



SHELTER BAY COMMUNITY
Stormwater Management Manual

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Shelter Bay Community Stormwater Management Manual
Table of Contents

| | | |
|---|---|---|
| I. | PURPOSE _____ | 3 |
| A. | Protect Slopes and Properties. _____ | 3 |
| B. | Maintenance of and improving the health of the Puget Sound. _____ | 3 |
| C. | Economic benefits to Shelter Bay Community resources. _____ | 3 |
| II. | USE OF THIS MANUAL _____ | 3 |
| A. | Requirements for Homeowners: _____ | 3 |
| B. | Best Management Practices for Maintaining Existing Stormwater Features _____ | 3 |
| III. | NEW CONSTRUCTION OR RENOVATION OF EXISTING _____ | 3 |
| A. | Minimum Requirement No. 1 – Preparation of Stormwater Site Plans (SSP) _____ | 4 |
| B. | Minimum Requirement No. 2. – Construction Stormwater Pollution Prevention _____ | 4 |
| Element #1 | – Mark Clearing Limits _____ | 4 |
| Element #2 | – Establish Construction Access _____ | 4 |
| Element #3 | – Control Flow Rates _____ | 4 |
| Element #4 | – Install Sediment Controls _____ | 4 |
| Element #5 | – Stabilize Soils _____ | 5 |
| Element #6 | – Protect Slopes _____ | 5 |
| Element #7 | – Protect Drainage Inlets _____ | 5 |
| Element #8 | – Stabilize Channels and Outlets _____ | 5 |
| Element #9 | – Control Pollutants _____ | 5 |
| Element #10 | – Control Dewatering _____ | 5 |
| Element #11 | – Maintain BMPs _____ | 6 |
| Element #13 | – Manage the Project _____ | 6 |
| C. | Minimum Requirements No. 3 – Source Control of Pollution _____ | 6 |
| D. | Minimum Requirement No. 4 – Preservation of Natural Drainage Systems and Outfalls _____ | 6 |
| E. | Minimum Requirement No. 5 – On-site Stormwater Management _____ | 6 |
| BMP T5.13 | Post -Construction Soil Qualify and Depth _____ | 6 |
| BMP T5.30 | Full Dispersion (page 44 of appendix) _____ | 7 |
| BMP T5.14A | Rain Gardens _____ | 7 |
| BMP T7.30 | Bioretention Cells, Swales, and Planter Boxes _____ | 7 |
| BMP T5.10B | Downspout Dispersion Systems (page 7 of appendix) _____ | 7 |
| BMP T5.10C | Perforated Stub-out Connections _____ | 7 |
| BMP T5.15 | Permeable Pavements _____ | 7 |
| BMP T5.12 | Sheet Flow Dispersion _____ | 8 |
| BMP T5.11 | Concentrated Flow Dispersion _____ | 8 |
| IV. | BMPs FOR MAINTAINING EXISTING STORMWATER FACILITIES _____ | 8 |
| Dispersion Trenches: | Areas where or through which stormwater is discharged _____ | 8 |
| Infiltration Systems | _____ | 8 |
| Catch Basins: | Concrete boxes with a steel grate to act as a junction for drainage pipe _____ | 8 |
| Culverts: | A pipe that transmits stormwater underground _____ | 8 |
| Yard Waste | _____ | 9 |
| Fertilizers, Herbicides, and Pesticides | _____ | 9 |

| | |
|-------------------------------------|----|
| Aesthetic Lawn and Landscaping | 9 |
| Water Runoff and Discharge | 9 |
| REFERENCES | 10 |
| APPENDIX: STORMWATER MANAGEMENT BMP | 10 |

I. PURPOSE

Stormwater runoff (water that doesn't soak into the ground) in Shelter Bay flows over roadways, rooftops, lawns, landscaped areas, and parking lots. It does not soak into the ground as it would in a forested area. It also picks up pollutants, including trash, chemicals, oils, and sediment. These increased flows and pollutants harm our rivers, lakes, streams, and coastal waters and our slopes and properties if not managed effectively.

