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Document Title(s)

Resource Protection Plan and Integrated Pest Management Plan for Hidden Meadow
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Reference Number(s) of Related Documents

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Grantor(s) (Last, First and Middle Initial)

Additional Reference #'s on page:

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Rainier Equity Ventures, LLC	

Additional Grantors on page:

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Grantee(s) (Last, First and Middle Initial)

The Public	

Additional Grantees on page:

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Legal Description (abbreviated form: i.e. lot, block, plat or section, township, range, quarter/quarter)

NE 1/4 NE 1/4, SECTION 25, TOWNSHIP 16 NORTH, RANGE 2 WEST, W.M.

Additional legal is on page:

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Assessor's Property Tax Parcel/Account Number

12625110300

Additional parcel #'s on page:

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The Auditor/Recorder will rely on the information provided on this form. The staff will not read the document to verify the accuracy or completeness of the indexing information provided herein.

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Thurston County Washington
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Resource Protection Plan and Integrated Pest Management Plan for Hidden Meadow

Project Summary

Hidden Meadow is a 30-lot single-family subdivision located in the City of Tenino (Figure 1). Because this project has more than 10 lots and is located in a Critical Aquifer Recharge Area, an “Integrated Pest Management Plan” (IPMP) is required to address best management practices (BMPs) for the maintenance of common open space areas, maintenance of the bioretention swales, as well as any maintenance of lawn and garden areas for the individual building lots.

This IPMP has been recorded with the Thurston County Auditor and will be included on the title of all lots included in this development. The following pages describe how stormwater and wastewater are managed in this development, as well as describe methods that residents can follow on a daily basis to reduce their impacts on local water resources.

Site Conditions

The project site is located within an Extreme Critical Aquifer Recharge Area and within the Scatter Creek Drainage Basin.

Stormwater Management & Treatment

Stormwater runoff (the water that leaves your property during rainy weather) may represent the largest source of pollutants to nearby water resources. As this stormwater moves over your property, it picks up soil, fertilizers, pesticides, oils and grease, and a multitude of other pollutants from driveway, rooftop, and roadway areas. Normally many of these pollutants are removed as the stormwater drains into the soil. However, site development increases the amount of impervious area and can cause an increase in stormwater runoff.

Fortunately, stormwater control features have been designed into the Hidden Meadow development to help reduce the impacts of these pollutants. Stormwater runoff from the roadways with Hidden Meadow sheet flow to a series of roadside bioretention swales for treatment, detention, and infiltration of stormwater (Figure 1). The bioretention swales contain a designed soil mix and plants and are intended to mimic a forested condition by controlling stormwater through detention, infiltration, and evapotranspiration. Stormwater runoff from roofs will need to be conveyed to underground downspout infiltration trenches and runoff from new driveway and yard areas will need to be sheet flow dispersed over soils meeting the Post-Construction Soil Quality and Depth requirements.

These stormwater systems require continued inspection and maintenance to insure they are working properly. Individual lot owners will be responsible for installing and maintaining their lot's landscaping and stormwater systems. The Homeowner's Association (HOA) will be responsible for maintaining landscaping within the common open space areas and maintenance of the bioretention swales along the roadways.

It is the responsibility of individual homeowners and/or the HOA to insure these routine maintenance tasks are performed. These tasks include, but are not limited to, the following: cleaning culvert pipes, landscaping maintenance, removing invasive plants and noxious weeds, and many other tasks.

Specific maintenance criteria for the roadside bioretention swales include:

- Maintaining a minimum 80% of vegetation coverage. Any new vegetation needed shall consist of an even mix of Slough Sedge, Kelsey Dogwood, Toughleaf Iris, Common Rush, and Hancock Coralberry.
- Providing supplemental irrigation as needed, especially during the first two growing seasons.
- Removing invasive plants and noxious weeds by hand (no herbicide use is allowed in stormwater facilities).
- Maintaining a 3-inch depth of mulch over a 3-inch depth of compost over an 18-inch depth of a designed soil mix (see the Hidden Meadow Record Drawings dated 8-16, 2018 for mulch, compost, and soil specifications).

Open Space

The Hidden Meadow development includes three open space tracts, Tracts A, B and C, for your enjoyment and to provide an area for native vegetation and habitat to flourish. It is the responsibility of the HOA to maintain these community open space areas. Depending upon how the open space tracts are ultimately developed, routine maintenance may involve such things as mowing and garbage pickup, removing invasive plants and noxious weeds, and other tasks. Landscape maintenance in your development should follow the methods outlined in this IPMP when working in these public areas.

