FACT SHEET

NPDES Permit Number:	WAS-026638
Date:	January 26, 2012
Public Comment Period Expiration Date:	March 30, 2012
Technical Contact:	Misha Vakoc (206) 553-6650 or (800) 424-4372 vakoc.misha@epa.gov

The U.S. Environmental Protection Agency (EPA) Proposes to Issue a National Pollutant Discharge Elimination System (NPDES) Permit for Stormwater Discharges To:

Joint Base Lewis-McChord, Washington

EPA Requests Public Comment on the Proposed Permit

EPA Region 10 proposes to issue a NPDES permit authorizing the discharge of stormwater from all municipal separate storm sewer system (MS4) outfalls owned or operated by the Joint Base Lewis-McChord (JBLM). Permit requirements are based on Section 402(p) of the Clean Water Act, 33 U.S.C. § 1342(p), and EPA's "Phase II" regulations for MS4 discharges, published in the Federal Register on December 8, 1999, 64 Fed. Reg. 68722.

The NPDES permit requires the implementation of a comprehensive municipal stormwater management program (SWMP), and outlines the best management practices (BMPs) to be used by JBLM to control pollutants in stormwater discharges to the maximum extent practicable (MEP). The permit establishes conditions, prohibitions, and management practices for discharges of stormwater from the MS4 owned or operated by JBLM. Assessment of water quality, through limited surface water, stormwater discharge, and biological sampling, is also included. Annual reporting is required to provide information on the status of the SWMP implementation. Permit Part III of the permit summarizes the SWMP actions and schedule for SWMP implementation.

This fact sheet includes information on public comment, public hearing and appeal procedures; a description of the JBLM MS4; and a description of requirements for the SWMP, a schedule of compliance, and other conditions.

EPA is requesting comments on all aspects of the proposed permit. ***Topics about which EPA is particularly interested in receiving public input are identified in this fact sheet using bold italic text.***

State of Washington Certification.

EPA has requested that the Washington Department of Ecology (Ecology) certify the NPDES permit pursuant to Section 401 of the Clean Water Act, 33 U.S.C. § 1341. EPA may not issue the NPDES permit until the state has granted, denied or waived certification. On January 17, 2012, Ecology provided EPA with a letter indicating its intent to certify the permit pursuant to certain conditions set forth in Ecology's letter (see Appendix C of this document).

The letter dated 1/17/2012 states that Ecology will issue a final certification for the permit if its comments set forth in the letter are addressed. EPA interprets this statement to mean that Ecology's general and detailed comments are conditions of a certification that must be included in the permit pursuant to CWA Section 401(d), 33 U.S.C. § 1341(d), unless otherwise stated in Ecology's letter.

Comments regarding Ecology's pending certification should be submitted directly to the Department of Ecology as indicated in the Public Comment section below. For more information about this letter of intent to certify, please contact Vincent McGowan at (360) 407-7320.

Public Meeting & Requests for Public Hearing

EPA has scheduled a public meeting to discuss this permit and accept written comment on Monday March 19, 2012. The meeting will be held at the Lakewood Library, 6300 Wildaire Road Southwest, Lakewood, Washington 98499. EPA will host an open house at 6:00 pm, and the meeting will be conducted between 6:30 - 8:00 pm.

Persons wishing to request that a formal public hearing be held must submit their request via email to the EPA address listed below no later than February 10, 2012. A request for a public hearing should identify the issues to be raised, as well as the requester's name, address and telephone number.

Public Comment

Persons wanting to comment on the proposed permit may do so in writing no later than the public notice expiration date, March 30, 2012. All comments should include the name, address and telephone number of the commenter, as well as a concise statement of the exact basis of any comment and relevant facts upon which it is based. Comments regarding the draft permit may be sent to:

EPA Region 10
Office of Water and Watersheds, OWW-130
Attn: NPDES Stormwater – JBLM #WAS-026638
1200 Sixth Avenue, Suite 900
Seattle, WA 98101

or via email to the following address: *vakoc.misha@epa.gov*

Persons wishing to comment on the pending State Certification may do so in writing no later than the public notice expiration date, March 30, 2012, to:

Vincent McGowan
Washington Department of Ecology
Southwest Regional Office, Water Quality Program
300 Desmond Drive
Lacey, WA 98503

or via email to the following address: *vincent.mcgowan@ecy.wa.gov*

After the public comment period expires and all significant comments are considered, EPA's regional Director of the Office of Water and Watersheds will make a final decision regarding permit issuance. If no comments requesting a change in the proposed permit are received, the tentative conditions in the proposed permit become final, and the permit will become effective upon issuance. If comments are submitted, EPA will prepare a response to comments, and, if necessary, will make changes to the proposed permit. After making any necessary changes, EPA will obtain a final CWA Section 401 certification from Ecology and issue the permit with a response to comments (unless issuance of a new proposed permit is warranted pursuant to 40 CFR § 122.14.) The permit will become effective no earlier than 33 days after the issuance date, unless the permit is appealed to the Environmental Appeals Board within 30 days, pursuant to 40 CFR § 122.19.

Documents Are Available for Review

The draft NPDES permit and related documents can be reviewed or obtained by contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday (see address above). The draft permit and fact sheet can also be downloaded from EPA's internet website at http://www.epa.gov/region10/stormwater.htm. Reference materials cited in the fact sheet are available in electronic format or in hard copy. The documents may also be requested by e-mail from washington.audrey@epa.gov or vakoc.misha@epa.gov .

Disability Reasonable Accommodation Notice

For technical questions regarding the draft permit or fact sheet, contact Misha Vakoc at the phone number or e-mail address at the beginning of this document. If you need a reasonable accommodation for a disability, please contact Audrey Washington at (206) 553-0523, or at washington.audrey@epa.gov. TTY/TDD users please dial Washington Relay Service at 1-800-833-6388. Please provide one week advance notice for special requests not related to ongoing programs and services.

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I. Introduction

Stormwater is the surface runoff that results from rain and snow melt. Urban development alters the land's natural hydrology, and human activity generates a host of pollutants that can accumulate on paved surfaces. Uncontrolled stormwater discharges from urban areas can negatively impact water quality.

The National Pollutant Discharge Elimination System (NPDES) stormwater regulations establish permit requirements for discharges from publicly owned ditches, pipes and other conveyances within urban areas. Appendix A of this fact sheet details the regulatory background for the municipal separate storm sewer system (MS4) permit program, and the types of pollutants typically found in urban runoff.

This fact sheet describes the MS4s owned or operated by the Joint Base Lewis-McChord (JBLM), and explains the rationale for the proposed NPDES permit conditions.

II. Applicant and Permit Area

The permit described in this document is proposed on a jurisdiction-wide basis to address discharges from the regulated small MS4 owned or operated by JBLM.

Joint Base Lewis-McChord
Public Works
Environmental Division
Box 339500 MS 17
Joint Base Lewis-McChord, Washington 98433-9500

JBLM was established in 2010, and is cooperatively operated by the Army and the Air Force. JBLM formally includes the military installation located in Pierce and Thurston Counties, Washington (this area is referred to as a "subinstallation"), the Yakima Training Center, and several other geographically separate facilities.

EPA's permit addresses only the discharges from the MS4 owned or operated by JBLM within the Pierce and Thurston County subinstallation, and does not include the Yakima Training Center or other geographically remote sites operated by JBLM.

According to JBLM supplemental permit application materials, the Joint Base Garrison operates the subinstallation on behalf of warfighting units, families, and extended military community who rely on JBLM for support. With an Army joint base commander and Air Force deputy joint base commander, the garrison supports the installation through directorates and agencies that provide a full range of city services and quality-of-life functions, including facility maintenance, recreation, family programs, training support and emergency services.

The JBLM subinstallation within Pierce and Thurston Counties consists of approximately 86,176 acres comprising Fort Lewis Army Base (Fort Lewis), and 4,639 acres comprising

McChord Air Force Base (McChord AFB). Total land area of the JBLM subinstallation is approximately 142 square miles.

MS4 Permit Application

Actions which predate the establishment of JBLM in 2010 may be described in this document as either a Fort Lewis action or McChord AFB action, depending of the responsible organization at the time of the action.

In 2003, Fort Lewis submitted a NPDES permit application to EPA describing a Stormwater Management Program (SWMP) to reduce pollutants in discharges to the maximum extent practicable from the portion of its MS4 located within the Seattle Urbanized Area. Fort Lewis submitted a SWMP report in 2004, an updated map of the Fort Lewis' storm sewer system, the *Watershed Management Plan for the Murray/SequalitchewWatershed* in 2007, and other materials to supplement the MS4 application information in 2010 and 2011.

In March 2003, McChord AFB responded to EPA's request for a MS4 permit application by stating that all stormwater discharges from McChord AFB were separately authorized under the *NPDES Multi-Sector General Permit for Stormwater Associated with Industrial Activity* (MSGP), #WAR05-000F. However, based on maps reviewed by EPA, EPA confirmed that MS4 discharges to waters of the U.S drain residential and other non-industrial areas of McChord, separate from than those permitted under the MSGP. In 2007, EPA informed McChord AFB that separate MS4 permit authorization was required for its municipal stormwater discharges.

In August 2010 and late 2011, JBLM provided information to supplement and revise the NPDES MS4 permit application to reflect the base realignment and topics relevant to the development of the permit. All application and supporting materials are available as part of the Administrative Record for the permit.

Other Regulated Stormwater Discharges

The permit defines terms and conditions to authorize the discharge of urban runoff to waters of the United States from the MS4 owned or operated by JBLM. The permit also conditionally authorizes the discharge of process waste water, regulated industrial stormwater, and regulated construction stormwater through the JBLM MS4, provided that such regulated discharges are authorized by EPA pursuant to other appropriate (but separate) NPDES permit(s). *See* Part I.C.4 of the permit.

Regulated industrial stormwater discharges defined in 40 CFR § 122.26(b)(14) and which originate from JBLM operations within the permit area are currently authorized under the MSGP, Permit #WAR05-000F. In addition, regulated construction stormwater discharges within areas operated by JBLM are authorized, as necessary, under EPA's *NPDES General Permit for Stormwater from Large and Small Construction Activity* (the Construction General Permit or CGP), Permit # WAR10-000F. These activities may discharge directly to waters of the United States, or through the MS4 to waters of the United States. These separate NPDES permits for the

control of pollutants in industrial and construction stormwater discharges must be maintained by JBLM.

Permit Area

Federal NPDES regulations require that, at a minimum, JBLM obtain a permit for its MS4 discharges which are located within an Urbanized Area as defined by the latest Decennial Census. A portion of this subinstallation area is located within the Seattle Urbanized Area defined by the Year 2000 Census.

EPA's permit imposes requirements for the management discharges from the MS4 owned or operated by JBLM in the subinstallation area within Pierce and Thurston Counties. (See Appendix B for maps of the Seattle Urbanized Area, JBLM subinstallation area, and watershed maps depicting detail of the JBLM subinstallation area within Pierce and Thurston Counties). As discussed in further detail below, EPA is proposing to expand the minimum area subject to the permit requirements to include all discharges from the MS4 owned or operated by JBLM to waters of the United States within the entire JBLM subinstallation area.

Jurisdiction-Wide Designation of the JBLM MS4 Permit Area

Federal regulations at 40 CFR § 122.32(a)(1) state that the operator of a regulated small MS4 located within an Urbanized Area must implement a SWMP and obtain a NPDES permit for the MS4 discharges; if the MS4 is not entirely located within the Urbanized Area, only the portion located within the Urbanized Area is regulated by the NPDES program. In addition, regulations at 40 CFR §§ 122.26(a)(1)(v) and 122.26(a)(9) allow EPA to designate any stormwater discharge as needing a NPDES permit if EPA determines that the discharge (or category of discharges) within a geographic area either contributes to a violation of a water quality standard, or is a significant contributor of pollutants to waters of the U.S.

EPA is proposing to expand the minimum required MS4 permit area at JBLM to include the entire subinstallation within Pierce and Thurston Counties for the following reasons:

- The Puget Sound Partnership identifies surface water runoff as a primary source of pollution to receiving waters leading to Puget Sound. Given JBLM's urban footprint and relative proximity to Puget Sound, EPA believes that MS4 discharges occurring within the JBLM subinstallation area of Pierce and Thurston Counties have a potential to contribute pollutants to Puget Sound. The Puget Sound Action Agenda states that reducing the sources of pollution, through a comprehensive and integrated approach to managing urban stormwater and rural surface water runoff, is necessary to reduce stormwater volumes and pollutant loadings to Puget Sound.[1] Expanding the mandatory permit area to include MS4 discharges occurring within all JBLM areas within Pierce and

[1] *Puget Sound Action Agenda- Protecting and Restoring the Puget Sound Ecosystem by 2020,* http://www.psp.wa.gov/downloads/ACTION_AGENDA_2008/Action_Agenda.pdf

Thurston counties will serve to reduce the stormwater volumes and pollutant loadings discharged to receiving waters of Western Washington.

- Base-wide implementation of a SWMP, combined with continued site-specific runoff management at industrial and construction site areas, will substantively address pollutants from the variety of sources in the Pierce and Thurston County areas operated by JBLM. Consistent implementation of the SWMP will comprehensively reduce current and future impacts to receiving waters within JBLM, and ultimately to Puget Sound.

- Implementation of a comprehensive SWMP throughout the JBLM subinstallation within Pierce and Thurston Counties is consistent with requirements imposed on other regulated MS4 jurisdictions within Western Washington.[2] EPA Region 10 recommends that comparable MS4 permits issued by Washington Department of Ecology (Ecology) and other state permitting authorities extend the MS4 program requirements where necessary beyond the federal minimum through jurisdiction-wide SWMPs. For example, in Washington State the Census defined Urbanized Areas do not line up with city and county boundaries and Urban Growth Areas established by the State's Growth Management Act. Through its *Western Washington Phase II Municipal Stormwater General Permit (WW Permit),* Ecology imposes the MS4 permit requirements to the areas targeted for growth by the MS4 entities; for cities, the permit requirements extend to the entire incorporated city, and for counties, the permit requirements extend to the Urban Growth Areas associated with the cities in each Urbanized Area.[3]

  EPA believes implementation of a base-wide SWMP supports JBLM's decision makers to continue the preservation and protection of the relatively undeveloped training areas, which currently have a positive impact on water quality and hydrology. See additional discussion in Section III of this document.

40 CFR § 122.26(a)(9)(iii) requires an operator of a stormwater discharge that is designated by EPA to submit a NPDES permit application within 180 days of receipt of the notice of designation. EPA waives the requirement in this case, because EPA has received sufficient information concerning the JBLM MS4 through the 2007 and 2011 supplemental application information to support extending the permit's mandatory SWMP implementation to JBLM areas located outside the Seattle Urbanized Area boundary.

[2] See EPA Region 10 Letter to Department of Ecology, dated October 2006. Jurisdictions neighboring JBLM which are subject to Ecology's MS4 permit requirements include Pierce County, Washington State Department of Transportation, and the Cities of Lakewood and Parkland.

[3] See NPDES General Permit Fact Sheet for Small Municipal Separate Storm Sewers in Western Washington (2006); http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIIww/wwphiifinalfs.pdf

When EPA uses its designation authority, the question of whether the designation was proper is open for consideration during the public comment period. See 40 CFR § 124.52(b). ***Therefore, EPA requests comment on the decision to designate and include as part of the area addressed by the permit the MS4 discharges located within all areas of the JBLM subinstallation within Pierce and Thurston counties.***

III. Description of the MS4 and Discharge Locations

According to information submitted by JBLM, the population of the subinstallation within Pierce and Thurston Counties in Year 2010 is estimated at 95,000, which includes military personnel, military dependants residing on base, civilian employees, and visitors. Most development is located within what is referred to as the "cantonment" areas. Those portions of the subinstallation designated as training areas have limited development, and are reserved exclusively to military training operations. See Appendix B for a map of the JBLM subinstallation. The MS4 throughout the subinstallation is comprised of curbs and gutters, ditches and storm drains, lift stations, treatment systems, and associated outfalls. JBLM provided the following description of the MS4 within the subinstallation:

- **Cantonment areas designated as JBLM-Main and JBLM-North.** JBLM-Main and JBLM-North are comprised of approximately 10,603 acres, almost half of which (estimated 4,972 acres) drain to the MS4 infrastructure.
    - The MS4 within the northern portion of JBLM-Main, which includes Madigan Army Medical Center and the Logistics Center east of Exit 122 on Interstate 5, drains to Murray Creek. The MS4 in the southern portion of JBLM-Main (area includes the Main Gate and Gray Army Airfield east of the Main Gate at I-5 Exit 120) drains to two stormwater treatment and infiltration facilities, both of which can overflow to marshes west of I-5. Overflows from two of these marshes, Bell Marsh and Hamer Marsh, are conveyed to the JBLM Stormwater Canal. The JBLM Stormwater Canal runs west along the south side of JBLM-North, then northwest to discharge to Puget Sound just north of the Solo Point Wastewater Treatment Plant.[4]

[4] The JBLM Stormwater Canal has previously been referred to as the "diversion canal." According to the *Murray-Sequalitchew Watershed Management Plan* (March 2007), the canal begins at Hamer Marsh, just south of Sequalitchew Lake and east of Sequalitchew Creek; it flows north from Hamer Marsh, crossing below the Creek through three 48" culverts. Water discharging over a diversion weir from the southern end of Sequalitchew Lake flows into the canal downstream of these culverts. The canal continues to flow northwest into Puget Sound near Solo Point. According to sources cited in the *Watershed Management Plan* (and EPA discussions with JBLM staff), the canal was originally constructed to avoid sending excess stormwater through Sequalitchew Creek when creek capacity is exceeded. (Beaver activity within Sequalitchew Creek frequently causes the Creek to back up, and occasionally to flow in reverse direction.) Sequalitchew Lake is highly influenced by groundwater; the diversion weir at the south end of the lake regulates the lake water level from rising to back up into Sequalitchew Springs, a primary potable water supply for JBLM.

- JBLM-North is located generally northwest of the JBLM Main Gate at I-5 Exit 120. The MS4 system in JBLM-North predominately drains to two treatment facilities, one of which has significant infiltration capacity. Overflows from these treatment facilities are conveyed to the JBLM Stormwater Canal, and ultimately to Puget Sound. Residential housing areas within JBLM-North include MS4 infrastructure which drains to American Lake, American Lake Marsh, and Elliot Marsh.

- **Cantonment areas on McChord Field.** The McChord Field cantonment area drains approximately 415 acres through a central MS4 discharging to Clover Creek. Clover Creek flows west and north from McChord Field to Lake Steilacoom. The central areas include the airfield, supporting infrastructure, and smaller residential areas. The MS4 serving the primary residential area within the McChord Field cantonment drains approximately 320 acres, and discharges to Carter Lake, Emerson wetland, and other wetlands. (Note: this acreage does not include McChord drainage areas discharging through Outfalls 9, 17 and 36, as these stormwater discharges are authorized under the MSGP.)

- **Training areas on JBLM.** Training areas are predominately located outside of the cantonment areas, and are typically not served by the JBLM MS4. Training areas include approximately 75,573 total acres within the former Fort Lewis Boundary and training ranges within the former McChord Air Force Base area. Stormwater runoff from the training areas generally infiltrates or follows natural drainages. Training areas close to the cantonment areas may drain to the water bodies described above; training areas outside the cantonment areas may drain to Muck Creek, the Nisqually River, and Puget Sound. JBLM has not evaluated the ext**e**nt of any MS4 infrastructure outside the cantonment areas.

Maps of the MS4 within the cantonment areas are included in the Administrative Record. According to JBLM staff, new development within the training areas is both limited and restricted.

To clarify EPA's expectations under the permit, JBLM must implement a SWMP to control pollutants in MS4 discharges to waters of the United States, as well as control pollutants in runoff from areas where new construction, development or redevelopment alters the landscape's drainage patterns. JBLM may prioritize and focus its public education, public involvement and illicit discharge SWMP implementation activities in areas where MS4 discharges to receiving waters are known to occur, and implement the construction site runoff control and stormwater management for new and redevelopment programs throughout the subinstallation as necessary.

Part II.B.3 of the permit requires JBLM to maintain a detailed MS4 assessment and map within the JBLM cantonment area, and no later than 180 days prior to the expiration date of the permit, to prepare a preliminary map of any MS4 draining from the training area within the Muck Creek basin. Muck Creek is considered important salmonid habitat, therefore EPA is

prioritizing the development of a MS4 map for the Muck Creek Basin in this permit term to inform future MS4 permitting efforts.

IV. Average Annual Precipitation in the JBLM Area

The 2007 *Watershed Management Plan for the Murray/Sequalitchew Watershed* (Murray WMP), summarized climate records from stations in Tacoma, Olympia and McMillan Reservoir. Average precipitation in the vicinity of JBLM is approximately 42 inches of rain per year. Approximately 85 percent of this precipitation occurs as rainfall between October and April.[5]

V. Receiving Waters

A. General Information

The JBLM subinstallation within Pierce and Thurston counties is considered part of the Washington Department of Ecology-defined Water Resource Inventory Areas (WRIAs) 11 (Chambers/Clover) and 12 (Nisqually). The JBLM MS4 discharges to Clover Creek, Murray Creek, American Lake, and to Puget Sound via the JBLM Stormwater Canal. As mentioned in Section III, it is unknown whether the any MS4 exists within training areas of JBLM which could potentially discharge to other receiving waters, such as Muck Creek.

- Clover Creek flows west and north from McChord Field to Lake Steilacoom and is part of the Steilacoom Lake Subwatershed within WRIA 11.[6]

- The Murray/Sequalitchew Watershed includes Murray Creek, American Lake, Sequalitchew Lake and Sequalitchew Creek; all are entirely or partially located within the boundaries of JBLM and part of both WRIAs 11 and 12. The Murray Creek Subbasin is bounded on the west by Puget Sound; the northern boundary runs through JBLM-North and the City of Lakewood, and includes Gravelly Lake; the eastern boundary runs through JBLM- McChord, and along the Burlington Northern Santa Fe Railway tracks. The southern boundary includes the southern portion of JBLM encompassing Gray Army Airfield. Murray Creek discharges to American Lake. As previously noted, overflow from Sequalitchew Lake, nearby wetlands, and several infiltration facilities is conveyed through the JBLM Stormwater Canal to Puget Sound. According to information submitted to EPA by JBLM in October 2011, the JBLM MS4 does not discharge directly to Sequalitchew Creek.

[5] See *Watershed Management Plan for the Murray/Sequalitchew Watershed, March 2007.*
[6] See the Clover Creek Basin Plan
http://www.co.pierce.wa.us/pc/services/home/environ/water/ps/basinplans/clovercreek.htm

- Puget Sound is located on the western edge of the JBLM training area, and receives flows from Sequalitchew Creek, the JBLM Stormwater Canal, and from Muck Creek/Nisqually River.

- Muck Creek (between River Mile 14 and the confluence with the Nisqually River) flows across the training areas in the southern portion of the JBLM subinstallation.[7]

All MS4 discharges to waters of the U.S. within the permit area must comply with the terms and conditions of the permit. The final permit will include any limitations imposed by Washington Department of Ecology as part of its water quality certification of NPDES permits issued by EPA pursuant to CWA Section 401, 33 U.S.C. § 1341. Appendix C contains Ecology's correspondence to EPA regarding its water quality certification of this permit. In its letter dated 1/17/2012, Ecology states it will issue a final certification for the permit if its comments set forth in the letter are addressed. EPA interprets this statement to mean that Ecology's general and detailed comments are conditions of a certification that must be included in the Permit pursuant to CWA Section 401(d), 33 U.S.C. § 1341(d), unless otherwise stated in Ecology's letter.

Table 1 summarizes the designated uses established by Ecology's surface water quality standards for waters receiving discharges from the JBLM MS4. Clover, and Murray Creeks are considered surface freshwaters, and Puget Sound (through Admiralty Inlet and South Puget Sound) is designated as marine waters, with designated uses specified in WAC 173-201A. [8] EPA is including Muck Creek in this discussion of surface receiving waters although it is unknown at this time whether any MS4 operated by JBLM discharges within the watershed.

