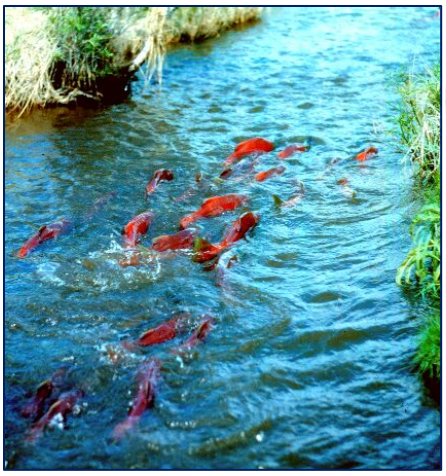
CityofRedmond

August 2013

Water Resources Strategic Plan
And 3-Year Action Plan (2014-2016)



SURFACE WATER

GROUNDWATER

STORMWATER

Draft

INTRODUCTION

Why a Strategic Plan

The purpose of this strategic planning effort has been to better define and communicate the City of Redmond's approach to water resources protection. The plan lays out the mission, goals, objectives, strategies and tactics for water resources efforts in Redmond and how they support the overall City vision and other City functional areas. The plan is a framework for making policy decisions, setting priorities, and most effectively allocating funds. This plan is intended to:

- Demonstrate alignment with Redmond's vision, Comprehensive Plan, Capital Investment Strategy Vision Blueprint, Budgeting by Priorities, and other City efforts
- Identify key strategies and major actions over the next 3 years based on a long-term view
- Become an analysis tool for potential future actions
- Guide other water resources planning efforts
- Communicate how the water resources plan relates to and implements Redmond's vision for the future

Process

Under direction from the Mayor and Public Works Director, a cross-departmental team of City staff was convened to contribute to the development of this plan. Staff members were chosen for their knowledge and experience in water resources subject areas and/or for their understanding of other City functions that could potentially be impacted by the outcomes from this plan. A core team facilitated discussions and incorporated comments into the plan. A draft plan will be submitted for review and comments to City Council and an external stakeholder group. The final plan will be submitted to City Council for its approval.

Community Involvement

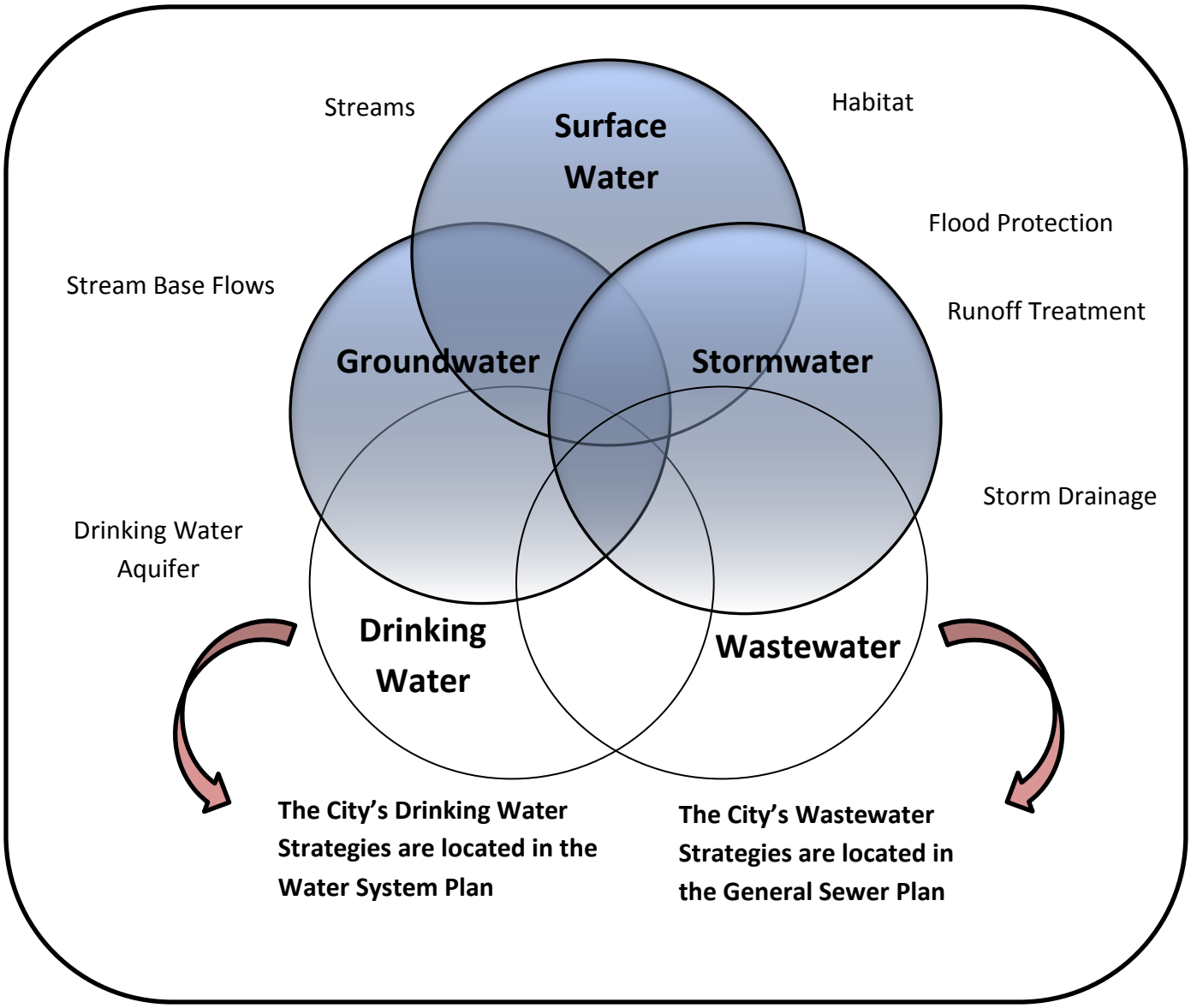
To create a foundation for establishing customer based objectives, we reviewed the City's recent public involvement work (Comprehensive Plan, Transportation Master Plan, Wellhead Protection Program, and Budgeting by Priorities). When an initial water resources draft plan is developed, additional public outreach will be done with the community. This will likely include a citizen review committee representing businesses and other interests to evaluate the draft plan and to provide feedback on the plan's clarity and approaches.

