



August 18, 2010

SUBJECT: Addendum to the Clearing, Grading and Stormwater Management Technical Notebook

Ladies and Gentlemen,

The City of Redmond has adopted the attached Addendum dated August 18, 2010 to the Stormwater Management and Erosion Control Technical Notebook. The main purpose of this addendum is to bring the City into Compliance with the Department of Ecology NPDES Phase 2 Permit issued to the City January 17, 2007. In addition, the requirements for regional facilities have been updated to reflect Ecology's approval of the City's regional stormwater facility program. The Addendum replaces all of Chapter 2 of Issue 5 of the Stormwater Technical Notebook. Chapter 15.24 of the Redmond Municipal Code has also been updated to reflect changes required by the City's NPDES Permit coverage.

This addendum is effective August 18, 2010 for all projects vested on or after that date. For projects vested prior to August 18, 2010, the Notebook effective at the vesting date still applies.

If you have any questions please contact Lisa Rigg, City of Redmond Stormwater Engineer at (425) 556-2758.

Sincerely,

City of Redmond
Public Works Department

ADDENDUM TO THE CLEARING, GRADING AND STORMWATER TECHNICAL NOTEBOOK, ISSUE 5

Effective August 18, 2010



CHAPTER 2: MODIFICATIONS TO THE 2005 DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON

2.1 Redmond Requirements

Clearing, grading, and stormwater management issues relating to construction are regulated by Chapter 15.24 of the Redmond Municipal Code and the Redmond Community Development Guide. Issues not addressed in the RCDG are regulated by the requirements of the Stormwater Notebook. The 2005 Ecology Manual as modified by the Western Washington Phase II Municipal Stormwater Permit, issued January 17, 2007, shall regulate issues not addressed in the Redmond Municipal Code, Redmond Community Development Guide, or the Stormwater Notebook.

This chapter is divided into two parts to address Department of Ecology requirements as well as issues specific to the City of Redmond. Volume 1, Chapter 2 of the 2005 Ecology Manual is replaced in full by Chapter 2, Sections 2.2 through 2.8 of the Stormwater Technical Notebook, as updated by this addendum. Section numbering of this chapter is intentionally the same as section numbering in the 2005 Ecology Manual (Volume 1, Chapter 2). Modifications and additions specific to the City of Redmond are in bold. Section 2.9 of Chapter 2 contains modifications to the remainder of the 2005 Ecology Manual to address work within the City of Redmond.

Key Modifications for Redmond

In accordance with the Ecology Manual, infiltration is encouraged for recharge or as a method of discharging surface water as an option in areas with highly permeable soils for clean runoff from sidewalks and roofs. However, due to wellhead protection concerns, all other infiltration proposals shall be evaluated by the Stormwater Engineer on a case-by-case basis.

Infiltration of water draining from pollution generating surfaces in single-family residential developments is allowed in Wellhead Protection Zones 1 and 2 following enhanced treatment in a BMP that is exposed to the surface (such as bioretention in view of sidewalks or roads). Infiltration of stormwater from pollution generating surfaces is prohibited in Wellhead Protection Zones 1 and 2 for all other uses. In Wellhead Protection Zone 3, infiltration for treatment is not permitted, but infiltration for flow control following treatment based on site use (per the requirements of the 2005 Ecology Manual) is allowed.

2.2 Exemptions

Forest Practices:

Forest practices regulated under Title 222 WAC, except for Class IV General forest practices that are conversions from timber land to other uses, are exempt from the provisions of the minimum requirements.

Commercial agriculture:

Commercial agriculture practices involving working the land for production are generally exempt. However, the conversion from timberland to agriculture, and the construction of impervious surfaces are not exempt.

Oil and Gas Field Activities or Operations:

Construction of drilling sites, waste management pits, and access roads, as well as construction of transportation and treatment infrastructure such as pipelines, natural gas treatment plants, natural gas pipeline compressor stations, and crude oil pumping stations are exempt. Operators are encouraged to implement and maintain Best Management Practices to minimize erosion and control sediment during and after construction activities to help ensure protection of surface water quality during storm events. These activities may be prohibited by 20D.140.50-030.

Road Maintenance:

The following road maintenance practices are exempt: pothole and square cut patching, overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage, shoulder grading, reshaping/regrading drainage systems, crack sealing, resurfacing with in-kind material without expanding the road prism, and vegetation maintenance.

The following road maintenance practices are considered redevelopment, and therefore are not categorically exempt. The extent to which this chapter applies is explained for each circumstance.

- Removing and replacing a paved surface to base course or lower, or repairing the roadway base; If impervious surfaces are not expanded, Minimum Requirements #1 - #5 apply. However, in most cases, only Minimum Requirement #2, Construction Stormwater Pollution Prevention, will be germane. Where appropriate, project proponents are encouraged to look for opportunities to use permeable and porous pavements.
- Extending the pavement edge without increasing the size of the road prism, or paving gravel shoulders; These are considered new impervious surfaces and are subject to the minimum requirements that are triggered when the thresholds identified for redevelopment projects are met.
- Resurfacing by upgrading from dirt to gravel, asphalt, or concrete; upgrading from gravel to asphalt, or concrete; or upgrading from a

bituminous surface treatment ("chip seal") to asphalt or concrete; These are considered new impervious surfaces and are subject to the minimum requirements that are triggered when the thresholds identified for redevelopment projects are met.

Underground utility projects:

Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics are only subject to Minimum Requirement #2, Construction Stormwater Pollution Prevention.

All other new development is subject to one or more of the Minimum Requirements (see Section 2.4 of this chapter).

2.3 Definitions Related to the Minimum Requirements

The following definitions are to help the end user of the Stormwater Notebook understand the application of Minimum Requirements.

Arterial – A road or street primarily for through traffic. A major arterial connects an Interstate Highway to cities and counties. A minor arterial connects major arterials to collectors. A collector connects an arterial to a neighborhood. A local access road connects individual homes to a collector.

Certified Erosion and Sediment Control Lead (CESCL) – means an individual who has current certification through an approved erosion and sediment control training program that meets the minimum training standards established by the Department of Ecology (see BMP C160 in the 2005 Ecology Manual). A CESCL is knowledgeable in the principles and practices of erosion and sediment control. The CESCL must have the skills to assess site conditions and construction activities that could impact the quality of stormwater and the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges. Certification is obtained through an Ecology approved erosion and sediment control source. Course listings are provided online at Ecology's web site.

***Clearing* – means the removal of timber, brush, grass, ground cover or other vegetative matter from a site which exposes the earth's surface or any actions which disturb the existing ground surface.**

Effective Impervious Surface – Those impervious surfaces that are connected via sheet flow or discrete conveyance to a drainage system. Impervious surfaces on residential development sites are considered ineffective if the runoff is dispersed through at least one hundred feet of native vegetation in accordance with BMP T5.30 – "Full Dispersion," as described in Chapter 5 of Volume V of the Ecology Manual.

Grading – means any action which changes the elevation of the ground surface. Grading includes, but is not limited to, dredging, landfills, excavations, filling, earthwork, embankments, etc.

Highway – A main public road connecting towns and cities.

Impervious surface – A hard surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development. A hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater. Open uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether the thresholds for application of minimum requirements are exceeded. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling.

Land disturbing activity – Any activity that results in movement of earth, or a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered a land disturbing activity.

Maintenance – Repair and maintenance includes activities conducted on currently serviceable structures, facilities, and equipment that involves no expansion or use beyond that previously existing and results in no significant adverse hydrologic impact. It includes those usual activities taken to prevent a decline, lapse, or cessation in the use of structures and systems. Those usual activities may include replacement of dysfunctional facilities, including cases where environmental permits require replacing an existing structure with a different type structure, as long as the functioning characteristics of the original structure are not changed. One example is the replacement of a collapsed, fish blocking, round culvert with a new box culvert under the same span, or width, of roadway. See also Road Maintenance exemptions in Section 2.2 of this chapter.

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

New development – Land disturbing activities, including Class IV –general forest practices that are conversions from timber land to other uses; structural development, including construction or installation of a building or other structure; creation of impervious surfaces; and subdivision, short subdivision and binding site plans, as defined and applied in Chapter 58.17RCW. Projects meeting the definition of redevelopment shall not be considered new development.

NTU – The letters “NTU” stand for Nephelometric Turbidity Units. These units are a quantitative measure of water clarity based on the scattering of a standard beam of light directed into a standard sample of the water. A higher reading means the sample is less clear (more cloudy/muddy). See also the definition for turbidity.

Pollution-generating impervious surface (PGIS) – Those impervious surfaces considered to be a significant source of pollutants in stormwater runoff. Such surfaces include those which are subject to: vehicular use; industrial activities (as further defined in the glossary); or storage of erodible or leachable materials, wastes, or chemicals, and which receive direct rainfall or the run-on or blow-in of rainfall. Erodible or leachable materials, wastes, or chemicals are those substances which, when exposed to rainfall, measurably alter the physical or chemical characteristics of the rainfall runoff. Examples include erodible soils that are stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage dumpster leakage. Metal roofs are also considered to be PGIS unless they are coated with an inert, non-leachable material (e.g., baked-on enamel coating).

A surface, whether paved or not, shall be considered subject to vehicular use if it is regularly used by motor vehicles. The following are considered regularly-used surfaces: roads, unvegetated road shoulders, bike lanes within the traveled lane of a roadway, driveways, parking lots, unfenced fire lanes, vehicular equipment storage yards, and airport runways.

The following are not considered regularly-used surfaces: paved bicycle pathways separated from and not subject to drainage from roads for motor vehicles, fenced fire lanes, and infrequently used maintenance access roads.

Pollution-generating pervious surfaces (PGPS) – Any non-impervious surface subject to use of pesticides and fertilizers or loss of soil. Typical PGPS include lawns, landscaped areas, golf courses, parks, cemeteries, and sports fields.

Potential hydraulic influence – Means surface runoff from the project would follow an identifiable conveyance route to surface water (including wetlands) and would not be infiltrated en-route.

Pre-developed condition – The native vegetation and soils that existed at a site prior to the influence of Euro-American settlement. The pre-developed conditions shall be assumed to be a forested land cover unless reasonable,

historic information is provided that indicates the site was prairie prior to settlement. **Historically the Sammamish River valley floor was pasture or wooded wetland. The map in Appendix N of the Technical Notebook identifies the historical land cover based on the City's research.**

Project site – The portion of a property, properties, or right of way subject to land disturbing activities, new impervious surfaces, or replaced impervious surfaces. **Projects that include improvements to an existing City right-of-way may consider the right of way as a separate project site, with approval of the City Stormwater Engineer, when determining Minimum Requirements.**

***Rainy season* – The period of time starting on October 1 of each year and ending April 30 of the following year. These dates may be adjusted by the Public Works Director based on climatic conditions for a particular year.**

Receiving waters – Bodies of water or surface water systems to which surface runoff is discharged via a point source of stormwater or via sheet flow.

Redevelopment – On a site that is already substantially developed (i.e., has 35% or more of existing impervious surface coverage), the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or other structure; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities.

Replaced impervious surface – For structures, the removal and replacement of any exterior impervious surfaces or foundation. For other impervious surfaces, the removal down to bare soil or base course and replacement.

Site – The area defined by the legal boundaries of a parcel or parcels of land that is (are) subject to new development or redevelopment. For road projects, the length of the project site and the right-of-way boundaries define the site.

Source control BMP – A structure or operation that is intended to prevent pollutants from coming into contact with stormwater through physical separation of areas or careful management of activities that are sources of pollutants. The Ecology Manual separates source control BMPs into two types. *Structural Source Control BMPs* are physical, structural, or mechanical devices, or facilities that are intended to prevent pollutants from entering stormwater. *Operational BMPs* are non-structural practices that prevent or reduce pollutants from entering stormwater. See Volume IV of the 2005 Ecology Manual for details.

***Stormwater Engineer* – The Stormwater Engineer is the reviewing authority who reports to the Public Works Director and represents the City for projects that involve stormwater management. City of Redmond Capital Improvement Projects are reviewed by a Stormwater Engineer within the Natural Resources**

Division of the Public Works Department. All other public or private projects are reviewed by a Stormwater Engineer in the Development Services Division of the Public Works Department.

Turbidity – The visual cloudiness of runoff, especially as caused by suspended solids and settle-able solids in runoff. Turbidity shall be measured as specified in Method 2130B of the following reference: Standard Methods for the Examination of Water and Wastewater. Current Edition. Franson, Mary Ann H., Managing Editor. Clesceri, Lenore S; Greenberg, Arnold E; and Eaton, Andrew D editorial board. Published jointly by the American Public Health Association, the American Water Works Association, and the Water Environment Federation.

