Section 6
Stormwater Management

6.0 STORMWATER MANAGEMENT

This section provides minimum design and construction guidance for stormwater management facilities to include erosion and sedimentation control, stormwater conveyance, stormwater quality and treatment, and control of stormwater quantity.

The criteria in this section apply to privately owned and publicly owned stormwater facilities.

6.1 Criteria

A. All design and construction of erosion and sedimentation control facilities, stormwater quality and treatment infrastructure, infrastructure to control stormwater quantity, and low impact development (LID) elements shall comply with the Washington State Department of Ecology's *Stormwater Management Manual for Western Washington*, dated July 2019 (Ecology Manual).

B. All design and construction of stormwater conveyance systems shall comply with King County's Surface Water Design Manual, dated 2021, and these Standards. The conveyance system shall be designed to fully contain the 25-year storm event with no surcharging, and to pass the 100-year storm event with no overflow or property damage. Closed conveyance system elements shall be designed to operate in an open flow, not pressure flow regime, for the 25-year design storm.

C. A downstream analysis shall be required for any project that does not provide detention facilities that limit flow off the site to pre-development conditions.

D. Projects that disturb more than one acre shall apply for and comply with the NPDES Construction Stormwater Permit, issued by the Department of Ecology.

E. Stormwater shall not be discharged to sanitary sewer pipes.

F. Stormwater generated within the proposed or existing public right-of-way shall be discharged to public facilities; it shall not be discharged to private property.

6.2 Documentation

A. The applicant shall submit a Stormwater Worksheet for each building and land use development permit (Attachment 6.1)

B. A Stormwater Site Plan, in accordance with the Ecology Manual, and storm drainage plans, stamped by a Washington State licensed engineer, shall be submitted to the Town for review unless the project is exempt from this requirement. Projects that are exempt from this requirement shall have less than 500 square feet of new plus replaced surface and the land disturbing activity is less than 5,000 square feet (See Attachment 6.1). If claiming an exemption, the applicant shall identify the applicable exemption(s) and explain how the project is eligible for the exemption(s).

C. A Stormwater Pollution Prevention Plan (SWPPP) shall be submitted to the Town for review and approval prior to any land disturbing activity. If the new plus replaced hard surface is less than 500 square feet and the land disturbing activity is less than 5,000 sf a SWPPP is not required. However, the applicant shall submit Small Project Certification (Attachment 6.2) to the Town.

6.3 Conveyance Pipe

A. Material

1. All storm sewer pipe installed in the Town shall be corrugated polyethylene pipe (CPEP) unless specifically approved otherwise by the Town. Any pipe with less than 24 inches of cover and installed in a load bearing zone shall be ductile iron. Pipe shall meet the following requirements:
   a. Corrugated polyethylene pipe CPEP up to 10-inch diameter pipe and fittings shall meet the requirements of AASHTO M252 Type S. Corrugated polyethylene pipe 12-inch to 60-inch diameter pipe and fittings shall meet the requirements of AASHTO M294 Type S. All joints for CPEP pipe shall be made with a bell/bell or bell/spigot coupling and shall conform to ASTM D3212 using elastomeric gaskets conforming to ASTM F477. All gaskets shall be factory installed on the pipe in accordance with the manufacturer's recommendations. Fittings shall be blow molded, rotational molded or factory welded.
   b. Ductile Iron, Class 50 shall conform to ANSI A 21.51 or AWWA C151 and shall be cement mortar lined. Non-restrained joints shall be rubber gasket type, push on type, or mechanical type and shall meet the requirements of AWWA C111. Cast iron fittings may be used with ductile iron pipe.
   c. PVC pipe SDR 35, Solid Wall (if approved by the Town) – 4-inch to 15-inch shall conform to ASTM D 3034 SDR 35 and 18-inch to 48-inch shall conform to ASTM F679. Joints for Solid Wall PVC pipe shall conform to ASTM D 3211 using elastomeric gaskets conforming to ASTM F477. Fittings for Solid Wall PVC pipe shall be injection molded, factory welded, or factory solvent cemented.
2. Stormwater pipe laid 16 feet and deeper shall be cement lined, ductile iron pipe, Class 50 unless otherwise approved by the Town.