Water Resources Areas Covered by this Plan

Surface water, groundwater, and stormwater are the water resources areas targeted by this plan. Water resources are major assets of the City of Redmond. Management of these resources is an important responsibility of the City and the City dedicates significant staff and financial resources towards this effort.

These three water resource areas are so interrelated that they will be considered together in this strategic plan as opposed to separate plans. Many factors being considered influence more than one of these water resource areas (surface water, groundwater, and stormwater) combining these areas provides a clear overall picture.

Figure 1. Water Resources Plan Coverage Diagram (Surface Water, Groundwater, and Stormwater)



ALIGNMENT WITH CITY GUIDANCE

City Vision

The abbreviated form of the City of Redmond Vision is:

> Redmond is a complete City – two urban centers, connected neighborhoods, with high quality services delivered in partnership with an engaged citizenry.
>
> (For the complete version of the City 2030 Vision, see Chapter 2 of Redmond's Comprehensive Plan.)

The complete vision has numerous references to the three functional areas relating to natural resources and environmental protection. Additionally, sustainability was the central theme of the 2010-2011 Comprehensive Plan update. General examples include:

- Surface waters and associated buffers are identified as "cherished natural features"
- Redmond is described as "urban place within a rich natural environment"
- Residential areas described as "housing blended with the environment"
- Overall, Redmond is characterized as "City framed within a beautiful natural setting"
- Community described as "City prides itself for its environmental stewardship"

Specifically, the vision has numerous references to the community's desire for clean drinking water (groundwater), stormwater systems that reduce excess runoff, increasing salmon runs, controlling contaminates, enhanced habitat and improved water quality.

Key guiding messages from the City vision include:

<u>Balance</u> – The City vision for the future is a vibrant urban community that has accommodated growth and preserved the environment. A rich natural environment is truly valued by the community and is a defining characteristic of Redmond.

<u>Enhancement</u> – The City vision looks to go beyond mitigating impacts of growth and improve the natural environment, streams and buffers, salmon runs, groundwater quality and quantity, surface water quality, etc. as the City grows.

<u>Planned well</u> – The vision states that the City is very intentional in its efforts to protect and enhance the environment. Use of creative design, public-private partnerships, inventorying and monitoring of natural features, innovative land use development, utility

planning and other techniques that are well thought out to protect, conserve and enhance the natural environment.

Maintained well – Long-term maintenance is anticipated, planned for and funded appropriately. Designing and upgrading systems prevent damage to the environment and provide for cost effective maintenance. Additionally, as the City performs maintenance, we foster conservation operationally.

In addition to the Comprehensive Plan, other City regulatory documents have numerous references and requirements for water resources protection and enhancement.

BUDGETING BY PRIORITIES

The City of Redmond budget is developed through a process where community priorities were determined based on extensive public input.

The priorities are:

- I want a diverse and vibrant range of businesses and services in Redmond.
- I want to live, learn, work and play in a **clean and green environment.**
- I want a sense of community and connection with others.
- I want a well maintained city whose transportation and other **infrastructure** keeps pace with growth.
- I want to be safe where I live, work and play.
- I want city government that is responsible and responsive to its residents and businesses.

Water resources efforts are predominantly covered under the clean and green priority and the infrastructure priority. (Refer to Appendix 2 for the key factors associated with these priorities.)

This City guidance provides the foundation for the development of the Water Resources Strategic Plan vision, goals, objectives, strategies and tactics.

WATER RESOURCES VISION & PRINCIPLES

Vision

The vision is the inspiring words chosen to clearly and concisely convey the direction of the organization. It is a long-term view and concentrates on the future. The vision statement communicates both the purpose and values of the organization. For employees, it gives direction about how they are expected to behave and inspires them to give their best. Shared with customers, it shapes customers' understanding of why they should work with the organization.

Water resources that support our vibrant urban community while providing a lasting natural legacy.

> *Water resources are managed so that: people are safe, buildings and property are protected from flooding and erosion, urban functions continue, stream areas are stable and healthy for fish and wildlife, surface and groundwater are safe and abundant, salmon are recovering, and our local streams, rivers, lakes and Puget Sound provide a lasting natural legacy for Redmond and the region.*

Water Resources Guiding Principles

Guiding principles are positive leading statements that are the foundation for the conduct of behavior, both individually and in relationships with others. They are the beliefs that most staff would agree with because they are viewed as organizationally appropriate and inherently valuable. Guiding principles are qualities that define and differentiate us and are naturally viewed as leading to higher level functioning, creating positive relationships with others, and promoting the City. These principles are not prioritized—all are to be considered equally.

1. Understand existing conditions and risks

Natural systems are complex and constantly changing. Additionally, many varied activities and conditions within a growing vibrant community have the potential to adversely impact these complex systems. Maintaining a solid level of understanding of these systems and risks will help maximize the effectiveness of our actions.

2. **Use a watershed (drainage area) approach for plans and projects**

In the water resources field, adverse conditions at a point are almost always the result of conditions contributing to that point. Whether it is flooding and erosion in a stream or pollution detected in the ground, these conditions are the result of multiple issues that are all contributing to that point. Taking a holistic view will allow us to identify causes, not just effects,

3. **Remain nimble – make the most of opportunities**

Numerous actions are occurring every day in the City that could impact the City's water resources. Partnering with private development, capital construction in other city areas, regional activities, other government agencies, citizen group, non-profits could multiply our effectiveness if we are positioned to take advantage of these opportunities.

4. **Innovate and adapt**

Technology related to water resources is constantly evolving. We need to stay current. The solutions we are using today are different than those used 10 or 20 years ago. We need to move forward even when there is uncertainty but recognize that adjustments may need to be made. We should build in flexibility, where feasible, to allow us to take advantage of technological advances.

