Plat of Bay Hill

Integrated Pest Management Plan

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HGP Project #02-102

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I. INTRODUCTION

Background

When urban development covers the land with buildings, houses, streets and parking lots, much of the native topsoil, duff, trees, shrubs and grass are replaced by homes, asphalt, concrete, and landscaping. Along with the development, people come bringing the potential for contamination to area lakes, streams, and groundwater supplies.

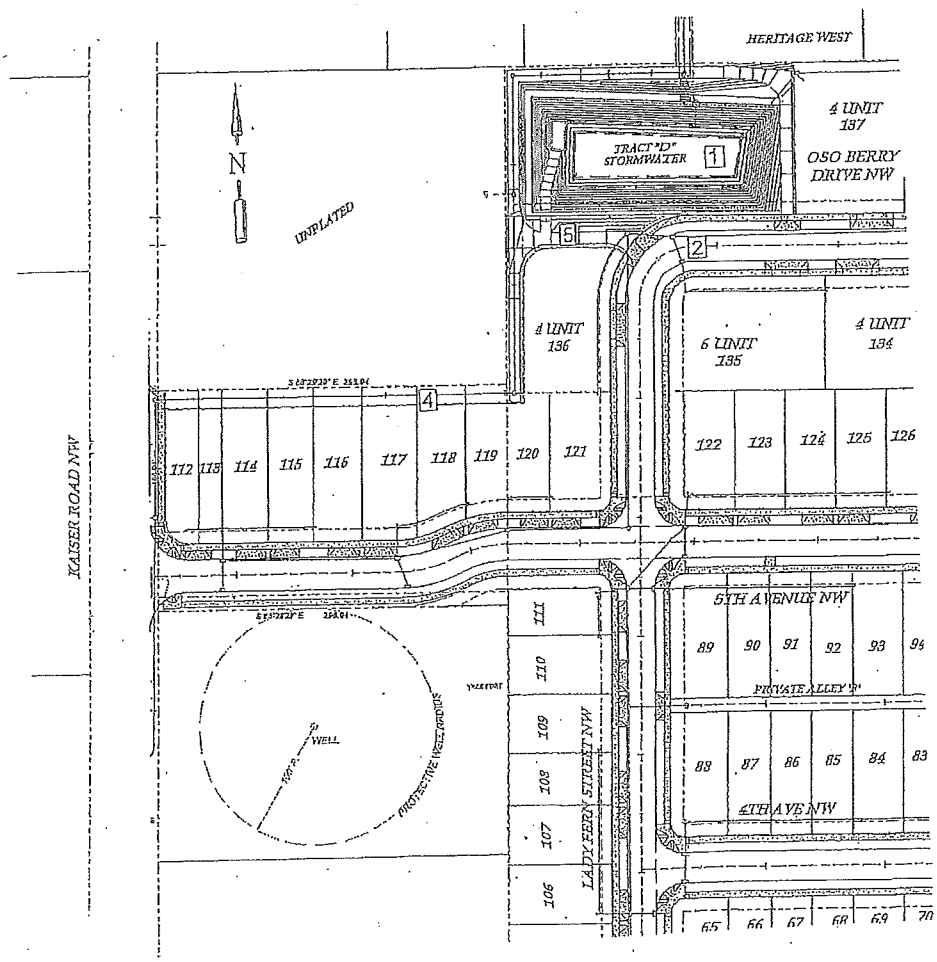
Much of Thurston County is classified as an "Aquifer Sensitive" area. That is to say that the groundwater resource, upon which the vast majority of Thurston County residents rely for water, is vulnerable to contamination from land activities. Many of the aquifers serving Thurston County are relatively shallow and largely unprotected by intervening impermeable layers of soil. Consequently, activities on the surface can have an impact on the water supply.

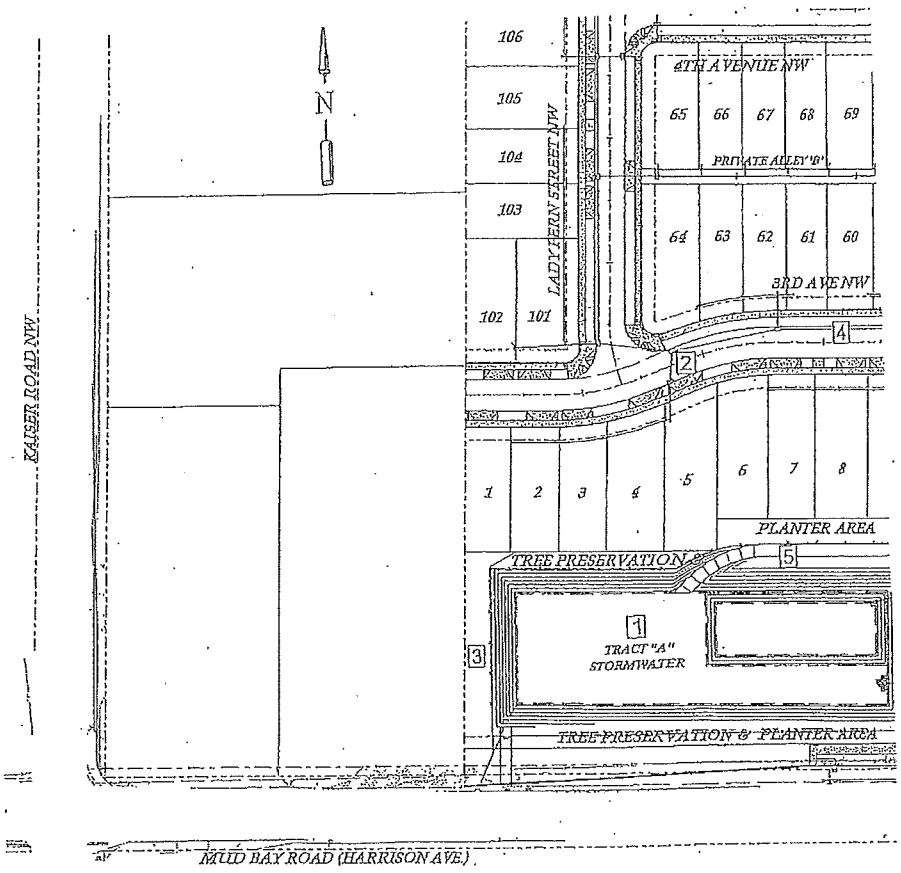
In addition to protecting the aquifer, this project lies near Grass Lake. This surface water body is susceptible to contamination from development and future activities on this site. Surface water bodies are typically home to a variety of aquatic life including plants, fish, and animals. Some support endangered species such as Coho and Chinook salmon.

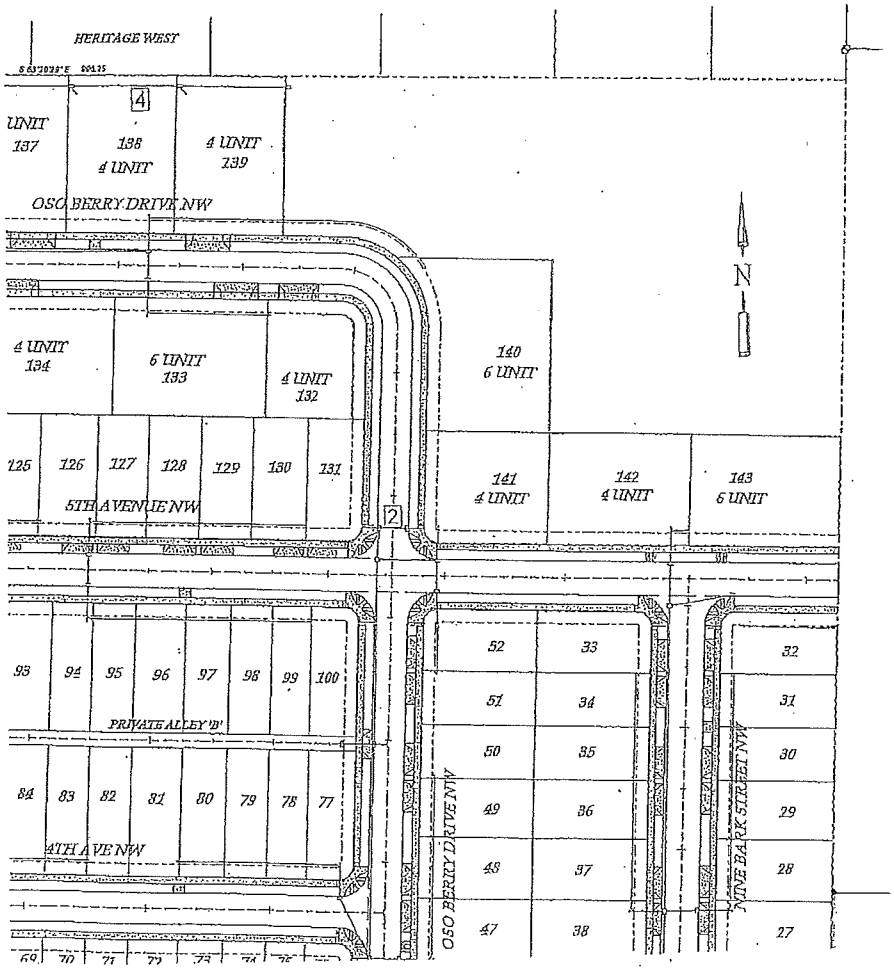
This Integrated Pest Management Plan (IPMP) seeks to address potential sources of contamination of both surface and ground waters. Moreover, it provides guidance to future homeowners of this project to identify actions and activities that can be mitigated to reduce the potential for contamination.

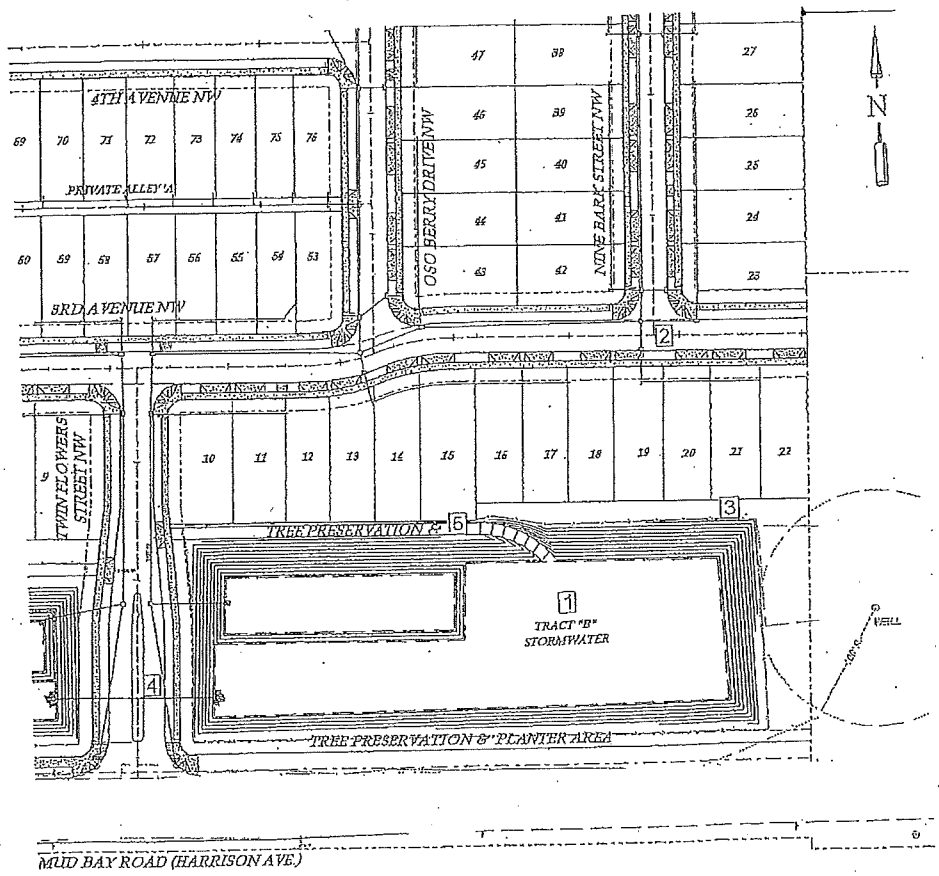
A. Responsibility

All property owners within this subdivision are members of the Homeowners Association (HA). The HA is responsible for many of the mitigation measures discussed herein. However, most of the responsibility for protection of our water resources lies with each individual property owner. This IPMP is attached to and a part of the Covenants, Conditions, and Restrictions for this subdivision and, as such, are recorded against the title for all properties within the subdivision. Enforcement of the recommendations of this IPMP lies with the HA, but responsibility rests with each property owner.









B. Project Description

The project is a mixed residential subdivision consisting of 143 lots, of which 12 lots will be multi-family. The remaining 131 lots are to be single family residential. The project address is the 3600 Block of Harrison Avenue NW. The legal description is Parcels A, B and C of Boundary Line Adjustment BLA-17290L recorded under Auditor's File Number 3337456, records of Thurston County, Washington. Tax parcel numbers are 12817130000, 12817130400, and 12817130500. The area is zoned MR 7-13, 6-12. A portion of the drainage facilities will be within Thurston County. The project lies in an aquifer sensitive area and the Allison Springs wellhead protection area.