Table 1. Surface Water Quality Standards/Beneficial Uses for Waters Within/Near JBLM

Designated Uses	**Receiving Waters**			
	Clover Creek & tributaries	Murray/Sequalitchew Creeks, American Lake	Puget Sound	Muck Creek & tributaries
Salmonid spawning, rearing and migration	X	X		
Core summer salmonid habitat				X
Primary contact recreation	X		X	X
Domestic, industrial, agricultural water supply	X	X		X
Stock Watering	X	X		X
Aquatic Life Uses (extraordinary)			X	
Shellfish Harvest			X	
Wildlife Habitat	X	X	X	X
Harvesting, Commerce and Navigation	X	X	X	X
Boating	X	X	X	X
Aesthetic values	X	X	X	X

[7] See the Muck Creek Basin Plan: http://www.co.pierce.wa.us/pc/services/home/environ/water/ps/basinplans/muck.htm
[8] See WAC-173-201A, Tables 602, 610 and 612

JBLM included information in its supplemental application materials noting that some beneficial uses identified in Table 1 are either restricted or limited on the waterbody's reaches within JBLM boundaries. For example, boating and contact recreation in Clover Creek and Muck Creek are restricted; similarly, stock watering, harvesting, navigation and commerce activity are limited on JBLM.

Despite such existing restrictions on the subinstallation, these waterbodies are considered Waters of the State, and are therefore subject to the Washington water quality standards described above. See Appendix C of this document. Ecology's draft certification states that the permit requirements must also be applied to groundwater discharges in order to comply with all state water quality standards. Therefore, pursuant to Section 401(d) of the CWA, EPA has included statements in the permit to clarify that discharges to groundwaters of the State are also authorized by the permit and are subject to the conditions/limitations of the permit.

B. Water Quality and Total Maximum Daily Loads

Any water body that does not and/or is not expected to meet the applicable water quality standards is described as "impaired" or as a "water quality-limited segment." Section 303(d) of the CWA, 33 U.S.C. § 1313(d), requires States to identify impaired water bodies within the State and to develop Total Maximum Daily Load (TMDL) management plans for those impaired water bodies. TMDLs define both waste load allocations (WLAs) and load allocations (LAs) that specify how much of a particular pollutant can be discharged from both regulated point sources and unregulated non-point sources, respectively, such that the water body will again meet State water quality standards. In a water body where EPA has approved a TMDL, any NPDES permit conditions must be consistent with the assumptions and requirements of the available WLAs. See 40 C.F.R. § 122.44(d)(1)(vii)(B).

Ecology's *2008 Water Quality Assessment Report* provides the list of impaired water bodies as required by CWA Section 303(d). Table 2 reflects the water bodies receiving discharges from the JBLM MS4 which are considered to be water quality-impaired (*i.e.*, meaning the water body does not meet water quality standards). There are no EPA approved TMDLs for these waters.

Table 2. Impaired Waters Within/Near JBLM as Listed in Ecology's 2008 Water Quality Assessment Report

Waterbody	Pollutant of Concern	Ecology's Listing Category	TMDL Approved by EPA?
Clover Creek	Fecal Coliform Dissolved oxygen	Category 5	No
Clover Creek	pH	Category 2	No
American Lake	Total Phosphorus	Category 5	No

In the event that EPA approves a TMDL for a waterbody receiving discharges from the MS4 owned or operated by the JBLM prior to the expiration date of this permit, and waste load allocation(s) are assigned to the MS4 owned or operated by JBLM, EPA may elect to modify this permit accordingly. Part VI.A of the permit addresses such a permit modification, consistent with the regulations at 40 CFR §§ 122.62, 122.64 and 124.5.

VI. Basis for Permit Conditions

A. Federal Requirements.

Permit conditions are based on Section 402(p)(3)(B) of the CWA, 33 U.S.C. § 1342(p)(3)(B), which requires any NPDES permit for MS4 discharges to: 1) effectively prohibit non-precipitation related flows from entering the MS4, and 2) require controls necessary to reduce pollutants in municipal stormwater discharges to the MEP, including management practices, control techniques, and system design and engineering methods, and/or other such provisions determined to be appropriate by the NPDES permitting authority. Appendix A of this fact sheet discusses the regulatory background, and associated definitions of relevant terms, for the NPDES municipal stormwater permit program.

NPDES permits for regulated small MS4s must require the operator to develop, implement, and enforce a SWMP designed to reduce the discharge of pollutants from the MS4 to the MEP, to protect water quality, and to satisfy the appropriate water quality requirements under the CWA.[9] See 40 CFR § 122.34(a). The SWMP must address six minimum control measures set forth in the federal regulations and discussed in detail below. See 40 CFR § 122.34(b). In the absence of evidence to the contrary, EPA presumes that a permit for a regulated small MS4 operator who implements a SWMP implementing the six minimum measures does not require more stringent limitations to meet water quality standards. See 64 Fed. Reg. at 68753 (Dec. 8, 1999).

In the preamble to the NPDES Phase II stormwater regulations, EPA states that it "considers narrative effluent limitations requiring implementation of Best Management Practices (BMPs) to be the most appropriate form of effluent limitations for MS4s." 64 Fed. Reg. at 68753 (Dec. 8, 1999). EPA's 1996 interim permitting policy recommends the use of BMPs in the first 5-year permit term, and the use of expanded or better tailored BMPs in subsequent permits, to provide for the attainment of water quality standards. See "*Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits,*" 61 Fed Reg. 43761 (August 26, 1996).

In addition, NPDES permit conditions must be consistent with the assumptions and requirements of available WLAs within approved TMDLs. See 40 C.F.R. § 122.44(d)(1)(vii)(B).

[9] The MS4 owned or operated by JBLM is considered a "regulated small MS4" according to the federal regulations 40 CFR 122.32(a); see Appendix A for further discussion.

EPA has outlined specific narrative permit limitations which require JBLM to implement a comprehensive SWMP designed to reduce the discharge of pollutants from its MS4 to the maximum extent practicable. As mentioned in Section V of this document, there are no WLAs associated with approved TMDLs for waters receiving MS4 discharges from JBLM. However, Clover Creek does not meet Washington water quality standards for fecal coliform, dissolved oxygen and pH; American Lake does not meet water quality standards for total phosphorus. Murray Creek discharges to American Lake and is wholly located within the JBLM subinstallation. In addition to the minimum SWMP requirements, the permit identifies SWMP activities to address these "pollutants of concern" and to minimize or eliminate MS4 discharges to these water bodies. Limited monitoring is required to assess pollutant loading and establish baseline conditions against which SWMP effectiveness may be measured.

B. State of Washington Requirements.

The State of Washington's Water Pollution Control Act is defined in Chapter 90.48 of the Revised Code of Washington (RCW). RCW 90.48.010 establishes that:

> "…the public policy of the state of Washington (is) to maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington."

Washington's Water Quality Standards (WQS) are established in the Washington Administrative Code (WAC) as follows: Surface Water Quality Standards are found in Chapter 173-201A WAC; Sediment Management Standards are found in Chapter 173-204 WAC; and human health-based criteria are found in the national Toxics Rule (Federal Register, Vol. 57, No. 246, Dec. 22, 1992, pages 60848-60923). In addition, Department of Ecology has stated as a condition of its certification under CWA Section 401 that the JBLM MS4 permit must be protective of the state groundwater standards (Chapter 173-200 WAC, and 90.48 of the Revised Code of Washington). [10] As such, EPA has included a requirement that JBLM must ensure compliance with state groundwater standards pursuant to CWA Section 401(d), 33 U.S.C. § 1341(d).

Ecology developed the 2005 *SW Management SW for Western Washington* (2005 Manual) which provides technical guidance on measures to control the quantity and quality of stormwater runoff from construction, new development and redevelopment projects. These measures are considered necessary to achieve compliance with Washington State water quality

[10] See Ecology's NPDES General Permit Fact Sheet for Small MS4s in Western Washington, March 24, 2006 http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIIww/wwphiipermit.html. See also Appendix C of this document.

standards and to contribute to the protection of the beneficial uses of the receiving waters (both surface and ground waters). Stormwater management techniques applied in accordance with the 2005 Manual are presumed by Ecology to meet the technology-based treatment requirement of Washington State law to provide all known available and reasonable methods of treatment, prevention and control (also known as AKART; see RCW 90.52.040 and RCW 90.48.010).[11]

EPA's Phase II stormwater regulations required state NPDES permitting authorities to "make available a menu of BMPs to assist regulated small MS4s in the design and implementation of municipal stormwater management programs to implement the minimum measures specified in (40 CFR) 122.34(b) of this chapter." Ecology's 2005 Manual meets this federal requirement in regard to construction site stormwater control and post-construction stormwater management for new development and re-development. The 2005 Manual provides guidance on the measures necessary to control the quantity and quality of stormwater produced by construction, new development and redevelopment activities, to comply with water quality standards, and protect beneficial uses of the receiving waters.[12]

EPA includes requirements in the JBLM permit which are functionally equivalent to the 2005 Manual. Ecology has conditioned its pending CWA Section 401 certification of the JBLM MS4 permit, stating the final permit must include runoff controls for new and redevelopment and construction sites that are functionally equivalent to the 2005 Manual. See Appendix C. EPA notes that, Ecology requested public comment on proposed revisions to the Stormwater Management Manual for Western Washington in October 2011; see http://www.ecy.wa.gov/programs/wq/stormwater/wwstormwatermanual/2012draft/2012draftSWMMWW.html. If Ecology updates the SWMM prior to EPA's issuance of a final permit for the JBLM MS4, EPA intends to consider all relevant applicable revisions, and will reference the most current available version of the 2005 Manual in the final permit. ***EPA requests public comment on the manner in which future editions of the 2005 Manual may be referenced or accommodated by EPA in the final JBLM MS4 permit.***

The Puget Sound Action Team and Washington State University Pierce County Extension published the *Low Impact Development Technical Guidance Manual for Puget Sou*nd (PSLID Manual) in 2005. EPA includes requirements in the JBLM permit which reference specifications of the PSLID Manual; similarly, the PSLID Manual is referenced in the 2005 Manual, particularly in those sections of the EPA draft permit highlighted by footnote. Revisions to the PSLID Manual have also recently been proposed (see http://www.psp.wa.gov/LID_manual.php). If the PSLID Manual is revised prior to EPA's issuance of a final permit for the JBLM MS4, EPA intends to consider all relevant applicable revisions, and will reference the most current available version of the PSLID Manual in the final permit. ***EPA requests public comment on the manner in which future editions of the PSLID Manual may be accommodated by EPA in the final JBLM MS4 permit.***

[11] See the 2005 Stormwater Management Manual for Western Washington (2005 Manual), Volume 1 http://www.ecy.wa.gov/programs/wq/stormwater/manual.html

[12] See 2005 Manual.

Ecology issued the *Western Washington Phase II Municipal Stormwater General Permit* (WW Permit) in January 2007, and modified it in 2009. The WW Permit defines the mandatory SWMP activities that Ecology determines meet the AKART standard for regulated small MS4s in Western Washington. The WW Permit also defines the required corrective action response for Western Washington MS4 operators when violations of the WA water quality standards are discovered.[13]

In response to appeals of Ecology's *Phase I Municipal Stormwater Permit* (Phase I Permit) and the WW Permit in 2008 and 2009 respectively, the Washington Pollution Control Hearings Board (PCHB) ruled that Ecology must include requirements in each MS4 permit that direct local governments to implement low impact development (LID) techniques through local codes. "LID" refers to developing land and managing stormwater in a manner that imitates the natural hydrology (or movement of water) of the site, and in general attempts to manage surface water runoff near its source. In order to define the specific LID techniques and performance targets which represent AKART for municipal stormwater discharges in Western Washington, Ecology convened a stakeholder advisory process to provide technical input on specific LID techniques to be included in future MS4 permits issued by Ecology. In October 2011, Ecology requested public comment on its proposals to reissue both the Phase I Permit and the WW Permit; each proposal document contains specific draft LID requirements MS4 operators to enact to better manage discharges for new development and redevelopment.[14]

For the purposes of this permit, EPA maintains that the practices and control measures considered by Ecology to be AKART for protecting water quality in Washington also reflect the federal standard of requiring pollutants in municipal stormwater discharges from regulated small MS4s to be controlled to the MEP. In the JBLM permit, EPA has included narrative SWMP requirements that are consistent with practices outlined in Ecology's 2005 Manual, the PSLID Manual, the WW Permit, and Ecology's preliminary minimum LID requirements for new development and redevelopment. EPA includes these specific narrative requirements to ensure, to the maximum extent practicable, the protection of the Washington water quality standards.

C. Watershed Basin Plans

As previously described, the JBLM subinstallation within Pierce and Thurston Counties is drained by three primary water bodies: Clover Creek; Murray Creek; and Muck Creek as it enters the Nisqually River. The western portion of the undeveloped JBLM training area also drains directly to Puget Sound. To date, several watershed management plans have been completed, each containing specific recommendations for stormwater management designed to improve surface water quality and address flow conditions during summer months: the *Management Plan for Murray/Sequalitchew Creek* (dated March 2007), the *Muck Creek Basin Plan*, the *Chambers/Clover Creek Basin Plan*, and the *Chambers-Clover Creek Watershed*

[13] See Washington Phase II Municipal Stormwater Permit: http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIIww/wwphiipermit.html

[14] See Ecology's proposal: http://www.ecy.wa.gov/programs/wq/stormwater/municipal/2012draftMUNIcom.html

Action Plan.[15] (These plans are also referred to as "watershed management plans," and/or "basin assessments.") Together, these four documents define the watershed features of approximately 80% of the total area subject to the MS4 permit.

Each watershed basin plan separately concludes that the soils throughout the JBLM subinstallation are well suited for infiltration-based stormwater management techniques and LID practices. Each plan also acknowledges that infiltration of stormwater runoff is necessary for ground water recharge, and for maintaining the seasonal surface water flows within each watershed. All four watershed plans recommend the following actions be implemented to mitigate the impacts of urban development on water quality and quantity: 1) use stormwater infiltration practices for new development occurring on JBLM property; 2) eliminate existing runoff discharging from impervious areas though improvements installed during redevelopment; and 3) preserve natural vegetation and habitat areas at new development/ redevelopment sites, and avoid development in the military training areas.

D. Other Considerations

In addition to the applicable federal NPDES requirements, Washington state stormwater management requirements, and existing watershed plans, EPA also considered the following information while developing the MS4 permit for JBLM:

- MS4 permit application materials submitted by JBLM (and/or its former organizations), including supplemental information regarding spill and emergency response procedures, and other existing programs;

- Conclusions from the National Research Council Report entitled *Urban Stormwater Management in the United States*, dated October 2008; [16]

- Section 438 of the Energy Independence and Security Act of 2005 (EISA), which requires federal agencies to use stormwater management strategies to maintain or restore the predevelopment hydrology at new development and redevelopment sites disturbing 5,000 square feet or more. EPA also considered its 2009 Technical Guidance which was authored to assist all federal agencies with implementation of the EISA Section 438 requirements;[17]

- MS4 permits for federal facilities issued by EPA regional offices in other areas of the country, particularly the Fort Carson (Colorado) MS4 permit, (#COR04200) and the District of Columbia MS4 permit, (#DC0000221); MS4 permits issued by other state NPDES authorities, such as the Maryland Department of the Environment's MS4

[15] Copies of these plans are available within the Administrative Record for this permit; contact EPA as indicated on pages 2-3.

[16] Available at http://www.epa.gov/npdes/pubs/nrc_stormwaterreport.pdf

[17] See http://www.epa.gov/greeningepa/stormwater/requirements.htm#guidance and http://www.epa.gov/greeningepa/documents/epa_swm_guidance.pdf

permits for Baltimore and Montgomery Counties (#MD00068314 and MD00068349, respectively); and

- Puget Sound Partnership's Action Agenda and Ecosystem Recovery Targets.

All materials supporting the development of the JBLM MS4 permit requirements are included in the Administrative Record.

E. Basis of the Permit Conditions - Conclusion

EPA has determined that narrative effluent limits, expressed as BMPs, which are implemented and enforced through a comprehensive SWMP, are the most effective means for meeting the requirements of Section 402(p) of the Clean Water Act (CWA), 33 USC § 1342(p), and federal stormwater permitting regulations at 40 CFR §122.32. The comprehensive SWMP outlined in the Part II of the permit is designed to prevent pollutants from causing or contributing to violations of the Washington water quality standards to the MEP, and to comply with other water quality provisions of the CWA.

Based on recommendations contained in the completed watershed management plans and water quality impairments in water bodies receiving MS4 discharges, EPA has included monitoring and assessment requirements in Part IV of the permit, which are intended to estimate pollutant loading from the MS4 to impaired water bodies and establish baseline conditions against which SWMP effectiveness may be measured and evaluated. These activities will also provide additional water quality and biological data that is not currently available. EPA has also required JBLM to identify retrofit opportunities in developed areas draining to certain impaired waters (and their tributaries) to reduce existing discharges from impervious areas through the use of infiltration and other LID practices.

EPA is not proposing to include numeric effluent limitations at this time. Numeric limitations could be included in the final permit if required by the State of Washington as a condition for certification of the permit pursuant to Section 401 of the CWA, 33 U.S.C. § 1341.

VII. Explanation of Permit Conditions

A. Permit Area

As outlined in Section II of this document, EPA is exercising its authority to designate the MS4 serving the entire JBLM subinstallation located within Pierce and Thurston Counties as being subject to the conditions of the MS4 permit. The permit requires implementation of the SWMP and associated permit requirements throughout the subinstallation, instead of the minimum federal requirement to control pollutants in MS4 discharges within the Census defined Urbanized Area (i.e, within the JBLM cantonment areas only). ***EPA requests public comment on this decision to designate the entire subinstallation as the area to be addressed by the permit.***

B. Discharges Authorized By The Permit

The permit authorizes all existing discharges to both waters of the U.S. and ground waters of the State from the MS4 owned or operated by JBLM. EPA has included the requirement concerning discharges to ground waters of the State pursuant to conditions of Ecology's pending CWA Section 401 certification (see Appendix C). In Part I.C, the permit limits the authorization to discharge from the MS4 in the following manner:

- Stormwater runoff commingled with process wastewater, non-process wastewater, stormwater associated with industrial or construction activity (as defined in 40 CFR §122.26(b)(14) and (15)) and/or other discharge flows are allowed, only when the commingled flows are authorized by a separate individual or general NPDES permit as necessary.

- Certain types of runoff that are unrelated to precipitation events (referred to as "non-stormwater") and which are listed in the permit consistent with 40 CFR § 122.34(b)(3)(iii), may also be discharged through/from the MS4, provided these discharges are not considered to be sources of pollution to the waters of the United States and meet certain permit conditions. Part II.B.3 of the permit requires JBLM to restrict or prohibit all other non-stormwater discharges into the MS4 through ordinance or other enforceable regulatory mechanism available to JBLM.
- Discharges from the MS4 must not cause or contribute to violations of applicable Washington water quality standards.
- Snow disposal directly into waters of the United States, or directly to the MS4, is prohibited. Melt water from snow management activities are allowed, provided that appropriate BMPs are used.

EPA requests comment on a request by JBLM to include the following specific discharges as "allowable non-stormwater discharges" authorized by the permit in Permit Part I.C.1: reclaimed water; water mixed with an appropriate dye used for investigating sources of infiltration and/or illicit discharges, etc; and uncontaminated cooling water. ***In particular, EPA seeks comment on whether to include such flows in the permit as allowable non-stormwater discharges, and if so, whether additional requirements should be also included in Permit Part II.B.3 allowing such discharge(s) under certain conditions***. As discussed below in Section D.3 of this document, Department of Ecology has provided input to EPA regarding this JBLM request. See Appendix C. EPA is interpreting Ecology's input to mean that the permit as written adequately accommodates such other discharges when identified, managed and/or restricted in accordance with Permit Part II.B.3. EPA requests comment on this issue.

C. Permittee Responsibilities

EPA regulations at 40 CFR §122.41 require the permittee to comply with all terms and conditions of a NPDES permit. See Permit Part V.A.

JBLM must implement a comprehensive SWMP to reduce pollutants from discharging through the MS4 to the maximum extent practicable. JBLM must describe its SWMP program components in a written SWMP document. See Permit Parts II.A.1, 2 and 3. The permittee must track progress and maintain records to report on SWMP implementation progress (Permit Part II.A.4).

The SWMP document required in Permit Part II.A.3 comprises those references and activities that uniquely define the JBLM stormwater management program, and is in essence a "looking forward" document that substantiates how JBLM reduces pollutants in stormwater discharges to the MEP. The SWMP document must be updated annually as new program components are implemented or added. The updated SWMP document must be submitted with the required Annual Report. In contrast to the SWMP, the Annual Report summarizes activities conducted by the permittee during the previous reporting period, and provides an overall assessment of the permittee's compliance with the permit.

EPA regulations allow that one or more of the required SWMP components may be implemented by an entity other than the permittee (for example, an organization which is not a regulated MS4 may implement a street sweeping program for a permittee). Pursuant to 40 CFR § 122.35(a), Permit Part II.A.6 allows JBLM to delegate the responsibility of implementing some or all of a required minimum control measure to another entity if: 1) the other entity in fact implements the control measure; 2) the particular control measure is at least as stringent as the corresponding permit requirement; and 3) the other entity agrees to implement the control measure on the permittee's behalf. The permittee must enter into binding agreements with such outside parties in order to minimize any uncertainty about compliance with the permit. JBLM remains responsible for compliance with the permit obligations in the event the other entity fails to implement the control measure (or any component thereof).

> As an example, numerous organizations and agencies are considered tenants on JBLM property; in some situations, these tenants operate the MS4 serving the respective facilities. JBLM may choose to include any required stormwater program element(s) in written agreements which must be accomplished on JBLM's behalf by the tenant. This arrangement should be an enforceable requirement of the applicable real property agreement or lease. Such arrangements, as well as any work accomplished on JBLM's behalf, must be summarized and reported to EPA through the Annual Reports and/or the SWMP document.
>
> If JBLM delegates responsibility for implementing a minimum control measure or program element to a tenant through a written agreement, and the tenant fails to implement the activity, JBLM remains responsible for compliance with the permit requirement. As an alternative, JBLM could instead require a tenant which operates some portion of the JBLM MS4 to become a co-permittee under the MS4 permit. In such a situation, JBLM and the tenant must subsequently request that EPA formally modify the MS4 permit through the submittal of a revised NPDES permit application signed by each party. EPA will consider including the entity as

a copermittee, and/or modifying the permit in accordance with NPDES regulations as 40 CFR Part 124 as appropriate.

Since submitting its initial permit application in 2003, JBLM Public Works Department have implemented several of the required SWMP program components within JBLM areas. Through the permit, EPA defines the necessary actions, including an implementation schedule, which adds to the existing JBLM stormwater management program. EPA encourages JBLM to continue working cooperatively with neighboring MS4 operators to manage stormwater in the most comprehensive and consistent manner possible throughout the Pierce and Thurston County areas.

EPA requests comment on Permit Part II.A.7, which EPA includes to address JBLM's request that the permit clearly acknowledge one or more existing JBLM documents and programs may be deemed by EPA as equivalent to a required SWMP element. According to JBLM, documents or programs which EPA may consider equivalent to required SWMP elements include the JBLM Business and Operations Integration Division Preventative Maintenance Program; the Integrated Contingency Plan; the JBLM Spill Prevention, Control and Countermeasure Plan; and the JBLM Quality Assurance Project Plan. EPA has outlined a procedure through which such programs/documents can be determined equivalent. In the event that EPA determines other documents or programs are equivalent to required SWMP element(s), JBLM remains responsible for including the specific document or program by reference within the written SWMP document required in Permit Part II.A, and for ensuring that EPA has ready access to current copy or representation of the equivalent document/program.

D. Summary of Minimum SWMP Requirements

EPA regulations as 40 CFR §122.34 require the following six minimum control measures to be included in a SWMP:

- Public Education and Outreach on Stormwater Impacts;
- Public Involvement and Participation;
- Illicit Discharge Detection and Elimination;
- Construction Site Stormwater Runoff Control;
- Post Construction Stormwater Management in New Development and Redevelopment; and
- Pollution Prevention/Good Housekeeping for Municipal Operations.

Permit Part II of the permit incorporates the minimum measures and specific requirements EPA determines are necessary to control MS4 discharges to the maximum extent practicable in Western Washington. The permit outlines the complete SWMP, monitoring and assessment activities, and reporting requirements, organized as follows:

- **Part II.A,** described above, requires JBLM to develop and implement a written SWMP document that describes the SWMP as it is implemented in the JBLM permit area.
- **Part II.B** contains the mandatory SWMP elements, milestones and compliance dates for accomplishing specific SWMP activities.

