

AGENDA

Clallam County Planning Commission

**PC Meeting of August 18, 2021
Clallam County Courthouse
223 East Fourth Street, Port Angeles
6:00 p.m.**

The Clallam County Planning Commission will conduct a regularly scheduled meeting appearing both in-person and via Zoom video conferencing on August 18, 2021 at 6pm. To appear by Zoom please visit <https://zoom.us/join> or call (888) 475-4499 or (253) 215-8782, then enter Meeting ID: 660 165 2237 and Passcode: 12345.

The information provided to the Commission in preparation for this meeting is available at: <https://websrv7.clallam.net/forms/uploads/PlanningCommissionPacket.pdf>

- A. CALL TO ORDER**
- B. PLEDGE OF ALLEGIANCE**
- C. ROLL CALL**
- D. WELCOME**
- E. APPROVAL OF MINUTES:** August 4, 2021
- F. ANNOUNCEMENTS**
- G. PUBLIC COMMENT** – Please Limit Comments to Three Minutes
- H. UNFINISHED BUSINESS:** None
- I. PUBLIC HEARING:** Stormwater Ordinance and Small Project Drainage Manual
- J. WORK SESSION ITEMS:** None
- K. PUBLIC COMMENT** – Please Limit Comments to Three Minutes
- L. ADJOURNMENT**

Members:

Chair, Jane Hielman & Vice-Chair, Scott Clausen
Robert Miller; Steve Gale; Ron Long; N. Bonnie Booth; M. Ingrid Carmean; Philip Giuntoli

Department of Community Development Staff:

Mary Ellen Winborn, Director; Donella Clark, Principal Planner
Greg Ballard, Senior Planner

1. Minutes from 8/04/21 PC Meeting

MINUTES

Clallam County Planning Commission

*Meeting of August 4, 2021
6:00 PM*

- A. CALL TO ORDER: The meeting was called to order at 6:00 p.m.
- B. PLEDGE OF ALLEGIANCE.
- C. ROLL CALL: Members present were Vice-Chair Clausen, Robert Miller, Steve Gale, Ron Long, N. Bonnie Booth, M. Ingrid Carmean and Philip Giuntoli. Donella Clark, Principal Planner; Greg Ballard, Senior Planner; Holden Fleming, Planner II, represented staff from the Department of Community Development.
- D. WELCOME: Vice-Chair Clausen welcomed all in attendance
- E. APPROVAL OF MINUTES: July 7, 2021 passed with a correction removing "not" to park models being used recreationally.
- F. ANNOUNCEMENTS: SMP passed July 20, 2021.
- G. PUBLIC COMMENT PERIOD: None.
- H. UNFINISHED BUSINESS: Recreational Use Ordinance, presentation of changes following last week's public hearing and request for vote to forward to BOCC. Vote was held and passed 6-1 to take the ordinance to the BOCC.
- I. PUBLIC HEARING ITEM: None.
- J. WORK SESSION ITEMS: Order was changed with Current Use Assessment first. Holden Fleming presented the First Half 2021, which included only one application. Reclass from farm & ag to the open space program. Allows a 30% reduction from fair market value. Vote (7-0) was held to take the application to the BOCC for approval.

Introduction of Stormwater Ordinance. Greg Ballard has been working with various stakeholder groups and engineers, as well as County Road Department to come up with an ordinance. A Public Hearing will be held August 18, 2021.
- K. PUBLIC COMMENT PERIOD: Barbara Spofford of Sunland, citizen of Clallam County and park model owner, is very impressed by the time effort, and thoughtful consideration of staff and the Planning Commissioners coming up with a solution that works. Appreciates the work the Planning Commission does.

Ron Long wanted to express his appreciation of the work done by staff and the commission and explained his dissenting vote of the ordinance.
- L. ADJOURNMENT: The meeting adjourned at _7:15_ p.m.

2. Clallam County Stormwater Ordinance
dated August 11, 2021

DRAFT 08/11/2021
Clallam County Stormwater Ordinance
Chapter 27.14
STORMWATER MANAGEMENT

- 27.14.010 Purpose
- 27.14.020 Applicability
- 27.14.030 Exemptions
- 27.14.040 Definitions
- 27.14.050 Stormwater Management Manual and Review Thresholds
- 27.14.060 Drainage Permit
- 27.14.070 Construction Stormwater Best Management Practices Requirements for Land Development Activities not requiring a Drainage Permit
- 27.14.080 Adjustments and Exceptions/Variances.
- 27.14.090 Experimental BMPs
- 27.14.100 Easements, Deeds and Covenants
- 27.14.110 Illicit Discharges and Connections
- 27.14.120 Enforcement
- 27.14.130 Fees
- 27.14.140 Security
- 27.14.150 Authority
- 27.14.160 Compliance with Other Laws
- 27.14.170 Effectiveness/No Retroactivity

27.14.010 Purpose

This Chapter is intended to address comprehensive stormwater management in unincorporated Clallam County for new development and redevelopment through the use of construction and post-construction best management practices. As part of implementing comprehensive stormwater management in Clallam County, this Chapter adopts a stormwater manual with minimum requirements for stormwater management. This chapter shall also address illicit non-stormwater discharges and illegal connections to

public stormwater drainage systems in an effort to control and reduce the presence of stormwater pollutants. Specifically, this Chapter has been created for the following purposes:

A. General Purposes

1. To promote the public health, safety, and general welfare of the citizens and protect public and private resources of Clallam County without preventing the reasonable use, development, and maintenance of land.
2. To protect critical areas from deterioration or destruction as required under the state's Growth Management Act and Shoreline Management Act.
3. To implement the provisions of the April 9, 2020 Settlement Agreement between the WA State Department of Ecology and Clallam County.. This included not requiring Clallam County to obtain a National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit, modified stormwater thresholds outside of the Port Angeles Urban Growth Area (PAUGA), and other requirements.
4. To provide landowners (outside of the Unincorporated Port Angeles Urban Growth Area (UPAUGA)) a cost effective, simple, non-custom engineered option for small residential projects through the use of the Small Project Drainage Manual.
5. To have the quality and quantity of stormwater, after land development activity occurs, be the same or better than the pre-development conditions.

B. Development Purposes

1. To ensure prompt development, restoration, and replanting and effective erosion control of property during and after land clearing, filling and grading.
2. To promote land development practices that minimize disturbance to existing vegetation and soils.
3. To manage and mitigate the effects of urbanization on stormwater drainage throughout the urban areas within unincorporated Clallam County through planning, appropriate engineering practices and proper maintenance.
4. To manage all surface water runoff and diversions that may contribute to flooding and the pollution of surface waters.
5. To prevent siltation in Clallam County's streams, lakes, storm sewer systems, and public roadside improvements.
6. To protect adjacent and downstream public or private properties from damage.
7. To reduce the risk of slides and the creation of unstable building sites.
8. To promote low impact development site planning and building practices that provide for managing surface water runoff on-site and are consistent with Clallam County's natural topography, vegetation cover, and hydrology.

9. To allow the use of simple technologies whenever appropriate and realistic, but require the use of more sophisticated techniques when necessary to ensure the adequacy of stormwater controls.
- C. Environmental Purposes
1. To preserve, protect, replace, or enhance the natural qualities of lands, watercourses, and aquatic resources.
 2. To preserve and protect priority fish and wildlife habitats.
 3. To prevent water quality degradation and the sedimentation of creeks, streams, ponds, lakes, wetlands, marine waters, and other water bodies; and preserve and enhance beneficial uses.

27.14.020 Applicability

All Land Development Activity occurring within unincorporated Clallam County shall be subject to the provisions of this Chapter unless specifically exempted under this Chapter. No approval of any required Drainage Permit shall be made by Clallam County prior to the Applicant's satisfying the submittal requirements as set forth in this Chapter and the Land Development Activity being in compliance with all applicable federal, state and Clallam County regulations, including the provisions of this Chapter.

27.14.030 Exemptions

- A. The following Land Development Activities are exempt from the requirements of this Chapter (for all of the unincorporated areas within Clallam County) :
1. Forest practices regulated under Title 222 WAC, except for Class IV-General forest practices that are conversions from timberland to other uses.
 2. Commercial agriculture practices involving working the land for production, except the conversion from timberland to agriculture and the construction of impervious surfaces are not exempt.
 3. Construction of drilling sites, waste management pits, and access roads, as well as construction of transportation and treatment infrastructure such as pipelines, natural gas treatment plants, natural gas pipeline compressor stations, and crude oil pumping stations.
 4. Pavement maintenance practices consisting of any of the following: pothole and square cut patching, overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area coverage, shoulder grading, reshaping/regrading drainage systems, crack sealing, resurfacing with in-kind material without expanding the road prism, pavement preservation activities that do not expand the road prism, and vegetation maintenance. The following pavement maintenance practices are not categorically exempt, and are subject to the Minimum Requirements that are triggered when the thresholds identified for new or redevelopment projects are met per I-3.3 Applicability of the Minimum Requirements of the

Department of Ecology's 2019 Stormwater Management Manual for Western Washington ("Ecology's 2019 Stormwater Manual").

- a. Removing and replacing an asphalt or concrete pavement to base course or lower, or repairing the pavement base: These are considered replaced hard surfaces.
 - b. Extending the pavement edge without increasing the size of the road prism, or paving graveled shoulders: These are considered new hard surfaces.
 - c. Resurfacing by upgrading from dirt to gravel, a bituminous surface treatment ("chip seal"), asphalt, or concrete; upgrading from gravel to chip seal, asphalt, or concrete; or upgrading from chip seal to asphalt or concrete: These are considered new impervious surfaces.
 5. Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics are only subject to Volume I-3.4.2 MR2 Construction Stormwater Pollution Prevention Plan of the Department of Ecology's 2019 Stormwater Manual.
- B. With the exception of the UPAUGA, land development activity within the unincorporated Clallam County shall be subject to the following additional exemptions:
1. Land clearing, grading, filling, sandbagging, diking, ditching, or similar work during or after periods of extreme weather or other emergency conditions which have created situations such as toxic releases, flooding, or high fire danger that present an immediate danger to life or property.
 2. Digging of individual graves in a permitted graveyard.
 3. Routine landscape maintenance of existing landscaped areas on developed lots, including pruning, weeding, planting annuals, and other activities associated with maintaining an already established landscape or thinning of limbs of individual trees to provide for a view corridor consistent with Chapter 27.12.
 4. Routine drainage maintenance of existing, constructed stormwater drainage facilities located outside of a protected area, including, but not limited to, detention/retention ponds, wet ponds, sediment ponds, constructed drainage swales, water quality treatment facilities, such as filtration systems, and regional storm facilities that are necessary to preserve the water quality treatment and flow control functions of the facility. This exemption does not apply to any expansion and/or modification to already excavated and constructed stormwater drainage facilities.
 5. Construction, expansion or repair of detached accessory buildings four hundred (400) square feet or less in size not located within two hundred (200) feet of a wetland, aquatic habitat, conservation area, landslide hazard area an erosion hazard area or within frequently flooded area pursuant to Chapter 27.12.

6. The construction or installation of minor street improvements exempt from SEPA per WAC 197-11-800(2)(d) that are conducted in compliance with the Regional Road Maintenance ESA Program and designed in accordance with the Highway Runoff Manual.

27.14.040 Definitions

Clallam County adopts the definitions contained within the Glossary of Ecology's 2019 Stormwater Management Manual for Western Washington, unless otherwise altered below.

- A. "Best Management Practice(s)" or "BMPs" means the schedule of activities, prohibitions of practices, maintenance procedures, and structural and/or managerial practices approved by the Washington State Department of Ecology that, when used singly or in combination, prevent or reduce the release of pollutants and other adverse impacts to waters of Washington State.
- B. "Clallam County Small Project Drainage Manual" means the manual adopted by Clallam County to be used for small-scale residential projects that meet the requirements for a small project drainage plan review.
- C. "Clearing" means the destruction and removal of vegetation by manual, mechanical, or chemical methods resulting in exposed soils. This does not include mowing, landscape maintenance or pruning consistent with accepted horticultural and arboricultural practices, which does not impair the health or survival of trees and associated vegetation.
- D. "Critical Areas" means any of those areas of Clallam County which meet the definition of geologically hazardous areas; wetlands; streams; flood hazard areas; fish and wildlife conservation areas; and areas with a critical recharging effect on aquifers used for potable water and are regulated under Title 27 of the Clallam County Code.
- E. "Drainage Permit" means the written permission by the County Engineer, or their designee to the permittee/applicant to proceed with the act of land development activities, whether new development or redevelopment, within the requirements and procedures contained in this Chapter. The Drainage Permit shall include the associated approved site plan, any required stormwater site plans consistent with Minimum Technical Requirements set forth herein, any required construction stormwater pollution prevention plan consistent with the Minimum Technical Requirements set forth herein, and any conditions of approval as well as the permit form itself.
- F. "Hard Surface" means an impervious surface, a permeable pavement, or a vegetated roof. An impervious surface is a surface that blocks the natural infiltration of surface water. Common hard surfaces include structures, asphalt pavement, cement concrete, and compacted gravel. Permeable pavements and green roofs shall be considered hard surfaces for minimum requirement thresholds but modelled depending on the characteristics of the design.
- G. "Impervious surface" means a hard surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development and causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Impervious surfaces include, but are not limited

- to, rooftops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, other surfaces which similarly prevent the natural infiltration of stormwater.
- H. "Land Development Activity" means New Development and Redevelopment and land disturbing activity as those terms are defined herein.
 - I. "Land Disturbing Activity" means any activity that results in a movement of earth or any change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, grubbing, filling, excavation, demolition and site preparation. Compaction that is associated with stabilization of structures and/or road construction shall also be considered land disturbing activity. Vegetative maintenance practices (as defined herein) are not considered land disturbing activity.
 - J. "Low impact development (LID)" means a stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design
 - K. "New Development" means any land disturbing activities, including but not limited to clearing, grading, grubbing, filling, excavation and demolition; Class IV General Forest Practices that are conversions from timber land to other uses; reclamation of mineral extraction; reclamation of sand and gravel extraction; structural development, including construction, installation or expansion of a building or other structure; creation of hard surfaces; and any subdivision, short subdivision and binding site plans, as defined and applied in RCW 58.17 and any Land Division as defined herein. Projects meeting the definition herein of Redevelopment shall not be considered New Development.
 - L. "Pollutant" means anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, and accumulations; floatables, pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.
 - M. "Project" means any proposed action to alter or develop a site.
 - N. "Project Site" means that portion of a property, properties, or right of way subject to land disturbing activities, new hard surfaces, or replaced hard surfaces.
 - O. "Redevelopment" means development of a site that is already substantially developed (i.e., has 35% or more existing hard surface coverage) through the creation or addition of hard surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or other structure; subdivision, short subdivision and binding site plans, as defined and applied in Chapter 58.17 RCW; replacement of hard surface that is not part of a routine maintenance activity; and other

land disturbing activities including but not limited to clearing, grading, grubbing, filling, excavation and demolition.

- P. "Replaced hard surface" means, for structures, the removal and replacement of hard surfaces down to the foundation. For other hard surfaces, the removal down to bare soil or base course and replacement.
- Q. "Site" means the area defined by the legal boundaries of a parcel or parcels of land that is (are) subject to new development or redevelopment. For road projects, the length of the project site and the right-of-way boundaries define the site.
- R. "Stormwater Drainage System" means facilities by which stormwater is collected and/or conveyed, including but not limited to, any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and man-made or altered drainage channels, reservoirs, and other drainage structures.
- S. "Stormwater facility" means a constructed component of a stormwater drainage system, designed or constructed to perform a particular function, or multiple functions. Stormwater facilities include, but are not limited to, pipes, swales, ditches, culverts, street gutters, detention ponds, retention ponds, constructed wetlands, infiltration devices, catch basins, oil/water separators, and biofiltration swales.
- T. "Vegetative Maintenance" means lawn maintenance, brush and tree pruning, and other normal land maintenance activities involving cutting, removal, or planting of vegetation by manual, mechanical, or chemical methods, such as gardening.
- U. "Watercourse" means any, natural or artificial (i.e. manmade) waterway area, whether perennial or intermittent, which flows in a definite direction and course or is used for the holding, delay or storage of waters, which functions at any time to convey or store storm water runoff. Watercourses include, but are not limited to, a creek, stream, river, or any constructed waterway, channel, canal, ditch, irrigation ditch or road ditch.
- V. The terms "single residential," "duplex," "townhome," "accessory building," and "multi-family residential" mean the definition of such terms contained in the County's current Building Code, CCC Title 21.

27.14.050 Stormwater Management Manual and Review Thresholds

- A. Based on parcel size, nature of development, amount of land disturbing activity, plat requirements, or potential to significantly impact receiving waters, infrastructure, county roads, or adjoining properties, the County Engineer, or their designee may require an engineered drainage, erosion and sediment control plan regardless of the thresholds found below. The purpose of the engineered drainage, erosion, and sediment control plan is to ensure that the plan will work and also to receive an installed as designed letter from the Engineer.
- B. The Department of Community Development (DCD) Administrator or her designee will require land disturbing activity within the jurisdiction of Critical Areas to submit a drainage permit, unless both of the following conditions apply: (1) the DCD Administrator or her designee

determines the project will not affect the Critical Area, and (2) the project falls below the thresholds found in Chapter 27.14.060. These Critical Area requirements are currently in effect, and the only modifications to these requirements are that land development activity will be subject to the 2019 SWMMWW instead of the 1992 SWMMWW.

- C. Stormwater Management Manual within the unincorporated County urban growth area (UGA) around the City of Port Angeles, also known as the unincorporated Port Angeles UGA or UPAUGA. Within the UPAUGA, Clallam County adopts Ecology's 2019 Stormwater Management Manual for Western Washington ("Ecology's 2019 Stormwater Manual") in its entirety (with no modifications).
- D. Stormwater Management Manual within unincorporated Clallam County outside the UPAUGA. Outside of the UPAUGA, Ecology's 2019 Stormwater Manual's minimum requirements contained in Volume I, Section 3.4, are modified as provided in the table below. For certain proposed Land Development Activities, Clallam County adopts and applies the Clallam County Small Project Drainage Manual as provided in the table below. The County may require the use of Ecology's 2019 Stormwater Manual if conditions are not met under the Small Project Drainage Manual or the project requires an engineer under state law.
- E. Table 27.14.050 Stormwater Management Requirements for New Development and Redevelopment Within Unincorporated Clallam County Outside of the UPAUGA
 - 1. Residential driveways that meet BMPs below would not counted in hard surface calculations for residential development¹

Thresholds (Hard surface/Land disturbance)	Drainage Permit required –Y/N?	Applicable Stormwater Manual	Minimum Requirements (MR)
N/A	N	Subject to BMPs 5.11 and 5.12 of the 2019 Ecology Manual or Section 3.4 of the Clallam County Small Project Drainage Manual	N/A

2. Residential Development¹ on less than 1 acre

Thresholds (Hard surface/Land disturbance)	Drainage Permit required –Y/N?	Applicable Stormwater Manual	Minimum Requirements (MR)
< 400 sq. ft. of new plus replaced hard surface OR <7,000 sq. ft. land disturbing activity	No, but Construction Stormwater Best Management Practices are always required	N/A	MR 2
Between 400 and 5,000 sq. ft. of new plus replaced hard surface OR between 7,000 and 10,000 sq. ft. land disturbing activity	Yes	Clallam County Small Project Drainage Manual ²	MRs 1-5
≥5,000 sq. ft. of new plus replaced Hard Surface OR ≥10,000 sq. ft. land disturbing activity	Yes	Ecology's 2019 Stormwater Manual	MRs 1-9 ³ ; Engineered Plan required.

Residential Development¹ on 1 acre or more

Thresholds (Hard surface/Land disturbance)	Drainage Permit required –Y/N?	Applicable Stormwater Manual	Minimum Requirements
<400 sq. ft. of new plus replaced hard surface OR <7,000 sq. ft. land disturbing activity OR <1.5 acres of veg to lawn conversion, OR <5 acres of veg to pasture	No, but Construction Stormwater Best Management Practices are always required	N/A	MR 2
Between 400 to 3,000 sq. ft. of new plus replaced hard surface (requiring a building permit)	Yes	Clallam County Small Project Drainage Manual ²	MRs 1-5, Optional Flow Control determined by County Engineer ³
Between 3,000 and 7,000 sq. ft. of new plus replaced hard surface OR between 7,000 and 12,000 sq. ft. land disturbing activity OR between 1.5 and 2 acres of veg to lawn conversion, OR between 5 and 7.5 acres of veg to pasture	Yes	Clallam County Small Project Drainage Manual ²	MRs 1-5
≥7,000 sq. feet new plus replaced Hard Surface OR ≥12,000 sq. ft. land disturbing activity, OR ≥2 acres of veg to lawn conversion, OR ≥7.5 acres of veg to pasture conversion	Yes	Ecology's 2019 Stormwater Manual	MRs 1-9 ⁴ Engineered Plan required.

3. All non-residential development¹, including commercial, industrial, and multifamily.

Thresholds (Hard surface/Land disturbance)	Drainage Permit required –Y/N?	Applicable Stormwater Manual	Minimum Requirements
≤ 2,000 sq. ft. of new plus replaced hard surface OR ≤ 7,000 sq. ft. land disturbing activity	No, but Construction Stormwater Best Management Practices are always required	N/A	MR 2
≥ 2,000 sq. ft. of new plus replaced hard surface OR ≥ 7,000 sq. ft. land disturbing activity	Yes	Ecology's 2019 Stormwater Manual	Per Manual. Engineered Plan required

Footnotes

¹ Residential Development is the construction of a single family dwelling, duplex, townhome, accessory structures to such dwelling, but excludes residential driveways (see Table 27.14.050(1) above).

² Applicants may elect to use the 2019 Ecology Stormwater Manual instead of the Clallam County Small Project Drainage Manual if they choose. If utilizing the 2019 Ecology Stormwater Manual, a civil or geotechnical engineer may be required to sign stormwater plans.

³ For land development activity that would not require flow controls or meet full dispersion (BMP T5.30) requirements per the 2019 SMMWW, the County Engineer will determine optional flow control requirements through the Small Project Drainage Manual.

⁴ MR3 and MR8 are usually N/A; MR9 only applies if a stormwater facility is installed.

27.14.060 Drainage Permit

A. A Drainage Permit is required inside the UPAUGA before any of the following land disturbing activity occurs:

1. The DCD Administrator or her designee may require submission of a Drainage Permit for any land disturbing activity within the jurisdictions of Critical Areas Ordinance.