Turbidity Meter – A portable, electric, hand-held measuring device designed to give a numerical value of the turbidity (cloudiness) of a sample of water. The numerical values are expressed in units know as Nephelometric Turbidity Units (NTUs).

Threshold Discharge Area – An onsite area draining to a single natural discharge location or multiple natural discharge locations that combine within one-quarter mile downstream (as determined by the shortest flowpath). The examples in Figure 2.1 illustrate this definition. The purpose of this definition is to clarify how the thresholds of this manual are applied to project sites with multiple discharge points.

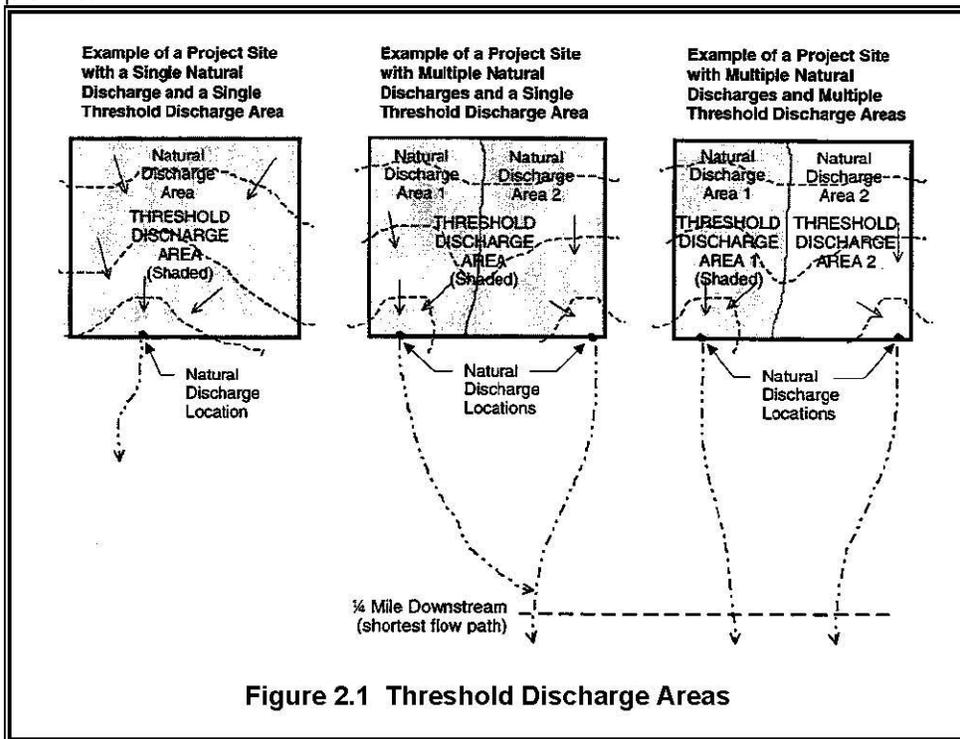


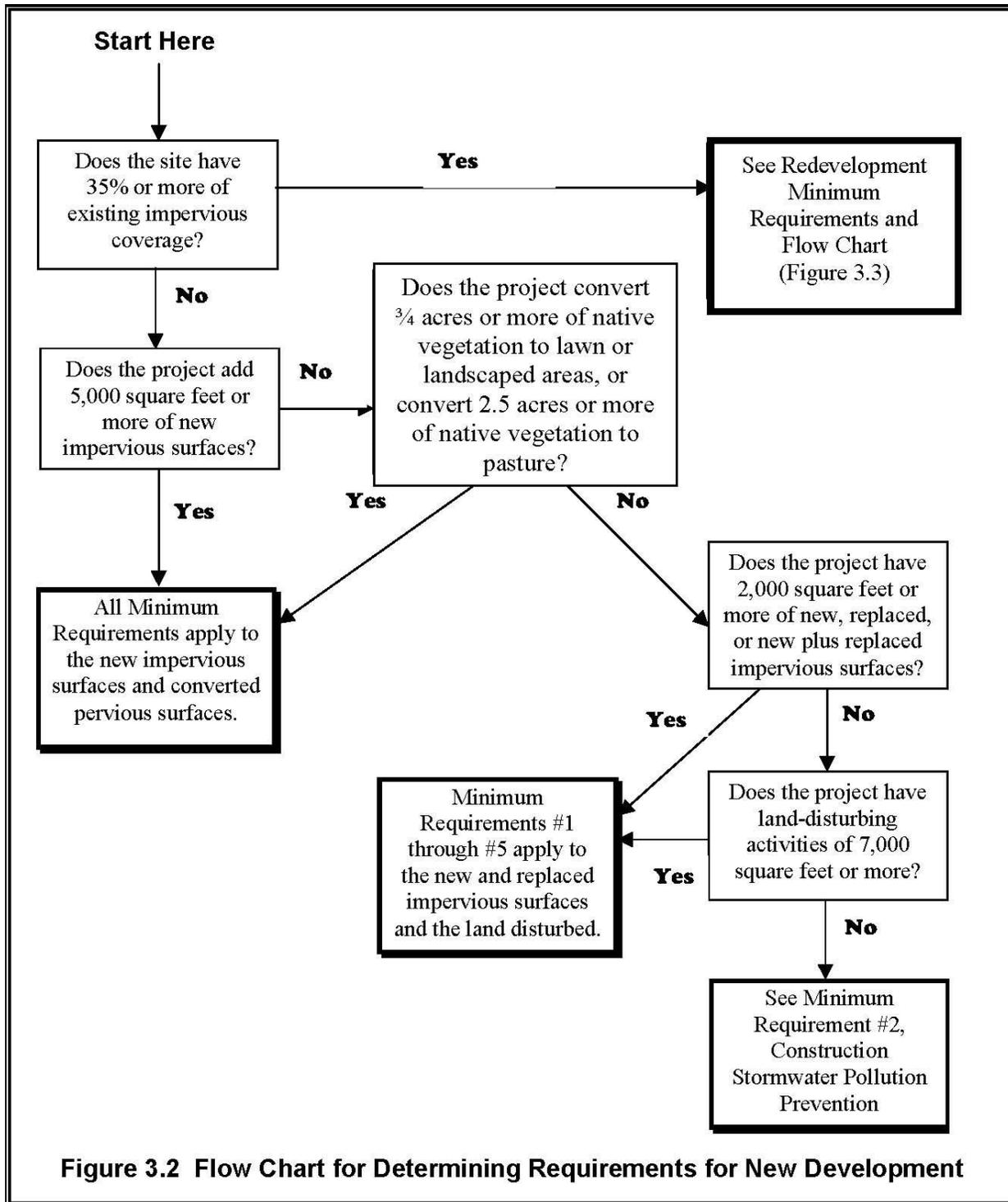
Figure 2.1 Threshold Discharge Areas

Wetland – Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands. **Note: This definition is only applicable to the 2005 Ecology Manual. A separate definition for all other uses is contained in the Redmond Community Development Guide.**

2.4 Applicability of the Minimum Requirements

Thresholds

Not all of the Minimum Requirements apply to every development or redevelopment project. The applicability varies depending on the type and size of the project. This section identifies thresholds that determine the applicability of the Minimum Requirements to different projects. The flow charts in Figures 3.2 and 3.3 (**from the NPDES Phase 2 permit**) can be used to determine which of the Minimum Requirements apply. The Minimum Requirements themselves are presented in Section 2.5. **Project proponents are encouraged to submit a copy of the flow charts indicating how they determined the Minimum Requirements applicable to their project.**



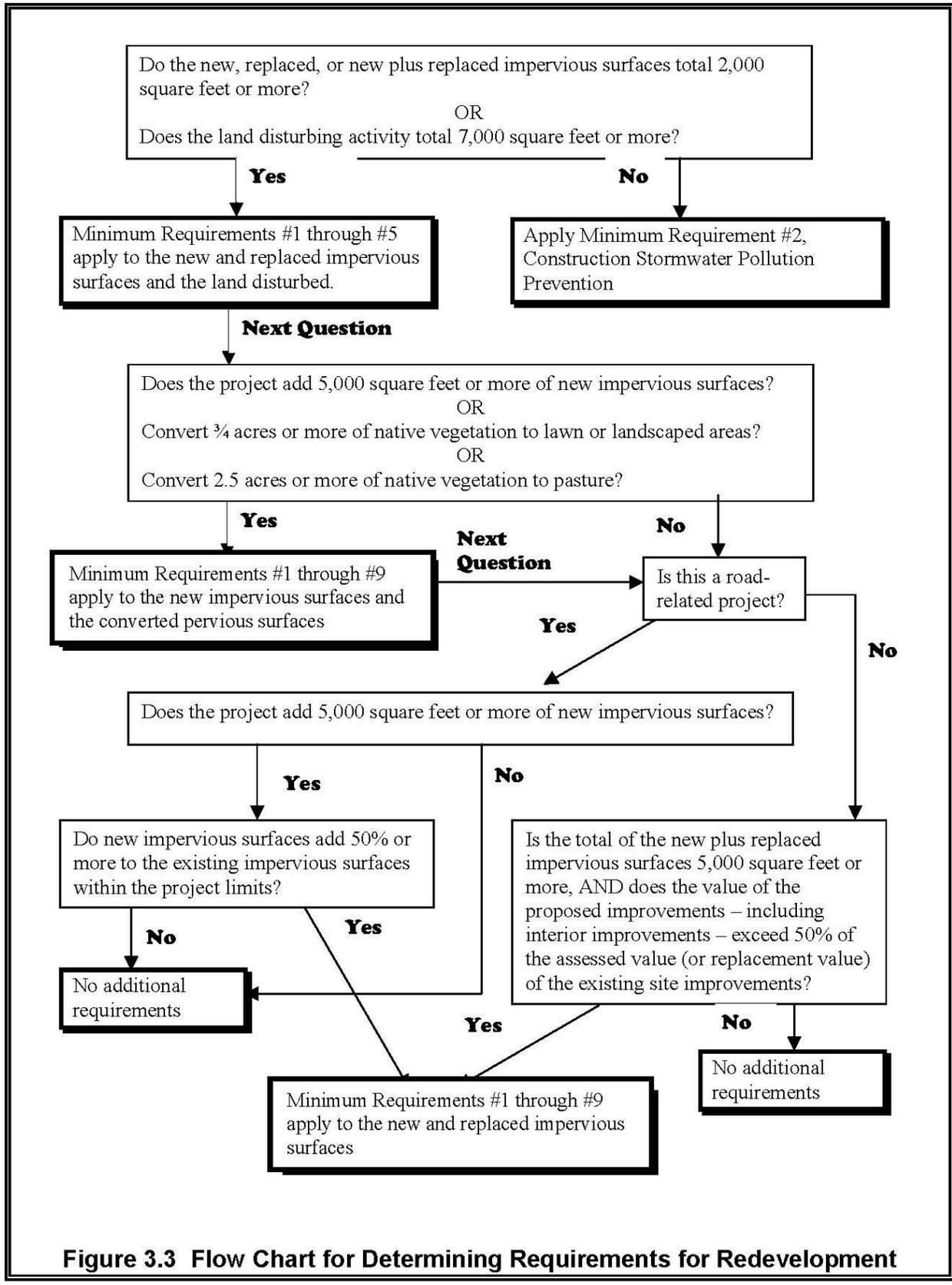


Figure 3.3 Flow Chart for Determining Requirements for Redevelopment

2.4.1 New Development

All new development shall be required to comply with Minimum Requirement #2.

The following new development shall comply with Minimum Requirements #1 through #5 for the new and replaced impervious surfaces and the land disturbed:

Creates or adds 2,000 square feet, or greater, of new, replaced, or new plus replaced impervious surface area, or

Has land disturbing activity of 7,000 square feet or greater.

The following new development shall comply with Minimum Requirements #1 through #9 for the new impervious surfaces and the converted pervious surfaces:

- Create or add 5,000 square feet, or more, of new impervious surface area, or
- Converts $\frac{3}{4}$ acres, or more, of native vegetation to lawn or landscaped areas, or
- Converts 2.5 acres, or more, of native vegetation to pasture.

2.4.2 Redevelopment

All redevelopment shall be required to comply with Minimum Requirement #2. In addition, all redevelopment that exceeds certain thresholds shall be required to comply with additional Minimum Requirements as follows.

The following redevelopment shall comply with Minimum Requirements #1 through #5 for the new and replaced impervious surfaces and the land disturbed:

- The new, replaced, or total of *new plus replaced* impervious surfaces is 2,000 square feet or more, or
- 7,000 square feet or more of land disturbing activities.

The following redevelopment shall comply with Minimum Requirements #1 through #10 for the new impervious surfaces and converted pervious areas:

- Adds 5,000 square feet or more of new impervious surfaces or,
- Converts $\frac{3}{4}$ acres, or more, of native vegetation to lawn or landscaped areas, or
- Converts 2.5 acres, or more, of native vegetation to pasture.

