



INSTRUCTIONS

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INSTRUCTIONS for completing the Assessment of Existing Stormwater Infiltration Systems

INTRODUCTION

This instruction sheet is a companion to the Assessment Form for each facility with a stormwater infiltration system located within the City's Wellhead Protection Zones 1 and 2. The 12 questions on the form are designed to provide a consistent way for each site owner or operator to prepare an assessment of risk that their stormwater infiltration system may pose to groundwater. This is important because groundwater is used as the City's drinking water source. The City has completed some portions of the form based on the City's available information. Owners or operators of stormwater infiltration systems may have more accurate information; and in those cases, the information should be corrected on the form.

The purpose of this assessment is to provide the City with information about your existing stormwater infiltration system that will be used to assess the potential risk that the property's land use, location, and infiltration system design may contribute to potential contamination risk to groundwater. Stormwater is known to collect and convey a variety of pollutants from the surface into receiving waters and groundwater. Careful management of hazardous materials and design of infiltration treatment systems can prevent the majority of these pollutants from reaching the groundwater. However, many existing systems were constructed prior to the development of design standards that help provide that protection.

The City will review each stormwater infiltration system assessment form in order to evaluate and compare the risk potential from multiple sites and develop a prioritized strategy for reducing the risk of contamination of the drinking water resource. The City intends to work with all owners to reduce risk, with priority given to those sites that present the highest risk.

This assessment is the primary tool by which the City will assess risk. We will review the risks at the site and help owners to develop strategies to reduce the risk to groundwater on a site-by-site basis.

Completion of this Assessment is required by Redmond City Ordinance (RMC 13.07.100) b and will also satisfy the Assessment requirements of the Washington State Department of Ecology Underground Injection Control (UIC) program (Washington Administrative Code 173-200) if applicable. Your completed Stormwater Infiltration Assessment Form(s) is due to the City on the date specified in your notice letter. You are encouraged to complete and submit your Assessment well in advance of this date.

INCENTIVES

The City recognizes that owners or operators will likely incur costs in modifying their stormwater system in order to protect groundwater and the drinking water supply. The City wants to encourage early modification of existing stormwater systems to protect our drinking water. The City will provide incentive reimbursement to owners who complete storm system modifications in compliance with the schedule noted in the 2013 code revision ([Ordinance 2704](#)). More information on incentives can be found on page 18.

1.0: INSTRUCTIONS

This assessment may be completed by the system owner or the owner's designated representative. A separate assessment must be completed for each separate infiltration system located in Wellhead Protection Zones 1 and 2 on the Owner's property. If two or more areas of the property have different uses and drain to different infiltration systems, separate assessments should be completed. Please contact City staff if you have any questions before you complete multiple assessments. Their contact information is at the end of the assessment form.

This assessment is arranged into the following sections:

- Section 1: Instructions
- Section 2: General Information
- Section 3: Land Use Information
- Section 4: Location
- Section 5: Infiltration System Description
- Section 6: Risk Reduction
- Section 7: Certification
- Section 8: Definitions
- Section 9: Groundwater Monitoring Requirements

Please answer all the questions in this assessment (look for text in green), add comments or attachments as you see fit, and sign the certification at the end of the assessment. If you are confused by a question or need assistance, City staff are available to help. Please see the contact information at the end of the assessment form.

2.0: GENERAL INFORMATION

This section of the form is partially completed with information previously provided to the City on the Stormwater Infiltration Registration Form. **Please enter any missing information, complete all sections and make any corrections necessary.**

3.0: LAND USE INFORMATION

3.1 Site Map

The City has provided a site map of your parcel based on the information available in its Geographic Information System (GIS). **Using the provided map, or your own map, show the following information about your site:**

- Note the location of the infiltration system for this assessment.
- Identify the limits of the area that drains to that infiltration system.
- Identify the direction that water flows on the surface and in pipes.
- Identify stormwater pipes, vaults, catch basins, ponds, and other structures.
- Identify buildings, covered areas, parking areas, loading docks and other site features.
- Identify the locations of hazardous materials storage and use.
- Mark areas where chemicals are used or applied.
- Identify any drinking water wells, production wells, or monitoring wells.

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- Identify the parcel boundaries, streets, and surface water features.
- Draw to scale and include a scale bar and north arrow.

If you choose to provide your own map, please ensure that it includes the items listed above, and check the box at the bottom of the page.

3.2 Pollutant Loading Risk Classification

Some land uses have typically been shown to result in higher pollutant loading to stormwater than other land uses. Review of various studies have found a correlation between some land uses and the level of pollutants within stormwater. It is generally agreed that higher traffic volumes result in higher pollutant loadings. Further, some activities such as construction, fueling, or industrial activity have a higher potential to result in pollutant loading of stormwater than other activities. For the purpose of this comparative risk assessment, the City is using State Department of Ecology guidance for risk of pollutant loading based on land use.

Select the pollutant loading risk classification (insignificant, low, medium, high) from Table 1 that most closely matches the use in the area contributing runoff to the infiltration system.

insignificant (0)

low (1)

medium (2)

high (3)

Add comments within this section of the form if you wish to clarify the land use. If you have additional comments that will not fit on the form, please check the box and attach them.

See Table 1 on the next page

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Table 1: Pollutant Loading Classification

Pollutant Loading Classification	Description of Land use for Areas Contributing Runoff to the Infiltration System
Insignificant	<ul style="list-style-type: none"> • Impervious surfaces not subject to motorized vehicle traffic or application of deicing compounds • Un-maintained open (green) space, bare earth, landscaped areas
Low	<ul style="list-style-type: none"> • Parking areas with <40 trip ends per 1000 SF of gross building area or <100 total trip ends • Other land uses with similar traffic/use characteristics (e.g. most residential parking and employee-only parking areas for small office parks or other commercial buildings) • Limited access highways with Average Daily Trips (ADT) less than 15000 • Other roads with ADT less than 7500 vehicles per day
Medium	<ul style="list-style-type: none"> • Parking areas with between 40 and 100 trip ends per 1000 SF of gross building area or between 100 and 300 total trip ends • Primary access points for high-density residential apartments • Intersections controlled by traffic signals that do not meet the definition of a high-density intersection (see below) • Roof runoff from commercial businesses with ventilation systems specifically designed to remove commercial indoor pollutants • Transit center bus stops • Other land uses with similar traffic/use characteristics (e.g. visitor parking for small to medium commercial buildings with a limited number of daily customers) • Roads with ADT between 7500 and 30000 vehicles per day
High	<ul style="list-style-type: none"> • Fueling stations and facilities. • Petroleum storage and transfer in excess of 1,500 gallons per year at commercial or industrial sites. This includes heating fuel, handling, and storage facilities. • Fleets of 25 or more diesel vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.) used, stored, or maintained at commercial or industrial sites. • Maintenance and repair facilities for vehicles, aircraft, construction equipment, railroad equipment, or industrial machinery, and equipment. • Outdoor areas where hydraulic equipment is stored. • Log storage and sorting yards and other sites subject to frequent use of forklifts and (or) other hydraulic equipment. • Railroad yards. • Commercial or industrial sites with an expected trip end count equal to or greater than 100 vehicles per 1000 square feet of gross building area. • High-density intersections (ADT of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway) • Parking areas with >100 trip ends per 1000 SF of gross building area or >300 total trip ends • On-street parking areas of municipal streets in commercial and industrial areas • Other land uses with similar traffic/use characteristics (e.g., commercial buildings with a frequent turnover of visitors, such as grocery stores, shopping malls, restaurants, drive-through services, etc.

