizing any kind of chemical treatment. Monitoring may be required for other ESC experimental adjustments and for flow control experimental adjustments, up to the discretion of DNRP staff. See Reference 8-F for details.
- If a criteria exception is required for the adjustment, DPER will issue a legal public notice of the adjustment request that indicates the DNRP's proposed decision on the request, including the written finding of fact specified in Section 1.4.2 (p. 1-108). The public notice will include a 15-working-day public comment period within which a request for reconsideration may be made to the DNRP director as described in Section 1.4.5. Absent a request for reconsideration, the director's decision becomes final after the 15-working-day public comment period.
- The DNRP director or designee will review and either approve or deny the adjustment request in writing, and this will in turn be communicated to the Applicant by DPER in writing.

Blanket Adjustments

Blanket adjustments may be established at the discretion of DPER and DNRP. Blanket adjustments are established by memorandum between DPER and DNRP based on:

1. Previously approved standard or experimental design adjustments and supporting documentation, AND
2. Experimental adjustment monitoring results in conjunction with any TAPE or CTAPE results AND
3. Information presenting the need for the blanket adjustment. Typically, blanket adjustments should apply globally to design or procedural requirements and be independent of ***site*** conditions.

Both DPER and DNRP must approve creation of a blanket adjustment.

Applicants may use any approved blanket adjustment listed in Reference 14, by submitting the form titled "Surface Water Design Manual Requirements/Standards Blanket Adjustment No. ____" to the DPER engineering plan reviewer currently reviewing the specific project proposal, but no further approval is required.

1.4.5 REQUEST FOR RECONSIDERATION PROCEDURE

Although adjustment decisions, classified as Type 1 land use decisions, are not appealable per KCC 20.20, the applicant may request reconsideration of the denial or conditions of approval of an adjustment request by submitting a formal letter to the director of the department in which the decision was made within 15 working days of the decision. This letter must include justification for reconsideration of the decision, along with a copy of the adjustment request with the conditions (if applicable) and a list of all previously submitted material. The department director shall respond to the applicant in writing within 15 working days. The director's decision on the reconsideration request shall be final. A review fee will be charged to the applicant for County review of a reconsideration request.

Criteria Exceptions

A criteria exception decision for an adjustment is also a Type 1 land use decision and thus, is not appealable per KCC 20.20. However, because the public is given an opportunity to comment on a criteria exception decision, they may request reconsideration of the decision by submitting a formal letter to the director of the department in which the decision was made within 15 working days of the legal public notice. This letter must include justification for reconsideration of the decision, along with any supporting information/documentation. The department director shall respond to the letter in writing within 15 working days. The director's decision on the reconsideration request shall be final.