The goals of the Manual are to implement simple **B**est **M**anagement **P**ractices (BMPs) within the Shelter Bay Community to meet the following goals:

A. **Protect Slopes and Properties.**

The Shelter Bay Community's steep slopes show signs of erosion due to increased stormwater volumes and velocities from impervious (water unable to soak into the soil) areas. In addition to adequately maintaining existing stormwater infrastructure, the proper re-routing of stormwater and reducing flow volumes and/or velocities can protect slopes and properties from long-term degradation. The drainage management objective is to slow the water down and soak the pervious (porous) surface areas.

B. **Maintenance of and improving the health of the Puget Sound.**

Treating stormwater runoff will reduce the number of pollutants reaching the Puget sound. The significant pollutants impacting our waters include turbidity (sediment suspended in the runoff), phosphorus and nitrogen from fertilizers, and oils from roadways. Simple treatment systems will help preserve the ecosystems which benefit our environment.

C. **Economic benefits to Shelter Bay Community resources.**

The Best Management Practices included in this Manual consider the economic impact of managing stormwater within Shelter Bay Community.

II. USE OF THIS MANUAL

The Shelter Bay Community resides within the jurisdiction of the Swinomish Indian Tribal Community. Tribal Code, Title 12 – Building and Construction, Chapter 5 – Stormwater managements specifies that stormwater must be managed according to the August 2001 edition of the Stormwater Management Manual for Western Washington (SWMMWW) by the Washington State Department of Ecology.

This Manual is not intended to replace the SWMMWW or the Tribal Code but should be used as a guild to direct the user to the appropriate resources regarding stormwater management.

A. Requirements for Homeowners:

1. Each unique project's requirements are dictated by the size of the new or replaced hard surface area. Hard surface is defined as rooftop, concrete, asphalt, compacted gravel (such as a driveway), pavers, flagstone, etc..
2. If a project requires either a building permit, certificate of compliance, or has a land disturbance area of greater than 500 square feet, then the development must comply with **Minimum Requirement No. 2**, of the SWMMWW.
3. All new single-family homes and all renovations where the new plus replaced hard surface is 2,000 square feet, but less than 5,000 square feet, must comply with **Minimum Requirements No. 1 through No. 5**, as described in the SWMMWW.
4. If the project creates or replaces greater than 5,000 square feet of hard surface or disturbs and area of $\frac{3}{4}$ acres or more then the project must comply with Minimum Requirements No. 1 through No. 9 of the SWMMWW. **This Manual does not apply for projects which must comply with Minimum Requirements No. 1 through No. 9.** Please contact a civil or geotechnical engineer for assistance.

B. Best Management Practices for Maintaining Existing Stormwater Features

This handbook discusses the operations and maintenance practices for existing stormwater facilities and features. Homeowners should use this section to maintain new infrastructure after development, existing infrastructure within their privates property, and protect Shelter Bay Community infrastructure within the right-of-way.

III. NEW CONSTRUCTION OR RENOVATION OF EXISTING

A. Minimum Requirement No. 1 – Preparation of Stormwater Site Plans (SSP)

Preparation of a stormwater site plan for review (the SSP can be incorporated with the clearing and grading plans), and the elements that must be included on the SSP are:

- A topographic survey
- A geological report that identifies soil types, hydraulic restriction layers, and feasibility of infiltration (if applicable based on Minimum Requirement No. 5)
- Native soil and protected areas on site must be shown on the plan
- A narrative explaining how Minimum Requirements No. 1 through No. 5 are incorporated into the development.

The site plan should also include the location of the proposed project and all of the permanent stormwater BMPs if applicable. If no permanent stormwater BMPs are part of the design, an actual plan sheet or detail sheets may not be required.