The project area consists of 30.86 acres lying within the City limits of Olympia and is located on the north side of Harrison Avenue NW approximately 300 feet east of Kaiser Rd. NW. The site is bounded on the north by a residential subdivision named Heritage West that is in Thurston County. The east and west boundaries abut a mixture of residential and commercial properties lying within the City limits of Olympia.

The proposed stormwater facilities for the project will consist of a combination of wet pond/detention ponds on site, as well as an additional offsite infiltration facility. The onsite stormwater facilities are divided into two tributary areas, one to the north tributary to Grass Lake and associated wetlands, and one to the south tributary to an offsite infiltration pond west of the site lying south of Mud Bay Road in Thurston County. Both facilities will release stormwater to a downstream area at designated release rates.

II. COMMON HAZARDS TO WATER RESOURCES

General

Many products commonly used in and around our homes are hazardous to both the environment and people. If used improperly, these products can end up in nearby surface or ground waters. This document provides alternatives, where possible, for many products and common practices that can reduce the potential for adverse impacts to those water resources. The term commonly used to describe environmentally conscientious practices is "Best Management Practices" (BMP). Many BMPs are incorporated into the design of your subdivision. BMPs described herein include "good housekeeping" practices that everyone can use.

It has been said that the average home today contains more chemicals than the average chemical lab of 100 years ago. When these chemicals are used industrially, they typically are subject to various health and safety standards. However, many of these same substances can be used freely and carelessly in our homes. Typical residential pollutant sources are classified as either "point" or "non-point" sources. A point source pollutant is one in which the contaminant can be traced to a specific location or locations. Non-point pollutants are more difficult to locate. Stormwater is a good example wherein tiny bits of contaminant collect over many acres of runoff, eventually reaching a single point. However, the source of the pollutant is anything but a "point" source.[1]

A. Point sources of pollutants

1. Household products

Many cleaning agents, solvents, polishes, etc. commonly used in the home are considered hazardous. These products may be toxic, corrosive, reactive, flammable, or carcinogenic. It is critical that these products are handled with care and are properly disposed. A list of common household hazardous materials is presented in Table 1.

In addition, many hazardous household chemicals persist for long periods of time in the environment. Manufacturers may truthfully state that a product is "biodegradable"; most products are biodegradable, but what is important is the rate at which they are broken down and the products they are broken down into. The term "biodegradable" is somewhat misleading unless the product rapidly degrades into harmless substances.
It is important to note here that the term "biodegradable" currently has no legal definition in this state. Consequently, any product can use this term according to the manufacturer's own definition. This definition may not be at all similar to the consumer's perception.

2. Automotive care products

Common automotive fluids such as oil, gas, antifreeze, degreasers, etc, are easily spread by small amounts of water and can cause significant damage to area ground and surface waters. Table 1 presents a list of these common items and Table 2 suggests alternatives or handling tips to reduce the potential for negative environmental impacts.

B. Non-point sources of pollutants

1. Yard care products

Pesticides (including insecticides and herbicides) and fertilizers are commonly used by homeowners in the quest for bigger, healthier plants and greener lawns. These chemicals are often overused. Many times, homeowners apply too much chemical or apply the right amount but at the wrong time. (Such as before heavy rains or any time the plants will not be able to absorb the chemicals.) Excess chemicals are easily introduced into stormwater runoff and can cause algae blooms (fertilizers) or kill off aquatic organisms (pesticides) in surface waters. Large quantities of fertilizer can negatively impact nitrate levels in drinking water well supplies as well.

2. Stormwater runoff

Stormwater runoff needs to be treated because it carries litter, oil, gasoline, fertilizers, pesticides, pet waste, sediments, and anything else that can float, dissolve or be swept along by moving water. Left untreated, polluted stormwater can reach nearby waterways where it can harm or kill aquatic life. Untreated stormwater can pollute groundwater in similar ways. Nationally, stormwater is recognized as a major threat to water quality. Remember to keep everything out of stormwater systems except the rainwater they are designed to collect.

III. REDUCING IMPACTS ON WATER RESOURCES

General

The following ideas should help you reduce the risks of stormwater and ground water contamination from many common products or practices. From a waste management standpoint, automobile maintenance is best done by professionals at facilities designed to handle, store, and dispose of waste products properly. Many of these facilities do an excellent job of dealing with waste oils, antifreezes, other fluids, batteries and tires. If you do repair or maintain your car at home, please consider the tips presented in this plan.

Fertilizing a lawn can be done in an environmentally sensitive manner. Also, rather than bringing out the sprayer whenever a pest infestation occurs in the garden, consider using other alternatives. Evaluate all factors that might affect the garden, including environmental effects, before chemicals are applied. Pesticides should only be used as a last resort. Some proven tactics that can be used to decrease the use of pesticides are discussed below.

A. Household operations

1. Read the label of products before you buy them. Toxic product labels carry many warnings. Either bypass such products entirely or buy them in small quantities. If you cannot use the entire product, try to give it away instead of disposing of it. Thurston County periodically facilitates product exchanges for leftover paints and other hazardous wastes. Call the Thurston County Health Department at 754-4111 for more information.

2. Buy detergents that contain little or no phosphorus. Phosphorus can cause algae blooms if washed into lakes or streams. Most detergents that are low or phosphate free are labeled as such.

3. Use no more than the manufacturer's suggested amount of any cleanser. (More isn't necessarily better.)

4. Products such as oven cleanser, floor wax, furniture polish, drain cleaners, and spot removers often contain chemicals that are toxic. Buy the least toxic product available, and use a non-toxic substitute if one can be found. Ovens, for example, can be cleaned by applying table salt to spills, then scrubbing with a solution of washing soda and water. Table 2 lists substitutes for many commonly used household products.

   If it is necessary to use a product that contains toxic chemicals, use the product only as directed. Do not combine products, as they may become more dangerous when mixed (example: mixing chlorine bleach and ammonia produces dangerous gases). Use eye-wear and rubber gloves as appropriate.

   Contact the Hazardous Substance Hotline at 1-800-633-7585 if you have any

questions regarding disposal of a product or empty container. The County has both hazardous waste collection days and permanent facilities where residents can bring hazardous wastes. Call the Thurston County Health Department at 754-4111 for more information.

5. Many chemicals left over from some activities such as photography and auto repair are hazardous and should not be flushed down the sink or toilet. This is especially important if your home is hooked up to a septic system. Toxic chemicals can kill bacteria in the tank that treat sewage and can also pollute water supply wells.

6. Be sure that all toxic material containers are clearly marked.

7. Common (not automobile) household batteries are one of the largest sources of heavy metals (such as lead, nickel, cadmium, and mercury) found in landfills. Instead of throwing batteries away, dispose of them at a hazardous waste collection site.

B. Automotive care and maintenance

1. Cars should be serviced regularly. Leaky lines or valves should be replaced.

2. Dumping oil, degreasers, antifreeze, and other automotive liquids into a stream or storm drain violates city, county and state law. Do not dump them onto the ground because they will end up in stormwater runoff or in groundwater. Do not use oil to reduce dust levels on unpaved areas. Instead, recycle used oil and antifreeze. (Keep them in separate containers.) Call the Recycling Hotline at 1-800-RECYCLE or call the Thurston County Health Department for the location of the nearest recycling center. You may also call your local automotive service centers to see if they take oil for recycling. (Some also take used oil filters.)

3. Wrap empty oil and antifreeze containers in several layers of newspaper, tie securely, and place them in a covered trashcan. (Antifreeze tastes sweet but is poisonous to people, fish, pets, and wildlife.)

4. Sweep your driveway instead of hosing it down. Fluids and heavy metals associated with automobiles can build up on driveway surfaces. When cleaned with a garden hose, these contaminants can be washed into local surface or ground waters. Sweeping up sediment and disposing of it properly can reduce the impact on our water resources.

5. Wash vehicles on the lawn or in a location where soapsuds can be directed onto the lawn or another vegetated area. This will help to keep soapsuds from washing into the storm drain system or local surface water. (Your stormwater pond is not designed to cleanse soapy water from washed cars.)

6. Small spills of oil or other fluids can be absorbed by using materials such as kitty litter or sawdust. Wrap the used kitty litter and any contaminated soil in a plastic bag and then place it in the garbage. If a spill reaches surface water, you must notify the

nearest regional office of the Department of Ecology immediately! Southwest Regional Office number: 407-6300. There are fines for failure to notify the appropriate agency when a spill occurs.

7. De-icing chemicals, usually a form of salt, can harm concrete less than three years in age, burn vegetation, and are corrosive to cars and other metal objects. De-icing chemicals and their additives can also be toxic. (Cyanide is formed from the breakdown of a common anti-caking agent used in de-icing chemicals.)

   Urea salts are an alternative to other types of salt de-icers, but great care must be used in applying them. These salts contain large quantities of nitrogen, which can severely burn plants and encourage algae growth in lakes if over-applied. The use of these chemicals should be minimized or avoided. Instead, shovel walks clear and apply a dusting of sand to improve footing.

C. **Landscape design and maintenance**

1. One of the best methods of reducing impacts to water resources is by using landscaping materials that do not require extensive care. Native plants have adapted themselves to our region, particularly their root structure and water needs. These plants have also built tolerances over the centuries to local pests and disease. By using native plants in the landscape, we are less likely to need fertilizers, herbicides, and pesticides. Native plants are also more tolerant of drought conditions and typically require less water.

   Native plants come in all shapes and sizes so there is probably one that will fit into your landscape plans. There are deciduous and evergreen varieties of trees, shrubs, and groundcovers. Following is a brief list of just some of the more common varieties of native plants. Contact your local garden supply store for more ideas on use of native plants in your garden.

Evergreen Plants:

Trees - western red cedar, douglas fir, western hemlock

Shrubs – rhododendron, evergreen huckleberry, tall oregon grape

Ferns – lady fern, sword fern, deer fern

Groundcover – manzanita, kinnikinnik, common juniper

Deciduous Plants:

Trees – big leaf maple, pacific dogwood, bitter cherry

Shrubs – western azalea, nootka rose, red huckleberry

2. The lawn is a major component of the landscape. Selection of a grass well suited to our area is an important step in reducing the impact to water resources. The

National Turfgrass Evaluation studies various types of grasses for their resistance to insects, drought tolerance, seasonal appearance, density, the strength of their sod, and leaf texture. Based upon these characteristics, specific grass types are recommended for specific areas throughout the country. Fescue and perennial rye grass are recommended for this area.

3. Use of native plants will greatly reduce the need for fertilizer. Use of mulch may eliminate the need altogether. Mulch acts as a physical barrier to weeds and is an excellent alternative to herbicides. Mulch can be compost, bark or wood chips, or leaves and grass clippings. It should be spread around the base of plants and within flowerbeds. The recommended depth of mulch varies between plant varieties but should typically be two to four inches.

4. Proper use of fertilizers yields better plants and reduces negative impacts to our water resources. Fertilizers typically contain high levels of nitrogen and phosphorus, both of which can damage ground and surface waters. The following are a few tips to optimize the use of fertilizers in your garden.

    - The first step in fixing a problem is to know what that problem is. Therefore, before applying any fertilizer, test your soil. Existing soil conditions, particularly nitrogen, phosphorus, potassium, and pH levels, can be easily determined by using kits available at garden stores or from the WSU Cooperative Extension. Applying fertilizer before knowing the components of the soil could lead to over loading certain areas that may impact our water resources.

    - Proper fertilization is important in maintaining a healthy lawn that resists environmental stress, including competition with weeds and moss and drought stress. Because Spring and Fall are periods of optimal growth, these are the most important times to fertilize. The use of slow release fertilizers is recommended. Natural organic and synthetic organic fertilizers (such as IBDU, sulfur or polymer coated urea, or methylene urea) behave similarly once they are applied to the soil. Although some people feel that natural organic fertilizers provide added benefits to soil health, research has not shown this to be true as a general rule. The natural organic nutrient sources in these products are often supplemented with synthetic plant nutrients anyway. The most important thing to remember is to use a slow release fertilizer. Extensive research around the country has shown that when these materials are applied properly there is very little risk of surface or groundwater contamination, and they provide an even feeding, which is better for your lawn. Remember to sweep granules off pavement to prevent washing into storm drains.

    - Turf fertilization practices for the entire year are built around what is done in the fall. Apply fertilizer in early to mid September to promote regrowth from summer stress. Another application in November is important in keeping the grass competitive with moss through the winter. If you fertilize in November, you probably don't need an early Spring fertilization. If not, your lawn will probably be ready for fertilizer in the Spring. Again, use a slow release

fertilizer so that you don't promote a big flush of growth. Fertilize again in early June so that the grass has the nutrients it needs to grow at a moderate rate through the summer stress period.

- If you want to maintain a lawn of moderate quality, a minimum of three fertilizations through the year is needed. Additional light fertilizations can be added if you are looking for a higher quality lawn. In general, you should apply no more than one pound of actual fertilizer nitrogen per 1000 square feet at a time, although this rate can be increased to 1.5 pounds in the fall when using slow release products. (If the fertilizer analysis is 24-4-12, for example, it contains 24% nitrogen.) To apply 1 pound of N per 1000 square feet, you need to apply 4.2 pounds of fertilizer (1 ÷ 0.24 = 4.2). Return clippings (grasscycle) when you mow to recycle nutrients into the lawn.