- **Part II.C** of the permit requires JBLM to reduce or eliminate existing stormwater discharges to impaired receiving waters through identification of potential retrofit projects.
- **Part II.D** of the permit requires JBLM to follow specific response requirements when a determination is made that MS4 discharges are contributing to a violation of applicable water quality standards.
- **Part II.E** describes how JBLM may request that EPA revise the mandatory SWMP requirements
- **Part II.F** specifies that any areas contiguous to the permit area and/or within Pierce or Thurston Counties which are annexed by JBLM during the permit term must be included in the SWMP within one year of annexation.
- **Part II.G** requires that sufficient resources be available to implement the activities required in the permit and that cost summaries of program implementation be provided to EPA as part of the Annual Report.
- **Part III** contains a table summarizing the SWMP, retrofit, and assessment/monitoring requirements, and all associated compliance dates for implementation.
- **Part IV** of the permit contains the stormwater discharge and water quality monitoring requirements intended to characterize pollutant contributions from the MS4, and to evaluate the effectiveness of the various SWMP practices. Annual reports must be submitted to document SWMP accomplishments, as required by 40 CFR §122.34 (g).
- **Parts V and VI** contain the NPDES standard permit conditions
- **Part VII** contains definitions of terms as used within the permit.

In Permit Part II.B, EPA has defined SWMP minimum control measures for JBLM which are consistent with the federal NPDES regulations as well as practices established by Ecology for regulated MS4 operators in Western Washington. By requiring SWMP activities at JBLM that complement those incumbent on other MS4 operators, EPA encourages ongoing partnerships between JBLM and other regulated MS4s (i.e.,, Cities of Tacoma and Dupont, and Pierce and Thurston Counties) which will result in consistent implementation of SWMP activities within the Clover, Murray, and Muck Creek watersheds.

In Permit Part IV, EPA has outlined limited water quality and biological monitoring requirements, and reporting requirements. As discussed further in the monitoring section of this document, ***EPA requests comment on whether EPA should include in the permit an opportunity for JBLM to voluntarily opt into participation with any future Puget Sound regional stormwater monitoring efforts as may be sponsored by Department of Ecology or other organizations***.

The following sections discuss the specific requirements of Permit Parts II, III and IV in detail:

D1. Public Education and Outreach (40 CFR §122.34(b)(1))

JBLM must implement a public education program to increase understanding of the impacts of stormwater discharges on water quality and steps the public can take to

reduce pollutants in stormwater runoff. *See* 40 CFR § 122.34(b)(1). Education leads to greater compliance with the local program, as the public becomes aware of personal responsibilities and individual actions that can protect or improve water quality in their area**.** For a federal military facility, EPA has determined that the community or "public" includes the tenants, staff, and contractors within the fence line of the facility.

JBLM's 2003 application and subsequent updates, identify various education activities intended to address this minimum control measure, including:

- Developing education material and outreach efforts targeting the military community, particularly focused on appropriate use of fertilizers, proper household hazardous waste disposal, recycling, and commercial, food service, and automotive activities;
- Initiating a "Scoop the Poop" regulation, including installing pet waste bag dispensers at American Lake areas;
- Preparing a regulation requiring spill prevention plans and other preventative measures at commercial activities occurring on the base; and
- Developing education materials regarding use of LID techniques in new development with the Public Works Master Planning Division.

EPA has proposed that JBLM address each of these topics through its public education efforts. In addition to these activities, EPA has included a requirement that JBLM assess the success of selected public education efforts.

The conditions in this section are consistent with the NPDES permit application and supporting documents, and with similar provisions of Ecology's WW Permit. EPA encourages JBLM to work with the other regulated MS4 operators, when possible, to conduct education activities. Cooperative efforts, pooling resources and building upon existing programs helps all regulated MS4 operators accomplish their public education goals.

EPA requests comment on the breadth, scope and adequacy of the public education activities contained in Permit Part II.B.1, in light of the other actions required by the permit.

D2. Public Involvement and Participation (40 CFR §122.34(b)(2))

All public participation efforts must comply with the applicable requirements of federal, state and/or local law. EPA believes that the public can provide valuable input and should be given opportunities to play an active role in both the development and implementation of the SWMP.

The 2003 permit application identifies the establishment of a Fort Lewis Water Council to assist in SWMP development and provide opportunities for the military community to participate in SWMP activities – such as through developing a volunteer

storm drain stenciling program; establishing a hotline and website for citizens to report pollution concerns; and tracking complaints and associated complaint resolution.

In other MS4 permits for military facilities, EPA has included requirements for the permittee to focus on internal organizational coordination with other offices to obtain necessary cooperation to achieve the SWMP program objectives. See, for example, EPA Region 8's MS4 permit for Fort Carson. In this permit, EPA has outlined requirements for JBLM to either convene regular internal meetings with JBLM organizations, or to engage the broader JBLM public through a regularly convened Water Council, to obtain input on SWMP activities. ***EPA requests comments on appropriate level of effort for this minimum control measure***.

In addition, EPA has proposed that JBLM provide public access to the SWMP document and Annual Reports through posting the materials on a website, and to provide at least one volunteer activity per year designed to engage the JBLM public in SWMP implementation. ***EPA requests comment on whether the activities as proposed are sufficient, or how to revise the permit requirement to better reflect the nature of the JBLM subinstallation operations.***

> For example, JBLM has identified Department of Defense concerns regarding security issues related to broad, web-based dissemination of location-specific information, as opposed to summarized general information provided exclusively to the installation's population through internal communication networks. EPA seeks to balance such concerns with the Agency's stated goals to increase public education and engagement in municipal stormwater management issues. EPA encourages JBLM to work cooperatively with neighboring MS4 operators or other organizations to coordinate efforts that can best engage the military community and surrounding community in the discussion of effective stormwater management affecting nearby receiving waters.

EPA requests comment on the breadth, scope and adequacy of the public involvement activities of Permit Part II.B.2, in light of the other actions required by the permit.

D3. Illicit Discharge Detection and Elimination (40 CFR §122.34(b)(3))

At a minimum, EPA requires the MS4 operator to have the ability to detect and eliminate illicit discharges from the MS4. An illicit discharge is any discharge to a MS4 that is not composed entirely of stormwater. Exceptions to this definition include discharges associated with fire fighting activities, and discharges already authorized by another NPDES permit.

Illicit discharges can enter a MS4 through either direct connections (*e.g.*, wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (*e.g.,* infiltration into the MS4 from cracked sanitary systems, spills

collected by drain inlets, or paint or used oil dumped directly into a drain). Pollutant levels from illicit discharges can significantly degrade receiving water quality and threaten aquatic, wildlife, and human health. Regulations at 40 CFR §122.34(b)(3) contain four required components to the Illicit Discharge Detection and Elimination (IDDE) control measure. The MS4 operator must:

a. Develop a map of the MS4 showing the location of all outfalls and names of the receiving waters;
b. Effectively prohibit discharges of non-stormwater to the MS4 through the use of an ordinance or other regulatory mechanism, and provide enforcement procedures and actions. (EPA recognizes that some MS4 operators -such as federal entities- may not have the legal authority to enact an ordinance; in such case, the operator may evaluate and use any policies, standard operating procedures, or other means in developing an adequate regulatory mechanism. EPA uses the term ordinance in the permit to refer to such a regulatory mechanism;
c. Develop and implement a program plan to detect and address non-stormwater discharges, including procedures to identify the problem areas in the community, determine sources of the problem(s), remove the source if one is identified, and document the actions taken; and
d. Inform public employees, businesses, and the general public of the hazards associated with illegal discharges and improper disposal of waste.

The 2003 NPDES permit application discusses implementation of an IDDE program on the base, including:

- Creating a MS4 system map;
- Conducting visual inspection of outfalls for illicit discharges, and eliminate observed illicit discharges;
- Preparing a regulation to prohibit illegal dumping;
- Developing procedures to detect and address illicit discharges to the MS4, and to address complaints from the public; and
- Addressing illegal discharges through public education activities.

In Permit Part II.B.3, EPA has proposed the specific IDDE program actions to be conducted by JBLM, including education of the JBLM public, regarding illegal discharges and improper waste disposal, and training of appropriate staff. These requirements are consistent with the JBLM's application and supporting documents, similar provisions in the WW Permit issued by Ecology, as well as other permits issued by EPA.

In Permit Part II.B.3.c, EPA clarifies the types of allowable non-stormwater drainage which can be discharged to the MS4, because they are not considered to be significant contributors of pollutants. See 40 CFR 122.34(b)(3)(iii), and also Permit Part I.C.1.c . EPA also specifies certain types of non-stormwater discharges that must be

restricted; if not restricted, such discharges to the MS4 must be prohibited by the permittee.

EPA requests public comment on whether, and how, other specific non-stormwater flows identified by JBLM should be included in the text of the final MS4 permit and considered "allowable nonstormwater discharges:"

1) In supplemental application materials submitted to EPA October 2011, JBLM requested that non-routine discharges of HVAC or heat pump cooling water be included as an allowable non-stormwater discharge. Although standard practice during maintenance or testing of such systems (which use groundwater for operating the heat pump) is to dispose of resulting flows in infiltration areas or wells, JBLM requests that such discharges be allowed to the MS4.

2) JBLM also requested that occasional discharges of product water from water purification equipment that meets reclaimed water or drinking water standards be allowed to discharge through the MS4.

3) JBLM requested that EPA specifically address the use and discharge to the MS4 of water mixed with non-toxic dyes intended to assist with the source identification of illicit discharges and spill response training exercises.

EPA notes that Ecology has provided input to EPA regarding this JBLM request, stating that such situations are adequately accommodated through the text of the draft permit and need not be mentioned specifically in the permit. See Appendix C. EPA interprets Ecology's input in this instance to mean that JBLM must adequately identify, manage, and/or restrict such discharges from discharging through the MS4, according to the provisions of Part II.B.3.

As mentioned in Section VII.C of this document, EPA requests comments on the best means to allow existing programs or activities to be deemed equivalent to required SWMP program activities. JBLM has also identified that certain activities conducted by JBLM to comply with other environmental regulations, such as its Spill Prevention Countermeasure and Control Plan and spill response procedures under the Integrated Contingency Plan, may duplicate efforts identified in the MS4 permit. In the case of the IDDE program, EPA acknowledges that existing JBLM spill response procedures may address some of the permit requirements (for example, procedures to characterize the nature/potential threat of an illicit discharge to the MS4, or remove identified sources from the MS4 per Permit Part II.B.3.d-5th and 7th bullets); however, JBLM response plans have not yet been assessed as to whether all components of a comprehensive IDDE program (regular field screening of outfalls for dry weather discharges or source tracing, for example) are included.

EPA requests comment on the breadth, scope and adequacy of these illicit discharge detection and elimination activities, in light of the other actions required by the permit.

D4. Construction Site Stormwater Runoff Control (40 CFR §122.34(b)(4))

Although stormwater discharges from any construction site disturbing more than one acre on federal land in Washington are regulated independently through the CGP issued by EPA, this SWMP minimum control measure requires JBLM to directly oversee construction sites within the permit area to reduce pollutants in stormwater discharges. EPA regulations at 40 CFR §122.34(b)(4) define the minimum program elements as:

a. An ordinance or other regulatory mechanism requiring sediment, erosion and waste management controls at construction sites, including sanctions to ensure compliance;

b. Requirements for site operators to implement appropriate erosion, sediment and waste management controls best management practices;

c. Procedures for site plan review that considers potential water quality impacts;

d. Procedures for site inspection and enforcement; and

e. Procedures for the receipt and consideration of information submitted by the public.

In the 2003 NPDES permit application, JBLM identified the following program activities:

- Develop, implement and enforce an erosion & sediment control program for sites disturbing >1 acre
- Maintain a base-wide construction stormwater management plan
- Develop education materials regarding construction site impacts and publicize how to report complaints of construction stormwater pollution

JBLM currently implements a base-wide construction stormwater management program designed to comply with federal construction stormwater permit requirements outlined by EPA through the EPA issued Construction General Permit (CGP), Permit #WAR10-000F. In general, JBLM's existing base-wide construction stormwater management program meets the requirements of this SWMP measure for construction site runoff control. Specifically, using the terminology of the federal NPDES construction stormwater requirements, JBLM considers the entire JBLM subinstallation to be a "common plan of development," as the phrase is used to define "stormwater discharge associated with 'large' and 'small' construction activity" in 40 CFR 122.26(b)(14)(x) and (b)(16).) JBLM's "common plan of development" consists of anticipated construction activity envisioned through the JBLM Comprehensive Development Plan. To comply

with the CGP, JBLM has submitted a Notice of Intent (NOI) as one of the responsible construction operators having control over construction plans and specifications of all JBLM construction projects. In this arrangement, JBLM therefore maintains continuous permit coverage under the CGP, and oversees the work of individual contractors hired to carry out specific construction projects. JBLM has developed a preliminary construction site Stormwater Pollution Prevention Plan (SWPPP) to broadly outline the installation-wide expectations for erosion, sediment and onsite material management controls.

Because construction projects on military bases are generally handled through contracts, this program requires close coordination with the U.S. Army Corps of Engineers contracting officers, and other Department of Defense organizations responsible for construction contract management and oversight. Upon selection of a contractor for a particular construction project, JBLM requires the contractor to add necessary details to a preliminary SWPPP in order to create the mandatory site-specific construction SWPPP. Upon JBLM approval of the SWPPP, the contractor then files a separate NOI with EPA as the site operator with day-to-day operational control of the construction project. At this point, JBLM provides oversight of all construction activity through project completion and final stabilization of remaining disturbed areas of the site. Upon satisfactory completion of the construction activity and site stabilization, JBLM requires the contractor to submit its CGP Notice of Termination (NOT) to EPA.

The JBLM Unified Facilities Guide Specifications (UFGS-01 57 20.00 10, UFGS-01 57 23, and associated updates) incorporate the CGP requirements by reference, and requires environmental protection measures and temporary stormwater erosion control to be used at all JBLM construction sites. In addition, all contractors must comply with JBLM Regulation 200-1 which outlines specific measures for environmental protection and enhancement. Since 2003, EPA has consulted periodically with JBLM's staff regarding implementation of its installation-wide construction program. The existing administration of the JBLM construction program provides CWA permit coverage for construction site discharges directly to waters of the U.S, and is sufficient to fulfill the requirements of the MS4 permit to adequately control pollutants in construction site stormwater discharges through the MS4.

To develop the requirements for this program, EPA considered the 2003 application, supplemental application materials, and requirements for MS4s covered by the WW Permit issued by Ecology, Ecology's 2005 Manual, and other MS4 permits issued by EPA regional offices.

EPA is using its discretion to require that JBLM impose its installation-wide construction stormwater management program oversight to address all construction activity disturbing 5,000 square feet or more. Setting this disturbance threshold for the construction runoff control program is consistent with similar construction stormwater program requirements in neighboring jurisdictions governed by the WW Permit issued by Ecology. In addition, the Unified Facilities Guide Specifications cited above apply to all construction occurring on the JBLM property, including sites disturbing less than one

acre. JBLM currently ensures such controls are implemented as part of the "common plan of development" concept which underlies its current program.

By specifically requiring that JBLM oversee all construction disturbing 5,000 ft or more, EPA clarifies that it is not suggesting that all construction activity deserves increasingly frequent inspection and oversight. JBLM may continue to use its discretion to scale and prioritize its construction site plan review, inspection and enforcement activities as appropriate, through consideration of the size of the project and relative risk to receiving waters. However, EPA has included the 5,000 square foot threshold for the JBLM program as a means of ensuring broad regional compliance with erosion and sediment control requirements through the consistent implementation of MS4 oversight activities.

EPA has included a provision in Permit Part II.B.4.e requiring JBLM to work with contracting officers and others within the JBLM establishment to ensure that all Requests for Proposals to bid on JBLM construction projects, as well as resulting construction contracts, include language identifying or referencing the requirements of the SWMP and the CGP as appropriate.

EPA has also specified in Permit Part II.B.4. g that JBLM must develop and implement a construction site inspection plan. JBLM must update its existing program, and increase coordination among other relevant JBLM organizations, to fully implement the construction site control program outlined in the permit.

EPA requests comment on the breadth, scope and adequacy of these construction site runoff control activities, in light of the other actions required by the permit.

D5. Post Construction Stormwater Management in New and Redevelopment (40 CFR §122.34(b)(5))

Background

Uncontrolled runoff from new development and redeveloped areas negatively affects receiving water bodies. Pavement and other impervious surfaces prevent infiltration, and the resulting runoff increases in both volume and velocity, which in turn causes the erosion of stream banks and scouring of stream beds. Fine sediments and pollutants from automobiles and landscape pesticides and fertilizers entering streams damage salmon spawning areas and other aquatic habitat. Traditional stormwater management practices employ engineered, end-of-pipe practices, which typically control only peak flow rates and total suspended solids concentrations. Such conventional practices fail to address the widespread and cumulative hydrologic modifications within a watershed that increase stormwater volumes and runoff rates, and cause excessive erosion

and stream channel degradation. Traditional practices also fail to adequately treat for pollutants such as nutrients, pathogens, and metals.[18]

The 2008 report entitled *Urban Stormwater Management in the United States*, authored by the Committee on Reducing Stormwater Discharge Contributions to Water Pollution of the National Research Council (NRC), confirms the shortcomings of such stormwater control efforts. Among its many findings, the NRC concluded that individual controls on stormwater discharges are inadequate as the sole solution to stormwater in urban watersheds. Instead, stormwater control measures such as product substitution, better site design, downspout disconnection, conservation of natural areas, as well as watershed and land use planning, can dramatically reduce both the volume of runoff and pollutant loads from new development. In particular, stormwater control measures that harvest, infiltrate, and evapotranspire stormwater are critical to reducing the volume and pollutant loading associated with small storms.[19]

EPA refers to such approaches as "green infrastructure" techniques, which represent long term stormwater management techniques that are cost-effective, sustainable, and environmentally friendly.[20] Use of green infrastructure techniques in new development or redevelopment projects is also called "Low Impact Development," or LID, which refers to stormwater management and land development strategies emphasizing conservation and the integration of natural features with small scale engineered hydrologic controls to more closely mimic predevelopment hydrologic function. A comprehensive approach to long term stormwater management seeks to:

- Preserve, protect and enhance natural landscape features, such as undisturbed forests, meadows, wetlands, and other undisturbed areas that provide natural stormwater management;

- Reduce overall land consumption, and use land efficiently, to reduce total watershed or regional impervious cover;

- Recycle land by directing new development to already degraded land, e.g., parking lots, vacant buildings, abandoned malls; and

- Direct stormwater into the ground near where it fell through infiltration, prevent rainfall from falling to the ground through interception, return water back to the atmosphere through evapotranspiration, and/or otherwise manage stormwater through reuse techniques.[21]

[18] Shaver, et al., 2007; Holz testimony, 2008; Horner testimony, 2008.
[19] National Research Council, 2008.
[20] See *Low Impact Development Technical Guidance Manual for Puget Sound* (January 2005; Revised May 2005), http://www.psparchives.com/publications/our_work/stormwater/lid/LID_manual2005.pdf and EPA's green infrastructure website: http://cfpub.epa.gov/npdes/home.cfm?program_id=298
[21] See *National Management Measures to Control Nonpoint Source Pollution From Urban Areas*, EPA-841-B-05-

At the watershed scale, retaining native vegetation and minimizing the impervious surface footprint of any development projects are cost effective ways to reduce total storm flows. Research has shown that once watersheds begin approaching or exceeding about 10 percent of their drainage area in an impervious or paved condition, there is a high potential for physical, chemical, and biological impairments to both water quality conditions and other aquatic resources. Related research has shown that watersheds, particularly those along the west side ranges of the Pacific Northwest, require, at a minimum, about 65 percent forest cover to retain the hydrological processes which minimize surface water runoff during storms and infiltrate water into ground water and provide summer base flows in local streams and rivers (McMurray and Bailey, 1998, Booth et al. 2002).

To protect water quality in Puget Sound and its tributaries to the maximum extent practicable, all new development and redevelopment sites within the surrounding watersheds must be planned, designed, and constructed in a manner that minimizes the negative impact of urbanization by mimicking natural hydrology.

D5.1 Section 438 of the 2007 Energy Independence and Security Act

Congress recognized the importance of the use green infrastructure/LID techniques to maintain and restore the predevelopment hydrology in new development and redevelopment for Federal facility projects by enacting Section 438 of the Energy Independence and Security Act of 2007 (EISA). [22] Section 438 reads as follows:

> "*Stormwater runoff requirements for federal development projects.* The sponsor of any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regards to the temperature, rate, volume, and duration of flow."

In December 2009, EPA issued its *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* (EPA Technical Guidance).[23] The guidance provides two recommended options for complying with the objective of maintaining or restoring predevelopment site hydrology; the options include 1) designing, constructing, and

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004, January 2006; 64 FR 68725 – 68728 and 68759, December 8, 1999, *Report to West Virginia Department of Environmental Protection: Options for WV's General Stormwater Permit under NPDES Phase II*, US EPA and Tetratech, Inc (November 2007); and *Technical Guidance on Implementing Section 438 of the Energy Independence and Security Act*, US EPA, December 2009.

[22] See EPA website, http://www.epa.gov/owow/NPS/lid/section438/

[23] See http://www.epa.gov/owow/NPS/lid/section438/pdf/final_sec438_eisa.pdf

maintaining stormwater management practices that manage rainfall onsite, and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 95th percentile rainfall event to the maximum extent technically feasible, using practices that infiltrate, evapotranspire and/or harvest and use rainwater; or 2) design, construct, and maintain stormwater management practices that preserve the pre-development runoff conditions determined through site-specific hydrologic analysis using continuous simulation modeling techniques, published data, studies, or other established tools.

Through its supplemental application materials, JBLM provided EPA an October 27, 2010, Army Memorandum, entitled "*Sustainable Design and Development Policy Update (Environmental and Energy Performance)"* (October 2010 Memo). The memo updates the sustainable design and development policy for Army facilities, and applies to all construction activities on active Army installations regardless of funding source. The policy memo states that

> …"Facility Construction projects will comply with [EISA Section 438] using [DoD policy on Implementation of EISA, Jan. 2010} and consistent with [EPA's 2009 Technical Guidance.]….all master planning, project development and project site planning should…incorporate low impact design criteria, maximize use of existing topography including slope, hydrology, flora, and soils, and minimize site clearing and soil grubbing activities to the greatest extent possible."

A Department of Defense memorandum, dated January 2010, entitled "*DoD Implementation of Stormwater Requirements under Section 438 of the Energy Independence and Security Act (EISA)*" is referenced in the October 2010 Memo, and states that:

> "EISA Section 438 requirements are independent of stormwater requirements under the Clean Water Act and should not be included in permits for stormwater unless a State (or EPA) has promulgated regulations for certain EISA Section 438 requirements (i.e., temperature/heat criteria) that are applicable to all regulated entities under its Clean Water Act authority.
>
> …….The overall design objective for each project is to maintain predevelopment hydrology and prevent any net increase in stormwater runoff. DoD defines "predevelopment hydrology" as the pre-project hydrologic conditions of temperature, rate, volume, and duration of stormwater flow from the project site."

Permit Part II.B.5 contains requirements which are consistent with the provisions of EISA and the January 2010 and October 2010 Memoranda. As described below, EPA includes in Permit Part II.B.5.f a specific definition of predevelopment hydrology for Western Washington as "forested land cover" for the purposes of modeling to comply with site design objectives established by this permit. EPA considers this definition of predevelopment hydrology, which reflects the original landscape within the Puget Sound

lowlands, to be necessary to protect receiving waters in Western Washington from the impacts of municipal stormwater discharges to the maximum extent practicable.

D5.2 Ecology's 2005 Manual and the Washington PCHB Rulings

Ecology updated its stormwater management manual in 2005, and included a flow control performance standard for new development and redevelopment projects that met certain thresholds (e.g., created 10,000 square feet of effective impervious surface). Specifically, the performance standard calls for post-development discharge flows to match pre-development discharge flow durations between the range from 50% of the 2-year peak flow up to 100% of the 50-year peak flow. This flow control performance standard was designed to attenuate the largest stormwater flows that cause streambank erosion and impairment of Western Washington streams. In 2007, Ecology included this flow control requirement as part of the mandatory requirements for new development and redevelopment projects with both its Phase I Permit and WW Permit.

Based on appeals of these permits in 2008 and 2009, the Washington Pollution Control Hearings Board (PCHB) upheld the flow control performance standard noted above for both permits, but ruled that neither permit adequately addressed LID to control stormwater runoff from frequent small to medium storms. The PCHB determined that in order to reduce stormwater to the maximum extent practicable under the Clean Water Act and to apply AKART under state law, the Phase I Permit must be modified to require LID, where feasible, for new development and redevelopment projects. The PCHB determined that the WW Permit must be modified to include LID metrics and goals, but that Ecology has discretion on the timing of when the WW Permit must include LID requirements for new development and redevelopment.