Adapted from *Washington State Department of Ecology Guidance for UIC Wells that Manage Stormwater, Ch. 173-218 WAC*

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3.3 High Risk Land Uses

The Washington State Department of Ecology (Ecology) has identified certain land uses as not compatible with certain stormwater infiltration systems because of the high likelihood that these uses may result in groundwater contamination. These high risk land uses are adapted from the prohibited uses section of Ecology Underground Injection Control Well Guidance.

Some types of recycling are listed as high risk uses, however, the City and Ecology continue to consider recycling as a necessary environmental function that is highly encouraged. If a recycling activity is designated as a high risk use, there may be reasonable measures that can be taken at a facility to ensure that groundwater is protected. For the purpose of the assessment, list all known high risk uses. Later in this form you will see that many of the listed high risk uses can be modified or mitigated to help protect groundwater. Additionally, minor outdoor vehicle maintenance will not be considered high risk as long as proper stormwater Best Management Practice (BMP) controls are in place. Activities that take place under cover and within secondary containment or within a building should generally not be included in this category.

Do any of the following conditions or uses take place within the area draining to the stormwater infiltration system at the site? If so, circle all applicable activities on the form and enter 7 points in the points column.

Table 2: Stormwater Infiltration High Risk Uses
1. Vehicle maintenance, repair and service (conducted outdoors).
2. Commercial or fleet vehicle washing.
3. De-icing activities (using ethylene glycol or large quantities of other deicers).
4. Storage of treated lumber.
5. Storage or handling of hazardous materials.
6. Generation, storage, transfer, treatment or disposal of hazardous wastes.
7. Handling of radioactive materials.
8. Recycling facilities, except for those that recycle only glass, paper, plastic, or cardboard. The use would not be prohibited if the facility has a management plan for proper storage and spill prevention, control, and containment appropriate to the types of materials handled at the facility and that would prevent release of pollutants to the infiltration system. (See the Ecology stormwater management manuals for information on stormwater pollution prevention plans and source control)
9. Industrial or commercial areas that have outdoor processing, handling, or storage of raw, solid materials or finished products at the facility. The use would not be prohibited if the facility has a management plan for proper storage and spill prevention, control, and containment appropriate to the types of materials handled at the facility and that would prevent release of pollutants to the infiltration system. (See the Ecology stormwater management manuals for information on stormwater pollution prevention plans and source control).
10. Infiltration systems at contaminated sites where the stormwater would increase the mobility of the contaminants at the site. For example, an infiltration system up gradient of or over the contaminant plume at a leaking underground storage tank site.

Adapted from Washington State Ecology Guidance for UIC Wells that Manage Stormwater

Add comments within this section of the form, as you wish. If you have additional comments that will not fit on the form, please check the box and attach them.

3.4 Chemical Application

Have chemicals (fertilizers, pesticides, herbicides, de-icers, or any other hazardous materials or deleterious substances) been applied within the drainage area of the infiltration system in the last two years or will they be applied in the future?

If no chemicals are applied (0 points)

Chemical application in small quantities used within manufacturer guidelines may be considered to be mitigated use (1 point). Deicers include rock salt, calcium chloride, ethylene glycol, propylene glycol or other deicing chemicals. Small quantities of rock salt used infrequently on sidewalks need not be mentioned here.

Large scale application of chemicals on roads, parking lots or on large sidewalk areas (greater than 1000 square feet) represents a higher risk and should be marked on the form as chemicals applied (2 points).

Answer the question on the form and enter the points score.

Add comments on the form, as you wish. If you have additional comments that will not fit on the form, please check the box and attach them.

3.5 Hazardous Materials Storage and Handling

Describe, list, and quantify any hazardous materials, deleterious substances or equipment stored or handled on site that could release hazardous material or deleterious substances to the stormwater infiltration system (see definitions in section 8.0).

- Hazardous materials are generally defined as hazardous substances, petroleum products, or hazardous, dangerous, or extremely hazardous wastes that pose a physical or health hazard.
- Deleterious substances include a broadly defined list of chemicals or microbial substances that have a potential to pose a significant groundwater hazard.

Describe any hazardous materials or deleterious substances stored, handled, treated, produced, recycled, used, or disposed of within the drainage area of the infiltration system.

Provide information about quantities and names of materials. Describe how the materials are stored or handled on the site and protective measures employed (i.e. secondary containment) to reduce the risk of those materials being spilled or entering groundwater. Indicate on the site map on page 2 of the Stormwater Infiltration Assessment Form or other site map where these materials are stored or handled on the site

If you have less than 50 gallons, cumulative, of hazardous materials or deleterious substances (less than 50 gallons or 500 pounds at any one time) this would be considered a **Small quantity**.

A **Large quantity** of hazardous materials would be volumes over 50 gallons or 500 pounds. **Proper storage** and handling include secondary containment, covering of materials, spill prevention and cleanup plans in place, etc.

Example: A 55 gallon drum or 12 - 5 gallon pails of hydraulic fluid proper stored in secondary containment and covered, would be a Large Quantity, properly stored.

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On the form circle the category that best describes your site.

No hazardous materials (0)

Small Quantity Hazardous materials properly stored (0)

Small Quantity Hazardous materials not properly stored (2)

Large Quantity Hazardous Materials properly stored (2)

Large Quantity Hazardous Materials not properly stored (7)

Write down the list of Hazardous Material at your site or you may attach the Hazardous Materials Inventory Statement (HMIS) you filled out for the City. If you do, please check the box at the bottom of the page.

Describe any historical spills or releases and measures taken to prevent them in the future.

Add comments within this section of the form, as you wish. If you have additional comments that will not fit on the form, please check the box and attach them.

4.0: LOCATION

4.1 Wellhead Protection Zone

What wellhead protection zone is the infiltration system(s) located in? Please review the site map on page 2. If any portion of the infiltration system is located across a wellhead protection zone boundary, the system will be considered to be in the lower numbered zone (i.e. if a system is in both zones 1 and 2, consider it to be in zone 1.). Infiltration systems located in Wellhead Protection Zones 3 and 4 are not required to complete this assessment.

Identify the zone where the infiltration system is and enter the points score.