2. Land disturbance of 7,000 sq. feet or more.
 3. Projects that result in 2,000 sq. feet or more of new plus replaced hard surfaces.
- B. A Drainage Permit is required outside the UPAUGA before any of the following land disturbing activity occurs:
1. The DCD Administrator or her designee may require submission of a Drainage Permit for any land disturbing activity within the jurisdictions of the Critical Areas Ordinance.
 2. Land disturbance of 7,000 sq. feet or more for construction of multi-family, commercial or industrial.
 3. Land disturbance of 10,000 sq. feet or more for single residential, duplex, townhome, or accessory building to such dwelling, on <1 acre. This does not include hard surfaces created for residential driveways that meet BMPs.
 4. Land disturbance of 12,000 sq. feet or more for single residential, duplex, townhome, or accessory building to such dwelling, on 1 acre or more. This does not include hard surfaces created for residential driveways that meet BMPs.
 5. Single residential, duplex, townhome, or accessory building to such dwelling projects requiring a building permit that result in 400 sq. feet or more new plus replaced hard surfaces. This not including hard surfaces created for residential driveways that meet BMPs.
 6. All other projects (e.g., commercial, industrial, multifamily) that result in 2,000 sq. feet or more of new plus replaced hard surfaces.
- C. An application for a Drainage Permit shall be submitted to the County Engineer, or their designee on a form provided by the County. All Drainage Permits shall include Construction BMP's and Construction Stormwater Pollution Prevention Plans (SWPPP).
- D. Unless otherwise specified by the Clallam County Small Project Drainage Manual, all applicants for a Drainage Permit shall provide the following basic plan exhibits. The basic plan exhibits shall contain all information as set forth in the official submittal checklist provided by the County Engineer, or their designee.
1. Site Topographical Map
 2. General Stormwater Site Plan
 3. Construction Stormwater Pollution Prevention Plan (SWPPP)
 4. Vicinity Topographical Map
- E. All plans prepared in connection with this Chapter shall be submitted for review and approval by the County Engineer, or their designee. Prior to the issuance of the Drainage Permit, the Applicant must submit final stormwater site plans.
- F. A Drainage Permit shall be issued by the County Engineer, or their designee only after the applicant demonstrates compliance with the requirements of this Chapter and the payment of

the applicable permit fees for plan review, inspection, and related expenses as specified in Section 27.14.130, Fees.

- G. The approved Drainage Permit under this ordinance will be available on the Clallam County On-Line Permit System. Any modifications of the approved Drainage Permit will require prior approval by the County Engineer, or their designee.
- H. Any permit granted under this Chapter shall expire one (1) year from the date of issuance. With approval of the County Engineer, or their designee, a permit issued under this Chapter may be extended for one 12-month period.
- I. The decision by the County Engineer or their designee to deny a Drainage Permit is appealable to the Clallam County Hearing Examiner using the procedures for denial of a Type I permit as defined under CCC Title 26.

27.14.070 Construction Stormwater Best Management Practices Requirements for Land Development Activities not requiring a Drainage Permit

- A. All Persons or entities engaging in Land Development Activities which do not require a Drainage Permit pursuant to Section 27.14.060 shall prevent (1) erosion and discharge of sediment and other pollutants into receiving waters and (2) harmful impacts to infrastructure or neighboring properties. Land Development Activities which do not require a Drainage Permit, but that cause significant erosion, discharge of sediment, or other pollutants into receiving waters, or harmful impacts to infrastructure or neighboring properties will be required to rectify impacts and shall be subject to Enforcement Actions found in Section 27.14.120 below. This may include requiring a Drainage Permit, Construction BMP's, and Construction Stormwater Pollution Prevention Plan (SWPPP).

27.14.080 Adjustments and Exceptions/Variations.

- A. The County Engineer, or their designee may grant an adjustment to the application of the Stormwater Management Manual and its minimum requirements prior to permit approval and construction consistent with the criteria in Ecology's 2019 Stormwater Manual, Volume I, Section 3.6.1 (Adjustments to the MRs).
- B. The County Engineer, or their designee may grant an exception/variance from this Chapter or the application of the Stormwater Management Manual and its minimum requirements prior to permit approval and construction when consistent with the criteria in Ecology's 2019 Stormwater Manual, Volume I, Section 3.6.2 (Exceptions/Variations). The applicant bears the burden to demonstrate the required criteria for an exception/variance. The County Engineer, or their designee shall retain records, including the written findings of fact, of all exceptions from the minimum requirements.
- C. A request for an adjustment or exception shall adequately describe the justification for relief and is processed as a Type III decision under Clallam County Code (CCC) Chapter 26.10.

27.14.090 Manufactured Treatment Devices (MTDs)

Clallam County accepts stormwater treatment BMPs identified in Ecology's 2019 Stormwater Manual for use. Additionally, designers may use manufactured treatment devices approved through the Technology Assessment Protocol – Ecology (TAPE) with a General Use Level Designation (GULD).

27.14.100 Easements, Deeds and Covenants

- A. Drainage easements shall be required where stormwater conveyance, storage, or treatment facilities identified in development plans are not located in public rights-of-way, and where access to stormwater facilities is required. Drainage easements shall be granted to the persons responsible for providing ongoing maintenance of the drainage systems. Drainage easements through structures are not allowed. Easements shall be of a width and location sufficient to allow access for equipment that would normally perform maintenance activities.
- B. Stormwater and conveyance facilities that are to be maintained by Clallam County, together with maintenance access roads to the facilities, shall be located in public right-of-way, in separate tracts dedicated to Clallam County, or corresponding to drainage easements granted to Clallam County.
- C. The approved Drainage Permit under this ordinance will be available on the Clallam County On-Line Permit System. This shall include the identification of flow controls (i.e. drywells, dispersion trenches, rain gardens, etc.) and Low Impact Development BMPs (full dispersion through natural vegetation) on the approved drainage permit site plan, along with the landowner's responsibility for operation and maintenance of these permanent stormwater BMPs. Any modifications of the approved Drainage Permit will require prior approval by the County Engineer, or their designee.
- D. Any flow control and runoff treatment BMPs for which the applicant identifies the operation and maintenance to be the responsibility of a private party must have a declaration of covenant and grant of easement which shall be recorded on the title of the parcel.

27.14.110 Illicit Discharges and Connections

- A. Illicit Discharges Prohibited. No person may throw, drain, or otherwise discharge, cause or allow others under their control to throw, drain, or otherwise discharge into the storm drain system, or into a watercourse within unincorporated Clallam County, any materials other than stormwater.
- B. Allowable Discharges. The following types of discharges are not illicit discharges for the purpose of this Chapter unless the County Engineer, or their designee determines that the type of discharge, whether singularly or in combination with others, is causing or is likely to cause pollution of surface water or groundwater:
 - 1. Diverted stream flows.
 - 2. Rising groundwaters.
 - 3. Uncontaminated groundwater infiltration as defined in 40 CFR 35.2005(20).

4. Uncontaminated pumped groundwater.
 5. Foundation drains.
 6. Air conditioning condensation.
 7. Irrigation water from agricultural sources that is commingled with urban stormwater.
 8. Springs.
 9. Uncontaminated water from crawl space pumps.
 10. Footing drains.
 11. Flows from riparian habitats and wetlands.
 12. Non-stormwater discharges authorized by another NPDES or state waste discharge permit.
 13. Discharges from emergency firefighting activities.
- C. Conditionally Allowed Discharges. The following types of discharges are not illicit discharges for the purposes of this Chapter if they meet the stated conditions, unless the County Engineer, or their designee determines that the type of discharge, whether singularly or in combination with others, is causing or is likely to cause pollution of surface water or groundwater:
1. Potable water, including water from water line flushing, hyperchlorinated water line flushing, fire hydrant system flushing, and pipeline hydrostatic test water. Planned discharges must be dechlorinated to a concentration of 0.1 ppm or less, pH-adjusted, if necessary and in volumes and velocities controlled to prevent re-suspension of sediments in the stormwater system.
 2. Lawn watering and other irrigation runoff are permitted but must be minimized.
 3. Dechlorinated swimming pool, spa and hot tub discharges. These discharges must be dechlorinated to a concentration of 0.1 ppm or less, pH-adjusted and re-oxygenated, if necessary and in volumes and velocities controlled to prevent resuspension of sediments in the stormwater system. Discharges must be thermally controlled to prevent an increase in temperature of the receiving water. Swimming pool cleaning wastewater and filter backwash shall not be discharged to the stormwater system.
 4. Street and sidewalk wash water, water to control dust and routine external building wash down that does not use detergents are permitted if the amount of street wash and dust control water is minimized. At active construction sites, street sweeping must be performed prior to washing the street.
 5. Other non-stormwater discharges. The discharges must be in compliance with the requirements of a stormwater pollution prevention plan (SWPPP) reviewed and approved by the County which addresses control of such discharges by applying all known, available and reasonable methods of prevention, control and treatment (AKART) to prevent pollutants from entering surface or groundwater.

D. Illicit Connections

1. No person may use the stormwater system, directly or indirectly, to dispose of any solid or liquid matter other than stormwater.
2. No person may make, use, or allow the continued existence of any connection to the stormwater system that could result in an illicit discharge.
3. Connections to the stormwater system from the interiors of structures are prohibited.
4. Sewer connections to the stormwater system or to any watercourse are prohibited.
5. Connections to the stormwater system for any purpose other than to convey stormwater or groundwater are prohibited and must be eliminated.

27.14.120 Enforcement

- A. The County Engineer, or their designee, is authorized to carry out inspection and enforcement actions pursuant to Clallam County Code (CCC) Chapter 33.59, Enforcement, and CCC Title 20, Code Compliance.
- B. If inspection or enforcement investigations by the County Engineer or their designee determines that new land development activity results in significant impacts to receiving water, infrastructure, county roads, or adjoining properties, then a Drainage Permit may be required to rectify the impacts regardless of the thresholds found in Section 27.14.050 above. Failure to comply with the voluntary compliance provisions outline above to obtain and implement the required Drainage Permit will be subject to enforcement actions found below.
- C. Any person who fails to comply with the standards contained within this Chapter and/or any person who fails to comply with a final written order may be assessed a civil penalty as follows:
 1. The County Engineer, or their designee, may assess the violator a civil penalty not to exceed \$1,000 for each violation.
 2. Each violation or each day of continued unlawful activity shall constitute a separate violation. Each day that a person fails to comply with the terms of a final written order shall constitute a separate violation.

27.14.130 Fees

The schedule of all fees associated with complying with this Chapter shall be those established pursuant to CCC Chapter 5.100. If Drainage Permit work is done in violation of this Chapter or the work is not done in accordance with an approved permit, a fee, not less than twice the applicable permit fee, covering investigation of any violation and inspection and plan checking of work required to correct the violation shall be charged to the violator to cover all actual costs. Such additional fee being in addition to any other of the remedies specified herein under Section 27.14.120, Enforcement.

27.14.140 Security

The County Engineer, or their designee may require as a condition to the granting of a Drainage Permit, that the applicant furnish security in the form of a bond, cash escrow account, an irrevocable letter of credit or other security acceptable to the County in its sole discretion, in an amount determined by the County Engineer, or their designee to be sufficient to complete the restoration and replanting of the property in accordance with the terms of the Drainage Permit and within the duration thereof. The security shall be in an amount equal to the estimated cost of such restoration and replanting and with surety and conditions satisfactory to the County Engineer, or their designee.

27.14.150 Authority

The Clallam County Engineer, or their designee, shall administer and enforce compliance with all terms in this Chapter. The Clallam County Engineer, or their designee may adopt and amend administrative policies and procedures for the purposes of implementing and enforcing the provisions of this Chapter. All such administrative policies and procedures shall be available to the public at the Public Works Department.

27.14.160 Compliance with Other Laws

Approvals and permits granted under this Chapter and any policies and procedures promulgated hereunder do not constitute waivers of the requirements of any other laws or regulations nor do they indicate compliance with any other laws or regulations. Compliance is still required with all applicable federal, state, or local laws and regulations. In the event of any conflict between this Chapter and any other Chapter of the Clallam County Code, the provisions of this Chapter shall prevail.

27.14.170 Effectiveness/No Retroactivity

- A. This Chapter shall become effective on [October __, 2021]
- B. This Chapter shall be prospective in operation only.
- C. The provisions of this Chapter shall not apply to existing Land Disturbing Activity for which all previously required permits were obtained prior to the effective date.
- D. The provisions of this Chapter shall not apply to a project or development not yet constructed provided that an appropriate residential or commercial building permit has been obtained and the permit bears a date prior to the effective date of this Chapter.

3. Small Project Drainage Manual

Dated August 13, 2021

Clallam County Small Project Drainage Manual

DRAFT



**Version Date: August 13, 2021
Adopted Date: TBD**

Table of Contents

Section	Page
SECTION 1 – INTRODUCTION TO SMALL Residential Project DRAINAGE PLAN.....	1
1.1 Why Are Drainage Requirements Needed?.....	1
1.2 Can I use this manual for my “Small Residential Project”?.....	2
1.3 Small Project Drainage Plan Requirements.....	5
1.3.1 Submittals	5
1.3.2 Implementation.....	5
1.3.3 Inspection.....	5
1.3.4 Liability and Responsibility	5
1.3.5 Operation and Maintenance Responsibility	5
SECTION 2 – DEVELOPING A DRAINAGE PLAN	6
2.1 Elements of a Drainage Plan	7
2.2 Runoff Management BMPs (Section III-A).....	7
2.3 Stormwater Conveyance BMPs (Section III-B).....	7
2.4 PRO TIPS #1	9
SECTION 3 – Runoff Management BMPs.....	10
3.1 Infiltration Systems	11
3.1.1 Infiltration Trenches.....	12
3.2 Rainwater Dispersion	17
3.2.1 Small Lot Dispersion	17
3.3 Rain Gardens	20
3.4 Runoff Filter Strips	22
3.5 Rainwater Collection	24
3.6 Stormwater Conveyance BMPs	25
3.7 Conveyance Piping	25
3.8 Swales	25
3.9 End-of-Line Discharge BMPs.....	26
3.9.1 Level Spreaders	26
3.9.2 Gravel Spreader Trenches.....	26

SECTION 1 – INTRODUCTION TO SMALL RESIDENTIAL PROJECT DRAINAGE PLAN

This manual has been created to assist owners of property in Unincorporated Clallam County to manage stormwater runoff resulting from small residential projects where land is disturbed, and potential runoff may occur. The management of stormwater runoff, notably the flows that result from the construction of impervious surfaces like buildings and driveways, is regulated by Clallam County's Stormwater Management ("SWM") Ordinance (Chapter __ of Clallam County Code) which requires a stormwater activity permit to be issued by the County for development and redevelopment land activities that are not exempted and that involve a certain threshold level of land disturbance. The threshold level of land disturbance that triggers the stormwater permit approval process is specified in Tables A-D in the SWM Ordinance and should be consulted by property owners seeking to do a development/redevelopment project.

Under Clallam County's SWM Ordinance regulated land disturbing activities require the preparation and submission of an engineered stormwater management plan to be reviewed and approved by Clallam County. The Stormwater permit application must adhere to the Department of Ecology's 2019 Stormwater Manual for parcels located in the Unincorporated Port Angeles Urban Growth Area ("UPAUGA") and adhere to Ecology's 2019 Stormwater Manual for Western Washington as modified by the SWM Ordinance for all other parcels in Unincorporated Clallam County.

An Alternative streamlined process in the SWM Ordinance has been adopted for land disturbing projects that are considered "Small Residential Projects" that meet certain specified criteria set forth on page 2. If your project meets the criteria, you will only be required to submit the documents listed in this manual on page 5, including a drainage plan, for approval by the Department of Community Development.

A drainage plan is a proposed method for containing rainwater on your property. Clallam County requires drainage plans to control storm water which runs off each piece of property as a result of the development/redevelopment of the property.

The process described in this manual is not intended and cannot be used with multi-family, large-scale subdivision or land development projects or activities that include public infrastructure like roadways. This manual cannot be used for any parcels in the UPAUGA. If you have a development/redevelopment project on a parcel in the UPAUGA, you must adhere to Ecology's 2019 Stormwater Manual and the thresholds and minimum requirements contained in such manual.

The stormwater best management practices ("BMPs") mentioned within this manual serve as examples and are not a comprehensive list of options. Please contact Clallam County with any questions or to discuss alternative solutions for site-specific applications.

1.1 Why Are Drainage Requirements Needed?

On undeveloped land, most rainwater soaks into the ground and flows slowly to nearby lakes and streams through the upper layers of soil. Almost any form of development increases the amount of rainfall that tends to run off property after a heavy rainstorm. Removing trees and other vegetation reduces the amount of water absorbed by roots and the subsequent evaporation through the leaves. Regrading the land eliminates natural pockets and depressions in the soil which hold water until it is absorbed into the soil. Covering ground with roofs, pavements, and similar impervious covers prevents the underlying soil from accepting surface water. Covering porous soil with comparatively impervious top soil and lawn decreases the rate the soil can absorb water. Driving over the ground (both during and after construction) compacts the surface, decreasing the small voids in the soil which let the water filter into the ground. Placing plastic films under landscaped areas prevents the underlying soil from absorbing water. These and other factors combine to decrease the ability of the native soil to absorb rainfall as well as it would have prior to development. To minimize the impacts of stormwater runoff associated with development, Clallam County requires appropriate management of that runoff.

1.2 Can I use this manual for my “Small Residential Project”?

Your project is a Small Residential Project and therefore may use the requirements contained in this manual if you satisfy ALL of the following criteria:

- Your project is on a parcel NOT located in the UPAUGA;
- Your project solely involves the development or redevelopment of a single family residence, duplex or townhome or accessory buildings to such dwelling or future planned dwelling;
- For parcels less than 1-acre, the proposed land disturbance is less than 10,000 sq. ft. and there is no more than 5,000 sf of new and replaced hard surfaces.
- For parcels greater than 1-acre, the proposed land disturbance is less than 12,000 sq. ft and there is no more than 7,000 sf of new and replaced hard surfaces.
- Your project is located outside a flood plain or shoreline designation under CC Code _____ (See SMP Ordinance);
- Your project will not adversely impact a wetland, stream or water of the State or change a natural drainage water course;

Note: If your small residential project contains or is adjacent to a wetland, flood zone, area of erosion, steep slope hazard, landslide hazard area or landslide hazard drainage area, then the County will require plans prepared and stamped by a civil engineer licensed in the State of Washington.

Ultimately, the SWM Ordinance governs and should be consulted in the case that any interpretation is needed. For example, please consult the SWM Ordinance, Section _____, for exemptions that may apply to your land disturbing proposed project.

Definitions of Key Terms

Proper application of the small project drainage requirements in this manual requires an understanding of the following key terms and their definitions.

Best Management Practice (BMP). A practice or combination of practices that are the most effective and practicable means of managing stormwater runoff based on the best available science.

Civil Engineer. A person licensed by the State of Washington as a professional engineer in civil engineering.

Conveyance BMP. A stormwater management technique that conveys stormwater to or from a runoff management BMP such as a rain garden or infiltration trench, and slows flows as stormwater travels across and from a developed site.

Critical Areas. Any of areas of Clallam County which are subject to natural hazards or landform features which carry, hold, or purify water and/or support unique, fragile or valuable natural resources including fish, wildlife, and other organisms and their habitat. These sensitive areas include the following features: geologically hazardous areas; wetlands; streams; flood hazard areas; fish and wildlife conservation areas; and areas with a critical recharging effect on aquifers used for potable water, i.e., ground water discharge areas. This definition is intended to be wholly consistent with the provisions contained in Title 27 of the Clallam County Code.

Discharge. Any stormwater runoff that is not infiltrated or evaporated but instead flows from the conveyance or management BMPs onto adjacent land.

Dispersion. Spreading stormwater runoff over vegetated pervious areas to slow runoff and aid in infiltration

Drainage plan A plan for receiving, handling and transporting surface water or groundwater runoff within the project site.

End-of-Line Discharge BMP. A stormwater management technique that disperses stormwater, discharging from a pipe or ditch, to a slow and diffuse manner to prevent concentration and associated channeling.

Engineered Drainage Plan. A plan designed by a civil engineer licensed in the State of Washington as a professional engineer in civil engineering.

Hydrologic Soil Group. Soils are classified by the Natural Resource Conservation Service into four Hydrologic Soil Groups based on the soil's runoff potential. Soil properties that influence runoff potential include depth to a seasonally high water table, intake rate and permeability after prolonged wetting, and depth to a very slowly infiltrating permeable layer. The four Hydrologic Soils Groups are A, B, C and D. Type A soils generally have the greatest infiltrative capacity and Type D soils have the least.

Impervious Surface. A hard surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development and causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Impervious surfaces include, but are not limited to, rooftops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, other surfaces which similarly prevent the natural infiltration of stormwater.

Manual. The State of Washington, Department of Ecology's 2019 Stormwater Management Manual for Western Washington.

On-Site Runoff Management BMP. A stormwater management technique designed to capture and absorb stormwater runoff from impervious surfaces such as roofs and driveways.

Pervious Surface. A surface that allows water to enter the ground by virtue of its porous nature or by large spaces in the material. Due to compaction, gravel driveways and parking areas do not count as permeable surfaces.

Raingarden. A vegetated depression that is designed to collect, store and infiltrate runoff. Raingarden areas typically include a mix of amended soils and vegetation.

Stormwater Region. Clallam County has three different stormwater regions based on the soil types, and amount of rainfall found in these areas. These regions determine the types and sizes of stormwater BMPs appropriate for use in managing stormwater in the project area. Consult the maps in Appendix B to determine the stormwater region your project is within.

Stormwater Runoff. Water which is not absorbed into the ground during and after a storm which then flows over the land.

Vegetated Open Space. Native undisturbed areas, rehabilitation of previously disturbed areas, or fields that are not regularly mowed. Active recreation areas and lawn shall not count towards vegetated open space.

1.3 Small Project Drainage Plan Requirements

1.3.1 Submittals

If you meet the criteria for a **Small Project Drainage Plan** Review and want to use it, the following must be submitted to the Department of Community Development for review and approval prior to construction activities, including earthwork, is started:

- **Small Project Drainage Plan Application Form** which will guide you through the submittal requirements. See Appendix A for an example of this form. Copies of the form are available from the Department of Community Development. The form will require you to provide a written overview of the proposed project that includes a description of the property, existing site conditions, proposed site improvements, operations and maintenance requirements (O&M) and proposed stormwater management techniques. Further instructions are available on the Drainage Plan Submittal Form.
- **Drainage Plan:** a scale drawing of the individual site showing the proposed improvements and how stormwater runoff from the improvements will be managed on the property. Consult Section II: Developing a Drainage Plan for guidance in preparing this plan.
- **Small Site Erosion and Sedimentation Control Plan-** a scale drawing of the project site used to show the limits of disturbance by the project and how required erosion control measures will be applied to prevent sediment from leaving the site during construction activities. This plan can sometimes be combined with the Drainage Plan.

1.3.2 Implementation

After a proposed drainage plan is approved by the County, the proposed improvements can be installed. The site improvements must be installed per the approved plan. If any changes to the plan are required, they must be reviewed and approved by the County before being constructed.

Separate building permits are required for any structures associated with the project.

1.3.3 Inspection

The drainage system must be inspected by the County during installation prior to certifying the structure for occupancy. Do not backfill over any underground installation until it has been inspected. The inspection requirements, such as when and how to schedule an inspection, will be identified in the approved plans and in the permit documentation.

1.3.4 Liability and Responsibility

You are responsible for damage caused by stormwater runoff due to your development. Clallam County's drainage requirements represent a good faith effort to address the potential problems associated with stormwater runoff due to development and during construction. However, the County has no control over the accuracy of information submitted and does not assume responsibility for damage which may occur due to stormwater runoff.

1.3.5 Operation and Maintenance Responsibility

The size, placement, and design of the drainage facilities as depicted by the drainage plan and approved by the Clallam County Department of Community Development must be maintained and may not be changed without written approval from the Clallam County Department of Community Development. Maintenance of all required drainage facilities is the responsibility of the owner of the site/lot served by these facilities.

SECTION 2 – DEVELOPING A DRAINAGE PLAN

This manual along with some basic measuring and drawing tools should be sufficient for most people to complete an acceptable drainage plan. Below is an example of a drainage plan that can be developed from a site plan. An example drainage plan is included in Appendix D for your use.