In response to the PCHB rulings, Ecology convened a LID advisory committee in 2009 to develop methods and performance metrics for LID requirements, where feasible. In October 2011, Ecology released drafts of the revised Phase I and WW Permits (proposed for reissuance in years 2013-2018), which include LID requirements for new development and redevelopment projects. Within these proposals, Ecology has outlined a LID hydrologic performance standard that supplements the existing flow control standard. The proposed LID performance standard calls for the post-development stormwater discharges to match the pre-development discharges from 8% of the 2-year peak flow to 50% of the 2-year peak flow calculated using an approved continuous simulation model.

The PCHB decision requiring additional performance requirements to address the impact of stormwater runoff from new and redevelopment sites constitutes a binding state requirement applicable to all regulated entities under the Clean Water Act, and represents the MEP standard for achieving the Washington water quality standards.

D5.3 NPDES Requirements and the JBLM MS4 Permit application

The federal minimum NPDES requirements for post-construction, or long term, stormwater runoff from new development and redevelopment direct the MS4 operator to implement and enforce a program to reduce pollutants to the MEP from new and redevelopment areas greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development. Specifically, 40 CFR § 122.34(b)(5) states that the MS4 operator must 1) develop and implement locally appropriate strategies that include a combination of structural and/or nonstructural BMPs requirements; 2) adopt an ordinance or other regulatory mechanism to address post-construction discharges; and 3) ensure adequate long-term operation and maintenance of these BMPs.

In the 2003 NPDES application materials, JBLM identified the following program activities to implement this control measure:

- Work with Public Works Master Planning office to incorporate LID principles into plans for new construction
- Ensure new construction plans include provisions to properly manage post-construction stormwater runoff.
- Adopt the Western Washington Stormwater Management Manual.

Through subsequent information submitted to EPA in October 2011, JBLM describes that the Public Works staff works with their counterparts responsible for JBLM's comprehensive master planning, operations, design consultants, and the U.S. Army Corps of Engineers to include appropriate stormwater management techniques in any development project at the earliest possible phase. This work includes participating in "deconfliction meetings" to locate facilities on JBLM, and design charettes to establish specific project features. Due to favorable soil conditions, on-site stormwater management is promoted by the Public Works staff for most all projects. When necessary, new connections to existing stormwater infrastructure are justified through both a technological requirement and a system capacity evaluation. JBLM staff observed that increased use of on-site stormwater management techniques may allow JBLM to abandon some aging stormwater infrastructure lines. Aging stormwater infrastructure can limit the use of existing properties for redevelopment, if using only traditional infrastructure techniques. JBLM must closely evaluate the overall cost to relocate or rehabilitate older stormwater lines and facilities. Stormwater system modeling efforts continue the evaluation of existing capacity of the JBLM MS4 system.

D5.4 EPA's Proposed Permit Requirements for New Development & Redevelopment at JBLM

Permit Part II.B.5 includes specific requirements which are consistent with federal SWMP requirements. The permittee must use an ordinance or other regulatory mechanism to control post construction stormwater runoff from public or private project development sites that will disturb 5,000 square feet or more. EPA has proposed a 5,000

square feet of disturbed area site size threshold to trigger the permit's new development and redevelopment requirements. As described be , EPA has included Permit Appendix C to describe the types of projects which can be exempted from specific provisions of Permit Part II.B.5 f.

EPA has specified site planning procedures; site plans, consistent with the 2005 Manual and the PSLID Manual; source control; new development design intended to minimize impervious areas, preserve natural drainage systems and preserve native vegetation where feasible; hydrologic performance requirements for on-site stormwater management; hydrologic performance requirements for flow control from certain sites; runoff treatment; wetland protection; proper operation and maintenance; and staff training requirements. EPA includes these provisions in the JBLM MS4 permit because the available management techniques are both practicable and feasible to use, and are proven to minimize the incremental negative water quality impacts associated with new development in urbanizing environments.

The site planning procedures, site plans, source control, and site design requirements in Permit Parts II.B.5.a through d apply to both new development and redevelopment project sites disturbing 5,000 square feet or more. As previously discussed in Section VII.D.4 of this document regarding the construction site management program, the 5,000 square foot size threshold ensures that a greater number of development sites within any given watershed are addressed so that stormwater management decisions can be made at the earliest possible planning stage, thus ensuring full opportunity to avoid further cumulative impacts to receiving waters. The 5,000 square foot size threshold triggering the new development and redevelopment considerations are consistent with the requirements of the EISA, directives within associated Department of Defense and Department of Army Memoranda, and new development/redevelopment site size thresholds established by Ecology in the 2005 Manual.

Ecology has provided preliminary input to EPA identifying a discrepancy between EPA's proposal of a 5,000 square foot disturbance size threshold (which trigger the construction, site planning, LID and other requirements of Permit Parts II.B.4 and II.B.5.a-e), and Ecology's analogous site size thresholds (namely, 2,000 square feet of new or replaced impervious surface or 7,000 sq. feet of land disturbance). See Appendix C of this document. Considering the input from Ecology EPA is considering alternative permit language, as indicated by footnote in the draft permit document, to match the thresholds as defined by Ecology. ***EPA therefore requests public comment on the best way to define straightforward trigger thresholds for Permit Parts II.B.4 and II.B.5.a-e which will be most protective of water quality and beneficial uses.***

D5.4.1 Hydrologic Performance Requirement for On-Site Stormwater Management

To articulate its expectations for implementing LID techniques in Permit Part II.B.5.e, EPA has proposed on-site stormwater management requirements for new and

redevelopment sites disturbing 5,000 square feet or more. JBLM must require all new development and redevelopment sites meeting this threshold to use onsite management practices intended to infiltrate, disperse, retain, and/or harvest/reuse stormwater onsite to the maximum extent technically feasible. Three specific provisions are included in Permit Part II.B.5.e:

- First, at all sites meeting the 5,000 square foot disturbance threshold, JBLM must require all lawn and landscaped areas to meet the soil specifications within BMP T5.13 (*Post-Construction Soil Quality and Depth*) as outlined in Chapter 5 of Volume 5 of the 2005 Manual. Native soil and amended soil meeting these specifications provides important stormwater treatment and storage functions which are often degraded during development when soil is removed or compacted. Native top soil on site must be undisturbed or stockpiled and retained to the maximum extent practicable; replaced soil must be at least 8 inches in depth and meet explicit quality specifications

- Second, at project sites meeting the 5,000 square foot disturbance threshold, and where between 2,000-4,999 square feet of hard surfaces will be created or replaced, JBLM must require dispersion and infiltration BMPs to be used consistent with the 2005 Manual or the PSLID Manual.. Example BMPs include: full dispersion, downspout dispersion and infiltration systems, rain gardens/bioretention areas, permeable pavement, and sheet flow dispersion. EPA is requiring the use of these BMPs at this subset of projects, but is not specifying a quantitative performance requirement due the relatively small size of the hard surfaces to be managed. EPA's expects that project designers can use appropriate practices to disperse and infiltrate stormwater which will generally meet the explicit performance standard discussed below for 5,000 square feet or more of hard surface area. These dispersion and infiltration techniques have been proven to be effective at reducing stormwater volume in the Western Washington region. Moreover, such practices are feasible based on the aforementioned watershed characterization studies which included JBLM areas.

  Ecology has stated this provision is likely consistent with existing requirements reflected in its 2005 Manual. As mentioned previously, EPA is requesting comment on how to adequately acknowledge and/or reference pending changes to the specifications cited in the 2005 Manual and the PSLID Manual. . EPA may revisit the language in the Permit Part if, prior to EPA's issuance of the final JBLM permit, the responsible state agencies substantively revise either the 2005 Manual or the PSLID Manual. Alternatively, EPA could cite the specific provisions of the 2005 Manual and PSLID Manual as defined on the final permit issuance date. EPA solicits public input on how best to accommodate this implementation issue.

- Third, for sites meeting the disturbance threshold of 5,000 square feet or more and which create or replace ≥5,000 square feet of hard surfaces, EPA is proposing a hydrologic performance standard. Specifically, stormwater controls must be designed to retain on-site the volume of stormwater produced from the 95th percentile rainfall event. This standard is the same volume based performance standard outlined as Option 1 in the EPA 2009 Technical Guidance. EPA includes a specification that the "predevelopment condition" for modeling to determine compliance with the performance standard must, in general, be forested conditions.

This performance standard is both technically and economically feasible for such sites, and provides a design objective that is quantitative and easily calculable. This approach provides environmental benefits by restoring site hydrology towards its natural condition, wherein the volume of stormwater to be retained on a developed site more closely matches the volume that would be retained under natural undeveloped conditions. Sites which are designed to attain this standard will mitigate runoff from the most frequent Western Washington storm events that currently contribute the bulk of pollutant loads and discharge volumes to receiving waters.

EPA considers this performance standard to be consistent with Ecology's October 2011 proposed approach to require LID, where feasible, through the Western Washington MS4 permits. As noted above, Ecology has proposed a LID hydrologic performance standard which calls for the post-development stormwater discharge flows to match the pre-development discharge flows from 8% of the 2-year peak flow to 50% of the 2-year peak flow. Using continuous simulation modeling assuming soils with high infiltration rates of greater than 0.2 in/hr (such as those that exist throughout the JBLM subinstallation), EPA has determined that a performance standard requiring retention of the volume of the 95th percentile rain event on-site is functionally equivalent to Ecology's October 2011 proposed performance standard for LID (for additional explanation, see Appendix F of this document).

Because the onsite stormwater management performance standard for sites creating or replacing ≥5,000 square feet of hard surfaces in Permit Part II.B.5.e is functionally equivalent to Ecology's proposed LID standard for the JBLM area, EPA is proposing that JBLM can require this standard to be met using either expression of the onsite stormwater or LID performance standard. Using Ecology's expression of the discharge flow standard as an alternative (8% of the 2-year peak flow to the 50% of the 2-year peak flow) method may be useful to the designers of those projects which also trigger the flow control performance standard in Permit Part II.B.5.f (as discussed in the next section of this document). Both Permit Parts II.B.5.e and II.B.5.f require the use of a continuous runoff model (such as the Western Washington Hydrology Model) to calculate attainment. For a new development or redevelopment site which meets the specific size thresholds described in Permit Part II.B.5.f and creates or replaces ≥5,000 square feet of hard surface, the same continuous runoff modelling can be used to meet both on-site stormwater performance standard and the flow control performance standard,

i.e., by ensuring the site's post-development discharge flows do not exceed the pre-development discharge flows for the range of 8% of the 2-year peak flow to 100% of the 50-year peak flow.

D5.4.2 Hydrologic Performance Requirement for Flow Control

For certain large development or redevelopment sites which cannot effectively manage all of the stormwater onsite, Permit Part II.B.5.f requires that JBLM impose design requirements to comply with a hydrologic performance standard for flow control modeled through use of the Western Washington Hydrology Model (WWHM) or other approved continuous runoff model. This hydrologic performance standard is designed to limit discharge flows to receiving waters such that post-development discharge flows do not exceed the pre-development discharge flows for the range of 50% of the 2-year peak flow to 100% of the 50-year peak flow.

This flow control performance standard applies to two types of sites: 1) site which create or replace 10,000 square feet or more of effective impervious surface area; and 2) sites from which there is a surface discharge to a natural or manmade conveyance system, and which convert ¾ acres or more from native vegetation to lawn/landscaping, or will convert 2.5 acres or more of native vegetation to pasture.

This flow control performance standard and applicable project thresholds are consistent with those in the 2005 Manual, and has been in effect for specific new/redevelopment projects in Western Washington through regulated MS4 ordinances for at least two years. EPA has included this flow control performance standard in the JBLM permit area to increase consistent implementation of the flow control requirements across Western Washington which will prevent further stream degradation from the cumulative impacts separate development projects across the landscape.

Scientific analysis illustrates that controlling flow rates in the range of the flow control standard is necessary to eliminate accelerated stream channel erosion responsible for bedload sediment movement in Puget Sound lowlands (Booth 1997). It is expected that such a standard will significantly reduce alteration to the natural hydrology and thus impacts on the beneficial uses and biological communities dependent on that hydrology (DeGaspari et al. 2009). The flow control standard is necessary in order to preserve and restore high quality aquatic resources, in particular salmonid and other ecologically, commercially, and culturally important fish species.

Permit Part II.B.5.f contains a specific exception for discharges to the JBLM Stormwater Canal. Because the canal drains directly to Puget Sound, it is not necessary to prevent stream channel erosion in the receiving environment; therefore, there is reduced environmental benefit to a flow control requirement for this manmade conveyance. To acknowledge that flow control intended to reduce stream erosion is not necessary for Puget Sound, Permit Part II.B.5.f EPA has included an exception from the hydrologic standard for flow control for discharges to the JBLM Stormwater Canal from new

development or redevelopment sites. All other provisions of Permit Part II.B.5, including the onsite stormwater management requirements, apply to sites discharging to the Canal that meet the site size thresholds

Permit Part II.b.5.f also defines the predevelopment condition to be used in hydrologic modeling to demonstrate compliance with the performance standard. In Western Washington, the appropriate predevelopment hydrologic flow condition must be established as forested land cover (unless historic information indicates the site was originally prairie).

D5.5. Other Requirements for New Development and Redevelopment Sites

Permit Part II.B.5.g addresses runoff treatment from certain types of land uses. EPA requires JBLM to follow the directives proposed in Permit Appendix B, which summarizes the stormwater treatment requirements for specific land uses using a separate water quality standard (treatment of 91% of all runoff volume, as estimated by continuous hydrologic modeling analysis). Ecology has recently proposed corrections to the 2005 Manual and has provided input to EPA regarding this requirement to specify water quality treatment expectations which are (and will continue to be) consistent with those imposed on other regulated MS4s in Western Washington. See Appendix C of this document for Ecology's input on this topic. EPA has highlighted he text in question using a footnote within the draft Permit Appendix B, and requests input on whether to include the alternative language as suggested by Ecology's 1/17/2012 letter.

To protect wetlands, in Permit Part II.B.5.h, the permittee must ensure that appropriate inputs are used when designing stormwater management controls to replicate predevelopment hydrology. In particular, stormwater controls should ensure the duration and frequency of saturation or inundation of a wetland does not deviate from predevelopment conditions. This can be achieved by minimizing impervious hard surfaces, retaining native vegetation, and incorporating Low Impact Development techniques and site planning into the stormwater management.

Permit Part II.B.5.i requires the permittee to develop an inspection plan to confirm that stormwater management techniques are installed properly and operational upon completion. In Permit Part II.B.5.j, EPA has included specific requirements to assure the long term operation and maintenance of stormwater facilities at sites and properties that will not remain under JBLM's direct responsibilities. This requirement, specifically the direction to develop and maintain an inventory of structural stormwater management facilities, is closely aligned with the ongoing operation and maintenance activities described in Permit Part II.B.6 related to good housekeeping for municipal operations.

Permit Part II.B.5.k requires the permittee to provide or obtain training for its staff responsible for implementing these program activities. Supplemental information provided by JBLM in 2011 demonstrates that JBLM staff are participating in available

LID training and other opportunities to increase understanding of the technical aspects of these requirements.

EPA has outlined in the Permit Appendix C those projects which may be exempted from the requirements of Part II.B.5. Such conditional exemptions are necessary because EPA acknowledges that there are some sites (and site conditions) which cannot and/or should not comply with the directives in Permit Part II.B.5. Such situations should be rare, and stormwater management should be done to the degree possible at all sites. Sites which are exempted from the requirements by the permittee due to technical infeasibility or excessive costs associated with full compliance must be documented and reported to EPA in each Annual Report. ***EPA requests comment on the provisions of Permit Appendix C (Exemptions), particularly related to the definitions and documentation associated with "technical infeasibility" and "severe economic cost."*** EPA has considered Ecology's proposed definitions of these terms when drafting these provisions. EPA also notes the unique nature of federal budgeting/financing for construction and development activities occurring within JBLM's jurisdiction; consequently, definitions for these terms may require further consideration of the unique circumstances facing federal facilities particularly when considering costs. ***EPA requests public comment on the best definitions to further refine both terms in the final permit.***

EPA also requests public comment on JBLM's October 2011 request that airfields, (including ramps, approaches and runways) be exempt from LID requirements of the permit. JBLM notes that, due to significant restrictions on land use in and around airfields, impounded water in above ground LID structures would attract birds and create a hazard for both the aircraft and wildlife. JBLM states that stormwater management requirements for airfields as described in Washington State Department of Transportation *Aviation Stormwater Design Manual*: *Managing Wildlife Hazards Near Airports* (December 2008) are consistent with Washington Department of Ecology, Washington State Department of Transportation, and Department of Defense guidance. EPA requests comment on the whether such areas should be exempt from these requirements.

In general, EPA requests comment on the breadth, scope and adequacy of the post-construction requirements for new development and redevelopment project sites in Permit Part II.B.5.

D6. Pollution Prevention and Good Housekeeping (40 CFR §122.34(b)(6))

This control measure requires MS4 operators to implement an operation and maintenance program to prevent or reduce pollutant runoff from activities conducted by the MS4 operator. Federal NPDES requirements require the MS4 operator to examine and subsequently alter their own actions to reduce the amount and type of pollution that: (1) collects on streets, parking lots, open spaces, storage and vehicle maintenance areas, that may be discharged into local waterways; and (2) results from actions such as environmentally damaging land development and flood management practices or poor

maintenance of storm sewer systems. Activities associated with maintenance of parks and open spaces, as well as fleet and building maintenance, must also be considered for possible water quality impacts. While this measure is meant primarily to improve or protect receiving water quality by improving municipal or facility operations, it can also result in a cost savings for the MS4 operator, since proper and timely maintenance can help avoid repair costs from damage caused by age and neglect. The program must also include an employee training component.

The following activities were identified in the 2003 permit application information:

- Developing education material regarding lawn care and water quality and pest control;
- Prepare regulation requiring all commercial activities to store hazardous materials in approved buildings with secondary containment, all activities to maintain updated spill control plan and to identify responsible person; and require auto repair commercial activities to have oil recycling plan/system

EPA has referenced similar activities to occur as part of the public education and IDDE program components elsewhere in permit. It is important for JBLM to inspect and maintain those stormwater conveyance and stormwater management facilities in a manner that does not create adverse impacts on receiving water quality. Therefore, as part of this control measure, EPA has proposed that JBLM must:

- Adopt maintenance standards to determine when maintenance of a particular function or location is necessary; JBLM may consider using the maintenance standards defined by Ecology in Chapter 4 of Volume V of the 2005 Manual (Permit Part II.B.6.a);

- Conduct annual inspections of permanent stormwater treatment and flow control facilities (Permit Part II.B.6.b);

- Conduct spot checks of potentially damaged treatment and flow control facilities after major storm events; a *major storm event* is defined as 24 hour, 10-year recurrence interval rainfalls or snow melts (Permit Part II.B.6.c);

- Inspect, and clean as necessary, all catch basins and inlets prior to the expiration date of the permit (Permit Part II.B.6.d); decant water and solids may be disposed in accordance with provisions of Permit Appendix A;

- Comply with the inspection requirements in Permit Parts 6.a-6.c by achieving an annual inspection rate of 95% total universe of facilities no later than 180 days from the permit expiration date;

- Establish and implement practices to reduce impacts from streets, roads, road right of ways, maintenance yards, and associated street/road maintenance activities which are owned or operated by JBLM (Permit Part II.B.6.f);

- Establish and implement practices to reduce impacts from lands owned or maintained by the permittee. Selection and application of pesticides and herbicides are of particular concern, and JBLM must evaluate and document its efforts to reduce the need and use of pesticides/herbicides through Integrated Pest Management techniques or other means (Permit Part II.B.6.g);

- Implement an ongoing training program for JBLM staff and contractors whose job functions may impact stormwater quality Permit Part II.B.6.h); and,

- Develop and implement of a site specific Stormwater Pollution Prevention Plan for all heavy equipment maintenance or storage yards, or other material storage areas that are not covered under the MSGP (Permit Part II.B.6.i); and

- Document and summarize all inspections, maintenance and repair activity, and include such information in each Annual Report (Permit Part II.B.6.j.

EPA proposes to allow JBLM the two years from the permit effective date to fully implement the requirements outline in this Part. ***EPA requests comment on the breadth, scope and adequacy of the operation and maintenance/good housekeeping requirements and activities of Permit Part II.B., in light of the other actions required by the permit.***

D7. Stormwater Retrofits to Reduce Discharges to Water Quality-Impaired Receiving Waters

All NPDES permits must include requirements necessary to achieve state water quality standards. (See 40 CFR 122.44(d)). This permit contains narrative limits to achieve the Washington water quality standards to the maximum extent practicable.

To address the water quality impairment in Clover Creek and American Lake, as well as other water quality impacts identified through the watershed basin plans for Murray Creek mentioned previously, EPA proposes in Permit Part II.C.1 that JBLM begin a monitoring program to better characterize phosphorus contributions from the MS4 to American Lake, and to evaluate the effectiveness of the various SWMP practices to overall surface water quality. Additional discussion of the monitoring requirements is contained in Section F of this document.

Source control is a cost effective means of reducing the impacts of stormwater runoff on the aquatic environment. Reducing impacts of urbanization by disconnecting runoff from impervious areas from discharging to surface waters prevents pollutants from entering the waters, eliminates the physical impact which compromises channel integrity, and allows for greater groundwater recharge. Using redevelopment opportunities to make

capital improvements at the site level which improve water quality and aquatic habitat is the best way to correct the negative impacts of urbanization on receiving waters.

In addition to monitoring, EPA is requiring JBLM to develop a plan to reduce existing discharge volumes entering Clover Creek and Murray Creek. Specifically, within three years, JBLM must develop a prioritized list of retrofit projects that would reduce overall stormwater discharge/flow volumes in both Clover Creek and Murray Creek through the use of LID or other practices. Prior to the expiration date of this permit, JBLM must initiate or complete one or more retrofit project sufficient to disconnect and infiltrate discharges from the effective hard surfaces equal to five acres cumulative area. The permittee must include a retrofit implementation status report with the 5th Year Annual Report.

EPA believes that JBLM can reasonably develop the initial retrofit project list by analyzing the feasibility of action recommendations contained in each completed watershed basin plan. For example, the Murray Creek Watershed Plan contains numerous retrofit recommendations - such as assessment of storm drain lines to identify locations where groundwater infiltration/inflow occurs and where storm drains could be repaired or replaced. The plan outlines that where repair/replace opportunities exist, the drainage basin upstream of a problem pipe could be retrofitted with infiltration BMPs, the line could be abandoned, and ground water is permanently prevented from entering the pipe and discharging to surface waters. In addition, where storm drain systems on the JBLM installation are privatized, the plan recommends that JBLM work with the new responsible parties to identify problem sections. EPA feels these watershed plan recommendations should be reviewed and evaluated by JBLM to consider overall feasibility, then acted upon in order to help restore predevelopment watershed hydrology within the cantonment areas.

D8. Required Response to Violations of Washington Water Quality Standards

To provide SWMP implementation expectations for JBLM that are consistent with the expectations imposed on other regulated MS4 operators in Western Washington, EPA has proposed corrective action provisions in Permit Part II.D that are comparable to the similar provision (Condition S4.F) in Ecology's WW Permit. Such corrective action, or adaptive management, provisions have also been included in other stormwater discharge permits issued by EPA, most notably in the MSGP for industrial stormwater discharges (see Permit Part 3 of the 2008 MSGP).

Once issued, noncompliance with any of the requirements of the JBLM permit constitutes a violation of the Clean Water Act. As detailed in Permit Part II.D, the failure to report to EPA (Part II.D.1), or to evaluate SWMP implementation and identify management response actions upon notification from EPA (Part II.D.4), would constitute an independent, additional violation of the permit and the Clean Water Act. Any actions and time periods specified by EPA for remedying noncompliance as discussed in Part

II.D does not absolve the permittee of the initial underlying noncompliance; in addition, EPA reserves its enforcement authority to respond to a violation of water quality standards even if the permittee conducts the adaptive management response activities.

D9. Reviewing and Updating the SWMP

The SWMP is the combination of structural and nonstructural actions and activities used by the permittee to reduce the discharge of pollutants from the MS4 to the MEP and to protect water quality. Minor changes and adjustments to the various SWMP elements are expected and may be necessary to more successfully adhere to the requirements of this permit. EPA has determined that minor changes to the SWMP shall not constitute the need for permit modifications as defined in the regulations at 40 CFR § 122.6. Permit Part II.E of the permit describes procedures to be used to perform additions and minor changes to the SWMP. The permit does not allow the JBLM to remove elements in the SWMP that are required through permit conditions or regulatory requirements. EPA, in consultation with Ecology, will review any changes to the SWMP requested by JBLM. If the requested changes are found to be major modifications to the permit, as defined in 40 CFR § 122.62(a), then EPA will notify JBLM and comply with permit modification procedures, including public notice procedures.