B. Minimum Requirement No. 2. – Construction Stormwater Pollution Prevention

A Stormwater Pollution Prevention Plan (SWPPP) is documentation that guides stormwater management during the construction phase. The SWPPP must address all 12 elements listed below. Part of the SWPPP is a Temporary Erosion and Sediment Control (TESC) plan which shows which BMPs will be utilized during construction, and where those BMPs will be utilized – included on the plan sheet, in the “notes” section, list all 12 SWPPP elements and how they apply to the project. The appropriate figures, details, or excerpts from SWMMWW. Construction BMPs should also be included in the plan.

Below is a narrative to describe twelve elements of construction stormwater management. The suggested BMPs are included in the Appendix and provide details on implementation.

Element #1 – Mark Clearing Limits

Before all land-disturbing activities, all clearing limits must be marked, including sensitive areas and buffers if they exist, as well as all trees that are to be preserved within the construction area. The duff layer, native topsoil, and native vegetation should be undisturbed to the maximum extent practical. BMPs that will be used to *Mark Clearing Limits* shall be described in this section.

Suggested BMPs include: BMP C101 Preserving Natural Vegetation, BMP C103 High Visibility Fence

Element #2 – Establish Construction Access

This section describes how construction access is managed on-site. For residential sites, access and exit should be limited to one route. Construction access stabilization and street sweeping are examples of topics that should be discussed in this section.

Suggested BMPs include: BMP 105 stabilized Construction Entrance/Exit

Element #3 – Control Flow Rates

This section is important for sloped sites where exposed soils may be present. Properties and waterways downstream of a construction site have the potential to be damaged if high velocities and volumetric flow rates create erosion and turbid discharge.

Describe areas on-site that may be at risk for high velocities and volumetric flow rates and mitigation procedures that may reduce this risk.

Suggested BMPs include: BMP C235 Wattles, BMP C120 Temporary and Permanent Seeding, BMP C121 Mulching, BMP C206 Level Spreader

Element #4 – Install Sediment Controls

This section describes which and/or how BMPs will be implemented on-site to reduce the amount of sediment leaving the site. These BMPs should be installed or constructed as one of the first steps in grading. These BMPs must be functional before site clearing or grading. Address the amount,

frequency, intensity, and duration of anticipated precipitation when implementing these BMPs. For example, if the earthwork will be completed over more than one dry season, additional sediment controls may need to be installed over the wet season.

Suggested BMPs include BMP C233 Silt Fence, BMP C235 Wattles, BMP C240 Sediment Trap, BMP C241 Temporary Sediment Pond.

Element #5 – Stabilize Soils

Describe how exposed soils on-site will be stabilized if exposed. These areas may include soil stockpiles and exposed areas of cut or fill.

Suggested BMPs include: BMP C120 Temporary and Permanent Seeding, BMP C123 Plastic Covering, BMP C140 Dust Control, BMP C122 Nets and Blankets, BMP C121 Mulching

Element #6 – Protect Slopes

Cut and fill slopes should be designed and constructed in a manner that minimizes erosion. The number of BMPs necessary to fulfill this requirement varies greatly depending on the topography of the site. The amount of protection required can be significantly reduced by leaving areas of the site vegetated. This can be a long-term solution or can be included in the site phasing.

Suggested BMPs include: BMP C120 Temporary and Permanent Seeding, BMP C121 Mulching, BMP C122 Nets and Blankets, BMP C123 Plastic Covering, BMP C124 Sodding, BMP C130 Surface Roughening, BMP C131 Gradient Terracing

Element #7 – Protect Drainage Inlets

If there are drainage inlets on the site, or if inlets downslope of the site collect runoff generating on the site, BMPs must be used to protect these areas.

Suggested BMPs include: BMP C220 Storm Drain Inlet Protection

Element #8 – Stabilize Channels and Outlets

On-site conveyance channels must be stabilized to prevent erosion. If a conveyance channel is located on-site, reference the SWMMWW to determine the intensity of flows that are expected. The channels and outlets must be protected from these flows.