- Water plants and lawns before fertilizing. Water enough to dampen the ground thoroughly, but not enough to cause surface runoff. Dampening the soil prevents fertilizer from being washed from the surface of dry soil in the first rain or watering after application.

- Use mulching mowers to return grass clippings directly to the lawn. Essential nutrients from the decomposed grass can then be retained in the soil thereby reducing the need for fertilizer.

- Many soils can benefit from the use of organic fertilizers such as compost or peat. These substances add nutrients to soil and increase the porosity of the soil as well as its ability to hold water.

5. Proper watering can help build strong plants resistant to drought, pests, and disease. Water infrequently but enough to dampen soil down to 10-inches. Be careful not to water so rapidly that water runs off the surface. Infrequent watering promotes shallow root depths making the plants susceptible to damage during periods of drought. Unhealthy plants are easy targets for pests and disease. Also, water during early morning hours rather than during the day or at night. Irrigating during the day loses a sizable amount of water to the atmosphere through evaporation. Watering at night can lead to mold and fungi growth on plants left damp over a cool night.

D. Pest control

1. Use natural predators and pathogens. Because chemical sprays generally kill beneficial insects along with the target pest, it may be necessary to introduce natural predators back into the garden. Ladybugs, lacewings, predatory wasps, and nematodes are all commercially available. Garter snakes and toads are also predators and should not be eliminated from the garden.

   Some bacteria, viruses, and insect parasites are specific to pests and will not harm other insects or animals. A commonly used bacterium in the Puget Sound area is *Bacillus thuringiensis* (Bt), which is intended to control infestations of tent caterpillars. Products containing Bt are available at your nursery.

2. Many times a change of habitat can control pest infestations. Removal of old tires can cut down on the mosquito population by removing a convenient water-filled location for them to breed. Crop rotation, even in a small garden, can reduce the number of pest infestations. Removing last year's leaves from under rose bushes can cut down on the incidence of mildew and blackspot, as these fungi overwinter in dead leaves.

3. Crops that can overwinter, such as leeks and carrots, should be planted in the fall. This gives them time to become established before pests arrive in the spring.

4. Many eggs, larvae, cocoons, and adult insects can be removed by hand. Be sure that the insect is properly identified prior to removing it so beneficial insects are not destroyed in error. Drowning insects in plain water or spraying them with soapy water are alternatives to squashing them.

5. Plants native to this area are often more resistant to pests and climate than are introduced plants. Many plant cultivars have been developed that are resistant to diseases such as verticilium wilt and peach leaf curl. Grass seed mixes are also available for lawns that require less watering, mowing, and chemical use.

6. Plants, such as hostas, that require some shade are more susceptible to pests when they are grown in the sun. Plants that are not properly fertilized or watered are less vigorous in growth and tend to attract pests. Plants that prefer an acid soil, such as azaleas, will perform better and be less susceptible to pests when they are grown in soil with the proper pH.

E. Pesticide management

1. Know what pest you are spraying for. Use the pesticide according to the manufacturer's instructions and buy only the quantity needed. Many pesticides have a limited shelf life and may be useless or degrade into even more toxic compounds if kept on the shelf.

2. Do not apply more than the specified amount. Overuse can be dangerous to your health as well as wildlife and the environment. If more than one chemical can be used to control the pest, choose the least toxic. The word "Caution" on the label means that the chemical is less toxic than one that is labeled "Warning".

3. Do not spray on windy days, in the morning of what will be a very hot day, or when rain is likely to occur. Herbicides can drift and injure valuable ornamental plants in either yours or your neighbor's back yard. Do not water heavily after application. Plants should be lightly watered BEFORE application to prevent burning the foliage, and to help evenly spread the chemical.

4. Never apply pesticides near streams, ponds, or wetlands (exception: approved applications for aquatic weeds). Do not apply them to bare eroded ground (exception: use of low toxicity herbicides such as Round-up to allow growth of desired planting in small areas). Many pesticides bind to soil particles and can be easily carried into a stream or storm drain.

5. Pesticides should be stored well away from living areas. Ideally, the storage area should have a cement floor and be insulated from temperature extremes. Always keep pesticides in their original containers with labels in tact. Labels often corrode and become illegible in this climate and may have to be taped onto the container.

6. Federal law requires all pesticides to be labeled with an appropriate disposal method. Leftovers should never be dumped anywhere, including a landfill. Take unwanted pesticides to the County's "Hazardous Waste Collection Days" or Hazo House at the landfill. Call the Thurston County Waste Line at 1-800-624-1234, ext. 4348 for more information.

7. Empty containers should be triple-rinsed and the rinse water used as spray. Once containers are triple-rinsed, they are not considered hazardous waste and may be disposed of in most landfills. However, call your local landfill before putting the container in the garbage.

8. If a pesticide is spilled onto pavement, it can be absorbed using kitty litter or sawdust. The contaminated absorbent should be bagged and labeled and taken to Hazo House.

9. If a pesticide is spilled onto dirt, dig up the dirt, place it in a plastic bag and take it to Hazo House.

10. Many pest control companies and licensed applicators have access to pesticides that are more toxic than those available to the consumer. Check with the company

before they spray indoors or outdoors to find out what spray they will be using and what precautions, if any, are necessary after the operator leaves.

F. Stormwater control

Your neighborhood has a stormwater control system that includes wet ponds to treat stormwater runoff and a detention pond to control stormwater release. Both facilities require certain types of maintenance to assure that they function as intended. A Stormwater Maintenance Agreement has been recorded with the title on all properties within your subdivision, binding the Homeowners Association to implementing the specified maintenance. Copies of the maintenance agreement is included in the covenants filed with the plat and should be included as part of your title policy on your lot.

IV. RELATED DOCUMENTS

Resources

A. Contact Numbers

Olympia Water Resources	753-8768
Thurston County Storm & Surface Water Management	754-4681
WSU Cooperative Extension	786-5445

Developer Information:

Bay Hill Partner, LLC
8905 Nimbus Avenue, SW
Suite 400
Beaverton, OR 97008-7164
(503) 607-5439

Engineer's Information:

Hatton Godat Pantier
1840 Barnes Blvd, SW
Tumwater, WA 98512
(360) 943-1599

B. Reference material

Puget Sound Water Quality Authority, Managing Nonpoint Pollution - an Action Plan for Puget Sound Watersheds, 88-31, June 1989.

Washington State Dept. of Ecology, Water Quality Guide - Recommended Pollution Control practices for Homeowners and Small Farm Operators 87-30, revised June 1991.

Washington State Dept. of Ecology, Hazardous Waste Pesticides, 89-41, August 1989.

Gardening with Native Plants of the Pacific Northwest by Arthur Kruckeberg

C. Quick Reference List of Toxic Products and Alternative Products

Table 1 – Hazardous Household Substances
Table 2 - Non-Toxic or Less Toxic Alternatives to Toxic Products

Table 1 Hazardous Household Substances

Auto, Boat and Equipment Maintenance	Repair and Remodeling	Cleansing Agents
1. Batteries	1. Adhesives, glues, cements	1. Oven cleaners
2. Waxes and cleansers	2. Roof coatings, sealants	2. Degreasers and spot removers
3. Paints, solvents and thinners	3. Caulking and sealants	3. Toilet, drain and septic tank cleaners
4. Additives	4. Epoxy resins	4. Polishes, waxes and strippers
5. Gasoline	5. Solvent-based paints	5. Deck, patio and chimney cleaners
6. Flushes	6. Solvents and thinners	6. Solvent cleaning fluids
7. Auto repair materials	7. Paint removers and strippers	
8. Motor oil		
9. Diesel oil		
10. Antifreeze		

Pesticides	Hobby and Recreation	Miscellaneous
1. Insecticides	1. Paints, thinners and solvents	1. Ammunition
2. Fungicides	2. Chemicals (photo and pool)	2. Asbestos
3. Rodenticides	3. Glues and cements	3. Fireworks
4. Molluscicides	4. Inks and dyes	
5. Wood preservatives	5. Glazes	
6. Moss retardants	6. Chemistry sets	
7. Herbicides	7. Bottled gas	
8. Fertilizers	8. White gas	
	9. Charcoal starter fluid	

Source: Guidelines for Local Hazardous Waste Planning, Ecology, No. 87-18 1987.

Table 2 Non-Toxic or Less Toxic Alternatives to Toxic Products

Hazardous Product	Alternative(s)
Air fresheners	Set out a dish of vinegar or simmer cinnamon and cloves or set out herbal bouquets or potpourri in open dishes or burn scented candles.
Bleach	Borax or oxygen bleaches or reduce bleach by ½ and add ¼ - ½ C. baking soda, or let clothes dry in the sun.
Brass polish.	Worcestershire sauce.
Chrome polish	Apple cider vinegar or a paste of baking soda and water or a lemon
Coffee pot cleaner	Vinegar.
Coffee stains	Moist salt paste.
Copper cleaner	Mix lemon juice w/ salt or use ketchup
Drain cleaner	Use a plunger followed by ½ C. baking soda in ½ C. vinegar. Let sit 15 min. & pour down 2 qt. boiling water.
Furniture polish	Linseed, olive or almond oils or a mixture of 3 parts olive oil to 1 part white vinegar or a mixture of 1 Tbs. lemon oil and 1 pint mineral oil.
Garbage disposal deodorizer	Used lemon rind or baking soda.
Glass cleaner	Mix 2 Tbs. vinegar with 1 quart water.
Grease remover	Make a paste of borax on a damp cloth.
Ink stain remover	Spray with leftover non-aerosol hair spray before washing.
Laundry soap	Borax, baking soda or washing soda
Linoleum floor cleaner	1 C. white vinegar in 2 gals. water.
Mildew remover	Equal parts vinegar and salt.
Mothballs	Cedar chips or blocks, or use dried tansy, lavender or peppercorns in drawers and closets.
Oil spills	Kitty litter, sawdust.
Oil stain removal	White chalk rubbed into the stain prior to washing.
Oven cleaner	Pour lots of salt on fresh spills and scrape off after the oven cools. A soda water solution will cut grease. Paint ammonia on spills with a paintbrush, then rinse off.
Paint brush softener	Hot vinegar.

Table 2 Non-Toxic or Less Toxic Alternatives to Toxic Products (Cont.)

Hazardous Product	Alternative(s)
Paint stripper	Use mechanical sanding instead of chemical strippers.
Paint/grease remover	Wear gloves or use baby oil.
Pet odor removal	Cider vinegar.
Pitch or sap remover	Butter, margarine or vegetable shortening.
Porcelain stain remover	Baking soda
Refrigerator deodorizer	Open box of baking soda.
Rug/carpet cleaner	(General) Use a soap-based non-aerosol rug shampoo, vacuum when dry. (Spots) Pour on club soda or sprinkle cornmeal or cornstarch on the rug, let sit for at least 30 minutes, then vacuum.
Rust removal	Lemon juice plus salt plus sunlight.
Rusty bolt remover	Carbonated beverage.
Scorch mark remover	Grated onion.
Scouring powder	Baking soda or a non-chlorine scouring powder.
Silver polish	Soak silver in warm water with 1 Tbs. soda, 1 Tbs. salt and a piece of aluminum foil.
Stainless steel polish	Mineral oil.
Toilet bowl cleaner	Paste of borax and lemon juice.
Tub and tile cleaner	¼ C. soda and ½ C. white vinegar mixed with warm water.
Upholstery spot remover	Club soda.
Water mark remover	Toothpaste.
Water softener	¼ C. vinegar.

D. Glossary

BEST MANAGEMENT PRACTICE (BMP) - Structures, conservation practices, or regulations that improve quality of runoff or reduce the impact of development on the quantity of runoff.

BIOFILTER (SWALE) - A wider and flatter vegetated version of a ditch over which runoff flows at uniform depth and velocity. Biofilters perform best when vegetation has a thick mat of roots, leaves, and stems at the soil interface (such as grass).

BIOFILTRATION - The process through which pollutant concentrations in runoff are reduced by filtering runoff through vegetation.

BUFFER - The zone that protects aquatic resources by providing protection of slope stability, attenuation of runoff, and reduction of landslide hazards. An integral part of a stream or wetland ecosystem, it provides shading, input of organic debris, and coarse sediments to streams. It also allows room for variation in stream or wetland boundaries, habitat for wildlife, and protection from harmful intrusion.

CATCH BASIN - An inlet for stormwater set into the ground, usually rectangular and made of concrete, and capped with a grate that allows stormwater to enter.

CHECK DAM - A dam (e.g., rock, earthen, log) used in channels to reduce water velocities, promote sediment deposition, and/or enhance infiltration.

COMPOST STORMWATER FILTER - A treatment facility that removes sediment and pollutants from stormwater by percolating water through a layer of specially prepared bigleaf maple compost. Clean water exits the bottom of the facility through a pipe, while stormwater flows in excess of the facility design overflow the compost bed and bypass the facility.