D10. Transfer of Ownership, Operational Authority or Responsibility for SWMP Implementation

Through Permit Part II.F, EPA does not intend to mandate a permit modification should the JBLM annex additional lands or accept the transfer of operational authority over portions of an interconnected MS4. Implementation of appropriate SWMP elements for these additions (annexed land or transferred authority) is required. JBLM must notify EPA of any such additions or transfers in the Annual Report(s). EPA may require a modification to the permit based on such new information pursuant to 40 CFR §§ 122.61 and 122.62.

D11. SWMP Resources

Permit Part II.G requires JBLM to provide adequate support to implement SWMP activities. Compliance with Permit Part II.G will be demonstrated by JBLM's ability to fully implement the SWMP and other permit requirements as scheduled. The permit does not require specific funding or staffing levels, thus providing JBLM the ability and incentive to adopt the most efficient and cost effective methods to comply with permit requirements.

E. Schedule for SWMP Implementation and Compliance

Permit Part III summarizes the schedule for SWMP implementation and compliance.

F. Monitoring, Recordkeeping and Reporting Requirements

40 CFR §122.34(g) requires MS4 operators to evaluate program compliance, the appropriateness of BMPs in their SWMPs, and progress towards meeting their SWMP goals. These requirements have been included in Part IV of the permit.

Although EPA's Phase II stormwater regulations do not explicitly require MS4s to conduct monitoring activities, EPA acknowledges that permitting authorities may consider a combination of physical, chemical and biological monitoring, or use of other environmental indicators in order to support documentation of compliance with permit conditions and/or water quality standards. EPA expects that such monitoring will be done in identified locations for relatively few pollutants of concern. (See 64 FR 68769, December 8, 1999).

EPA has determined that stormwater discharge surface water and limited biological monitoring, is appropriate level of monitoring activity for JBLM.. ***In general, the monitoring information collected by the JBLM will be used by EPA to help evaluate the overall success of the SWMP and to define adjustments to permit requirements which may be necessary in future permit terms.***

In Permit Parts IV.A.5 and 6, EPA proposes monitoring of stormwater discharges to American Lake and surface water monitoring in Murray and Clover Creeks. Analytical monitoring of the quality of JBLM's municipal stormwater discharges to American Lake is appropriate, given the phosphorus impairment listing for American Lake as well as the current lack of information regarding the quality and quantity of the MS4 discharges to the lakes. Ambient monitoring of Murray Creek is appropriate, given that the creek drains to American Lake, to help understand phosphorus loadings to the lake. Clover Creek is impaired for pH, fecal coliform and dissolved oxygen; although monitoring of stormwater discharges into the Creek occurs in compliance with the MSGP, it is appropriate to establish monitoring at a downstream location as the creek leaves the subinstallation permit area to help assess upstream sources of pollutants.

In Permit Part IV.A.7, EPA is also outlining requirements for JBLM to conduct benthic macroinvertebrate sampling in both Murray Creek and Clover Creek at least twice during the permit term. The Puget Sound Partnership established Ecosystem Recovery Targets for the Puget Sound basin in July 2011 which include a target stating that "By 2020, 100% of Puget Sound lowland stream drainage areas monitored with baseline Benthic Index of Biological Integrity (B-IBI) scores of 42-46 or better retain these excellent scores, and mean B-IBI scores of 30 Puget Sound Lowland drainage areas improve from 'fair' to 'good.' " Using B-IBI as an indicator of the effects of development and stormwater runoff on watershed health is viewed by many regional experts working with the Puget Sound Partnership as appropriate and accurate

monitoring for Puget Sound lowland streams.[24] Pierce County, Thurston County, and others currently are conducting such monitoring of stream health using similar macroinvertebrate sampling protocols. These organizations are conducting analysis/scoring of samples according to the Puget Sound Lowlands B-IBI, which is reflected on the Puget Sound Stream Benthos website (www.pugetsoundbenthos.org). ***EPA requests public comment on the appropriateness of requiring JBLM to establish baseline stream health information for Clover and Murray Creeks.***

EPA also requests comment on whether EPA should include a permit requirement providing an option for JBLM to participate into the pending Western Washington Stormwater Monitoring Program. As an alternative to the monitoring provisions included in the proposed permit, EPA could instead consider participation in a future Western Washington Stormwater Monitoring Program as a suitable substitute for discharge, water quality and/or biological sampling conducted by JBLM staff. Although such an optional monitoring alternative is not currently proposed as part of the permit text, EPA invites comment on how and whether to include a provision allowing JBLM to consider the economic benefits and opportunities of membership in such a regional monitoring consortium.

EPA requests public comment on all aspects of the monitoring program proposed in the permit. Specifically EPA seeks input regarding the scope and breadth of the discharge, water quality and biological monitoring program for JBLM, and specific recommendations for appropriate data collection activities to be conducted.

Permit Part IV.B requires the permittee to keep all required records required by this permit for a period of at least five years. Records must be submitted only when requested by EPA. JBLM's SWMP materials must also be available to the public; MS4 operators may charge a reasonable fee for copies, and may require a member of the public to provide advance notice of their request. As previously mentioned, JBLM will make their program materials available to the public electronically via a website within the term of this permit.

Permit Part IV.C describes the content of the Annual Reports, as required by 40 CFR §122.34(g)(3). EPA is requiring these reports to be submitted to EPA at the addresses listed in Permit Part IV.D. The Annual Reports must contain an evaluation of the SWMP for compliance with the terms of the permit, the appropriateness of the identified BMPs, and progress towards achieving their measurable goals. The Annual Report must also contain a summary of any information that has been collected and analyzed, including any and all types of data and discharge monitoring reports. JBLM must indicate what activities are planned for the next reporting cycle, and discuss any changes to either BMPs or measurable goals, and if necessary must indicate if any minimum control measure or measurable goal is the responsibility of another

[24] For example, see: Karr, J. R., and E. W. Chu. 1997. *Biological Monitoring and Assessment: Using Multimetric Indexes Effectively*. EPA 235-R97-001. University of Washington, Seattle, and
Pierce County. 2011. Appendix A. BIBI Sampling SOP & Field Sheet. *Quality Assurance Project Plan for Targeted Stormwater Management Program Effectiveness Monitoring. Prepared in Compliance with Section S8.E of Pierce County, Washington's Phase I Municipal Stormwater Permit*. Feb. 2011; and
Puget Sound Partnership – Setting Targets for Puget Sound Recovery- Revised Addendum to Technical Memorandum on Runoff From the Built Environment (May 16, 2011 Draft).

entity. In addition, each Annual Report should include the number of new development or redevelopment projects initiated and completed using the performance standards in Permit Part II.B.5. Appendix E of this document contains a suggested format for the Annual Report; however***, EPA requests public comment on the most effective format for JBLM to use to create its Annual Report reflecting the activities required by the permit.*** Options may include the current narrative/outline format; a more formalized checklist or form, or other means. To conserve resources, EPA will accept the Annual Report document in a readily accessible electronic format, such as Adobe Acrobat or other commonly available word processing program, and the documents may be sent to EPA on CD-ROM. JBLM should note that the signed certification statement required by NPDES regulations for all reports submitted to EPA must be printed and submitted in hard copy. Any documents comprising the Annual Report may accompany the signed certification statement and be submitted electronically on CD-ROM

EPA requests comment on the scope and breadth of all monitoring and reporting requirements contained in this permit, in light of the other actions required by this permit.

G. Standard Permit Conditions and Appendices

Permit Parts V and VI of the permit contain standard regulatory language that must be included in all NPDES permits, consistent with 40 CFR § 122.41. Because they are regulations, they cannot be challenged in the context of an NPDES permit action. This standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements.

Appendices A through C of the permit augment the requirements of Permit Part II.B, and provide additional detail for street waste disposal, stormwater treatment requirements and allowable exemptions to the new development and redevelopment requirements. These provisions mirror similar details currently imposed on other regulated MS4 operators in Western Washington.

VII. Other Legal Requirements

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with the National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NOAA-Fisheries) and the U.S. Fish and Wildlife Service (USFWS) regarding potential effects an action may have on listed endangered species.

EPA is currently evaluating the potential effects of the proposed permit, and has not yet completed its Biological Evaluation to determine whether issuance of this permit is likely to adversely affect any threatened or endangered species. EPA expects to complete its evaluation in the near future and will consult with NOAA-Fisheries and USFWS as required by the Endangered Species Act.

B. Essential Fish Habitat

Essential fish habitat (EFH) is the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires EPA to consult with the NOAA-Fisheries when a proposed action has the potential to adversely affect (reduce quality and/or quantity of) EFH. EPA is currently evaluating the impacts of EPA's issuance of this permit and will complete EFH consultation if necessary in the near future.

C. National Historic Preservation Act

With regard to the National Historic Preservation Act, EPA believes that the reduction of pollutants in runoff from the MS4 will not result in the disturbance of any site listed or eligible for listing in the National Historic Register. Therefore, EPA believes that the actions associated with this permit are in compliance with the terms and conditions of the National Historic Preservation Act. If JBLM engages in any activity which meets all of the following criteria, JBLM must consult with and obtain approval from the State Historic Preservation Office prior to initiating the activity:

1) the permitted entity is conducting the activity in order to facilitate compliance with this permit;
2) the activity includes excavation and/or construction; and
3) the activity disturbs previously undisturbed land.

Some examples of activities subject to this permit condition and the above criteria include, but are not limited to: retention/detention basin construction; storm drain line construction; infiltration basin construction; dredging; and stabilization projects (*e.g.*, retaining walls, gabions). The requirement to submit information on plans for future earth disturbing is not intended for activities such as maintenance and private development construction projects.

D. State Certification of the Draft Permit

Concurrent with the public notice of today's draft permit, EPA is formally requesting comment on the State's intention to certify the JBLM permit, as required by Section 401(a)(1) of the CWA 33 USC § 1341 (a)(1), and 40 CFR §124.53. EPA requested a draft certification from the Department of Ecology, and includes Ecology's 1/17/2012 response indicating its intent to certify the permit as Appendix C of this document. As previously discussed, EPA has included certain provisions as reflected in Ecology's letter, and requests public input on several specific provisions. Persons wishing to comment on the conditions outlined in the State's Certification response should submit written comments by the public notice expiration date indicated at the beginning of this document to: Vincent McGowan, Washington Department of Ecology, Southwest Regional Office, Water Quality Program, 300 Desmond Drive, Lacey, WA 98503, or by email to vincent.mcgowan@ecy.wa.gov.

Appendix A - Statutory and Regulatory Background

Stormwater is the surface runoff that results from precipitation events and snow melt. Stormwater flowing across land surfaces may contain or mobilize high levels of contaminants. Under most natural conditions, stormwater runoff is slowed and filtered as it flows through vegetation and wetlands. These flows soak into the ground, gradually recharging groundwater, and eventually seep into receiving waters.

Urban development has significantly altered the natural infiltration capability of the land, and often generates a host of pollutants that are associated with the activities of dense populations. This developed area in turn causes an increase in stormwater runoff volumes and pollutant loadings in the stormwater discharged to receiving waters. Urban development increases the amount of impervious surface in a watershed, as naturally vegetated areas are replaced with parking lots, roadways, and commercial, industrial, and residential structures. These surfaces inhibit rainfall infiltration into the soil and reduce evaporation and transpiration, thereby increasing the amount of precipitation which is converted to runoff. Stormwater and snow melt runoff washes over impervious surfaces, picking up pollutants while gaining speed and volume because of the inability to disperse and filter into the ground.[25]

Uncontrolled stormwater discharges from areas of urban development can negatively impact receiving waters by changing the physical, biological and chemical composition of the water, resulting in an unhealthy environment for aquatic organisms, wildlife and humans. The Nationwide Urban Runoff Program (NURP), conducted by EPA between 1978 through 1983, demonstrated that stormwater runoff is a significant source of pollutants. The study indicated that discharges from separate storm sewer systems draining from residential, commercial and light industrial areas carried more than 10 times the annual loadings of total suspended solids (TSS) than discharges from municipal sewage treatment plants providing secondary treatment. The study also identified a variety of other contaminants (such as oil and grease, copper, lead, and zinc) that were detected frequently at levels of concern. Numerous other studies and reports have confirmed the average pollutant concentration data collected in the NURP study.[26]

EPA's report entitled "National Water Quality Inventory, 1998 Report to Congress" concludes that stormwater related discharges from both non-point and point sources remain the leading causes of existing water quality impairments.

More information and copies of documents with additional information on environmental impacts of stormwater discharges are available via EPA's stormwater web page, http://www.epa.gov/npdes/stormwater.

In 1987, Congress amended the Clean Water Act (CWA) and added Section 402(p). This section requires a comprehensive program for addressing stormwater discharges through the National Pollutant Discharge Elimination System (NPDES) program. Specifically, CWA §402(p)(1) and (2) require NPDES discharge permits for the following five categories of stormwater discharges:

[25] 64 Fed. Reg. 68725-27 (December 8, 1999)
[26] U.S. EPA 1983. *Results of the Nationwide Urban Runoff Program, Executive Summary*, Office of Water, Washington D.C.; and Phase II NPDES Stormwater Regulation – Final Rule, 64 FR 68726 (December 8, 1999).

1. Discharges permitted prior to February 4, 1987;

2. Discharges associated with industrial activity;

3. Discharges from large Municipal Separate Storm Sewer Systems (MS4s) serving a population of 250,000 or more;

4. Discharges from medium MS4s serving a population of 100,000 but less than 250,000; and

5. Discharges judged by the NPDES permitting authority to be significant contributor of pollutants or which contribute to a violation of a water quality standard.

CWA §402(p)(3) requires that industrial stormwater discharges meet technology-based requirements and any more stringent requirements necessary to meet water quality standards. Municipal stormwater discharges, however, are held to different standards. This section of the CWA specifies a new technology-related level of control for pollutants in the municipal discharges, namely, control to the maximum extent practicable (MEP). Permits for MS4 discharges may be issued on a system or jurisdiction-wide basis, and must effectively prohibit non-stormwater discharges into the sewer system. Such permits must also require controls to reduce pollutant discharges to the maximum extent practicable including best management practices (BMPs), and other provisions as the EPA determines to be appropriate for the control of such pollutants. Currently, EPA believes that water quality-based controls, implemented with BMPs through an iterative process, are appropriate for the control of pollutants for stormwater discharges from municipalities.

CWA §402 (p)(5) required EPA to conduct additional studies on the impacts of stormwater and submit a report to Congress. The purpose of the report was to identify unregulated sources of stormwater discharges, determine the nature and extent of pollutants in the discharges, and establish procedures and methods to mitigate the impacts of those discharges on water quality. EPA published this report on December 8, 1999,[27] and recommended the following:

a. Establish a phased compliance with water quality standards approach for discharges from municipal separate storm sewer systems, with priority on controlling discharges from municipal growth and development areas;

b. Clarify that the MEP standard should be applied in a site-specific, flexible manner, taking into account cost considerations as well as water quality effects;

c. Provide an exemption from the NPDES program for stormwater discharges from industrial facilities where there are no activities where significant material is exposed to stormwater;

d. Provide extensions to the statutory deadline to complete implementation of the NPDES program for the stormwater program;

[27] Report to Congress on the Phase II Stormwater Regulations, EPA-833-R-99-001.

e. Target urbanized areas for the requirements in the NPDES program for stormwater; and

f. Provide control of discharges from inactive and abandoned mines located on federal lands.

CWA §402(p)(6) requires that EPA provide a comprehensive program that designates and controls additional sources of stormwater discharges to protect water quality. EPA regulations promulgated under the authority of section 402(p)(6) are commonly referred to as the "Phase II stormwater regulations" published by EPA on December 8, 1999 (64 Fed. Reg. 68722-68851). [28]

Additional sources regulated during this second phase of the stormwater program include municipal stormwater discharges from urbanized areas defined by the Decennial Census, and discharges from construction activities with land disturbances greater than or equal to one acre and less than five. (Requirements for construction-related discharges are addressed through other NPDES permits issued by EPA Region 10; more information on requirements for stormwater from construction sites can be found at http://www.epa.gov/npdes/stormwater/cgp.)

The terms "municipal separate storm sewer" and "small municipal separate storm sewer system" are defined at 40 CFR §122.26(b)(8) and (b)(16), respectively. MS4s include any publicly-owned conveyance or system of conveyances used for collecting and conveying stormwater and which discharges to waters of the United States. MS4s are designed for conveying stormwater only, and are not part of a combined sewer system, nor part of a publicly owned treatment works. Such a system may include roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains.

A *regulated small MS4* is defined as any MS4 located in an "urbanized area" as defined by the Bureau of the Census from the Year 2000 Census; the term may also describe small MS4s located outside of an urbanized area that are designated as regulated by the NPDES permitting authority. See 40 CFR §122.32(a). A regulated small MS4 includes storm drain conveyance systems owned or operated by a state, city, federal, or other public entity where stormwater discharges directly to waters of the U.S.

The permit associated with this fact sheet implements the requirements of the Phase II stormwater program for small municipal separate storm sewer systems in urbanized areas, and requires the permittee to initiate a comprehensive stormwater quality management program. As provided under 40 CFR §122.34(a), the permit allows up to five years during the first permit term for the permittee to fully develop and implement the stormwater management program.

[28] See 40 CFR §§ 122.30-35.

Appendix B –Maps

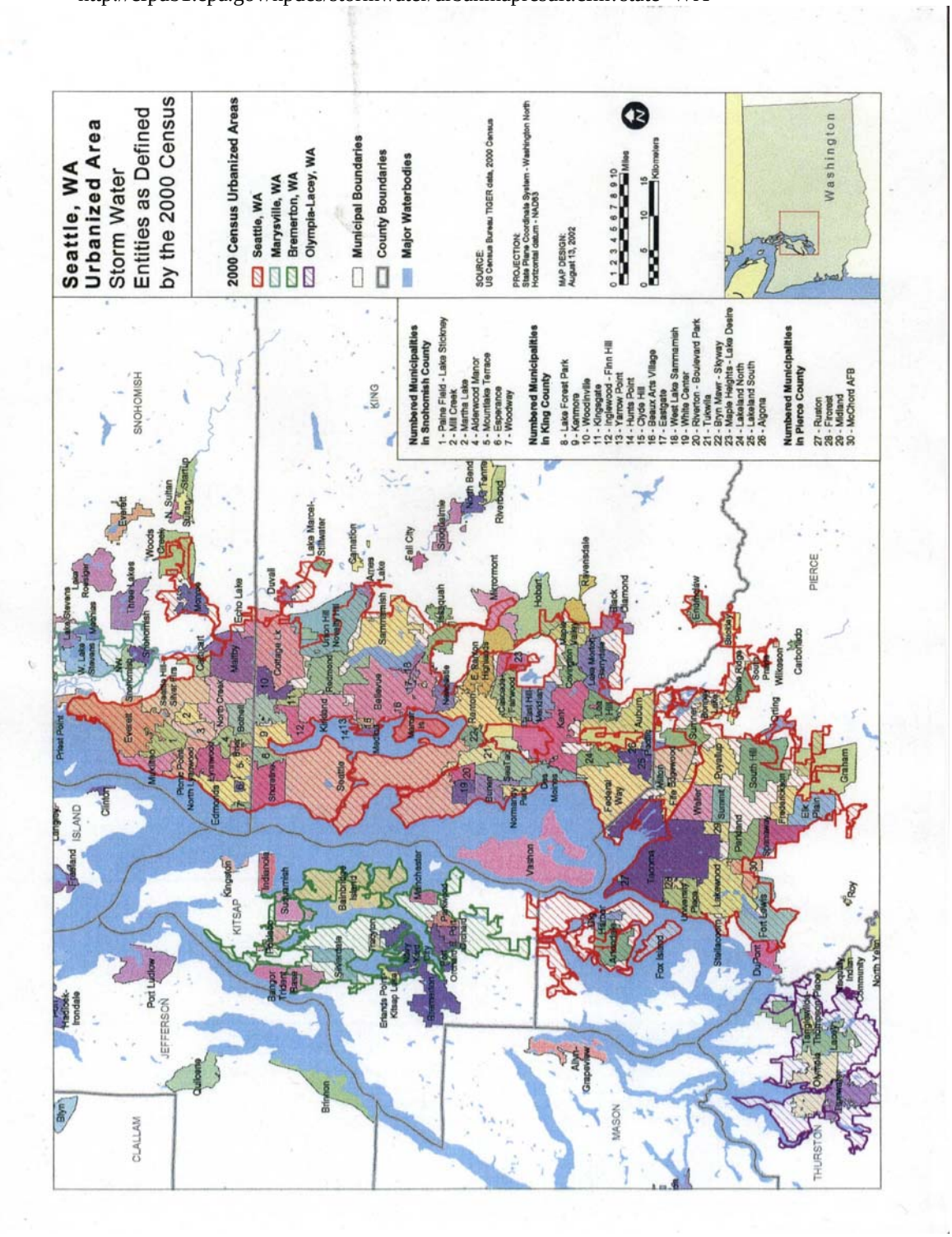
The following maps are included in this appendix:

- **B-1: Map of the Seattle Urbanized Area, as defined by the Bureau of the Census**
- **B-2: Map of JBLM and Vicinity**
- **B-3: Map of Water Resource Inventory Area (WRIA) 11, Nisqually**
- **B-4: Map of WRIA 12, Chambers/Clover**
- **B-5: Map of Murray Creek/Sequalitchew Creek Watershed**
- **B-6: Map of Muck Creek Basin**
- **B-7: Map of Nisqually River Basin**

B-1 Seattle Urbanized Area

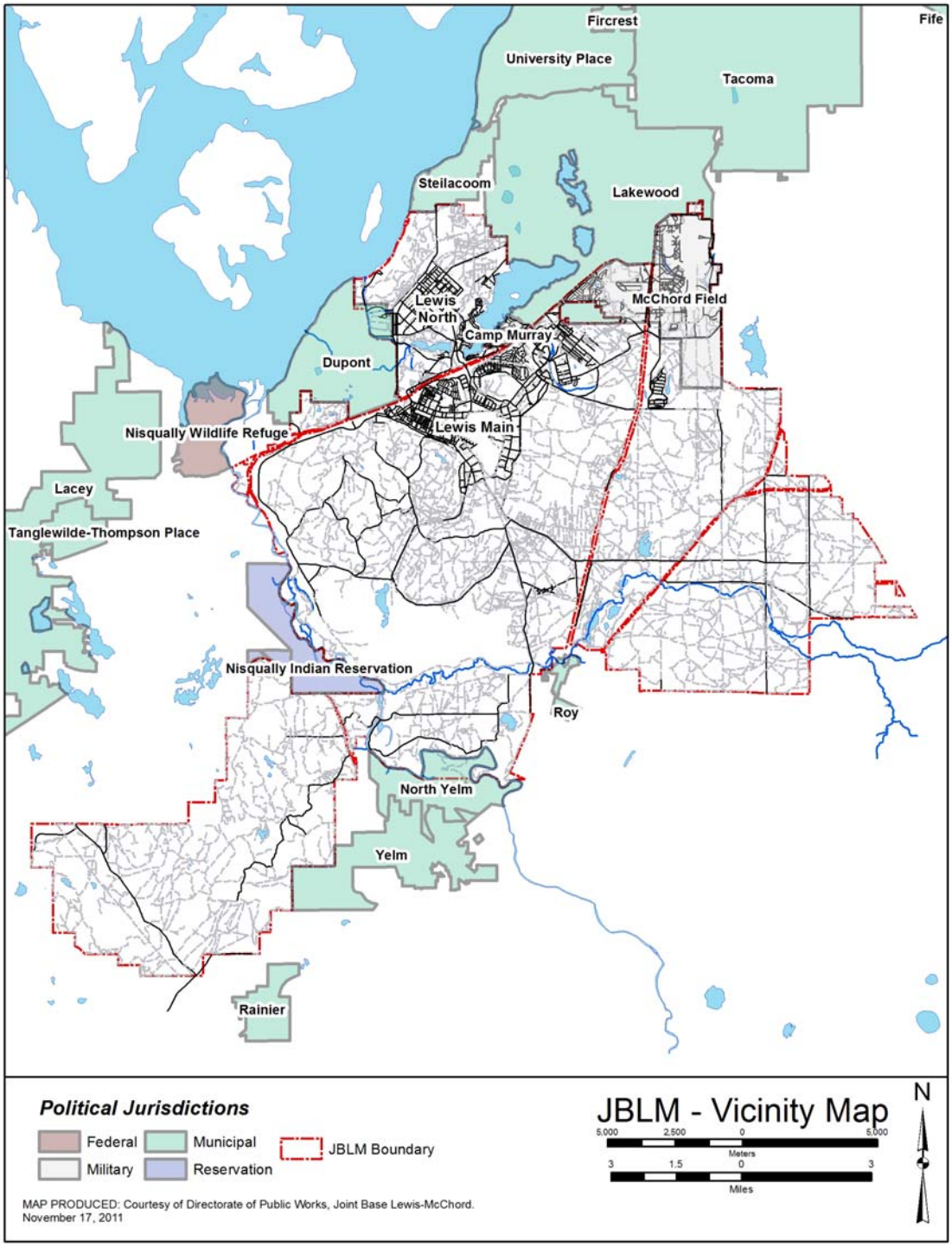
Source: US EPA & US Census Bureau

Additional detailed maps of the Seattle Urbanized Areas can be viewed on-line at http://cfpub1.epa.gov/npdes/stormwater/urbanmapresult.cfm?state=WA