5. **Address the source of the problem**

Addressing the source of problems is better for the environment and more cost effective than dealing with the resulting conditions. Focus should be on preventing pollution rather than cleaning it up and preventing excess runoff rather than addressing flooding and repairing erosion. If the source of the problem cannot be remedied, address the issue as close to the source as possible.

6. **Foster community stewardship**

The water resources we are protecting are assets for the community and the community should play a role in preserving these assets. Some in the community are unaware that they may be putting these resources at risk and would be willing to make changes to their behavior to protect these resources. Others are more than willing to contribute, but are not sure how or where. Engaging the community as stewards of the water resources can prevent adverse impacts and can multiply the effectiveness of City actions.

7. **Influence and advance regional efforts**

Redmond's water resources are impacted by actions outside our City, just as our actions impact the water resources of the region. We need to work regionally to engage others to limit their impact on Redmond. Additionally, we need to support the water resource goals of the region—like recovering salmon and Puget Sound—since these play a role in the quality of life for all of us.

8. **Strive to meet the intent of regulatory requirements through partnerships**

Redmond, like all cities in the region, is required to meet water resources regulations from numerous agencies including the Department of Ecology, Department of Health, Department of Fish and Wildlife, Corps of Engineers, National Marine Fisheries Service, and others. Most of these regulations focus on what to do, which is very narrow and limiting rather than on what is the intent of the regulation, which allows for creativity and opportunity. Agencies do struggle with creative approaches over just meeting the letter of the regulation. However, with the right partnership and demonstrated results, Redmond can build the necessary credibility with agencies that will allow us to consider more creative solutions that are better for Redmond and the region.

9. **Seek the best balance of environmental conditions and other City goals**

Redmond is in the urban growth area and has designated two urban centers for focused growth, and as such is expecting to accommodate additional growth. At the same time, environmental conditions are a major factor in quality of life. The key is to strive for the best balance. An example of this approach is allowing development and density that is mindful of the environment that permits businesses to operate over our aquifer and near surface waters while taking reasonable precautions to preserve these valuable community resources. In addition, investments in locations that will be further developed can improve the condition of the environment, such as through the City's investment in regional stormwater facilities in our urban centers to manage stormwater flow and water quality.

10. **Encourage voluntary compliance prior to enforcement actions**

Compliance with water resources protection regulations is vital to the preservation of these community resources. We need to work with businesses, citizens, contractors, etc. in the community with a focus on gaining voluntary compliance. However, if reasonable efforts to gain voluntary compliance are not successful enforcement may be necessary to preserve these resources to maintain Redmond's quality of life now and into the future.

WATER RESOURCES GOALS, OBJECTIVES, STRATEGIES AND TACTICS

Goals

Goals describe what the program/project is striving to accomplish; they depict the general programmatic outcomes desired.

I. Sustain the groundwater resource as a safe and abundant supply for drinking water and stream base flows
II. Manage stormwater runoff to protect people, property and the environment
III. Ensure the quality of surface waters and associated buffers support thriving salmon and wildlife populations, and provide recreational opportunities and beautiful natural areas

Objectives

Objectives provide additional clarity and insight into the intent of our goals. This supports the development of strategies and tactics that will help us achieve our vision.

Objective 1 – Protect the quality of surface waters and groundwater

- Groundwater is not degraded and meets drinking water standards with existing treatment processes
- Developed areas and urban activities produce little pollution
- Stream and lake conditions support healthy fish and wildlife

Objective 2 – Maintain adequate quantity of surface waters and groundwater

- Groundwater levels do not degrade and remain high enough to supply drinking water wells
- Sustained stable flow in streams during summer
- Flow conditions support fish (not too much in winter and not too little in summer)

Objective 3 – Manage stormwater to prevent flooding and erosion

- Drainage system collects and conveys water to minimize impact to streets and other developed areas
- Stable channels that provide habitat features for life cycle (wood, gravel, pools, riffles)

Objective 4 – Restore stream habitat

- Flow conditions support fish (not too much in winter and not too little in summer)
- Stable channels that provide habitat features for life cycle (wood, gravel, pools, riffles)
- Streams are accessible to fish and riparian wildlife
- Stream buffers have predominantly native vegetation

Strategies and Tactics

Strategies and tactics are the method or plan chosen to bring about a desired future, such as achievement of a goal, objective or solution to a problem.

Strategy 1 – Reduce the risk of surface water, groundwater, and stormwater contamination

1.1 Tactic Maintain the inventory of hazardous materials used and/or stored over our drinking water aquifer

1.2 Tactic Inspect sites to determine how hazardous materials are stored and used. Use inspection as an opportunity to educate property owners/operators about the risks from contamination and what they can do to reduce risk

1.3 Tactic Encourage businesses and the public to reduce the use and storage of hazardous material and to use the least hazardous approach

1.4 Tactic Encourage businesses to use best management practices for activities and storage (such as secondary containment, covered storage, parking lot sweeping, etc.) in accordance with regulations

1.5 Tactic Have businesses with large quantities of hazardous materials develop plans for handling the materials in a manner that protects groundwater and surface water

1.6 Tactic Evaluate the risks to groundwater from stormwater infiltration systems and partner with businesses on upgrades to reduce the risk

1.7 Tactic Review and inspect capital construction projects and private development projects to ensure that they meet project goals while protecting water resources

1.8 Tactic Develop policies to address threats to groundwater quality and quantity

<u>Strategy 2</u> – Monitor surface water, groundwater, and stormwater conditions

2.1 Tactic Continue to monitor the groundwater to identify presence and sources of contamination and changes in quantity and quality conditions early to foster cost effective cleanup and to prevent impacts to City wells

2.2 Tactic Reevaluate groundwater comprehensive monitoring plan and well network that provides opportunity to evaluate conditions between known and potential sources of contamination and City production wells

2.3 Tactic Continue to monitor surface water conditions and trends for biological conditions, water quality, seasonal surface water conditions, flow conditions and stream and buffer habitat conditions to provide a strong data foundation for decision making