B. Sizing

1. Size of the required pipe will be based on Manning's Equation with the following minimum slopes:

Pipe Diameter	Slope (min)
6"	.02 ft/ft
8"	.005 ft/ft
12" and larger	.002 ft/ft

Minimum velocity at full flow shall be 3 ft/second. If site constraints result in velocities less than 3 feet per second at full flow, impacts from sedimentation in the pipe system shall be addressed with larger pipes, closer spacing of structures, sediment basins, or other similar measures.

2. The minimum pipe diameter size for the listed pipe type shall be as follows:
   a. Main Line 12"
   b. Curb Inlet Crossing/lateral 12"
   c. Side Service 6"
   d. Perforated Drain line 4"
   e. Retaining Wall Drain 6"

The Town may, at its discretion, require the installation of a larger sized main if it is determined that a larger size would be necessary to serve adjacent areas or provide future service.

3. Downstream pipe shall be the same size or larger than upstream pipe.

C. Horizontal and Vertical Clearance

1. All storm water pipes shall be placed in accordance with Section 3: General Utilities. All pipes shall have a minimum cover of 24 inches unless otherwise approved by Town.
2. Minimum horizontal clearance between stormwater and sanitary sewer pipes shall be 5 feet and between stormwater and water pipes shall be 10 feet, unless another design alternative is specifically approved by the Town.
3. Minimum vertical clearance where stormwater and any other utilities cross shall be 12 inches between the pipes, unless an alternative design is specifically approved by the Town.
4. Storm sewer pipe, with less than 2 feet of cover, shall be encased in steel casing when crossing under a rockery or retaining wall. The steel casing shall extend beyond the footings or the rockery face for a minimum of 5 feet or for the height of the wall or rockery, whichever is greater.

D. Side Service

Side service stubs shall be provided for each individual lot, unless those lots are approved by the Town for infiltration. Side service stubs shall conform to the following:

1. Each side service stub shall be located at the lowest elevation on the lot.
2. Each side service stub shall have free-flowing positive drainage to an approved stormwater conveyance system or to an approved outfall location.
3. Side Sewer stubs shall be located with a 5' high, white 2" x 4" stake marked “STORM.” The stub out shall visibly extend above surface level and be secured to the stake.
4. Drainage easements are required for drainage systems designed to convey flows across more than one lot.
5. The side service shall be privately owned and maintained by the respective property owner.

E. Connections to Existing System

1. New storm sewer mains shall connect to existing storm sewer mains only at existing manholes or catch basins, or with a new manhole or catch basin installed on the existing sewer
2. If connecting to an existing manhole or catch basin that has access of less than the Town Standard, the existing manhole or catch basin shall be replaced to the meet the Town Standard.

F. General

1. Bends are not allowed in main lines or inlet crossings.
2. Catch basins are required for the following conditions:
   a. A change in the flow-line slope.
   b. A maximum distance of 300 feet in a main line.
   c. Change in pipe size.
   d. The joining of two or more main lines.

e. The joining of a curb inlet to the main line.
f. For a side service.
g. A change in pipe-material type.

3. Tapping tees are acceptable for side services where structures cannot be installed due to other structure conflicts, but a yard drain shall be located within 10 feet of the property line.
4. Public stormwater pipes within public right-of-way shall be located within the paved road width. If outside of the right-of-way, public stormwater pipes shall be centered in easements with a minimum width of 15 feet or two times the depth of the storm pipe, whichever is greater.
5. Building structures shall not be permitted within 10 feet of the outside of any storm drainage pipe.

6.4 Structures

A. Material

1. Catch basins shall be as shown on the Standard Drawings. WSDOT Type 1 or Type 2, as necessary. Type 1 catch basins shall have a minimum catch of 18 inches below the invert. Type 2 catch basins shall have a minimum catch of 24 inches below the invert.
2. Shall be precast concrete steel or fiber reinforcement construction.
3. Adjustment rings shall be precast concrete.
4. Grates and covers shall be ductile iron and frames cast iron. Covers shall be marked “STORM.”