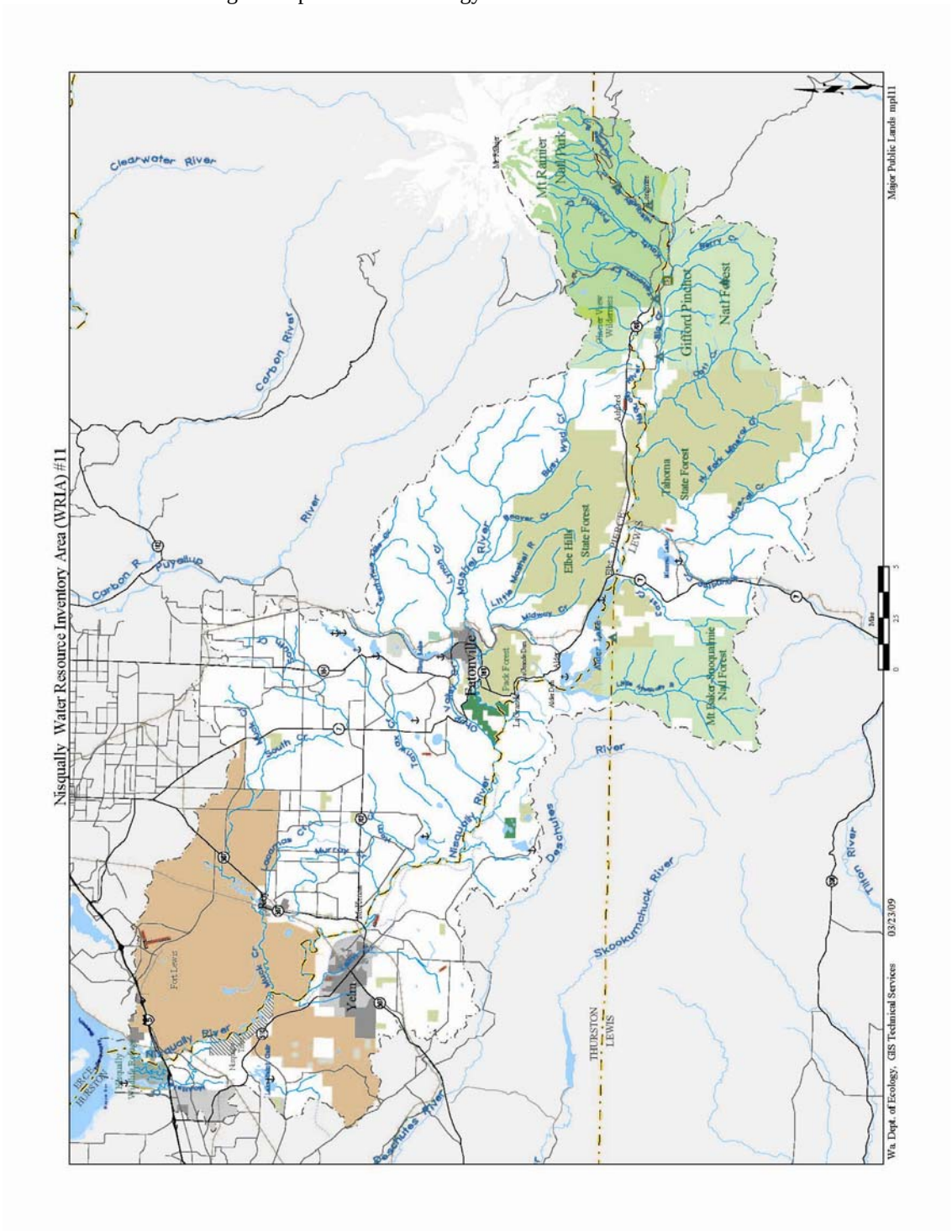
B-2: JBLM Vicinity Map

Source: JBLM Directorate of Public Works



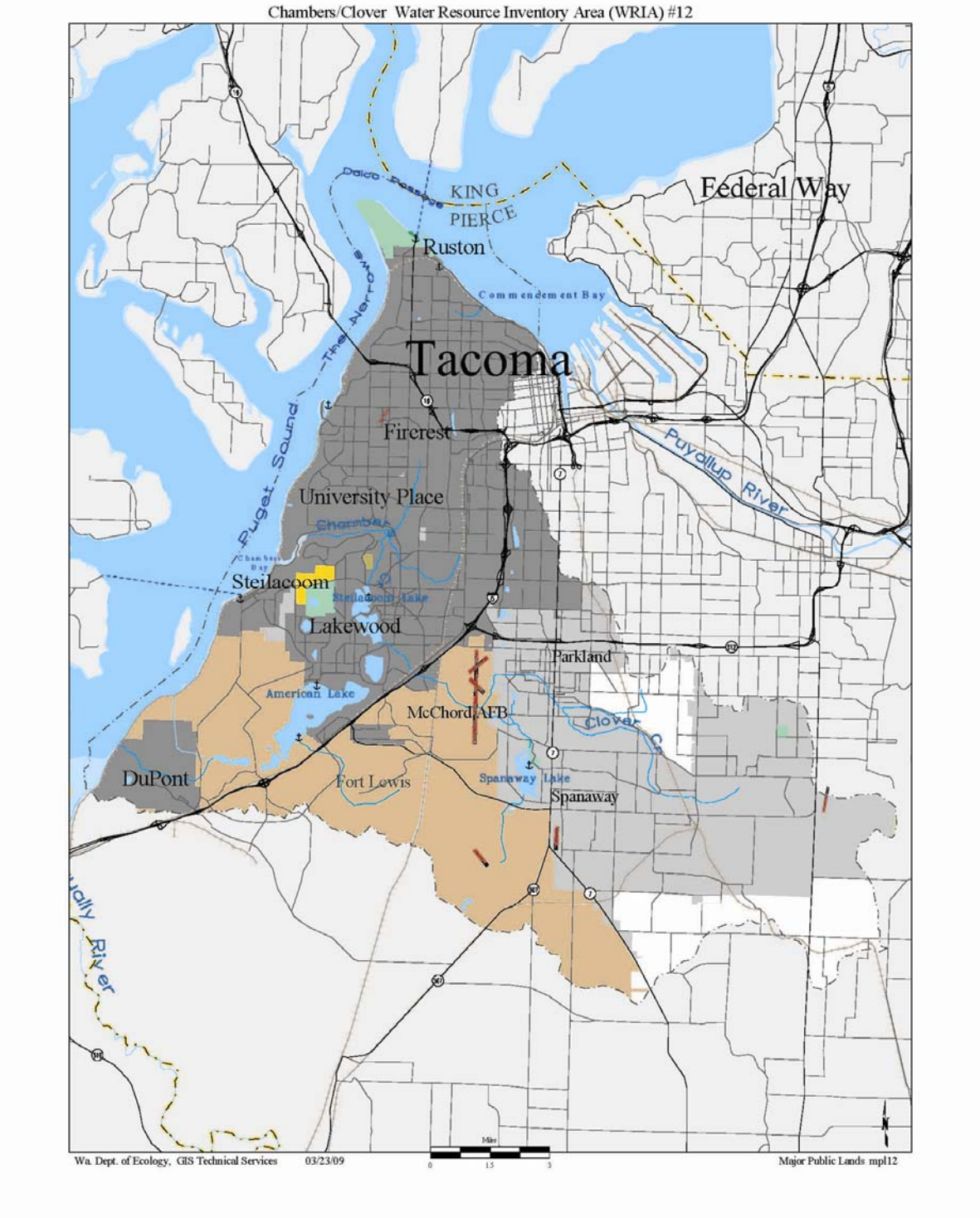
B-3 Map of WRIA 11, Nisqually

Source: Washington Department of Ecology



B-4: Map of WRIA 12, Chambers/Clover

Source: Department of Ecology



B-5: Map of Murray Creek/Sequalitchew Creek Watershed

Source:
Watershed Management Plan- Final - Murray/Sequalitchew Watershed, March 2007

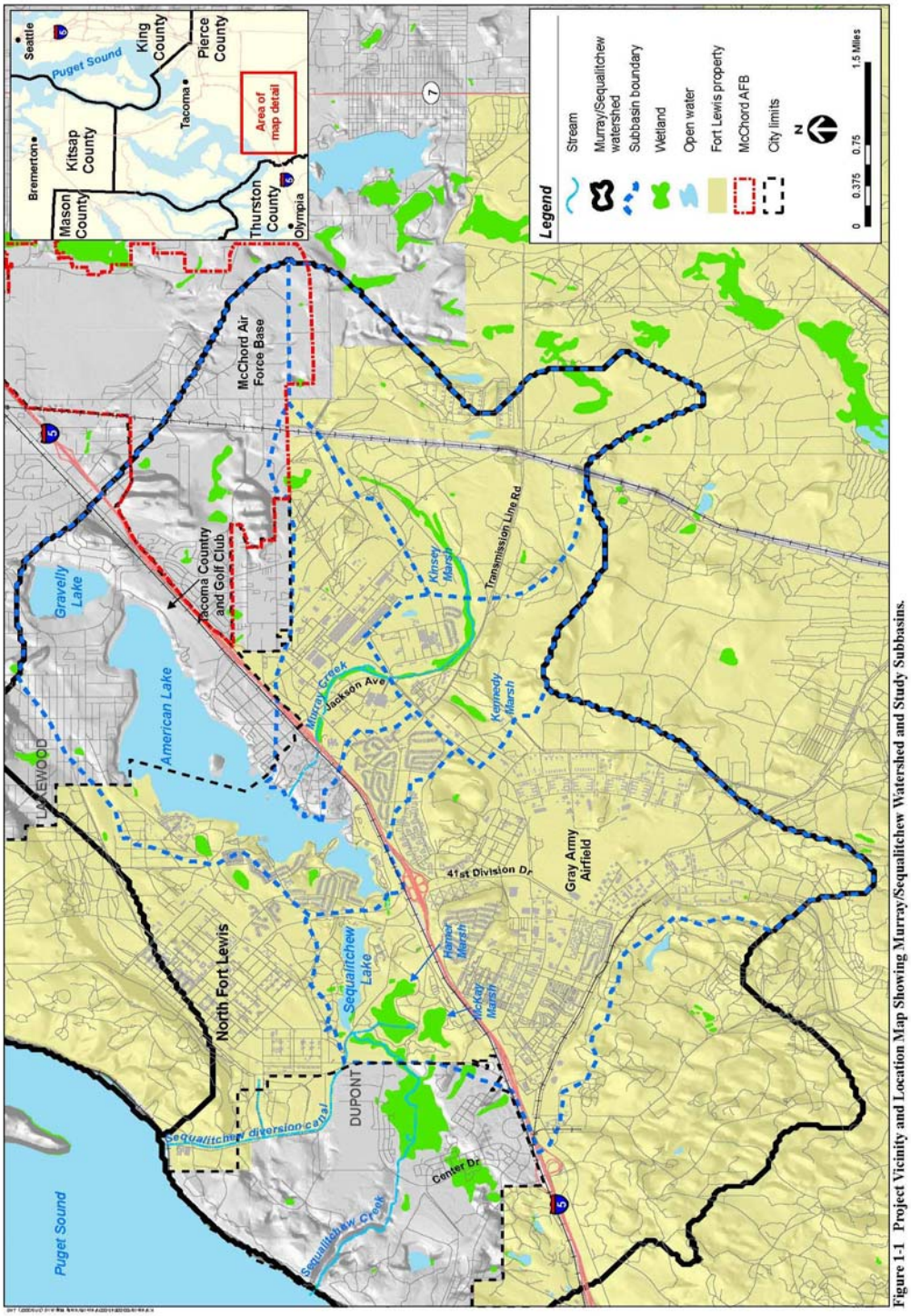
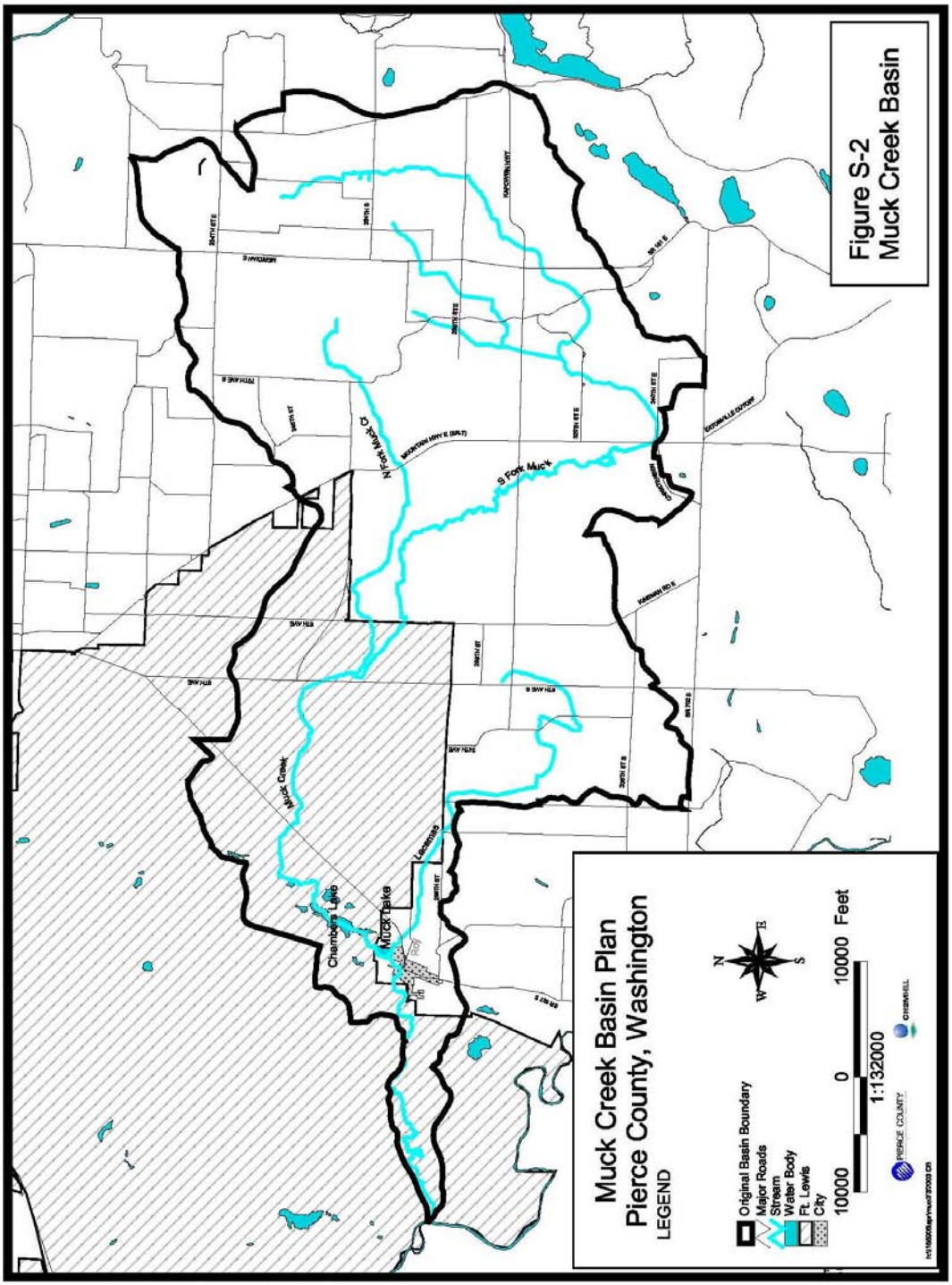


Figure 1-1 Project Vicinity and Location Map Showing Murray/Sequalitchew Watershed and Study Subbasins.

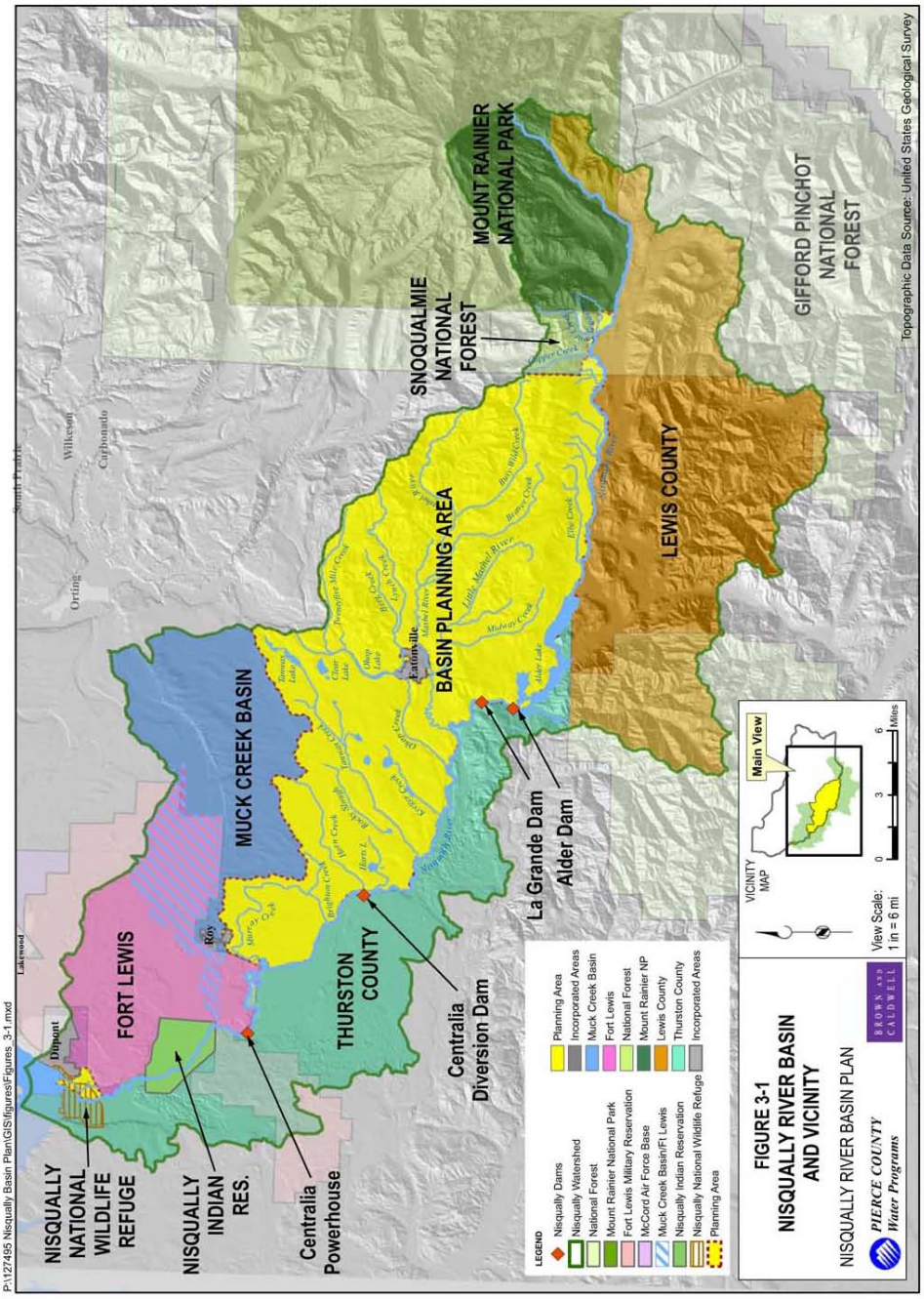
B-6: Map of Muck Creek Basin

Source: Muck Creek Basin Plan
http://www.co.pierce.wa.us/xml/services/home/environ/water/ps/basinplans/muck/FinalExecSummary.pdf



B-7: Map of Nisqually River Basin

Source: Nisqually River Basin Plan
http://www.co.pierce.wa.us/xml/services/home/environ/water/ps/basinplans/nisqually/New082508/NisqBP-Chap3-WEB082508.pdf



Appendix C –January 17, 2012 Letter from Washington Department of Ecology Regarding its Clean Water Act § 401 Certification

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

January 17, 2012

Mr. Michael Lidgard
NPDES Permits Unit Manager
Office of Water and Watersheds
U.S. EPA Region 10
1200 6th Avenue, Suite 900 OWW-130
Seattle, WA 98101-3140

Re: EPA Draft Permit No. WAS-026638 authorizing discharge from Joint Base Lewis McChord, Pierce County, WA

Dear Mr. Lidgard:

The Washington State Department of Ecology (Ecology) received the United States Environmental Protection Agency's (EPA) Draft Fact Sheet and Draft National Pollutant Discharge Elimination System (NPDES) Permit Number WAS-026638 on December 12, 2011. EPA requested a preliminary Clean Water Act (CWA) Section 401 Water Quality Certification (401 Certification) in a letter accompanying the draft permit and fact sheet.

Based on our review, Ecology concurs that the permit will lead to assurance that discharge from the municipal separate storm sewer system (MS4) of Joint Base Lewis McChord (JBLM) will comply with Chapter 173-201A (surface water quality standards) of the Washington Administrative Code (WAC); sediment management standards (Chapter 173-204 WAC); and human health-based criteria in the national Toxics Rule (Federal Register, Vol.57, NO. 246, Dec. 22, 1992, pages 60848-60923). See comments below regarding water quality standards for ground waters of the state.

Ecology recommends the following process to move toward formal certification:

- EPA should include notification for Ecology's letter of intent to issue 401 Certification in the same public notice as the draft permit.
- EPA must address comments on critical issues of the draft permit and fact sheet.
- After Ecology reviews comments received during the joint public notice and receives a final draft permit from EPA, we will proceed with review for 401 Certification.

We understand EPA will request formal 401 Certification once the permit is finalized. Ecology will issue a certification for the final permit if the following general and detailed comments are addressed. The verb *should* is used to indicate recommendations. The verb *must* is used for issues critical for the state's certification of the permit.

General comments on the draft permit and fact sheet:

1. Washington state water quality standards for ground waters (Chapter 173-200 WAC) are not adequately addressed in the draft permit. Consistent with federal rule, section I.B of the draft

JBLM permit authorizes discharges to waters of the United States. Under state authorities (Chapter 90.48 of the Revised Code of Washington (RCW)), Washington MS4 permits authorize discharges to waters of the *state*, which include groundwater. Section VI.B of the draft JBLM fact sheet also fails to include groundwater standards. The JBLM permit requirements must also be applied to groundwater discharges to comply with all state water quality standards. If this cannot be done through modification of the draft permit, it will be a required condition of the state's 401 Certification.

2. The permit must retain runoff controls for new and redevelopment and construction sites that are functionally equivalent to *2005 Stormwater Management Manual for Western Washington* requirements including at a minimum applicable thresholds and definitions in Appendix 1 of the *Western Washington Phase II Municipal Stormwater Permit* issued by Ecology on January 17, 2007. See specific comments below.

3. Ecology is currently seeking public comment on a draft *2012 Stormwater Management Manual for Western Washington*. The *Low Impact Development Technical Guidance Manual* is also currently under revision on a similar schedule. If these manuals are updated prior to EPA's issuance of the final JBLM MS4 permit, EPA should consider relevant applicable revisions to permit requirements for consistency with the updated manuals.

4. The final permit must retain the draft permit and fact sheet language regarding common plan of development. Ecology concurs with the consideration of JBLM as a common plan of development. Therefore the one-acre threshold currently available to Phase II jurisdictions in Washington does not apply to new and redevelopment on JBLM.

Specific comments on draft permit requirements:

1. *State of Washington Requirements (I.B in permit, VI.B in fact sheet)* – These sections should include a discussion of state water quality standards for groundwater.