2.4 Tactic Refine stormwater system monitoring to identify sources of contamination to better inform prevention efforts

2.5 Tactic Monitor effectiveness of actions/projects to adapt to continually improve results

2.6 Tactic Monitor and inspect stormwater infrastructure systems to ensure that they are functioning as designed

<u>Strategy 3</u> – Manage existing contamination

3.1 Tactic Look for opportunities to get contamination cleaned up

3.2 Tactic Encourage the state to take the lead on groundwater and soil cleanups and continue to coordinate/monitor ongoing clean-up efforts

3.3 Tactic Pursue the cleanup of sites by responsible party

3.4 Tactic High risk sites should be managed or cleaned up by the City if other options are not viable; level of action should be based on potential impact to the City and public benefit

3.5 Tactic Continue to monitor low risk contamination to ensure that conditions are not changing until clean-up opportunities are viable

<u>Strategy 4</u> – Increase the infiltration of clean water to maintain surface water and groundwater quantity, reduce pollution loading, and reduce flood potential

4.1 Tactic Use infiltration as preferred method of stormwater management for private development projects and capital construction where suitable

4.2 Tactic Look for opportunities to minimize the creation of impervious area while meeting planned density targets

4.3 Tactic Look for opportunities to retrofit previously developed areas to infiltrate where feasible to compensate for historical losses of recharge

4.4 Tactic Coordinate with King County to maintain/increase recharge in areas that contribute groundwater to Redmond but are outside City limits

4.5 Tactic Permanent dewatering should not be permitted. Temporary dewatering should be minimized but may occur with analysis of potential impacts and provisions to address adverse impact such as loss of drinking water and storm drainage capacity

<u>Strategy 5</u> – Proactively maintain water resources infrastructure (pipes, catch basins, vaults, ponds, swales, monitoring wells, etc.)

5.1 Tactic Maintain a complete and accurate inventory of water resources infrastructure

5.2 Tactic Minimize road debris, sediment and leaves from impacting/entering the system through street sweeping, leaf pickup, etc.

5.3 Tactic Remove debris from the system to protect water quality and prevent flooding

5.4 Tactic Repair infrastructure to maintain function and optimize the useful life

5.5 Tactic Plan and design infrastructure to allow for cost effective maintenance

5.6 Tactic Develop a program to identify needed system replacement

5.7 Tactic Maintain aesthetics, landscaping and habitat associated with water resources infrastructure

5.8 Tactic Ensure that private systems are maintained to function as designed

5.9 Tactic Consider maintenance staffing and equipment needs from capital construction and private development projects

<u>Strategy 6</u> – Manage flooding and adverse impact to floodplains

6.1 Tactic Identify frequently flooded areas and manage to protect the public

6.2 Tactic Coordinate with FEMA on floodplain issues (flood insurance, community rating system, floodplain update, elevation certificates, compensatory flood storage, etc.)

6.3 Tactic Maintain and restore flood storage capacity, floodplain habitat, and floodplain connections to surface waters

6.4 Tactic Provide drainage system conveyance capacity for at least the 10 year storm (25 year for culverts) and provide safe drainage system overflow paths in the event the drainage system is overwhelmed or fails

<u>Strategy 7</u> – Plan for future development and retrofit developed areas that flood or have degraded water quality and/or habitat

7.1 Tactic Continue to implement regional facilities for stormwater management in urban centers and southeast Redmond and consider it for other areas

7.2 Tactic Time construction of regional stormwater facilities to provide capacity ahead of private development and capital project needs

7.3 Tactic Coordinate stormwater infrastructure with other City efforts (such as parks and transportation) to achieve efficient and mutually beneficial facilities and to retrofit existing streets

7.4 Tactic Develop basin plans that address system deficiencies, plan for growth, improve water quality, and restore salmon habitat

7.5 Tactic Prioritize development of basin plans in areas with highest recovery potential over areas that are more degraded

7.6 Tactic Retrofit water quality first through minimizing loading then installing treatment systems to remove pollutants

7.7 Tactic Contribute to long range planning efforts such as neighborhood planning to identify water resources issues early and potential remedies

7.8 Tactic Develop Low Impact Development (LID) approach for Redmond to support desired stormwater management strategies and as a required element of our NPDES permit. Align City approach with the state refining science and guidance

7.9 Tactic Prioritize water resources capital projects that have multiple benefits and coordinate timing through the citywide capital investment strategy

<u>Strategy 8</u> – Protect and restore stream corridors, buffers and riparian habitat

8.1 Tactic Use a watershed approach for habitat restoration planning and activities

8.2 Tactic Take the lead and seek regional support on habitat restoration efforts of Class 1 waters (Sammamish River, Bear Creek and Evans Creek) within the City limits and support efforts for Lake Sammamish

8.3 Tactic Consider addressing causes of degradation such as excessive flows prior to conducting direct habitat restoration

8.4 Tactic Remove barriers to fish migration and prevent the creation of new barriers, prioritize removal in areas based on habitat quality and quantity above the barrier and value (cost)

8.5 Tactic Encourage private development to address restoration issues onsite and explore options for enhanced requirements

8.6 Tactic Enhance the long-term protection of riparian habitat through land use protections (i.e., Native Growth Protection Easements), community education and outreach, and encouraging stewardship

8.7 Tactic Provide maintenance of habitat restoration areas to ensure long-term success

8.8 Tactic Look for creative opportunities to restore and maintain habitat such as offsite mitigation and partnerships

8.9 Tactic Actively plant buffers and address invasive species

<u>Strategy 9</u> – Involve the public in water resources protection and recovery

9.1 Tactic Include the public in major planning efforts related to water resources

9.2 Tactic Coordinate water resources outreach with other City communication efforts

9.3 Tactic Encourage the public to be stewards of water resources through daily actions and volunteer efforts

9.4 Tactic Educate children on water resources issues to help influence actions of adults and to set a path for long-term support of water resources protection

9.5 Tactic Engage the public on water resources issues through capital projects, private development and other City program activities

9.6 Tactic Respond to public drainage concerns promptly and use actions as opportunity to educate and engage the public on water resources issues

9.7 Tactic Educate all City staff on water resources issues

9.8 Tactic Support and coordinate with regional water resources outreach efforts

<u>Strategy 10</u> – Fund water resources protection through utility rates, connection charges, development fees and grants

10.1 Tactic Use utility rate structures to encourage preferred methods of water resources protection

10.2 Tactic Ensure that maintenance funding and staffing keeps pace with system expansion and changing requirements

10.3 Tactic Update funding strategy to plan for and fund system repairs, replacement and expansion

10.4 Tactic Position the City well to take advantage of grant opportunities and seek grant funding to add to City funds

Water Resources Strategic Plan and 3-Year Action Plan

Key Actions for the years 2014 – 2016

The 3-Year Action Plan outlines major planning, programmatic and project actions in support of the strategic plan. The lists below provide guidance on strategic actions that can be taken in support of plan goals and objectives. Many of the actions are budgeted and some have already been initiated. Other actions will be included in future budget offers for City Council to consider.