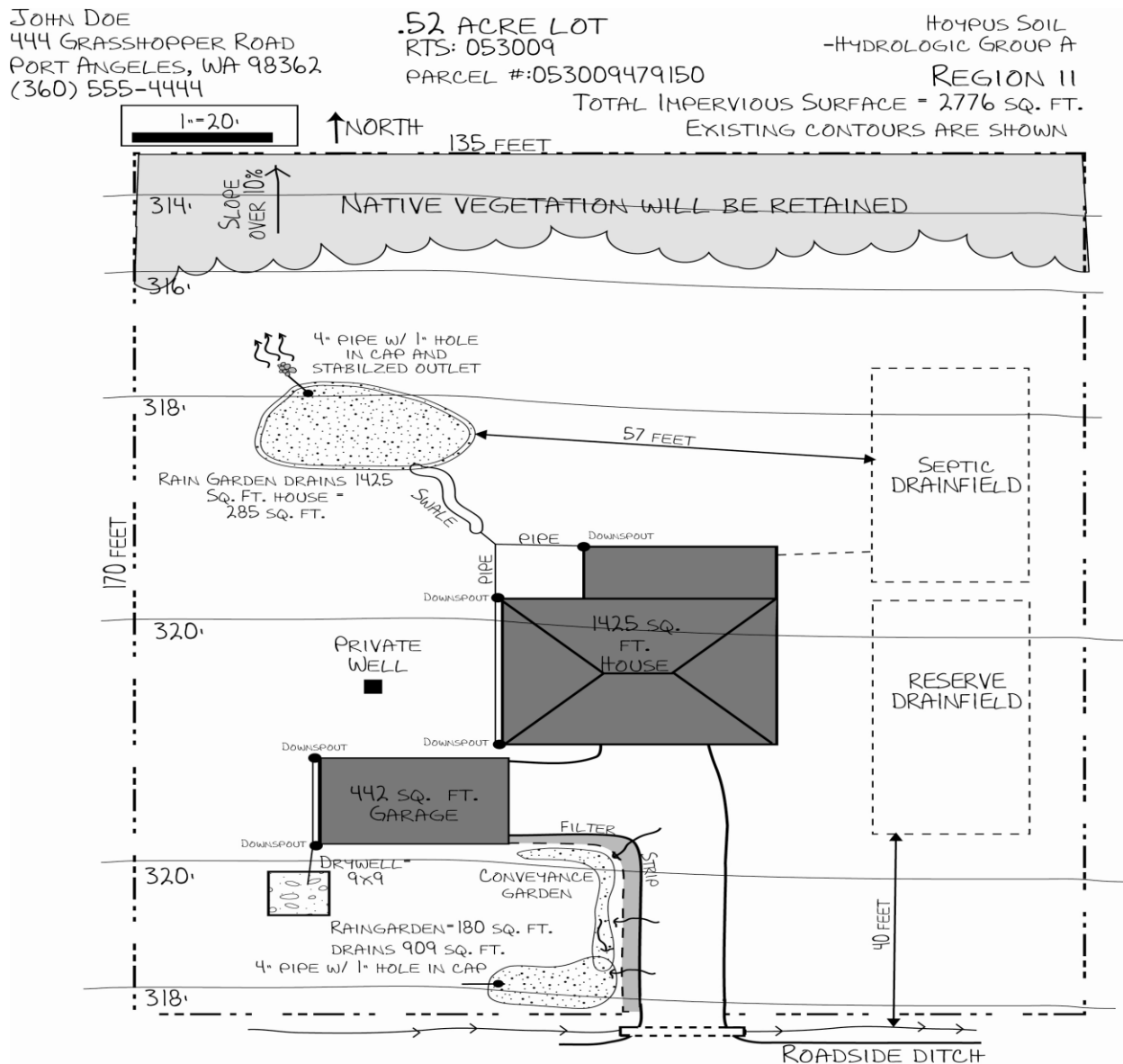


Figure 1. Example Drainage Plan

2.1 Elements of a Drainage Plan

The drainage plan must show the impervious areas such as a roof and driveway, the technique for managing the runoff generated by the impervious surfaces and the drainage path of the runoff from source to treatment area. Important considerations are the amount of impervious surfaces added and how good the soils are.

The primary goal of this plan to provide measures which prevent or greatly reduce the runoff generated by the improvements from leaving the site. This is called runoff management. The preferred method of managing stormwater is to infiltrate it. This does require the site to have average, or better soils. (Types A, B and C) and room on the site for a trench or a drywell. The 2nd preference for managing runoff from a small site improvement is dispersion. This option requires there be a native vegetated area downstream of the site that is of a prescribed length and less than a maximum slope. Runoff is dispersed (evenly spread) along the top of the vegetated dispersal area and allowed to sheet flow through the vegetation allowing the water to be naturally infiltrated.

2.2 Runoff Management BMPs (Section III-A)

The **Runoff Management** section of this manual presents general guidelines for design of BMPs for managing runoff from impervious surfaces such as roofs and driveways. In a ***Small Project Drainage Plan*** there are five options to manage stormwater from roofs and paved areas:

- Infiltration Systems
- Rainwater Dispersion
- Rain Gardens
- Runoff Filter Strips
- Rainwater Collection

The runoff management section of this manual provides general design requirements for the BMPs listed above, as well as specific sizing requirements for BMPs. There are additional BMPs that can manage stormwater, such as porous pavements. Those BMPs are included in the Manual for larger projects and are typically designed by a civil engineer.

2.3 Stormwater Conveyance BMPs (Section III-B)

The stormwater conveyance section of this manual presents general guidelines for conveying stormwater on your site. The stormwater conveyance BMPs serve to both convey stormwater from, and if necessary, to, a runoff management area such as a rain garden or infiltration trench, and to slow flows as they travel across and from a developed site. There are two options for the conveyance of stormwater on the site:

- Conveyance Piping
- Swales

The steps described below outline the process for development of a **Small Project Drainage Plan**. For effective stormwater management, the plan needs to show the improvements and provide a BMP to manage the runoff.

1. Obtain an accurate topographic map for the site to use as a basis for the drainage plan. This can be as simple as a map that denotes flat areas, sloped areas, and drainage paths.
2. Find out the soil type on your project site in order to determine which stormwater management techniques in this manual will be applicable for your site. A soils professional or a septic designer can make this determination. For sites without a septic system, County soils maps can be consulted. To view the *Soil Survey of Clallam County*, go to <http://www.clallam.net/Maps/> or visit the Clallam Conservation District.
3. Conduct a site inventory to determine existing patterns of water movement and vegetated areas on your site.
4. On your plan draw out your proposed improvements. Be sure to show all the proposed buildings, walks, driveways, and any other site improvements that are a part of the project. (see pro tip #1)
5. Using your plan, track, and identify on the plan, the path that water will flow along from the proposed downspouts or paved areas. Surface water will flow down the slope, perpendicular to topography lines. Use the drainage project planning chart on page x to select options for managing roof water runoff, driveway runoff, conveyance areas, and end-of-line discharge areas. For example, show a pipe connecting the roof downspouts to a drywell that will infiltrate the runoff.
6. Consult Section III of this manual for details on how to size and locate each of the BMP options.
7. Sketch your drainage plan. Appendix A includes a list of the required information to include in the plan.
8. Layout, on the drainage plan, temporary erosion control measures and complete the small site construction pollution prevention plan form.
9. Submit the plan, and all of the supporting information listed in the submittal checklist, to the Clallam County Department of Community Development. The County will review and approve the plan if it is acceptable. If it is not, the County reviewer will provide you with comments to consider and you will need to revise the plan and resubmit for approval.

2.4 PRO TIPS #1

The following are tips for creating a development that minimizes the impact your construction project will have on the patterns of water flow and vegetated areas of the site and help facilitate stormwater infiltration on the property:

- Use an eraser when working on your plan. The process is iterative, and you may need to adjust you plan along the way.
- Place structures as close to the public access point as possible to minimize road/driveway length. Minimize paved parking areas, and utilize porous paving options wherever possible.
- Slope paved areas to facilitate drainage to stormwater management areas.
- Reduce building footprints whenever possible. Utilize basements or taller structures with lofts or second stories to achieve square footage goals.
- Orient buildings on slopes with long-axis along topographic contours to reduce grading requirements.
- Set clearing limits that give maximum protection to soils and vegetation while allowing reasonable areas for equipment to maneuver on the site. Delineate the areas both on the construction plans and on the ground with temporary fencing or taping to help you visualize the layout before drawing it.
- Retain natural vegetation and avoid disturbing natural drainage patterns.

SECTION 3 – RUNOFF MANAGEMENT BMPS

A drainage system collects, cleanses, infiltrates, and conveys stormwater to a natural drainage system or existing storm sewer. The following are guidelines for the design and implementation of a ***Small Project Drainage Plan***, including techniques for managing run-off from impervious surfaces, conveying stormwater on the property, and for properly discharging stormwater from your property.

Runoff management is the main component of a small project drainage plan. This manual includes seven options to manage stormwater from roofs and paved areas. The main features and preferred application for each option are summarized below. Details of each option are explained in the following sections.

Rain Gardens

- Rain gardens are excavated basins in which runoff accumulates and slowly infiltrates or flows out through a small outlet opening.
- One of the most versatile options, rain gardens can be placed in any soil type and on most sites and should be the primary runoff management technique for most sites.

Infiltration Systems: Trenches and Drywells

- Infiltration utilizes gravel-filled basins or trenches to infiltrate runoff into porous soil.
- Requires soil with sandy or gravelly texture without high water table. A list of suitable soils for infiltration techniques can be found in Appendix C.
- Infiltration systems may clog with sediment over time and require replacement.
- Some trenches and drywells are considered Underground Injection Control (UIC) wells and are required to be registered with the Washington Department of Ecology.

Rainwater Dispersion

- Dispersion emphasizes use of vegetated areas to receive dispersed stormwater.
- Requires at least 50% vegetated open space on site with a drainage easement.
- Best on slopes less than 10% where runoff is easily routed to vegetated areas.

Rainwater Collection

- Rain barrels and cisterns are containers in which roof runoff is collected for later use or release. These options have limitations on size and application.
- Rain barrels and cisterns can only collect roof runoff, and the collected water is suitable for non-potable uses only.
- Rain barrels and cisterns require careful management to control and manage overflow.

Runoff Filter Strips

- Runoff filter strips are large roadside areas of sandy or gravelly soil covered with turf which allow filtering, storage and infiltration of paved area runoff.

- The filter strip area must be equal to that of the impervious paved area it is adjacent to (such as the driveway), excavated and filled with sand or gravel.

3.1 Infiltration Systems

Infiltration systems are BMPs that are designed to allow runoff to be absorbed into the ground. Soil conditions must be favorable enough to assure that the device used to soak water into the ground (e.g., infiltration trench, drywell, etc.) will perform as expected. Many locations in Clallam County have soils that are underlain by a compact layer of soil called glacial till or hardpan which severely limits infiltration capacity and causes water to accumulate at or near the soil surface during the wet season. This can make full infiltration of runoff impracticable, cost prohibitive, unreliable, or all three.

In order to utilize infiltration, a soils professional, such as a professional soil scientist certified by the Soil Science Society of America, a locally licensed on-site sewage designer, or a suitably trained person working under the supervision of a professional engineer, geologist, or engineering geologist registered in the State of Washington, shall complete site specific testing to categorize the soils and identify the soils type for the sizing of the infiltration system. Refer to BMP T5.10A for additional information.

Infiltration trenches that only receive runoff from single family residential roof runoff are not considered UIC wells. Infiltration trenches that receive runoff from any other surfaces shall be registered. Infiltration trenches can be registered online at: <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Underground-injection-control-program/Register-UIC-wells-online>.

Consult Appendix C to determine if your soil is suitable for these techniques.

If you plan to utilize infiltration trenches or drywells to control stormwater runoff, you will need to follow the guidelines listed below:

- Confirm you the project parcel has soils that are type A, B, or C type soils. Sites D soils are not appropriate for infiltration. If infiltration is feasible, have a soils professional categorize the soils on the project parcel.
- In your drainage plan include locations of proposed drywells and trenches with their sizes.
- Using the sizing criteria, calculate the area of trench required for the project's roof area. The roof can be routed to a single trench, or a combination of trenches. In the case of multiple trenches, indicate which roof areas will be routed into each.
- Runoff from paved areas including driveways and parking areas should flow through or across a vegetated strip or swale prior to infiltration. This will help remove debris from the runoff and preserve the life of the infiltration trench.
- Infiltration systems must be appropriately sited with respect to the locations of septic drainfields, wells, and building foundations so as not to adversely affect them. Infiltration systems must be down gradient and at least 30 feet from the septic drainfield, at least 10 feet from foundations, and 100 ft. from wells. Infiltration systems shall be located on flat or gently sloped ground with grades of less than 15%.
- Infiltration systems must be filled with washed drain rock (1 ½" to 3" in diameter). The top and sides must be covered and wrapped with filter fabric so that the fine soils do not migrate into the voids of the drain rock. Landscaping cloth (generally available at hardware stores) works well for this purpose. A screen must be provided either at the outlet of the downspout or at the inlet to the drywell pipe to keep debris from entering the system.

3.1.1 Infiltration Trenches

Infiltration trenches are shallow gravel-filled trenches where runoff water is routed for storage and infiltration. Infiltration trenches work best in sandy or gravelly soil and are not appropriate in some clayey soil types (hydrologic group D).

Runoff from paved areas including driveways and parking areas should flow through or across a vegetated strip or swale prior to infiltration.

Infiltration trenches are sized according to the type of soils found on the site. The following minimum lengths (linear feet) per 1,000 square feet of roof area based on soil type may be used for sizing downspout infiltration trenches:

- Coarse sands and cobbles: 20 LF
- Medium Sand: 30 LF
- Fine Sand, loamy sand: 75 LF
- Sandy loam: 125 LF
- Loam: 190 LF

INFILTRATION TRENCH DESIGN WORKSHEET

Step 1. Determine the roof area and check the soil group/infiltration rate the design is based on.

Building area: _____ sqft (roof area)

Step 2: Determine the soil type found on the project site.

Soil Type:

___ Coarse sands and cobbles

___ Medium sand

___ Fine sand, loamy sand

___ Sandy Loam

___ Loam

Soil Professional that determined soil type: _____

Step 3: Determine Length of Trench Required.

(Building Area / 1000 sqft) x (Required Trench Length) =

(_____ / 1000) X _____ = _____ ft of Trench*

*Round trench length up to the nearest whole foot.

Required Trench Lengths

- Coarse sands and cobbles: 20 LF
- Medium Sand: 30 LF
- Fine Sand, loamy sand: 75 LF
- Sandy loam: 125 LF
- Loam: 190 LF

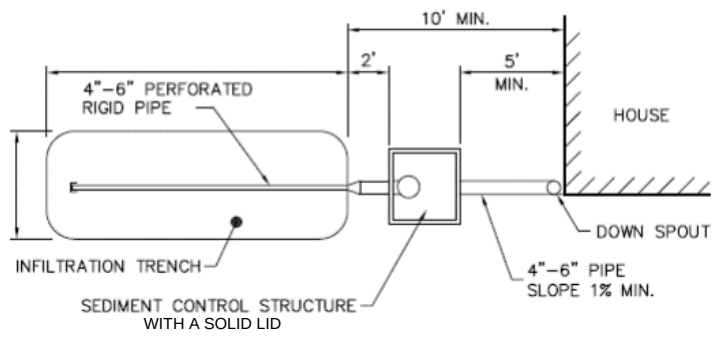
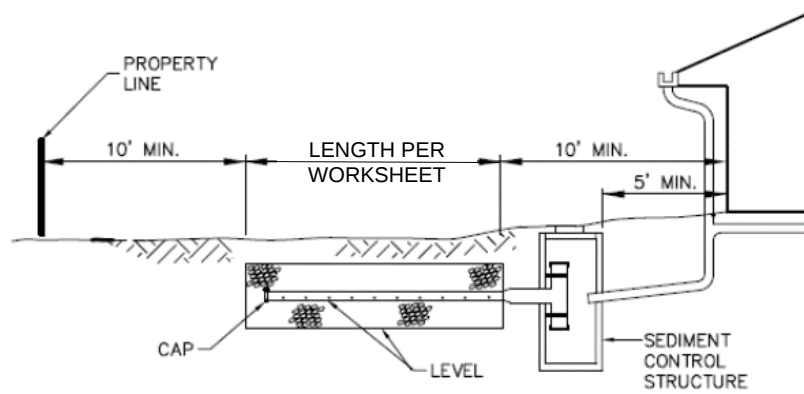
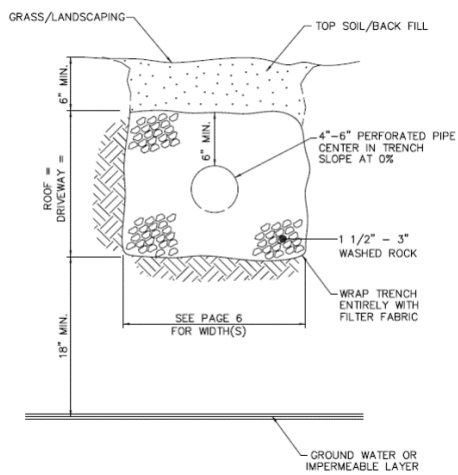


FIGURE 3

PROFILE
NOT TO SCALE



TRENCH SECTION
NOT TO SCALE



INFILTRATION DRYWELL WORKSHEET

A drywell is a simple, gravel-filled hole with a bottomless catch basin in the center into which runoff from the downspouts and gutters is routed. Drywells give a limited storage space for runoff to infiltrate slowly into the surrounding soil. Individual drywells can be used to manage runoff from up to 1,250 square feet of impervious surface area. Multiple drywells may be needed to manage the stormwater runoff on your property. Drywells are restricted to sandy or gravelly soil types (hydrologic group A and B).

When located in coarse sands, and cobbles, drywells must contain a volume of gravel equal to or greater than 60 cubic feet per 1000 square feet of impervious surface served. When located in medium sands, drywells must contain at least 90 cubic feet of gravel per 1,000 square feet of impervious surface served.

Similar to infiltration trenches, drywells that only receive runoff from single family residential roof runoff are not considered UIC wells. Infiltration trenches that receive runoff from any other surfaces shall be registered. Infiltration trenches can be registered online at: <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Underground-injection-control-program/Register-UIC-wells-online>

Drywell Design Worksheet:

Step 1. Determine the roof area and check the soil group/infiltration rate the design is based on.

Building area: _____ sqft (roof area)

Step 2: Determine the soil type found on the project site.

Soil Type:

☐ Coarse sands and cobbles

☐ Medium sand

Drywells are not permitted in soils that do not meet the soil type listed above

Soil Professional that determined soil type: _____

Step 3: Determine Volume of drywell gravel required.

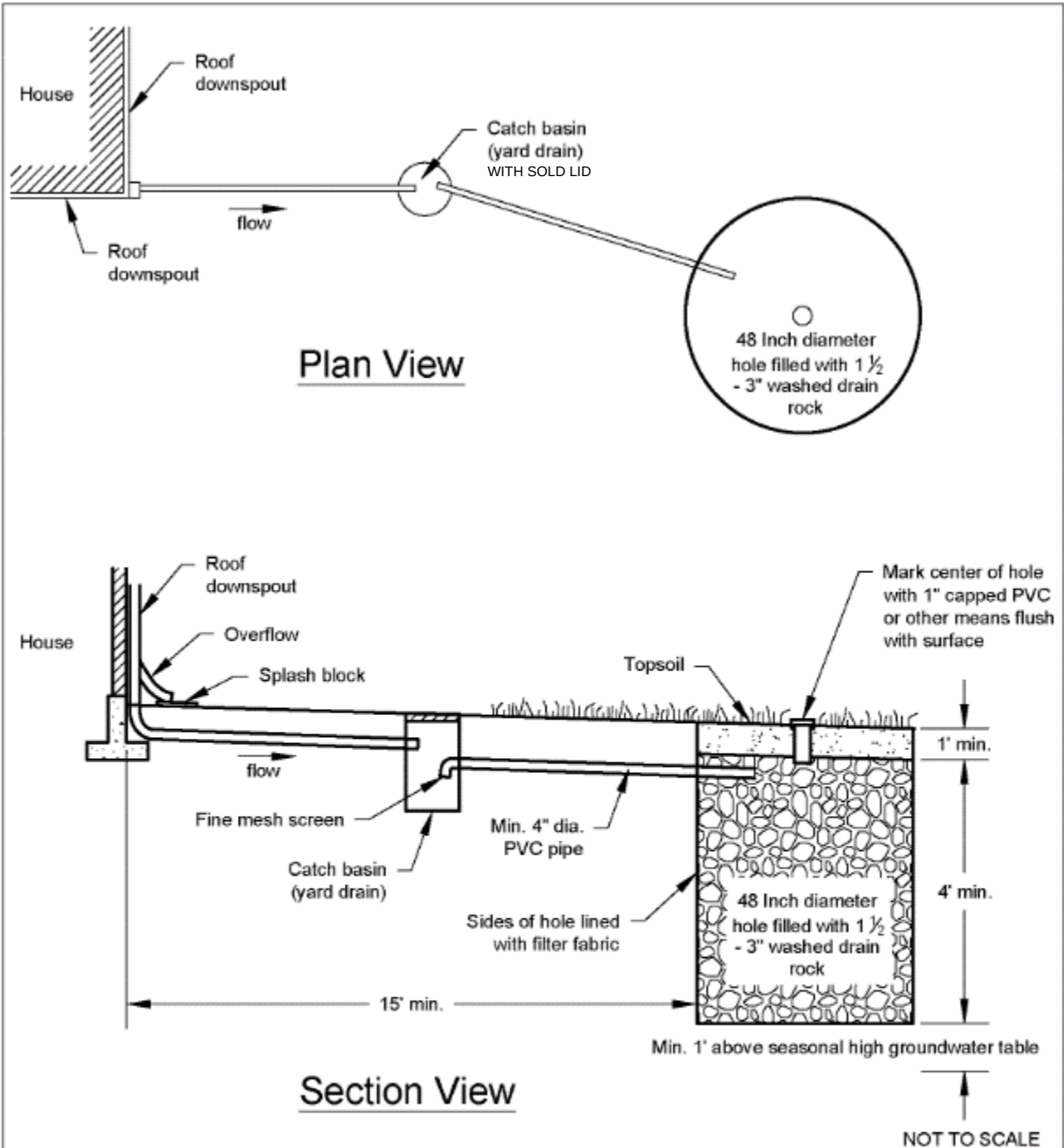
(Building Area / 1000 sqft) x (Required volume of gravel) =

(_____ / 1000) X _____ = _____ cuft of drywell gravel required.*

*Round up volume of gravel to the nearest whole cubic foot.

Required Trench Lengths

- Coarse sands and cobbles: 60 cuft / 1000 sqft of roof
- Medium Sand: 90 cuft / 1000 sqft of roof



Typical Downspout Infiltration Drywell

Revised June 2016

Please see <http://www.ecy.wa.gov/copyright.html> for copyright notice including permissions, limitation of liability, and disclaimer.

3.2 Rainwater Dispersion

Rainwater dispersion is a strategy that emphasizes minimization of impervious surfaces and evenly dispersing runoff into vegetated areas on your property. In order to utilize dispersion, there needs to be an appropriate vegetated open space that is down slope from the improvements, is large enough and has the desired slope. The vegetated open space includes native undisturbed areas, rehabilitation of previously disturbed areas, or fields that are not regularly mowed. Active recreation areas and lawn shall not count towards vegetated open space.