2. *Illicit Discharge Detection and Elimination (II.B.3 in permit, VII.D.3 in the fact sheet)* –The draft permit fact sheet specifically requests comments on potential addition of non-routine discharges of HVAC or heat pump cooling water; occasional discharges of product water from water purification equipment; and water mixed with non-toxic dyes as "allowable non-stormwater discharges" in the permit. These discharges have the potential to be significant contributors of pollutants unless certain conditions are met and should not be added to the final permit. Current draft permit language for "other non-stormwater discharges" under II.B.3 already provides a mechanism for JBLM to address these discharges through development of stormwater pollution prevention plans.

3. *Stormwater Management for New and Redevelopment (II.B.5 in permit)*
    a. *Subsections a) through e)* propose a 5,000 sq. ft. of land disturbance threshold to trigger requirements. Ecology thresholds are 2,000 sq. ft. new or replaced impervious surface area or 7,000 sq. ft. of land disturbance. The draft permit threshold will result in less stringent requirements for projects creating 2,000 to 5,000 sq. ft. of hard surface, and more stringent requirements for projects that disturb 5,000 to 7,000 sq. ft. of land but do not exceed 2,000 sq. ft. of new and replaced hard surface. EPA should consider options for addressing this discrepancy in thresholds
    b. *Subsection b)* – The second sentence should reference Chapter 3 of Volume I. Also in the second sentence, the "and/or" statement should be "and". The *Low Impact Technical*

Guidance Manual for Puget Sound (2005) does not cover all the stormwater management issues in Volume I of the Ecology manual. The "or" should be deleted to clarify that use of only the low impact development manual is not an option.

c. *Subsection e) 2nd bullet* – This requirement could be open to interpretation. It is likely equivalent to existing Ecology requirements. EPA should revisit this requirement consistent with general comment #3 above.

d. *Subsection e) 3rd bullet* – EPA should clarify that the "pre-development condition" is the same as specified in *Subsection f)*.

4. *Appendix B, Runoff Treatment Requirements*

   a. *Treatment Facility Sizing* – Draft permit language for treatment facility sizing matches current language in the 2005 Ecology manual. However, Ecology is proposing to modify this language in the 2012 update of the manual. EPA should modify the last sentence of the draft permit requirement to; "Alternatively, the simulated daily volume that represents the upper limit of the range of daily volumes that accounts for 91% of the entire runoff volume over a multi-decade period of record when using a continuous runoff model". This will be consistent with the corrections proposed in Ecology's update of the manual.

   b. *Water Quality Design Flow Rate, 1. Preceding Detention...* – Ecology is proposing adding the following to this requirement in the 2012 update of the manual: "At a minimum, 91% of the total runoff volume, as estimated by an approved continuous runoff model, must pass through the treatment facility(ies) at or below the approved hydraulic loading rate for the facility(ies)". EPA should add this statement to the draft permit requirement.

   c. *Water Quality Design Flow Rate, 2. Downstream of Detention Facilities, 2nd bullet* – EPA should replace "PGIS" with "PGHS" for this requirement.

5. *Monitoring (IV.A in permit, VII.F in fact sheet)* – The draft permit fact sheet specifically requests comments on a potential option for JBLM to participate in the Regional Stormwater Monitoring Program (RSMP) currently proposed in Ecology's draft MS4 permits for Western Washington. Ecology is open to further discussion of JBLM's participation in the RSMP.

If you have any questions regarding the comments on the draft permit and fact sheet, please contact Vincent McGowan at 360-407-7320 or vincent.mcgowan@ecy.wa.gov.

Sincerely,

Robert W. Bergquist, LEED© AP
Southwest Region Manager
Water Quality Program

cc: Misha Vakoc, USEPA Region 10
Bill Moore, Ecology
Vincent McGowan, Ecology

Appendix D– Sectors of Industrial Activity That Require NPDES Permit Coverage for Stormwater Discharges

The term "Stormwater Discharges Associated with Industrial Activity," defined in federal regulations at 40 CFR §122.26(b)(14)(i)-(xi), indicates which industrial facilities are potentially subject to the stormwater permit program. Definitions of the 11 industrial categories use either SIC (Standard Industrial Classification) codes or narrative descriptions to characterize the activities. Table D-1 is a summary list of industrial activities listed in the regulations, provided for informational purposes only. Table D-2 contains a decision tree for determining which facilities must have NPDES permit coverage. More information can be obtained through EPA's website at http://www.epa.gov/npdes/stormwater/msgp or by contacting EPA Region 10 directly.

Category (i)
Facilities subject to a stormwater effluent limitation guideline, new source performance standards, or toxic pollutant effluent standards under 40 CFR subchapter N (except facilities with toxic pollutant effluent standards which are exempted under category (xi)). These types of facilities include the following :

40 CFR Subchapter N

405 Dairy products processing
406 Grain mills
407 Canned & preserved fruits & vegetable*
408 Canned & preserved seafood processing
409 Beet, crystalline & liquid cane sugar
410 Textile mills
411 Cement manufacturing
412 Feedlots
414 Org. Chem plastics & synthetic fibers
415 Inorganic chemical manufacturing *
417 Soap and detergent manufacturing
418 Fertilizer manufacturing
419 Petroleum refining
420 Iron and steel manufacturing
421 Nonferrous metal manufacturing
422 Phosphate manufacturing *
423 Steam electric power
424 Ferroalloy manufacturing *
425 Leather tanning and finishing
426 Glass manufacturing *
427 Asbestos manufacturing
428 Rubber manufacturing
429 Timber products processing
430 Pulp, paper, and paperboard*
431 Builder's paper and board mills
432 Meat products
433 Metal finishing
434 Coal Mining *
436 Mineral mining & processing *
439 Pharmaceutical manufacturing *
440 Ore mining & dressing *
443 Paving and roofing materials
446 Paint formulating
447 Ink formulating
455 Pesticide Chemicals *
458 Carbon Black manufacturing

461 Battery manufacturing
463 Plastics molding and forming
464 Metal molding and casting
465 Coil coating
466 Porcelain enameling
467 Aluminum forming
468 Copper forming *
469 Electrical & electronic component
471 Nonferrous metal forming & powders
* some facilities in group do not have limits or standards, see 40 CFR subchapter N to verify

Category (ii)
Facilities classified by the following SIC codes:
24 lumber and wood products (except 2434 wood kitchen cabinets, see (xi))
26 paper & allied products (except 265 paperboard containers, 267 converted paper, see (xi))
28 chemicals & allied products (except 283 drugs,see (xi))
29 petroleum & coal products
311 leather tanning & finishing
32 stone, clay & glass production (except
323 products of purchased glass, see (xi))
33 primary metal industry
3441 fabricated structural metal
373 ship and boat building and repair

Category (iii) Mineral Industry
Facilities classified as SIC codes 10-14 including active or inactive mining operations, and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge stormwater contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations (inactive mining operations are mining sites that are not being actively mined, but which have an identifiable owner/operator; inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, benefication, or processing of mined materials, nor sites where minimal activities are undertaken for the sole purpose of maintaining a mining claim).
SIC Code
10 metal mining (metallic mineral/ores)
12 coal mining
13 oil and gas extraction
14 non-metallic minerals except fuels

Category (iv) Hazardous Waste
Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of the Resource Conservation and Recovery Act (RCRA).

Category (v) Landfills
Landfills, land application sites, and open dumps that receive or have received any industrial waste (waste that is received from any of the facilities described under categories (i) - (xi)) including those that are subject to regulations under Subtitle D of RCRA.

Category (vi)
Facilities involved in the recycling of materials, including metal scrap yards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as SIC 5015 (used motor vehicle parts) and 5093 (scrap and waste materials).

Category (vii) Steam Electric Plants
Steam electric power generating facilities, including coal handling sites.

Category (viii) Transportation
Transportation facilities classified by the SIC codes listed below which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which are otherwise identified under categories (i)-(vii) or (ix)-(xi) are associated with industrial activity, and need
permit coverage.

SIC Code	
40	railroad transportation
41	local and interurban passenger transit
42	trucking & warehousing (except 4221-25, see (xi))
43	US postal service
44	water transportation
45	transportation by air
5171	petroleum bulk stations and terminals

Category (ix) Treatment Works
Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR 403. Not included are farm lands, domestic gardens or lands used for sludge management where
sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with section 405 of the Clean Water Act.

Category (x) Construction
Note: Construction activity in Idaho is permitted through the EPA Construction General Permit, and is not listed here as an industrial activity to be tracked by the MS4 operator(s).

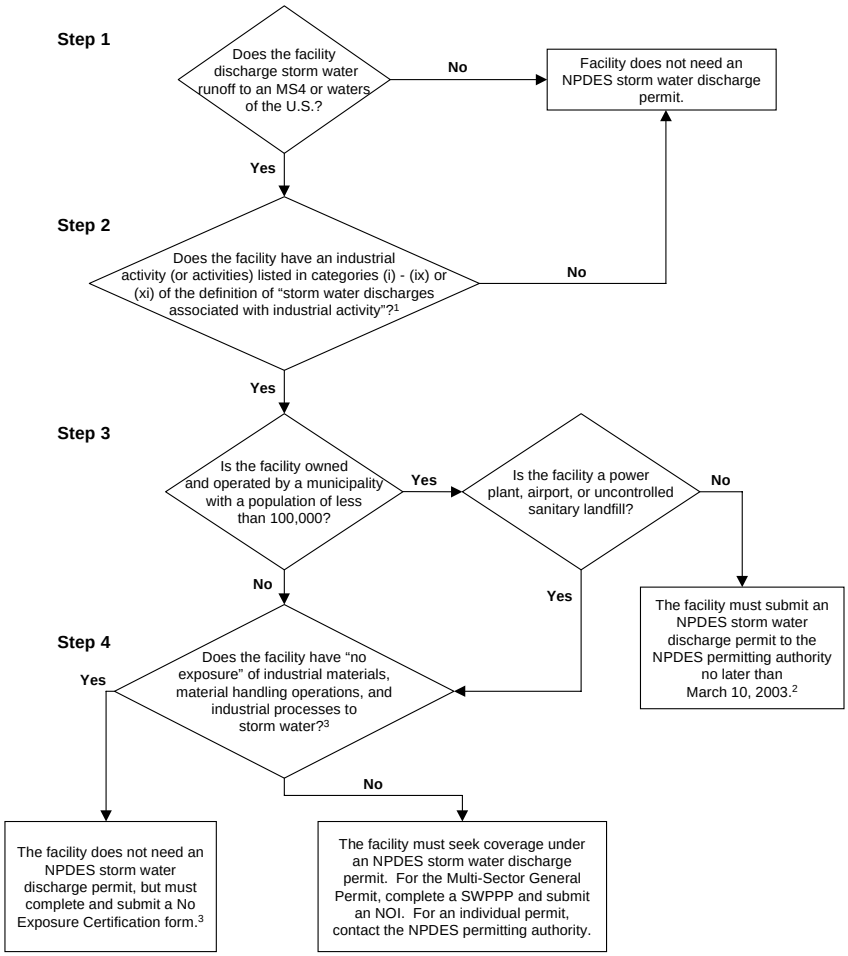
Category (xi) Light industry
Facilities classified by the following SIC codes:

SIC Code	
20	food and kindred product
21	tobacco products
22	textile mill products
23	apparel and other textile product
2434	wood kitchen cabinets
25	furniture and fixtures
265	paperboard containers and boxes
267	miscellaneous converted paper products
27	printing and publishing
283	drugs
285	paints and allied products
30	rubber and miscellaneous plastic
31	leather and products (except 311)
323	products of purchased glass
34	fabricated metal products (except 3441)
35	industrial machinery and equipment
36	electronic and other electric equipment
37	transportation equipment (except 373)
38	instruments and related products
39	miscellaneous manufacturing

4221 farm product storage
4222 refrigerated storage
4225 general warehouse and storage
(and which are not otherwise included in categories (ii) - (x)) with stormwater discharges from all areas (except access roads and rail lines) where material handling equipment, or activities, raw materials, immediate products, final products, waste materials, by-products, or industrial machinery are exposed to stormwater. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate produce, finished product, by-product, or waste product.

Table D-2

Industrial Facilities Storm Water Program Permitting Decision Tree



1. See 40 CFR 122.26(b)(14)(i)-(ix), (xi).
2. See new 122.26(e)(1)(ii). A permit is required unless there is a condition of no exposure as defined at new 122.26(g).
3. See new 122.26(g) for the definition of "no exposure" and the certification requirements.

NOTE: For information about industrial Stormwater Pollution Prevention Plans (SWPPPs), Notices of Intent (NOI), industrial No Exposure Certification, etc. can contact the EPA Region 10 Stormwater Program at (800) 424-4372, extension 6650 or visit the website http://www.epa.gov/npdes/stormwater/msgp.

Appendix E - Suggested Annual Report Format

EPA provides the following format as a possible means of submitting the Annual Report information required under Permit Part IV.C.of this permit. The Annual Report information may be submitted to EPA in electronic format on CD-ROM(s) using universally available document formats, such as Microsoft Word, Adobe Acrobat PDF or other available means. However, please note that while the Annual Report text can be submitted in electronic format, the required certification statement must be signed and dated in hard copy by the permittee as directed in Permit Part VI.E. of this permit. *Other guidance on the required elements of the Annual Report is provided in italics below.*

A. PERMITTEE INFORMATION

Permit Number: _____

Permittee:_____

Mailing Address:
_____

City, State and Zip Code:
_____

Phone Number: _____

Have any areas been added to the MS4 due to annexation or other legal means? YES NO
(If yes, include updated map.)

B. REPORTING PERIOD _____ to _____

C. STATUS OF STORMWATER MANAGEMENT PROGRAM

For each of the six minimum control measures in Permit Part II.B. regarding public education, public participation/involvement, illicit discharge detection and elimination, construction runoff control, post-construction runoff control, and good housekeeping for municipal operations) address each of the following items. The status of each program area must be addressed, even if the program area was completed and fully implemented in a previous reporting year or has not yet been implemented yet. (Depending on the size of the municipality and the complexity of the programs, the attachments for this section will likely comprise 1 to 5 pages per control measure.)

a. General summary of accomplishments to date.
b. An evaluation of compliance with the requirements of this permit, the appropriateness of identified BMPs, and progress toward achieving identified measurable goals of the SWMP for each minimum control measure.
c. Results of any information collected and analyzed during the previous 12-month reporting period, including stormwater discharge data, surface water monitoring data, and any other information used to assess the success of the program at

reducing the discharge of pollutants to the maximum extent practicable. *Examples of data sources other than monitoring data include survey/polling results, miles of riverbank cleaned up, number of illicit discharge complaints addressed; number of hits on a website before and after a public education campaign, etc.*

d. A summary of the number and nature of inspections and formal enforcement actions performed.

e. A general summary of the activities the permittee will undertake during the next reporting cycle (including an implementation schedule) for each minimum control measure. *Provide a short summary based on the Stormwater Management Program implementation schedule. .*

f. Proposed changes to the SWMP, including changes to any BMPs or any identified measurable goals for any minimum control measures since previous report or permit application. *Significant changes that involve replacing or deleting an ineffective or unfeasible BMP may require permit modification as outlined in Part II.E .*

g. Notice if the permittee is relying on another entity to satisfy some of the permit obligations, if applicable. *Another entity may be relied on to perform requirements of your MS4 permit. However, as the permittee, the MS4 operator remains liable for compliance with the terms of the permit if the requirements are not fulfilled. The permittee must complete this Annual Report for the geographic areas covered under its permit, for all program areas, even if one or more program elements is being performed by another entity.*

D. OTHER REQUIRED DOCUMENTS AND REPORTS

Include documents such as the Structural Control Plan, monitoring reports, etc.

E. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Permittee (legally responsible person)
Date Signed
Name & Title (printed)

Note: Collection of Annual Report information required under 40 CFR ' 122.34(g)(3) is covered under Paperwork Reduction Act Information Collection Request #1820.03, OMB NO.: 2040-0211, Expiration Date: 06/30/2006.

Appendix F – Comparison of Hydrologic Performance Standards

In Permit Part II.B.5.e (third bullet), EPA provides two alternative options for a hydrologic performance standard for projects that disturb 5,000 square feet or more and create or replace 5,000 square feet or more of hard surface. Each of the standards is an example of a mitigation strategy to reduce the impacts of stormwater runoff.

- The first option is a volumetric standard that specifies that stormwater controls are designed to retain on-site the volume of stormwater runoff produced at the site from up to and including the 95th percentile rainfall event to the maximum extent technically feasible (METF) and that the stormwater controls are operated and maintained to perform according to their design (hereafter referred to as the "95% volumetric standard").

- The second option is a flow control standard that specifies that post development stormwater discharge flows will not exceed pre-developed discharge flows for the range of 8% of the 2-year peak flow through 50% of the 2-year peak flow, as calculated using an approved continuous simulation model such as the Western Washington Hydrology Model (WWHM) (hereafter referred to as "Ecology's LID performance standard").

- EPA has found that the 95% volumetric standard and Ecology's LID performance standard, when compared, are functionally equivalent for assumed soil infiltration rates greater than 0.2 inches per hour, which represents soil conditions in/around the JBLM subinstallation.

The purpose of this Appendix is to compare these two different performance standards in terms of the expected mitigation, assuming the requirements of each standard were to be properly implemented and each standard fully met. Modeling results of predicted stormwater runoff under these two different mitigation strategies are described below to illustrate the expected mitigation under each hydrologic standard.

EPA has provided alternative performance standards for new development and redevelopment projects that disturb 5,000 square feet or more, and create or replace 5,000 square feet or more of hard surface, for multiple reasons:

1. The implementation of a flow control standard requires the use of continuous simulation modeling and expertise in interpreting the model's results. However, the 95% volumetric standard approach would provide a standard that is more easily calculable. Moreover, the concept of stormwater volume reduction is easy to understand and communicate to the general public.

2. The Ecology LID performance standard option is a variation on the flow control standard mandated for projects that disturb 10,000 square feet or more (see

Permit Part II.B.5.f). Therefore, a stormwater manager or engineer may wish to maintain consistency with this approach instead of using a different methodology for smaller projects.

Both the 95% volumetric standard and Ecology's LID performance standard are quantifiable, technically feasible and economically achievable. Moreover, both approaches provide significant environmental benefits by restoring site hydrology towards its natural condition. However, there is some uncertainty as to whether one performance standard provides more protection against stormwater flows compared to the other.

Because of the apparent differences between the two performance standards, EPA chose to simulate runoff from a theoretical site designed to meet the 95% volumetric standard using a continuous simulation model to evaluate the standard's long term ability to reduce runoff. The results from this analysis were compared to results from the same theoretical site designed to meet Ecology's LID performance standard to highlight the similarities and differences between the two mitigation strategies.

It should be noted that the 95% volumetric standard compared in this Appendix is not functionally equivalent to the hydrologic performance flow control standard required for larger projects disturbing 10,000 square feet or more (such larger sites are required in the Permit to match flows for the range between 50% of the 2-year peak flow to 100% of the 50-year peak flow); the flow control standard for larger new/redevelopment sites provides a much greater level of protection to receiving waters. The flow control standard for larger projects ensures protection against flows with a frequency of 1% or less (i.e., the top 1% most infrequent flows that are known to cause the most erosive impacts to streams). By protecting against the rare but high flow events, this flow control standard more closely matches predevelopment hydrology for the higher magnitude range of historic runoff flows.

Brief Background: Hydrologic Modeling and Flow Duration Curves

As humans develop land, increases in stormwater runoff are generated because pervious surfaces that allow rain water to drain into the ground are replaced with impervious surfaces the prevent water from draining to deeper groundwater. To understand the anthropogenic impacts of development on the water cycle, it is common to compare the changes in stormwater runoff due to development using hydrologic models. With continuous simulation hydrologic models, it is possible to utilize long term historic precipitation data to predict the expected amount of stormwater runoff from a given property. Because these models provide runoff output continuously throughout the entire time frame being modeled, they generate large numbers of runoff flow measurements. For example, a model that uses a thirty year record of precipitation as its input and designed to provide results reflecting the hourly amount of runoff for a specific site over that time frame will generate results reflecting over 260,000 discharge flows for that 30 year period.

A flow duration curve is a useful visualization tool used by hydrologists and engineers to summarize a large amount of hydrologic information in a concise way. A flow duration curve is a plot that shows the percent of time stormwater discharges of various sizes were equaled or exceeded during a given period. It combines in one curve the flow characteristics from a property throughout the range of discharge, without regard to the sequence of occurrence (i.e., it is not chronological or sorted by time).

Rain events range from very small storms (with no measurable precipitation) to very large storms that generate massive amounts of rain. Typically, smaller and medium sized storms are more frequent, while the larger storms are rare, and happen on fewer occasions. Small storms that occur more frequently do not generate large quantities of rainwater and are expected to produce very small or negligible amounts of stormwater discharge flows. Most of the rain water will drain into the soil, be intercepted or transpired by vegetation, or evaporate back to the atmosphere. Conversely, large torrential rain storms are exceptional and rare, and are likely to generate large discharges of stormwater runoff from a parcel of land. Thus, there is a wide range of possible stormwater discharges from a given parcel of land. Interpreting the impacts of these discharges can be difficult unless they are organized in some way. A flow duration curve sorts these flows by magnitude and calculates how frequently each flow magnitude occurs during the given period of record.

An example flow duration curve is shown in Figure F-1 below. The Y axis shows the range of flows, or stormwater discharges, that have occurred (or were predicted to occur using a model) during a particular period of record. The larger flows, in units of cubic feet per second (cfs), are located at the top of the Y axis. The X axis shows the percent of time during the period of record that a given flow was exceeded. It is a way of describing how frequent or how rare a flow of a given magnitude is relative to all other flows. It can also be interpreted as the likelihood that a flow of that magnitude would occur again in the future at a given location if the period of record used to generate the flow duration curve represents the long term historical record for that location. Note the X axis is frequently shown in logarithmic scale to better visualize the plot values at very low exceedance percentages.

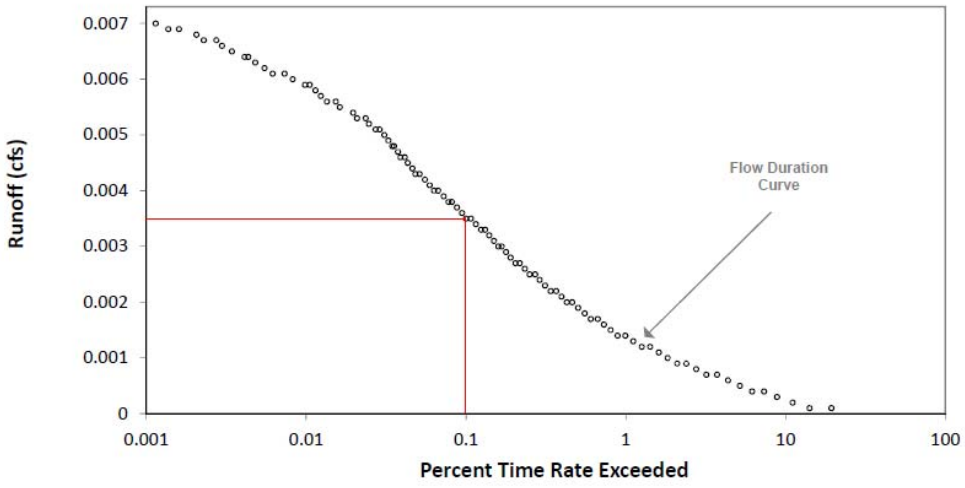


Figure F-1: Example Flow Duration Curve

Using our model example and the flow duration curve above, there are a total of 262,800 hourly flow values estimated by our model. Of the total number of flow estimates, let's say there were at least 260 hourly estimates generated that were greater than or equal to a certain flow (e.g., 0.0035 cfs). In this case, only 0.1% of the flow values would be greater than or equal to 0.0035 cfs (This is because [260/262,800]*100 = ~0.1). Thus, 0.0035 cfs would correspond to the 0.1% time exceeded value of the flow duration curve.

Ecology's LID Performance Standard

The proposed Ecology LID performance standard requires matching the predevelopment flow duration curve between two flow values: 8% of the 2-year peak flow and 50% of the 2-year peak flow. See Figure F-2. The 2-year peak flow is the flow that has a reoccurrence interval of 2 years, which is the same as saying this flow, has a 1 in 2 probability of occurrence (50% chance of occurring) in any given year. (For comparison, the 100-year peak flow would have a reoccurrence interval of 100 years and a 1 in 100 probability of occurrence (1% chance of occurring) in any given year.) The 2-year peak flow will vary from site to site due to differences in local precipitation and soil properties.