Planning Actions	**Tactic**	2013	**2014**	**2015**	**2016**	2017
Wellhead Protection Master Plan - development	Numerous					
Wellhead Inspection Program Plan - update	1.2					
Wellhead Monitoring Plan - update	2.2 & Strategy 3					
Funding Strategy - update	10.3					
Low Impact Development (LID) Plan – development	7.8					
Stormwater and Surface Water Functional Plan – development	5.1 & Strategy 7					
Strategic Transportation Stormwater Treatment Plan - development	7.3					
Stormwater System Infrastructure Replacement Plan - development	5.6					
Southeast Redmond Phase II Planning support	7.3					
Watershed Plan	Numerous					

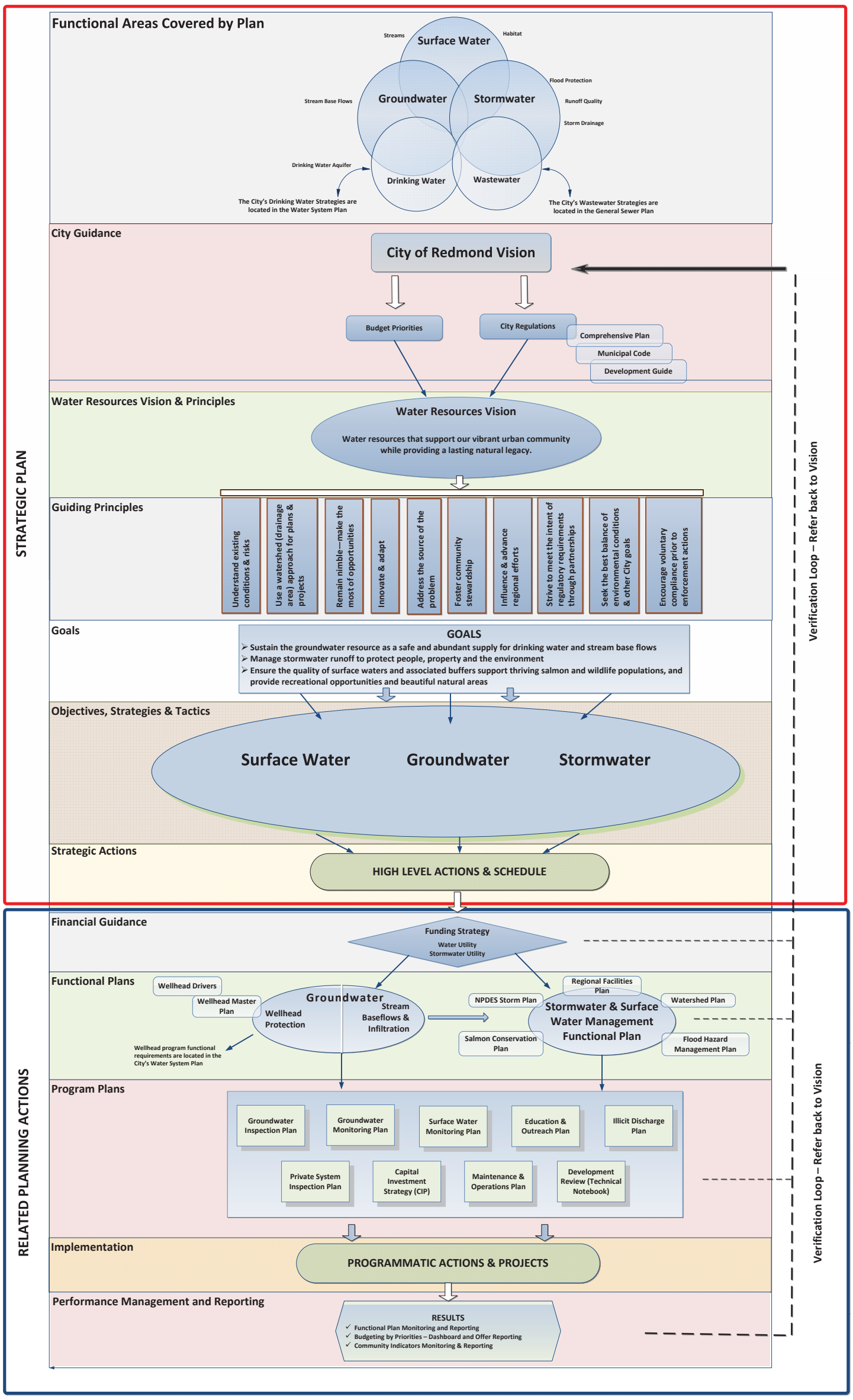
Major Programmatic Actions	**Tactic**	2013	**2014**	**2015**	**2016**	2017
Evaluate culvert safety/capacity features	6.5					
Stream base flow and recharge analysis pilot (Tosh)	7.4 – 7.6					
Three dimensional model of aquifer	1.2, 1.8, 2.1, 2.2					
Urban centers hydraulic model – updates	7.1					
Support development of asset management system	5.1					
Hazardous materials data collection process – update	1.2 – 1.5					
Stormwater infiltration retrofits (higher risk sites)	1.6					
TV City storm drainage system	5.1					