Pollutants and Contaminants

There are two common sources of pollutants generated by homes – those produced by lawn and garden areas, and those resulting from home and shop activities.

Pollution Sources – Lawn & Garden

Lawn, garden and other high maintenance landscaping often require pollutant contributing upkeep measures such as mowing, fertilizing, and chemical weed and disease control. These pollutants often migrate from your yard to nearby water resources. There are two common ways this can happen: the pollutants are caught up with stormwater leaving your property and transported to surface waters, or they can filter through the soils and into the groundwater.

The type of soil that exists on your property is the key factor in determining how healthy your lawn and plants will be, and therefore in determining how much fertilizer, water, etc., you will be tempted to use. According to the Thurston County Soil Survey, completed by the U.S. Department of Agriculture/Natural Resources Conservation Service, the soils in your development are Everett and Spanaway Very Gravelly Sandy Loam. As part of the building permit approval process, each lot must submit a Soil Management Plan for review and approval. This plan shows existing soils that need to be amended with compost and/or mulch; existing soils to be stockpiled for future amendment; soils and vegetation to remain undisturbed; and proposed lawn and landscape areas. Amending your soil will accomplish two things: it will provide an improved growing medium for gardening and landscaping, and will increase the water holding capacity of your soil. Without amendment, every time you water your lawn or garden, most of the water will pass through the root zone before it provides your plants with any benefit. Also, fertilizers and pesticides will move through the soil before plants can use them. This means that not only have you wasted money on these chemicals because they won't help your plants, you have also contributed to pollution of the groundwater.

The following list contains recommendations for reducing impacts of lawn and garden activities on local water resources:

- Reduce use of hazardous materials (fertilizers and pesticides, paints, solvents, or other chemicals).
- Clean up and dispose of these wastes properly. Do not wash them down the driveway and into the stormwater system. Do not use them during periods of rain or predicted rain.
- Do not over-fertilize or over-water. More frequent and shorter periods of watering will be more effective than long duration watering in areas with native undisturbed soils. In areas with amended soils, infrequent, long irrigation is recommended to encourage deep roots. Lower fertilizer application rates are more appropriate since excess could be washed into the groundwater. Avoid using chemical fertilizers or pesticides at all if you have not taken the precaution of first adding amendment to the soil. Native vegetation is more disease resistant and requires less fertilizer and water than traditional lawn and garden plants.

- Preserve native vegetation whenever possible and utilize native plants in landscaping plans. Similarly, reduce the extent of high-maintenance lawn and garden areas and select grass seeds that are more drought-tolerant.

Additionally, local government agencies have several pamphlets and informational brochures available that describe environmentally-friendly methods of yard maintenance. These include “Natural Yard Care” (rev. 12/09/2008, Washington State Department of Ecology Publication No. 08-07-064) and “The Common Sense Guide to Natural Lawn Care” (2007, published by Thurston County). These documents, as well as many others, are available online or directly from Washington State or Thurston County.

Pollution Sources – Home, Shop & Garage

Household cleaning agents, oils, paints, solvents, and innumerable other pollutants are continually used in home, shop and garage areas. As with lawn and garden areas, proper home stewardship involves reducing the amount of chemicals or pollutants used, and then keeping these pollutants from migrating from your property.

The following list describes alternatives for limiting the impacts of home, shop and garage activities on local water resources:

- Reduce use of hazardous materials by utilizing alternative “natural” and biodegradable household cleaning products and giving excess paints, pesticides, and etc. to others to use. The pamphlet “Turning the Tide on Toxins in the Home” lists alternatives to ordinary household products that are less toxic. This pamphlet can be obtained free of charge from the Washington State Department of Ecology.
- Recycle used solvents and motor oils.
- Take all unused hazardous wastes to a household hazardous waste collection site.
- Reuse and recycle as much as possible.
- Impervious surfaces, such as asphalt, buildings, concrete, and even heavily used trails act as pathways for polluted runoff water to enter nearby water bodies. Try to minimize the amount of impervious area on your property. A smaller driveway, parking pad or the use of pervious pavement/pavers can reduce impervious surface area for your automobile needs. Additionally, smaller decks or use of flagstones interspersed with vegetation may decrease runoff from outdoor living areas.
- Where impervious surfaces already exist, redirect runoff from these areas to lawn, garden, or other vegetated areas to help slow down runoff and filter out pollutants.