If the runoff from the new impervious surfaces and converted pervious surfaces is not separated from runoff from other surfaces on the project site, the stormwater treatment facilities must be sized for the entire flow that is directed to them.

With approval of the Stormwater Engineer, the Minimum Requirements may be met for an equivalent (flow and pollution characteristics) area within the same

site. For public roads' projects, the equivalent area does not have to be within the project limits, but must drain to the same receiving water.

If flow control/runoff treatment facilities are required of a City right-of-way project, project proponents are encouraged to purchase flow control/runoff treatment in regional facilities, if available.

Additional Requirements for Re-development Project Sites

For road-related projects, runoff from the replaced and new impervious surfaces (including pavement, shoulders, curbs, and sidewalks) shall meet all the Minimum Requirements if the new impervious surfaces total 5,000 square feet or more and total 50% or more of the existing impervious surfaces within the project limits. The project limits shall be defined by the length of the project and the width of the right-of-way.

Other types of redevelopment projects shall comply with all the Minimum Requirements for the new and replaced impervious surfaces if the total of new plus replaced impervious surfaces is 5,000 square feet or more, and the valuation of proposed improvements – including interior improvements – exceeds 50% of the assessed value of the existing site improvements.

Redmond does not have the “stop-loss” provision described in the 2005 Ecology Manual.

2.5 Minimum Requirements

This section describes the Minimum Requirements for stormwater management at development and redevelopment sites. Section 2.4 of this Chapter should be consulted to determine which of the minimum requirements below apply to any given project. Figures 3.2 and 3.3 should be consulted to determine whether the minimum requirements apply to new surfaces, replaced surfaces or new and replaced surfaces.

2.5.1 Minimum Requirement #1: Preparation of Stormwater Site Plans

A Stormwater Site Plan is required for all projects meeting the thresholds in Section 2.4 of this Chapter. Stormwater Site Plans shall be prepared in accordance with Chapter 3 of Volume 1 of the 2005 Ecology Manual.

2.5.2 Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan (SWPPP)

All new development, redevelopment **and maintenance** projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters. Projects subject to Minimum Requirement #2 are required to provide a Construction Stormwater Pollution Prevention Plan (SWPPP) as part of the Stormwater Site Plan (see Minimum Requirement #1). The SWPPP shall be implemented beginning with initial soil disturbance and until final stabilization.

Sediment and erosion control BMPs shall be consistent with the BMPs contained in chapters 3 and 4 of Volume II of the 2005 Ecology Manual and/or other equivalent BMPs contained in technical stormwater manuals approved by the Department of Ecology.

The SWPPP shall include a narrative and drawings. All BMPs shall be clearly referenced in the narrative and marked on the drawings. The SWPPP narrative shall include documentation to explain and justify the pollution prevention decisions made for the project. Clearing and grading activities for development shall be permitted only if conducted pursuant to an approved site development plan (e.g. subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. When establishing these permitted clearing and grading areas, consideration should be given to minimizing removal of existing trees and minimizing disturbance/compaction of native soils except as needed for building purposes. These permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas, buffers, native growth protection easements, or tree retention areas shall be delineated on the site plans and the development site.

Seasonal Work Limitations – From October 1 through April 30, clearing, grading, and other soil disturbing activities **shall require submittal of Wet Weather Plans for review and approval by Redmond’s Wet Weather Committee, as detailed in Chapter 10 of the Stormwater Technical Notebook.**

Based on the information provided and/or local weather conditions, the City of Redmond may expand or restrict the seasonal limitation on site disturbance.

Redmond may take enforcement action – such as a notice of violation, administrative order, penalty, or stop-work order under the following circumstances:

If, during the course of any construction activity or soil disturbance during the seasonal limitation period, sediment or contaminants leave the construction site causing a violation of the Washington State surface water quality standard or groundwater quality standard; or
If clearing and grading limits or erosion and sediment control measures shown in the approved plan are not maintained.

The following activities are exempt from the seasonal clearing and grading limitations;

Routine maintenance and necessary repair of erosion and sediment control BMPs;

Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil, and Activities where there is one hundred percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

Project proponents are required to notify the City of Redmond within 24 hours if a turbidity reading is 250 NTU or higher. Projects discharging water during construction in excess of 25 NTU are required to take immediate action, applying

additional temporary sediment and erosion control measures, to lower the NTU in runoff leaving the site below 25 NTU. If a site discharges directly to a surface water body, the NTU limit is based on the standards in WAC 173-201. In general, projects are not allowed to discharge sediment laden water to surface waters unless the background turbidity is not increased by more than 5 NTU. Project sites in seasonal suspension are still required to meet this requirement.

Construction Stormwater Pollution Prevention Plan (SWPPP) Elements

The construction site operator shall include each of the twelve elements below in the SWPPP and ensure that they are implemented unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the SWPPP. All BMPs shall be clearly referenced in the narrative and marked on the drawings. The SWPPP narrative shall include documentation to explain and justify the pollution prevention decisions made for the project.

1. Preserve Vegetation/Mark Clearing Limits:
 - a. Prior to beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.
 - b. The duff layer, native top soil, and natural vegetation shall be retained in an undisturbed state to the maximum degree practicable.

2. Establish Construction Access:
 - a. Construction vehicle access and exit shall be limited to one route, if possible.
 - b. Access points shall be stabilized with quarry spalls, crushed rock or other equivalent BMP to minimize the tracking of sediment onto public roads.
 - c. Wheel wash or tire baths shall be located on site, if the stabilized construction entrance is not effective in preventing sediment from being tracked onto public roads.
 - d. If sediment is tracked off site, roads shall be cleaned thoroughly at the end of each day, or more frequently during wet weather. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area.
 - e. Street flushing of sediment into stormwater systems is prohibited in Redmond.**

3. Control Flow Rates:
 - a. Properties and waterways downstream from development sites shall be protected from erosion due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site.
 - b. Where necessary to comply with Minimum Requirement #7, stormwater retention/detention facilities shall be constructed as one of the first steps in grading. Detention facilities shall be functional prior to construction of site improvements (e.g. impervious surfaces).

quality impacts that stabilization materials may have on downstream waters or ground water.

- g. Linear construction activities, including right-of-way and easement clearing, roadway development, pipelines, and trenching for utilities, shall be conducted to meet the soil stabilization requirement. Contractors shall install the bedding materials, roadbeds, structures, pipelines, or utilities and re-stabilize the disturbed soils so that: From October 1 through April 30 no soils shall remain exposed and unworked for more than 2 days; and From May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days.**

6. Protect Slopes:

- a. Design and construct cut and fill slopes in a manner that will minimize erosion.
- b. Reduce slope runoff velocities by reducing the continuous length of slope with terracing and diversions, reduce slope steepness, and roughen slope surface.**
- c. Off-site stormwater (run-on) or groundwater shall be diverted away from slopes and undisturbed areas with interceptor dikes, pipes and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.
- d. At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion. Temporary pipe slope drains shall handle the expected peak 10-minute flow velocity from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. The hydrologic analysis shall use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis shall use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model to predict flows, bare soil areas should be modeled as "landscaped area."
- e. Excavated material shall be placed on the uphill side of trenches, consistent with safety and space considerations.
- f. Check dams shall be placed at regular intervals within constructed channels that are cut down a slope.
- g. Provide drainage to remove groundwater intersecting the slope surface of exposed soil areas.**
- h. Stabilize soils on slopes, as specified in Element #5.**

7. Protect Drain Inlets:

- a. Storm drain inlets made operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment. Catch basins are considered operational when project**

proponents create a hole in the side of the drain inlet to allow for drainage when the road is below finished grade. Flows allowed to enter the drain through the created hole are not being treated unless the catch basin insert is installed to provide protection/treatment of runoff entering through the side of the catch basin.

- b. All approach roads shall be kept clean. Approach roads shall have inlet protection if they could be impacted by the construction site and at the discretion of the City inspector.**
- c. Inlet protection devices shall be cleaned or removed and replaced when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).
- d. When projects are completed, removal of inlet protection devices is required. Removal will be done in a way that does not allow the captured sediment to enter or later be washed into the stormwater inlet.**

8. Stabilize Channels and Outlets:

- a. All temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the following expected peak flows. Channels shall handle the expected peak 10-minute flow velocity from a Type 1A, 10-year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6 may be used. The hydrologic analysis shall use the existing land cover condition for predicting flow rates from tributary areas outside the project or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydrology Model to predict flows, bare soil areas should be modeled as "landscaped area."
- b. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.

9. Control Pollutants:

- a. All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater, soils or groundwater.
- b. Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks shall include secondary containment.
- c. Maintenance, fueling and repair of heavy equipment and vehicles shall be conducted using spill prevention and control measures. Contaminated surfaces shall be cleaned immediately following any spill incident.

- d. **Wheel wash or tire bath wastewater shall be discharged to a sanitary sewer with appropriate permits or alternative as approved by the Stormwater Engineer**
- e. Application of **agricultural chemicals, including** fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' label requirements for application rates and procedures shall be followed.
- f. BMPs shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. These sources include, but are not limited to: bulk cement, cement kiln dust (with Stormwater Engineer pre-approval), new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters. **Stormwater discharges shall not cause or contribute to a violation of the water quality standard for pH in the stormwater drainage system or receiving water. Allowable runoff pH concentrations shall be within the range of 6.5 to 8.5 pH.**
- g. Construction site operators are required to obtain written approval from the Department of Ecology prior to using chemical treatment other than CO₂ or dry ice to adjust pH.

10. Control De-watering:

- a. Foundation, vault, and trench de-watering water, which have similar characteristics to stormwater runoff at the site, shall be discharged into a controlled conveyance system prior to discharge to a sediment trap or sediment pond.
- b. Clean, non-turbid de-watering water, such as well-point ground water, can be discharged to systems tributary to, or directly into surface waters of the state as specified in #8, above, provided the de-watering flow does not cause erosion or flooding of receiving waters. Clean de-watering water should not be routed through stormwater sediment ponds.
- c. Other de-watering disposal options may include: (i) infiltration; (ii) transport offsite in vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters; (iii) on-site chemical treatment or other suitable treatment technologies approved by Ecology; (iv) sanitary sewer discharge with **City of Redmond and King County** approval, if there is no other option; or (v) use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized de-watering.
- d. Highly turbid or contaminated dewatering water, **such as from construction equipment operation, clamshell digging, concrete tremie pour, or work inside a cofferdam**, shall be handled separately from stormwater.

11. Maintaining BMPs:

- a. All temporary and permanent erosion and sediment control BMPs shall be inspected, maintained and repaired as needed to assure continued performance of their intended function in accordance with BMP specifications.
- b. All temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed.

12. Manage the Project:

- a. Development projects shall be phased to the maximum degree practicable and shall take into account seasonal work limitations.
- b. Construction site operators shall maintain, and repair as needed, all sediment and erosion control BMPs to assure continued performance of their intended function.
- c. Construction site operators shall periodically inspect their sites. For projects that disturb one or more acres, site inspections shall be conducted by a Certified Erosion and Sediment Control Lead who shall be identified in the SWPPP and shall be present on-site or on-call at all times. **Certification may be obtained through an approved training program that meets the erosion and sediment control training standards established by Ecology. Sites smaller than one acre that require a SWPPP shall also have an on-site and on-call person at all times during construction.**
- d. Construction site operators shall maintain, update and implement their SWPPP. Construction site operators shall modify their SWPPP whenever there is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

Coordination with Utilities and Other Contractors – The primary project proponent shall evaluate, with input from utilities and other contractors, the stormwater management requirements for the entire project, including the utilities, when preparing the Construction SWPPP.

Inspection and Monitoring – All BMPs shall be inspected, maintained and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. The person must have the skills to 1) assess the site conditions and construction activities that could impact the quality of stormwater, and 2) assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

Whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible. The

SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) calendar days following the inspection.

The Construction SWPPP shall be retained on-site or within reasonable access to the site.

The SWPPP shall be modified whenever there is a significant change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

2.5.3 Minimum Requirement #3: Source Control of Pollution

This minimum requirement is also codified in RMC 13.06 (Appendix A). All known, available and reasonable source control BMPs must be required for all projects approved by the City. Source control BMPs must be selected, designed, and maintained in accordance with Volume IV of the Ecology Manual.

2.5.4 Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and down gradient properties. All outfalls require energy dissipation.

Where no conveyance system exists at the adjacent downgradient property line and the discharge was previously unconcentrated flow or significantly lower concentrated flow, then measures must be taken to prevent downgradient impacts. Drainage easements from downstream property owners may be needed and shall be obtained prior to approval of engineering plans.

