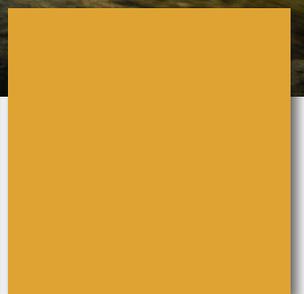
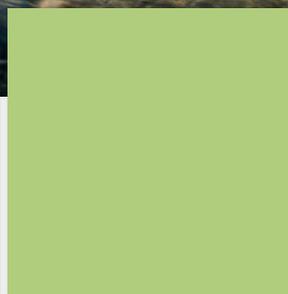
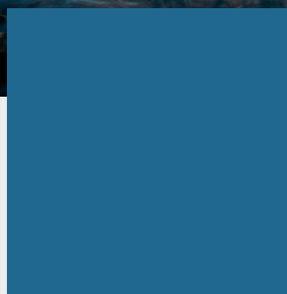
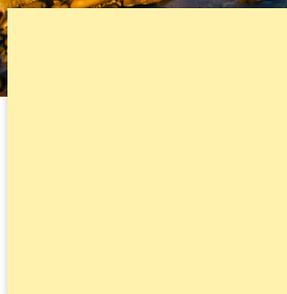
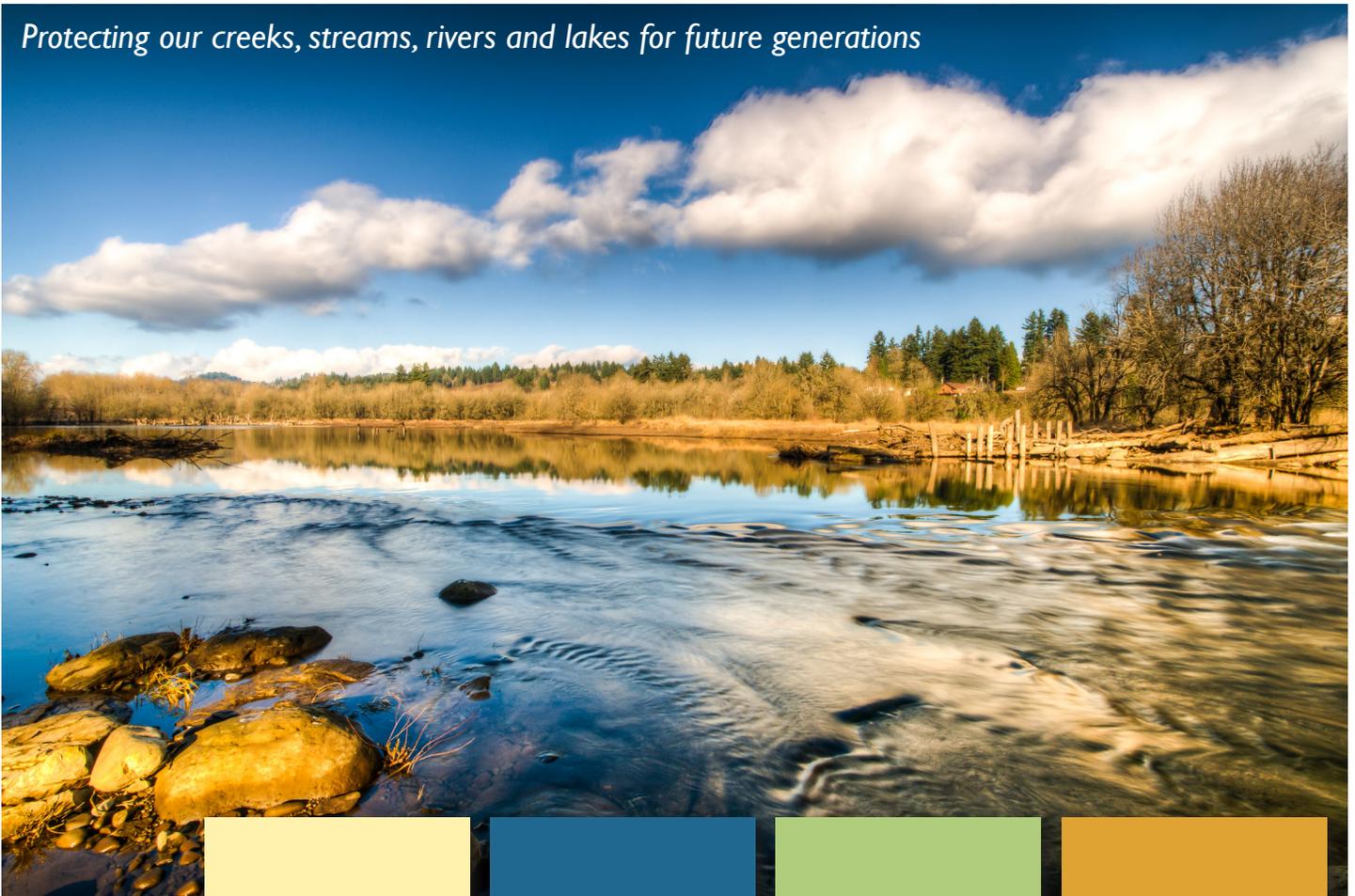