Suggested BMPs include: BMP C202 Channel Lining, BMP C122 Nets and Blankets, BMP C207 Check Dams, BMPs C209 Outlet Protection

Element #9 – Control Pollutants

This section describes how the discharge of pollutants is minimized. Proper handling and disposal practices of waste materials and demolition debris that occur on-site can reduce pollutants' release. Proper handling and disposal practices include covering and containing all on-site chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to the environment or human health.

Suggested BMPs include: BMP C151 Concrete Handling, BMP C152 Saw cutting and Surface Pollution Prevention, BMP C153 Material Delivery, Storage, and Containment, BMP C154 Concrete Washout Area, BMP C250 Construction Stormwater Filtration, BMP C252 High pH Neutralization Using CO₂, BMP C253 Control for High pH Water

Element #10 – Control Dewatering

It is unlikely that dewatering (removal of excess water from the soil) will be required on a residential project, but this section describes how to control dewatering water discharging from the site. Dewatering water must be routed to a sediment trap or temporary sediment pond before discharging. If dewatering water is highly turbid, then it must be treated separately from stormwater.

Suggested BMPs include: BMP C203 Water Bars, BMP C236 Vegetative Filtration, BMP C240 Sediment Trap, BMP C241 Temporary Sediment Pond

Element #11 – Maintain BMPs

All temporary and permanent erosion control and sediment control BMPs must be maintained and repaired as needed to ensure that they are functioning properly. All temporary BMPs must be removed within 30 days after achieving final site stabilization or after the temporary BMP is no longer needed. Be aware that some temporary BMPs are designed to remain in place, such as biodegradable compost stock.

Suggested BMPs include: BMP C150 Materials on Hand, BMP C160 Certified Erosion and Sediment Control Lead

Element #13 – Manage the Project

This section covers how the erosion and sediment control will be managed from the start to the end of construction. This includes discussion on how the project may be phased, maintaining the SWPPP and the TESC plan, and inspection and monitoring.

C. Minimum Requirements No. 3 – Source Control of Pollution

This requirement is dedicated to preventing stormwater runoff from coming in contact with pollutants. Residential properties are generally exempt from this requirement because there are no sources of pollution monitored by the Department of Ecology, which are generated by a single-family residence. Mandatory source control of pollution is required for commercial properties, multifamily properties, and boatyards.

Within the SSP narrative of a project, it is beneficial to list *pollution surfaces* that are being created. Common pollution generating surfaces for a residential lot is a driveway or parking area where runoff may pick up pollutants from vehicular traffic.

D. Minimum Requirement No. 4 – Preservation of Natural Drainage Systems and Outfalls

Minimum Requirement No. 4 states that natural drainage patterns on-site shall be maintained and discharge from the project site shall occur at the natural location to the maximum extent practicable. How runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and downgradient properties.

This requirement is significant in the Shelter Bay Community because steep slopes are prevalent, and the management of stormwater is significant in the prevention of erosion throughout the Shelter Bay Community. Whenever possible, direct stormwater to existing Shelter Bay Community culverts and storm drains in the right-of-way, infiltrate runoff, or disperse runoff over vegetated areas. Avoid discharging runoff as a concentrated flow.

E. Minimum Requirement No. 5 – On-site Stormwater Management

Projects shall employ stormwater management BMPs to infiltrate, disperse, and retain stormwater runoff on-site to the maximum extent feasible without causing flooding or erosion or erosion impacts. Below are several examples of BMPS that may be utilized to incorporate Minimum Requirement No. 5.

Each BMP described is appropriate for residential development, but site characteristics and/or soil parameters must be considered before implementation. Some BMPs require a soil analysis by a geologist, and some systems must be designed by an engineer. The following descriptions do not describe what each BBMP is but will help you choose an appropriate solution for stormwater management on your project. One or more systems may be appropriate for the project. A copy of each BMP is attached in the Appendix.

BMP T5.13 Post -Construction Soil Qualify and Depth

This BMP applies to all new and/or replaced lawn and landscaped areas. The primary purpose of the BMP is to improve the post-development topsoil to provide increased stormwater storage, filtration, and pollution treatment.