Major Projects	**Tactics Supported**	2013	**2014**	**2015**	**2016**	2017
Construct Redmond Way Regional Facility	7.1,2,3, 9.1,9.2, 10.4					
Construct Overlake detention vault (behind Sears)	7.1,2,3, 9.1,9.2, 10.4					
Tosh Creek basin retrofit projects	4.3, 8.4, 8.6,8.9,9.3, 10.4					
Sammamish River habitat & flood capacity project	6.2, 8.2 & 8.7-8.9, 9.3					
Bear Creek rehabilitation	8.2 & 8.6-8.9, 9.5, 10.4					
Evans Creek relocation	8.2 & 8.6-8.9, 9.5, 10.4					
Overlake station vault construction	7.1, 7.7					

Appendix 1 Water Resources Strategic Plan and Related Planning Actions – Diagram

WATER RESOURCES STRATEGIC PLAN AND RELATED PLANNING ACTIONS

August 2013



Appendix 2 Budgeting by Priorities

Clean and Green

The Clean and Green results team identified four main factors critical to the goal of ensuring a clean and green environment. They developed these factors through research, team brainstorming, and review of the maps and request for proposals (RFOs) created from the previous two Clean and Green results teams.

Factor 1: Create, Conserve, Reduce, Restore, and Recycle

This is our central theme and can be applied to each of the other factors as the core principles of a clean and green environment.

Factor 2: Environment

In order to create and maintain a clean and green environment (natural and urban) for ourselves and for future generations we must protect the resources that nourish and sustain us physically, emotionally, and spiritually. Clean air, water, and soil create a solid foundation to build upon. Maintaining and restoring healthy habitats and ecosystems is a natural way to help accomplish our goal of clean air, water and soil, while also nurturing our desire for beautiful places. Providing safe and aesthetically pleasing places to recreate encourages physical activity, and provides opportunities for connection with others in our community. A walkable, connected community encourages physical activity and also helps us maintain clean air, water, and soil by reducing pollutants emitted by vehicles.

Factor 3: Ethic

A clean and green environment will thrive only when we embrace the ethic that sustains it. To firmly establish this ethic, continued education and outreach to the community and businesses are essential. Commitment to exploring innovative and efficient technology, despite challenging economic times, will pay off in the long term. Strong connections and partnerships between city departments, businesses, and the community help us all achieve a higher standard with less individual effort and expenditure.

Factor 4: Management

Our responsibility to provide key services to protect the health of our community and the environment can be fulfilled by maintaining a strong, up-to-date infrastructure and using innovative technology to control storm water, waste water, and solid waste, and protect watersheds and water sources. Education and outlets must be provided to reduce hazardous waste and pollution. Clean streets, sidewalks, and pathways provide safe places to recreate, encourage physical activity, and contribute to an enhanced aesthetic: all important elements of living in a clean and green environment.

Infrastructure and Growth

Offers should support the City's *Infrastructure and Growth* priority, which contributes to three factors:

1. Plan
2. Build & Invest
3. Maintain & Operate

These factors are broad categories that provide for a systematic process to provide well-maintained infrastructures and a financially solvent and sustainable community.

Factor 1: Plan

A well-maintained city that keeps pace with growth requires the creation of a blue print that defines community goals. Creating such entails thoughtful planning as well as educating and engaging with the community. The Plan must understand and adhere to local, regional, and federal regulations, zoning requirements, and policies. The Plan should also shift to more sustainable and greener infrastructures, provide choices for moving people, goods, and services from one place to another and ensure housing options that keep ahead of changing demographics.

Factor 2: Build & Invest

To support the growth of a vibrant community, the City must execute long range plans such as the Capital Investment Strategies, Comprehensive Plan and the Transportation Master Plan. Identifying and leveraging funding sources is vital in building the key components identified in these plans. Together with the goals of building two urban centers, we can utilize opportunities from the Capital Improvement Projects and Private Developments to focus on building necessary infrastructures to support planned growth.

Factor 3: Maintain & Operate

A successfully functioning municipal infrastructure enables a community and its businesses to operate at the highest level. To ensure that this occurs in Redmond, the City utilizes a proactive approach to infrastructure management. An emphasis on preventative maintenance reduces the frequency of more costly reactive maintenance. Maintenance of the City's growing public infrastructure (water, sewer, stormwater, roads, and facilities) is thoughtfully planned and scheduled. Trained personnel with the appropriate equipment are utilized to perform the required maintenance in an efficient and effective manner ensuring reduction of future budget costs, continuity of essential City services, and strengthen the emergency preparedness of the community. The City manages and prioritizes ongoing infrastructure maintenance according to the highest standards, regulations, and policies.

Appendix 3 Measuring Performance

Evaluating performance of this plan will focus on the water resources conditions that result from implementing plan actions. Most of the measures identified were previously established with varying levels of results reported annually over the last several years. Detailed descriptions on exactly how each measure is calculated are available in the Natural Resources Core Services document. Measuring Performance provides a general description of measures and targets. Targets are intended for guidance only and have not been analyzed to determine funding needs. Enhancements to these measures will be considered as the City refines its overall system for measuring performance. The following are the measures for evaluating plan performance:

MEASURES

I. Surface Water and Habitat Protection/Enhancement

1. Surface Water Quality
2. Surface Water Biology
3. Stream Buffer Coverage
4. Stream Length Accessible by Fish & Number of Fish Migration Barriers
5. In-stream Habitat Complexity

II. Stormwater Management

6. Runoff Flow Control
7. Drainage System and Culvert Flow Capacity
8. Runoff Treatment

III. Groundwater Protection

9. Recharge
10. Inspection Compliance Rate

IV. Plan Administration

11. Plan Completion

1. Surface Water Quality

Surface water quality is a direct measure of part of water resources objective one: *Protect the quality of surface waters and groundwater.* The City uses the state water quality index as the measure. The measure includes: nutrients, pH, temperature, fecal coliforms and other broad parameters to gage overall water quality. Using the accepted water quality standards allows Redmond to compare the status of its surface waters to other water bodies in the state. The standards also help to identify water quality problems caused by, for example, failing septic systems, runoff or discharges from construction sites, fertilizers, chemicals from lawns, and erosion of stream banks caused by improper flow control practices, etc.