B. Structure Size

Catch basin or manhole size shall be determined by pipe orientation at the junction structure. A plan view of the junction structure, drawn to scale, will be required when more than four pipes enter the structure on the same plane, or if angles or approach and clearance between pipes is of concern. The plan view must ensure a minimum distance of solid concrete wall between pipe openings of 8 inches for 48-inch and 54-inch manholes, and 12 inches for 72-inch manholes.

C. Spacing

Catch basins shall be spaced no greater than 150 feet apart on grades less than one percent, 200 feet for grades between 1 percent and 3 percent and 300 feet for grades greater than 3 percent.

D. Covers and Grates

Vaned grates shall be installed on all catch basins located within the street, gutter, or shoulder. Herringbone grates may be used in high pedestrian areas, including parking lots and crosswalks. Catch basin grates and covers shall have the bolt down capacity. Inlets should not be located directly in front of ADA ramps. Inlets should be located so as to reduce the amount of water passing in front of ADA ramps.

E. Elevation

All manholes, inlets and catch basins shall be constructed to finished grade. In areas of new and existing pavement, the grate rim elevation shall be set to promote drainage flow.

F. Access

All catch basins to be owned and maintained by the Town shall be located within 50 feet of a paved access.

6.5 Channels

The Town allows the use of open vegetated channels to convey storm water runoff when possible outside of the right of way and within easements. Any open channels proposed to be located within public rights of way shall require specific approval from the Town.

6.6 General Notes (Sedimentation/Erosion Control and Storm Sewer)

The General Notes, provided on Standard DWG. SE-0 shall be included on any plans that include land disturbing activities. The General Notes, provided on Standard Dwg. SW-0 shall be included on any plans that provide for the installation of storm sewer.

ATTACHMENT 6.1

Town of Friday Harbor
PO Box 219 / Friday Harbor / WA / 98250
(360) 378-2810 / fax (360) 378-5339 / www.fridayharbor.org

STORMWATER WORKSHEET

DETERMINING STORMWATER MANAGEMENT REQUIREMENTS: This Stormwater Worksheet should be completed and submitted with a site plan. The worksheet will determine whether a Stormwater Site Plan is required in conjunction with a building permit application or other land use approval application that involves stormwater review. The basic information will also be helpful for completing a Stormwater Site Plan, if required.

PARCEL # _____ PROJECT/APPLICANT NAME: _____

Size of parcel _____ acres Size of parcel in square feet 0 ft²

LAND DISTURBING ACTIVITY, CONVERSION OF NATIVE VEGETATION, AND VOLUME OF CUT/FILL

Calculate the total area to be cleared, graded, filled, excavated, and/or compacted for proposed development project. Include in this calculation the area to be cleared for:

Construction site for structures _____ ft²

Drainfield, septic tank, etc. _____ ft²

Well, utilities, etc. _____ ft²

Driveway, parking, roads, etc. _____ ft²

Lawn, landscaping, etc. _____ ft²

Other compacted surface, etc. _____ ft²

Temporary construction area on site _____ ft²

Temporary construction area off site _____ ft²

Total Land Disturbance 0 **ft²**

Answer the following two questions related to conversion of native vegetation:

Does the project convert 3/4 acres or more of native vegetation to lawn or landscaped areas?

☐ **Yes** ☐ **No**

Does the project convert 2-1/2 acres or more of native vegetation to pasture?

☐ **Yes** ☐ **No**

Indicate Total Volumes of Proposed:

Cut _____ **Fill** _____ **(cy)**

Definitions:

***ft²* -** square feet

***cy* -** cubic yard, 1 cubic yard = 27 cubic feet

***1 acre* =** 43,560 ft²

Land-disturbing activity is any activity that results in movement of earth, or a 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, filling, excavation, and compaction associated with stabilization of structures and road construction.

Native vegetation is vegetation comprised of plant species, other than noxious weeds, which reasonably could have been expected to naturally occur on the site. Examples include species such as Douglas fir, western hemlock, western red cedar, alder, big-leaf maple, and vine maple; shrubs such as willow, elderberry, salmonberry, and salal; herbaceous plants such as sword fern, foam flower, and fireweed.