Clark County Stormwater Manual

Adoption Draft
September 17, 2015
(for Public Review)

Protecting our creeks, streams, rivers and lakes for future generations



Clark County Stormwater Manual

Introduction to the Manual

Adoption Draft
September 17, 2015
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The *Clark County Stormwater Manual* is adapted from five original sources:

- *2012 Stormwater Management Manual for Western Washington* published by Washington Department of Ecology, Amended December 2014.
- *Clark County Pollution Control Manual*, published by Clark County.
- *Clark County Stormwater Manual* published by Clark County, November 2009.
- *Stormwater Facility Maintenance Manual* published by Clark County, January 2009.
- *Appendix 1 – Minimum Technical Requirements for New Development and Redevelopment* of the Phase I Municipal Stormwater Permit: National Pollutant Discharge Elimination System and State Waste Discharge General Permit for discharges from Large and Medium Municipal Separate Storm Sewer Systems, issued by Department of Ecology to Clark County, as modified January 16, 2015.

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Introduction to the Clark County Stormwater Manual

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Purpose

The *Clark County Stormwater Manual* (CCSM) is intended to be a single reference for all aspects of controlling quantity and quality of stormwater regulated by Clark County. The manual is written to be equivalent to the *2012 Stormwater Management Manual for Western Washington*, as amended in December, 2014 (known as the 2014 SMMWW).

The manual is written for a broad audience, including engineers, developers, property owners, construction contractors, business operators and County staff. The manual describes requirements for stormwater management on development and redevelopment sites and requirements for maintenance of facilities and control of stormwater pollutants at business sites, County facilities, government properties, subdivisions and other areas where hard surfaces allow precipitation to run off. Two chapters of Clark County Code (CCC) adopt this manual's requirements (13.26A and 40.386).

The *Clark County Stormwater Manual* complies with Clark County's National Pollutant Discharge Elimination Systems (NPDES) Phase I municipal stormwater permit, issued by Washington Department of Ecology under the federal Clean Water Act. Compliance with this manual also addresses stormwater aspects of Clark County's Critical Areas code and the State Environmental Policy Act.

The requirements and Best Management Practices (BMPs) in this manual are intended to safeguard public health, safety and welfare by protecting the quality of surface water and groundwater for drinking water supply, recreation, fishing and other beneficial uses as described in the Clean Water Act, the Washington Water Pollution Control Act (Revised Code of Washington (RCW) 90.48 and Washington Administrative Code (WAC) 173-201A and 173-200).

Effects of Urbanization

As land is cleared and covered with impervious surfaces such as roofs and roads for urban, suburban and rural development, the way that rainfall runs off during precipitation events changes. Changes include:

- Increased volume of runoff
- Increased rate of flow of runoff
- Decreased time for runoff to reach natural receiving water
- Reduced groundwater recharge
- Increased frequency and duration of high stream flows and wetland inundation during and after wet weather
- Reduced stream flows and wetlands water levels during the dry season

- Greater stream velocities
- Increased types and quantities of pollutants carried to receiving waters by runoff

The effects of these changes can include: erosion of stream channels; deposition of sediment in streams and over fish spawning beds; decrease in water quality in streams, lakes, rivers and groundwater used for recreation and drinking; flooding during storms; and insufficient levels of water in streams during the dry season.

The requirements in this manual are designed to decrease the changes in surface water runoff on newly developed land or on land that is undergoing redevelopment, compared to runoff generated by the local land cover in Clark County prior to Euro-American settlement.