Dispersion is a good option for large rural lots. The following basic requirements apply to sites utilizing rainwater dispersion; additional measures may be required if site conditions warrant:

- The developed lot area must be predominately flat with slopes of no more than 10%.
- Provide at least 10-ft of dispersal trench for every 700 ft of roof area. A single trench shall not disperse more than 3500 sqft of roof. For roofs that exceed 3500 provide multiple trenches and spread trenches apart to the max extent possible.
- Areas of vegetated open space should be delineated clearly on the drainage plan.
- The maximum lot impervious surface area is 10% of the total parcel area.
- A vegetated flow path of at least 25 feet in length must be available along the path that runoff will follow prior to discharge to the nearest property line. The flow path must be as wide as the trench and slopes such that the water will not become channelize.
- A minimum 200-foot vegetated buffer from the point of dispersion to a critical area such as a stream or wetland. A vegetated flow path of at least 50-ft must be maintain between the outlet of the trench and slopes steeper than 15%.
- Dispersion areas must be at least 30 feet away from wells, and primary and reserve septic drainfields.
- Careful attention must be paid to spreading the stormwater properly. Runoff from each distinct impervious area should be dispersed to *different areas* and combining the flows from different areas should be kept to a minimum.

3.2.1 Small Lot Dispersion

Some areas of Region I in eastern Clallam County have excessively drained soils that are classified as hydrologic groups A or B. In these areas, rainwater dispersion can be used as the sole stormwater management regardless of the amount of vegetated open space on the lot. This is called Small Lot Dispersion. **See Appendix C to determine if the soil type on your site is suitable for this option.**

In situations with excessively drained soils, splash blocks are the simplest way to disperse the runoff collected from the roof area and discharged via a downspout. Downspout splash blocks or downspout extensions with splash blocks may be the only hardware required for areas with these excessively drained soil types. In general, if the ground is sloped away from the foundation, and there is adequate vegetation for effective dispersion, splash blocks will adequately disperse storm runoff into these gravelly or sandy soils. If the ground is level, adding downspout extensions to move the discharge point further from the foundation may be a better choice.

- ☐ The developed lot area must be predominately flat with slopes of no more than 10%.

- ☐ When utilizing Small Lot Dispersion, no more than 700 square-feet of roof area may be drained to a single splash block.
- ☐ A vegetated flow path of at least 25 feet in length must be available along the path that runoff will follow upon discharge from the splash block to the nearest property line.

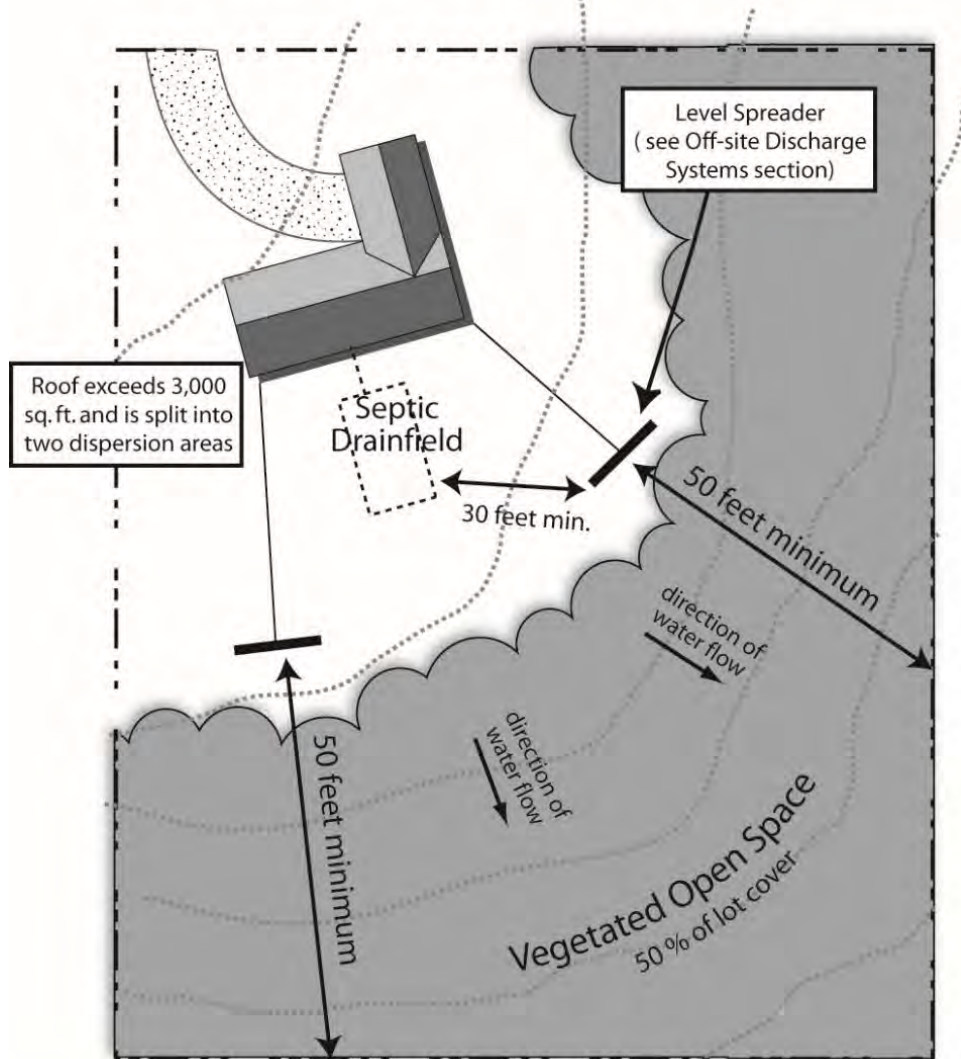
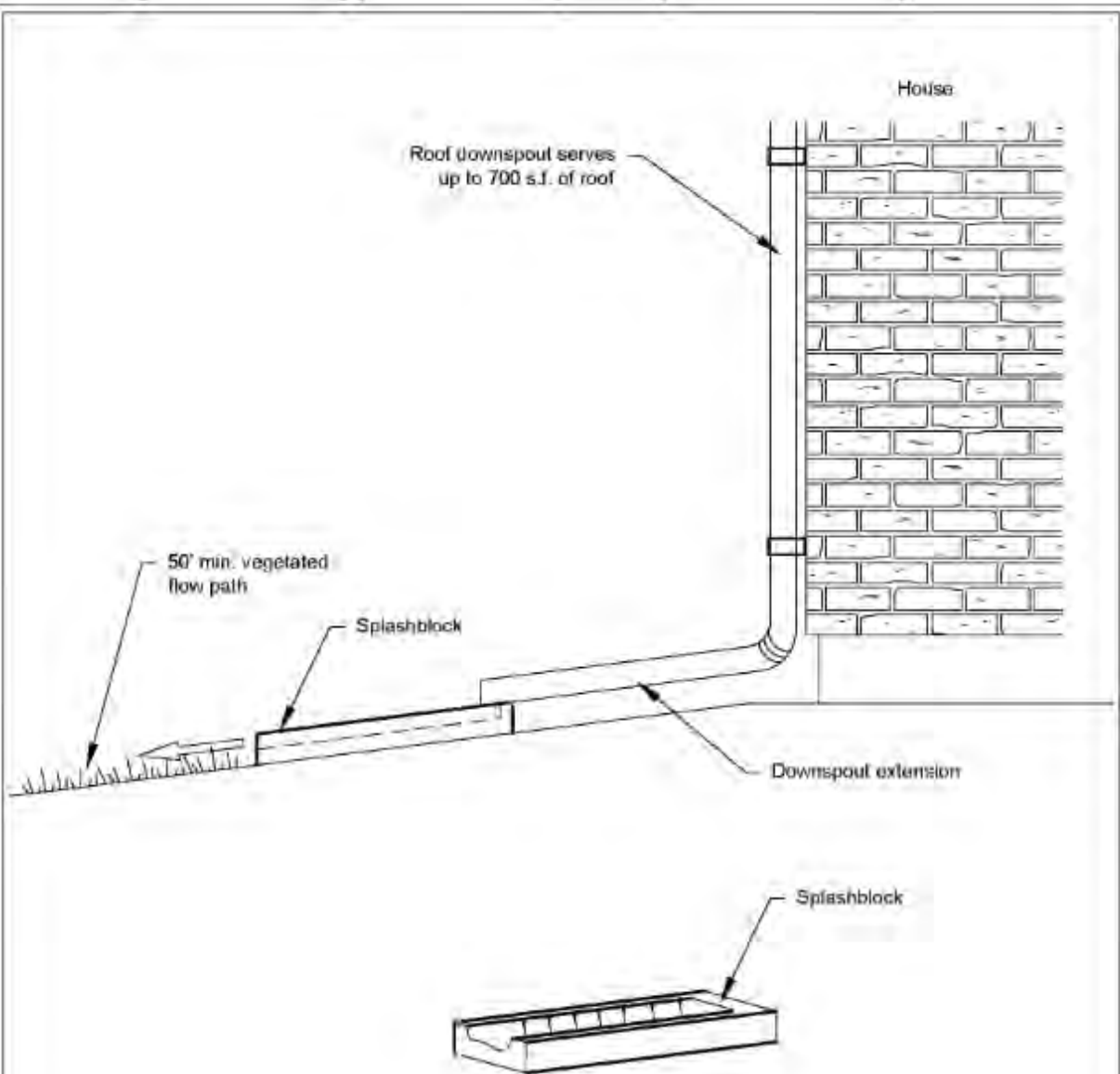


Figure 2. Example Dispersion Plan



Source: King County Department of Natural Resources, 1998

NOT TO SCALE



Typical Downspout Splashblock Dispersion

Revised December 2016

Please see <http://www.ecy.wa.gov/copyright.html> for copyright notice including permissions, limitation of liability, and disclaimer.

3.3 Rain Gardens

Rain gardens are excavated depressions lined with amended soil and planted with vegetation capable of thriving in wet soil in the winter and dry conditions in the summer. Raingardens provide bioretention, a process in which storm runoff partially infiltrated, partially absorbed by the plants and filtered by the vegetation and soil. Depending on the size and project site soils, it should be expected that ponding or overflows occur in larger precipitation events or when there are periods of sustained rainfall. Rain gardens, however, can be among the simplest and easiest to maintain stormwater BMPs.

The surface area of a Raingarden, as measured just below the overflow/outlet elevation, shall be at least 5% of the surface area draining to it.

Rain gardens have a minimum ponding depth of 6-inches.

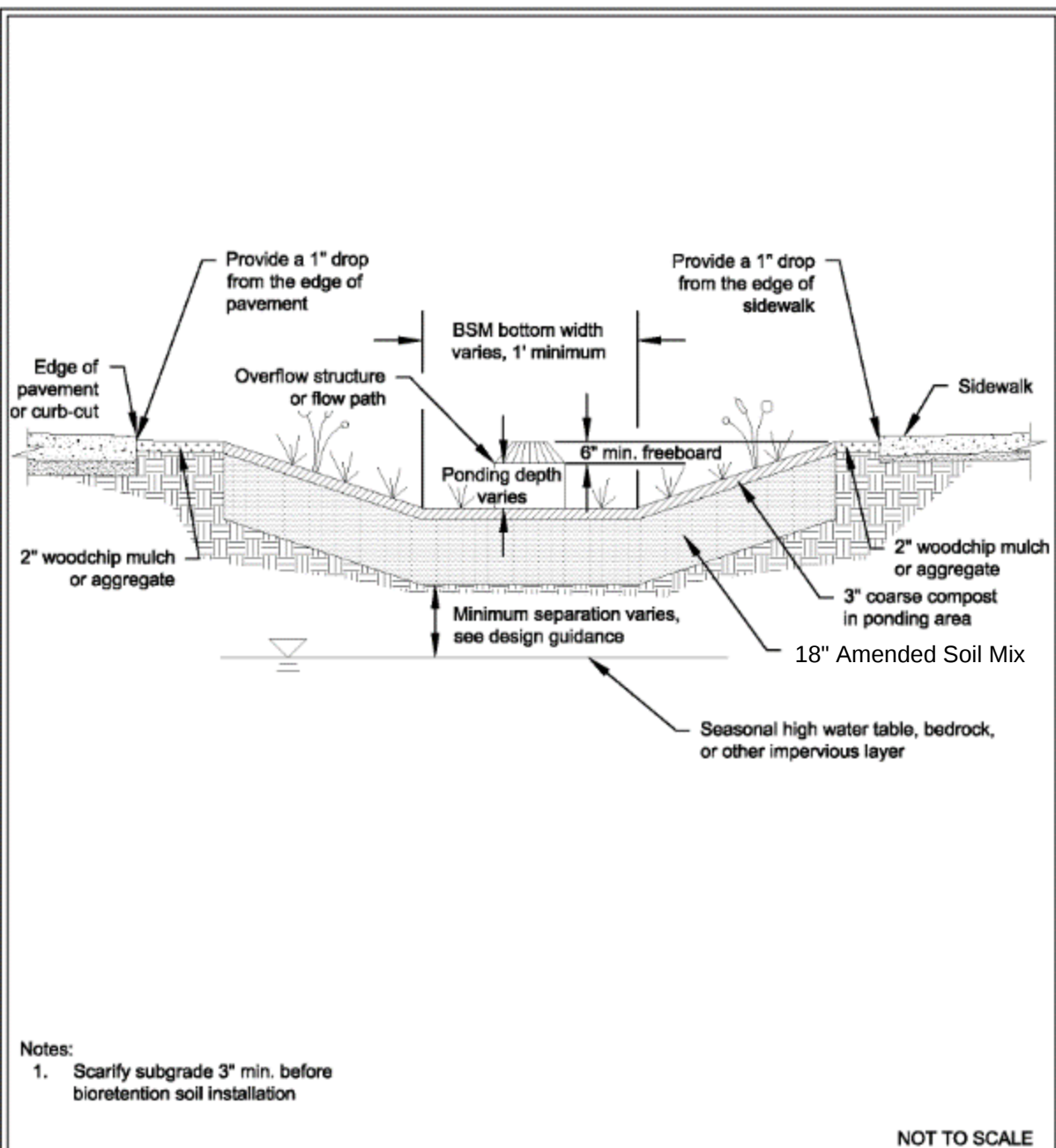
Pro Tip:

- Bioretention soils are very sensitive to over compaction. Construction must take place during good weather. Care must be taken to not compact during the installation of the plans.
- Raingardens will have ponding water in them during, and after, precipitation events.
- Refer to the Raingarden Handbook for Western Washington, Curtis Hinman - June 2013 (<https://apps.ecology.wa.gov/publications/documents/1310027.pdf>)
- Amended soils shall consist of 65% of the excavated soils + 35% compost. Amended soil shall be placed in the bottom of the raingard and lightly compacted. It is recommended that 6-inches of the amended soils be placed at a time and lightly tamped. Keep foot and vehicles off of the placed soil.
- Refer to the sample planting plans in the Raingarden Handbook link above.

Example: A 3,000 square foot house would require a rain garden with a surface area of 150 square feet.

If you utilize a rain garden to control stormwater runoff, you will need to follow the guidelines below:

- ☐ Rain gardens should be located on level to gently sloped ground. Use caution in locating rain gardens on slopes greater than 10%.
- ☐ Rain gardens shall be built to the required size as shown in the sizing table above.
- ☐ Rain gardens shall have a minimum ponding depth and at least 18-inches of amended soils.
- ☐ Side slopes shall be 3 horizontal to 1 vertical or less.
- ☐ Be sure to provide an overflow drain path for the rain garden. Outlets may consist of small spill ways or consisting of a 4" pipe. Overflow path shall be inspected and confirmed that overflow stormwater will not have a negative downstream impact.
- ☐ The rain garden shall include an additional overflow either by surface sheet flow or stabilized rock spillway to a level spreader, ditch or other stormwater dispersal system.
- ☐ The rain garden should be planted with vegetation appropriate for moist and seasonally dry conditions. See Appendix E for a list of recommended plants.



Typical Bioretention

Revised January 2019

Please see <http://www.ecy.wa.gov/copyright.html> for copyright notice including permissions, limitation of liability, and disclaimer.

3.4 Runoff Filter Strips

Runoff filter strips are lawn areas underlain by 1 to 1.5 feet of sand or gravel that are adjacent to driveways or parking areas. The turf and sand filter pollutants from runoff and allow stormwater to slowly infiltrate into the underlying soil.

Runoff filter strips shall encompass an area equal in width to the impervious surface area that drains to them. The lengths of the filter strip in areas with Type A or B soils shall be:

- 10' long for impervious areas up to 20'.
- For impervious areas greater than 20', the flow path through the filter strip shall be 10-feet, plus an additional 0.25-feet for every 1-foot of impervious area beyond the initial 20-feet.

In areas with Type C or D soils, the lengths of filter strips shall be:

- For every 1-foot of flow path length across the impervious surface, the flow path through the filter strip shall be 6.5-feet.

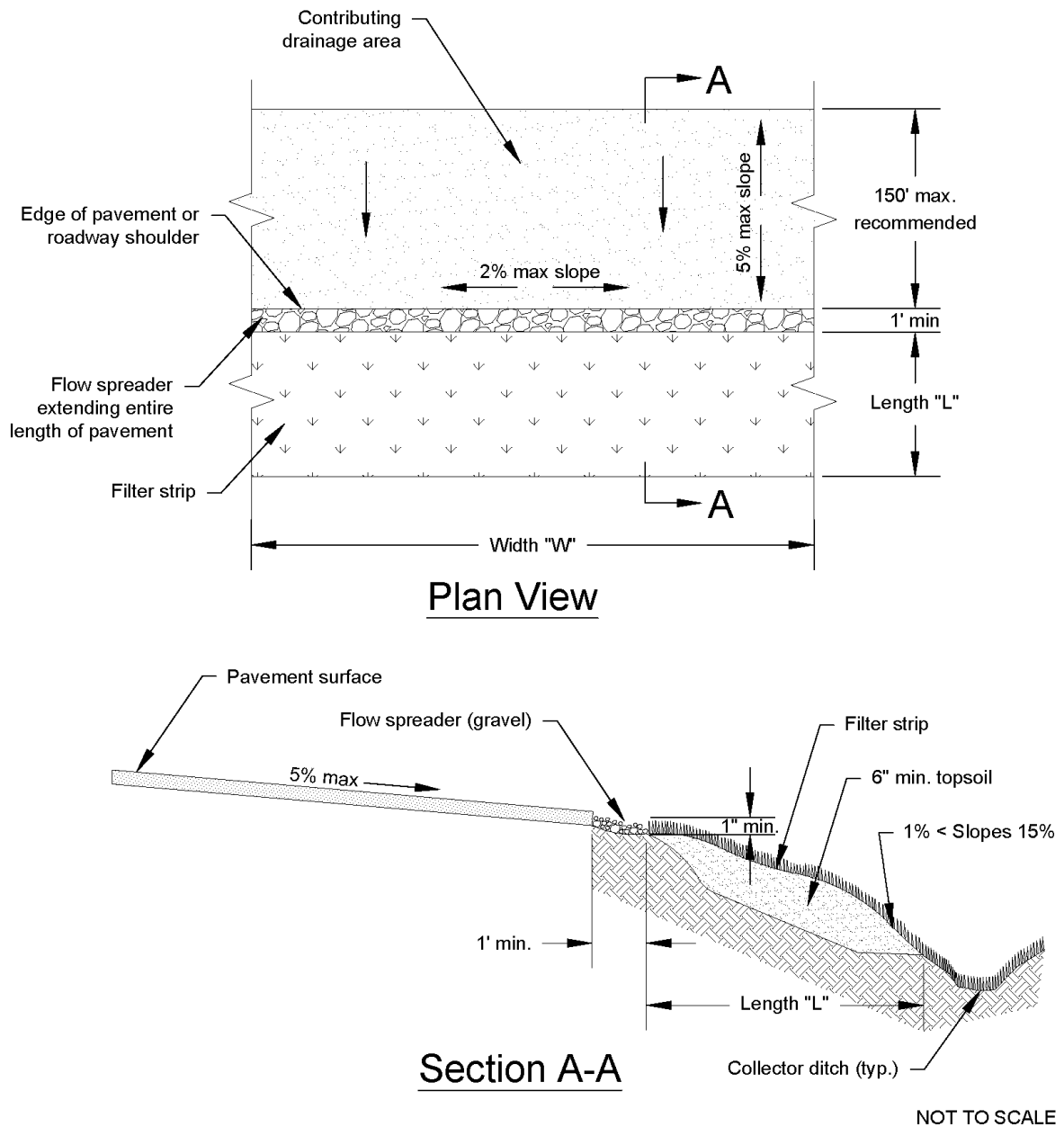
Additional filter strip criteria are

- The slope of the impervious area, such as a parking lot, draining to the filter strip must be less than 8 percent.
- The longitudinal slope of a road draining to a filter strip shall be less than 5%.
- The average slope of the filter strip shall be less than 15%.

Examples:

- A 75' long paved driveway, 24' wide, in an area with Type B soils, would require a filter strip 11' wide along the entire length of the driveway. ($10' + 0.25'/ft \times 4' = 11\text{-ft}$).
- A 75' long paved driveway, 10' wide, in an area with Type C soils, would require a filter strip 65' wide along the entire length of the driveway. ($10' \times 6.5'/ft = 65\text{ft}$).

Figure V-7.11: Typical Filter Strip



Typical Filter Strip

Revised June 2016

Please see <http://www.ecy.wa.gov/copyright.html> for copyright notice including permissions, limitation of liability, and disclaimer.

3.5 Rainwater Collection

Rainwater can be collected off of roofs and routed to containers such as rain barrels or cisterns for storage and later use. Up to 2,500 square feet of impervious surface may be mitigated by the use of rainwater catchment. Small systems of up to 2,200 gallons with water use restricted to non-potable outdoor uses can be incorporated into a drainage plan without engineered designs. Engineering design is required for systems requiring more than 2,200 gallons of storage.

Refer to <https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-recovery-solutions/Rainwater-collection> for additional information.

The table shown below shows the minimum size of storage required for the roof area draining to the cistern.

Square Footage of Roof Area Draining to Cistern							
		250	500	1,000	1,500	2,000	2,500
Required Cistern Volume by Region (Gallons)	Region I	400	800	1,600			
	Region II	500	1,100	2,200			Not permitted
	Region III	750	1,600			Not permitted	Not permitted

Shaded cells indicate rainwater catchment systems over 2,200 gallons that require an engineered design. Rainwater catchment can be used as the sole runoff management option for roofs up to 1,000 square feet and for up to 50% credit for additional roof areas. To receive credit for roof areas routed to cisterns or rain barrels, the storage volume must equal or exceed the amounts required in the sizing table above.

In order for rainwater catchment to aid in reducing flows from developed areas, it is important to manage overflow during storms. Ideally, spigots should be shut off during stormy periods, and overflow routed to additional BMPs such as a rain garden or infiltration trench. Storage levels kept to less than $\frac{3}{4}$ full by slowly lowering levels during dryer weather by irrigating lawns or gardens or very slowly draining to conveyance areas. Larger clean-out valves should never be used to lower water levels especially during winter months. Water from the cistern should be drained prior to freezing weather.

If you plan to utilize a cistern or rain barrels to collect stormwater runoff, follow the guidelines below:

- ☐ Containers should be placed on a concrete or brick footing on firm ground.
- ☐ Container capacity shall meet or exceed the size specified in the sizing chart for the roof area draining to it.
- ☐ Containers storing less than 1,000 gallons shall use an outlet spigot of $\frac{1}{2}$ ", larger containers shall utilize spigots $\frac{3}{4}$ " or larger.
- ☐ Containers must have an overflow pipe located below the top of the tank which is directly routed to a conveyance BMP.
- ☐ The container shall have a controllable spigot or valve located near the bottom. The spigot should drain to a hose or pipeline that can outlet to a conveyance BMP.
- ☐ The water collected from the gutter shall be filtered with a fine screen prior to discharging to the storage container.
- ☐ The container should have a valve of at least 2" in diameter to flush sediment out of the tank. This larger valve should not be used to drain the tank because of the rapid rate of draining.