STORMWATER CALCULATIONS – IMPERVIOUS SURFACE

Impervious surface is a hard surface that either prevents or slows the entry of water into the soil as under natural conditions prior to development. A hard surface area which 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. Common impervious surfaces include, but are not limited to roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater.

NEW		**EXISTING**	
Structures (all roof area)	_____ ft²	Structures (all roof area)	_____ ft²
Sidewalks	_____ ft²	Sidewalks	_____ ft²
Patios	_____ ft²	Patios	_____ ft²
Solid Decks (without infiltration below)	_____ ft	Solid Decks (without infiltration below)	_____ ft²
Driveway, parking, roads, etc.	_____ ft²	Driveway, parking, roads, etc.	_____ ft²
Other	_____ ft²	Other	_____ ft²
Total New	0 **ft²**	**Total *Existing***	0 **ft²**

TOTAL NEW + TOTAL EXISTING* 0 **ft²** *This amount will be used to check total lot coverage.

DEVELOPMENT v. REDEVELOPMENT

Divide the total *existing* impervious surface above by the size of the parcel and convert to a percentage. 0%

→ Does the site have >35% or more existing impervious surface?

→ no

The proposal is considered **new development**. Answer questions in **Figure 1-3.1 Flow Chart for New Development** to determine project size **(next page).**

yes

The proposal is considered **redevelopment** Answer questions in **Figure 1-3.2**. **Flow Chart for Redevelopment** to determine project size **(next page).**

Projects that must comply only with Minimum Requirement #2, Construction Stormwater Pollution Prevention, shall submit the Small Project Certification. The proponent is responsible for employing the 12 Elements to control erosion and prevent sediment and other pollutants from leaving the site during the construction phase of the project.

APPLICANT SIGNATURE By signing the Stormwater Calculation Worksheet, I as the applicant/owner attest that the information provided herein is true and correct to the best of my knowledge. I also certify that this application is being made with the full knowledge and consent of all owners of the affected property.

_____ _____

(LANDOWNER OR AUTHORIZED REPRESENTATIVE SIGNATURE) (DATE)