CONSTRUCTED WETLAND - A wet pond with dead storage at varied depths and planted with wetland plants to enhance its treatment capabilities.

CONTROL STRUCTURE OR FLOW RESTRICTOR - A manhole and/or pipe structure with a flow-regulating or metering device such as a weir or plates with small holes known as orifices. This structure controls the rate at which water leaves the pond.

CONVEYANCE - A mechanism or device for transporting water including pipes, channels (natural and man-made), culverts, gutters, manholes, etc.

CRITICAL AREA - Areas such as wetlands, streams, steep slopes, etc. as defined by ordinance or resolution by the jurisdiction. Also known as environmentally sensitive areas.

CULVERT - A conveyance device (e.g., concrete box, pipe) which conveys water from a ditch, swale, or stream under (usually across) a roadway or embankment.

DEAD STORAGE - The volume of storage in a pond below the outlet which does not drain after a storm event. This storage area provides treatment of the stormwater by allowing sediments to settle out.

DETENTION FACILITY - A facility (e.g., pond, vault, pipe) in which surface and storm water is temporarily stored.

DETENTION POND - A detention facility in the form of an open pond.

DISPERSION TRENCH - An open-top trench filled with riprap or gravel that takes the discharge from a pond, spreads it out, and spills (bubbles) the flow out along its entire length. Dispersion trenches are used to simulate "sheet flow" of stormwater from an area, and are often used to protect sensitive adjacent areas, such as wetlands.

DRAINAGE SYSTEM - The combination of Best Management Practices (BMPs), conveyances, treatment, retention, detention, and outfall features or structures on a project.

DROP STRUCTURE - A structure for dropping water to a lower elevation and/or dissipating energy. A drop may be vertical or inclined.

DRY POND - A detention facility that drains completely after a storm. This type of pond has a pipe outlet at the bottom.

EASEMENT - A right afforded a person to make limited use of another's real property. Typical easements are for pipes or access to ponds, and may be 15 to 20 feet wide.

EMERGENCY OVERFLOW OR SPILLWAY - An area on the top edge of the pond that is slightly lower in elevation than areas around it. This area is normally lined with riprap. The emergency overflow is used only if the primary and secondary outlets of the pond fail, in the event of extreme storms, or if the infiltration capability of the pond becomes significantly diminished. If the emergency overflow ever comes into play, it may indicate the pond needs to be upgraded.

ENERGY DISSIPATER - A rock pad at an outlet designed to slow the velocity, spread out the water leaving the pipe or channel, and reduce the potential for erosion.

FREEBOARD - The vertical distance between the design high water mark and the elevation of the top of the pond. Most ponds have one to two feet of freeboard to prevent them from overflowing.

INFILTRATION - The soaking of water through the soil surface into the ground (percolation is essentially the same thing). Many ponds are designed to infiltrate or retain stormwater, and thus do not have a regularly used discharge pipe.

INFILTRATION FACILITY (OR STRUCTURE) - A facility (pond or trench) which retains and percolates stormwater into the ground, having no discharge (to any surface water) under normal operating conditions.

JUNCTION - Point where two or more drainage pipes or channels converge (e.g., a manhole).

JURISDICTION - Olympia, Lacey, Tumwater, or Thurston County (as applicable).

LINED POND OR CONVEYANCE - A facility, the bottom and sides of which have been made impervious (using, for example, a plastic liner or clay/silt soil layer) to the transmission of liquids.

LIVE STORAGE - The volume of storage in a pond above the outlet which drains after a storm event. This storage area provides flood control and habitat protection for nearby streams.

MANHOLE - A larger version of a catch basin, often round, with a solid lid. Manholes allow access to underground stormwater pipes for maintenance.

NATURAL CHANNEL - Stream, creek, river, lake, wetland, estuary, gully, swale, ravine, or any open conduit where water will concentrate and flow intermittently or continuously.

OIL-WATER SEPARATOR - A structure or device used to remove oil and greasy solids from water. They operate by using gravity separation of liquids that have different densities. Many catch basins have a downturned elbow that provides some oil-water separation.

OUTFALL - The point where water flows from a man-made conduit, channel, or drain into a water body or other natural drainage feature.

RETENTION FACILITY - An infiltration facility.

RETENTION POND - A retention facility that is an open pond.

REVETMENTS - Materials such as rock or keystones used to sustain an embankment, such as in a retaining wall.

RIP RAP - Broken rock, cobbles, or boulders placed on earth surfaces, such as on top of a berm for the emergency overflow, along steep slopes, or at the outlet of a pipe, for protection against the action of water. Also used for entrances to construction sites.

RUNOFF - Stormwater.

SAND FILTER - A treatment facility that removes sediment and pollutants from stormwater by percolating water through a layer of sand. Clean water exits the bottom of the facility through a pipe, while stormwater flows in excess of the facility design overflow the sand bed and bypass the facility.

STORMWATER - That portion of precipitation that falls on property and that does not naturally percolate into the ground or evaporate, but flows via overland flow, channels or pipes into a defined surface water channel, or a constructed infiltration facility.

Stormwater includes washdown water and other wastewater that enters the drainage system.

SWALE - A shallow drainage conveyance with relatively gentle side slopes, generally with flow depths less than one foot. This term is used interchangeably with "BIOFILTER".

TRASH RACK OR BAR SCREEN - A device (usually a screen or bars) that fits over a pipe opening to prevent large debris such as rocks or branches from entering and partially blocking the pipe.

WET POND - A stormwater treatment pond designed with a dead storage area to maintain a continuous or seasonal static water level below the pond outlet elevation.

EXHIBIT B

Stormwater Maintenance Plan

STORMWATER MAINTENANCE PLAN

PLAT OF BAY HILL
AUGUST 5, 2005

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Return to:
City of Olympia
PO Box 1967
Olympia, WA 98507

RESIDENTIAL
AGREEMENT TO MAINTAIN
STORMWATER FACILITIES AND TO IMPLEMENT A
POLLUTION SOURCE CONTROL PLAN
BY AND BETWEEN
CITY OF OLYMPIA (HEREINAFTER "JURISDICTION")
AND
Bay Hill Partner, LLC
ITS HEIRS, SUCCESSORS, OR ASSIGNS
(HEREINAFTER "OWNERS")

GRANTOR: Bay Hill Partner, LLC

GRANTEE: Olympia, City of

LEGAL DESCRIPTION: SW Quarter of NE Quarter of Sec. 17, Township18N, Range 2W, W.M.

ASSESSOR'S TAX PARCEL NO.: 12817120500, 12817130000, 12817120400

The upkeep and maintenance of stormwater facilities and the implementation of pollution source control best management practices (BMPs) is essential to the protection of water resources. All property owners are expected to conduct business in a manner that promotes environmental protection. This Agreement contains specific provisions with respect to maintenance of stormwater facilities and use of pollution source control BMPs.

LEGAL DESCRIPTION:

PARCELS A, B, AND C OF BOUNDARY LINE ADJUSTMENT NO. BLA-17290I RECORDED UNDER AUDITOR'S FILE NO. 3337456, IN THURSTON COUNTY, WASHINGTON

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12/28/2005 03:01P
HATTON GODAT PANTIER, I COV $131.00 Thurston Co. Wa.

Whereas, the OWNERS have constructed improvements, including but not limited to, buildings, pavement, and stormwater facilities on the property described above. In order to further the goals of the Jurisdiction to ensure the protection and enhancement of Jurisdiction's water resources, the Jurisdiction and OWNERS hereby enter into this Agreement. The responsibilities of each party to this Agreement are identified below.

OWNERS SHALL:

(1) Implement the stormwater facility maintenance program included herein as Attachment "A."

(2) Implement the pollution source control program included herein as Attachment "B".

(3) Maintain a record (in the form of a log book) of steps taken to implement the programs referenced in (1) and (2) above. The log book shall be available for inspection by Jurisdiction staff at 8905 SW Nimbus Ave. Ste 400, Beaverton, OR 97008-7164 during normal business hours. The log book shall catalog the action taken, who took it, when it was done, how it was done, and any problems encountered or follow-on actions recommended. Maintenance items ("problems") listed in Attachment "A" shall be inspected on a monthly or more frequent basis as necessary. OWNERS are encouraged to photocopy the individual checklists in Attachment "A" and use them to complete its monthly inspections. These completed checklists would then, in combination, comprise the monthly log book.

(4) Submit an annual report to the Jurisdiction regarding implementation of the programs referenced in (1) and (2) above. The report must be submitted on or before May 15 of each calendar year and shall contain, at a minimum, the following:

   (a) Name, address, and telephone number of the business, the person, or the firm responsible for plan implementation, and the person completing the report.

   (b) Time period covered by the report.

   (c) A chronological summary of activities conducted to implement the programs referenced in (1) and (2) above. A photocopy of the applicable sections of the log book, with any additional explanation needed, shall normally suffice. For any activities conducted by paid parties not affiliated with OWNERS, include a copy of the invoice for services.

   (d) An outline of planned activities for the next year.

THE JURISDICTION SHALL:

(1) Provide technical assistance to OWNERS in support of its operation and maintenance activities conducted pursuant to its maintenance and source control programs. Said assistance shall be provided upon request and as Jurisdiction time and resources permit, at no charge to OWNERS.

(2) Review the annual report and conduct a minimum of one (1) site visit per year to discuss performance and problems with OWNERS.

(3) Review this agreement with OWNERS and modify it as necessary at least once every three (3) years.

REMEDIES:

(1) If the Jurisdiction determines that maintenance or repair work is required to be done to the stormwater facility existing on the OWNERS property, the Jurisdiction shall give the owner of the property within which the drainage facility is located, and the person or agent in control of said property, notice of the specific maintenance and/or repair required. The Jurisdiction shall set a reasonable time in which such work is to be completed by the persons who were given notice. If the above required maintenance and/or repair is not completed within the time set by the Jurisdiction, written notice will be sent to the persons who were given notice stating the Jurisdiction's intention to perform such maintenance and bill the owner for all incurred expenses. The Jurisdiction may also revoke stormwater utility rate credits for the quality component or invoke surcharges to the quantity component of the OWNERS bill if required maintenance is not performed.

(2) If at any time the Jurisdiction determines that the existing system creates any imminent threat to public health or welfare, the Jurisdiction may take immediate measures to remedy said threat. No notice to the persons listed in (1), above, shall be required under such circumstances.

(3) The owner grants unrestricted authority to the Jurisdiction for access to any and all stormwater system features for the purpose of performing maintenance or repair as may become necessary under Remedies (1) and/or (2).

(4) The persons listed in (1), above, shall assume responsibility for the cost of any maintenance and for repairs to the stormwater facility. Such responsibility shall include reimbursement to the Jurisdiction within 30 days of the receipt of the invoice for any such work performed. Overdue payments will require payment of interest at the current legal rate for liquidated judgments. If legal action ensues, any costs or fees incurred by the Jurisdiction will be borne by the parties responsible for said reimbursements.

(5) The owner hereby grants to the Jurisdiction a lien against the above-described property in an amount equal to the cost incurred by the Jurisdiction to perform the maintenance or repair work described herein.

This Agreement is intended to protect the value and desirability of the real property described above and to benefit all the citizens of the Jurisdiction. It shall run with the land and be binding on all parties having or acquiring from OWNERS or their successors any right, title, or interest in the property, or any part thereof, as well as their title, or interest in the property or any part thereof, as well as their heirs, successors, and assigns. They shall inure to the benefit of each present or future successor in interest of said property or any part thereof, or interest therein, and to the benefit of all citizens of the Jurisdiction.

Owner

George Robertson for
Owner Mark Rockwell

STATE OF WASHINGTON)
) ss
COUNTY OF THURSTON)

On this day and year above personally appeared before me, _____ _____and _____ known to be the individual(s) described, and who executed the foregoing instrument and acknowledge that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

Given under my hand and official seal this _____ day of _____, 2005.

_____
Notary Public in and for the State of Washington, residing in _____
My commission expires _____

Dated at _____, Washington, this _____ day of _____, 2005.

_____
City of Olympia

STATE OF ~~WASHINGTON~~ OREGON)
) ss
COUNTY OF ~~THURSTON~~ WASHINGTON)

On this day and year above personally appeared before me, _____ George Robertson who executed the foregoing instrument and acknowledge the said instrument to be the free and voluntary act and deed of said Municipal Corporation for the uses and purposes therein mentioned and on oath states he is authorized to execute the said instrument.

Given under my hand and official seal this 5th day of August, 2005.

Mark A. Thomas
Notary Public in and for the State of Oregon, ~~Washington~~, residing in Beaverton, Oregon
My commission expires Nov. 4, 2007

APPROVED AS TO FORM:

_____

OFFICIAL SEAL
MARK A THOMAS
NOTARY PUBLIC - OREGON
COMMISSION NO. 374445
MY COMMISSION EXPIRES NOVEMBER 4, 2007

ATTACHMENT "A" STORMWATER FACILITY MAINTENANCE GUIDE

II. STORMWATER FACILITY MAINTENANCE GUIDE

INTRODUCTION

What is Stormwater Runoff?