The Water Quality Index (WQI) is a number ranging from 10 to 100. The higher the number indicates better water quality.

- >80 Waters of "lowest concern" generally meet state water quality standards
- 40 – 80 Waters of "marginal concern"
- <40 Waters of "highest concern" do not meet state water quality standards

Target Type	Description
Near Term Target (~ 5 years)	Positive trend of higher WQI scores (better water quality) in targeted Class 2 and 3 streams. *(Targeted streams are identified by the City's watershed management plan where the City is actively conducting programs and projects focused on improving water quality.)*
Medium Term Target (~ 10 years)	WQI scores for targeted Class 2 and 3 streams consistently above 40 (~ 2 basins).
Long Term Target (~ 20 years)	WQI scores for targeted Class 2 and 3 streams consistently above 40. (~ 6 basins)
Ultimate Goal ~ 100 years	WQI scores for all Class 2 and 3 streams achieve 80 and above. Surface water quality is adequate to protect receiving waters to a level that support fish and other beneficial uses.

Note: Sampling sites, protocols and results are available from Redmond's Natural Resources Division.

2. Surface Water Biology

The health, quantity, and diversity of the aquatic invertebrate life (bugs) are an effective indicator of the overall stream health because bugs are influenced by numerous private and public actions for which City programs directly or indirectly address. They are also the basis of the food chain for fish and other wildlife. Land use, landscape management, street sweeping, street maintenance, development regulations, storage and management of chemicals, construction site erosion control, spill and dumping, transportation, and more impact aquatic life.

The Benthic Index of Biological Integrity (B-IBI) collects and analyzes the stream benthic invertebrate communities to gauge stream biological health. Annual samples are taken during the fall from core Class 1 and 2 streams in the City of Redmond. The B-IBI measures 10 variables of stream benthic invertebrates (bug) populations providing feedback on aggregate in-stream habitat conditions (e.g., cumulative effects of water quality, flow, temperature on the insect community living in a stream). Total B-IBI scores range from a low of 10 (worst) to a high of 50 (best). Regional studies have established a B-IBI score/stream health classification as follows:

- Below 18 reflects critically impaired stream health
- 18-26 highly impaired health
- 28-34 impaired health
- 36-44 compromised health, and
- Above 44 reflects healthy stream biology

Typically as human influence increases, benthic scores drop. B-IBI scores above 36 or greater are generally needed for self-sustaining salmon populations.

Target Type	Description
Near Term Target (~ 5 years)	Positive trend of higher B-IBI scores (better stream health) in targeted Class 2 streams.
Medium Term Target (~ 10 years)	B-IBI scores for targeted Class 2 streams consistently 28 or greater. *(Targeted streams are identified by the City's Watershed Management Plan where the City is actively conducting programs and projects focused on improving biology.)*
Long Term Target (~ 20 years)	B-IBI scores for targeted Class 2 streams consistently 36 or greater.
Ultimate Goal ~ 100 years	B-IBI scores for all Class 2 streams are 36 or greater.

Note: Sampling sites, protocols and results are available from Redmond's Natural Resources Division.

3. Stream Buffer Coverage

Conditions within stream buffers play a significant role in the overall health of surface waters. Buffer trees provide shade to keep temperatures low, leaf litter to rebuild soil and support insects and eventually trees fall and contribute to stream complexity and flow attenuation. Buffers are often impacted by land development encroachment and crossings for streets and utilities. The City tracks tree canopy coverage within the regulatory stream buffers (all stream classes). Using GIS, the City has identified the area of appropriate buffers (based on the City's Critical Areas Ordinance) and performs qualitative evaluation of buffer vegetation. The City annually measures buffer areas planted and measures overall tree canopy cover approximately every three to four years following Citywide aerial photograph updates (include buffers for Class 1 waters except for the lake).

Target Type	Description
Near Term Target (~ 5 years)	Establish a consistent measurement protocol and document baseline condition of tree canopy within regulatory stream buffers. Plant an average of 2-acres of buffer area per year either through requirements for development or public projects.
Medium Term Target (~ 10 years)	Tree canopy covers at least 60% of the area within regulatory buffers in the City (including the Watershed Preserve).
Long Term Target (~ 20 years)	Tree canopy covers over 70% of the area within regulatory buffers in the City (including the Watershed Preserve).
Ultimate Goal ~ 100 years *(2105 based on support for Chinook Salmon Recovery plan goals).*	Tree canopy covers over 90% of the area within regulatory buffers in the City (including the Watershed Preserve).

4. Percent of Stream Length Fully Accessible by Fish (salmon)

For surface waters to support healthy salmon the fish have to physically be able to access the streams. Barriers to fish migration include culverts that are too high to access, too long for the fish to get through or too steep that the flow is too fast. Erosion and debris buildup within streams can also cause barriers to fish migration. The City currently has an inventory of partial and full fish migration barriers in its GIS system. The City is actively working to remove barriers prioritized by quantity and quality of habitat that could be accessed with barrier removed related to value (cost).

Target Type	Description
Near Term Target (~ 5 years)	Removal of an average of one fish barrier on Class 2 stream per year making 1000ft ~ 2000ft of stream accessible.
Medium Term Target (~ 10 years)	Removal of 10 barriers total by year 10 and increasing the total Class 2 stream length accessible to fish by 10,000ft ~ 20,000ft.
Long Term Target (~ 20 years)	Removal of 20 barriers total by year 20 and increasing the total Class 2 stream length accessible to fish by 20,000ft ~ 40,000ft.
Ultimate Goal ~ 100 years (2105 *based on support for Chinook Salmon Recovery plan goals).*	All Class 2 streams with the potential for fish access allow for the natural migration of fish.

5. Percentage of Class 2 Streams with Adequate In-stream Habitat Complexity

Fish and aquatic wildlife need complex surface water habitat conditions in order to support them throughout their life stages. Much of this in-stream habitat diversity is driven by large wood (from fallen trees and branches) that ends up in the water. Wood provides food for insects, creates resting pools, traps sediment and a host of other beneficial functions. State fisheries guidance indicates the appropriate number of wood pieces needed to support healthy habitat conditions.