Refer to the 2014 SMMWW, Volume I, Section 1.7 for a lengthy discussion of the effects of urbanization.

Organization and Use of this Manual

The CCSM consists of four books that address all County-regulated aspects of stormwater management, pollution source control and stormwater facility maintenance in Clark County.

Book I – Applicability, BMP Selection, and Submittal

Book 1 contains regulatory requirements for applicability of permanent and temporary stormwater controls that apply to new development, redevelopment and construction sites. It includes nine Minimum Requirements for development and redevelopment, as well as:

- Applicability of the requirements.
- Requirements for initial site investigations.
- Requirements for selecting Low Impact Development facilities, runoff treatment facilities, flow control facilities, and conveyance infrastructure to serve the site after development.
- Requirements for control of stormwater pollution on construction sites.
- Administrative and legal requirements for providing mechanisms for continued operation and maintenance of infrastructure constructed according to the provisions of this manual.

The nine Minimum Requirements are (refer to Book 1 for detailed descriptions):

1. Preparation of Stormwater Site Plans
2. Construction Stormwater Pollution Prevention
3. Source Control of Pollution

4. Preservation of Natural Drainage Systems and Outfalls
5. On-site Stormwater Management (Low Impact Development)
6. Runoff Treatment
7. Flow Control
8. Wetlands Protection
9. Operation and Maintenance

Book 1 is regulatory and technical in nature. Use Book 1 to determine which Minimum Requirements and County requirements apply, to select appropriate structural and erosion control BMPs, and to find out how to submit a Stormwater Site Plan. Also use Book 1 to determine how to comply with CCC 40.386 and Minimum Requirements #1, #2, #4, #5, #6, #7 and #8, when applicable.

County staff may use Book 1 in reviewing Stormwater Site Plans, reviewing building permit applications, checking BMP engineering designs, and inspecting construction sites and permanent stormwater control facilities.

Book 2 – BMP Design

Book 2 contains specific requirements for engineering analyses and design. It includes BMP information sheets for structural stormwater control BMPs, including those for runoff treatment and flow control, Low Impact Development BMPs, and BMPs for control of stormwater pollution at construction sites. It also lists standard details for drainage that are accepted by Clark County.

Book 2 is technical in nature. Use Book 2 for detailed engineering design of stormwater controls that were selected using requirements in Book 1. Also use Book 2 to assist in complying with CCC 40.386 and Minimum Requirements #2, #5, #6, #7 and #8, when applicable.

County staff may use Book 2 in reviewing BMP designs and inspecting construction sites.

Book 3 – Source Control

Book 3 contains regulatory requirements for controlling the sources of stormwater pollution on existing business sites, new development, redevelopment, and construction sites. Book 3 also describes operational and structural source control BMPs.

Book 3 is regulatory and technical in nature. Use Book 3 to determine how to comply with CCC 13.26A and CCC 40.386 and with Minimum Requirement #3, when applicable. Also use Book 3 as a reference for the selection, design, and implementation of stormwater source control BMPs.

County staff may use Book 3 in enforcing source control requirements at non-residential sites.

Book 4 – Stormwater Facility Operations and Maintenance

Book 4 contains minimum standards for maintaining stormwater facilities on private and public land in Clark County and basic guidance on maintenance frequency and techniques.

Book 4 is regulatory and technical in nature. Use Book 4 to determine how to comply with CCC 40.386 and Minimum Requirement #9, when applicable for operation and maintenance of new stormwater facilities, and with CCC 13.26A, for operation and maintenance of existing stormwater facilities. Also use Book 4 as a reference for inspection and maintenance of stormwater treatment facilities, flow control facilities, and Low Impact Development facilities.

County staff may use Book 4 in inspecting and maintaining County owned or operated stormwater infrastructure and in inspecting private stormwater facilities.

Applicability of CCSM

The CCSM is adopted by reference in CCC 40.386, Stormwater and Erosion Control and CCC 13.26A, Water Quality. The applicability, thresholds, Minimum Requirements, technical requirements and minimum standards described in this manual apply to those applicants, business operators, land owners and County property managers and operators that must comply with the named County codes.

Relationship to the Stormwater Management Manual for Western Washington

Clark County's National Pollutant Discharge Elimination System (NPDES) Phase I municipal stormwater permit identifies stormwater management requirements for Clark County. One requirement is that the County must adopt the technical requirements in Appendix 1 of the Phase I municipal stormwater permit, which are fully described in the *Stormwater Management Manual for Western Washington* (SMMWW; Department of Ecology, 2014). The County has elected to write and adopt an equivalent manual.