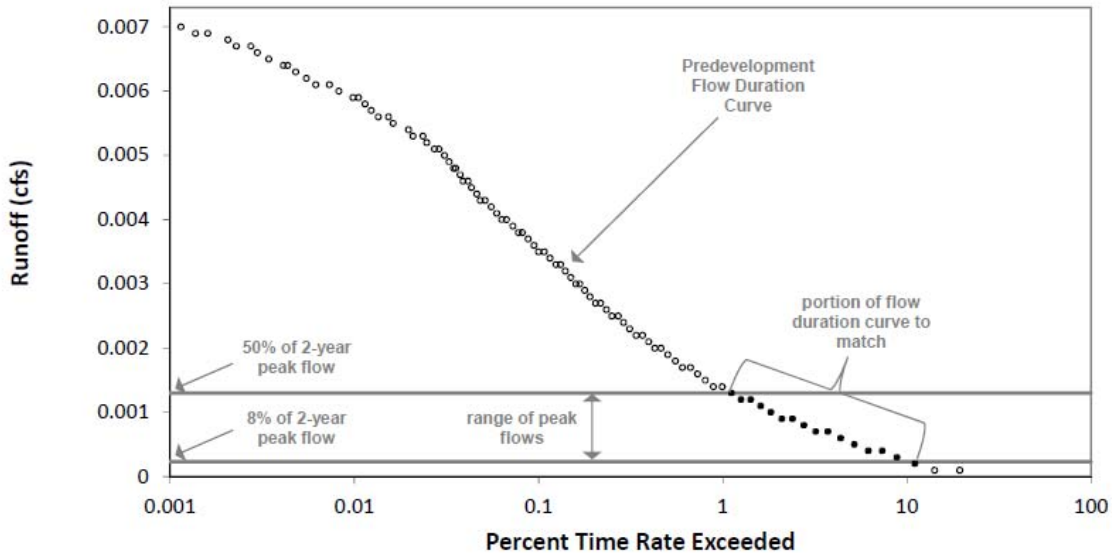


Figure F-2. Illustration of the Flow Duration Curve for Ecology's LID performance Standard

Interpreting Modeling Results

The 8% and 50% of the 2-year peak flow values define the range of the flow duration curve for a predevelopment (or undeveloped) site that must be matched after development occurs. In order to do this, the flows from any disturbed land/building/other hard surface development at the site within this specified range must occur at the same frequency- or less frequently- than they would occur if the site was not developed and left in its vegetated state. (Stated another way, the flow standard will be met if, for a given frequency, the flows are smaller than those defined in the predevelopment curve.) When translated to the flow duration curve, flows that meet or exceed the standard will be below and/or shifted to the left of the curve; flows that fail the standard will be greater than and/or shifted to the right of the curve. See Figure F-3.

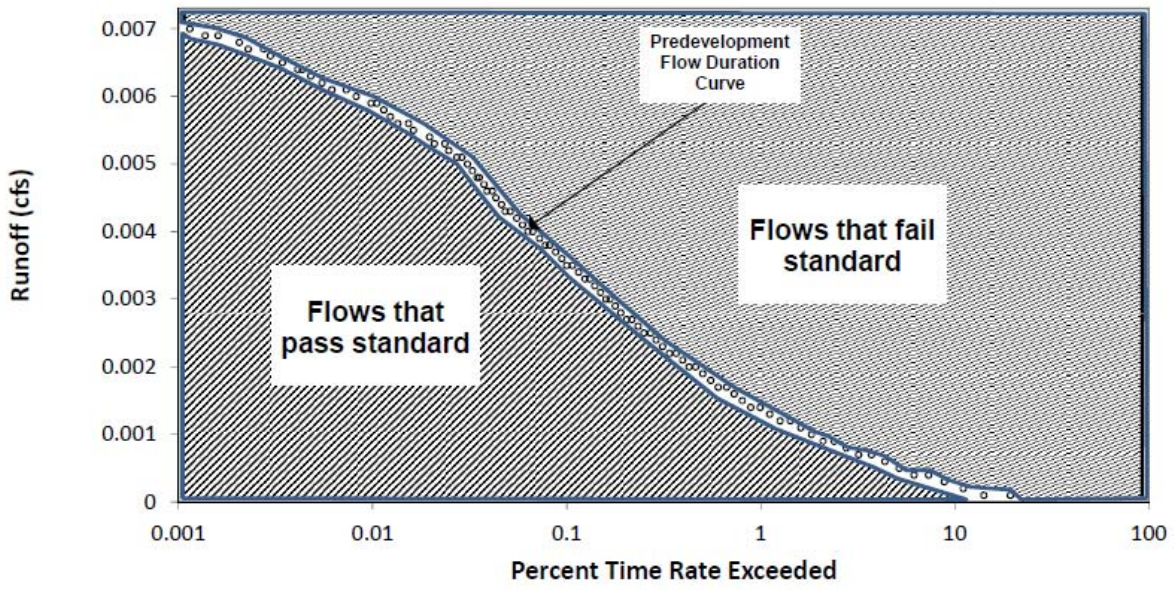


Figure F-3: Interpreting Model Results on the Flow Duration Curve

EPA's Methodology Used to Compare the 95% Volumetric and Ecology LID Performance Standards

To evaluate differences between the 95% volumetric and Ecology LID performance standards, EPA ran continuous simulation models to generate expected runoff, assuming stormwater management best management practices (BMPs) at the site were designed to meet each performance standard. For both analyses, runoff values were generated using the Western Washington Hydrology Model version 3 (WWHMv3). The parcel of land in each analysis was 5,000 ft^2. Predevelopment runoff conditions were modeled as a fully forested site on Type C soil with zero slope. Postdevelopment runoff was modeled assuming conversion of 100% of the site to impervious cover, with zero slope. EPA understands that JBLM has soils that typically behave differently than type C soils in that they tend to have higher infiltration rates. However, EPA made this model assumption, as well as the 100% conversion to impervious surface, in order to model the "worst case scenario" that would generate the greatest amount of stormwater runoff.

EPA selected three different cities in Puget Sound to determine the effect of location on the comparison between the different standard options: Port Townsend, Seattle, and Olympia. Each location has differing historic precipitation patterns and accumulations, with Olympia receiving the most annual precipitation and Port Townsend receiving the least. For each location, historic rainfall records were used to calculate the 95^{th} percentile storm event. This value was then used to quantify the volume of the design storm for the volumetric performance standard (Port Townsend: 0.69 in; Seattle: 1.01 in; Olympia: 1.28 in). The period of record of

historic rainfall data for each city are as follows: Port Townsend, 50 years (1948-1998); Seattle, 49 years (1948-1997); Olympia, 43 years (1955-1998).[29]

EPA assumed a bioretention facility is installed at the theoretical development site to achieve compliance with the 95% volumetric standard. Bioretention cells were modeled with 6 inches of ponding depth and 2 feet of bioretention soil. Porosity/voids space was homogenous for the soil mixture (40%). Infiltration to native soil was assumed to be 0.2 inches per hour (in hr^{-1}), a conservative representation of soils at JBLM. Bioretention cells were modeled without underdrains. Side slopes were modeled with a 3:1 slope. Infiltration was set to exclude wetted surface areas (i.e., sidewalls) effectively limiting the bottom surface of the cell as the only area used to infiltrate runoff to the native layer.

Bioretention cell volumes (including ponding depth) were sized to accommodate the volume of precipitation from the 95th percentile rain event. For example, the 95th percentile rain event for Seattle, WA is 1.01 inches. Assuming equal rainfall over the entire parcel (5,000 ft^2), such an event would create 0.0097 acre-feet of generated runoff for a 100% impervious site. Taking into consideration porosity/void space, the bioretention cell was sized at to accommodate this volume (19.2 x 11.0 x 2.5 ft).

To evaluate compliance with Ecology's LID performance standard, the runoff from a developed site must match the flow duration curve assuming the predevelopment condition for that location. In other words, the performance standard requires that the runoff generated from the developed site produces flows with the same (or less) frequency as flows that would have occurred if the site was undeveloped/undisturbed. For Ecology's LID performance standard, the flows that define this range of flows are the 8% of the 2-year peak flow, and the 50% of the 2-year peak flow. If a developed project site were to fully comply with this performance standard, stormwater flows from the developed site would match – and never exceed- the predeveloped flow duration curve for the site. Thus, EPA uses the predevelopment flow duration curve within this range to compare to the flows from the modeled 95% volumetric standard scenario results.

Model Comparison Results

Table F-1 summarizes the specifications for the bioretention cells used to mitigate runoff under the 95% volumetric standard scenario. Continuous simulation indicated that bioretention facilities were able to infiltrate approximately 80% of all runoff generated during the period of record in the 95% volumetric standard development scenario model. Note: the

[29] Calculation of the 95th percentile storm from the rainfall record is described in detail in EPA's Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act and Hirschman, David and John Kosco. 2008. *Managing Stormwater in Your Community: A Guide for Building an Effective Post-Construction Program*, Center for Watershed Protection,www.cwp.org/postconstruction.

sizing factor is a unitless value describing the percentage of the parcel area occupied by the bioretention facility footprint. In each location-specific model, the bioretention facility was less that 6% of the areal extent of the parcel.

Table F-1. Summary of bioretention facilities used in the modeling of the 95% volumetric standard.

Effect of Location on Bioretention Facility for 95th Percentile Standard						
	Volume Infiltrated (%)	Infiltration Rate (in/hr)	Sizing Factor (unitless)	Length (ft)	Width (ft)	Volume (ac-ft)
Port Townsend (0.69 in)	81.7	0.2	2.9	7.6	19.2	0.0066
Seattle (1.01 in)	82.1	0.2	4.2	11.0	19.2	0.0097
Olympia (1.28 in)	79.2	0.2	5.4	14.1	19.2	0.0122

Figure F-4 below shows the flow duration results from the 95% volumetric standard modeled using bioretention for Olympia, WA. The black circles in the graph (labeled Predevelopment Forest- Olympia) reflect a predevelopment flow duration curve for a forested site condition, the representation of Ecology's LID performance standard for the theoretical site. The horizontal grey lines of the graph are labeled to signify the various flow thresholds for each standard at the hypothetical 5,000 ft^2 parcel: the 8% of the 2-year peak flow and 50% of the 2-year peak flow (0.00033 cfs and 0.002085 cfs, respectively). The blue crosses (labeled Olympia 95th Percentile Event) signify the flow duration curve for the mitigated scenario which uses bioretention to manage runoff from the hypothetical 5,000 ft^2 parcel with 100% impervious development. [Note that the Y axis scale on subsequent example Figures in this Appendix is different for each city's flow duration curve due to location-specific differences in historic precipitation (each location has different threshold values as well). The X axis is consistent across all figures.]

To meet Ecology's LID performance standard, discharge durations from the project site must match or be lower than the predevelopment flow duration curve created by the black circles/Predevelopment Forest- Olympia between the range of flows from 8% of the 2-year peak flow and 50% of the 2-year peak flow (i.e., between the bottom two grey lines). From Figure D-1, it is clear that discharge flows under the 95% volumetric standard management scenario (i.e., the blue line) would also pass Ecology's LID performance standard because flow rates are lower than and to the left of those of the predevelopment curve (as indicated by the black circles) within the range specified by the 8% and 50% of the 2-year peak flow values.

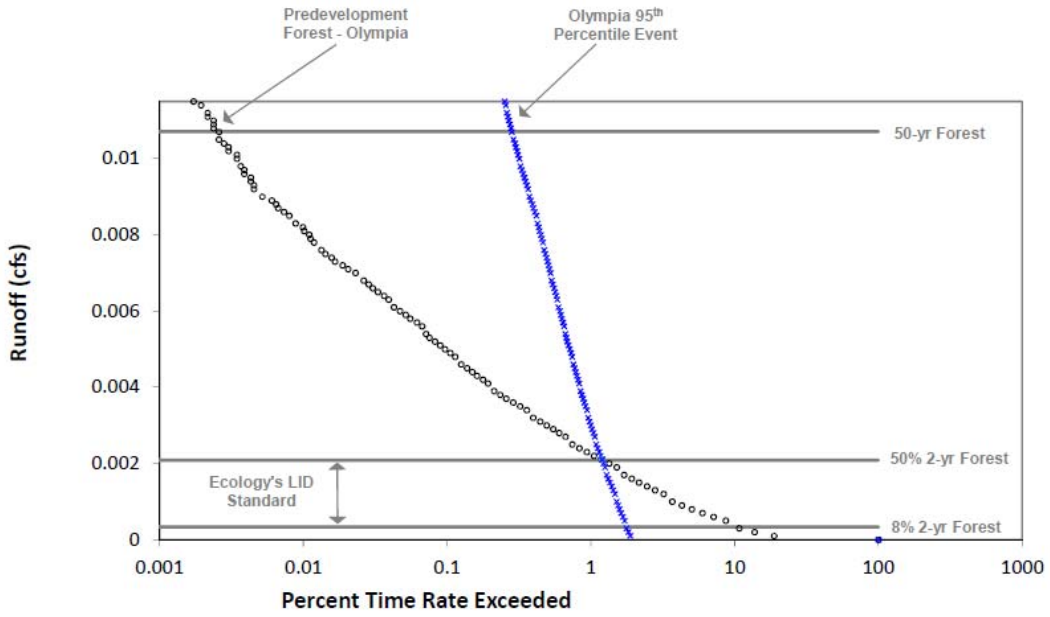


Figure F-4. Flow duration comparison of the two hydrologic performance standards for Olympia, WA.

Bioretention facilities function as short-term storage for stormwater runoff until one of two events occurs: a) the runoff is infiltrated into the underlying native soil layer or b) the capacity of the bioretention facility is exceeded and runoff in excess is released unchecked as surface sheet flow. Runoff flows are generated whenever the bioretention capacity is exceeded, either because the storm event generated more rain than the capacity of the facility or the facility was filled with water from an antecedent precipitation event and could not handle additional runoff. Thus, it is intuitive that the 95% volumetric standard scenario produces essentially zero discharge until runoff reaches a certain level; after that point, the runoff generated in that management scenario increases rapidly (as indicated by the sharp increase in values just before 1% on the X axis).

Once the blue line/Olympia 95th Percentile Event crosses the black line/Predevelopment Forest (at approximately 1.2% percent), the flows generated under the 95% volumetric standard scenario exceed those acceptable for meeting the hydrologic performance flow control standard (see Permit Part II.B.5.f.). Thus, the 95% volumetric standard does not minimize the larger (and therefore rarer) discharge flows to a sufficient level necessary in order to comply with a flow control standard other than the Ecology LID performance standard.

In other words, the 95% volumetric standard is much less protective than the hydrologic performance flow control standard that requires matching the predevelopment flow duration curve for larger storms/runoff flows. However, the 95% volumetric standard is sufficient to comply with Ecology's LID performance standard for smaller storms/runoff

flows. The two standards are functionally equivalent at mitigating runoff discharge flows for the range of flows from 8% of the 2-year peak flow to 50% of the 2-year peak flow.

Similar results are evident for modeling scenarios in Seattle, WA and Port Townsend, WA (Figures F-5 and F-6 below). Thus, it appears the functional equivalence of Ecology's LID performance standard and the 95% volumetric standard holds true for a wide range of precipitation patterns found in Western Washington.

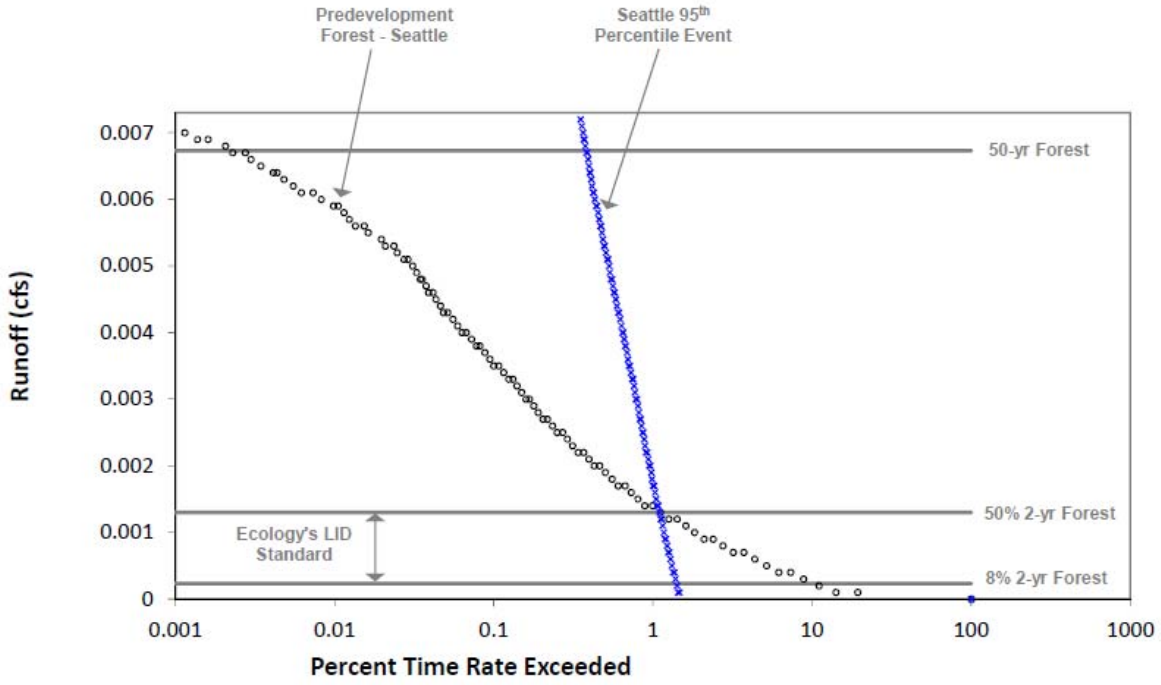


Figure F-5. Flow duration comparison of the two hydrologic performance standards for Seattle, WA.

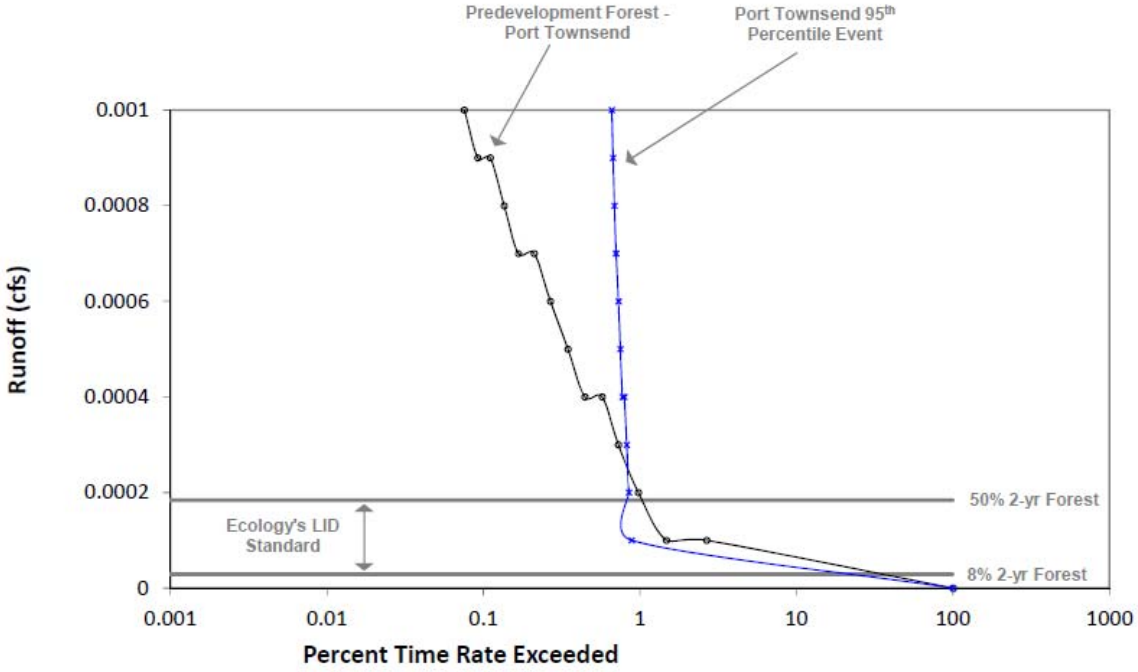


Figure F-6. Flow duration comparison of the two hydrologic performance standards for Port Townsend, WA.

Results of This Model Comparison Using Other Site Conditions

The infiltration rate for the native soil layer is a critical condition that determines the functional performance of any infiltration BMP. To examine how native infiltration rate affects the performance of the 95% volumetric standard, infiltration rate was varied and the Olympia, WA model was rerun using identical assumptions as the initial scenario. Figure F-7 shows the results of this exercise. As the infiltration rate decreases from 0.2 in hr^{-1} to 0.1 to 0.05 in hr^{-1} (labeled as blue cross/0.2", green triangle/0.1", and red square/0.05" lines, respectively), the ability of the bioretention facility to infiltrate runoff decreases. As a result, stormwater drains from the facility at a slower rate and water is retained in the facility for a longer period of time. As subsequent storms create new runoff discharge, the ability of the facility to retain and store that additional water decreases. Using infiltration rates of 0.1 and 0.05 in hr^{-1}, modeled bioretention facilities were able to infiltrate approximately 61.9 and 42.5%, respectively, of all runoff generated during the period of record.

Due to the reduced capacity to infiltrate runoff, the hypothetical bioretention facility designed to retain the 95th percentile storm event as modeled has reduced stormwater volume retention performance. The flow duration curves under each subsequently lower infiltration scenario move to the right in the graph, indicating that flows offsite for any given magnitude storm are predicted to occur at a greater frequency as a result of the reduced infiltration. By

shifting to the right, these flow duration curves cross the predevelopment flow duration curve (represented by the black circles/Predevelopment Forest) within the range of Ecology's LID performance standard. Because the lower infiltration scenario curves do not match the flow duration curve for the entire range specified by Ecology's LID performance standard, the 95% volumetric standard under these assumed conditions for the theoretical site is not functionally equivalent to Ecology's LID performance standard.

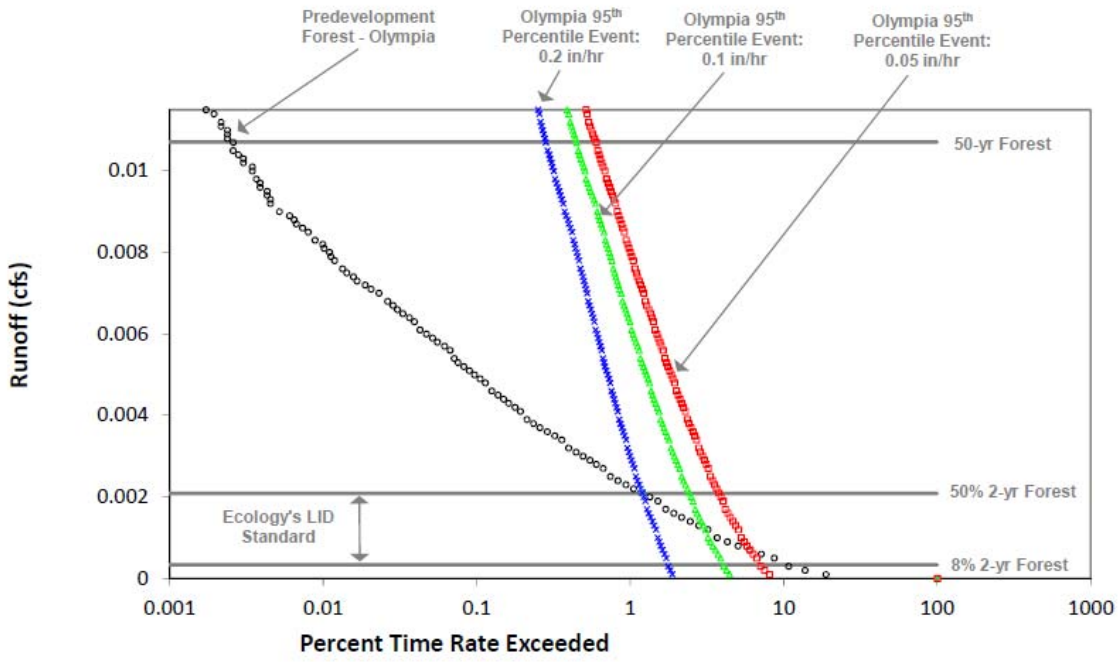


Figure F-7. Flow duration comparison of the 95% volumetric standard under different infiltration rates for Olympia, WA.

Summary

Based on the analysis outlined above, it is estimated that Ecology's LID performance standard and the 95% volumetric standard compared are functionally equivalent. This equivalence is true only for assumed soil infiltration rates greater than 0.2 inches per hour, which represents soil conditions in/around the JBLM subinstallation.