Where no conveyance system exists at the abutting downstream property line and the natural (existing) discharge is unconcentrated, any runoff concentrated by the proposed project must be discharged as follows:

- a. If the 100-year peak discharge is less than or equal to 0.2 cfs under existing conditions and will remain less than or equal to 0.2 cfs under developed conditions, then the concentrated runoff may be discharged onto a rock pad or to any other system that serves to disperse flows.**
- b. If the 100-year peak discharge is less than or equal to 0.5 cfs under existing conditions and will remain less than or equal to 0.5 cfs under developed conditions, then the concentrated runoff may be discharged through a dispersal trench or other dispersal system, provided the**

applicant can demonstrate that there will be no significant adverse impact to downhill properties or drainage systems.

- c. If the 100-year peak discharge is greater than 0.5 cfs for either existing or developed conditions, or if a significant adverse impact to downgradient properties or drainage systems is likely, then a conveyance system must be provided to convey the concentrated runoff across the downstream properties to an acceptable discharge point (i.e., an enclosed drainage system or open drainage feature where concentrated runoff can be discharged without significant adverse impact).

Stormwater control or treatment structures should not be located within the expected 25-year water level elevations for salmonid-bearing waters. Such areas may provide off-channel habitat for juvenile salmonids and salmonid fry. Redmond Stormwater Engineer pre-approval is required for any structure proposed in the 25-year water level elevation of salmonid bearing streams. Designs for outfall systems to protect against adverse impacts from concentrated runoff are included in Volume V, Chapter 4 of the Ecology Manual.

2.5.5 Minimum Requirement #5: On-site Stormwater Management

Projects are required to implement On-site Stormwater Management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible without causing flooding, **groundwater contamination**, or erosion impacts. Roof Downspout Control BMPs, functionally equivalent to those described in Chapter 3 of Volume III of the Ecology Manual, and Dispersion and Soil Quality BMPs, functionally equivalent to those in Chapter 5 of Volume V of the Ecology Manual are required to reduce the hydrologic disruption of developed sites.

“Flooding and erosion impacts” include impacts such as flooding of septic systems, crawl spaces, living areas, outbuildings, etc; increased ice or algal growth on sidewalks/roadways; earth movement/settlement, increased landslide potential; erosion and other potential damage.

Project proponents are encouraged to use runoff reduction/on-site stormwater management techniques to meet flow control requirements, if Minimum Requirement 7 is triggered. Projects that require flow control are required to perform a site assessment to determine applicability and feasibility of runoff reduction techniques.

Groundwater Protection

Protection of the City’s shallow unconfined drinking water aquifer needs to be considered when managing stormwater runoff from pollution generating surfaces. Except for single-family residential projects, infiltrating runoff from pollution generating surfaces in wellhead protection zones 1 and 2 is prohibited. Single-family residential projects in wellhead protection zones 1 and 2 can infiltrate from pollution generating surfaces after enhanced runoff treatment using

a BMP that is exposed to the surface (such as bioretention in view of sidewalks or roads).

In wellhead protection zone 3, runoff from pollution generating surfaces can be infiltrated with treatment prior to infiltration based on land use (see minimum requirement 6). In wellhead protection zone 4, runoff from pollution generating surfaces can be directly infiltrated provided the soil profile provides treatment per the requirements of the Ecology Manual. Infiltration from areas considered to be clean, including most roofs and sidewalks, is strongly encouraged where infiltration is feasible.

2.5.6 Minimum Requirement #6: Runoff Treatment

Project Thresholds

The following require construction of stormwater treatment facilities (see Table 2.1 below):

Projects in which the total of pollution generating impervious surface (PGIS) is 5,000 square feet or more in a threshold discharge area of the project, or Projects in which the total of pollution-generating pervious surfaces (PGPS) is three-quarters (3/4) of an acre or more in threshold discharge area, and from which there is a surface discharge in a natural or man-made conveyance system from the site.

Groundwater Protection – please refer to Minimum Requirement #5 for requirements specific to Redmond regarding groundwater protection.

	<3/4 acres of PGPS	>3/4 acres PGPS	<5,000 sf PGIS	>5,000 sf PGIS
Treatment Facilities		x		x
Onsite Stormwater BMPS	x	x	x	x

PGPS = pollution generating pervious surfaces
 PGIS = pollution generating impervious surfaces
 sf = square feet

Treatment-Type Thresholds

1. Oil Control:

Treatment to achieve Oil Control applies to projects that have “high-use sites.” High-use sites are those that typically generate high concentrations of oil due to high traffic turnover or the frequent transfer of oil. High-use sites include:

- a. An area of commercial or industrial site subject to an expected average daily traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area;
- b. An area of commercial or industrial site subject to petroleum storage and transfer in excess of 1,500 gallons per year, not including routinely delivered heating oil;
- c. An area of a commercial or industrial site subject to parking, storage or maintenance of 25 or more vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.);
- d. A road intersection with a measured ADT count of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway, excluding projects proposing primarily pedestrian or bicycle use improvements.

2. Phosphorus Treatment:

Phosphorus treatment facilities are required for stormwater runoff that discharges directly or indirectly to Lake Sammamish.

3. Enhanced Treatment:

Enhanced treatment for reduction in dissolved metals is required for the following project sites that discharge to fish-bearing streams, lakes, or to waters or conveyance systems tributary to fish-bearing streams or lakes:

Industrial project sites, Commercial project sites Multi-family project sites, and High AADT roads as follows:

Fully controlled and partially controlled limited access highways with Annual Average Daily Traffic (AADT) counts of 15,000 or more

- All other roads with an AADT of 7,500 or greater

Enhanced treatment is also required for single family residential projects that infiltrate stormwater runoff from pollution generating surfaces in wellhead protection zones 1 and 2.

For developments with a mix of land use types, the Enhanced Treatment requirement shall apply when the runoff from the areas subject to the Enhanced Treatment requirement comprise 50% or more of the total runoff within a threshold discharge area.

4. Basic Treatment:

Basic Treatment generally applies to:

- Project sites that discharge to the ground, UNLESS:
 - 1) The soil suitability criteria for infiltration treatment are met; (see Chapter 3 of Volume III of the *Stormwater Management Manual for Western Washington* (2005) for soil suitability criteria) or

- 2) The project uses infiltration strictly for flow control – not treatment - and the discharge is within ¼-mile of a phosphorus sensitive lake (use a Phosphorus Treatment facility), or within ¼ mile of a fish-bearing stream, or a lake (use an Enhanced Treatment facility). **See limitations on infiltrating runoff from pollution generating surfaces under Minimum Requirement #5.** Residential projects not otherwise needing phosphorus control; and
- Project sites that drain to streams that are not fish-bearing, or to waters not tributary to fish-bearing streams;
- Landscaped areas of industrial, commercial, and multi-family project sites, and parking lots of industrial and commercial project sites that do not involve pollution-generating sources (e.g., industrial activities, customer parking, storage of erodible or leachable material, wastes or chemicals) other than parking of employees' private vehicles.

For developments with a mix of land use types, the Basic Treatment requirement shall apply when the runoff from the areas subject to the Basic Treatment requirement comprise 50% or more of the total runoff within a threshold discharge area.

Treatment Facility Sizing

Water Quality Design Storm Volume: The volume of runoff predicted from a 24-hour storm with a 6-month return frequency (a.k.a., 6-month, 24-hour storm). Wetpool facilities are sized based upon the volume of runoff predicted through use of the Natural Resource Conservation Service curve number equations in Chapter 2 of Volume III of the *Stormwater Management Manual for Western Washington* (2005), for the 6-month, 24hour storm. Alternatively, the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model may be used.

Water Quality Design Flow Rate

1. Preceding Detention Facilities or when Detention Facilities are not required: The flow rate at or below which 91% of the runoff volume, as estimated by an approved continuous runoff model, will be treated. Design criteria for treatment facilities are assigned to achieve the applicable performance goal at the water quality design flow rate (e.g., 80% TSS removal).

2. Downstream of Detention Facilities: The water quality design flow rate must be the full 2-year release rate from the detention facility. Alternative methods may be used if they identify volumes and flow rates that are at least equivalent. That portion of any development project in which the above PGIS or PGPS thresholds are not exceeded in a threshold discharge area shall apply On-site Stormwater Management BMPs in accordance with Minimum Requirement #5.

Treatment Facility Selection, Design, and Maintenance

Stormwater treatment facilities shall be:

- Selected in accordance with the process identified in Chapter 4 of Volume I of the *Stormwater Management Manual for Western Washington* (2005), as modified by the Stormwater Technical Notebook.
- Designed in accordance with the design criteria in Volume V of the *Stormwater Management Manual for Western Washington* (2005), as modified by the Stormwater Technical Notebook, and
- Maintained in accordance with the maintenance schedule in Volume V of the *Stormwater Management Manual for Western Washington* (2005) as modified by the Stormwater Technical Notebook.

Additional Requirements

The discharge of untreated stormwater from pollution-generating impervious surfaces to ground water is prohibited, except for the discharge achieved by infiltration or dispersion of runoff from residential sites through use of On-site Stormwater Management BMPs.

In some areas of the City, regional runoff treatment facilities have been built, or are planned to be built. One alternative to building runoff treatment facilities within the site is to pay a regional facility surcharge. This alternative is mandatory in some locations, and optional in others. See Chapter 8 of the 2007 Stormwater Notebook for additional information on regional facilities and to confirm if participation in the regional facilities program is required or an option.

Treatment facilities applied consistent with this Notebook and the 2005 Ecology Manual are presumed to meet the requirement of state law to provide all known available and reasonable methods of treatment (RCW 90.52.040, RCW 90.48.010). This technology-based treatment requirement does not excuse any discharge from the obligation to apply whatever technology is necessary to comply with state water quality standards, Chapter 173-200 WAC; state sediment management standards, Chapter 173-204 WAC; and the underground injection program, Chapter 173-218WAC. Additional treatment to meet those standards may be required by the federal government, Washington State or the City of Redmond.

2.5.7 Minimum Requirement #7: Flow Control

Applicability

Except as provided below, projects subject to Minimum Requirement #7 must provide flow control to reduce the impacts of stormwater runoff from impervious surfaces and land cover conversions. The requirement below applies to projects that discharge stormwater directly, or indirectly through a conveyance system,

into a fresh water.

Flow control is not required for projects that discharge directly to, or indirectly through a conveyance system to Lake Sammamish or the Sammamish River subject to the following restrictions:

- Direct discharge to Lake Sammamish or the Sammamish River does not result in the diversion of drainage from any perennial stream classified as Class 1, 2, 3, or 4 in the City of Redmond Critical Areas Regulations, or from any category I, II, or III wetland; and
- Flow splitting devices or drainage BMP's are applied to route natural runoff volumes from the project site to any downstream Class 4 intermittent stream or category IV wetland:
 - Design of flow splitting devices or drainage BMP's will be based on continuous hydrologic modeling analysis. The design will assure that flows delivered to Class 4 intermittent stream reaches will approximate, but in no case exceed, durations ranging from 50% of the 2-year to the 50-year peak flow.
 - Flow splitting devices or drainage BMP's that deliver flow to category IV wetlands will also be designed using continuous hydrologic modeling to preserve pre-project wetland hydrologic conditions unless specifically waived or exempted by regulatory agencies with permitting jurisdiction; and
- The project site must be drained by a conveyance system that is comprised entirely of manmade conveyance elements (e.g., pipes, ditches, outfall protection, etc.) and extends to the ordinary high water line of the exempt receiving water; and
- The conveyance system between the project site and the exempt receiving water shall have sufficient hydraulic capacity to convey discharges from future build-out conditions (under current zoning) of the site, and the existing condition from non-project areas from which runoff is or will be collected; and
- Any erodible elements of the manmade conveyance system must be adequately stabilized to prevent erosion under the conditions noted above.
- **Use of the manmade conveyance system is subject to restrictions that may be placed by the owner of that system.**

The City of Redmond may require a maximum discharge rate for a site that is flow control exempt. This would typically occur due to existing limits of downstream conveyance capacity.

If the discharge is to a stream that leads to a wetland, or to a wetland that has an outflow to a stream, both this minimum requirement (Minimum Requirement #7) and Minimum Requirement #8 apply.

Thresholds

The following require construction of flow control facilities and/or land use management BMPs that will achieve the standard flow control requirement for western Washington (see Table 4.2):

- Projects in which the total of impervious surfaces is 10,000 square feet or more in a threshold discharge area, or
- Projects that convert $\frac{3}{4}$ acres or more of native vegetation to lawn or landscape, or convert 2.5 acres or more of native vegetation to pasture in a threshold discharge area, and from which there is a surface discharge in a natural or man-made conveyance system from the site, or
- Projects **with 1 acre or more of disturbed area** that through a combination of impervious surfaces and converted pervious surfaces cause a 0.1 cubic feet per second increase in the 100-year flow frequency from a threshold discharge area as estimated using the Western Washington Hydrology Model or other approved model.