Exposed soils are stabilized post-construction utilizing on-site topsoil from areas where grading was required, import topsoil, mulch or compost, or other approved amended soils. All stabilized topsoil and duff layers should be placed with a minimum thickness of 8-inches, except where tree roots limit

the depth. Compaction should also be limited. Subsurface soils should be scarified 4-inches before replacing the topsoil.

BMP T5.30 Full Dispersion (page 44 of appendix)

The DOE also prefers downspout full infiltration due to its environmental benefits. BMP T5.10A may be utilized for roof surfaces. To utilize this BMP, a soil report must be prepared by a professional soil scientist, a licensed on-site sewage designer, or a professional engineer, geologist, hydrogeologist, or engineering geologist.

The BMP must be constructed on slopes less than 25% and may not be constructed above landslide hazard areas or on slopes greater than 15% without evaluation by a professional engineer with geotechnical expertise or a licensed geologist, hydrogeologist, or engineering geologist, with jurisdiction approval.

BMP T5.10A is inexpensive to construct and maintain and is practical for projects with limited space and well-draining soils.

BMP T5.14A Rain Gardens

Rain gardens may be utilized for both roof surfaces and other hard surfaces. Rain gardens do not need a soil report or an engineered design. Refer to the *Rain Garden Handbook for Western Washington (2013)* for design guidance. Rain gardens must be constructed in well-draining soils and on slopes no greater than 10%.

BMP T5.14A is an aesthetically pleasing stormwater management option in landscaped areas and is practical for sites with limited space. The DOE refers this option for its environmental benefits.

BMP T7.30 Bioretention Cells, Swales, and Planter Boxes

Bioretention is when contaminants and sedimentation are removed from stormwater runoff from both roof surfaces and other hard surfaces. A professional engineer must design Bioretention cells, swales, planter boxes, and a soil report prepared by a professional engineer, hydrogeologist, or engineering geologist. Bioretention systems must be constructed on slopes no greater than 10%.

BMP T7.30 is an aesthetically pleasing stormwater management option in landscaped areas and is practical for sites with limited space.

BMP T5.10B Downspout Dispersion Systems (page 7 of appendix)

Downspout dispersion systems may be utilized for roof surfaces. If a pervious vegetated area of 25 to 50 feet is available with slopes no greater than 15%, this BMP may be feasible.

BMP T5.10B is a low-cost option for construction, maintenance, and design but requires a large area of vegetated, lawn, or landscaped surface.

BMP T5.10C Perforated Stub-out Connections

Perforated stub-out connections may be utilized for roof surfaces. This BMP may not be placed above slopes that are greater than 20% or above erosion hazard areas without evaluation by a professional engineer with geotechnical expertise or a qualified geologist.

BMP T7.10C is a low-cost option for construction, maintenance, and design but requires a large area of vegetated, lawn, or landscaped surface.

BMP T5.15 Permeable Pavements

Permeable pavements may be utilized for hard surfaces. A professional engineer must design permeable pavements, and a soils report prepared by a professional soil scientist, a licensed on-site

sewage designer, a professional engineer, geologist, hydrogeologist, or engineering geologist. Bioretention facilities must be constructed on slopes no greater than 5%. This option works well for sites with limited landscaped areas.

This option has design, construction, and maintenance costs but is preferred by the DOE due to its environmental benefits.

BMP T5.12 Sheet Flow Dispersion

This BMP is utilized for hard surfaces. This BMP must be used for flat or moderately sloping (less than 15% slopes) surfaces. A 10-foot-wide vegetated surface must be available for up to 20-feet of the impervious surface.

BMP T5.12 is a low-cost option for construction, maintenance, and design but requires a large area of vegetated, lawn, or landscaped surface.

BMP T5.11 Concentrated Flow Dispersion

This BMP is utilized for hard surfaces. A vegetated flow path of 50 feet must be available. Runoff discharged towards landslide hazard areas must be evaluated by a geotechnical engineer or qualified geologist. The discharge point must not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluations by a geotechnical engineer or qualified geologist.