Residents of Thurston County can drop off toxic materials free of charge at the HazoHouse, located at the Thurston County Waste & Recovery Center at 2418 Hogum Bay Road NE in Lacey. A detailed list of items that the HazoHouse accepts can be found on the County’s website: www.co.thurston.wa.us/solidwaste/hazardous/haz-hazohouse.htm.

Integrated Pest Management Principals for General Landscape Maintenance & Management

The goal of environmentally friendly landscape care is to minimize the potential for water quality impacts from yard and garden activities. The recommendations described here follow the Thurston County Pest and Vegetation Management Policy. They reflect proper land stewardship practices that should be followed by all property owners. There are recommendations for protection of groundwater, plant selection, landscape maintenance and low-impact approaches to pest and disease control.

Groundwater

Groundwater is an important source of drinking water for communities and individuals. In 2000, the use of groundwater in the United States for human consumption was about 408 billion gallons per day. Roughly 78% of all Americans get their drinking water from underground sources. In Washington State, groundwater provides approximately 80-85% of the drinking and irrigation water to communities and individuals. In Thurston County, groundwater is our sole water supply.

Until the 1970s, it was believed that groundwater was naturally protected from contamination by layers of soil, rock, and sand between the surface of the ground and groundwater. These layers of soil, rock and sand were believed to filter out pollutants before they could reach the groundwater. However, it has been determined this is not the case and contaminants can move through these layers and enter the groundwater. Because groundwater is not immediately visible and easy to monitor, groundwater contamination can go undetected until the problem has become extensive. In turn, cleaning up contamination of groundwater is complicated, costly, and sometimes impossible; therefore, preventing contamination of groundwater is the best way to guarantee continued supply. Listed below are methods to control your input to groundwater:

- Reduce your use of hazardous materials (fertilizers and pesticides, paints, solvents, or other chemicals) and substitute with non-hazardous products whenever possible. Additionally, many common household products include potentially harmful components that may be considered hazardous. The pamphlet "Turning the Tide on Toxins in the Home" lists alternatives to ordinary household products that are less toxic.
- Clean up and dispose of wastes properly. Do not wash them down the driveway and into the stormwater system.
- Buy only what you need.
- Reuse and recycle as much as possible.
- Take all unused hazardous wastes to a household hazardous waste collection site.

Appropriate Plant Selection

See "Stormwater Management and Maintenance" above for specific landscape requirements for the bioretention swales. The first step to consider when choosing grass or landscaping plants is

to select plants that are native or well-adapted to the soils and climate of the Puget Sound area. Native plant species have adapted over time to their specific region. If a plant is adapted to regional conditions, it is less likely to require extra fertilizing and watering, as well as less likely to be attacked by pests. An excellent reference for more information on native plants is Gardening with Native Plants of the Pacific Northwest by Arthur Kruckeberg.

Based on information from the Seattle Tilth Association and the National Turfgrass Evaluation, the following grass strains are recommended for use in our area. A mix containing a variety of these strains could be used to optimize best characteristics of each strain. The easiest way to get the best variety is to choose a mix that is blended for the Pacific Northwest.

Recommended Strains Of Grass Types	
Grass Type	Strains
Fescue (finest leaf)	Palmer, Manhattan II, and Repell
Perennial Rye grass	Reliant, Scaldis and Enjoy

Landscape Maintenance

Mulching

See "Stormwater Management and Maintenance" above for specific landscape requirements for the bioretention swales. Mulch is recommended in landscaped areas as the most effective form of non-herbicide weed control. Mulch acts as a physical barrier to weeds. It typically is either composed of compost, bark, wood chips, leaves, dry grass clippings, or sawdust. Annuals or herbaceous perennials generally require 1 to 2 inches of compost, dry grass clippings, leaves, or sawdust. Shrubs or trees require 2 to 4 inches of coarse wood chips or bark. (Note: Shrubs such as rhododendrons and azaleas, with roots located close to the surface, should receive no more than 2 inches of mulch to allow for adequate gas exchange.) The key to successful weed control is to maintain the mulch depth as it decomposes, and to take into consideration that wood chips and sawdust deplete nitrogen if worked into the soil. This effect may require some addition of nitrogen fertilizer. Mulch is effective as a control against chickweed, annual bluegrass, bitter cress and many other species. Weeds that grow through properly installed mulch are more easily removed by hand. Periodic hand-pulling of weeds is also recommended in zones between mulched areas to minimize weed seed source.