When urban and suburban development covers the land with buildings, streets and parking lots, much of the native topsoil, duff, trees, shrubs and grass are replaced by asphalt and concrete. Rainfall that would have soaked directly into the ground instead stays on the surface as *stormwater runoff* making its way into storm drains (including man-made pipes, ditches, or swale networks), stormwater ponds, surface and groundwater, and eventually to Puget Sound.

What is a Storm Drain System and how does it work?

The storm drain system for most developments includes measures to *carry, store, cleanse, and release* the stormwater. Components work together to reduce the impacts of development on the environment. Impacts can include *flooding* which results in property damage and blocked emergency routes, *erosion* which can cause damage to salmon spawning habitat, and *pollution* which harms fish and/or drinking water supplies.

The storm drain system provides a safe method to carry stormwater to the treatment and storage area. Swales and ponds filter pollutants from the stormwater by *physically* settling out particles, *chemically* binding pollutants to pond sediments, and *biologically* converting pollutants to less harmful compounds. Ponds also store treated water, releasing it gradually to a nearby stream or to groundwater.

What does Stormwater Runoff have to do with Water Quality?

Stormwater runoff must be treated because it carries litter, oil, gasoline, fertilizers, pesticides, pet wastes, sediments, and anything else that can float, dissolve or be swept along by moving water. Left untreated, polluted stormwater can reach nearby waterways where it can harm and even kill aquatic life. It can also pollute groundwater to the extent that it requires treatment before it is suitable for drinking. Nationally, stormwater is recognized as a major threat to water quality. Remember to keep everything out of stormwater systems except the rainwater they are designed to collect.

Your Stormwater Facility

Different types of ponds are designed for different purposes. For example, wet ponds primarily provide treatment of stormwater. Dry ponds or infiltration ponds are designed to provide storage for stormwater and allow for its gradual release downstream or into the ground.

Who is Responsible for Maintaining Stormwater Facilities?

All stormwater facilities require maintenance. Regular maintenance ensures proper functioning and preserves visual appeal. This Stormwater Facility Maintenance Guide was designed to explain how stormwater facilities work and provide user-friendly, straightforward guidance on facility maintenance.

You are responsible for regularly maintaining privately owned ponds, catch basins, pipes and other drainage facilities on your property. Stormwater facilities located in public rights-of-way are maintained by local governments.

How to Use the Stormwater Facility Maintenance Guide

This Maintenance Guide includes a Site Plan specific to your development and a Facility Key that identifies the private stormwater facilities you are responsible for maintaining. A "Quick List" of maintenance activities has also been included to help you identify the more routine needs of your facility.

Included in This Guide

- Comprehensive Maintenance Checklists that provide specific details on required maintenance
- Pollution Prevention Tips that list ways to protect water quality and keep storm drain systems functioning smoothly
- Resources to provide more information and technical assistance

A Regional Approach to Stormwater Management

The Cities of Lacey, Olympia and Tumwater together with Thurston County are taking steps to educate and involve area residents in water quality issues and stormwater management. Stormwater runoff is a widespread cause of water quality impairment and stream degradation. The jurisdictions are working together with residents, businesses, community groups and schools to address this problem. This guide focuses on providing information on ways that you can reduce stormwater impacts through pollution prevention and proper facility maintenance.

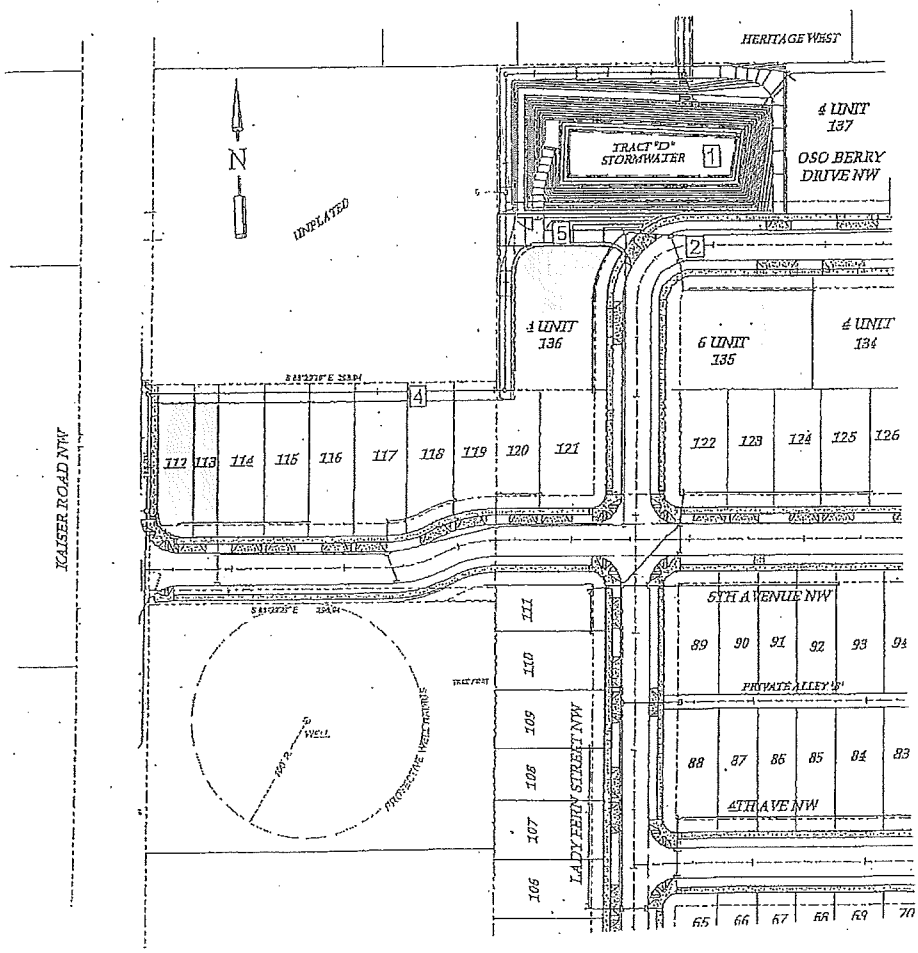
YOUR STORMWATER FACILITIES

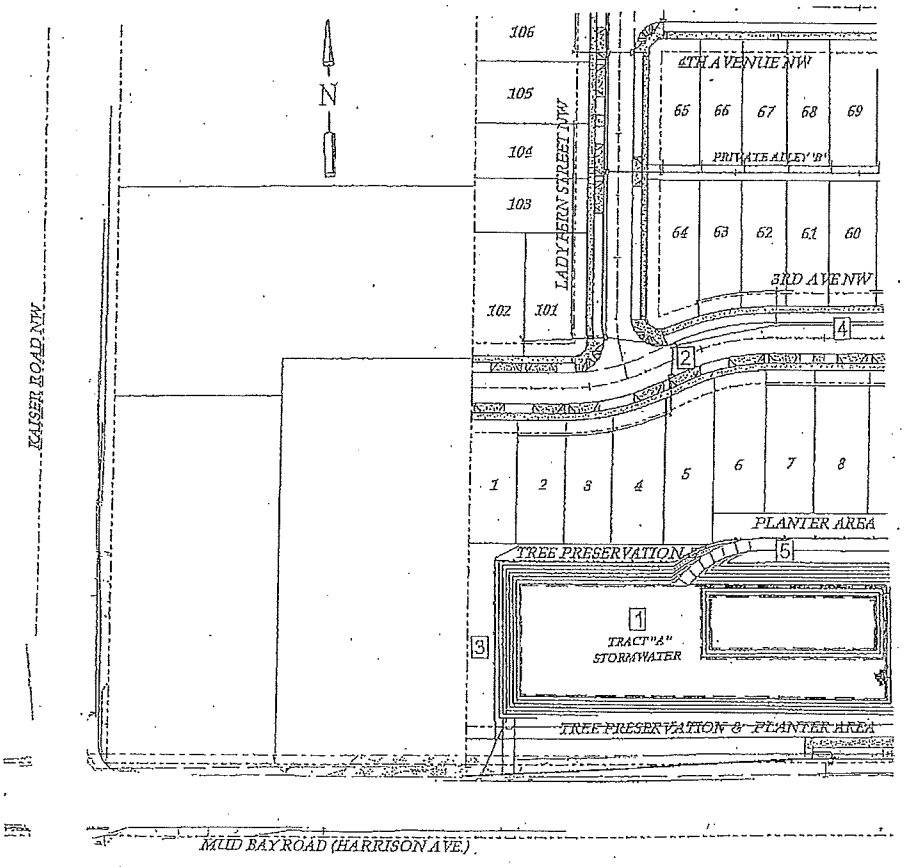
This section consists of two parts that are to be used together: the ***Facility Key*** and the ***Site Plan***. Review the site plan and identify the numbers denoting a feature of the system. Then check the facility key for the feature type and checklist name.

FACILITY KEY

The stormwater facility in your neighborhood is comprised of the following elements:

Type of Feature & Checklist Name	Location on Site Plan
Pond	1
Catch Basins, Manholes, and Inlets	2
Fencing, Shrubbery Screens, and Gates	3
Conveyance Pipes, Ditches, and Swales	4
Access Roads and Easements	5





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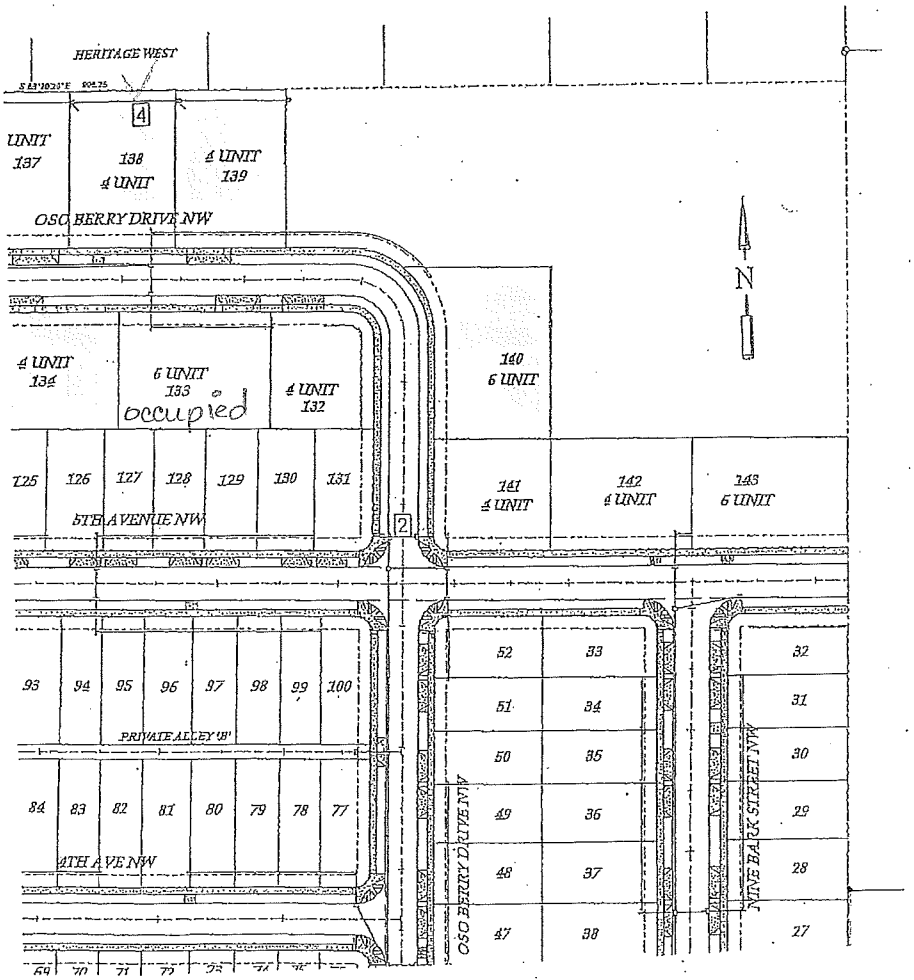

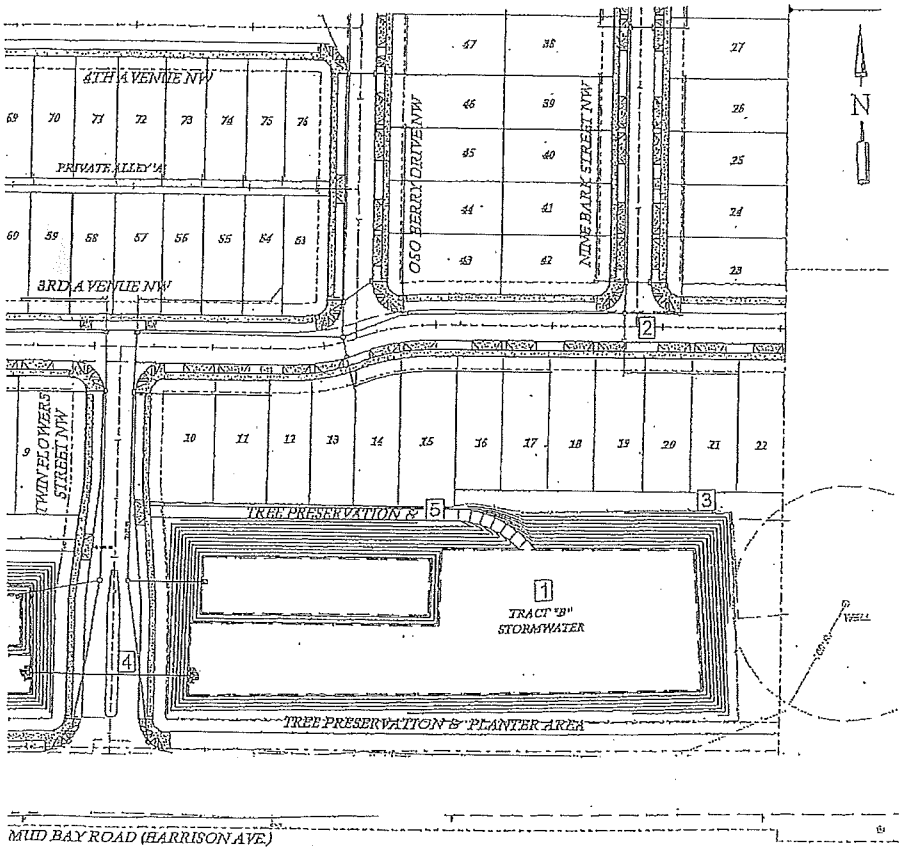

QUICK LIST

The following is an abbreviated checklist of the most common types of maintenance required. Please go over this checklist after heavy rains. The list represents minimum maintenance to be performed and should be completed in conjunction with the other checklists for an effective maintenance program.