3.6 Stormwater Conveyance BMPs

The stormwater conveyance BMPs collect and convey runoff on the site. When well implemented, conveyance BMPs can slow flows and allow some infiltration of stormwater as it travels across a developed site. To achieve these benefits, at least half of the flow paths from various impervious areas shall consist of open conveyance, thus limiting the use of pipes and narrow ditches. The two options for conveyance of stormwater consist of conveyance piping and swales. This section of the manual presents general guidelines for design of the following conveyance BMPs for small projects:

- Conveyance Piping
- Swales

3.7 Conveyance Piping

The most common way to convey stormwater is with Closed conveyance piping. Pipes are sold in many types of materials. PVC, and CPEP pipes are the most common types of pipes used for small site drainage plans. For culverts, or pipes that are shallow under vehicle areas, concrete and ductile pipes are recommended.

Pipes should be laid to a true line and grade. Pipes shall be bedded with well graded soils that do not contain rocks greater than 1-inch in diameter. The bedding shall be compacted below, around the sides of the pipe, and above the pipe to a firm and unyielding condition. Native soils can be generally used for backfilling the remainder of the trench. These soils shall be placed in layers no more than 8-12 inches and compacted. Wet soils that do not compact, or soils that contain a lot of debris and organics, may need to be replaced with an imported gravel borrow.

Refer to Section 7-08 General Pipe Installation Requirements in the current edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction for additional information.

3.8 Swales

Swales are broad, shallow ditches with gentle slopes. They are generally grassed and designed for easy mowing. Swales may be stabilized with cobbles and decorative stones/river rock. Swales should be used on level or gentle sloped ground with grades less than 5%. The bottom width of a swale should be at least 2 feet. However, if the swale serves over 5,000 square feet of impervious surface, the bottom should be at least 3 feet wide.

3.9 End-of-Line Discharge BMPs

After stormwater has traveled through a Runoff Management BMP such as a rain garden, rainwater planter, or infiltration system, it is conveyed through an open conveyance BMP to a discharge point. This point should be at or near the point where water naturally flowed from the site before the permitted development. In order to eliminate or minimize any impacts associated with the discharge of stormwater from a site, stormwater shall be dispersed utilizing either a level spreader, continued dispersion or a rock energy dissipating pad. This section of the manual presents general guidelines for design of the following discharge BMPs for small projects:

- Level Spreaders
- Continued Dispersion

3.9.1 Level Spreaders

Level spreaders are structures that are designed to convert small concentrated stormwater flows to sheet flows over a large area. Level spreaders come in many forms, but all designs follow the same principle:

1. Concentrated flow enters the spreader through a pipe, ditch or swale.
2. The flow is slowed and energy is dissipated.
3. The flow is distributed throughout a long linear shallow trench or behind a low berm.
4. Water then rises and is dispersed over the level spreader.

3.9.2 Gravel Spreader Trenches

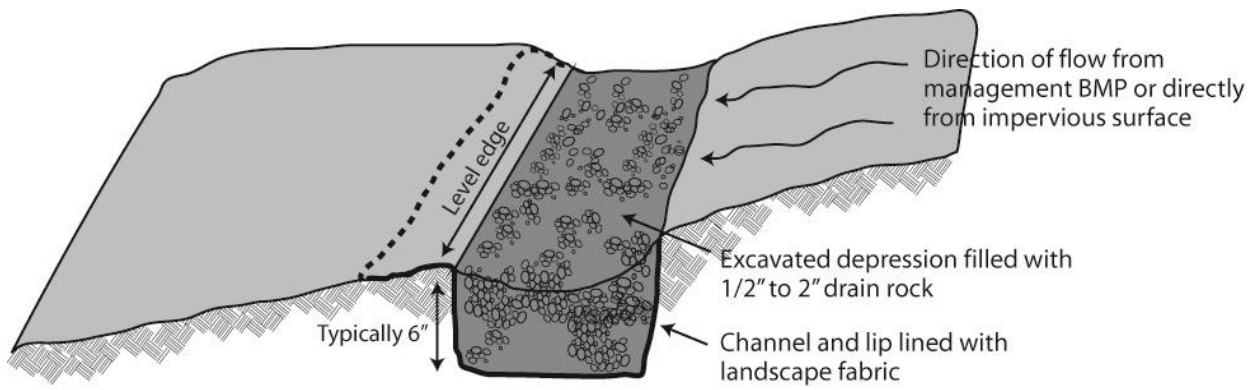
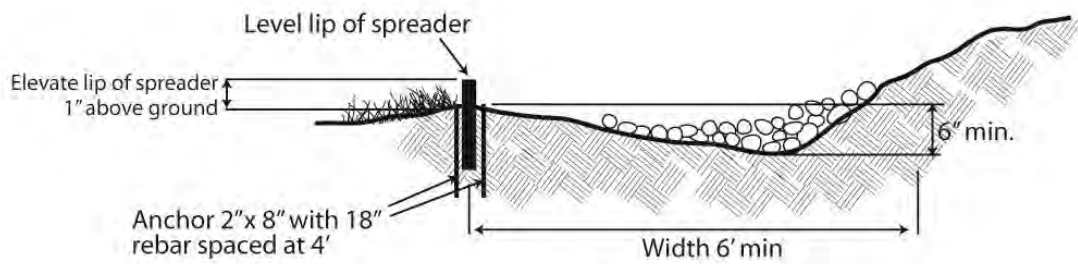
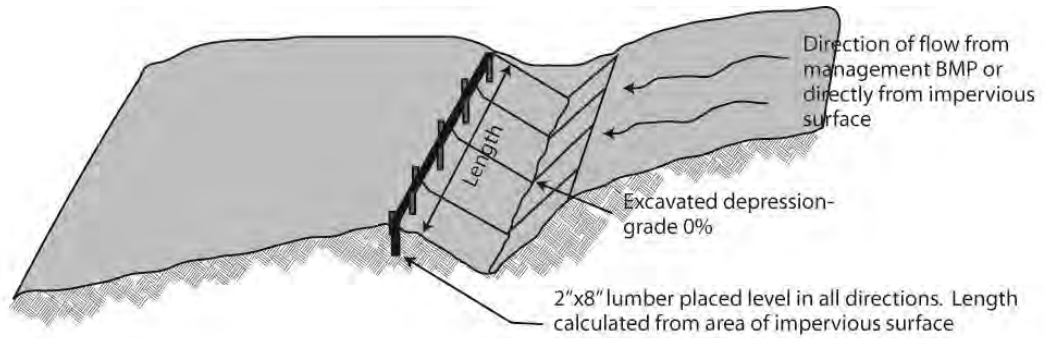
A gravel spreader trench is a gravel filled channel with a level downslope edge. Water pools in the channel, rises up and flows evenly over the edge of the channel as dispersed sheet flow. The channel should be dug along an elevation contour, which helps make the downstream lip “level.” Landscape fabric should be used to underlay the channel and protect the downslope lip. A disadvantage of this type of spreader is that it is very hard to get the lip truly level and keep it that way.

A spreader shall have a minimum length of 10 feet for every 1,000 feet of directly tied impervious surface. For example, to adequately disperse flows from an impervious surface (such as a driveway) that measures 1,500 square feet, a level spreader 15 feet long would be needed.

For the outflow of a BMP such as a rain garden, or planter, 2,000 square feet of impervious surface may be routed for every 10 feet of width of the level spreader. For example, a rain garden receiving the runoff from a 4,000 square foot surface should have an overflow leading to a level spreader 20 feet in length.

The maximum length of one level spreader shall be 30 feet. For areas larger than 3,000 square feet of impervious surface that are drained directly by a level spreader, more than one level spreader should be used. When used in conjunction with runoff management and conveyance BMPs such as a rain garden or conveyance furrow, impervious surfaces larger than 6,000 should incorporate more than one level spreader.

A vegetated flow path of at least 50 feet in length must be available along the path that runoff will follow upon discharge from the spreader to the nearest property line. The level spreader should be at least 200 feet from a critical area such as a stream, wetland or geologically hazardous area.



Appendix A

Appendix A: Sample Drainage Plan Submittal Form

Copies of this form are available at the Clallam County Department of Community Development or on the website: [\[redacted\]](#)

FEE:

Clallam County Public Works Department
223 E. 4th Street, Suite 6 Port Angeles, WA 98362
360-417-2379 Fax 417-2513

DRA _____

Drainage Plan Submittal

Information

Please print. Leave no blank lines.

Landowner _____

Phone _____

Address _____

City, ST ZIP Code _____

Nearest County Road _____

Tax Parcel # _____

Prepared By (Agent) _____

Address _____

City, ST ZIP Code _____

Phone _____

Short Plat Name _____

Driveway:

Not on County Road (accesses private rd, easement, or State Hwy) _____

Block: _____

Lot: _____

Submitting permit now for driveway approach onto County road _____

Volume _____

Page: _____

Existing driveway approach onto County road _____

Acreage: _____

Soils: _____

Regarding pre-approval for additional/future structures: Locations and dimensions must be shown on this site plan for future drainage fees to be waived. Future/Additional structures which create impervious areas that are equal to or greater than 5,000 square feet may require engineered drainage plans.

Signature of Owner/ Owner's Agent _____

Date _____

Requirements: The following are required as part of a drainage plan submittal

- ☐ Drainage Plan (must be plotted to scale, with all significant dimensions given. Use attached sheet or attach a separate sheet, no larger than 11x17. See checklist for required information.
- ☐ Written Drainage Assessment
- ☐ Declaration of Covenant and Grant of Easement form

Submit the completed forms to the Clallam County Public Works Department. Incomplete information can delay processing of the drainage evaluation.

Drainage Plan

DRAINAGE PLAN CHECKLIST:

The following information must be included on all small project drainage plans:

Identification

- ☐ Name, address, and phone number of applicant
- ☐ Parcel number
- ☐ Dimension of all property lines
- ☐ Street names and existing or proposed property address
- ☐ Section, township, and range of proposal.
- ☐ North arrow
- ☐ Legend if needed
- ☐ Scale—use a scale that clearly illustrates drainage features and BMPs/measures
- ☐ Show at least 5-foot contours for all slopes steeper than 15% .

Building and Site Development Features

- ☐ Footprint of all structures (existing and proposed)
- ☐ Future structures and improvements planned.
 - If you wish to have drainage review fees waived for future structures/improvements on this parcel, you must show them (with dimensions) on the site plan.
- ☐ Parking, roads, and driveways (existing and proposed)
- ☐ Sport courts, patios, pools and any other paved or impervious surfaces (existing and proposed)
- ☐ Total impervious surface land cover (existing and proposed)
- ☐ Location of any retaining walls and rockeries (existing and proposed)
- ☐ Existing or proposed septic system, including all system components and both primary and reserve drainfields.
- ☐ Utility structures (poles, fire hydrants, etc.)
- ☐ Existing easements
- ☐ Existing wells or wells to be abandoned.
- ☐ Newly created vegetated areas.
- ☐ Remaining **vegetated open space** that will remain undisturbed.

Natural Features and Critical Areas

For a map detailing the critical areas on your site, go to <http://www.clallam.net/Maps/> or visit the permit counter at the Department of Community Development. *Development within 200 feet of a critical area requires an engineered drainage plan.*

- ☐ Existing natural features of the property (woods, pasture, brush).
- ☐ Existing hydrology- Location of all existing and proposed ditches, swales, pipes, etc.
- ☐ Delineation of all streams, wetlands, lakes, closed depressions, or other water features (including any required buffer widths)
- ☐ Delineation of all flood hazard areas, erosion hazard areas, steep slope hazard areas, landslide hazard areas, and their buffers and building setback lines.

Stormwater Management Information

In addition to the general information listed above, the following additional information is required on drainage plans that include installation of stormwater BMPs:

- ☐ Identify the Stormwater Region your project is within.
 - Consult the map on page X to determine the stormwater region your project is within. This is critical for sizing various stormwater management techniques.
- ☐ Identify the soil type(s) on your project site in order to determine which stormwater management techniques in this manual will be applicable for your site.
 - For a County soils map showing this information, consult the *Soil Survey of Clallam County*, go to <http://www.clallam.net/Maps/>, or visit the Clallam Conservation District.
- ☐ Show delineation and dimensions of impervious surfaces and pervious surfaces, both existing and new.
- ☐ Show location and dimensions of runoff management BMP methods such as but not limited to infiltration trenches, drywells, rain gardens, permeable pavements, rain water storage tanks for managing stormwater from all impervious surfaces.
 - Use the drainage project planning chart on page x to select options for managing roof water runoff, driveway runoff, conveyance areas, and off-site ROW discharge areas.
 - Appendix C summarizes the BMPs appropriate for your soil type and slope.
 - Consult Section III of this manual for details on the design and applicability of each of the BMP options. Use the sizing charts located in Section III to determine the required dimensions for each BMP based on the stormwater region in which the project is located.
- ☐ Show delineation and dimensions of the flowpath of stormwater through the site - from the runoff management BMPs, to conveyance BMPs, to end-of-line discharge BMPs.
- ☐ Show setback lengths between stormwater management BMPs and any property line, structure, well, steep slope, stream, wetland, or septic system including drainfields.

Written Drainage Assessment

The written drainage assessment is a supporting document of the small project drainage plan that should include the following information:

- ☐ A description of the property:
 - **Property Description:** Describe the natural features of the parcel (i.e. woods, pasture, brush) and give the approximate area covered by those features.
 - **Existing Structures/ Improvements:** List any existing buildings, driveways (dirt, gravel, etc.), sidewalks, etc. and their area size in square feet or acres.
 - **New Structures/ Improvements:** List new buildings and their sizes along with any size changes in existing driveways, parking areas, landscaped areas, etc.
 - **Future Structures/ Improvements Planned:** If you wish to have drainage review fees waived for future structures/improvements on this parcel, you must list them (with dimensions) in this section. Show their locations on the plot plan.
 - **Remaining Undisturbed Land:** List and provide the size of the land (woods, pasture) not covered by buildings or improvements.
- ☐ Proposed Drainage Plan: A description of proposed stormwater management BMPs shown on the drainage plan and how they were selected.

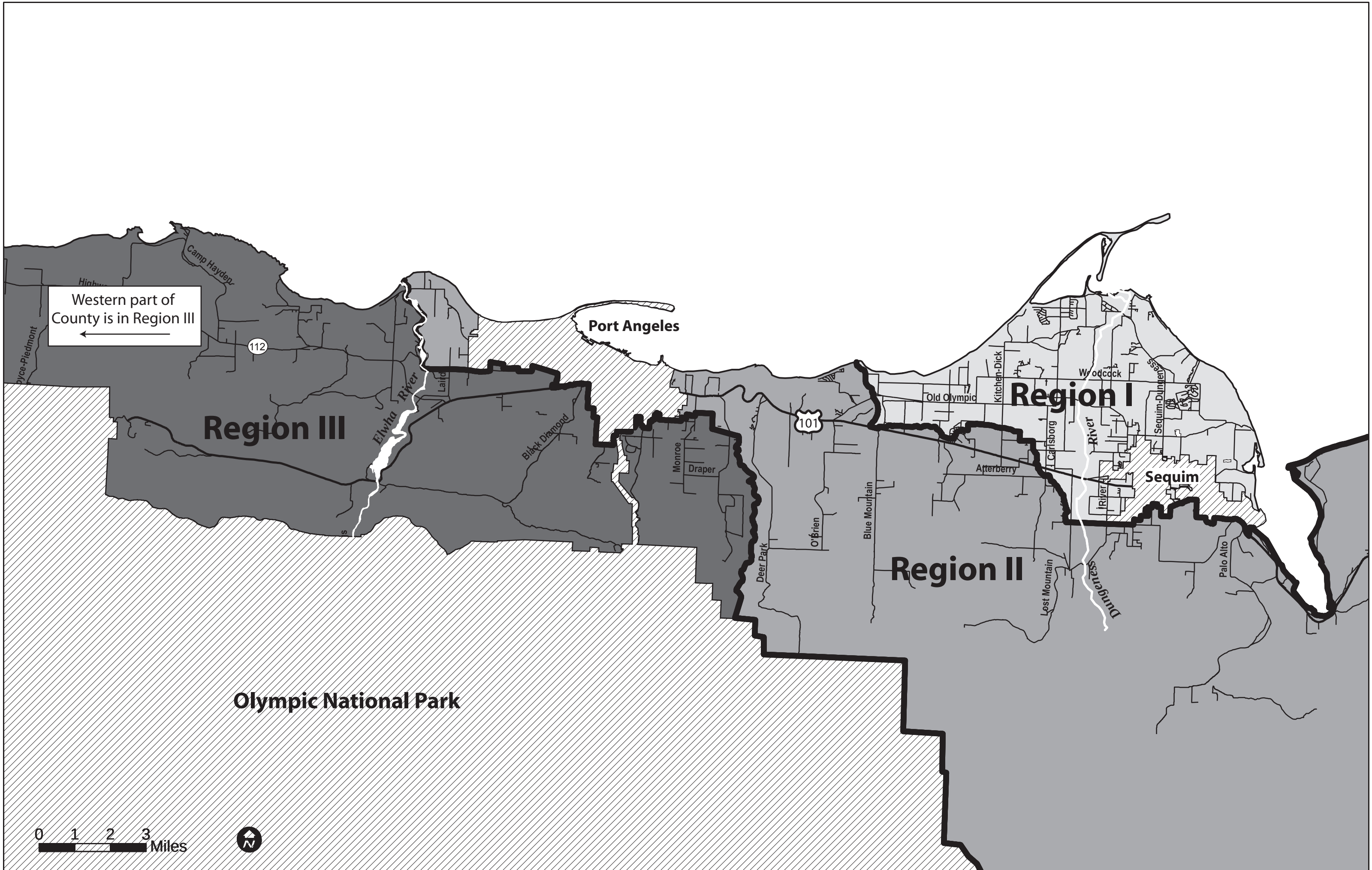
Parcel Number:	
Description	Area (sq. ft.)
Property description: (wooded, pasture, etc.)	
Existing Structures/ Improvements:	
New Structures and Improvements:	
Future Structures and Improvements:	
Proposed Drainage Plan:	

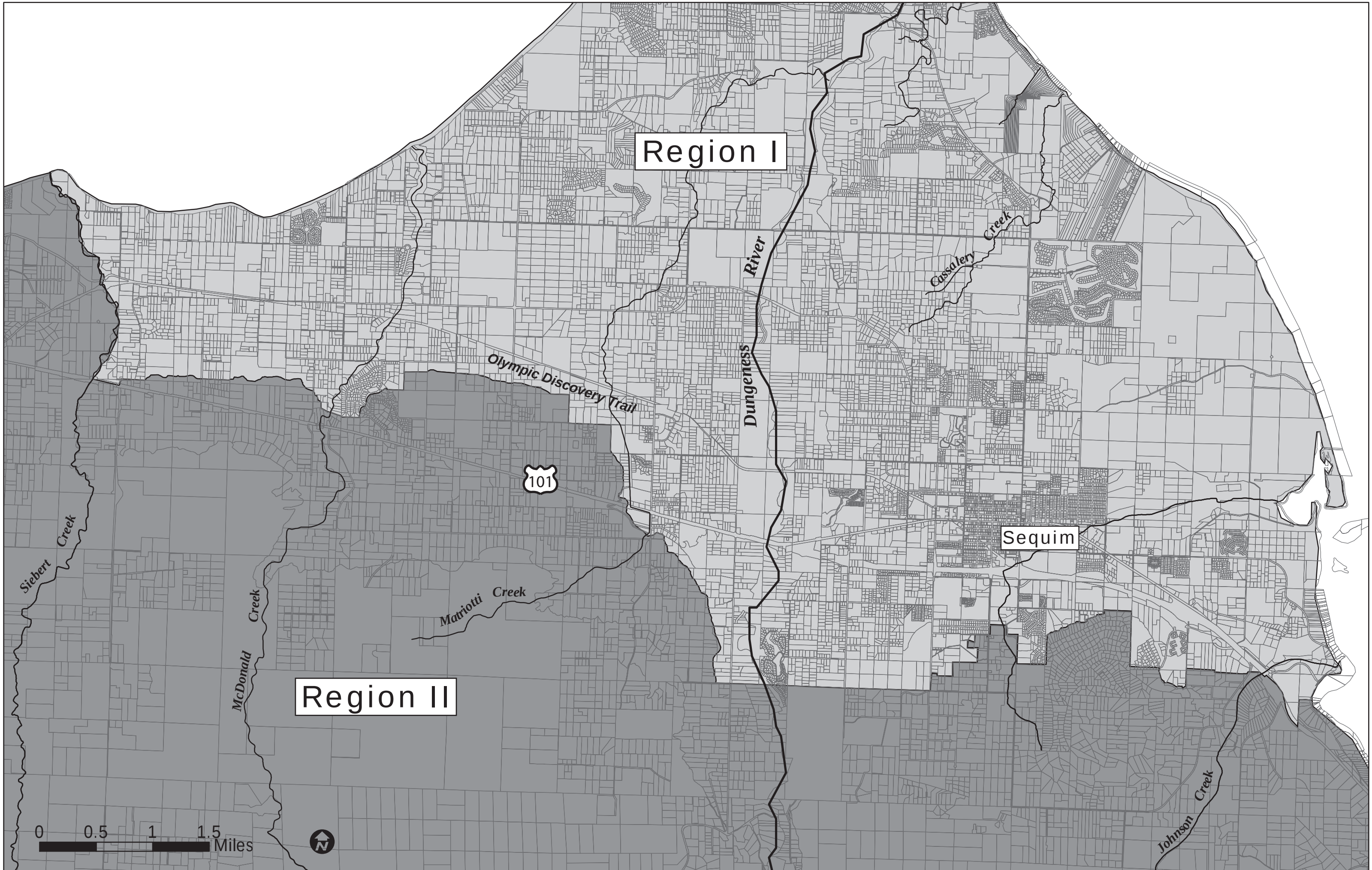
I hereby certify the information provided above and on the attached plot plan is true and accurate to the best of my knowledge and represents the ultimate development of the parcel.