Infiltration is located in Wellhead Protection Zone 1 (2 points)

Infiltration is located in Wellhead Protection Zone 2 (1 point)

Add comments within this section of the form, as you wish. If you have additional comments that will not fit on the form, please check the box and attach them.

4.2 Drinking Water Supply Well

Regulations require that there be an adequate distance between drinking water supply wells and stormwater infiltration systems to protect the groundwater. This is a protection for the user of the water supply well that may be drinking the water.

Regulations generally require infiltration systems to be a minimum of 100 feet from public or private drinking water supply wells.

Is there a drinking water supply well within 100 feet of your infiltration system? Answer the question on the form and enter the points score.

Yes, there is a drinking water well 100 feet or less from infiltration system (7 points)

No, there is no drinking water well 100 feet or less from infiltration system (0 points)

Add comments within this section of the form, as you wish. If you have additional comments that will not fit on the form, please check the box and attach them.

5.0: INFILTRATION SYSTEM DESCRIPTION

Under current stormwater standards, new infiltration systems are designed with pretreatment, water quality treatment, and adequate separation from groundwater in order to reduce the risk that stormwater contaminants will enter the groundwater. This section is used to evaluate to what extent the existing system may include these risk reduction elements.

5.1 Water Quality Pretreatment

For this question, you are asked to evaluate to what extent your system has “adequate” pretreatment. This judgment is site specific. Pretreatment systems are generally used to filter or remove some contaminants to protect the downstream stormwater treatment system to ensure that it is effective and is not clogged or fouled by leaves, oils and debris. Simple down-turned elbows in a catch basin are a very low cost measure that may help to capture floatable contaminants before they enter the infiltration system.

Other pretreatment systems are designed to address specific pollutants. Medium and High Pollutant Loading sites (See Table 1) generally require more advanced oil/water separators like American Petroleum Institute (API) also known as baffle type or coalescing plate (CPS) oil/water separators or other Ecology approved oil treatment option.

Does the infiltration system have pretreatment Best Management Practices (BMP's) and/or Oil Control BMP's installed upstream of the infiltration system?

- Simple Floatables Separators (Tees or down-turned elbows)
- Advanced Oil/Water Separators (API or CPS type)
- Sediment/Metals Reduction BMP's (settling pond, biofilter, media filter)

Based on your knowledge of the site, determine if the system has one of the three listed existing pretreatment methods.

Is existing pretreatment “adequate” to protect the water quality treatment system (Yes, 0 points)

If there is no pretreatment in place or it is not designed for the site specific risks, this would be considered “not adequate”. (No, 3 points)

Answer the question on the form and enter the points score.

Add comments within this section of the form, as you wish. If you have additional comments that will not fit on the form, please check the box and attach them.

5.2 Water Quality Treatment

For this question, you are asked to evaluate to what extent your site has “adequate” water quality treatment. This judgment is site specific. Water quality treatment is generally designed to remove site specific contaminants from stormwater before it is discharged. The Ecology Stormwater Manual provides guidance for many kinds of treatment, ranging from “**basic**” treatment that removes pollutants primarily by removing sediment (and pollutants

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attached to that sediment) to “**enhanced**” treatment that removes dissolved metals and other contaminants. Other “**enhanced**” site-specific treatment includes oil / water separators, or BMPs designed to remove phosphorous or dissolved contaminants.

Most infiltration systems designed prior to 1992 will **not** have “adequate” water quality treatment because water quality treatment to protect groundwater was not required at that time.

Water quality treatment is typically required for stormwater from pollution generating impervious surfaces like roads, manufacturing or process areas, driveways, and parking lots.

Treatment systems that are not designed to treat the site specific contaminants may receive only partial points for enhanced treatment.

System Identification

Most stormwater systems are fairly simple and can be determined by reviewing the “as-built” drawings for the facility. The City will likely be able to help you with identifying the type of treatment being used as well as with adequacy of your treatment.

Using the list on the Form, identify the type of treatment used at the site (if any) and make a judgment about whether or not that treatment is “adequate” and appropriate for the site specific contaminants.

Is there “adequate” treatment for the site specific contaminant sources? Yes (0 points)
If there is no treatment or it is not the correct treatment for the type of contaminant(s) at the site, enter No (7 points)

Enter the points score.

Add comments within this section of the form, as you wish. If you have additional comments that will not fit on the form, please check the box and attach them.

5.3 Treatment Bypass

For a water quality treatment system to be effective, stormwater must flow through it, and it must be properly sized to treat that flow. For this question you are to estimate to what extent the existing treatment is bypassed (**does stormwater flow pass or overflow this system without being treated**) during large storm events? Have you ever seen your system flood, or stormwater flow over the top of the treatment system? If yes, then treatment is probably being bypassed. The more often the treatment system is bypassed or overflowed, the less effective that treatment will be at removing contaminants. Generally, some bypass is considered acceptable, although if there is less bypass the risk to the groundwater is reduced.

If there is no treatment, then you select “**Always bypasses treatment**” (2 points).

If stormwater flows passed the treatment during large storm events a few times per year, then circle “**A few times per year...**” (1 point).

If stormwater almost never flows passed the treatment system, circle “**Almost never**” (0 points)

Estimate the amount of bypass, circle that answer, and enter a points score.

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Add comments within this section of the form, as you wish. If you have additional comments that will not fit on the form, please check the box and attach them.

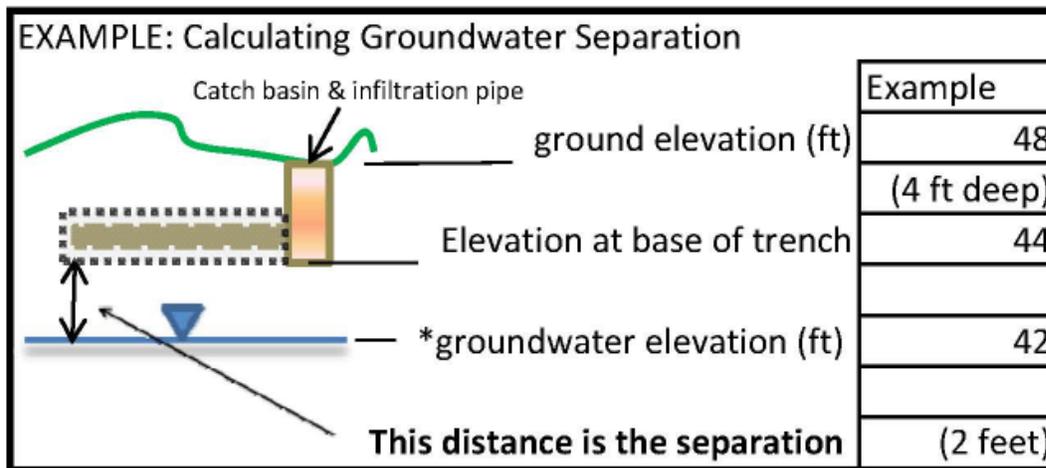
5.4 Separation

Risk of groundwater contamination is reduced the greater the distance that water must travel through soil from the infiltration system to the groundwater table. Actual in-soil removal of contaminants is highly dependent upon the type of soil through which the stormwater flows before it reaches groundwater. Silts, clays, fine sands, and loams provide the best contaminant removal. Sand and gravel provides poor treatment of stormwater.