BMP T5.11 is a low-cost option for construction, maintenance, and design but requires a large area of vegetated, lawn, or landscaped surface.

IV. BMPS FOR MAINTAINING EXISTING STORMWATER FACILITIES

The following sections outline maintenance procedures for stormwater management facilities. The property owner is responsible for all maintenance of stormwater facilities on-site. The Shelter Bay Community is responsible for all maintenance of stormwater facilities in the right-of-way. Still, it is the property owner's responsibility to ensure that on-site activities and stormwater facilities do not negatively impact the facilities in the right-of-way. Drainage ditches are in the right-of-way, owners are responsible for maintaining the culvert in the ditch. Shelter Bay community is responsible for ditch maintenance.

Dispersion Trenches: Areas where or through which stormwater is discharged

Periodically inspect and clear roof drains, downspout dispersion trench, and vegetated concentrated flow dispersion berm area for all debris and plant material.

Infiltration Systems

Periodically inspect and clear roof drains, catch basins, and infiltration systems for all debris and plant material. Monitor sediment build-up in the top foot of the wash rock and replace or clean when necessary.

Catch Basins: Concrete boxes with a steel grate to act as a junction for drainage pipe

Keep catch basins clear of all yard waste, gravel, sand, and aggregate within and out of the right-of-way.

Catch basins shall be CB 16 Type 1L, CB 18 Type 1, CB 30 Type 30. Shelter Bay maintenance department must approve the catch basin before installation. (The specification may change for a project due to the conditions of the site).

Culverts: A pipe that transmits stormwater underground

All culverts and open stormwater conveyance trenches within the right-of-way must be either planted with grass or armored with quarry spalls (3-31/2 inches). Gravel and rounded drain rock must be kept out of the culverts to prevent the Shelter Bay Community vacuum equipment from being clogged.

Do not dump yard waste into culverts or trenches.

ADS N-12® WT IB PIPE (per AASHTO) SPECIFICATION

Pipe Requirements – Minimum ID 12 inches.

N-12 WT IB pipe (per AASHTO) shall have a smooth interior and annular exterior corrugations.

- 4-through 10-inch (100 to 250 mm) shall meet AASHTO M252, Type S.
- 12-through 60-inch (300 to 1500 mm) shall meet AASHTO M294, Type S or ASTM F2306.
- Manning's "n" value for use in design shall be 0.012

Yard Waste

Do not dispose of collected vegetation into waterways or stormwater systems such as catch basins, culverts, or within dispersion or infiltration trenches or bioretention systems.

Fertilizers, Herbicides, and Pesticides

Choose permanent plants and landscaping that will reduce the need for irrigation, fertilizers, herbicides, and pesticides wherever possible. Develop and implement an Integrated Pest Management Plan (IPMP) and use pesticides only as a last resort. Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.

If possible, use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Till fertilizers into the soil rather than dumping or broadcasting onto the surface. Determine the proper fertilizer application rate for the types of soil and vegetation encountered.

Till a topsoil mix of composted organic material into the soil to create a well-mixed transition layer that encourages a deeper root system and drought resistant plants.

Use manual and/or mechanical methods of vegetation removal rather than applying herbicides, where practical.

Choose the least toxic pesticide available that can reduce the infestation to acceptable levels. The pesticide should readily degrade in the environment and have properties that strongly bind it to the soil. Conduct any pest control activity at the life stage when the pest is most vulnerable. Apply pesticides in appropriate quantities and according to the manufacturer's instructions.

Mix pesticides and clean the application equipment in areas where accidental spills will not enter the surface or groundwaters – store pesticides in enclosed spaces or covered impervious containment. Do not discharge pesticide-contaminated stormwater or spill/leak of pesticides to storm drains or to infiltration facilities.

Clean up any spilled pesticides. Keep pesticide-contaminated waste materials in designated covered and contained areas.