That portion of any development project in which the above thresholds are not exceeded in a threshold discharge area shall apply Onsite Stormwater Management BMPs in accordance with Minimum Requirement #5.

	Flow Control Facilities	On-site Stormwater Management BMPs
<3/4 acres conversion to lawn/landscape, or <2.5 acres to pasture		x
> $\frac{3}{4}$ acres conversion to lawn/landscape, or > 2.5 acres to pasture	x	x
<10,000 square feet of impervious area		x
>10,000 square feet of impervious area	x	x
>0.1 cubic feet per second increase in the 100-year flood frequency for sites 1 acre or larger	x	x

Standard Flow Control Requirement

Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The pre-developed condition to be matched shall be a forested land cover unless:

- Reasonable, historic information is available that indicates the site was not forested prior to settlement. **A map showing where project proponents can assume pasture for predevelopment conditions (modeled as “pasture” in the Western Washington Hydrology Model) is contained in Appendix N of the Technical Notebook;** or
- The drainage area of the immediate stream and all subsequent downstream basins have had at least 40% total impervious area since 1985. In this case, the pre-developed condition to be matched shall be

the existing land cover condition. Where basin-specific studies determine a stream channel to be unstable, even though the above criterion is met, the pre-developed condition assumption shall be the “historic” land cover condition, or a land cover condition commensurate with achieving a target flow regime identified by an approved basin study.

Alternative Flow Control Design Areas in Redmond

Redmond allows alternative flow control design standards in portions of the City. Those areas allowed, or required to meet and alternative flow control requirement are detailed as follows:

North Overlake Flow Control Alternative Area (see Attachment A1). This portion of the City directly discharges to the Sammamish River, a flow control exempt receiving water. The conveyance to the Sammamish River is largely owned by Washington Department of Transportation (WSDOT). As such, the City is required to control flows entering WSDOT conveyance to prevent flooding. See Attachment A1 for flow control design standards for this area. Project proponents are required to control flows from this area at the rates detailed in Attachment A1.

Regional Facility Areas (see Appendix O). Proposed project sites in the areas mapped in Appendix O may not be required to construct flow control facilities. This does not waive runoff reduction as required in Minimum Requirement #5. Alternatively, project proponents would be required to participate in the regional flow control facility. See Chapter 8 for information on regional facilities.

Groundwater Protection. To protect Redmond’s shallow, unconfined aquifer/drinking water supply, infiltration in Wellhead Protection Zones (WPZ) 1 and 2 is limited. In WPZ 1 and 2, soils are typically sand and gravel and contain low amounts of organic material. Infiltration rates range from 4 – 20 inches/hour. The groundwater table has been frequently measured at less than 5 feet from the surface. Stormwater detention facilities would need to be extremely large as modeled predevelopment runoff quantities are so small. Based on these conditions, and Redmond’s desire to protect its drinking water supply by limiting infiltration of stormwater runoff from PGIS in WPZ 1 and 2, Redmond has adjusted the soil modeling requirements for this area. Project proponents are allowed to model soil type as till (group C) when determining flow control requirements.

Additional Requirement

Flow Control BMPs shall be selected, designed, and maintained in accordance with Volume III of the *Stormwater Management Manual for Western Washington* (2005) or an approved equivalent.

2.5.8 Minimum Requirement #8: Wetlands Protection

Applicability

The requirements below apply only to projects whose stormwater discharges

into a wetland, either directly or indirectly through a conveyance system. These requirements must be met in addition to meeting Minimum Requirement #6, Runoff Treatment.

Thresholds

The thresholds identified in Minimum Requirement #6 – Runoff Treatment, and Minimum Requirement #7 – Flow Control shall also be applied for discharges to wetlands. Additional requirements to protect wetlands are documented in Redmond's Community Development Guide. **Standard Requirement**

Discharges to wetlands shall maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses. The hydrologic analysis shall use the existing land cover condition to determine the existing hydrologic conditions unless directed otherwise by a regulatory agency with jurisdiction. A wetland can be considered for hydrologic modification and/or stormwater treatment in accordance with Guide Sheet 1B in Appendix I-D on the *Stormwater Management Manual for Western Washington* (2005) **if allowed by the Community Development Guide.**

Additional Requirements

Stormwater treatment and flow control facilities shall not be built within a natural vegetated buffer, except for:

- necessary conveyance systems as approved by the Permittee; or
- as allowed in wetlands approved for hydrologic modification and/or treatment in accordance with Guidesheet 1B in Appendix I-D of the *Stormwater Management Manual for Western Washington* (2005) **if allowed by the Community Development Guide.**

An adopted and implemented basin plan prepared in accordance with the provisions of Section 2.9 of this Chapter may be used to develop requirements for wetlands that are tailored to a specific basin.

2.5.9 Minimum Requirement #9: Operation and Maintenance

An operation and maintenance manual that is consistent with the provisions in Volume V of the *Stormwater Management Manual for Western Washington* (2005) is required for all proposed stormwater facilities and BMPs. The party (or parties) responsible for maintenance and operation shall be identified in the operation and maintenance manual. For private facilities approved by the City, a copy of the manual shall be retained onsite or within reasonable access to the site, and shall be transferred with the property to the new owner. For public facilities, a copy of the manual shall be retained in the appropriate department. A log of maintenance activity that indicates what actions were taken shall be kept and be available for inspection by the local government. **The operations and maintenance manual shall be submitted for review by the Stormwater Engineer as part of the development proposal, and shall be revised following**

construction for approval. The development proposal shall include provisions for maintenance of facilities in perpetuity.

At a minimum, the operations and maintenance manual shall include:

- the purpose of the facility;
- the dimensions and other characteristics of the facility (site map);
- the party (parties) responsible for maintenance of the facility, with phone numbers and addresses;
- list of any proprietary components along with information from the vendor describing maintenance schedule and costs;
- what maintenance activities are required, and proposed schedule;
- care and maintenance of any powered devices (aeration);
- inspection procedures and how the maintenance schedule will be modified if inspections determine the facility is not operating properly; the minimum requirements for this type of facility as described in Chapter 4 of Volume V of the Ecology Manual as modified in this notebook; the minimum requirements for low impact development facilities as described in the following documents:
 - Appendix F of Volume III of the Ecology Manual;
 - the Low Impact Development Technical Guidance Manual for Puget Sound, published by the Puget Sound Action Team, May, 2005 or current edition,
 - Maintenance of Low Impact Development Facilities (Appendix P)

The final O&M manual shall incorporate any written comments made during the development review process, and shall incorporate any field changes made to the facilities during construction.

The review procedure for O&M Manuals shall be as follows:

For Public Facilities (that will be maintained by the City): A copy of the draft operations and maintenance manual shall be provided to the Stormwater Maintenance Supervisor for Public Works for review at 90% design or earlier. Design of public facilities may be subject to revision through the review process to ensure that the facilities make adequate provisions for maintenance, including easements and physical access requirements. The final O&M manual shall be submitted for review and approval prior to acceptance of the completed construction project. The final approved O&M manual shall be submitted with one hard copy and one electronic copy on CD.

For Private Facilities (that will be privately maintained): A copy of the draft operations and maintenance manual shall be provided to the Private System Inspection Program Lead for Public Works during the development review process. The developer shall also submit to the Stormwater Engineer for approval, a proposal indicating the method by which ongoing maintenance will be ensured. For developments that include multiple lots, the party (or parties)

responsible for maintenance shall be identified (i.e. homeowners association). Notes shall be added to the property title or plat indicating this maintenance requirement. The final O&M manual shall be submitted for review and approval prior to acceptance of the development. The final approved O&M manual shall be submitted with one hard copy and one electronic copy on CD.

2.6 Adjustments

Adjustments to the Minimum Requirements may be granted by the City of Redmond. See RMC 15.24.084 (Appendix A) for details and requirements for adjustments to be granted.

2.7 Variances

Variances can be allowed in Redmond. See RMC 15.24.089 (Appendix A) for details and requirements for variances to be granted in Redmond.

2.8 Basin/Watershed Planning

Basin/Watershed planning may be used by the City of Redmond to tailor Minimum Requirement #6 Runoff Treatment, Minimum Requirement #7 Flow Control, and/or Minimum Requirement #8 Wetlands Protection. Basin planning may be used to support alternative treatment, flow control, and/or wetland protection requirements to those contained in Section 4 of this chapter. Basin planning may also be used to demonstrate an equivalent level of treatment, flow control, and/or wetland protection through the construction and use of regional stormwater facilities. Basin planning provides a mechanism by which the minimum requirements and implementing BMP's can be evaluated and refined based on an analysis of a basin or watershed. Basin plans are may be used to develop control strategies to address impacts from future development and to correct specific problems whose sources are known or suspected. Basin plans can be effective at addressing both long-term cumulative impacts of pollutant loads and short-term acute impacts of pollutant concentrations, as well as hydrologic impacts to streams, wetlands, and ground water resources.

Basin planning will require the use of computer models and field work to verify and support the models. The USGS has developed software called "GenScn" (Generation and Analysis of Model Simulation Scenarios) that can facilitate basin planning. The program is a Windows-based application of HSPF that predicts water quality and quantity changes for multiple scenarios of land use and water management within a basin. Permittees who are considering the use of basin/watershed plans to modify or tailor one or more of the minimum requirements are encouraged to contact Ecology early in the planning stage.

Some examples of how Basin Planning can alter the minimum requirements are given in Appendix I-A from the *Stormwater Management Manual for Western Washington* (2005).

In order for a basin plan to serve as a means of modifying the minimum requirements the following conditions must be met:

- The plan must be formally adopted by all jurisdictions with responsibilities under the plan; and
- All ordinances or regulations called for by the plan must be in effect; and
- The basin plan must be reviewed and approved by Ecology.

2.9 Applicability of the 2005 Ecology Manual in Redmond

2.9.1 Volume I: Minimum Technical Requirements and Site Planning

2.9.1.1 Chapter 1: Introduction

No local changes but used for reference only in Redmond.

2.9.1.2 Chapter 2: Minimum Requirements for New Development and Re-development

Replaced by Chapter 2 of this Addendum.

2.9.1.3 Chapter 3: Preparation of Stormwater Site Plans

3.1- Stormwater Site Plans: Step-By-Step

Applies.

3.1.3- Step 3 – Perform an Offsite Analysis

The one-quarter mile distance off-site analysis shall be provided for Medium or Large projects (See Chapter 3 of the Stormwater Notebook) unless specifically waived for a project, by the Stormwater Engineer.

3.1.5- Step 5 – Prepare a Permanent Stormwater Control Plan

In addition to the requirements of this section, the report covering the Permanent Stormwater Control Plan (Drainage Report) shall be submitted in electronic format. Submit a CD to the engineer that includes a PDF of the completed report with all electronic modeling and calculations included in their native format.

The drainage report shall be prepared with the following outline:

Drainage Report

- A. Cover Page: Project name; project address; name of developer or owner; name, address, and phone number of engineer of record; engineer's stamp; date of report
- B. Project Overview:
 - General description of project vicinity
 - Describe existing site hydrology

- Description of proposed project
- Description of nearby receiving waters
- Site Vicinity Map showing site, nearby roads, and receiving waters
- C. Minimum Requirements
 - Determine project size: Small, Medium, Large
 - Determine which Minimum Requirements Apply
 - Describe how each applicable requirement is being met
- D. Offsite Analysis
 - Describe study area
 - Upstream Analysis
 - Downstream Analysis
 - Summarize existing problems downstream
 - Summarize how project will avoid exacerbating or correct existing downstream problems
 - If downstream problems can be solved through offsite improvements, those offsite improvements must be sized for full buildout conditions under current zoning.
- E. Conveyance Design
 - Pipe sizing
 - Area draining to each structure
 - HGL calculations for all conveyance
- F. Flow Control Design
 - Existing hydrology
 - Proposed hydrology
 - Soil Types
 - Summarize existing and proposed land use/condition
 - Describe modeling inputs
 - Model results
 - Describe design criteria for flow control facilities
 - Summarize dimensions of flow control facilities: volumes, lengths, widths, depths, orifice sizes, bottom elevation, overflow elevations, etc.
- G. Water Quality Design
 - Summarize new proposed PGIS and PGPS
 - Summarize treatment level required (basic, enhanced, oil control, phosphorous)
 - Describe contaminants of concern
 - Describe proposed source control measures if applicable
 - Model results
 - Describe design criteria for water quality facilities
 - Summarize dimensions of water quality facilities: volumes, lengths, widths, depths, orifice sizes, bottom elevation, overflow elevations, vegetation types, etc.
 - If site is in Wellhead Protection Zones 1, 2, or 3, describe how proposed facilities will protect groundwater. Describe measures to be taken during construction to protect groundwater.