Typically stormwater infiltration systems are required to have a minimum of 5 feet of separation between the bottom of an infiltration system and the seasonal high elevation of the groundwater table. This distance may be reduced through careful evaluation of the stormwater treatment, groundwater and the soils at the site.

As noted above, 5 feet of separation is required. As little as 3 feet may be acceptable **if the proper soils are present and an engineering analysis is performed**. Less than 3 feet is generally prohibited.

What is the distance between the bottom of your infiltration system and the seasonal high elevation of the groundwater? Examples are illustrated below and on the Form. The City may be able to provide additional information on groundwater depth and infiltration system construction for your site. The City has maps on-line at www.redmond.gov/groundwater that will give you an indication of the [depth-to-groundwater](#) and [groundwater elevations](#) in your area. The construction specifications for your stormwater system will be on the engineering drawings or “as-built” drawings for your site. (Survey elevations and datum may vary! The City has adopted NAVD 88 as its Vertical Datum effective 2009)



* Groundwater elevation is the seasonal High groundwater elevation (wet winter)

Estimate the separation in feet, circle the appropriate answer, and enter a point score on the form. Provide an explanation of how you arrived at your answer.

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What is the distance between the bottom of your infiltration system and the seasonal high elevation of the groundwater?

Less than 3 feet (7 points) Between 3 and 5 feet (3 points) Greater than 5 feet (0 points)

Add comments within this section of the form, as you wish. If you have additional comments that will not fit on the form, please check the box and attach them.

5.5 Construction and Modification History

Please provide information about the original construction of the stormwater infiltration system. If you have any information to add regarding any modifications to the infiltration system please describe the modifications here.

Please describe what modifications have been made to your stormwater system since it was originally installed. When were the modifications made? Please provide any engineering drawings, design documents or as-built drawings that you think would be helpful in determining the treatment capabilities of your modified stormwater system.

No points are applied to this question.

5.6 Verification Groundwater Monitoring

Periodic collection and analysis of groundwater samples close to a stormwater infiltration system may be the most accurate way to verify its effects on the groundwater. A comprehensive, City-approved verification groundwater monitoring program can demonstrate the reduced risk to groundwater.

A comprehensive, City-approved verification groundwater monitoring program may include at a minimum:

1. Preparation of a Quality Assurance Project Plan.
2. Approval of the verification groundwater monitoring program by the City.
3. Sampling a minimum of 3 groundwater monitoring wells.
4. Conducting frequent sampling and analysis of the stormwater and monitoring wells.
5. Comparing the results to State and Federal drinking water and groundwater standards and routine reporting to the City.

An example groundwater monitoring program on a site at risk mainly from vehicle traffic may include chemical testing for, copper, zinc, lead, and fuel/oil products such as petroleum hydrocarbons, Oil and Grease, and volatile components such as benzene (a component of gasoline). A more comprehensive discussion of groundwater monitoring requirements is attached as Section 9.0.

If after the first year, the groundwater monitoring and analysis results are below the groundwater quality standards, testing may be reduced to a semi-annual or annual monitoring upon demonstration of the treatment systems effectiveness in treating stormwater. Annual monitoring and reporting should occur during the rainy season.

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Question: Is a groundwater monitoring program in place to monitor groundwater quality immediately down gradient of the infiltration system?

- No** Absence of a monitoring program will receive (0 points).
Alternate An alternate monitoring program is in place (estimate points).
Comprehensive A comprehensive groundwater monitoring program will receive (-7 points).

Final points deductions between 0 and -7 points for alternate monitoring programs will be determined by the City based on the results of the testing and the appropriateness and effectiveness of the alternate monitoring program.

Circle the answer, and enter a points score.

If yes, please describe and provide existing monitoring results. Provide a copy of your sampling and analysis plan or quality assurance plan if available.

Add comments within this section of the form, as you wish. If you have additional comments that will not fit on the form, or would like to attach a copy of your state waste discharge or NPDES permit, please check the box and attach them.

6.0: Risk Reduction

The applicant may request a reduction in the calculated risk score by demonstrating their current risk, as the facility exists right now, has been reduced either by 1) mitigating circumstances for that particular risk element or 2) through the implementation of BMPs already in place that result in additional protection to groundwater..

This is an assessment of your facility, as it exists now. This section provides an example of things that you may already be doing and for which you may be able to take credit. It is not meant to address all the factors from the previous five sections of this assessment, but represents innovative risk reduction factors that already exist at your facility. **Do not include measures that you plan to implement in the future**, see section 7.0.

The following examples of risk reduction measures are provided with an **estimate** of what points might be reduced from a score if those measures are already being successfully implemented. If you have put these or other risk reduction, pollution prevention measures in place, describe them on the form. Using this guidance, enter a points score in the points column. There may be many other risk reduction measures in use at various facilities. If your facility implements a unique or extraordinary risk reduction measure, please describe it in the comments section and justify your proposed point reduction.

Public / Employee Education Program for Groundwater Awareness (-1)

A facility provides a comprehensive program for educating employees, residents, and visitors about the presence of the stormwater infiltration system and what activities may represent a risk to groundwater. Education programs may include meetings, signage, catch basin stenciling, lease requirements, etc.

Frequent Parking Lot Sweeping (-1)

Enhanced parking lot sweeping is conducted with vacuum sweepers at a frequency appropriate for site uses.

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Mitigate for chemical use (-1)

The use of deicers, pesticides or chemical dust control agents has already been reduced according to a written plan. No large quantities of chemicals are applied, however a small amount of salt is applied to sidewalks or walking areas (less than 1000 square feet) infrequently. Good lawn or landscape care combined with mechanical weed removal is used as primary weed control with infrequent use of herbicides that are sparingly applied by hand to control recalcitrant weeds. This is also called an integrated pest management program (IPM).

Other Risk Reduction measures might include:

Vehicle washing or fueling is conducted in an area that is designed to collect wash water/spills and direct them to the Sanitary Sewer.

Hazardous materials are already stored in secondary containment and under cover.

7.0: CERTIFICATION, POINTS TOTAL, AND WHAT HAPPENS NEXT

Referring back to the assessment form, total the points scored in each of the sections of the form in the right hand column. Total them at the bottom of the last page. Note that there are no points for item 5.5, and you will subtract points (if any) from items 5.6 and 6.0. Calculate your points total and sign the form. **A legally authorized representative of the owner must sign the form.**

Please complete ALL sections of the Assessment. Thoroughly read the instructions. If you cannot complete a section, call the City representative at 425 556-2756 for assistance or an appointment for assistance. Incomplete or unsigned assessment forms will be returned and may not qualify for incentives if submitted late.