The CCSM is based on the *Stormwater Management Manual for Western Washington*. Some processes and technical requirements have been customized for Clark County users, and this manual is organized differently than SMMWW. Users do not need to consult the SMMWW to comply with CCC 40.386 or CCC 13.26A.

However, the CCSM omits some explanatory and educational language contained in the SMMWW, so users who are new to stormwater management, engineering and construction in the Pacific

Northwest may refer to the SMMWW to learn why some requirements have been established. Callouts throughout the CCSM alert readers to the opportunity to read background or educational information in the SMMWW or in other educational reference books or manuals.

Relationship to Other Clark County Regulations

Projects that are subject to the CCSM often must meet other related County codes and submit engineering designs in accordance with other County standards. The following codes and standards may also be applicable and are listed here for the user's convenience.

Critical Aquifer Recharge Areas (CARA)

CCC 40.410 prevents degradation, and where possible, enhances quality and quantity, of groundwater which will be used for drinking water. CARA regulation limits the placement of some stormwater features, such as Class V injection wells.

Geologic Hazard Areas

CCC 40.430 places limits on development in geologically hazardous areas consistent with requirements of the State Growth Management Act. It identifies areas where geologic concerns such as steep slopes may affect preparation of Stormwater Site Plans and erosion control plans.

Habitat Conservation

CCC 40.440 addresses loss of habitat functions and values within designated habitat areas. It regulates some stormwater discharges and the placement of treatment and control facilities in habitat buffers.

Wetland Protection

CCC 40.450 provides balanced wetland protection measures pursuant to the Washington State Growth Management Act. It regulates some stormwater discharges and the placement of treatment and control facilities in wetlands and wetland buffers.

Shoreline Master Program

CCC 40.460 protects water quality and biological and ecological resources by regulating development near County-regulated shorelines.

Related State and Federal Regulations

Projects that are subject to the CCSM often must meet other related state and federal regulations. The following laws, regulations, and rules may also be applicable and are listed here for the user's convenience.

Industrial Stormwater General Permit

Facilities covered under Ecology's Industrial Stormwater General Permit (i.e. NPDES and State Waste Discharge General Permit for Stormwater Discharges Associated with Industrial Activities) must manage stormwater in accordance with specific terms and conditions, including: development and implementation of an Industrial Stormwater Pollution Prevention Plan (Industrial SWPPP); monitoring; reporting; and ongoing adaptive management based on sampling and inspections. Industrial SWPPPs must include mandatory Best Management Practices identified in the SMMWW or this manual.

Construction Stormwater General Permit

Activities such as clearing, grading, and excavating require coverage under the Construction General Stormwater Permit for sites that discharge stormwater either into surface water(s) of the State or into a storm drainage system that discharges into surface water(s) of the State and that disturb one or more acres of land (or disturb less than one acre of land but are part of a larger common plan of development or sale). The permit requires practices to reduce the potential for erosion and the discharge of sediments from the site and implementation of stormwater BMPs contained in the SMMWW, or an equivalent manual, on construction sites.

Endangered Species Act

With the listing of multiple species of salmon as threatened or endangered across much of Washington State, implementation of the requirements of the Endangered Species Act impacts urban stormwater management. Provisions of the Endangered Species Act that can apply to stormwater management include the Section 4(d) rules, Section 7 consultations, and Section 10 Habitat Conservation Plans.

Section 401 Water Quality Certifications

For projects that require a fill or dredge permit under Section 404 of the Clean Water Act, Ecology must certify to the permitting agency, the U.S. Army Corps of Engineers, that the proposed project will not violate water quality standards. In order to make such a determination, Ecology may do a more specific review of the potential impacts of a stormwater discharge from the construction phase of the project and from the completed project.

Hydraulic Project Approvals

Under Chapter 77.55 Revised Code of Washington (RCW), the Hydraulics Act, the Washington State Department of Fish and Wildlife has the authority to require actions when stormwater discharges related to a project would change the natural flow or bed of state waters. The implementing mechanism is the issuance of a Hydraulics Project Approval permit.