- H. Construction cost estimates for stormwater facilities, if required by the Stormwater Engineer.
- I. Draft Operations & Maintenance Manual. As described in Paragraph 2.5.9 of the Stormwater Notebook.
- J. If low impact development BMPs are proposed, then submit a site assessment in accordance with Paragraph 8.27 of the Stormwater Notebook.

3.1.6- Step 6 – Prepare a Construction Stormwater Pollution Prevention Plan

Applies. Additional requirements are in Chapter 9 and 10 of the Stormwater Notebook.

2.9.1.4 Chapter 4: BMP and Facility Selection Process for Permanent Stormwater Control Plans

4.2 BMP and Facility Selection Process

Applies. Note that the City of Redmond has preferences for certain types of stormwater treatment over others. These preferences are based primarily on long term performance and maintenance cost. Actual selection of facilities must necessarily address site-specific constraints. However, these preferences are provided to help the designer in cases where more than one alternative exists to meet the same needs. Capital improvement projects shall involve the Stormwater Engineer early in the design process to ensure selection of stormwater treatment facilities that best meet the long term goals of the City.

The Stormwater Engineer may direct substitution of an alternative treatment method based on these preferences. Table 4.4R, below, describes some of the City's preferences for basic, enhanced, phosphorous, and oil treatment. Treatment methods are designated in the table as follows:

- **Preferred.** These treatment methods are preferred by the City.
- **Accepted.** These treatment methods are acceptable to the City.
- **Conditional.** These treatment methods may be allowed based on site specific information, with approval from the Stormwater Engineer.
- **N/A.** These treatment methods are not accepted by the City.

Table 4.4R: Treatment Facility Options in Redmond

Facility Option	Basic	Enhanced	Phosphorous	Oil
Biofiltration Swale	Preferred	N/A	N/A	N/A
Wetpond	Preferred	N/A	N/A	N/A
Infiltration Treatment (Wellhead Protection Zone 4)	Preferred	N/A	N/A	N/A
Bio-infiltration Swale (WPZ 4)	Preferred	N/A	N/A	N/A
Stormwater Treatment Wetland	Preferred	Preferred	N/A	N/A
Large Wet Pond	Preferred	N/A	Preferred	N/A
Stormwater Treatment Wetland / Sand Filter	Preferred	Preferred	Preferred	N/A
Stormwater Treatment Wetland / Sand Filter Vault	Preferred	Accepted	Accepted	N/A
Bioretention or Rain Garden (WPZ 4)	Preferred	Accepted	N/A	N/A
Phosphorous Control Credit	N/A	N/A	Preferred	N/A
Infiltration Treatment with Basic Treatment (WPZ 4)	Accepted	Accepted	Accepted	N/A
Infiltration Treatment with Enhanced Trtmnt (WPZ 3,4)	Accepted	Accepted	Accepted	N/A
Infiltration Treatment with Phosphorous Trtmnt (WPZ 4)	Accepted	Accepted	Accepted	N/A
Media Filter Vault (Iron Media)	Accepted	Conditional	Accepted	N/A
Large Sand Filter	Accepted	Accepted	Accepted	N/A
Amended Sand Filter	Accepted	Accepted	Accepted	N/A
Biofiltration Swale / Sand Filter	Accepted	Accepted	Accepted	N/A
Biofiltration Swale / Sand Filter Vault	Accepted	Accepted	Accepted	N/A
Filter Strip / Linear Sand Filter	Accepted	Accepted	Accepted	N/A
Linear Sand Filter / Filter Strip	Accepted	Accepted	Accepted	N/A
Wet Pond / Sand Filter	Accepted	Accepted	Accepted	N/A
Wet Pond / Sand Filter Vault	Accepted	Accepted	Accepted	N/A
Wet Vault / Sand Filter	Accepted	Accepted	Accepted	N/A
Wet Vault / Sand Filter Vault	Accepted	Accepted	Accepted	N/A
Filtrerra	Accepted	Accepted	N/A	N/A
Ecology Embankment	Accepted	Accepted	N/A	N/A
Compost Amended Filter Strip	Accepted	Accepted	N/A	N/A
Biofiltration Swale / Media Filter Vault	Accepted	Accepted	N/A	N/A
Wet Pond / Media Filter Vault	Accepted	Accepted	N/A	N/A
Wet Vault / Media Filter Vault	Accepted	Accepted	N/A	N/A
Sand Filter / Media Filter Vault	Accepted	Accepted	N/A	N/A
Sand Filter Vault / Media Filter Vault	Accepted	Accepted	N/A	N/A
Media Filter Vault (Zeolite/Perlite/Granular Act. Carbon)	Accepted	N/A	N/A	N/A
Sand Filter	Accepted	N/A	N/A	N/A
Filter Strip	Accepted	N/A	N/A	N/A
Wetvault	Accepted	N/A	N/A	N/A
API OWS	N/A	N/A	N/A	Preferred
CP OWS	N/A	N/A	N/A	Accepted
CB Insert	N/A	N/A	N/A	Accepted
Linear Sand Filter	N/A	N/A	N/A	Accepted
Contribution in lieu of Treatment	Conditional	Conditional	Conditional	N/A
Alternative Technologies	Conditional	Conditional	Conditional	Conditional

Step IV: Step 1: Determine whether you can infiltrate

Infiltration of clean water (water draining from non-pollution generating surfaces) is encouraged throughout Redmond. Infiltration of water draining from pollution generating impervious surfaces in Wellhead Protection Zones 1 or 2 (map available at: <http://www.redmond.gov/cityservices/citymaps.asp>) is only permitted for single-family residential projects, and requires enhanced treatment using a BMP that is exposed to the surface. Infiltration of water draining from pollution generating impervious surfaces in Wellhead Protection Zone 3 is permitted following treatment based on land use.

Step V: Step 1: Determine the Receiving Waters and Pollutants of Concern Based on Off-Site Analysis.

The City may adopt a basin plan for any watershed in the City that may place additional stormwater requirements. Contact the Stormwater Engineer to determine if any basin plans apply to your project site.

Step V: Step 2: Determine if an Oil Control Facility/Device is Required.

Traffic counts in Redmond are available for some roadways at: <http://www.redmond.gov/insidecityhall/publicworks/transportation/trafficcounts.asp>. Follow guidance in the Ecology Manual if traffic counts are not available from Redmond for the project site.

Step V: Step 3: Determine if Infiltration for Pollutant Removal is Practicable.

Infiltration for pollutant removal of water draining from pollution generating surfaces in Wellhead Protection Zones 1, 2, or 3 (map available at: <http://www.redmond.gov/cityservices/citymaps.asp>) is not permitted. Infiltration for pollutant removal is permitted in Wellhead Protection Zone 4, provided all requirements in the Ecology Manual are met. Note that there are additional requirements regarding infiltration in Wellhead Protection Zones 1, 2 and 3. Please refer to Section 2.5.5 of this Addendum for details. Use of infiltration for water quality treatment is also subject to the requirements of the Washington State Department of Ecology's Underground Injection Control program.

Step V: Step 4: Determine if Control of Phosphorous is Required.

Phosphorus control treatment is required for "Large Project" sites that drain to Lake Sammamish. The City's watershed map delineates the boundaries between watersheds, and is available on the City's website at: <http://www.redmond.gov/cityservices/citymaps.asp>. See Volume V, Chapter 3, Section 3.3.

Step V: Step 5: Determine if Enhanced Treatment is Required.

Traffic counts in Redmond are available for some roadways at: <http://www.redmond.gov/insidecityhall/publicworks/transportation/trafficcounts.asp>. Follow guidance in the Ecology Manual if traffic counts are not available from Redmond for the project site.

Step V: Step 6: Determine if Fee in Lieu is Required.

Following review of the step by step process for selecting BMPs and review of Table 4.4R, determine if the project will be required or have the option to pay a fee in lieu of construction of the selected onsite BMPs. See chapter 8, section 8.8 of the Stormwater Notebook.

2.9.1.5 Appendix 1-C:

Phosphorus control is required for sites draining to Lake Sammamish. See Step V, Step 4, above.

2.9.1.6 Appendix 1-E: Flow Control-Exempt Surface Waters

Applies with the following revision:

The Sammamish River in Redmond is included on the exempt surface waters list.

2.9.1.7 Glossary and Notations

City Definitions shall be used where applicable.

2.9.2 Volume II: Construction Stormwater Pollution Prevention

2.9.2.1 Chapter 1: Introduction to Constr. Stormwater Pollution Prevention

Applies

2.9.2.2 Chapter 2: Regulatory Requirements

Applies with the following additions:

Additional local requirements can be found in:

- Wellhead Protection Zones (especially Zones 1, 2, and 3) (RCDG 20D.140.50)
- Critical Areas Regulations (RCDG 20D.140)
- Construction Stormwater Pollution Prevention (Chapter 9 of the Stormwater Notebook)
- Rainy-Season construction guidelines (Chapter 10 of the Stormwater Notebook)

- o State regulations provide that turbidity in receiving waters shall not be increased over 5 NTU above existing levels due to runoff from a construction site. In addition to that regulation, Contractor shall take all necessary TESC measures to ensure that runoff from a site does not exceed 50 NTU (during construction). All or parts of a project shall be required by City Inspectors to be shut down until a satisfactory plan is developed and implemented with additional TESC measures as needed to meet these requirements. If the violations occur in the Rainy Season (October 1 through April 30) suspension of work until after April 30 may be required.

2.9.2.3 Chapter 3: Planning

3.1-General Guidelines

Applies.

3.2.3- Step 3 - Construction SWPPP Development and Implementation

Element #4- BMP C230: Straw bale barrier and BMP C231: brush barrier are not allowed in Redmond.

Element #12- Refer to Chapter 10 of this document for seasonal restrictions/exemptions.

3.3.2-Drawings

Narrative section of Construction SWPPP Checklist applies. Refer to City Standard Notes (Appendix L) and City Plan Review Checklist (Appendix F) for SWPPP drawing requirements.

2.9.2.4 Chapter 4: Standards and Specs for Best Management Practices

4.1-Source Control BMPs

BMP C101: Preserving Natural Vegetation. No disturbance is allowed within 5 feet of drip lines of trees to be saved unless specifically approved by the Project Planner.

BMP C103- High visibility plastic or metal fence. Refer to Redmond Standard Specifications and Details.

BMP C104- Stake and wire fence. Not approved in Redmond.

BMP C105- Stabilized construction entrance. Refer to Redmond Standard Specifications and Details.

BMP C106- Wheel wash. Refer to Redmond Standard Specifications and Details.

BMP C121- Compost mulch may only be used on proposed landscape areas. It is not approved as a general TESC mulch in Redmond.

BMP C140- Chemical dust suppressants are not approved for use in Redmond.

BMP C202- Rubble concrete channel lining is not approved in Redmond.

BMP C204- Pipe slope drain. Note that this is "temporary" only.

BMP C205- The minimum subsurface drain size shall be 6" diameter.

BMP C220- Catch basin filters are required in Redmond for storm drain inlet control. Provisions shall be made to remove filters at the end of the project without dropping accumulated sediment into the catch basin.

BMP C230- Straw Bales. Not approved in Redmond.

BMP C231- Brush Barrier. Not approved in Redmond.

BMP C233- Silt fence. Refer to Redmond Standard Specifications and Details.

BMP C234- Vegetated strips shall have a minimum length of 200 feet.

BMP C240- Sediment trap shall be sized using the 10-year design storm.

BMP C241- Temporary sediment pond shall be sized using the 10-year design storm. Side slopes shall be 3:1 or flatter (interior and exterior).

BMP C250- Construction stormwater chemical treatment and other non-standard treatment systems must be approved by the City.

Appendix II-A- Use Redmond Standard Notes (See Appendix L of the Stormwater Notebook).

2.9.3 Volume III: Hydrologic Analysis and Flow Control BMPs

2.9.3.1 Chapter 1: Introduction

1.2- Content and Organization of this Volume

The 2005 Ecology Manual notes that conveyance system design is not addressed in that manual. See Chapter 8 of the Stormwater Notebook.

2.9.3.2 Chapter 2: Hydrologic Analysis

2.1- Minimum Computational Standards

Applies.

2.2- Western Washington Hydrology Model

For commercial sites use actual proposed impervious area for the developed condition. For single-family developments use 80% of the maximum impervious area allowed by the zoning code. Detention systems serving projects utilizing green infrastructure design bonuses shall be designed based on the allowed maximum impervious lot area. . For single family lots, 4,200 s.f. impervious area per lot may be used with approval from the Stormwater Engineer.

Credits for infiltration of roof runoff or use of porous pavement require demonstration that stormwater is “clean” (draining from non-pollution generating surface) and that it will infiltrate without causing a flooding problem nearby.