Aesthetic Lawn and Landscaping

Keep all permanent lawn ornaments and garden features at least 3-feet from all stormwater features, including culverts, catch basins, Bioretention facilities, infiltration facilities, and dispersion trenches, so that these features do not prevent or inhibit scheduled inspection and maintenance.

When planting new shrubs, groundcover, trees, or bushes, be aware of these plants' impact on new or existing stormwater structures. In general, increased vegetation is helpful for stormwater management purposes, but the improper placement of certain plants may negatively impact stormwater facilities on private properties or within the right-of-way. For example, ground cover growing over the inlet of a catch basin will inhibit the collection of runoff and placement of trees that could drop flowers, leaves, or pine needles.

Water Runoff and Discharge

Only stormwater runoff and irrigation water shall be discharged into stormwater management features such as catch basins, culverts, infiltration facilities, and dispersion systems. Avoid dumping liquids such as paints, solvents, soapy wash water, or other chemicals into the stormwater systems.

REFERENCES

Bakeman, S., Dan, G., Howie, D., Killelea, J., Labib, F., & Ed, O. (n.d.). *2012 Stormwater Management Manual for Western Washington, as Amended in December 2014 (The 2014 SWMMWW)* (pp. 101042) (the United States, Washington State Department of Ecology).

O'Brien, Ed. (n.d.). *2001 Stormwater Management Manual for Western Washington (SWMMWW)* (pp. 1-1042) (The United States, Washington Department of Ecology).

Swinomish Indian Tribal Community Tribal Code – Stormwater Management §§ 12-05.010-12-05.107 (2017)

APPENDIX: STORMWATER MANAGEMENT BMP

The Shelter Bay Community resides within the jurisdiction of the Swinomish Indian Tribal Community. Tribal Code, Title 12- Building and Construction, Chapter 5 - Stormwater Management specifies that stormwater must be managed according to the August 2001 edition of the *Stormwater Management Manual for Western Washington (SWMMWW)* by the Washington Department of Ecology.

Reference of the SWMMWW can be reviewed on-line. If the on-line ability isn't available, then contact the Shelter Bay Committee Secretary to review the office copy.

(Note the Manual is 1089 pages.)

The SWMMWW consists of several volumes as follows:

- Volume I – Minimal Technical Requirements and Site Planning
- Volume II – Construction Stormwater Pollution Prevention
- Volume III – Hydrologic Analysis and Flow Control Design/BMPs
- Volume IV – Source Control BMPs
- Volume V – Runoff Treatment BMPs

The following are recommended excerpts from the above Volumes that adhere to Shelter Bay Communities drainage plan:

- BMP T5.10A – Vol III – Chapter 3 Page 452-466
- BMP T5.11 – Vol IV – Chapter 5 Page 905-932
- BMP T5.30 – Vol V chapter 5 Page 939-948
- BMPT7.30 – Vol V chapter 7 Page 959-986

- BMP C101 Preserving Natural Vegetation Vol II Chapter 4 Page 266
- BMP C102 Buffer Zone Vol II chapter 4 Page 268
- BMP C103 High Visibility Fence Vol II chapter 4 Page 269
- BMP C105 Stabilizing construction Entrance Vol II chapter 4 Page 270
- BMP C120 Temporary & Permanent Seeding Vol II Chapter 4 Page 278
- BMP C121 Mulching Vol II chapter 4 Page 284
- BMP C122 Nets & Blankets Vol II Chapter 4 Page 288
- BMP C123 Plastic covering Vol II Chapter 4 Page 294
- BMP C124 Sodding Col II Chapter 4 Page 296
- BMP C207 Check Dams Vol II Chapter 4 Page 352
- BMP C232 Gravel Filter Berm Vol II Chapter 4 Page 367
- BMP C233 Silt Fence Vol II Chapter 4 Page 367
- BMP C235 Wattles Vol II Chapter 4 Page 376
- BMP C236 Vegetative Filtration Vol II Chapter 4 Page 379