Make a copy of the form for your records and mail or deliver the completed form to the City along with any of your supporting documentation and attachments.

What Happens After I've Completed the Assessment?

The City will review the Assessment Forms from all the properties located in Wellhead Protection Zones 1 and 2. The City will evaluate each form and will meet with the owner to review the information and determine the final assessment score, appropriate BMPs, potential mitigation or modifications specific to each facility and a schedule for implementation. The City will detail these requirements and the final assessment in an Authorized Work letter that will be sent to each owner with the review of their Assessment Form.

Generally speaking, existing stormwater infiltration systems with an overall risk score of 0-7 are lower risk. These sites will be required to implement groundwater protection BMPs and prepare a written stormwater pollution prevention plan or equivalent plan to ensure that BMPs are properly maintained.

Systems with higher risk scores, over 7 points, are considered a potential significant groundwater hazard. City staff will work with owners to develop a modification plan and schedule for reducing their risks and risk scores. These facilities will also be expected to implement BMPs and a written stormwater pollution prevention plan to protect groundwater quality while the modification plan is being developed.

The following criteria will be used to assess the overall risk that the infiltration system poses to groundwater:

<u>Overall Risk Score</u>	<u>Risk Assignment</u>
0-7	<u>Low</u> - BMPs Required
8 or higher	<u>High</u> - Modification and/or BMPs Required

This assessment will be the primary tool with which City staff and owners develop risk reduction strategies for individual sites. This means that as we work together to assess what modifications are appropriate or possible at a site and develop a plan to move forward with those modifications. **Do not undertake construction of mitigation or modification projects before coordinating with the City and applying for appropriate permits.**

All Facilities to Implement Best Management Practices (BMPs)

Under the current municipal code, all facilities with stormwater infiltration are required to implement operational and structural source control BMPs to protect groundwater and stormwater quality. Facilities shall implement BMPs that are practicable for the site and provide an appropriate level of additional protection to the aquifer relative to the implementation cost. The primary standard to be used for determining appropriate BMPs for these sites is Chapter 2, Volume IV of the 2005 Ecology Storm Water Management Manual (SWMM) for Western Washington. The SWMM is a guidance document and will be used as such. The City will work with individual owners to help them evaluate appropriate BMPs based on the risks present at their site. A Stormwater Pollution Prevention Plan (SWPPP) or risk based equivalent plan will be required for each facility. The SWPPP will list the pollution prevention measures, maintenance requirements and schedule, and the person responsible to maintain the stormwater system. The complexity of this plan will vary with the size and complexity of the operations at the individual facility.

Future Modifications

Modifications to existing stormwater infiltration systems will be discussed during your meeting with the City. You may also contact a stormwater engineer to help you evaluate potential stormwater treatment options or practices that may be changed to help reduce the risk to groundwater. Below are some examples of modifications a site might make to reduce its risk.

These are just a few examples of the types of modifications that may be made at a facility; many more site specific modifications are available. It is important to consult with the City and an Engineer prior to implementing any changes to your existing stormwater system as the listed treatment options may not be applicable to all situations and City, State and/or Federal requirements must be met and permits will likely be required.

Potential point reductions are listed to the right:

Engineered Treatment Soils Installation (-3 to -7 points)

An engineer could design a soil treatment layer to be installed in a pond or bio-swale that then infiltrates the treated stormwater. This soil treatment layer will likely require periodic replacement. An engineering study describing the designed soil thickness and treatment purpose, would be required to demonstrate this treatment.

Advanced Catch Basin Filter Insert (up to -6 points) small residential use only

Catch basin inserts do not provide Basic Treatment, but may be useful at some residential facilities in reducing the contaminants in stormwater. Inserts can be maintenance intensive, but capital costs may be lower than retrofitting sites with traditional stormwater treatment systems. ClearWater*, Aqua Shield* and Kristar* make various catch basin inserts. To get credit for this BMP, manufacturer information documenting that this product is effective for your specific onsite pollutants is required.

**The City does not endorse any product or manufacturer, but is merely using these names as an example. Other comparable products may be available from other companies.*

Eliminate high risk uses (-7)

- Hazardous waste or treated lumber storage can be moved indoors or into covered secondary containment areas.
- Fleet vehicle washing can be moved to a contained area that drains to the sanitary sewer.
- Motor vehicle maintenance areas can be moved under cover, within secondary containment or site specific pre-treatment can be provided to mitigate for pollution risks.
- Fueling areas can be covered and bermed to prevent contact with stormwater.
- Separate process water from stormwater and discharge it to the sanitary sewer or other approved disposal method.

Reduce hazardous materials quantities or store properly (up to -7)

Hazardous materials and deleterious substances are a risk factor that can be greatly mitigated through proper storage, reduction in quantity, and good onsite management

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practices. Process changes can be made that eliminate the use of hazardous materials and replace them with non-toxic alternatives. Hazardous wastes or materials can be moved into a covered, secondarily contained storage area.

Mitigate for chemical use (-1 to -2) Reduce or eliminate the use of chemicals, deicers, or dust control agents replacing them with inert materials such as sand or water, respectively. Large scale application of de-icers on roads, parking lots or on large sidewalk areas (greater than 1000 square feet) represent a higher risk and should be mitigated through use reduction or selection of less hazardous materials. Develop, document and implement an integrated pest management program (IPM).

Additional Risk Reduction Methods that may mitigate risk.

- Relocating risky activities outside the infiltration system drainage area (or placing them undercover or indoors). **This could reduce point scores in Sections 3.2, 3.3, 3.4, 3.5 of the form.**
- Relocating infiltration systems outside of Wellhead Protection Zones 1 and 2. **This could reduce all the points for this assessment.** (Groundwater protection measures will still be required in other areas of the City and any new stormwater infiltration system will be required to meet City, State and Federal stormwater and groundwater protection codes and regulations).
- Connecting high risk portions of the site to City of Redmond storm sewer or sanitary sewer (with appropriate treatment). **This could reduce some or all the points.**
- Connect to the City stormwater system or regional facility (replace the infiltration system). **(All the points)**
- Relocate infiltration system from wellhead protection zones 1 to 2 **(1 point)**
- Retrofit a site to include stormwater quality treatment designed for the six-month storm. **(7 points for water quality treatment + 1 point for bypass = 8 points)**
- Implement a verification groundwater monitoring program as described in Section 6. **(up to 7 points).**
- Add risk reduction factors like those shown in Section 6 **(up to 7 points).**

Note that if you anticipate conducting a Development or Redevelopment project on your property in the near future, infiltration will not be allowed from pollution generating surfaces in Wellhead Protection Zones 1 and 2 under the City's current stormwater regulations. If you plan to re-develop or develop your property in the near future please make special note of this during your meeting with the City.