Signature of Owner/ Owner's Agent

Date

Appendix B





Region I

Region II

Sequim

101

Olympic Discovery Trail

Dungeness River

Cassalery Creek

Mariotti Creek

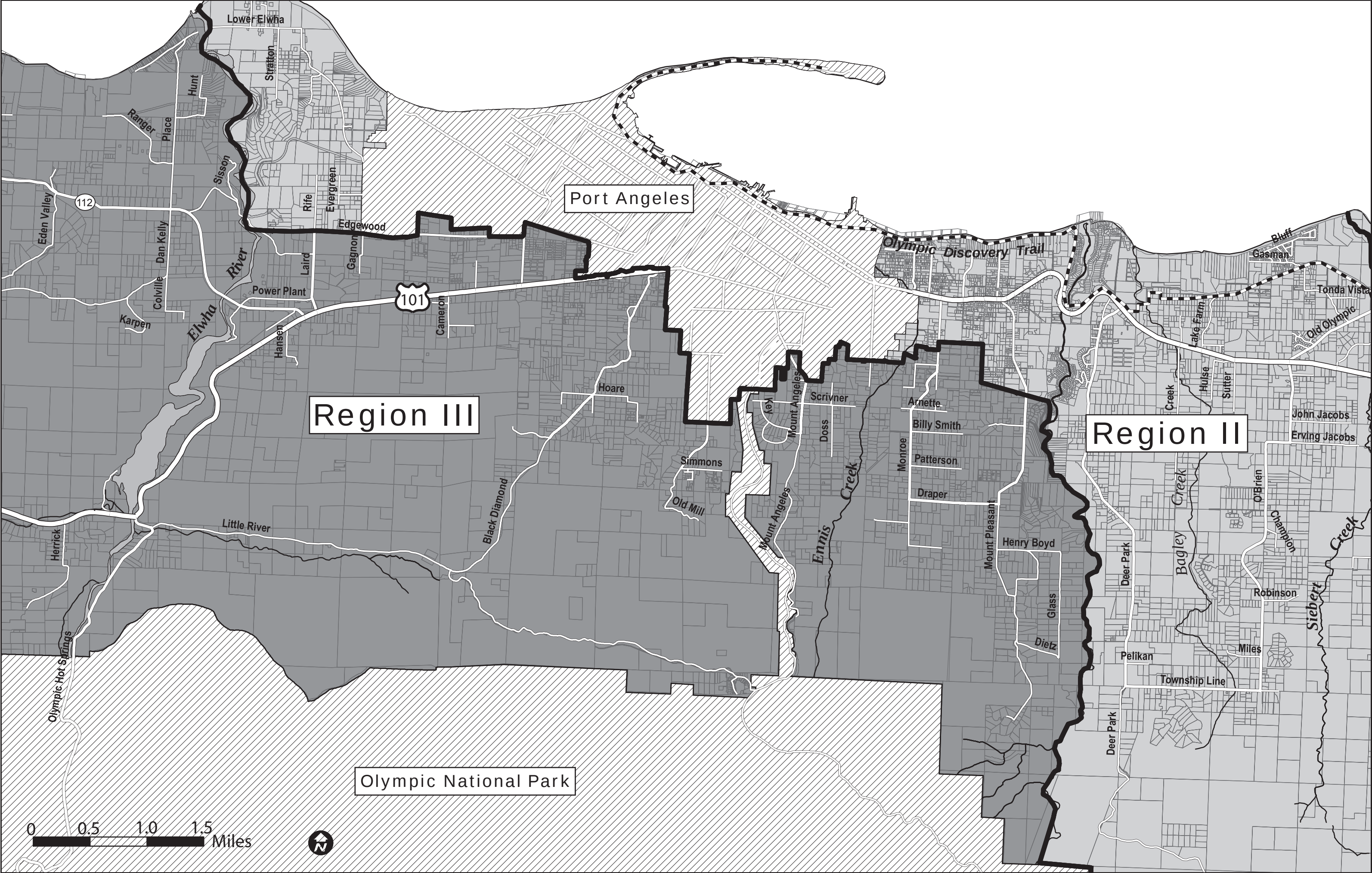
Johnson Creek

Siebert Creek

McDonald Creek

0 0.5 1 1.5 Miles





Appendix C

Appendix C: Suitable Soils and Slopes for BMPs

Some BMPs in this manual may not be appropriate for use in some areas of the county due to soil limitations or steep slopes.

The following tables outline applicable soils and slopes in the county for BMPs in the three stormwater regions. Soils are classified in different hydrologic groups depending on their drainage characteristics. The names and hydrologic groups of the soils present on your project site can be found in the *Soil Survey of Clallam County*, on the County website at <http://www.clallam.net/Maps/> or by visiting the Clallam Conservation District.

Region I

BMP	Applicable Soils	Applicable Slopes
Runoff Management		
Infiltration Systems: Infiltration Trench Drywell	Only the following Hydrologic Group A or B soils: ▪ Carlsborg (7) ▪ Dick (16) ▪ Dungeness (17) ▪ Hoypus (23, 24,25) ▪ Pits (52) ▪ Sequim (63,64)	15% or less
Rainwater Dispersion	All Soils	10% or less
Small Lot Dispersion (with Splash Block)	Only the following Hydrologic Group A or B soils: ▪ Carlsborg (7) ▪ Dick (16) ▪ Dungeness (17) ▪ Hoypus (23, 24,25) ▪ Pits (52) ▪ Sequim (63,64)	10% or less
Rain garden	All Soils	10% or less
Rainwater Planters	All Soils	Level construction site
Runoff Filter Strips	All Soils	5% or less
Porous Pavement	Only the following Hydrologic Group A or B soils: ▪ Carlsborg (7) ▪ Dick (16) ▪ Dungeness (17) ▪ Hoypus (23, 24,25) ▪ Pits (52) ▪ Sequim (63,64)	5% or less
Rainbarrels/ Cisterns	All Soils	Level construction site
Conveyance		
Swales	All Soils	5% or less
Conveyance Furrows	All Soils	Greater than 15%
Conveyance Gardens	All Soils	10% or less
Gravel Trenches	All Soils	5% or less
Off-site Discharge		
Level Spreader	All Soils	All slopes
Continued Dispersion	All Soils	10% or less

Numbers after soils correspond to Soil ID numbers found on <http://www.clallam.net/Maps/>

Region II

BMP	Applicable Soils	Applicable Slopes
Runoff Management		
Infiltration Systems: Infiltration Trench Drywell	Only the following Hydrologic Group A or B soils: - Carlsborg (7) - Dick (16) - Dungeness (17) - Dystic Xerorthents (18,19) - Hoypus (23,24,25) - Louella (34,35,36) - Neilton (44,45,46) - Pits (52) - Schnorbush (59,60,61,62) - Sequim (63,64) - Terbies (70,71,72) - Typic Xerofluvents (73)	15% or less
Rainwater Dispersion	All Soils	10% or less
Small Lot Dispersion	Not Applicable in Region II	
Rain garden	All Soils	10% or less
Rainwater Planters	All Soils	Level construction site
Runoff Filter Strips	All Soils	5% or less
Porous Pavement	Only the following Hydrologic Group A or B soils: - Carlsborg (7) - Dick (16) - Dungeness (17) - Dystic Xerorthents (18,19) - Hoypus (23,24,25) - Louella (34,35,36) - Neilton (44,45,46) - Pits (52) - Schnorbush (59,60,61,62) - Sequim (63,64) - Terbies (70,71,72) - Typic Xerofluvents (73)	5% or less
Rainbarrels/ Cisterns	All Soils	Level construction site
Conveyance		
Swales	All Soils	5% or less
Conveyance Furrows	All Soils	Greater than 15%
Conveyance Gardens	All Soils	10% or less
Gravel Trenches	All Soils	5% or less
Off-site Discharge		
Level Spreader	All Soils	All slopes
Continued Dispersion	All Soils	10% or less

Region III

BMP	Applicable Soils	Applicable Slopes
Runoff Management		
Infiltration Systems: Infiltration Trench Drywell	Only the following Hydrologic Group A or B soils: ▪ Andeptic Udorthents (2) ▪ Calawah (5) ▪ Carlsborg (7) ▪ Dick (16) ▪ Dystric Xerorthents (18,19) ▪ Hoh (22) ▪ Hoypus (23,24,25) ▪ Hyas (26) ▪ Ilwaco (27,28) ▪ Klone (29,30,31) ▪ Louella (34,35,36) ▪ Lyre (39,40) ▪ Makah (41) ▪ Neilton (44,45,46) ▪ Palix (49,50,51) ▪ Pits (52) ▪ Queets (54,55) ▪ Quillayute (56) ▪ Schnorbush (59,60,61,62) ▪ Sequim (63,64) ▪ Snahopish (65) ▪ Solduc (66) ▪ Solleks (67,68) ▪ Terbies (70,71,72) ▪ Typic Xerofluvents (73) ▪ Wellman (74)	15% or less
Rainwater Dispersion	All Soils	10% or less
Small Lot Dispersion	Not Applicable in Region III	-----
Rain garden	All Soils	10% or less
Rainwater Planters	All Soils	Level construction site
Runoff Filter Strips	All Soils	5% or less
Porous Pavement	Only the following Hydrologic Group A or B soils: ▪ Andeptic Udorthents (2) ▪ Calawah (5) ▪ Carlsborg (7) ▪ Dick (16) ▪ Dystric Xerorthents (18,19) ▪ Hoh (22) ▪ Hoypus (23,24,25) ▪ Hyas (26) ▪ Ilwaco (27,28) ▪ Klone (29,30,31) ▪ Louella (34,35,36) ▪ Lyre (39,40) ▪ Makah (41) ▪ Neilton (44,45,46) ▪ Palix (49,50,51) ▪ Pits (52) ▪ Queets (54,55) ▪ Quillayute (56) ▪ Schnorbush (59,60,61,62) ▪ Sequim (63,64) ▪ Snahopish (65) ▪ Solduc (66) ▪ Solleks (67,68) ▪ Terbies (70,71,72) ▪ Typic Xerofluvents (73) ▪ Wellman (74)	5% or less
Rainbarrels/ Cisterns	All Soils	Level construction site
Conveyance		
Swales	All Soils	5% or less
Conveyance Furrows	All Soils	Greater than 15%
Conveyance Gardens	All Soils	10% or less
Gravel Trenches	All Soils	5% or less
Off-site Discharge		
Level Spreader	All Soils	All slopes
Continued Dispersion	All Soils	10% or less

Appendix D: Sample Drainage Plans

The following pages include sample drainage plans from development situations likely to be encountered in different areas of Clallam County. While each drainage plan should be site specific and address the unique conditions found on the site, these sample plans can be used as general examples for managing stormwater on residential sites.

- Large Lot with Full Dispersion
- Small Lot Dispersion
- Small Lot with Poorly Draining Soils
- Typical Rural Lot with Well-Drained Soils
- Typical Rural Lot with Poorly Draining Soils

Note: The following plans are intended as examples only. Each drainage plan should be designed to meet the specific conditions of the site.

Example A: Full Dispersion on Large Lot

A single family residential project with a roof area of 2,400 square-feet and a garage with a roof area of 970 square-feet on a 2.5 acre lot.

Step 1: Conduct Site inventory

A thorough inventory of the site is the initial step for developing and implementing an effective site design and drainage plan.

- The site is gently sloping with 5-7% slopes.
- There are no seeps, springs or visible drainage paths on-site.
- There are no environmental critical areas (e.g. wetlands, streams, geologic hazard areas) on the site.
- The forested portions of the site have native vegetated areas of trees and shrubs.
- The site utilizes an on-site septic system and well.

Step 2: Site Design

Using the information gathered in the Inventory, align the roads and structures on the site to maximize the preservation of vegetation and retain the existing flow of water on the site to the greatest possible extent.

- Building envelope and access point are identified.
- Clearing limits are marked on construction plans.

Step 3: Determine Soil Type and Stormwater Region

- The maps in Appendix A are consulted to determine the stormwater region of the project. The project is in Region III, in the Joyce area.
- The *Soil Survey of Clallam County* indicates the soil type of the project site is Elwha Gravelly Sandy Loam. According to the table in Appendix B, the soils are not suitable for infiltration techniques such as drywells or infiltration trenches.

Step 4: Drainage Plan Design

A drainage plan is developed using the project planning chart on [page X](#) and the details in the Small Project Drainage Plan Design Elements section (pages x-x) to select options for managing roof water runoff, driveway runoff, conveyance areas, and discharge areas. The sizing chart for each drainage element determines the required dimensions based on the stormwater region in which the project is located. The table in Appendix B is consulted to make sure the BMPs chosen are appropriate for the region and soil type. The following page shows the runoff, conveyance and discharge locations illustrated on the drainage plan for the site. The connection to the community drainage system is shown.

- ☐ Full dispersion of the roof runoff is possible because of the size of the lot, small building envelope and the existing vegetated open space is more than 50% of the lot cover.
- ☐ The house roof runoff is routed through downspouts, pipes and a swale to a spreader trench that is used to disperse the stormwater evenly.
- ☐ Splash blocks in combination with gutters and downspouts are used to disperse garage roof runoff.
- ☐ Runoff from the gravel driveway is dispersed into the surrounding lawn areas.

Example A: Full Dispersion on Large Lot

Applicant: John Doe

P.O. Box A4h

Port Angeles, WA 98362

(360) 555-3100

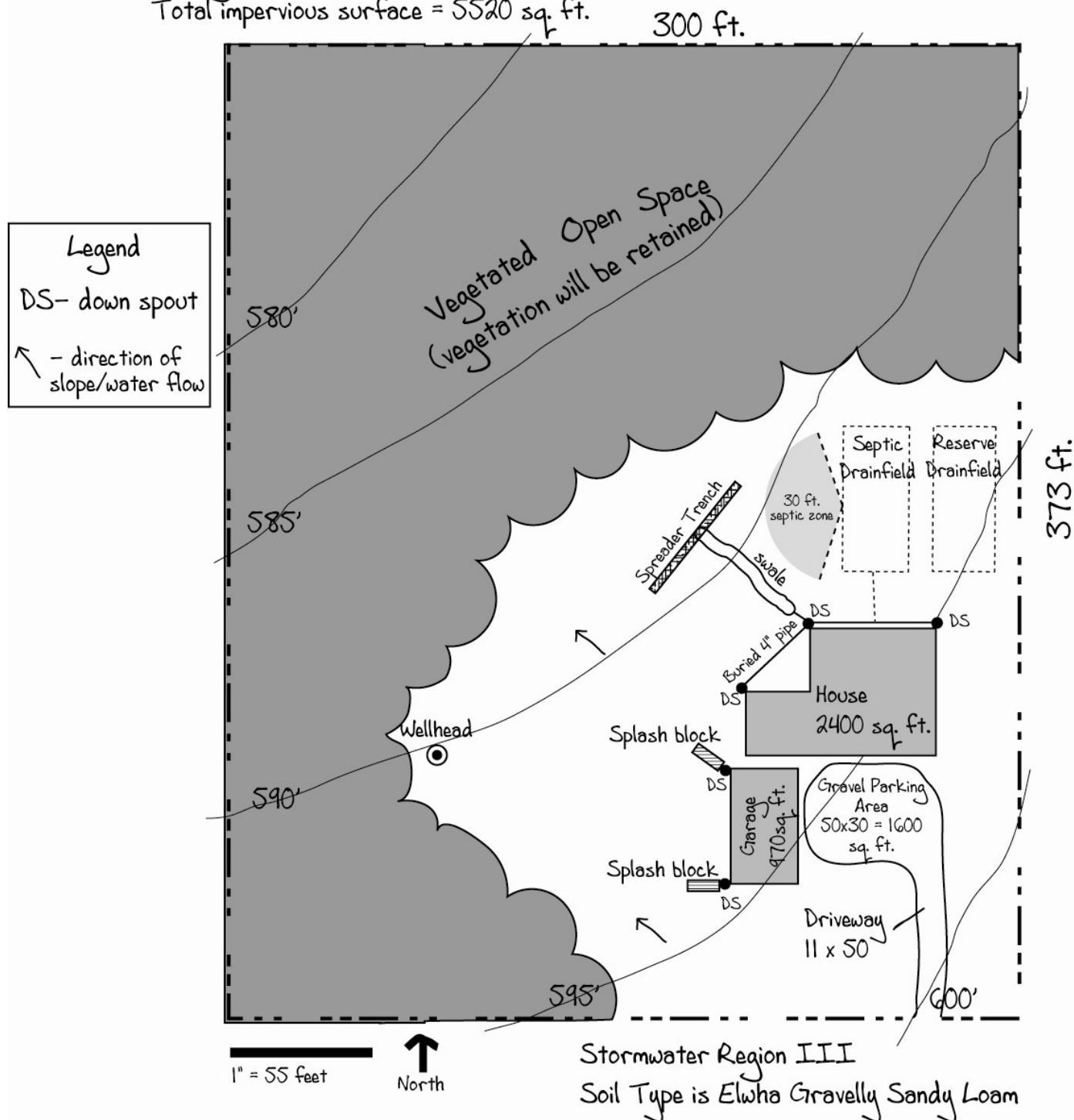
Acreage = 2.5 acres

Total impervious surface = 5520 sq. ft.

Parcel number: 083001232900

Project Address: 7543 Greenfields Lane

Joyce, WA 98343



Example B: Small Lot Dispersion

A single family residential project with a roof area of 2,040 square-feet, a 1,180 square-foot driveway/parking area and a garage with a roof area of 936 square-feet on a 0.62 acre lot near Carlsborg.

Step 1: Conduct Site inventory

A thorough inventory of the site is the initial step for developing and implementing an effective site design and drainage plan.

- The site is level and there are no seeps, springs or visible drainage paths on site.
- There are no critical areas on the site.
- The site is a former hayfield and has no existing native vegetated areas but does have an intact ground cover layer of pasture grasses.
- The site utilizes an on-site septic system and well.

Step 2: Site Design

Using the information gathered in the Inventory, align the roads and structures on the site to maximize the preservation of vegetation and retain the existing flow of water on the site to the greatest possible extent.

- Building Envelope and Access Point are identified.
- Clearing limits are marked on construction plans.

Step 3: Determine Soil Type and Stormwater Region

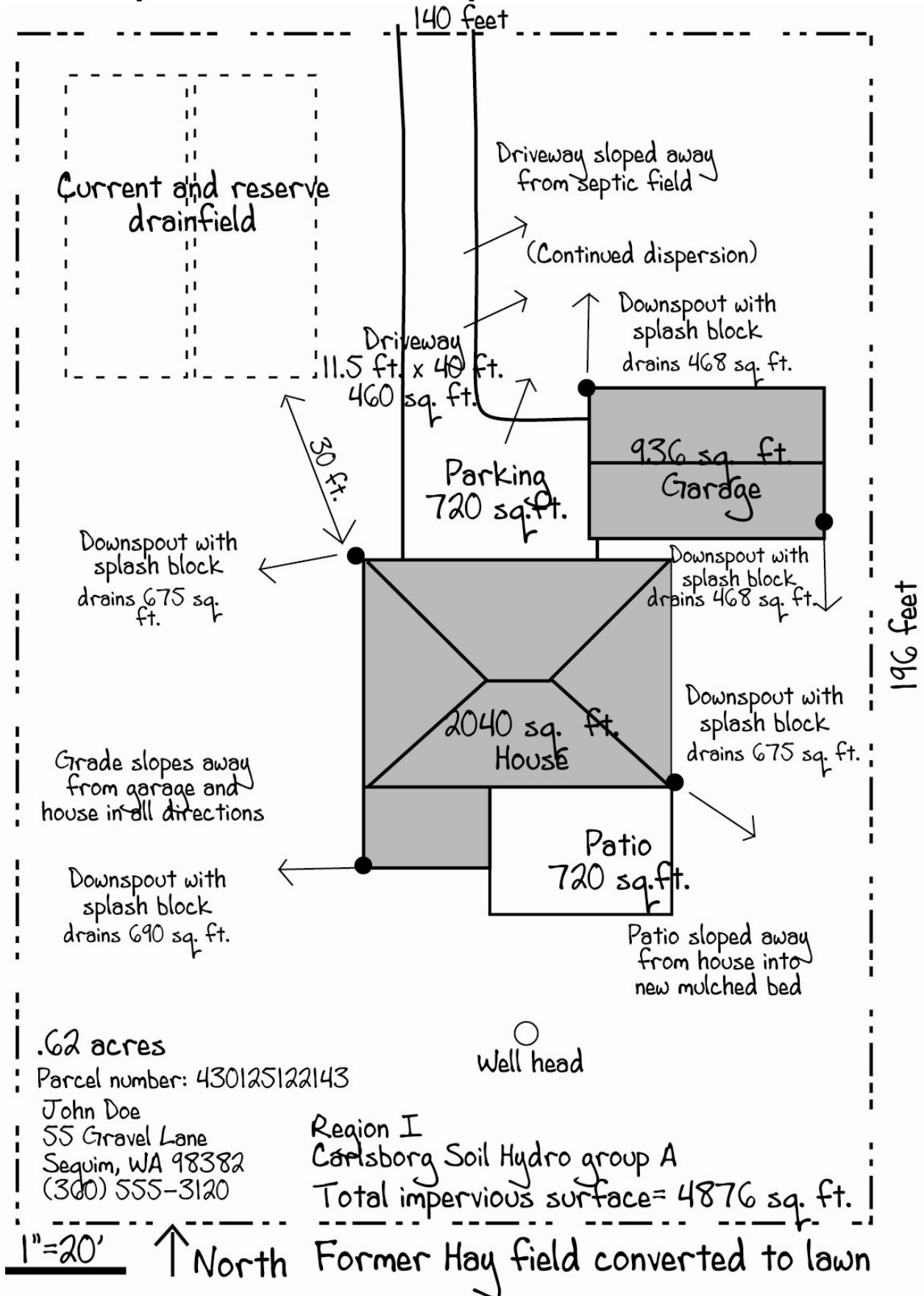
- The maps in Appendix A are consulted to determine the stormwater region of the project. The project is in Region I.
- According to the *Soil Survey of Clallam County*, the soil type of the project site is Carlsborg gravelly sandy loam (Hydrologic Group A). According to the table in Appendix B, this location is suitable for *Small Lot Dispersion*.

Step 4: Drainage Plan Design

A drainage plan is developed using the project planning chart on [page X](#) and the details in the Small Project Drainage Plan Design Elements section (pages x-x) to select options for managing roof water runoff, driveway runoff, conveyance areas, and discharge areas. The sizing chart for each drainage element determines the required dimensions based on the stormwater region in which the project is located. The table in Appendix B is consulted to make sure the BMPs are chosen are appropriate for the region and soil type. The following page shows the runoff, conveyance and discharge locations illustrated on the drainage plan for the site.

- ☐ Because this lot is eligible for *Small Lot Dispersion*, the roof runoff from the house can be managed with gutters, downspouts and splash blocks.
- ☐ No more than 700 square feet of roof area is drained to a single splash block. Size of drainage area is indicated for each dispersion site.
- ☐ A vegetated flowpath of at least 50 feet in length is available along the paths that runoff will follow upon discharge from the splash blocks to the nearest property line.
- ☐ Runoff from the driveway is dispersed into surrounding lawn area.

Example B: Small Lot Dispersion



Example C: Small Lot with Poorly Draining Soils

A single family residential project with a roof area of 1,854 square-feet, a 945 square-foot driveway, and a garage with a roof area of 528 square-feet on a 9,000 square-foot lot in the Sequim Urban Growth Area outside the City of Sequim.

Step 1: Conduct Site inventory

A thorough inventory of the site is the initial step for developing and implementing an effective site design and drainage plan.

- The site is level and there are no seeps, springs or visible drainage paths on site.
- There are no critical areas on the site.
- The site is former pasture land and has no existing native vegetated areas.
- The site has access to public sewer and water systems and a private community stormwater drainage system.

Step 2: Site Design

Using the information gathered in the Inventory, align the roads and structures on the site to maximize the preservation of vegetation and retain the existing flow of water on the site to the greatest possible extent.

- Building Envelope and Access Point are identified.
- Site was pre-cleared so defining clearing limits on plan is not an option.

Step 3: Determine Soil Type and Stormwater Region

- The maps in Appendix A are consulted to determine the stormwater region of the project. The project is in Region I, in the Urban Growth Area outside of the City of Sequim.
- According to the *Soil Survey of Clallam County*, the soil type of the project site is Clallam Gravelly Sandy Loam. According to the table in Appendix B, the soils are not suitable for infiltration techniques such as drywells and infiltration trenches.