Fertilizing

According to the National Academy of Science, on the average, 5 to 10 pounds of fertilizer are applied annually for every acre of lawn in the United States. Often this occurs whether the lawn needs it or not. There are two types of fertilizers, natural and synthetic. Natural fertilizers such as: bone meals (Ca, P and some N), blood meals (N), fish meals (N and P), kelp meals (K and trace elements), seed meals (N and some P/K) and rock phosphates (P) are often recommended for both lawns and landscaping plants. These are preferred over synthetic fertilizers for a number of reasons. The various meals listed above are slow-releasing, tend

to be neutral in pH and are relatively water insoluble. As such, they tend to stay in the soil longer and are not as quickly leached out as their synthetic alternatives. Natural fertilizers often contain many naturally occurring micro-nutrients that are typically unavailable in synthetic fertilizers. Synthetic fertilizers can also contain inert ingredients (compounds added during manufacturing that are not listed as part of the active ingredients) that can be harmful to the environment. However, for both natural and synthetic fertilizers, improper management and over-application can cause serious impacts. When applying fertilizers, the application rate and timing is dependent upon the type of fertilizer used and soil needs. Some general notes to remember when fertilizing include:

- Avoid over-watering lawns immediately after applying fertilizer. It is better to water the lawn thoroughly a day or two before fertilizing, and then water briefly after the application to wash the fertilizer off the leaves and into the soil.
- Reduce the need for fertilizers by returning grass clippings to lawns. In Western Washington, 4 pounds of nitrogen per 1,000 square feet per year is usually a maximum application rate; 1 pound is often sufficient. Grass-cycling (leaving the cut grass on the lawn) can supply at least a quarter of what is needed by your lawn.
- Test soils before applying fertilizers. Simple soil test kits are available at most gardening centers. In the Puget Sound area, soils are naturally high in phosphate. Adding additional phosphate through fertilizing is not only a waste of money, but it can also result in excess pollution of nearby waters. There are now phosphate-free lawn fertilizers available commercially that can provide a nitrogen and micro-nutrient source without contributing to excess phosphates in our environment.
- Use fertilizers no more than four times per year. The preferred frequency is April, June, September and November.

An example of a well-balanced organic fertilizer mixture for lawn grass suggested by the Territorial Seed Company consists of: 4 parts seed meal or fish meal (N); 1 part agricultural lime or dolomite (Ca); 1 part rock phosphate or 2 part bone meal (P₂O₅); 2 part kelp meal (K); (all measurements by volume). This mixture would need to be adjusted based on results of site soil testing and nutrient content of the meals used. For more information on fertilizers refer to "Grow Smart, Grow Safe - A Consumer's Guide to Lawn and Garden Products" by Philip Dickey and the Washington Toxics Coalition. This handbook rates fertilizers and pesticides by their toxicity or environmental impacts. It can be obtained free of charge from the King County Hazardous Waste Management Program or the Washington Toxics Coalition.

Established native plants should require little in the way of fertilizing other than annual mulching. Although periodic fertilization will promote bloom of more traditional garden plants, you can still reduce fertilizer use through mulching and use natural fertilizers instead of synthetic types. As always the garden soil should be tested first to determine nutrient needs.

Watering

The key to a healthy lawn and plants is to encourage the roots to grow as deep into the soil as possible. That will make them more drought resistant later in the season. Infrequent, long irrigation (i.e., wetting the soil to about 10 inches) is recommended to encourage deep roots in areas with amended soil. However, more frequent and shorter periods of watering will be more effective than long duration watering in areas containing native undisturbed soils.

- When watering, keep an eye on the watered area to insure that the flow rate of the sprinklers doesn't exceed the infiltration rate of the soil, which can vary greatly based on surface management. Over-watering can result in the proliferation of unwanted insect pests.
- Water during early morning to reduce loss by evaporation and minimize development of mold and fungal problems on lawn and plants. (Note: Many garden plants, notably roses, garden phlox, peonies, and others, are susceptible to diseases that can be discouraged through early morning watering.)
- During extreme drought conditions, watering should be restricted to priority plantings, such as newly established trees and shrubs.
- Healthy lawns need no more than 1 inch of water per week, including rainfall.
- Consider not supplying extra water to your lawn in summer, to let the grass go through a normal dormant stage. Think of this as a natural seasonal event like the trees changing color in the fall.

Monitoring of Noxious Weeds

The Thurston County Noxious Weed Control Program keeps a list of invasive plant species that are creating problems in Thurston County. Left unmanaged, these plants can quickly populate an area and displace native vegetation. The displacement of native vegetation over time is a threat to plant diversity and wildlife habitat.