Aquatic Lands Use Authorizations

The Department of Natural Resources (DNR), as the steward of public aquatic lands, may require a stormwater outfall to have a valid use authorization, and to avoid or mitigate resource impacts. Use authorizations are issued under authority of Chapter 79.105-79.140 RCW, and in accordance with Chapter 332-30 of the Washington Administrative Code (WAC).

Requirements Identified through Total Maximum Daily Loads

A number of the requirements of the SMMWW can be superseded or modified through the adoption of actions and requirements identified in a Total Maximum Daily Load (TMDL) that is approved by the Environmental Protection Agency.

Underground Injection Control (UIC) Authorizations

To implement provisions of the federal Safe Drinking Water Act (see Federal UIC regulations, 40 CFR, Part 144), Ecology has adopted rules (Chapter 173-218 WAC) for an UIC program. For more information visit Ecology's home page for the UIC program at <http://www.ecy.wa.gov/programs/wq/grndwtr/uic/> and *Guidance for UIC Wells that Manage Stormwater* at <http://www.ecy.wa.gov/pubs/0510067.pdf>.

According to WAC 173-218-030 a UIC well is defined as “a well that is used to discharge fluids into the subsurface. A UIC well is one of the following: (1) A bored, drilled or driven shaft, or dug hole whose depth is greater than the largest surface dimension; (2) An improved sinkhole; or (3) A subsurface fluid distribution system (contains perforated pipe or similar structure).”

Depending upon the manner in which it is accomplished, the discharge of stormwater into the ground can be classified as a Class V injection well. For more information and for a listing on potential stormwater facilities that may have Class V classification refer to the memorandum available at:

<http://www.ecy.wa.gov/programs/wq/stormwater/municipal/resources/EPAmemo infiltration class v wells.pdf>.

The CCSM is intended to conform to state UIC construction standards; however, applicants should consult state guidance independently.

Stormwater Discharges to Public Sanitary Sewers, Septic Systems, Dead-End Sumps, and Industrial Waste Treatment Systems

Stormwater Discharges to Sanitary Sewers

Discharging stormwater to a public sanitary sewer is normally prohibited, as this tends to overload the sewage treatment plant during storm events when flows are already high. Such discharges require the approval of the local Sewer Authority, or if the Sewer Authority has not received authority to set pretreatment requirements, a State Waste Discharge Permit from Ecology.

Pretreatment requirements are set pursuant to Chapter 173-216 WAC – State Waste Water Discharge Permit Program – which must comply with federal regulations (40 CFR Part 403.5 – National Pretreatment).

Stormwater Discharges to an Industrial Waste Treatment System

The operator's NPDES permit will regulate how the business may dispose of polluted stormwater.

Stormwater Discharges to Dead-end Sumps

Do not discharge a substance that causes a violation of water quality standards to a septic system, surface water, or groundwater. If a sanitary or industrial wastewater treatment system is not available, an alternative is the use of a dead-end sump that can be periodically pumped for appropriate disposal. Depending on the composition of the waste, it may or may not be considered Dangerous Waste.

For more information on disposal requirements for sumps, see "Step By Step: Fact Sheets for Hazardous Waste Generators," publication #91-12, available from Ecology's Regional Offices.

Uniform Fire Code Requirements

Storage of flammable, ignitable, and reactive chemicals and materials must comply with the stricter of local zoning codes, local fire codes (CCC 15.12), the Uniform Fire Code, Uniform Fire Code standards or the National Electric Code.

Ecology Requirements for Generators of Dangerous Wastes

The State's Dangerous Waste Regulations (Chapter 173-303 WAC) cover accumulation, storage, transportation, treatment and disposal of dangerous wastes. Of interest to this manual are those businesses or public agencies that accumulate the waste at their building until taken from the site by a contract hauler.

For more information on applicable requirements for dangerous wastes, see “Step By Step: Fact Sheets for Hazardous Waste Generators,” publication #91-12, available from Ecology's Regional Offices.

Standards for Solid Waste Containers

Standards for solid waste containers are identified in WAC 173-350-300, On-site Storage, Collection, and Transportation Standards. Clark County manages its program through an approved and adopted [Solid Waste Management Plan](#).