- ☐ Inspect catch basin grates to see that they are not clogged or broken. Remove twigs, leaves, or other blockages. Contact the local jurisdiction to replace the grate if it is broken.
- ☐ Inspect inlet and outlet pipes for blockages. Clear all blockages.
- ☐ Inspect filter strip, swale and pond walls for erosion or caved in areas.
- ☐ Inspect riprap (rocks) at the inlets and outlets of culverts and other pipes. If they are silted in or eroded away, replace them.

MAINTENANCE CHECKLISTS

The Maintenance Checklists in this packet are for your use when inspecting the stormwater facilities on your property. This packet has been customized so that only the checklists for your facilities are included. If you feel you are missing a checklist, or you have additional facilities not identified or addressed in this packet, please contact your local jurisdiction.

The checklists are in tabular format for ease of use. Each describes the area to inspect, inspection frequency, what to look for, and what action to take. A log sheet is included toward the end of the chapter to help you track maintenance of your storm drainage system.

Although it is not intended for the maintenance survey to involve anything too difficult or strenuous, there are a few tools that will make the job easier and safer including:

- A flashlight
- A long pole or broom handle
- Some kind of pry bar or lifting tool for pulling manhole and grate covers
- Gloves

A resource list is included in the next chapter. Here you will find the phone numbers of the agencies referred to in the tables, as well as the contractors and consultants who designed and constructed your facilities.

SAFETY WARNING: In keeping with OSHA regulations, you should never stick your head or any part of your body into a manhole or other type of confined space. When looking into a manhole or catch basin, stand above it and use the flashlight to help you see. Use a long pole or broom handle to check sediment depths in confined spaces. *NO PART OF YOUR BODY SHOULD BREAK THE PLANE OF THE OPEN HOLE.*

Ponds

There are essentially three kinds of ponds: treatment ponds, infiltration ponds, and detention ponds. Although each pond has unique maintenance requirements, there are also many things they have in common. Your facility is a treatment and detention pond.

INSPECTION AREA	FREQUENCY	LOOK FOR	ACTION
Entire Pond	Quarterly	Yard waste such as grass clippings and branches in basin; presence of glass, plastic, metal, foam, or coated paper.	Remove trash and debris and dispose of properly.
Entire Pond	Quarterly	Vegetation that may constitute a public hazard, e.g., tansy ragwort, poison oak, stinging nettles, devilsclub.	Remove invasive or noxious vegetation. Do not spray chemicals on vegetation without obtaining guidance from WSU Cooperative Extension and approval from City or County.
Entire Pond	Quarterly	Presence of chemicals such as natural gas, oil, and gasoline, noxious odor, or sludge.	First, attempt to locate source of pollution; then call Moderate Risk Waste program at Thurston County Environmental Health to report the hazard.
Entire Pond	Quarterly	Sparse, weedy, or overgrown grass in grassy (dry/infiltration) ponds; presence of invasive species or sparse growth of plants in wet ponds.	Grassy ponds: selectively thatch, aerate, and re-seed ponds. Grass should be kept less than 8 inches high. Wet ponds: hand-plant nursery-grown wetland plants in bare areas. Contact WSU Cooperative Extension for guidance on invasive species. Pond bottoms should have uniform dense coverage of desired plant species.
Entire Pond	Quarterly	Evidence of rodent holes if facility is a dam or berm. Water should not flow through rodent holes.	Destroy rodents and repair dam or berm. Contact Thurston County Health Department for guidance.
Entire Pond	Quarterly	Nuisance insects such as wasps, hornets or mosquitoes that may interfere with maintenance	Destroy or remove insects. Contact WSU Cooperative Extension for guidance.
Entire Pond	Annually	Confirmation that trees are not interfering with maintenance (i.e., mowing, silt removal, or access.)	Prune tree limbs to allow for maintenance. Some trees may be cut.
Inlet	Annually	Confirmation that the riprap under the inlet pipe is intact and that no native soil is exposed. Also, look for accumulations of sediment greater than half the height of the rocks.	Replace rocks and/or remove sediment.
Outlet	Quarterly	A free-flowing overflow that is clear of debris.	Replace riprap if missing. Remove trash or debris and dispose of properly.
Side Slopes	Annually	Signs of erosion around inlets and outlets. Inspect berms for signs of sliding or settling. Take action if eroded damage is over 2 inches deep and where there is potential for continued erosion.	Attempt to determine the cause of erosion and repair it. Stabilize slopes by reinforcing with rock, planting grass, or compacting soil. Contact WSU Cooperative Extension for guidance on slope reinforcement.
Storage Area	Annually	Sediment build-up on pond bottom. A buried or partially buried outlet structure or very slow infiltration rate may indicate significant sediment deposits.	Remove the sediment and re-seed the pond if necessary to improve infiltration and control erosion.
Dikes	Annually	Significant settling of any part of dike.	Build dike back to the original elevation.
Emergency Overflow/ Spillway	Annually	Intact riprap protective area. Repair if any native soil is exposed.	Replace rocks so all native soil is covered.
Trench Drain	Quarterly	Confirmation that the grate is clear of debris and that the drain is not plugged.	Remove debris from grate, clean drain.

Catch Basins and Inlets

These structures are typically located in the streets and public rights-of-way. Local jurisdictions are responsible for routine maintenance of the pipes and catch basins in rights-of-way, while you are responsible for keeping the grates clear of debris in all areas as well as pipes and catch basins in private areas.

INPSECTION AREA	FREQENCY	LOOK FOR	ACTION
Catch basin opening	During and after major storms	Accumulation of trash or debris in front of catch basin opening that prevents water from flowing in	Remove blocking trash or debris with a rake and clean off the grate.
Catch basin	Quarterly	Sediment or debris in the basin. No more than half the depth from the bottom of the pipe to the bottom of the basin should be allowed to accumulate. Use a long stick or broom handle to poke into sediment and determine depth.	Remove debris from catch basin.
Inlet and outlet pipes	Quarterly	Trash or debris in the pipes that has exceeded 1/5 of their height. Ensure there are not tree roots or other vegetation growing in the pipes.	Remove trash or debris from inlet and outlet pipes.
Inlet and outlet pipe joints	Annually	Cracks wider than ½ inch and longer than 12-inches at the joint of any inlet or outlet pipe. Also check for evidence of sediment entering the catch basin through cracks.	Repair cracks or replace the joints.
Grate	Quarterly	Cracks longer than 2 inches or multiple cracks.	Replace grate if necessary.
Frame	Quarterly	Confirmation that the frame is sitting flush on top of the concrete structure (slab). A separation of more than ¾ inch between the frame and the slab should be corrected.	Repair or replace the frame so it is flush with the slab.
Catch basin	Annually	Cracks wider than ½ inch and longer than 3 feet. Also check for any evidence of sediment entering the catch basin through cracks. Determine whether or not the structure is sound.	Replace or repair the basin. Contact a professional engineer for evaluation.
Catch basin	Quarterly	Chemicals such as natural gas, oil, and gasoline have may have entered the catch basin. Check for noxious odor or oily sludge.	Clean out catch basin. Contact your local jurisdiction or Thurston County Environmental Health if you detect a color, odor, or oily sludge.
Oil / water separator (downturned elbow or "T" in catch basin)	Quarterly	Significant sludge, oil, grease, or scum layer covering all or most of the water surface.	Remove the catch basin lid and skim off oil layer. Pour oil into a disposable container, seal container, wrap securely in newspaper, and place in trash. Water surface should be clear of oily layer.
Pipe elbow	Quarterly	Damage to top or bottom of pipe; determine whether pipe is plumb.	If pipe is broken, replace pipe in accordance with approved plans on file with your local jurisdiction.

Fencing, Shrubbery Screens, and Gates

Fences and shrubbery screens aren't typically required for stormwater ponds. If the slopes of the sides are too steep, usually some kind of barricade is constructed.

INSPECTION AREA	FREQUENCY	LOOK FOR	ACTION
Fence or shrubbery screen	Quarterly	Inspect the fence or screen to ensure that it blocks easy entry to the facility. Make sure erosion hasn't created an opening under fence.	Mend the fence, repair erosion, or replace the shrubs to form a solid barrier.
Shrubbery screen	Quarterly	Confirm that shrubbery is not growing out-of-control or that it is not infested with weeds.	Trim and weed shrubbery to provide appealing aesthetics. Do not use chemicals to control weeds.
Wire Fences	Annually	Confirmation that fence is still in alignment.	Straighten posts and rails if necessary.
Wire Fences	Annually	Missing or loose tension wire.	Replace or repair tension wire so it holds fabric.
Wire Fences	Annually	Missing, loose, or sagging barbed wire.	Replace or repair barbed wire so that it doesn't sag between posts.
Wire Fences	Annually	Rust or scaling	Paint or coat rusting or scaling parts with a protective coating.
Wire Fences	Quarterly	Confirm that there are no holes in the fabric or fencing.	Repair holes so that there are no openings in the fabric or fencing.
Gate	Quarterly	Confirm that the gate is not broken, jammed, or missing and that it opens easily.	Repair or replace the gate to allow entry of maintenance people and equipment. If a lock is used, make sure you have a key.

Conveyance Pipes, Ditches, and Swales

INSPECTION AREA	FREQUENCY	LOOK FOR	ACTION
Pipes	Annually	Confirmation that accumulated sediment has not exceeded 20% of the diameter of the pipe and that vegetation has not reduced free movement of water through pipes. Ensure that the protective coating is not damaged and rusted. Dents should not significantly impede flow. Pipe should not have major cracks or tears allowing water to leak out.	Clean pipes of all sediment and debris. Remove all vegetation so that water flows freely through pipes. Repair or replace pipe as necessary.
Open ditches	Quarterly	Yard waste or litter in the ditch.	Remove trash and debris and dispose of properly.
Open ditches	Annually	Confirmation that accumulated sediment has not exceeded 20% of the depth of the ditch.	Clean ditch of all sediment and debris.
Open ditches & Swales	Annually	Vegetation (e.g., weedy shrubs or saplings) that reduces the free movement of water through ditches or swales.	Clear blocking vegetation so that water flows freely through ditches. Grassy vegetation should be left alone.
Open ditches & Swales	Quarterly	Signs of erosion. Inspect slopes for signs of sloughing or settling. Action is needed where eroded damage is over 2 inches deep and where potential for continued erosion exists.	Eliminate causes of erosion. Stabilize slopes by using appropriate erosion control measures (e.g., reinforce with rock, plant grass, compact soil.)
Open ditches & Swales	Annually	Adequate rock placement in splash pad, check dam or lining. Native soil should not be visible.	Replace rocks to design standard.
Swales	Quarterly	Adequate grass coverage. Take action if coverage is sparse and weedy, or areas are overgrown with woody vegetation.	Aerate soils, reseed and mulch bare areas. Keep grass less than 8 inches high. Remove woody growth, regrade, and reseed as necessary.
Swales	Quarterly	Confirmation that swale has not been filled in or blocked by structures, shrubbery, etc.	If possible, speak with homeowner and request that the swale area be restored.
Swales	Annually	Standing water in swale or very slow flow velocity. Stagnation.	A survey may be needed to verify grades. Grades should be between 1-5%.

Access Roads and Easements

INSPECTION AREA	FREQUENCY	LOOK FOR	ACTION
General	One Time	Adequate access to your stormwater facilities for maintenance vehicles.	If there is not enough access, check with your local jurisdiction to determine whether an easement exists. If so, a maintenance road may need to be constructed.
Access road	Quarterly	Debris that could damage vehicle tires (glass or metal).	Clear all potentially damaging debris.
Access road	Annually	Any obstructions that reduce clearance above and along the road to less than 14 feet.	Clear along and over roadway so there is enough clearance.
Road surface	Annually	Potholes, ruts, mushy spots, or woody debris that limit access by maintenance vehicles.	Add gravel or remove wood as necessary.
Shoulders and ditches	Annually	Erosion along the roadway.	Repair erosion with additional soil or gravel.