Step 4: Drainage Plan Design

A drainage plan is developed using the project planning chart on [page X](#) and the details in the Small Project Drainage Plan Design Elements section (pages x-x) to select options for managing roof water runoff, driveway runoff, conveyance areas, and discharge areas. The sizing chart for each drainage element determines the required dimensions based on the stormwater region in which the project is located. The table in Appendix B is consulted to make sure the BMPs are chosen are appropriate for the region and soil type. The following page shows the runoff, conveyance and discharge locations illustrated on the drainage plan for the site.

- ❑ The roof runoff from the house is managed with gutters and downspouts that are piped to a rain garden. The surface area of the rain garden is sized at 357 sq. ft. to handle the 2,382 square foot total of roof area (house and garage) according to the table on [page x](#). The overflow of the rain garden is routed to the existing community drainage system.
- ❑ The roof runoff from the garage is routed through a conveyance garden to slow and infiltrate some water and to provide an amenity along the backside of the house. The overflow of the conveyance garden is piped to the rain garden at the front of the house.
- ❑ The 945 sq. ft. driveway is paved. Because the driveway is less than 2,000 square feet, filter strips are all that is needed to manage the driveway runoff. The filter strip areas are equal in size to the driveway.
- ❑ The connection to the community drainage system is shown.

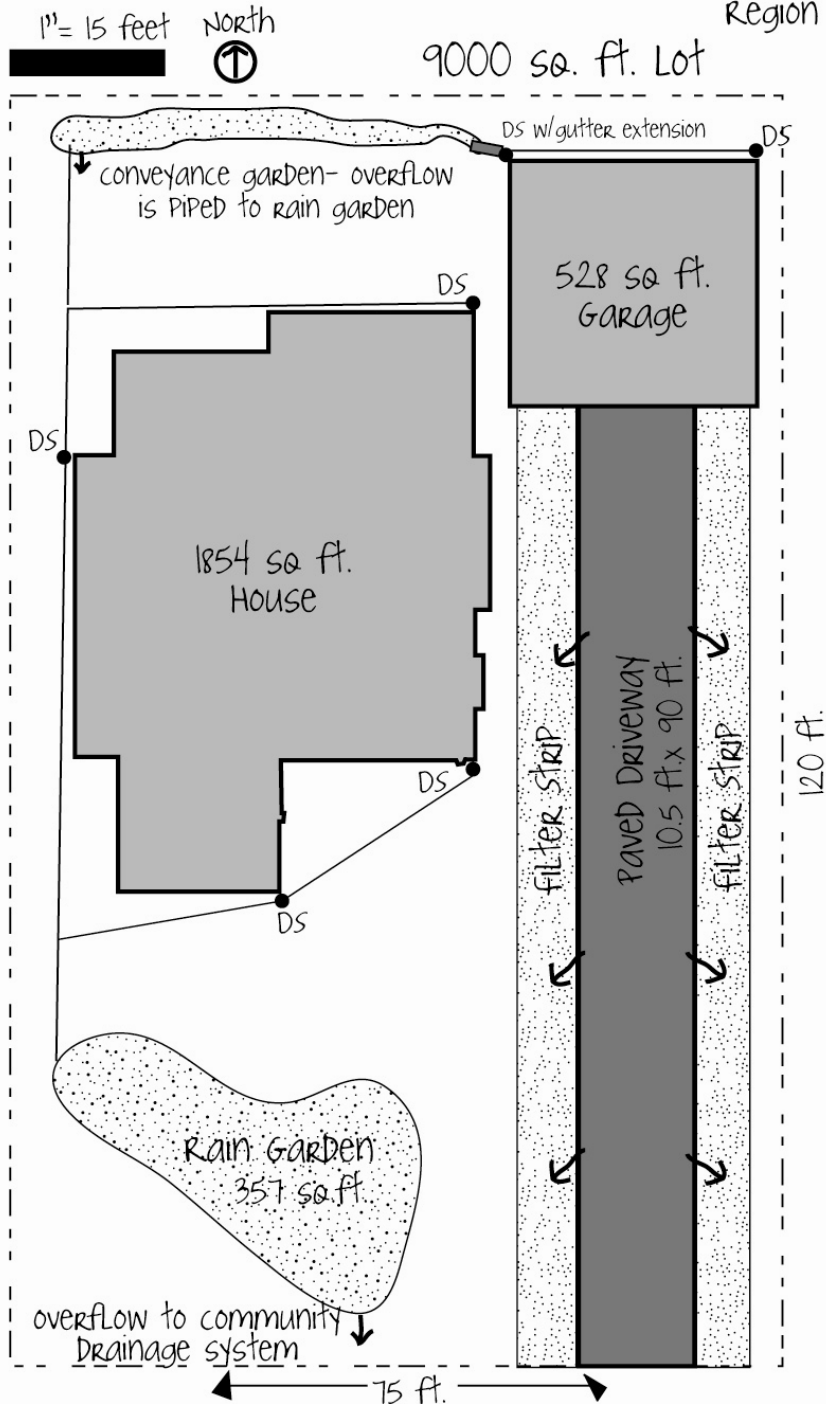
Example C: Small Lot with Poorly Draining Soils

Jane Resident
P.O. Box 10-2
Sequim, WA 98382

Parcel number: 330223402100
Project Address: 435 Z Street
Sequim, WA 98382
T30N, R3W, Section 12
Region I - Clallam soil

Acreage = 0.2 acres

Total impervious surface of house and garage = 2382 sq. ft.



Example D: Typical Rural Lot with Well-Drained Soils

A single family residential project with a roof area of 3,281 square-feet and a garage with a roof area of 1,875 square-feet on a one-acre lot between Port Angeles and Sequim.

Step 1: Conduct Site inventory

A thorough inventory of the site is the initial step for developing and implementing an effective site design and drainage plan.

- The site slopes gently to the north with 5% slopes or less.
- There are no seeps, springs or visible drainage paths on-site.
- There are no critical areas on the site.
- The site has little native vegetation remaining.
- The site utilizes an on-site septic system and well.

Step 2: Site Design

Using the information gathered in the Inventory, align the roads and structures on the site to maximize the preservation of vegetation and retain the existing flow of water on the site to the greatest possible extent.

- Building Envelope and Access Point are identified.
- Clearing limits are marked on construction plans.

Step 3: Determine Soil Type and Stormwater Region

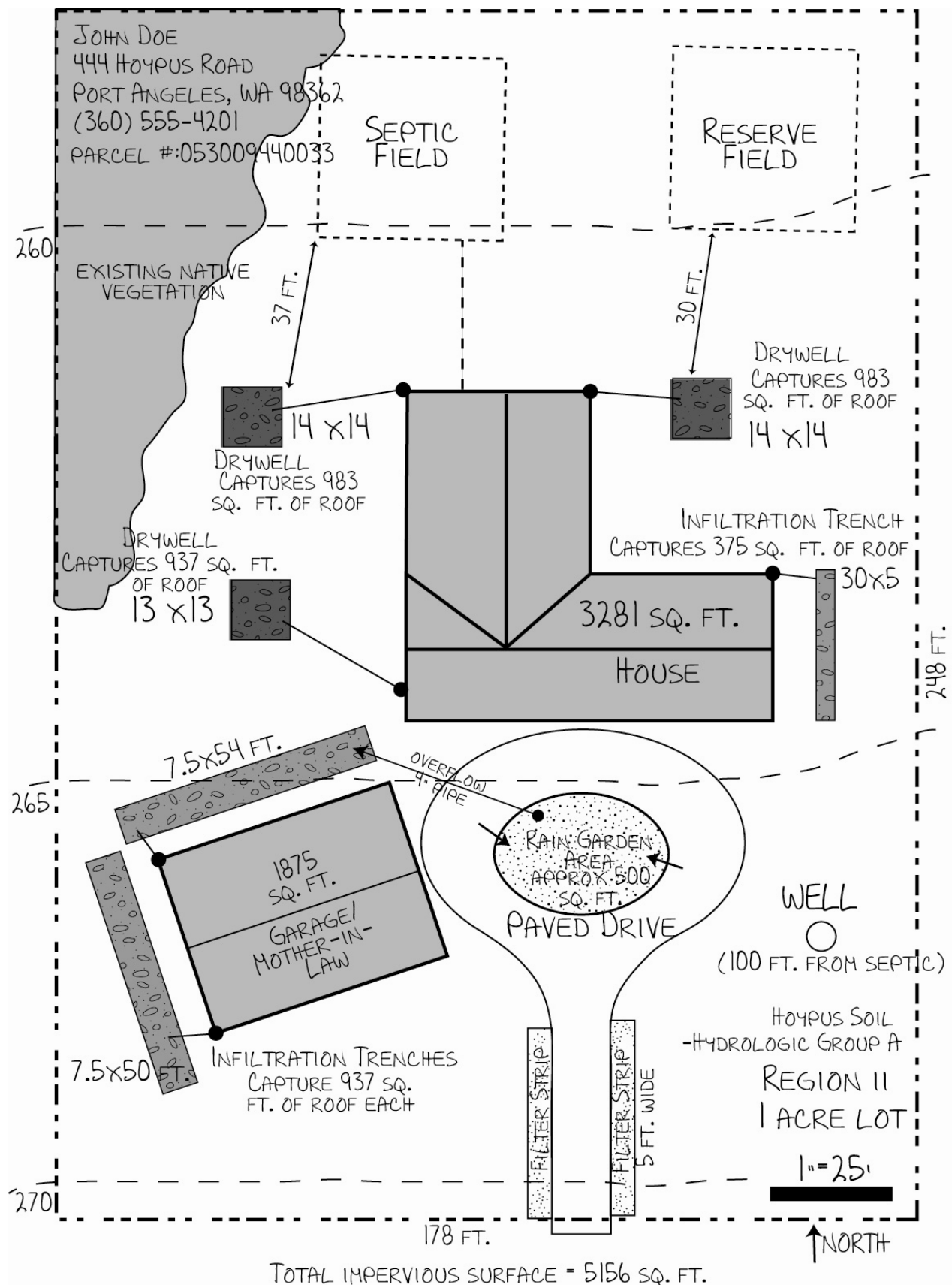
- The maps in Appendix A are consulted to determine the stormwater region of the project. The project is in Region II, east of Port Angeles.
- According to the *Soil Survey of Clallam County*, the soil type of the project site is Hoypus Gravelly Sandy Loam, Hydrologic Group A. According to the table in Appendix B, the soils are suitable for infiltration techniques such as drywells and infiltration trenches.

Step 4: Drainage Plan Design

A drainage plan is developed using the project planning chart on page X and the details in the Small Project Drainage Plan Design Elements section (pages x-x) to select options for managing roof water runoff, driveway runoff, conveyance areas, and discharge areas. The sizing chart for each drainage element determines the required dimensions based on the stormwater region in which the project is located. The table in Appendix B is consulted to make sure the BMPs chosen are appropriate for the region and soil type. The following page shows the runoff, conveyance and discharge locations illustrated on the drainage plan for the site.

- ❑ Roof runoff is handled by 3 different drywells and an infiltration trench to avoid exceeding the 1,250 sq. ft. drainage area limit to a single drywell. The size of the drywells and trench and the area it drains is noted on the plan.
- ❑ Infiltration trenches are used to manage the garage roof runoff. The infiltration trenches are sized at 40% of the drainage area, according to directions on p. The size of the trenches and the area they drain are noted on the plan.
- ❑ Runoff from the gravel driveway is handled by filter strips and a rain garden. The circular drive is graded to drain to the rain garden.

Example D: Typical Rural Lot with Well-Drained Soils



Example E: Typical Rural Lot with Poorly Draining Soils

A single family residential project with a roof area of 2,496 square-feet with a outbuilding with a roof area of 576 square-feet on a two-acre lot in the foothills above Port Angeles.

Step 1: Conduct Site inventory

A thorough inventory of the site is the initial step for developing and implementing an effective site design and drainage plan.

- The site has slopes over 15% draining to the northwest.
- There is a seep/ wet area along the hillside of the property that seasonally drains to the north.
- There are no critical areas on the site.
- The site was logged and has little native vegetation remaining.
- The site utilizes an on-site septic system and well.

Step 2: Site Design

Using the information gathered in the Inventory, align the roads and structures on the site to maximize the preservation of vegetation and retain the existing flow of water on the site to the greatest possible extent.

- Building Envelope and Access Point are identified.
- Clearing limits are marked on construction plans.

Step 3: Determine Soil Type and Stormwater Region

- The maps in Appendix A are consulted to determine the stormwater region of the project. The project is in Region III, south of Port Angeles.
- The *Soil Survey of Clallam County* shows the soil type of the project site is Elwha Gravelly Sandy Loam, Hydrologic Group C. According to the table in Appendix B, the soils are not suitable for infiltration techniques such as drywells and infiltration trenches.

Step 4: Drainage Plan Design

A drainage plan is developed using the project planning chart on page X and the details in the Small Project Drainage Plan Design Elements section (pages x-x) to select options for managing roof water runoff, driveway runoff, conveyance areas, and discharge areas. The sizing chart for each drainage element determines the required dimensions based on the stormwater region in which the project is located. The table in Appendix B is consulted to make sure the BMPs are chosen are appropriate for the region and soil type. The following page shows the runoff, conveyance and discharge locations illustrated on the drainage plan for the site.

- ☐ Roof runoff of the house is handled by a rain garden sized at 25% of the house size (according to the sizing information on page dddddd. The size of the rain garden and the area that it drains is noted on the plan.
- ☐ Swales and pipes are used to convey the roof runoff to the rain garden. A gravel spreader trench is used as end-of- the line discharge.
- ☐ Roof runoff from the outbuilding is managed by a downspout with a splash block that drains to 3 conveyance furrows on the northern slope.
- ☐ The gravel driveway utilizes a Runoff from the gravel driveway is dispersed into the surrounding lawn area.

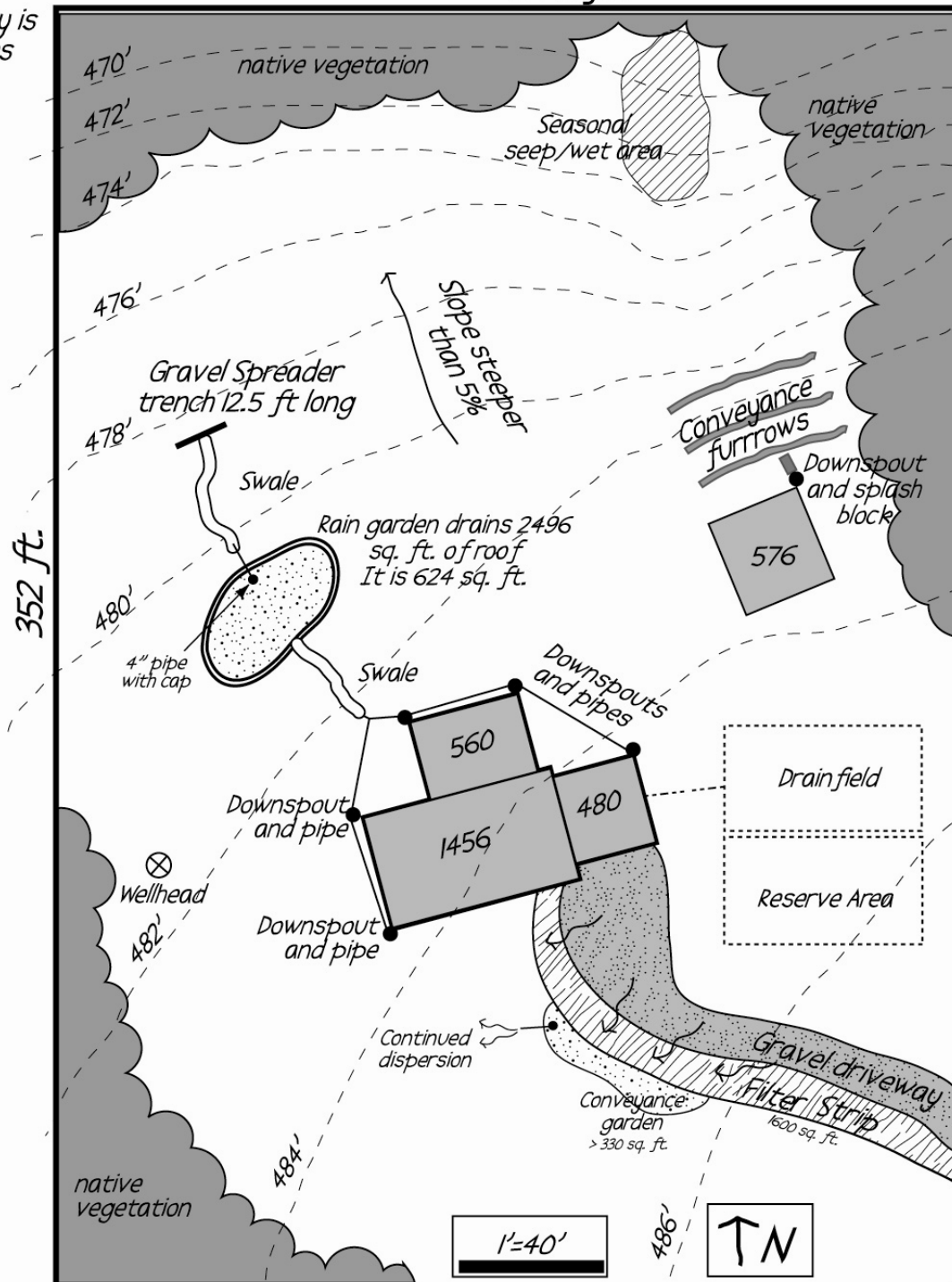
Example E: Typical Rural Lot with Poorly Draining Soils

Applicant: Jane Housebuilder
 P.O. Box 42-10
 Port Angeles, WA 98362
 (360) 555-1410
 Parcel number: 053029732220

Project Address: 56 Foothills Crt.
 Port Angeles, WA 98362
 Stormwater Region III
 Elwha Soil- Group C

Total impervious surface = 3072 sq. ft. buildings, 2944 sq. ft. gravel driveway
 248 ft.

Property is
 2 acres



Appendix E: Recommended Plant List for Bioretention Areas

Adapted from *Low Impact Development: Technical Guidance Manual for Puget Sound*, Puget Sound Action Team and Washington State University Pierce County Extension, January 2005

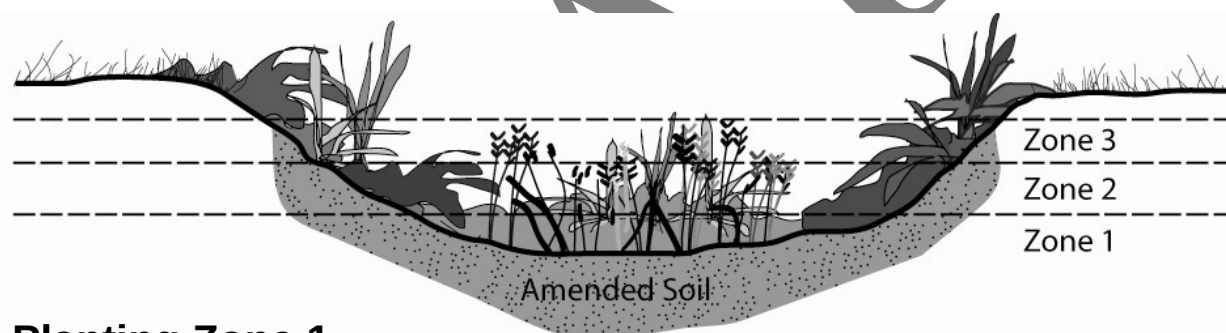
The following native and non-native plants are recommended for use in Rain Gardens, Rainwater Planters, and Conveyance Gardens. Plants utilized in the bioretention areas should be adapted to withstand periods of dryness, but be able to tolerate saturated soil periodically. Conditions in the stormwater management areas will change from very dry during months with little or no rain, to wet or saturated soil following a storm event. The deeper areas of the Rain Garden and Conveyance Garden will be saturated more frequently than the sloping sides. The plants in the Rainwater Planter are at a more uniform depth, but soil moisture within the planter will vary seasonally.

The following list is arranged beginning with plants that thrive in wetter conditions to ones that prefer the slightly drier and higher sides of the Rain Garden or Conveyance Garden. Rainwater Planters should utilize plants from Zone 1 and Zone 2.

Zone 1: Areas of frequent inundation or standing water.

Zone 2: Periodically moist or saturated during larger storms.

Zone 3: Drier soils with infrequent inundation. Transition zone to existing landscape.



Planting Zone 1

Zone 1: Shrubs			
Scientific Name	Common Name	Exposure	Mature Size/ Spread
<i>Cornus sericea</i>	Red-osier dogwood	Sun/part shade	to 15 feet
<i>Cornus sericea</i> 'Kelsey'	Dwarf dogwood	Sun	to 1.5 feet
<i>Cornus sericea</i> 'Flaviramea'	Yellow dogwood	Sun/part shade	6-8 feet
<i>Physocarpus capitatus</i>	Pacific ninebark	Sun-part shade	6-13 feet
<i>Spirea douglasii</i>	Douglas spirea	Sun/part shade	4-7 feet
<i>Rubus spectabilis</i>	Salmonberry	Shade	5-10 feet

Zone 1: Perennials			
Scientific Name	Common Name	Exposure	Mature Size/ Spread
<i>Carex obnuta</i>	Slough sedge	Sun/part shade	1-5 feet
<i>Carex stipata</i>	Sawbeak sedge	Part shade	10 inches-3 feet
<i>Juncus effusus</i>	Common rush	Sun/part shade	1-2 feet
<i>Juncus ensipoluos</i>	Daggerleaf rush	Sun	12-18 inches
<i>Scirpus microcarpus</i>	Small-fruited bulrush	Sun/shade	2-4 feet

Planting Zone 2

Zone 2: Shrubs			
Scientific Name	Common Name	Exposure	Mature Size/ Spread
<i>Acer circinatum</i>	Vine Maple	Part shade	to 25 feet
<i>Hammamelis intermedia</i> 'Diane'	Diane Witchhazel	Sun/part shade	10-20 feet/ 10 foot spread
<i>Oemleria cerasiformis</i>	Indian plun	Sun/part shade	5-15 feet
<i>Symphoricarpos albus</i>	Snowberry	Sun/shade	2-6 feet
<i>Rosa nutkana</i>	Nootka rose	Sun/part shade	6-10 feet

Zone 2: Perennials			
Scientific Name	Common Name	Exposure	Mature Size/ Spread
<i>Aquilegia formosa</i>	Western Columbine	Sun/part shade	1-3 feet
<i>Asarum caudatum</i>	Wild Ginger	Shade	to 10 inches
<i>Aster subspicatus</i>	Douglas aster	Sun	.5-2.5 feet
<i>Iris douglasiana</i>	Pacific Coast Iris	Sun/part shade	1-2 feet
<i>Tellima grandiflora</i>	Fringecup	Shade	1-3 feet
<i>Hemerocallis fulva</i>	Day Lily	Sun/part shade	1-4 feet
<i>Heuchera micrantha</i>	Purple Palace Heuchera	Sun/part shade	1-2 feet
<i>Geranium sanguineum</i>	Cranesbill	Sun/part shade	1.5 feet

Planting Zone 3

Zone 3: Shrubs			
Scientific Name	Common Name	Exposure	Mature Size/ Spread
<i>Arbutus unedo</i> 'Compacta'	Compact strawberry tree	Sun/part shade	to 10 feet
<i>Holodiscus discolor</i>	Oceanspray	Sun/part shade	to 15' feet
<i>Mahonia aquifolium</i>	Tall Oregon Grape	Sun/part shade	6-8 feet
<i>Philadelphus lewis</i>	Mock Orange	Sun/part shade	5-10 feet
<i>Potentilla fruitcosa</i>	Shrubby Cinqufoil	Sun	4 feet
<i>Ribes sanguineum</i>	Red-flowering current	Sun/part shade	8-12 feet
<i>Rhododendron</i> 'PJM'	PJM Rhododendron	Sun/part shade	4 feet
<i>Vaccinium ovatum</i>	Evergreen huckleberry	Part shade/shade	3-15 feet

Zone 3: Perennials and Grasses			
Scientific Name	Common Name	Exposure	Mature Size/ Spread
<i>Achillea millefolium</i>	Western Yarrow	Sun	4 inches-2.5 feet
<i>Dicentra formosa</i>	Pacific bleeding-heart	Sun/shade	6-20 inches
<i>Festuca ovina</i> 'Glaucous'	Blue fescue	Sun/part shade	to 10 inches
<i>Lupinus</i> spp.	Lupine	Sun	3- 5 feet
<i>Polystichum munitum</i>	Sword Fern	Part shade/shade	2-4 feet
<i>Rudbeckia hirta</i>	Black-eyed Susan	Sun/part shade	3-4 feet
<i>Smilacina racemosa</i>	False Solomon's Seal	Part shade	1-3 feet

Appendix G: Small Project Erosion and Sediment Control

The intent of erosion and sedimentation control measures is to prevent the erosion and transport of soils from a construction site. Eroded soil is a major pollutant to streams and wetlands and can have harmful impacts to private property by silting up drainage ways. Preventing construction site erosion can help prevent harm to salmon spawning beds, maintain good water quality, and safeguard public drainage infrastructure.