Coast Guard Requirements for Marine Transfer of Petroleum Products

Federal regulations 33 CFR Parts 153, 154 and 155 cover, respectively, general requirements on spill response, spill prevention at marine transfer facilities, and spill prevention for vessels. These regulations specify technical requirements for transfer hoses, loading arms, closure, and monitoring devices. The regulations also cover small discharge containment. *See also NFPA 30A Automotive and Marine Service Station Code from American National Standard Institute and the National Fire Protection Association.*

Emergency Spill Cleanup Requirements

Washington State Requirements

The Oil and Hazardous Substance Spills Act of 1990 and the Oil Spill Prevention and Response Act of 1991 (Chapter 90.56 RCW) authorized Ecology to develop effective oil spill response regulations.

Facility Contingency Plan requirements (Chapter 173-182 WAC) apply to all oil handling facilities (including pipelines) that are on or near navigable waters and transfer bulk oil by tank, ship, or pipeline.

The Oil Handling Training and Certification Rule (Chapter 173-180 WAC) establishes oil spill training and certification requirements for key facility personnel including applicable contractors involved in oil handling, transfer, storage, and monitoring operations.

In accordance with WAC 173-303-350 of Ecology's Dangerous Waste Regulations, generators of dangerous wastes must have a Contingency Plan.

For more information on disposal requirements for solid and dangerous wastes, see “Step By Step: Fact Sheets for Hazardous Waste Generators,” publication #91-12, available from Ecology's Regional Offices.

Federal Requirements

The Oil Pollution Act of 1990 is a comprehensive federal law that addresses marine oil spill issues including contingency plans, financial responsibility, marine safety regulations, etc.

Federal Regulations require that owners or operators of facilities engaged in drilling, producing, gathering, storing, processing, refining, transferring, or consuming oil and oil products are required to have a Spill Prevention Control and Countermeasure Plan, provided that the facility is non-transportation related; and, that the above-ground storage of a single container is in excess of 660 gallons, or an aggregate capacity greater than 1,320 gallons, or a total below-ground capacity in excess of 42,000 gallons.

Pesticide Regulations

The Washington State Department of Agriculture (WSDA) administers pesticide laws, under the Washington Pesticide Control Act (Chapter 15.58 RCW), Washington Pesticide Application Act (Chapter 17.21 RCW), and regulations under Chapter 16-228 WAC. The regulations include:

- Licenses are required for persons who apply pesticides, with some exceptions.
- No person shall pollute streams, lakes, or other water supplies while loading, mixing or applying pesticides.
- No person shall transport, handle, store, load, apply, or dispose of any pesticide, pesticide container, or apparatus in such a manner as to pollute water supplies or waterways, or cause damage or injury to land, including humans, desirable plants, and animals.

For more information on pesticide application and disposal requirements the following publications may be useful:

“Hazardous Waste Pesticides: A Guide for Growers, Applicators, Consultants and Dealers,” Ecology Publication #89-41, August 1989, available from Ecology’s Regional Offices.

“Suspended, Canceled and Restricted Pesticides,” EPA, available from the EPA Region 10 Office in Seattle.

“Best Management Practices for Agricultural Chemicals-A Guide for Pesticide Secondary Containment,” Ecology Publication #94-189.

“Site Evaluation-A Guide for Pesticide Secondary Containment,” Ecology Publication #94-188.

“Reducing and Managing Wastes From Catchbasins-A Guide for Pesticide Secondary Containment,” Ecology Publication #94-186.

“Spill Reporting and Cleanup in Washington State-A Guide for Pesticide Secondary Containment,” Ecology Publication #94-187.

“Pesticide Container Cleaning and Disposal,” Ecology Publication #96-431.

“Step By Step: Fact Sheets for Hazardous Waste Generators,” Ecology Publication #91-12.

Noxious Weed Control

Washington’s noxious weed control regulations are defined in Chapter 17.10 RCW, which prohibits the spread or transport of state-listed noxious weeds, and in Chapter 16-750 WAC, which establishes the list of noxious weeds in the state. These regulations require property owners to eradicate all class A noxious weeds and control and prevent the spread of class B and class C noxious weeds. These weeds may be spread during construction and during installation of some erosion and sediment control practices.

Air Quality Regulations

Regulation of air pollutant emissions in Washington is controlled by seven local air pollution control agencies, three Ecology regional offices and two Ecology programs (Central Program’s Industrial Section, and Nuclear and Mixed Waste Program). The Southwest Clean Air Agency is responsible for enforcing outdoor air quality standards in Clark, Cowlitz, Lewis, Skamania, and Wahkiakum counties. All of the local air pollution agencies and the regional offices enforce local, state and federal air pollution regulations. The Industrial Section of Ecology’s Central Program enforces state and federal air pollution regulations at chemical pulp mills and aluminum reduction facilities. The Nuclear and Mixed Waste Program enforces state and federal air pollution regulation on the Hanford Nuclear Reservation.