Figure I-3.1: Flow Chart for Determining Requirements for New Development

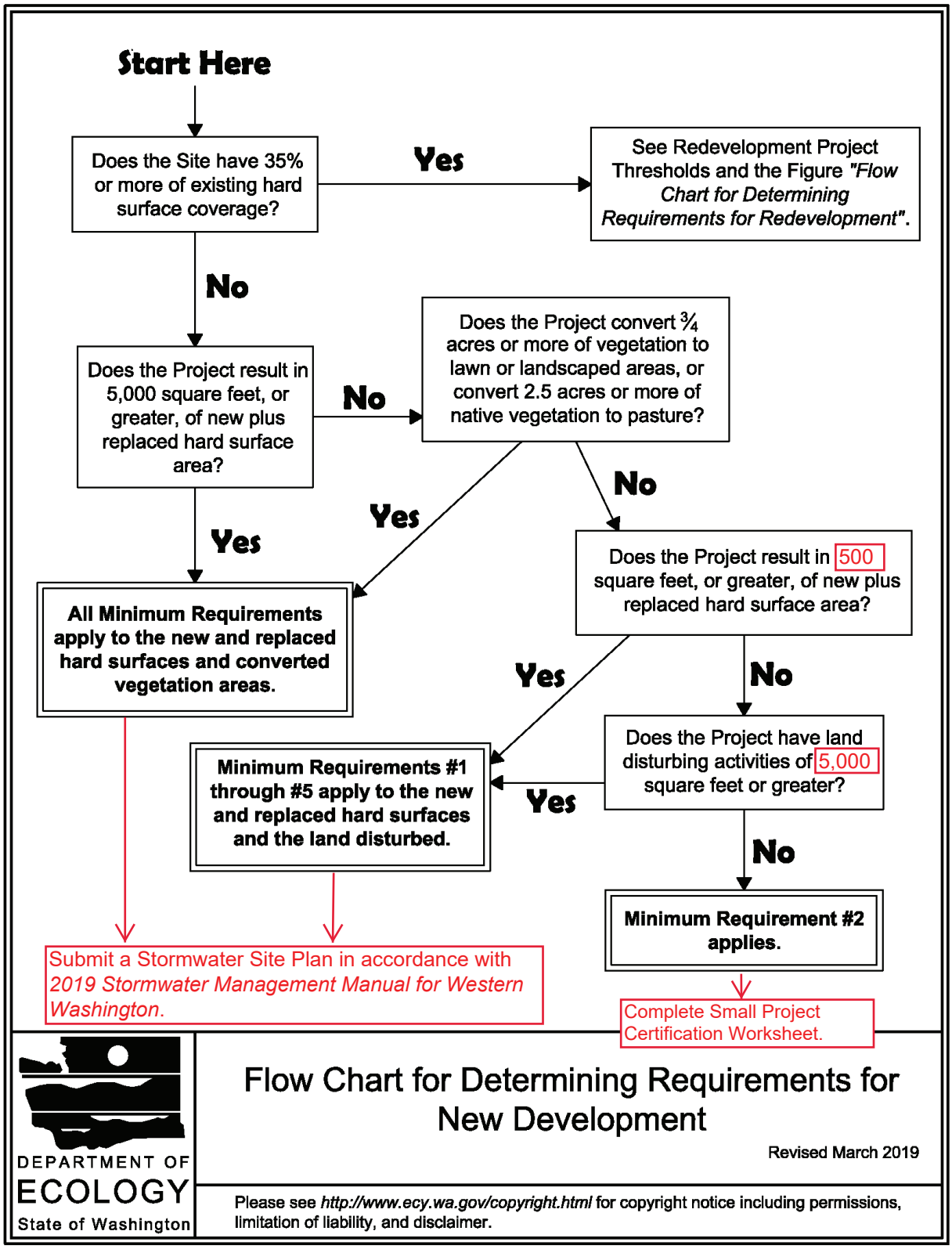
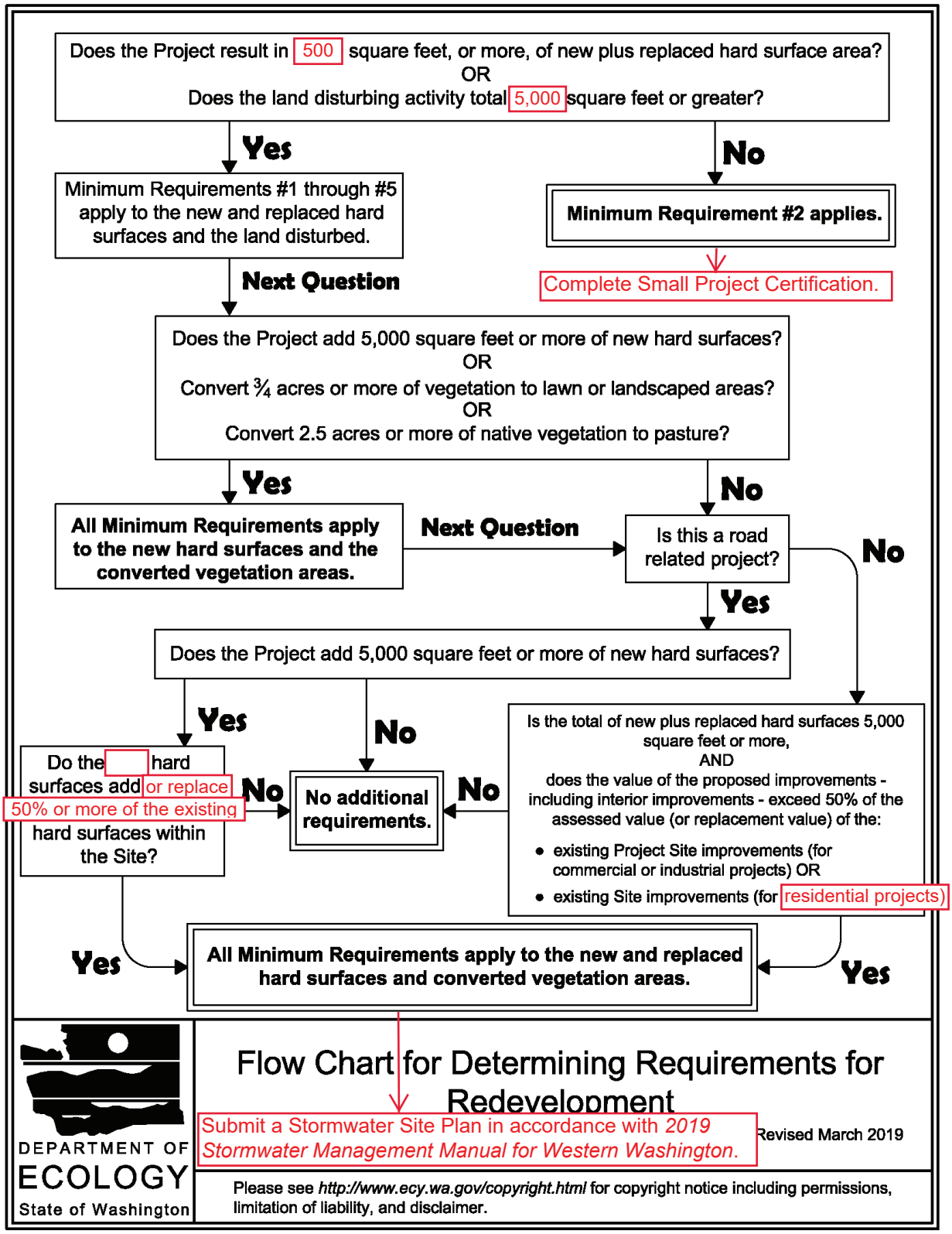


Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment



ATTACHMENT 6.2

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Small Project Certification

This certification may only be used if you answer yes to all of the questions below (check yes or no). Otherwise, a submittal prepared by a licensed engineer may be required.

yes	no	Permanent and temporary drainage on site is designed to divert stormwater away from my on-site septic system or any neighboring on-site septic system.
yes	no	My project will not create a nuisance by allowing or causing flooding to occur on private property that is likely to or does result in damage to persons or property.
yes	no	My project will not discharge stormwater runoff into a critical area (including but not limited to: geohazard area or its 30-foot buffer, wetland or Fish and Wildlife Habitat Conservation Area).
yes	no	My proposal is a small project, which means it will create less than 2,000 square feet of new, replaced, or new-plus-replaced impervious surface area, and has less than 7,000 square feet of land-disturbing activities as defined on the Stormwater Worksheet.

I understand that my project must comply with Minimum Requirement #2 in the Department of Ecology *2019 Stormwater Management Manual for Western Washington* as amended. I have read the Construction Stormwater Pollution Prevention Fact Sheet and will implement Best Management Practices (BMPs) as applicable to my project.

Applicant Signature

By signing the small project certification, I as the applicant/owner attest that the information provided herein is true and correct to the best of my knowledge.

(landowner or authorized representative signature)	(date)

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CONSTRUCTION STORMWATER POLLUTION PREVENTION
Best Management Practices (BMPs) Fact Sheet

The applicant shall consider the twelve Construction Stormwater Pollution Prevention elements and implement applicable BMPs. There is no additional submittal required as part of the permit application.

The following twelve elements must be considered for Construction Stormwater Pollution Prevention before and during the construction phase of the project:

1. Mark Clearing Limits
2. Establish Construction Access
3. Control Flow Rates
4. Install Sediment Controls
5. Stabilize Soils
6. Protect Slopes
7. Protect Drain Inlets
8. Stabilize Channels and Outlets
9. Control Pollutants
10. Control Dewatering
11. Maintain Best Management Practices
12. Manage the Project

Each of the twelve elements is described in more detail below:

1. Mark Clearing Limits

By minimizing the limits of clearing on the site, a builder can minimize stormwater runoff and provide effective control of pollution.

2. Establish Construction Access

Much of the sediment that leaves a construction site does so on the wheels of delivery and construction vehicles that drive off a project site. Construction access must be limited to a single location and a properly constructed Stabilized Construction Entrance (BMP C105) should be included on the site.