Erosion control is the most effective and inexpensive method to reduce the impacts associated with construction activities. These practices primarily involve the protection of site vegetation and soils, the trapping of eroded or tracked soils, and the reestablishment of vegetation after construction has been completed. The proper installation and maintenance of selected erosion control options to a large degree determines their effectiveness. Avoidance of land disturbance during the winter months, when erosion control is the most difficult is encouraged, and may be required as a part of the permitting of your project. It is important to remember that it is easier to prevent erosion than it is to trap it once it has been mobilized.

Limit site disturbance

The protection and management strategies discussed in this section are designed to protect vegetation and soil necessary for maintaining functioning hydrologic conditions on the site.

Equipment activity on construction sites can severely compact soil. Soil compaction is a leading cause of death or decline of mature trees in developed areas. Most tree roots are located within 3 feet of the ground surface and the majority of the ?ne roots necessary for water and nutrient absorption are within 18 inches. Roots can extend 2 to 3 times beyond the diameter of the crown. In addition to soil compaction, several other direct and indirect impacts can influence vegetation health during land development including:

- Direct loss of roots from trenching, foundation construction, and other grade changes
- Application of ?ll material
- Damage to trunks or branches from construction equipment and activities
- Exposure of forest interior areas to new stresses of forest edges as land is cleared
- Changes in surface and subsurface water ?ow patterns

Vegetation Protection

Leaving native vegetation intact is the single most effective method for reducing erosion on the construction site. Well marked clearing limits prevent disturbance to vegetation and soils in critical areas, buffers, and protected conservation and lot perimeter zones.

Vegetation Protection Guidelines:

- ☐ Map native soil and vegetation retention areas on all plans to protect soils and vegetation from construction damage.
- ☐ Clearing limits must be well marked with highly visible fencing or wire and tape and should be at least 3 feet high.
- ☐ Fencing for vegetation retention areas should be located at a minimum of 3 feet beyond the existing tree canopy along the outer edge of the tree stand.
- ☐ Individual trees that are to be preserved should be marked and the areas within the drip line protected from disturbance.
- ☐ Equipment operators should be informed of clearing limits prior to commencement of grading work. Walk property with equipment operators to clarify construction boundaries and limits of disturbance.
- ☐ Prohibit the stockpiling or disposal of excavated or construction materials in the vegetation retention areas to prevent contaminants from damaging vegetation and soils.
- ☐ Avoid excavation or changing the grade near trees that have been designated for protection.
- ☐ In areas of wildfire risk, utilize Firewise principles for developing a vegetation protection and planting plan. Consult the Firewise website (<http://www.firewise.org/>), the Washington State Department of Natural Resources, or your local fire department for details on Firewise recommendations.

Topsoil Conservation and Protection

Stockpiling topsoil for reuse during final site stabilization saves money by reducing the amount of soil to be imported and exported.

- ☐ Stockpile soil removed during grading.
- ☐ Cover stockpiled soil with mulch (preferred), plastic sheeting or temporary grass seeding (for stockpiles that may remain for several months) to prevent erosion.
- ☐ Surround stockpiles with silt fence.

Control Sediment and Flows On-site

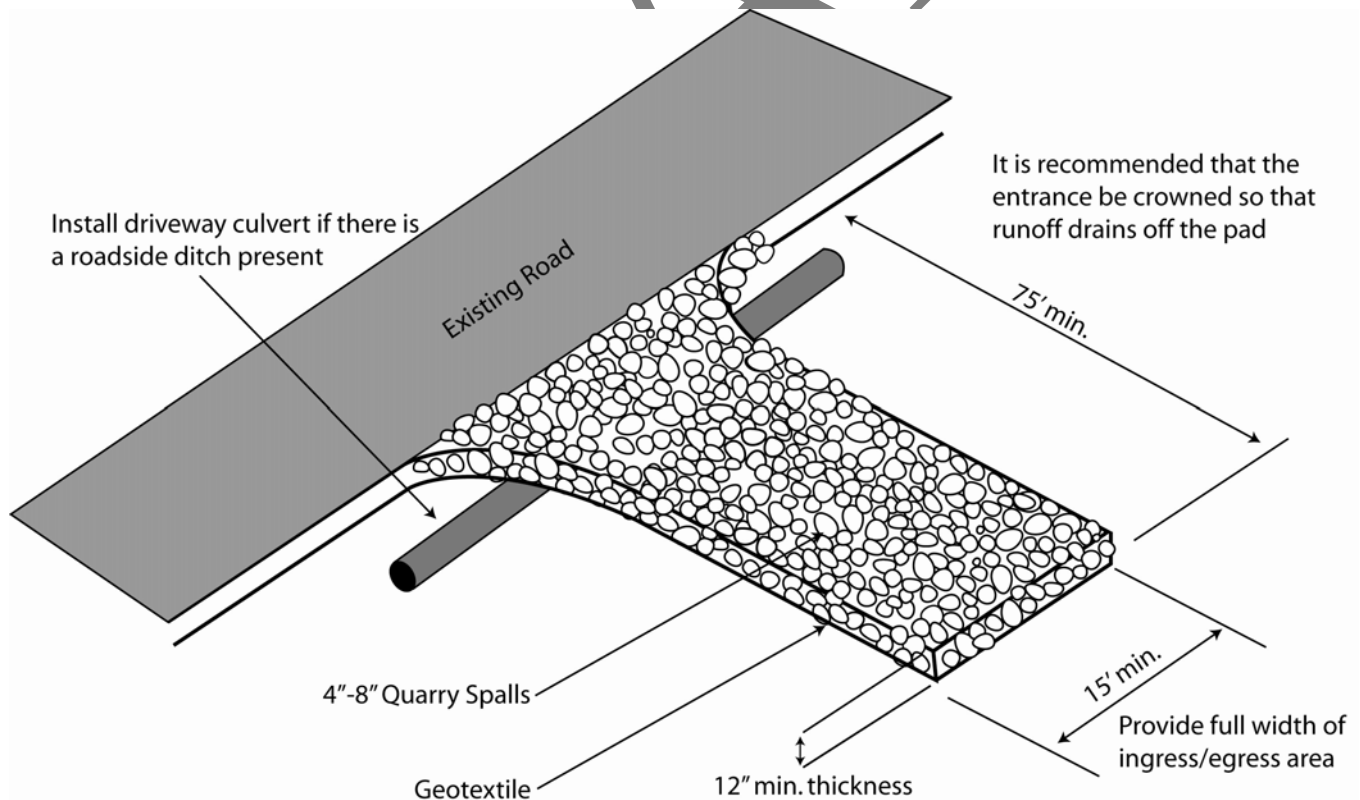
Most often some soil on a construction site will be mobilized. BMPs such as a stabilized entrance, silt fencing and sediment traps can capture and contain soil on site, reducing the amount of sediment and associated pollutants which can enter nearby waterways and wetlands.

Stabilize the Construction Entrance

Vehicles and heavy equipment can track mud offsite where it washes off the roads into ditches and waterways. A stabilized construction entrance is a stone pad located at the vehicular access point to the site that minimizes the amount of sediment and mud tracked offsite by construction site traffic.

- ☐ Stabilized entrance should use 4" to 8" angular quarry spalls
- ☐ Dimensions should be 75' minimum length, 15' foot minimum width, 1' depth
- ☐ If site soils are clayey, filter fabric should be placed under the stone pad to prevent soil from working into the rock material
- ☐ Install driveway culvert if roadside ditch is present
- ☐ Crown the entrance so runoff does not drain onto roadway
- ☐ Limit site access to one route
- ☐ Install fencing as necessary to restrict traffic to stabilized entrance
- ☐ Remove any mud or gravel that is tracked onto roadway by sweeping or shoveling it back onto site

Figure A-1. Stabilized Construction Entrance



Silt fences

Silt fencing, also known as filter fencing, is a temporary physical barrier to intercept sediment that has been mobilized on site. Silt fences are usually placed around the perimeter of a construction site, and can be used for both retaining sediment and demarking clearing limits on the site.

- ❑ The fabric at the bottom of a silt fence must be firmly anchored into the soil by burying it in a “J” configuration in a trench that is backfilled.
- ❑ A wire mesh fence can be placed behind a silt fence to prevent collapse where soil may pile up against the silt fence.
- ❑ Follow manufacturer’s instructions on proper installation of filter fabric.
- ❑ Choose filter fabric with proper porosity and ability to trap sediments for the soil type on site.
- ❑ Do not install across streams or ditches.
- ❑ Do not attach to existing trees
- ❑ Construct trench to follow natural contour of land to ensure best protection.
- ❑ Inspect fencing on a regular basis throughout construction.

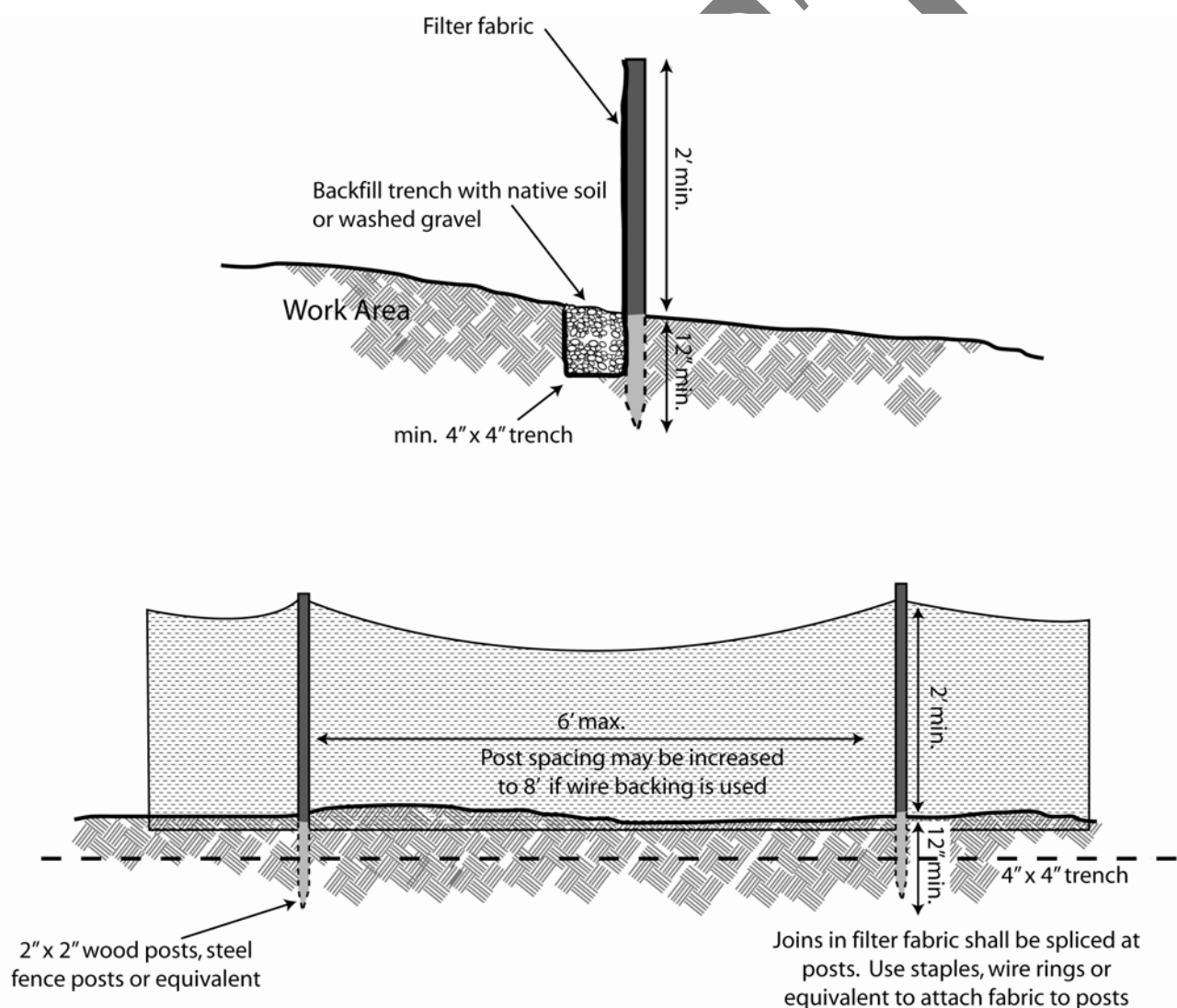


Figure A-2. Silt Fence diagram

Sediment barriers

Sediment barriers are used to impede the flow of water in small channels and ditches and allow sediment to settle out. Barriers are the last defense against sediment leaving a site and should be implemented as a secondary measure. Barriers may be constructed of sand or gravel bags, gravel or rock berms, manufactured silt dikes, straw bales, or brush waddles. In order to function, the barrier must be dense and allow water to back up behind it and flow across a low spot near the center of the barrier. A Check Dam is an example of an effective barrier.

Check Dams

A check dam is a small rock dam constructed across a path of water that slows concentrated flows and filters sediment.

- ☐ Dam should be constructed of rock or pea-gravel filled sandbags
- ☐ Dam should be placed perpendicular to flow of water
- ☐ The maximum spacing between the dams shall be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam
- ☐ Construct so that center of the dam is at least 12 inches lower than the outer edges
- ☐ Side slopes should be 2:1 or less
- ☐ Maximum height should be 2 feet at center of dam
- ☐ Whatever material is used, dam should form a triangle when viewed from side
- ☐ Line area under check dam with filter fabric
- ☐ Seed and mulch area beneath check dam immediately after removal



Kitsap County

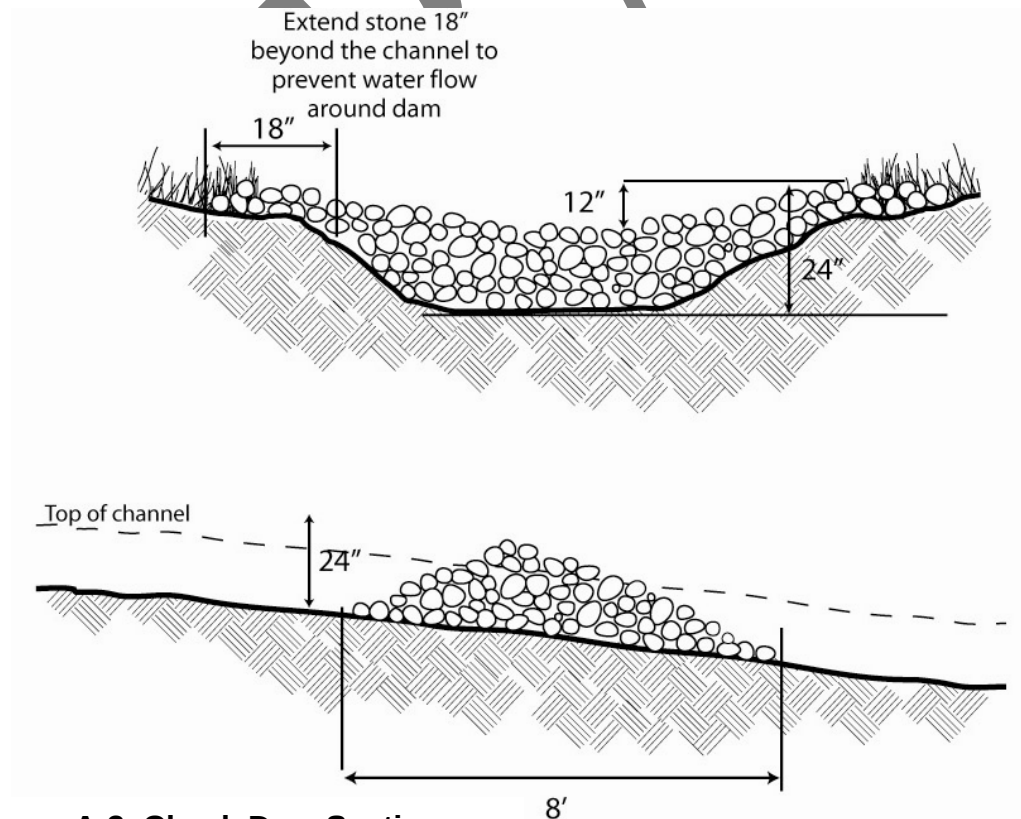


Figure A-3. Check Dam Sections

Stabilize Soils

Covering disturbed areas with mulch, woven materials, plastic sheeting or temporary seeding prevents soil erosion on disturbed areas and soil stockpiles. If the final stabilization of the site will not occur for more than 30 days, additional measures may be needed to protect the site soil.

Mulching

Mulching provides immediate temporary protection from erosion. Common mulch materials include straw, compost, and wood chips. Mulch is a temporary measure that should be followed up by seeding or other permanent landscape implementation. Mulch may be covered with a loose weave net to protect it from wind and water exposure.

Type of mulch	Thickness of Application
Straw	2"-3" thick; 5 bales per 1000 sq. ft.
Hydromulch	25-30 pounds per 1000 sq. ft.
Composted mulch and compost	2" minimum
Chipped on-site vegetation	2" minimum
Wood-based mulch	2" minimum

Temporary Seeding

Seeding is intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion. Seeding can be temporary or permanent. Seeding may be used throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days.

- ☐ Install all surface runoff control measures before seeding
- ☐ Mulch is required at all times because it protects seeds from heat, moisture loss, and transport due to runoff.
- ☐ All disturbed areas shall be reviewed in late August to early September and all seeding should be completed by the end of September. Otherwise, vegetation will not establish itself enough to provide adequate winter cover.
- ☐ The optimum seeding windows for western Washington are April 1 through May 31st and September 1 through October 1.

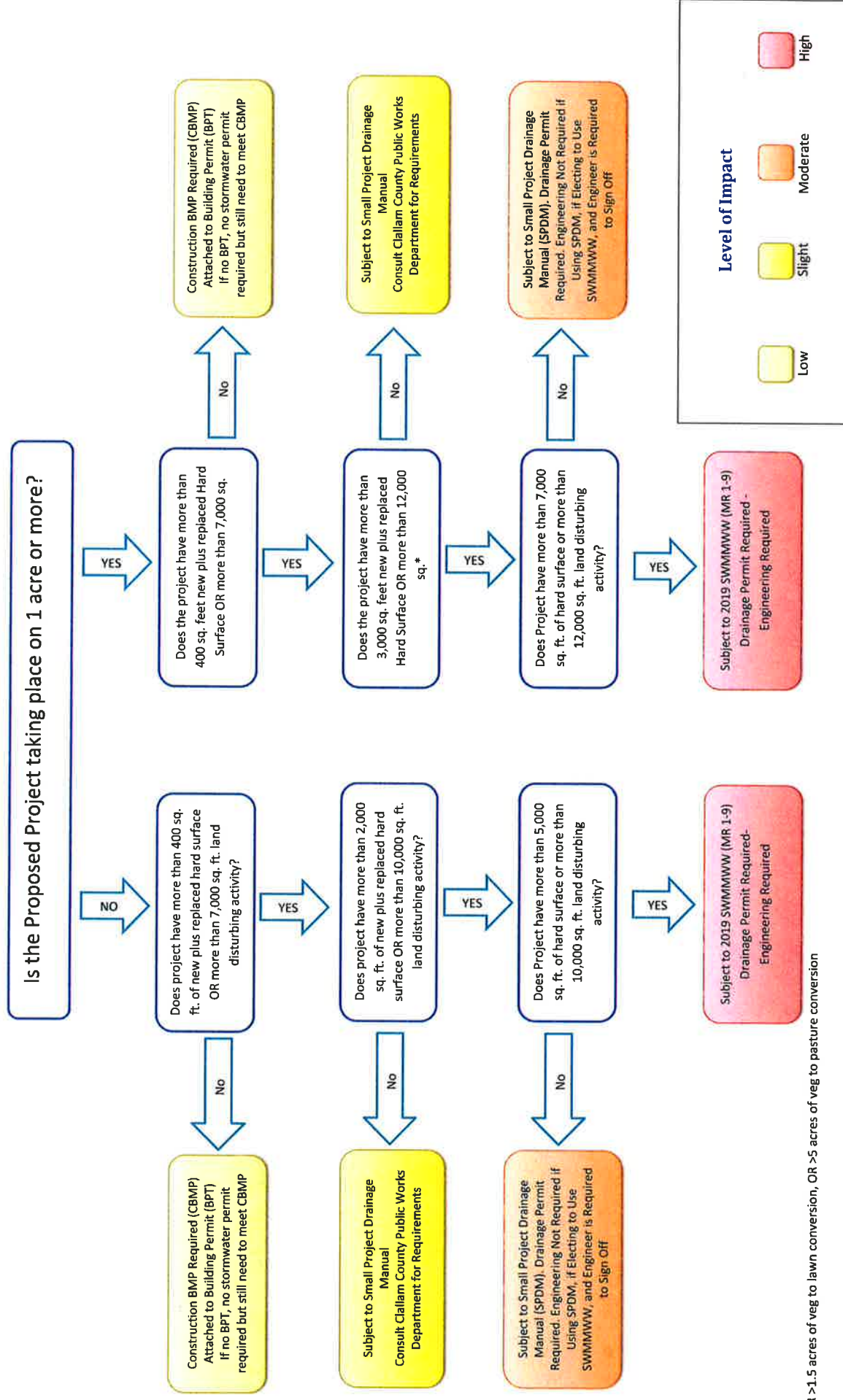
Temporary Erosion Control Seed Mix

Grass type	% by Weight
Chewings fescue <i>Festuca rubra</i> var. <i>commutata</i>	40
Perennial rye - <i>Lolium perenne</i>	50
Redtop or colonial bentgrass - <i>Agrostis alba</i> or <i>Agrostis tenuis</i>	5
White Dutch clover - <i>Trifolium repens</i>	5

Application rate of erosion control seed mix is 120 pounds per acre.

4. Stormwater Flowchart for the Area outside of the Port Angeles Urban Growth Area

Stormwater Development Requirements for Single-Family residences, Duplexes, Townhomes, and Accessory Buildings to Such Dwellings, Excluding residential Driveways Outside of the Port Angeles UGA



*OR >1.5 acres of veg to lawn conversion, OR >5 acres of veg to pasture conversion