Whether it is to control the generation of fugitive emissions or point source (smoke stack) emissions, new and existing sources of air pollutants must comply with the requirements contained in their air pollution permits, regulatory orders, and local, state, and federal air pollution regulations. This will minimize the effects of each facility’s emissions on stormwater.

Ecology Hazardous Waste Reduction Program

The 1990 Hazardous Waste Reduction Act, Chapter 70.95C RCW, established a goal to reduce dangerous waste generation by 50 percent. The primary means for achieving this goal is through implementation of a pollution prevention-planning program. Facilities that generate in excess of 2,640 pounds of dangerous waste per year, or that are required to report under the Toxic Release Inventory (TRI) of Title III of the Superfund Amendments and Reauthorization Act (SARA), are subject to this law. Some 650 facilities in Washington currently participate in this planning program. Ecology provides technical assistance through its regional offices, with emphasis on the reduction of hazardous substance use and dangerous waste generation. Site visits, phone consultations, and workshops are some of the ways assistance is provided to businesses and governmental entities.

Washington State Groundwater Quality Standards

In December 1990, the state of Washington adopted groundwater quality standards to prevent groundwater pollution and to protect both current and future beneficial uses of the resource. Groundwater standards are found in Chapter 173-200 WAC. Beneficial uses of groundwater include drinking water, irrigation, and support of wildlife habitat. These standards, adopted from the Federal Safe Drinking Water Act of 1971, apply to any activity, including point and non-point, which has a potential to contaminate groundwater. The standards incorporate an existing part of state water quality law: the anti-degradation policy, which is an integral part of both the ground and surface water quality standards.

The anti-degradation policy requires that groundwater quality be protected to the greatest extent possible prior to contaminant concentrations reaching those specified within set numeric criteria. To address this requirement, narrative standards were developed which are based upon background water quality and use of treatment technologies and are site-specific in nature. The determination of specific limits is outlined in *Implementation Guidance for the Ground Water Quality Standards*, Ecology publication #96-02 (Ecology, 1996).

Washington law requires that all activities with the potential to contaminate water implement practices known as AKART – short for “all known available and reasonable methods of prevention, control, and treatment.” AKART must be used regardless of the quality of the receiving waters. State law requires the permitting of any industrial, commercial, or municipal operation that discharges waste material into ground and/or surface waters. These permits, issued by Ecology, set limits and conditions for discharges. Underground injection activities, while exempt from the State Waste Discharge Program, Chapter 173-216 WAC, are required to meet the groundwater quality standards and may be permitted under Chapter 173-218 WAC, Underground Injection Control Program.

Acronyms

The following acronyms are used throughout the CCSM.

AKART	All known, available, and reasonable methods of prevention, control, and treatment
ATB	Asphalt Treated Base
BFM	Bonded Fiber Matrix
BMP	Best Management Practice
CCC	Clark County Code
CCSM	Clark County Stormwater Manual
CESCL	Certified Erosion and Sediment Control Lead
CESCP	Contractor’s Erosion and Sediment Control Plan
CFR	Code of Federal Regulations

CPESC	Certified Professional in Erosion and Sediment Control
CSWGP	Construction Stormwater General Permit
CWA	Clean Water Act (federal)
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act (federal)
ESC	Erosion and Sediment Control
FEMA	Federal Emergency Management Agency
IECA	International Erosion Control Association
LID	Low Impact Development
MBFM	Mechanically Bonded Fiber Matrix
Min.	Minimum
NOEC	No observed effects concentration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
PAM	Polyacrylamide
PGHS	Pollution generating hard surface
PGIS	Pollution generating impervious surface
PGPS	Pollution generating pervious surface
RCW	Revised Code of Washington
RUSLE	Revised Universal Soil Loss Equation
SMMWW	Stormwater Management Manual for Western Washington
SWPPP	Stormwater Pollution Prevention Plan
TDA	Threshold Discharge Area
TESC	Temporary Erosion and Sediment Control
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
WAC	Washington Administrative Code
WWHM	Western Washington Hydrology Model
WSDOT	Washington State Department of Transportation

End of Introduction to Manual