RESOURCE LISTING

If you suspect a problem exists, please contact your local jurisdiction at one of the numbers below and ask for Technical Assistance.

Contact Numbers:

Olympia Sewer & Stormwater Engineering	(360) 753-8768
Thurston County (Storm & Surface Water)	(360) 754-4681
WSU Cooperative Extension	(360) 786-5445

Developer Information:

Bay Hill Partner, LLC
8905 Nimbus Avenue SW
Suite 400
Beaverton, OR 97008-7164
(503) 607-5439

Engineer's Information:

HATTON GODAT PANTIER
1840 Barnes Blvd SW
Tumwater, WA 98512
(360) 943-1599

LOG SHEET

Use log sheets to track maintenance checks and what items, if any, are repaired or altered. The completed sheets will serve as a record of maintenance activity and will provide valuable information about how your facilities are operating. Log sheets should be kept in a dry, readily accessible place.

INSPECTION DATE: _____

PERFORMED BY: _____

PHONE NUMBER: _____ ADDRESS: _____

POSITION ON HOA: _____ CITY, ST, ZIP: _____

PART OF FACILITY INSPECTED	OBSERVATIONS (LIST REQUIRED MAINTENANCE ACTIVITIES)	ACTION TAKEN	DATE OF ACTION

ATTACHMENT "B" POLLUTION SOURCE CONTROL PROGRAM

III. POLLUTION SOURCE CONTROL PROGRAM

Purpose

Many products and practices commonly used in and around the home are hazardous to both the environment and us. Many of these products can end up in our stormwater systems and groundwater. This document gives alternatives, where possible, for those types of products and practices. The Best Management Practices (BMPs) described here, include "good housekeeping" practices that everyone can use.

Recommended Pollution Control Practices For Homeowners

It has been said that the average home today contains more chemicals than the average chemical lab of 100 years ago. When many of these chemicals are used industrially, they can be subject to various health and safety standards; yet these same substances are used freely and often carelessly in our homes.
The BMPs in this section are divided into four categories: **Household Hazardous Wastes, Pesticides, Remodeling,** and **Septic Maintenance.** Each section includes information on available alternatives.

Household Hazardous Wastes

Many of the cleaning agents, solvents, polishes, etc. commonly used in the home are considered hazardous. These products may be toxic, corrosive, reactive, flammable, and/or carcinogenic. It is critical that these products are handled with care and are properly disposed of. A list of common household hazardous materials is presented in Table 1.
In addition, many hazardous household chemicals persist for long periods of time in the environment. Manufacturers may truthfully state that a product is "biodegradable"; most products are biodegradable, but what is important is the rate at which they are broken down and the products they are broken down into. The term "biodegradable" on its own is misleading at best, unless the product is rapidly degraded into harmless substances.
It is important to note here that the term "biodegradable" currently has no legal definition in this state. This means that any product can use this term according to the manufacturer's own definition. This definition may not be at all similar to the consumer's perception. The following ideas will help you reduce the risks of stormwater and ground water contamination from many household products:

Household Product Management:

1. Read product labels before purchasing. Toxic product labels will carry many warnings. Either bypass such products or purchase in small quantities. If you cannot use the entire product, try to give it away instead of disposing of it. Thurston County periodically facilitates product exchanges for leftover paints and other hazardous wastes. Call the Thurston County Health Department at (360) 754-4111 for more information.
2. Buy only those detergents that contain little or no phosphorus. Phosphorus can cause algae blooms if washed into lakes or streams. Most detergents that are low or phosphate free are labeled as such.
3. Use no more than the manufacturer's suggested amount of any cleanser. More is not necessarily better.

4. Products such as oven cleanser, floor wax, furniture polish, drain cleaners, and spot removers often contain toxic chemicals. Buy the least toxic product available or use a non-toxic substitute if one can be found. For example, ovens can be cleaned by applying table salt to spills, then scrubbing with a solution of baking soda and water. Table 2 lists substitutes for many commonly used household products.

   If it is necessary to use a product that contains toxic chemicals, use the product only as directed. Do not combine products, as they may become more dangerous when mixed (e.g., mixing chlorine bleach and ammonia produces dangerous gases). Use eye protection and rubber gloves as appropriate.

   Contact the Hazardous Substance Hotline at 1-800-633-7585 if you have any questions regarding disposal of a product or empty container. The County has both hazardous waste collection days and permanent facilities where residents can bring hazardous wastes. Call the Thurston County Health Department at (360) 754-4111 for more information.

5. Chemicals left over from activities, such as photography and auto repair, are hazardous and should not be flushed down the sink. This is especially important if your home is hooked up to a septic system. Toxic chemicals can kill the beneficial bacteria in the tank used to treat sewage and can pollute water supply wells.

6. Be sure all containers are clearly labeled.

7. Common batteries (not automobile) are one of the largest sources of heavy metals (such as lead, nickel, cadmium, and mercury) found in landfills. Instead of throwing them away, dispose of them at a hazardous waste collection site.

Automotive Usage, Care and Maintenance:

From a waste management standpoint, automobile maintenance is best done by professionals at facilities designed to handle, store, and dispose of the waste products properly. Many of these facilities do an excellent job of dealing with waste oils, antifreezes, other fluids, batteries and tires. They often charge a small fee to cover the added expenses, but it's worth it. However if you repair your car at home, please consider these helpful tips:

1. Cars should be serviced regularly. Leaky lines or valves should be replaced.

2. Dumping oil, degreasers, antifreeze, and other automotive liquids into a stream or a storm drain violates city, county and state laws or ordinances. Do not dump them onto the ground because they will end up in stormwater runoff or in groundwater. Do not use oil to reduce dust levels on unpaved areas. Instead, recycle used oil and antifreeze. Keep them in separate containers. Call the Recycling Hotline at 1-800-RECYCLE or call the Thurston County Health Department for the location of the nearest recycling center or, inquire whether your local automotive service center recycles oil. Some may also take used oil filters.

3. Wrap empty oil or antifreeze containers in several layers of newspaper, tie securely and place in a covered trashcan. Antifreeze is sweet tasting, but poisonous to people, fish, pets and wildlife.

4. Sweep your driveway instead of hosing it down. Fluids and heavy metals associated with automobiles can build up on driveway surfaces and be washed into local surface or groundwater when driveways are hosed down.

5. When washing vehicles, do so over your lawn or where you can direct soapsuds onto the lawn or another vegetated area to keep the soaps from washing into the storm drain system or local surface water. Your stormwater pond cannot cleanse soapy water.

6. Small spills of oil and other fluids can be absorbed with materials such as kitty litter or sawdust. Wrap the used absorbent and any contaminated soil in a plastic bag and place in the garbage.

   If a spill reaches surface water, you must notify the nearest regional office of the Department of Ecology Immediately! The Southwest Regional Office number is (360) 407-6300 or call 911. There are fines for failure to notify the appropriate agency when a spill occurs.

7. De-icing chemicals (various types of salt) can harm concrete less than three years in age, burn vegetation, and be corrosive to cars and other metal objects. De-icing chemicals and their additives can be toxic. (Cyanide is formed from the breakdown of a common anti-caking agent used in de-icing chemicals.)

   Urea salts are an alternative to other types of salt de-icers, but great care must be used in applying them. These salts contain large quantities of nitrogen, which can severely burn plants and encourage algae growth if over-applied.

   The use of these chemicals should be minimized or avoided. Instead, shovel walks clear and apply a dusting of sand to improve footing.

TABLE 1. HAZARDOUS HOUSEHOLD SUBSTANCES LIST

AUTO BOAT AND EQUIPMENT MAINTENANCE	REPAIR AND REMODELING	CLEANSING AGENTS
Batteries	Adhesives, glues, cements	Oven cleaners
Waxes and cleansers	Roof coatings, sealants	Degreasers and spot removers
Paints, solvents and thinners	Caulking and sealants	Toilet, drain and septic tank cleaners
Additives	Epoxy resins	Polishes, waxes and strippers
Gasoline	Solvent-based paints	Deck, patio and chimney cleaners
Flushes	Solvents and thinners	Solvent cleaning fluids
Auto repair materials	Paint removers and strippers	
Motor oil		
Diesel oil		
Antifreeze		

PESTICIDES	HOBBY AND RECREATION	MISCELLANEOUS
Insecticides	Paints, thinners and solvents	Ammunition
Fungicides	Chemicals (photo and pool)	Asbestos
Rodenticides	Glues and cements	Fireworks
Molluscicides	Inks and dyes	
Wood preservatives	Glazes	
Moss retardants	Chemistry sets	
Herbicides	Bottled gas	
Fertilizers	White gas	
	Charcoal starter fluid	

Source: Guidelines for Local Hazardous Waste Planning, Ecology, No. 87-18 1987.

TABLE 2. NON- OR LESS TOXIC ALTERNATIVES TO TOXIC PRODUCTS

HAZARDOUS PRODUCT	ALTERNATIVE(S)
Air fresheners	Set out a dish of vinegar; simmer a potpourri of cinnamon and cloves; set out herbal bouquets or potpourri in open dishes; burn scented candles
Bleach	Borax or oxygen bleaches or reduce bleach by ½ and add ¼ - ½ C baking soda; line dry clothes
Brass polish	Worcestershire sauce
Chrome polish	Apple cider vinegar; a paste of baking soda and water; a lemon
Coffee pot cleaner	Vinegar; remove coffee stains with moist salt paste
Copper cleaner	Mixture of lemon juice and salt or tomato catsup
Drain cleaner	Use a plunger followed by ½ C baking soda mixed in ½ C vinegar. Let sit 15 minutes, pour into drain followed by 2 qt. boiling water.
Furniture polish	Linseed, olive or almond oils; a mixture of 3 parts olive oil to 1 part white vinegar; a mixture of 1T lemon oil and 1 pint mineral oil
Garbage disposal deodorizer	Lemon rind or baking soda
Glass cleaner	Mixture of 2T vinegar and 1quart water
Grease remover	Paste of borax and water on damp cloth
Ink stain remover	Spray with non-aerosol hairspray before washing
Laundry soap	Borax; baking soda; washing soda
Linoleum floor cleaner	Mixture of 1 C white vinegar and 2 gallons water
Mildew remover	Equal parts vinegar and salt
Mothballs	Cedar chips or blocks; dried tansy, lavender or peppercorns
Oil spills	Kitty litter; sawdust
Oil stain remover	White chalk rubbed into stain prior to washing
Oven cleaner	Cover fresh spills with salt; scrape off after the oven cools. A soda water solution will cut grease. Paint ammonia on spills with a paintbrush, then rinse off.
Paint brush softener	Hot vinegar
Paint stripper	Use mechanical sanding instead of chemical strippers
Paint or grease remover	Wear gloves or try baby oil
Pet odor remover	Cider vinegar
Pitch or sap remover	Butter, margarine or vegetable shortening
Porcelain stain remover	Baking soda
Refrigerator deodorizer	Open box of baking soda
Rug/carpet cleaner	(General) Use a soap-based non-aerosol rug shampoo, vacuum when dry. (Spots) Pour club soda or sprinkle cornmeal or cornstarch on the rug, let sit for at least 30 minutes; vacuum.
Rust remover	Lemon juice and sunlight
Rusty bolt remover	Carbonated beverage
Scorch mark remover	Grated onion
Scouring powder	Baking soda or non-chlorine scouring powder
Silver polish	Soak silver in warm water with 1T soda, 1T salt and a piece of aluminum foil.
Stainless steel polish	Mineral oil
Toilet bowl cleaner	Paste mixture of borax and lemon juice
Tub and tile cleaner	¼ C soda and ½ C white vinegar mixed with warm water
Upholstery spot remover	Club soda
Water mark remover	Toothpaste
Water softener	¼ C vinegar

Pesticides[1] And Fertilizers

Pesticides and fertilizers are commonly used by homeowners in their quest for bigger, healthier plants and greener, lusher lawns. These chemicals are often overused and misapplied. These chemicals are easily introduced into stormwater runoff and can cause algae blooms (fertilizers) or kill off aquatic organisms (pesticides).

Fertilizer Management:

Fertilizing a lawn can be done in an environmentally sensitive manner. Here are some ideas:

1. Before fertilizing, test your soil's pH by using a readily available kit, or through tests provided by WSU Cooperative Extension. Use only the recommended amount of fertilizer, and any soil amendments, such as lime, that are recommended in your test results.
2. Use fertilizers that are appropriate for your area and for the types of plants you are growing. Work the fertilizer into the soil directly around the plant's drip line. By incorporating the fertilizer in the soil, there will be less likelihood of contaminated runoff. Contact the Thurston Conservation District for more information.
3. Water before fertilizing. Water enough to dampen the ground thoroughly, but not enough to cause surface runoff. Dampening the soil prevents fertilizer from being washed from the surface of dry soil in the first rain or watering after application
4. Many soils can benefit from the use of organic fertilizers such as compost or peat. Not only do these substances add nutrients to soil, they also increase the porosity of the soil and increase its ability to hold water.
5. Slow release fertilizers (which are generally resin-coated) can be used in addition to organic fertilizers. They are not mobile in the soil, and are only applied once.