3. Control Flow Rates

Stormwater that leaves a project site unimpeded may exceed the capacity of the existing stormwater control facilities downstream and may contain sediment that may be deposited as the velocity of the runoff decreases. Stormwater protection on a construction site should include measures to control the flow rate of runoff from the site. This can be done by installing a Sediment Trap (BMP C240) or other measure that will impede the flow of water off a construction site.

4. Install Sediment Controls

In addition to limiting the rate of stormwater flow off a construction site, measures should be put in place to treat the runoff and remove sediment. Limiting of the cleared area (Element 1) will assist in this effort, but there will be exposed soils that may move with the runoff. Suggested BMPs for controlling sediment include Straw Wattles (BMP C235), Brush Barrier (BMP C231), Gravel Filter Berm (BMP C232), and Silt Fence (BMP C233). Installation of a Sediment Trap (Element 3) is an additional sediment control feature.

5. Stabilize Soils

An additional measure that can minimize sediment transport in runoff is to stabilize soils on the site with mulch or some other covering. This will limit the amount of soil that is exposed to rainfall, thus limiting the sediment that could potentially leave the site. BMPs that could be used for this include Mulching (BMP C121), Nets and Blankets (BMP C122), and Plastic Covering (BMP C123). During periods of dry weather, dust can become a problem and sediment could be transported from the site in high winds. BMP C140 Dust Control should be followed to limit loss of soils in windy conditions.

6. Protect Slopes

If the cleared area includes slopes of 3:1 (Horizontal:Vertical) or steeper, the slopes should be protected to limit runoff. If the slopes are not protected, rills and gullies may form, transporting sediment to the lower elevations and potentially off the construction site. The slopes should be graded to minimize erosion and runoff at the downstream end of the slopes, and runoff should be collected and treated. The following BMPs could be used: Surface Roughening (BMP C130), Interceptor Dike and Swale (BMP C200), and Pipe Slope Drains (BMP C204).

7. Protect Drain Inlets

Runoff from urban construction sites often discharges into existing stormwater collection systems. Water enters the collection system through drain inlets. If there are drain inlets downstream of a construction site, they should be protected using BMP C220 Storm Drain Inlet Protection.

8. Stabilize Channels and Outlets

Any temporary on-site channels or ditches that are used to control runoff should be stabilized to prevent erosion in the channel. BMP C202 Channel Lining and BMP C209 Outlet Protection should be used.

9. Control Pollutants

The best way to control pollution is to limit the source of pollution. Construction debris should be maintained in a safe location. Vehicle maintenance on the construction site should be minimized and any spill should be promptly cleaned up. Concrete spillage should be kept to a minimum and cleaning of the concrete trucks after they have unloaded should be done in an area that will not drain off site (see BMP C151 Concrete Handling).

10. Control Dewatering

In some cases, excavation for the foundation or below-ground structures will encounter groundwater. This water must be removed (dewatered) from the excavation. Discharge of this groundwater must be treated in a manner that will not cause damage downstream due to flow rates or added pollution. There are no specific BMPs identified for this activity, but the water should be handled with care to assure that soils or other pollutants are not added to this flow.

11. Maintain BMPs

Installation of the appropriate BMPs is not adequate to completely control stormwater runoff. The BMPs that have been installed on the project must be inspected and maintained during the duration of the construction project. In addition, the temporary controls that were installed for construction should be removed within 30 days of completion of the work. Typically, once construction has been completed, the temporary facilities are not maintained, and by removing the facilities, it will ensure that these will not fail and discharge water or sediment that had been previously trapped or contained.

12. Manage the Project

Management of a project has four aspects:

1. Phasing construction to prevent transportation of runoff and sediment,
2. Limiting the work during seasons where large amounts of rainfall could be anticipated,
3. Coordination with utilities and other contractors, and
4. Inspection and monitoring.

All of these four aspects are important and must be followed to ensure a project that will have minimal impact on the environment. Volume II of the Manual contains additional BMPs that could be used on site. The applicant is encouraged to review the Manual to see if other BMPs may be applicable to, or more useful on, a particular site.