Sites Requiring Modification

In accordance with Redmond Municipal Code 13.07.100, infiltration systems that are determined through this assessment process to pose a significant groundwater hazard are to be modified or decommissioned to protect groundwater quality. Infiltration systems with high risk uses that are unable to modify or eliminate the prohibited use, or maintain adequate groundwater separation, must be replaced.

The primary guidance for evaluating and selecting modifications is the 2005 Ecology SWMM as adopted within the current City of Redmond Clearing, Grading, and Stormwater

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Management Technical Notebook and the Washington Department of Ecology Guidance for UIC Wells that Manage Stormwater.

For many infiltration systems, it may be possible to implement **modifications** that reduce the risk. The goal of the modification process will be to reduce each infiltration system's risk level to less than 8 points and implement permanent measures to protect groundwater quality. The City recognizes that these are **existing** infiltration systems and that risks to groundwater may be reduced by application of risk mitigation measures, BMPs and modifications that are not strictly in conformance with the 2005 SWMM. The City has identified several risk reduction factors for existing sites that would not be permitted for new development projects. Examples of such alternative risk reduction efforts include: 1) treatment of the six-month storm prior to stormwater infiltration; 2) catch basin inserts; 3) public or employee education. The City is open to discussion of the merits of other proposed risk reduction factors proposed by applicants who are most familiar with their site operations and processes.

Owners may also **decommission** their stormwater infiltration system to reduce risk to the groundwater. In such cases, the owner must replace the system with an alternative stormwater system that meets applicable City of Redmond Codes and Requirements. This may include a different infiltration system, designed and constructed in accordance with the SWMM as adopted by the Redmond Clearing, Grading and Stormwater Technical Notebook, or connection to the public storm system where capacity is available. On-site detention and/or treatment may be required if the existing/planned public stormwater system does not provide detention and/or water quality treatment.

City staff will be available to assist owners to determine if their proposed BMPs, modifications or decommissioning will require City permits. Clearing & Grading permits will be required for most projects. Planning permits may be required for projects modifying landscaping, parking or critical areas. Other permits may be required for larger projects or projects adjacent to streams or wetlands. Permit Fees are not charged for City required modifications.

Groundwater Protection Incentives

Investing in groundwater protection is a wise investment. Pollution prevention can cost 100 times less than it costs to clean up contamination once it has reached groundwater.

To help put that prevention in place and ensure a safer drinking water resource, the City has developed a groundwater protection incentive program to help offset the cost of constructing stormwater infiltration modification projects. The City will provide up to 50% to 75% reimbursement for projects completed on schedule.

To be eligible you must:

- Submit your completed Assessment Form by the deadline.
- Complete the BMPs for stormwater protection detailed in the Authorized Work letter issued by the City,
- Complete the Authorized stormwater infiltration system modifications approved in the Notice to Proceed letter and have them inspected by a City inspector,

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- Work must be completed, inspected by the City and record drawings submitted in accordance with the schedule in the Authorized Work letter and subsequent letters from the City.
- Submit your supporting records to the City for reimbursement.

Who pays for the Groundwater Protection Incentive Program?

The City of Redmond has earmarked funds from the water utility to pay for this incentive program.

What costs can be reimbursed?

The incentive program can reimburse up to 50 to 75 percent of approved costs (depending on the site score) – to implement groundwater protection measures. The steps taken by an owner must be based on recommendations from the City representatives and could include:

- Construction and installation of structural stormwater BMPs
- Engineering design of stormwater modifications
- Purchasing equipment to clean stormwater
- Constructing or decommissioning stormwater infiltration system modifications
- Permit fees

Permits

Before conducting any construction activities on your site associated with stormwater infiltration modifications, you must apply for appropriate permits from the City. It's important that any modifications you make are constructed according to relevant engineering and safety codes, as well as ensuring that changes to your stormwater system are safe and will not impact your property or neighboring properties adversely. A Clearing and Grading permit will be required for most projects that involve "breaking ground".

In order to help reduce the financial burden on owners and create an additional incentive to build groundwater protection projects, the City will **eliminate permit review fees** for existing stormwater infiltration system modification, replacement and decommissioning projects associated with existing stormwater infiltration systems.

Schedule for Assessment Form Submittal

The Assessment Form must be completed and submitted to the City no later than February 3, 2011. We encourage you to complete the assessment well in advance of the deadline in order to take full advantage of the incentives program.

BMPs are already required by City stormwater code and the wellhead protection ordinance, any outstanding BMPs shall be implemented within 90 days after receiving an Authorized Work Letter from the City.

Each owner will have the opportunity to meet with City of Redmond to review their assessment and determine the appropriate mitigation and modification measures and a schedule for implementation.

The City will place a high priority on the permit review of existing stormwater infiltration system modifications and retrofitting. Steps have been taken to streamline the review

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process, reduce review times and eliminate fees, especially for simple projects. Some facilities, due to their location near critical areas or due to the type of changes that will be required may take a considerable time to complete the permitting. The City will make every effort to minimize this burden; however, certain environmental regulations require review periods and consultation with agencies outside of the City of Redmond's control.

Schedule for Assessment and Modification:

Site Ranking: Assessment scores will be ranked and divided into 3 groups based on their score. Sites with the highest risk to groundwater will start work on their facilities first:

- **Group One** parcels with scores of 19 and higher will receive notification letters between October 2013 and October 2014.
- There are approximately 25 parcels in group one.
- Work will be completed between 2013 and 2017
 - If all work is completed within 2.5 years of notification, owner will be eligible for reimbursement of 75% of approved costs.
 - If all work is completed in over 2.5 years and less than 3.5 years, owner will be eligible for reimbursement of 50% of approved costs.
 - There will be no reimbursement for work completed after 3.5.

- **Group Two** parcels with assessment scores of eight to 18 will receive notification letters for beginning work in January 2018.
- There are approximately 60 parcels in this group.
- Work will be completed between 2018 and 2022
 - Between 2013 and 2018, Group 2 owners will be required to implement stormwater best management practices to protect groundwater.
 - City approved modifications will be eligible for reimbursement of 60% of approved costs for work completed within 4.0 years of notification.
 - There will be no reimbursement for work completed after 4.0 years.

- **Group Three** parcels with scores seven and below will not be required to modify their systems but will be required to meet appropriate stormwater best management practices.

Closing

Thank you for completing the Stormwater Infiltration System Assessment Form and helping to protect our groundwater. This document was prepared with the considerable assistance and input of the Stormwater Infiltration Technical Advisory Group, a volunteer group of business leaders, Chamber of Commerce representatives and City staff who dedicated many hours of time to help ensure that this Assessment meets our collective goals: 1) protecting the drinking water resource, 2) supporting property owners who are doing their part to help protect the drinking water resource, and 3) providing a positive business environment within the City of Redmond.