2.9.3.3 Chapter 3: Flow Control Design

3.1-Roof Downspout Controls:

Applies only to single family detached homes (with or without an attached or detached Accessory Dwelling Unit).

Section 3.1.3 applies to single family detached homes with modifications as follows:

- The setback from any structure, property line, or steep slope (over 40%) shall be 50 feet minimum.
- The perforated pipe shall not be located where percolating water will encounter and be intercepted by another nearby (within 25 feet) utility trench or foundation drain.

Figure 3.1-Flow Diagram Showing Selection of Roof Downspout Controls

Applies.

Figure 3.2-Typical Downspout Infiltration Trench

6" minimum diameter pipe required. Flexible single wall pipe is not approved in Redmond.

Figure 3.4-Typical Downspout Infiltration Drywell

6" minimum diameter pipe required.

3.2.1- Detention Ponds

Proposed slopes shall be 3:1 or flatter. Up to 25% of the pond perimeter may have vertical walls. Anything greater will require approval of the Stormwater Engineer.

Modular grid pavement is only allowed if specifically approved by the Stormwater Engineer.

Ponds shall be setback a minimum of 10 feet from structures, property lines or required vegetated buffers, and 50 feet from the limits of steep slope areas. The setback from steep slopes may be reduced per Section 20D.140.10-120 of the Redmond Community Development Guide. Conveyance pipes in steep slope areas shall be installed on the surface of the slope, with the minimum disturbance possible, and shall require applicable City approvals.

Minimum setback required for trees is 8 feet in Redmond. Trees shall be setback one (1) vertical foot above the maximum storage elevation to provide maintenance access and liner protection. Trees shall not be planted over any pond liner.

A fire hydrant shall be located within 100 feet of the control structure for maintenance.

Detention ponds in infiltrative soils shall be lined, unless otherwise approved as combination infiltration facilities. Lining may consist of an impermeable fill layer 18 inches or thicker, bentonite or synthetic liners approved by the Stormwater Engineer. When a geomembrane is used, provide an analysis demonstrating that the required cover soil will be stable against sliding when saturated. Impervious bottoms and sides shall extend up to the stage of the 50-year event.

Combination infiltration / detention ponds may be approved by the Stormwater Engineer, subject to the restrictions on infiltration in wellhead protection zones noted in Table 3.11R below.

Pond control structures shall be accessible by a Vactor truck. A backhoe must be able to access each pond for maintenance. The detention pond emergency overflow route must be independent from the primary outflow system.

Signs shall be posted at all stormwater ponds using the standard sign format described in Appendix M. There are several alternative sign formats, and they shall be selected based on the following:

- Ponds greater than 5000 square feet in size shall receive the large (24 x 48) sign. Smaller ponds may have either the small (12 x 18) or the large sign.
- Public ponds shall receive the sign with the City of Redmond logo. Private pond signs shall not include the logo, but shall indicate they are privately owned and maintained.
- Ponds with liners shall receive the sign indicating the liner. Ponds that infiltrate shall have the sign indicating the infiltration.

Ponds shall be named by the project proponent. The pond name shall be unique to the City of Redmond. In general, the pond name shall be the same as the name of the subdivision in which the pond is located. Pond names are subject to approval by the Stormwater Engineer.

Figure 3.12- Example of Permanent Surface Water Control Pond Sign

See Appendix M of the Stormwater Notebook for City of Redmond standard sign.

3.2.2- Detention Tanks

Corrugated metal detention tanks are not approved in Redmond.

Corrugated metal pipe (CMP) risers are not approved in Redmond.

Tanks shall be setback a minimum of 10 feet from structures, property lines, required vegetated buffers, and 25 feet from the limits of steep slopes. The setback from steep slope may be reduced per Section 20D.140.10-120 of the Redmond Community Development Guide. For limitations on tree planting, see tree separation information for pipes in Chapter 8.

Add the following note to drawings that include detention tanks: "Pressure tests may be required by the City Inspector. Tanks that do not pass pressure tests shall be repaired or replaced." Avoiding leakage is particularly critical in Wellhead Protection Zones 1, 2, and 3.

Maintenance must be feasible and designs should strive to facilitate maintenance (design adjustments to facilitate maintenance may be required during plan review).

3.2.3- Detention Vaults

Vaults shall be setback a minimum of 10 feet from structures, property lines, required vegetated buffers, and 25 feet from the limits of steep slopes. The Stormwater Engineer may approve integrated vaults constructed as part of a building structure. The setback from steep slopes may be reduced per Section 20D.140.10-120 of the Redmond Community Development Guide.

Vault setbacks from property lines or right-of-way limits must be a minimum of 10 feet, or the distance required to excavate a 1:1 slope from the bottom of the vault to the ground surface at the right-of-way or property line – whichever is greater. Trees may be as close as 2 feet from concrete vaults provided the trees do not interfere with access for maintenance. Specify shallow rooted trees by species on the project landscape plans for locations closer than 8 feet to vaults.

Maintenance must be feasible and designs should strive to facilitate maintenance (design adjustments to facilitate maintenance may be required during plan review).

Figure 3.17-Flow Restrictor (TEE)

Refer to City Standard Detail in “City of Redmond Standard Specifications and Details”

Figure 3.18-Flow Restrictor (Baffle)

Refer to City Standard Detail in “City of Redmond Standard Specifications and Details”

Figure 3.19-Flow Restrictor (Weir)

Refer to City Standard Detail in “City of Redmond Standard Specifications and Details”

3.2.5- Other Detention Options

Parking lot ponding is only allowed for the 50-year storm event or greater. A maximum ponding depth of 6 inches is allowed. The 50-year event may not impact any buildings or other structures. Provisions to bypass offsite flows shall be included in design of parking lot detention.

Roof detention is not allowed in Redmond at this time.

3.3- Infiltration Facilities for Flow Control and for Treatment

Protection of the drinking water resource is a very high priority in Redmond. Therefore, infiltration of stormwater, even with treatment, is limited within Wellhead Protection Zones (map available at: <http://www.redmond.gov/cityservices/citymaps.asp>).

3.3.5- Site Characterization Criteria

The soil infiltration rate may be determined by a falling head test conducted by a qualified engineer using commonly accepted methods. Infiltration locations will be considered unacceptable if the design infiltration rate is less than 1.0 inches/hour. In no case shall the design infiltration rate be more than 20.0 inches/hour.

Notify the City of Redmond's Wellhead Protection Program prior to installing groundwater monitoring wells. The City may consider allowing placement of such wells within public right-of-way if the City wishes to assume responsibility for the wells in the future. All wells shall either be required to be properly abandoned when they are no longer needed, or may be requested to be turned over to the City for ongoing monitoring by City staff.

3.3.6- Site Suitability Criteria (SSC)

At least 200 feet shall be provided for separation from public wells. Public wells are located within Wellhead Protection Zone 1. A map of wellhead protection zones is available at:
<http://www.redmond.gov/cityservices/citymaps.asp>.

3.3.9-General Design, Maintenance, and Construction Criteria for Infiltration Facilities

Construction plans shall include a note to require field verification during construction of the facility, of soil conditions, and infiltration rates by an engineer with experience in stormwater management and licensed in the State of Washington. The engineer shall provide a written statement to the City of Redmond related to the field verification of the design parameters.

3.3.10- Infiltration Basins

Infiltration basins shall meet the same requirements for slopes, fences, signage, etc. as detention ponds.

3.3.11- Infiltration Trenches

Geotextile fabric or sand base required for infiltration trenches in Redmond. Maximum length shall be 100 feet.

2.9.3.4 Appendix III B: Western Washington Hydrology Model – Information, Assumptions, and Computation Steps

WWHM Information and Assumptions

5. Vegetation data

Predeveloped conditions shall be modeled as forested or pasture land cover. Forested land cover shall be used, except for the valley floors associated with the Sammamish River, Bear Creek, Evans Creek, and Lake Sammamish. For these valley floors, pre-developed condition is "pasture land cover." 100% of the site shall be assumed pervious. A map of historical land cover is available on the City's website at:
<http://www.redmond.gov/cityservices/citymaps.asp>.

6. Development land use data.

For commercial sites use actual proposed impervious area for the developed condition. For single-family developments use 80% of the maximum impervious area allowed by the zoning code. For single family lots, 4,200 s.f. impervious area per lot may be used with approval from the Stormwater Engineer.

2.9.3.5 Appendix IIIC: Washington State Department of Ecology Low Impact Development Design and Flow Modeling Guidance

Note: Use of low impact development BMPs requires more thorough site assessment than traditional measures. See Paragraph 8.29 of the Stormwater Notebook.

7.1 Permeable Pavements

Use of permeable pavements is subject to approval by the Technical Committee. Use of permeable pavements as pollution generating impervious surface is not allowed. A maintenance plan is required. Use of modular pavements in fire lanes is discouraged and is subject to approval from the Technical Committee.

7.2 Dispersion

7.2.5 Dispersion in Urban Areas

As noted in paragraph 2.5.5 of this Stormwater Notebook, full site dispersion may be limited by site conditions...

2.9.4 Volume IV: Source Control BMPs

2.9.4.1 Appendix IVG: Recommendations for Management of Street Wastes

Street Waste Liquids

Decant liquid shall be discharged to sanitary sewer or otherwise disposed. It shall not be discharged to the storm system, even if it passes through a stormwater treatment BMP.

2.9.5 Volume V: Runoff Treatment BMPs

2.9.5.1 Chapter 1: Introduction

Applies. See Table 4.4R in Section 2.9.1.4 of the Stormwater Notebook.

2.9.5.2 Chapter 2: Treatment Facility Selection Process

Applies. Note that the City of Redmond has preferences for certain types of stormwater treatment over others. These preferences are

based primarily on long term performance and maintenance cost. Actual selection of facilities must necessarily address site-specific constraints. However, these preferences are provided to help the designer in cases where more than one alternative exists to meet the same needs. Capital improvement projects shall involve the Stormwater Engineer early in the design process to ensure selection of stormwater treatment facilities that best meet the long term goals of the City. The Stormwater Engineer may direct substitution of an alternative treatment method based on these preferences. Table 4.4R describes some of the City's preferences.

Step 1: Determine the Receiving Waters and Pollutants of Concern Based on Off-Site Analysis.

The City may adopt a basin plan for any watershed in the City that may place additional stormwater requirements. Contact the Stormwater Engineer to determine if any basin plans apply to your project site.

Step 2: Determine if an Oil Control Facility/Device is Required.

Traffic counts in Redmond are available for some roadways at: <http://www.redmond.gov/insidecityhall/publicworks/transportation/trafficcounts.asp>. Follow guidance in the Ecology Manual if traffic counts are not available from Redmond for the project site.

Step 3: Determine if Infiltration for Pollutant Removal is Practicable.

Infiltration for pollutant removal of water draining from pollution generating surfaces in Wellhead Protection Zones 1, 2, or 3 (map available at: <http://www.redmond.gov/cityservices/citymaps.asp>) is not permitted. Infiltration for pollutant removal is permitted in Wellhead Protection Zone 4, provided all requirements in the Ecology Manual are met. Use of infiltration for water quality treatment is also subject to the requirements of the Washington State Department of Ecology's Underground Injection Control program. See Table 3.11R in Section 2.3.3.3 of the Stormwater Notebook.

Step 4: Determine if Control of Phosphorous is Required.

Phosphorus control treatment is required for "Large Project" sites that drain to Lake Sammamish. The City's watershed map delineates the boundaries between watersheds, and is available on the City's website at: <http://www.redmond.gov/cityservices/citymaps.asp>. See Volume V, Chapter 3, Section 3.3.

Step 5: Determine if Enhanced Treatment is Required.

Traffic counts in Redmond are available for some roadways at: <http://www.redmond.gov/insidecityhall/publicworks/transportation/trafficcounts.asp>

[ccounts.asp](#). Follow guidance in the Ecology Manual if traffic counts are not available from Redmond for the project site.

Step 6: Determine if Fee in Lieu is Required.

Following review of the step by step process for selecting BMPs and review of Table 4.4R, determine if the project will be required or have the option to pay a fee in lieu of construction of the selected onsite BMPs. See chapter 8, section 8.8 of the Stormwater Notebook.

2.9.5.3 Chapter 3: Treatment Facility Menus

3.2-Oil Control Menu

Applies. However, the Stormwater Engineer may direct substitution of an alternative treatment method based on the preferences noted in Table 4.4R of Section 2.3.1 of the Stormwater Notebook.

3.3-Phosphorous Treatment Menu

Applies. However, the Stormwater Engineer may direct substitution of an alternative treatment method based on the preferences noted in Table 4.4R of Section 2.3.1 of the Stormwater Notebook.