Integrated Pest Management:

Rather than bringing out the sprayer whenever a pest infestation occurs in the garden, consider using Integrated Pest Management (also known as IPM). IPM emphasizes the evaluation of all factors including environmental effects before chemicals are applied. Pesticides should only be used as a last resort. Some of the tactics that can be used to decrease or eliminate the use of pesticides include:

1. Use of Natural Predators, Pathogens: Because chemical sprays generally kill many beneficial insects instead of just the target pest, it may be necessary to introduce natural predators back into the garden. Ladybugs, lacewings, predatory wasps, and nematodes are all commercially available. Garter snakes and toads are also predators and should not be eliminated from the garden.

   There are some bacteria, viruses, and insect parasites that are specific to pests and will not harm other insects or animals. A commonly used bacterium in the Puget Sound area is Bacillus thuringiensis (Bt), which is intended to control infestations of tent caterpillars. Products containing Bt are available at your nursery.

[1] As used here, the word pesticide can mean any herbicide, insecticide, rodenticide, miticide, or other types of chemicals used in the same manner.

2. Habitat Changes: Many times a change of habitat can control pest infestations. Removal of old tires can cut down on the mosquito population by removing a convenient water-filled location for them to breed in. Crop rotation, even in a small garden, can reduce the number of pest infestations. Removing last year's leaves from under rose bushes can cut down on the incidence of mildew and blackspot, as these fungi overwinter in dead leaves.

3. Timing: Crops that can overwinter (such as leeks or carrots) should be planted in the fall. This gives them time to become established before pests arrive in the spring.

4. Mechanical: Many eggs, larvae, cocoons, and adult insects can be removed by hand. Be sure that the insect is properly identified prior to removing it so those beneficial insects are not destroyed in error. Drowning insects in plain water or spraying them with soapy water are alternatives to squashing them.

5. Resistant Plants: Plants that are native to this area are often more resistant to pests and climate, etc. than are introduced plants. Many plant cultivars have been developed which are resistant to such diseases as verticillium wilt and peach leaf curl. Grass seed mixes are also available for lawns that need much less watering, mowing, and chemical use.

6. Growing Conditions: Plants, such as hostas, that require some shade are more susceptible to pests when they are growing in the sun. Improperly fertilized or watered plants are less vigorous in growth and tend to attract pests. Plants that prefer an acid soil, such as azaleas, will perform better and be less susceptible to pests when they are grown in soil with the proper pH.

7. Chemicals: Chemicals are a small part of the IPM plan and should be applied only as needed after reviewing all other alternatives.

Pesticide Management:

When use of a chemical is the best or only option, follow these simple guidelines:

1. Know your target pest before spraying. Use the pesticide according to the manufacturer's instructions and buy only the needed quantity. Many pesticides have a limited shelf life and may be useless or degrade into even more toxic compounds if for extended periods of time.

2. Do not apply more than the specified amount. Overuse can be dangerous to your health as well as the health of wildlife and the environment. If more than one chemical can be used to control the pest, choose the least toxic. The word "caution" on the label means that the chemical is less toxic than one that is labeled "warning".

3. Do not spray on windy days, in the morning of what will be a very hot day, or when rain is likely. Herbicides can drift and injure valuable ornamental plants. Do not water heavily after application. Plants should be lightly watered BEFORE application to prevent burning of the foliage, and to help evenly spread the chemical.

4. Never apply pesticides near streams, ponds, or wetlands (exception: approved applications for aquatic weeds). Do not apply pesticides to bare eroded ground (exception: use of low toxicity herbicides such as Round-up to allow growth of desired planting in small areas). Many pesticides bind to soil particles and can be easily carried into a stream or storm drain.

5. Pesticides should be stored well away from living areas. Ideally, the storage area should have a cement floor and be insulated from temperature extremes. Always keep pesticides in their original containers with labels in tact. Labels often corrode and become illegible in this climate and may have to be taped onto the container.

6. Federal law now requires that all pesticides be labeled with the appropriate disposal method. Leftovers should never be dumped anywhere, including a landfill. Take unwanted pesticides to the County's hazardous waste collection days or Hazo House at the landfill.
7. Empty containers should be triple-rinsed and the rinse water used as spray. Once containers are triple-rinsed, they are not considered hazardous waste and may be disposed of in most landfills. However, call your local landfill before putting the container in the garbage.
8. If a pesticide is spilled onto pavement, it can be absorbed using kitty litter or sawdust. The contaminated absorbent should be bagged, labeled and taken to Hazo House.
9. If the pesticide is spilled onto dirt, dig up the dirt, place it in a plastic bag and take it to Hazo House.
10. Many pest control companies and licensed applicators have access to pesticides that are more toxic than those available to the consumer. Check with the company before they spray indoors or outdoors to find out what spray they will be using and what precautions, if any, are necessary after the operator leaves.

Home Remodeling

Remodeling uses some of the most toxic substances found in the home. Paints, preservatives, strippers, brush cleaners, and solvents all contain a wide range of chemicals, some of which are suspected to be carcinogenic (cancer causing). These products should never be dumped in a landfill or put down a sewer or septic system.

1. When building a deck consider using wood or wood alternatives such as recycled wood/plastic decking instead of concrete. Wood decking allows rainwater to drip onto the ground below, keeping it from becoming surface runoff.
2. Decks and sidewalks can also be built out of brick interlocking pavers or modular concrete. If these surfaces are placed on a bed of well-drained soil gravel or sand, rainwater can infiltrate into the ground around them.
3. To reduce disposal problems, buy only the needed amount. Used turpentine or brush cleaner can be filtered and reused. Paint cans should be allowed to dry and then be disposed of during a hazardous waste collection day or at Hazo House.
4. Leftover paint can be given away, for example to a theater group. Contact the Thurston County Health Department at (360) 754-4111 for other options.
5. Roof downspouts can be adjusted to infiltrate runoff to a well drained area. The runoff from them can enter a gravel bed where it can infiltrate into the ground. For design criteria, see your jurisdiction's drainage manual.
6. When gardening on slopes, reduce the potential for surface runoff by using terraces across the face of the hill. These can be as simple as little soil "bumps" or more elaborate using timbers, masonry or rock walls.

Septic System Care and Management

While septic systems do not seem to have a direct relationship with stormwater runoff, they can in some instances be related.

1. Roof drains and stormwater runoff should be diverted away from drainfields. Excess water reduces the capacity of the drainfield to absorb effluent from the septic tank.

IV. GLOSSARY

BEST MANAGEMENT PRACTICE (BMP) - Structures, conservation practices, or regulations that improve quality of runoff or reduce the impact of development on the quantity of runoff.

BIOFILTER (SWALE) - A wider and flatter vegetated version of a ditch over which runoff flows at uniform depth and velocity. Biofilters perform best when vegetation has a thick mat of roots, leaves, and stems at the soil interface (such as grass).

BIOFILTRATION - The process through which pollutant concentrations in runoff are reduced by filtering runoff through vegetation.

BUFFER - The zone that protects aquatic resources by providing protection of slope stability, attenuation of runoff, and reduction of landslide hazards. An integral part of a stream or wetland ecosystem, it provides shading, input of organic debris, and coarse sediments to streams. It also allows room for variation in stream or wetland boundaries, habitat for wildlife, and protection from harmful intrusion.

CATCH BASIN - An inlet for stormwater set into the ground, usually rectangular and made of concrete, and capped with a grate that allows stormwater to enter.

CHECK DAM - A dam (e.g., rock, earthen, log) used in channels to reduce water velocities, promote sediment deposition, and/or enhance infiltration.

COMPOST STORMWATER FILTER - A treatment facility that removes sediment and pollutants from stormwater by percolating water through a layer of specially prepared bigleaf maple compost.

CONSTRUCTED WETLAND - A wet pond with dead storage at varied depths and planted with wetland plants to enhance its treatment capabilities.

CONTROL STRUCTURE (FLOW RESTRICTOR) - A manhole and/or pipe structure with a flow-regulating or metering device such as a weir or plates with small holes known as orifices. This structure controls the rate at which water leaves the pond.

CONVEYANCE - A mechanism or device for transporting water including pipes, channels (natural and man-made), culverts, gutters, manholes, etc.

CRITICAL AREA - Areas such as wetlands, streams, steep slopes, etc. as defined by ordinance or resolution by the jurisdiction. Also known as "environmentally sensitive areas."

CULVERT - A conveyance device (e.g., concrete box, pipe) that conveys water from a ditch, swale, or stream under (usually across) a roadway or embankment.

DEAD STORAGE - The volume of storage in a pond below the outlet that does not drain after a storm event. This storage area provides treatment of the stormwater by allowing sediments to settle out.

DETENTION FACILITY - A facility (e.g., pond, vault, pipe) in which surface and storm water is temporarily stored.

DETENTION POND - A detention facility in the form of an open pond.

DISPERSION TRENCH - An open-top trench filled with riprap or gravel that takes the discharge from a pond, spreads it out, and spills (bubbles) the flow out along its entire length. Dispersion trenches are used to simulate "sheet flow" of stormwater from an area, and are often used to protect sensitive adjacent areas, such as wetlands.

DRAINAGE SYSTEM - The combination of Best Management Practices (BMPs), conveyances, treatment, retention, detention, and outfall features or structures on a project.

DROP STRUCTURE - A structure for dropping water to a lower elevation and/or dissipating energy. A drop may be vertical or inclined.

DRY POND - A detention facility that drains completely after a storm. This type of pond has a pipe outlet at the bottom.

EASEMENT - A right afforded a person to make limited use of another's real property. Typical easements are for pipes or access to ponds, and may be 15 to 20 feet wide.

EMERGENCY OVERFLOW OR SPILLWAY - An area on the top edge of the pond that is slightly lower in elevation than areas around it. This area is normally lined with riprap. The emergency overflow is used only if the primary and secondary outlets of the pond fail, in the event of extreme storms, or if the infiltration capability of the pond becomes significantly diminished. If the emergency overflow ever comes into play, it may indicate the pond needs to be upgraded.

ENERGY DISSIPATER - A rock pad at an outlet designed to slow the velocity, spread out the water leaving the pipe or channel, and reduce the potential for erosion.

FREEBOARD - The vertical distance between the design high water mark and the elevation of the top of the pond. Most ponds have one to two feet of freeboard to prevent them from overflowing.

INFILTRATION - The soaking of water through the soil surface into the ground (percolation). (Many ponds are designed to fully infiltrate stormwater, and thus do not have a regularly used discharge pipe.)

INFILTRATION FACILITY (or STRUCTURE) - A facility (pond or trench) that retains and percolates stormwater into the ground, having no discharge (to any surface water) under normal operating conditions.

JUNCTION - Point where two or more drainage pipes or channels converge (e.g., a manhole).

JURISDICTION - Olympia, Lacey, Tumwater, or Thurston County (as applicable).

LINED POND or CONVEYANCE - A facility, the bottom and sides of which have been made impervious (using, for example, a plastic liner or clay/silt soil layer) to the transmission of liquids.

LIVE STORAGE - The volume of storage in a pond above the outlet that drains after a storm event. This storage area provides flood control and habitat protection for nearby streams.

MANHOLE - A larger version of a catch basin, often round, with a solid lid. Manholes allow access to underground stormwater pipes for maintenance.

NATURAL CHANNEL - Stream, creek, river, lake, wetland, estuary, gully, swale, ravine, or any open conduit where water will concentrate and flow intermittently or continuously.

OIL-WATER SEPARATOR - A structure or device used to remove oil and greasy solids from water. They operate by using gravity separation of liquids that have different densities. Many catch basins have a downturned elbow that provides some oil-water separation.

OUTFALL - The point where water flows from a man-made conduit, channel, or drain into a water body or other natural drainage feature.

RETENTION FACILITY - An infiltration facility.

RETENTION POND - A retention facility that is an open pond.

REVETMENTS - Materials such as rock or keystones used to sustain an embankment, such as in a retaining wall.

RIP RAP - Broken rock, cobbles, or boulders placed on earth surfaces, such as on top of a berm for the emergency overflow, along steep slopes, or at the outlet of a pipe, for protection against the action of water. Also used for entrances to construction sites.

RUNOFF - Stormwater.

SAND FILTER - A treatment facility that removes sediment and pollutants from stormwater by percolating water through a layer of sand.

STORMWATER - That portion of precipitation that falls on property and that does not naturally percolate into the ground or evaporate, but flows via overland flow, channels or pipes into a defined surface water channel, or a constructed infiltration facility. Stormwater includes washdown water and other wastewater that enters the drainage system.

SWALE - A shallow drainage conveyance with relatively gentle side slopes, generally with flow depths less than one foot. This term is used interchangeably with "BIOFILTER".

TRASH RACK or BAR SCREEN - A device (usually a screen or bars) that fits over a pipe opening to prevent large debris such as rocks or branches from entering and partially blocking the pipe.

WET POND - A stormwater treatment pond designed with a dead storage area to maintain a continuous or seasonal static water level below the pond outlet elevation.