City staff will be contacting you to review your answers and develop a plan that is reasonable and protective of our drinking water resource. Between now and your initial contact from the City, you may consider your site and how you might be able to reduce the site's risk score. This assessment is the primary tool by which the City is assessing risk, so it can be a guide for the kinds of things that you could do to modify your site or your practices to reduce your site's risk. Please consider making a list of measures you might be able to put in place at

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your site and bring your list to the assessment review meeting. In addition, if you have an engineer or consultant that is knowledgeable about your stormwater system or operations, you may wish to bring them to the assessment review meeting.

Thank you again for your participation in this important process. If you want more information about the City's Wellhead Protection Stormwater Infiltration Assessment Program, please visit us at <http://redmond.gov/groundwater>, email groundwater@redmond.gov, or call Kevin Murphy at (425) 556-2756.

Please send completed form to:
City of Redmond
Wellhead Protection Program
P.O. Box 97010
REDMOND, WASHINGTON 98073-9710
You may fax the form to FAX (425) 556-2820`

8.0 Definitions

The following definitions are provided to assist in clarifying the meaning of questions you will find in the Form.

“Aquifer” is a body of soil or rock that contains sufficient saturated material to conduct groundwater and yield useable quantities of groundwater to springs and wells.

“Best Management Practice” (BMP) - means approved physical, structural, and/or managerial practices that, when used singularly or in combination, prevent or reduce pollutant discharges.

“Critical Aquifer Recharge Areas” (CARA) are areas, defined under the provisions of the Growth Management Act ([Chapter 36.70A RCW](#)), where an aquifer that is a source of drinking water is both highly susceptible and vulnerable to contamination. Areas with a high susceptibility to groundwater contamination occur where an aquifer is used as a drinking water source and a combination of the following occur(s): permeable soils, permeable surficial geology, and/or groundwater close to the ground surface

“Deleterious Substances” include, but are not limited to, chemical and microbial substances that are not classified as hazardous materials under RCDG 20A.20.080 , whether the substances are in usable or waste condition, that have the potential to pose a significant groundwater hazard, or for which monitoring requirements or treatment-based standards are enforced under [Chapter 246-290 WAC](#).

“Drywells” are UIC wells completed above the water table so that the bottom and sides are typically dry except when receiving fluids. Drywells may be stand-alone or as part of a larger drainage system, such as the overflow for a bio-infiltration swale or other stormwater treatment BMP.

“Ecology” means the Washington State Department of Ecology

“Groundwater” Water in a saturated zone or stratum beneath the surface of the land or below a surface water body.

“Hazardous Materials” Any hazardous waste, hazardous substance, dangerous waste, or extremely hazardous waste that is a physical or health hazard as defined and classified in Chapter [70.105 RCW](#) and Chapter [173-303 WAC](#), whether the materials are in usable or waste condition. Hazardous materials shall also include petroleum or petroleum products that are in a liquid phase at ambient temperatures, including any waste oils or sludges. **(For the purpose of this document, when Hazardous Materials are referred to, it also includes Deleterious Substances).**

“High threat to ground water” means, for this chapter, a UIC well is a high threat to ground water when it receives fluids that cannot meet the criteria in chapter 173-200 WAC Water quality standards for ground waters of Washington (GWQS) at the top of the aquifer, which

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include, but are not limited to, the following examples: A UIC well that receives drainage, that has not been pretreated and does not meet the GWQS; such as, from an area where storm water comes into contact with a vehicle fueling area, airport deicing activities, storage of treated lumber or vehicle washing; or a UIC well that receives a discharge that is determined to be an imminent public health hazard by a legal authority or is prohibited in this chapter.

"Monitoring well" means a well designed to obtain a representative groundwater sample or designed to measure the water level elevations in either clean or contaminated water or soil.

"Operator" means any person or persons in control of, or having responsibility for, the operation of a facility.

"Owner" means, for purposes of this chapter, a person or persons with a vested ownership interest in a facility, including a leasehold interest, but does not include persons holding only contingent interests or security interests in all or a portion of the facility.

"Person" means an individual, firm, association, joint venture, partnership, municipality, government agency, political subdivision, industry, public or private corporation, owner, lessee, tenant, or any other entity whatsoever.

"RCDG" means the Redmond Community Development Guide

"RCW" means the Revised Code of Washington

"Retrofit" means taking actions to reduce the pollutant load from a UIC well to meet the statutory requirements of 40 CFR 144.12 and RCW 90.48.010. These actions may include, but are not limited to: Changes to the source control activities and/or structures around the well; an upgrade to the well such as adding a catch basin or spill control device; and/or addition of pretreatment facilities or decommissioning. The selection of actions is based on local priorities, required by the department or the local jurisdiction to address a documented water quality problem.

"RMC" means Redmond Municipal Code

"Secondary Containment" Containment designed to hold an unauthorized release external to a primary container.

"Significant Groundwater Hazard" A condition in which there is a reasonable probability of release of a hazardous material or deleterious substance and the material or substance is or can be transferred to a liquid phase that is mobile in both soils and groundwater.

"System Protective of Groundwater" A system at a facility that serves to protect groundwater quality, including, but not limited to, stormwater systems, wheel wash systems, and secondary containment systems associated with hazardous materials.

"Subsurface infiltration systems" include drywells, pipe or French drains, drain fields, and other similar devices that are used to discharge stormwater directly into the ground.

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“Time-of-Travel Zone” The delineated area within which groundwater moves towards, and eventually reaches, a water supply well within a given period of time.

“Unauthorized Release” Any intentional or unintentional spilling, leaking, emitting, discharging, escaping, leaching, or disposing of any hazardous material or other deleterious substance into groundwater, surface water, surface soils, or subsurface soils not permitted under federal, state, or local law.

“Underground Injection Control” (UIC) well is a manmade subsurface fluid distribution system designed to discharge fluids into the ground and consists of an assemblage of perforated pipes, drain tiles, or other similar mechanisms, or a dug hole that is deeper than the largest surface dimension (WAC 173-218-030).

“WAC” means Washington Administrative Code

“Well” For the purposes of administering Chapter 20D.140 RCDG, Critical Areas, a bored, drilled or driven shaft, or dug hole whose depth is greater than the largest surface dimension that includes water wells, resource protection wells, instrumentation wells, dewatering wells, and geotechnical soil borings. For this purpose a well does not mean an excavation made for the purpose of obtaining or prospecting for oil or natural gas, geothermal resources, minerals, or products of mining, or quarrying, or for inserting media to repressure oil or natural gas bearing formations, or for storing petroleum, natural gas, or other products. (Ord. 2180)

“Wellhead Protection Zones” means land areas delineated by the City for purposes of safeguarding groundwaters that supply, or potentially supply, drinking water to wells operated by the City. A zone designated under guidance from the Washington Department of Health Wellhead Protection Program pursuant to [Chapter 246-290 WAC](#) to protect areas with a critical recharging effect on aquifers used for potable waters.