Projects within the Lake Sammamish Basin that are Large Projects as defined in Chapter 3 of the Stormwater Notebook (subject to Minimum Requirement #6) are required to provide phosphorus controls.

In addition to the Treatment Methods listed in the 2005 Ecology Manual, phosphorous control may be provided by applying measures listed below such that a score of 10 points or more is achieved. Credit options for phosphorus reduction are as summarized in Table 3.3R and are described as follows:

1. **Leaving part of the site undisturbed, including undevelopable land.** Full credit, or 10 points, is awarded for leaving 65 percent of a site in undisturbed native vegetation or areas re-established in native vegetation. Critical Areas and their buffers may be counted. All areas for phosphorus credit must be in tracts dedicated to the City protected in accordance with the requirements set forth for general critical area protective measures in Chapter 20D.140.10-180 of the Community Development Guide. A descending scale of points applies where lower percentages of the site are left undisturbed. Possible credit = 1 to 10 points.

2. **Directing runoff from pollution-generating surfaces to grassy areas with level spreading.** Directing runoff from pollution-

generating areas to grassy areas that are not fertilized (a notice shall be made on the plat and signage posted to this effect) or to areas of native vegetation (protected by critical area tract) results in pollutant removals similar to those obtained in swales while also providing an increased opportunity for infiltration. To use this option, flows must remain unconcentrated and be spread uniformly over the intended area. The vegetated area receiving dispersed flows should be at least 25 percent as large as the area contributing flow. The receiving area should be increased by one percent for each percent increase in slope over four percent. The area should be configured so that the length of the flow path is no longer than the width over which flows are dispersed.

Example:

Assume a parking lot is 100'x600', or 60,000 sf. Flows will be dispersed through an adjacent area of native vegetation with a slope of 8 percent.

The area of vegetation must be at least 17,400 sf (25% +4% (for steeper slope) x 60,000 sf). Assuming runoff is dispersed continuously along the wider edge of the parking lot, the flow path would need to be at least 29 feet (17,400' ÷ 600'). If the water were dispersed along the shorter edge, flow path would be 174 feet (17,400' ÷ 100'). However, this flow path would be longer than the width over which flows were dispersed (100'), and would not be a satisfactory option. The parking lot could be graded, however, so that flows would be dispersed at both of the 100-foot ends, making each flow path 87 feet, which would be acceptable.

Credit is proportional to the total volume of runoff diverted; one point is earned for every 25 percent of total volume so directed. Possible credit = 1 to 4 points

3. **Providing covered parking areas isolated from the stormwater conveyance system.** This item applies to all land uses for which covered parking for employees, residents, guests, and the general public is provided. This can be achieved for commercial land uses simply by covering the parking required by code. For other land uses, provision of additional covered parking for guests or the general public (total parking) in lieu of on-street parking can be used to provide this assurance. It is intended that covered parking would isolate the area from stormwater run-on as well as direct rainfall. A low curb, berm, or enclosing walls, in addition to a roof, would typically be

needed. The water quality credit is proportional to the percentage of the total surface area that is effectively covered. One point is earned for every 25 percent of parking covered and protected from run-on. Possible credit = 1 to 4 points

4. **Providing covered vehicle washing areas connected to the sanitary sewer system.** This item applies to commercial, industrial, and multi-family sites. Frequent car-washing can contribute significant amounts of phosphorus to stormwater. Note that sewer districts may have pretreatment requirements before allowing connection to the sanitary sewer. Possible credit = 3 points
5. **Providing covered waste disposal and recycling areas isolated from the stormwater conveyance system.** One point is earned if all solid waste management areas are covered and protected from stormwater run-on. Possible credit = 1 point

Credit shall be applied to the whole site.

If the credit option is used, it should be applied for during initial drainage review by the City. The preliminary stormwater report should include a written request for credit based on either the site plan or the grading plan for the project. The request should outline how the point totals are to be achieved. Credit is not given unless requested. Use of the credit option does not release the project from the need for basic or enhanced treatment (as applicable).

Table 3.3R Water Quality Credit for Phosphorus Control	
Credit Option	Points
Leaving site undisturbed, in native vegetation. Buffers without trails may be counted.	At least 65 % = 10 60 % = 9 55 % = 8 50 % = 7 45 % = 6 40 % = 5 35 % = 4 30 % = 3 25 % = 2 20 % = 1
Directing road runoff to pervious, non-pollution-generating vegetated area.	100 % of volume = 4 75 % of volume = 3 50 % of volume = 2 25% of volume = 1
Covered parking protected from run-on	100 % of parking = 4 75 % of parking = 3 50 % of parking = 2 25% of parking = 1
Covered car wash area connected to sanitary sewer (multi-family)	3
Covered solid waste storage area	1

3.4-Enhanced Treatment Menu

Applies. However, the Stormwater Engineer may direct substitution of an alternative treatment method based on the preferences noted in Table 4.4R of Section 2.9.1.4 of the Stormwater Notebook.

3.5-Basic Treatment Menu

Applies. However, the Stormwater Engineer may direct substitution of an alternative treatment method based on the preferences noted in Table 4.4R of Section 2.9.1.4 of the Stormwater Notebook.

2.9.5.4 Chapter 4: General Requirements for Stormwater Facilities

4.3.2-Side Slopes and Embankments

Up to 25% of the pond perimeter may have vertical walls. Anything greater will require approval of the Stormwater Engineer. Provide fence along slopes greater than 3:1.

4.4.1-General Design Criteria

Liners are required for all water quality ponds and most detention ponds (impermeable fill layer, synthetic liner or bentonite).

4.4.3-Design Criteria for Low Permeability Liner Options

Concrete liners are not approved in Redmond.

4.5.3-Outfall Systems

Drop structures are not allowed unless specifically approved by the Stormwater Engineer.

Table 4.5-Maintenance Standards

No. 4 – Control Structure / Flow Restrictor

Under “General”, maintenance is required if Trash and Debris (Includes Sediment) material exceeds **20%** of sump depth or 1 foot below orifice plate.

Figure 4.8-Flow Dispersal Trench

6” minimum diameter perforated pipe required.

2.9.5.5 Chapter 5: On-Site Stormwater Management

BMP T5.10 Downspout Dispersion

Downspout dispersion may be limited based on site and downstream conditions.

BMP T5.13 Post-Construction Soil Quality and Depth

For landscaped areas and lawns, compost-amended soils are encouraged to be used. Compost-amended soils shall be installed in accordance with the requirements specified in “Guidelines for Landscaping with Compost-Amended Soils” in Appendix Q. If landscaped areas and lawns have slope lengths of at least 50 feet and are made up of contiguous areas with a minimum area of 500 square feet, then landscaped areas with compost-amended soils may be considered to be pasture when modeling with WWHM.

Compost-amended areas shall be marked to prevent vehicle traffic in those areas.

BMP T5.20 Preserving Natural Vegetation

Preserved areas shall be set aside as native growth protection easement and marked accordingly. No vehicle traffic shall be permitted in preserved areas.

BMP T5.30 Full Dispersion

Full dispersion credit may be limited based on site and downstream conditions.

2.9.5.6 Chapter 6: Pretreatment

Applies

2.9.5.7 Chapter 7: Infiltration and Bio-infiltration Facilities

Applies. Note that infiltration for treatment is not allowed in Wellhead Protection Zones 1, 2, or 3.

2.9.5.8 Chapter 8: Sand Filtration Treatment Facilities

Applies

2.9.5.9 Chapter 9: Biofiltration Treatment Facilities

9.4-Best Management Practices

Swales shall be at least 200 feet long. Swale length may be reduced to 150 feet for re-development projects if no feasible alternative exists. Maximum swale bottom width shall be 8 feet (parallel swales are acceptable if needed to provide adequate treatment area). Biofiltration swales and similar water quality facilities shall be lined (e.g. geomembrane) in Wellhead Protection Zones 1, 2, and 3, and shall be lined in other areas unless constructed over at least one foot of compacted till (native or constructed).

If biofilters are not able to be located off-line, the swale shall be designed so the maximum flow possible in the swale up to the 50 year does not produce a velocity over 3 feet per second.

The size and shape of biofilters (and other surface features) shall be compatible with the terrain and not detract from the landscape value (the latter as determined by the Technical Committee).

At least one side of each biofilter shall be accessible for maintenance by a backhoe.

Plant no trees within 8 feet of biofiltration swale banks. Their resulting shade and leaves impact the dense vegetated cover required for biofiltration. In designing the landscaping for the area, and placement

of the biofiltration swale, take into account the need for sunlight within the swale.

Table 9.1- Sizing Criteria

Underdrains are not required.

Figure 9.2-Biofiltration Swale Underdrain Detail

Underdrains are not required.

2.9.5.10 Chapter 10: Wet Pool Facility Designs

10.3-Best Management Practices (BMPs) for Wetpool Facilities

See requirements for Detention Ponds in Volume III.

Provide a 5-foot wide level bench around the perimeter of the pond at or up to 1 foot below the permanent water surface.

All water quality ponds shall be lined to prevent infiltration. Lining may consist of an impermeable fill layer 18 inches or thicker, bentonite or synthetic liners approved by the Stormwater Engineer. When a geomembrane is used, provide an analysis demonstrating that the required cover soil will be stable against sliding when saturated.

Gravity drains are not required for wet ponds or vaults. Access roads to the pond bottom are not required but are encouraged for wet ponds.

Wet ponds that are intended solely for water quality treatment shall have a high flow bypass to divert peak flows above the water quality design storm.

Wetponds shall be setback a minimum of 10 feet from structures, property lines, or required vegetated buffers, and 50 feet from the limits of steep slopes. The setback from steep slopes may be reduced per Section 20D.140.10-120 of the Redmond Community Development Guide.

A minimum, average depth of 3 feet is required for water quality treatment in vaults and tanks.

Storm pipes should discharge into wet ponds at/or above the normal control elevation (elevation of outlet pipe invert). Designs that include pipes discharging below the control elevation must include an analysis demonstrating that sediment will not accumulate within the pipe.

To avoid anaerobic conditions, wet ponds should not have permanent pool depths greater than 8 feet, unless aeration is provided. For publicly

owned and maintained ponds, aeration requires approval from the Stormwater Engineer.

2.9.5.11 Chapter 11: Oil and Water Separator BMPs

11.7 Oil and Water Separator BMPs

API separators rise rate shall be 0.2187 foot/minute.

2.9.5.12 Chapter 12: Emerging Technologies

12.7- Use of Emerging Technologies in Redmond

The use of emerging technologies is not discouraged in Redmond, but will require more careful scrutiny, additional submittals, and may require post-construction monitoring. In general:

- Technologies that have received General Use (GULD) designation are acceptable for use in Redmond, within the guidance and recommendations for use provided by Ecology.
- Technologies that have received Conditional Use (CUD) designation are acceptable for use in Redmond for some projects, on a case-by-case basis. Such projects may require post-construction monitoring.
- Technologies that are going through Ecology's Technology Assessment Protocol may be considered for use in Redmond for some projects, on a case-by-case basis. Such projects will require substantial performance data submittals and post-construction monitoring.

Contact the Stormwater Engineer to discuss use of emerging technologies. Final approval will be by a committee that includes a representative from the Natural Resources Division, the Development Services Division, and the Construction Division of Public Works.

Additional Updates

Chapter 8, Section 8.7.42 – Remove (*lots 5 acres and greater*).

Chapter 8, Section 8.7.5 – All large projects are required to submit a site assessment for LID. If infiltration and/or dispersion are not feasible options, the applicant shall provide justification to demonstrate why.

Chapter 8, Section 8.8.1 – Add the following:

For new development projects (less than 35% existing impervious area), regional facilities must be operational to be eligible for “fee-in-lieu”. Redevelopment projects (more than 35% existing impervious area) are eligible if associated regional facilities are operational or are on the City's six year Stormwater Capital Improvement Plan.

To be eligible for “fee-in-lieu”, project areas must drain to the existing or proposed regional facility. For public road projects, the project area must drain to the same receiving water as the existing or proposed regional facility.

Chapter 8, Section 8.8.3.3 – Add the following:

If a redevelopment project drains into Bellevue, and regional facilities have not yet been constructed, then onsite interim facilities may be required. The purpose of such facilities is to ensure that the proposed project does not create a greater negative environmental impact on receiving waters than is currently caused by the project site. Such facilities may use the existing release rate from the site as the proposed release rate from the site (instead of predeveloped conditions).

Chapter 8, Section 8.8.4.1 – Add the following:

Within the Overlake regional surcharge area, the Overlake Village is required to provide onsite treatment for pollution generating impervious surfaces. Low impact development methods shall be used to the extent practical to meet this requirement.

Appendix A – See current RMC, Chapter 15.24.

Appendix C – Contained in updated Chapter 2.