An integrated vegetation management approach is recommended for control of these species. This approach involves early identification, use of appropriate control measures, and proper timing of their application. Use of these methods will reduce the need for herbicide use. It is recommended that you visually check your site for these species in early spring and late summer. Early spring is when the over-wintered seeds are germinating. Identification of the plants when they are still young is critical. Generally, it is recommended that plants be hand-pulled and disposed of at the County landfill. In late summer and early fall, the recommended method for eradication for the following year is to remove the seed heads on the plant and collect any that are at the soil surface. However, there are a number of problem plants for which this method will not be effective. Because the best control technique varies for each plant listed, it is recommended Thurston County Noxious Weed Control be contacted directly at (360) 786-5576 for plant-specific information.

Controlling Pests and Disease

Effective pest control can be achieved by avoidance of circumstances that encourage pest growth and periodic monitoring. Ultimately, the types of insect pests that will occur will be based on the type of landscaping plants and grasses used and how well they are maintained. Many insect pests can be avoided by selecting appropriate plants, and by following recommendations on proper care. The cornerstone of pest management is doing periodic visual checks of your landscaping. This way, a new disease or infestation will be spotted before it becomes out of hand. When pest management becomes necessary, an integrated pest management approach should be followed.

Integrated pest management (IPM) is a holistic approach to pest and invasive plant control that consists of: monitoring the problem at hand; determining the injury and action level; correct timing of the solution; and selecting optimal strategies (as defined below) to carry out the solution. The first step is correct identification of the problem pest. Once this has been done, strategies to reduce or eliminate the specific pest can be applied. IPM practices take into consideration that insects are a natural part of the environment. Therefore, it is necessary to determine at what level of infestation they become a problem. Action usually occurs when there are extensive unacceptable aesthetic changes in the vegetation and, in some cases, when the health of an entire landscaped area is in jeopardy.

Optimal strategies are defined as:

- Least damaging to the natural environment and humans
- Greatest probability of permanent reduction of the intended pest
- Least disruptive to the natural pest controls at hand

Pest control can be divided into three types: physical controls (traps, barriers and hand removal), biological controls (beneficial insects or bacteria), and chemical. All of these controls have advantages and disadvantages that must be taken into consideration prior to use. Recent federal rulings on pesticide use require buffers from streams and prominent warning labels that display potential of the product to impact species.

Early Infestation

Early infestations are defined as small areas of coverage and/or new less dense populations of the pest (e.g. a few plants in a small area). The goal is to catch the problem pest at this stage before it leads to an advanced infestation. It is recommended that these early infestations be dealt with by using physical controls. Physical controls are by far the least invasive of all the insect control methodologies. If physical controls alone prove ineffective, then appropriate biological controls should be utilized. Biological controls include predatory insects and bacteria. The high effectiveness of these types of controls has been proven within the last thirty years, and remains as some of the best, less invasive forms of pest control. Chemical controls are generally not recommended for infestations of this level.

Advanced Infestation

Advanced infestations are defined as large areas of unacceptable aesthetic changes to vegetation due to insects or diseases. When dealing with advanced infestations it is recommended that biological controls be utilized first. If these methods fail then it is recommended that botanical and mineral (organic or synthesized) insecticide/fungicide controls (i.e. chemical controls) be implemented. These controls should be applied properly at levels intended to bring the target problem back to a level that can subsequently be managed with the physical and biological controls. Unwise use could lead to an upset in the natural ecological balance of the system and result in wetland and water quality impacts.

Once a decision has appropriately been made to utilize a pesticide (insecticide or fungicide) to help with controlling a disease outbreak, the pesticide to be used should be selected carefully. A number of pesticides that have unrestricted use (that is they are easily available for purchase and use by homeowners and do not require a professional applicators license to apply), have a high potential for leaching into groundwater and thus constitute a risk to nearby ground and surface waters. The lowest hazard pesticide product that will be effective in controlling the pest problem should be used. The www.growsmartgrowsafe.org website can be a good source for selecting which pesticides to purchase to accomplish this.

Additional Resources

- Thurston County Public Health & Social Services Department (Common Sense Gardening) – (360) 867-2674
- Thurston County Noxious Weed Control – (360) 786-5576
- Thurston Conservation District – (360) 754-3588
- Washington State Department of Ecology – (360) 407-6000
- Washington State University Cooperative Extension – (360) 867-2151
- Thurston County Drainage Design and Erosion Control Manual, 2009