9.0 Verification Groundwater Monitoring Requirements

A comprehensive, City-approved verification groundwater monitoring program would include at a minimum the following elements:

1. Quality Assurance Project Plan describing the monitoring program and addressing site-specific contaminants that could be discharged to groundwater.
2. A minimum of three (3) groundwater monitoring wells. One (1) well will be located in an up-gradient position from the stormwater infiltration system for the purpose of defining background water quality conditions. Two (2) wells (minimum) will be located down-gradient of the infiltration system for the purpose of determining compliance within the groundwater. The down-gradient wells should be placed approximately one monitoring well per 50 to 100 foot length of the infiltration system and located approximately no more than 50 feet hydraulically down-gradient of the infiltration system. See the Monitoring Well Installation Guidance below. Wells should be placed in a generally triangular orientation to facilitate calculation of a groundwater gradient. Monitoring of the treated stormwater will also be required, when feasible, to determine treatment performance.
3. Frequent sampling of the monitoring wells, analysis of samples collected for contaminants that might be expected to enter the infiltration system, and reporting of results to the City. The wells should be monitored quarterly the first year for both depth to groundwater and water quality. Water quality testing will include those chemicals most likely to pollute groundwater based on an assessment of the site activities and chemicals stored or used within the drainage area. Samples should be collected by a trained sampler, using Environmental Protection Agency (EPA)/Ecology specified collection methods, and submitted to an Ecology accredited laboratory. Analyses should be conducted for the appropriate analytes using detection limits that will ensure detection of the target analytes for both EPA Maximum Contaminant Level (MCL) and secondary standards for drinking water (Safe Drinking Water Act) and Washington State Ground Water Quality Standards (GWQS) as adopted by the Washington Administrative Code (WAC) Chapter 173-200.
4. Approval by the City that the verification groundwater monitoring program meets the goals of the City's wellhead protection program and Implementation Guidance for Groundwater Quality Standards, Chapter 5.0 Monitoring Plan (Ecology publication #96-02 Revised October 2005 or current revision) .
5. If an exceedance of GWQS is identified, reporting, additional sampling, increased sampling frequency, and as appropriate, corrective measures to remedy the exceedance will be required.

An example groundwater monitoring program on a site at risk mainly from vehicle traffic, may include chemical testing for, copper, zinc, lead, and fuel/oil products such as petroleum hydrocarbons, oil and grease, and volatile components such as benzene (a component of gasoline). Monitoring programs will be site specific based on the use of the facility.

If after the first year, the groundwater monitoring and analysis results are below the MCL's/GWQS, testing may be reduced to a semi-annual frequency for one year. The following year may be reduced to annual monitoring upon demonstration of the treatment systems effectiveness in treating stormwater and continuing to meet the MCL's/GWQS. Annual monitoring and reporting will be required thereafter. Annual reporting should occur during the rainy season. Typically the most representative samples would be collected shortly after the first storm flush, typically in October or November.

MONITORING WELL INSTALLATION GUIDANCE

Monitoring wells should be professionally designed to provide accurate groundwater elevation data and allow for collection of representative groundwater samples. Monitoring well construction specifications should comply with Chapter 173-160 WAC and must be installed by a licensed well driller. Monitoring wells should be completed with 2-inch diameter, schedule 40 PVC. Monitoring wells screens should extend from just below the seasonal low water table for five feet. Screen slot and sand pack size should be suitable for the aquifer characteristics at each monitoring well location. Monitoring wells should be completed so that they are flush with the ground surface (or only very slightly raised to prevent accumulation of storm water) so that they do not impede foot or vehicular traffic. Permits are required to place a well within the City right-of-way (ROW).

All newly installed monitoring wells should be developed. Development should be accomplished by surging the water column and pumping groundwater until the turbidity of the groundwater stabilizes or is ≤ 25 NTU. Development may take place minimum of 24 hours after well installation.

A licensed surveyor shall establish the elevation (to 0.01 ft) and horizontal position (± 1 ft) of each monitoring well. A notch (not to exceed $\frac{1}{4}$ ") should be made on the top, north rim of each well casing. The top edge of the casing and ground surface elevation should be surveyed utilizing the following Survey Criteria:

- City of Redmond Vertical Control Datum, NAVD 88
- Redmond City Horizontal Control Notebook, 1993 – State Plane Washington North, Survey Feet, NAD 83/91 Harn
- All record drawings need to be tied into two City of Redmond control monuments
- Text file with the X, Y, & Z coordinates that can be easily formatted into MS Excel

GROUNDWATER SAMPLING GUIDANCE

Groundwater samples must be collected by a trained environmental technician familiar with sampling techniques and record keeping protocol. Groundwater samples should be obtained with a low-flow device such as the Sample Pro 3/4" Portable MicroPurge (bladder) Pump, peristaltic pump or similar device. The wells should be purged using a low-flow technique (pumping rate of no more than 500 milliliters per minute). If a purge rate of 100 ml/min cannot be maintained without reducing the water column within the well to less than one foot, the well should be pumped dry and the water that recharges into the well should be collected for analysis.

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Depth-to-water, flow rate, temperature, dissolved oxygen, specific conductivity, oxidation reduction potential, pH, and turbidity should be monitored in the field during well purging activities, prior to obtaining samples. A flow-through cell should be used for measurement of field parameters (other than turbidity). Field equipment requiring calibration should be calibrated to known standards in accordance with manufacturers' recommended schedules and procedures for each instrument. The wells should be purged until field parameters have stabilized. Stabilization should be based on a minimum two-minute measurement interval or the time it takes to completely purge the flow-through cell being used, whichever is greater. Stabilization is achieved after all parameters have stabilized for three consecutive readings according to the following:

- Temperature – 0.5°C
- Specific Conductivity – 5%
- pH – 0.2 units
- Dissolved Oxygen – 0.2 mg/L
- Turbidity - 10% or <5 ntu

One groundwater sample should be obtained from each of the monitoring wells or sampling points immediately after successful parameter stabilization. Unfiltered samples should be obtained. Groundwater samples must be appropriately preserved, logged on a chain of custody and provided to a State approved laboratory for appropriate analysis. Samples should be analyzed for the site specific contaminants using the appropriate EPA and/or Ecology analytic methods. Example methods include: Metals (total and dissolved; EPA 200.8 or equivalent), Volatile Organic Compounds (VOCs; EPA 8260B or equivalent), and Total Dissolved Solids (TDS; SM 2540C or equivalent). The list of metals should include arsenic, chromium, copper, lead, nickel, zinc, aluminum, cobalt, iron, manganese, vanadium, sodium, calcium, potassium and magnesium. One trip blank should be obtained and analyzed for volatile organic compounds only. Other analytic methods as appropriate for the site specific contaminants may be required.