Target Type	Description
Near Term Target (~ 5 years)	Increase the length of Class 2 streams in Redmond to have adequate habitat complexity by an average of 1500ft per year.
Medium Term Target (~ 10 years)	30% of Class 2 streams fully or partially accessible by fish have adequate habitat complexity.
Long Term Target (~ 20 years)	45% of Class 2 streams fully or partially accessible by fish have adequate habitat complexity.
Ultimate Goal ~ 100 years (2105 *based on support for Chinook Salmon Recovery plan goals).*	All Class 2 streams have good in-stream complexity (8.1-12 pieces per 100ft).

6. Percentage of the City with Adequate Runoff Flow Control

Controlling the rate of stormwater runoff is vital to protecting small streams from severe erosion and is needed to reduce the risk of flooding, especially at lower elevations in the City. Adequate flow control is defined by the state Department of Ecology. The percentage of the City with adequate runoff treatment is determined by the total of the undeveloped area plus the area that directly drains to flow exempt waters (lake and river) plus the area with adequate flow controls divided by the total area of the City.

Target Type	Description
Near Term Target (~ 5 years)	Prioritize stream basins, complete Watershed Plan, and begin stream basin plans.
Medium Term Target (~ 10 years)	40% of the City has adequate runoff flow control.
Long Term Target (~ 20 years)	60% of the City has adequate runoff flow control.
Ultimate Goal ~ 100 years (2105 *based on support for Chinook Salmon Recovery plan goals)*	100% of the City has adequate flow control that protects the receiving waters to a level that support fish and other beneficial uses - target year.

7. Percentage of Drainage System with Adequate Flow Capacity

Drainage system capacity is an important factor in flood protection. This will be evaluated for both the piped systems and culverts. Adequate conveyance capacity for pipes is defined as the ability to convey stormwater runoff from at least the 10-year storm event without flooding. Adequate conveyance capacity for culverts is defined as the ability to convey the 25-year fully developed peak flow without overtopping embankment (typically a roadway). The percentage of the drainage system with adequate flow capacity is determined by the number of pipes and culverts with adequate capacity divided by the total number of pipes and culverts.

Target	Description
Near Term Target (1 – 5 years)	Identify and prioritize culverts for assessment and analysis.
Near Term Target (~ 5 years)	90% of the drainage system has adequate capacity.
Medium Term Target (~ 10 years)	100% of City pipes and culvert have adequate capacity.
Ultimate Goal ~ 100 years	Major roads and buildings are not adversely impacted (flooded) during storm events.

8. Percentage of the City with Adequate Runoff Treatment

Surface and groundwater quality is directly related to developed areas having adequate stormwater runoff treatment. Adequate protection is basic treatment (as defined by the state Department of Ecology) or better per current standards (NPDES Phase II Stormwater Permit). The percentage of the City with adequate runoff treatment is determined by the total of the undeveloped area plus the area with adequate treatment divided by the total area of the City.

Target	Description
Near Term Target (~ 5 years)	Prioritize stream basins for runoff treatment improvements through the Watershed Plan.
Medium Term Target (~ 10 years)	30% of the City has adequate runoff treatment.
Long Term Target (~ 20 years)	50% of the City has adequate runoff treatment.
Ultimate Goal ~ 100 years	100% of the City has runoff treatment adequate to protect receiving waters to a level that support fish and other beneficial uses.

9. Percentage of Basins with Adequate Recharge *(Effective impervious of 30% or less)*

Currently, the City performs semi-annual and selective continuous monitoring of groundwater levels in representative monitoring wells. City efforts are focused on evaluation of the water balance, monitoring and determining trends in water levels over time and by season. Increased efforts and attention are being directed to reducing the effective impervious area (increasing infiltration of clean water) to help sustain the resource for both our drinking water supply and base flow for streams. With the many influences on groundwater levels and the extremely slow response time (years), measures will target restoring/maintaining recharge through minimizing impervious area and increasing infiltration. This is measured as effective impervious area. This measure is also widely used for stream restoration and has shown to be directly related to a stream basin's ability to support sustained salmon runs. We also believe that this should support a sustained drinking water supply. This will be verified over time through groundwater level monitoring. The percentage of basins with adequate recharge is determined by the number of basins with 30% or less effective impervious area divided by the total number of basins.

Target Type	Description
Near Term Target (~ 5 years)	At least 40% of Class 2 drainage basins have adequate recharge (less than 30% effective impervious area).
Medium Term Target (~ 10 years)	At least 60% of Class 2 drainage basins have adequate recharge (less than 30% effective impervious area).
Long Term Target (~ 20 years)	80% of Class 2 drainage basins have adequate recharge (less than 30% effective impervious area).
Ultimate Goal ~ 100 years	Trends in groundwater levels (quantity) within the Critical Aquifer Recharge Area (CARA) remain stable at a sustainable level to support drinking water and stream base flows.

10. Inspection Compliance Rate

Since the quality of groundwater is affected by many variables and therefore is largely outside the City's control, City efforts to protect groundwater quality are focused on reducing potential risks to the aquifer through inspections, technical assistance, secondary containment, retrofitting of stormwater infiltration systems, and implementation and follow-through (development review) of regulations. For this measure, risk reduction will focus on inspection compliance rate.

Once a site has been brought into initial compliance through a technical assistance visit, it is put on an ongoing inspection schedule. The inspection frequency for each site is based on the risk level. Site compliance rate is the number of inspection sites that are in compliance divided by the total number of inspection sites visited for the year.

Target Type	Description
Near Term Target (~ 5 years)	Finalize development of inspection program and complete initial inspections. Set up on-going inspection schedule and begin on-going compliance evaluation.
Medium Term Target (~ 10 years)	Complete 80% of the anticipated inspections with at least a 30% annual compliance rate.
Long Term Target (~ 20 years)	Complete 80% of the anticipated inspections with an 80% annual compliance rate.
Ultimate Goal ~ 100 years	Groundwater quality within the CARA meets Water Quality Standards for Ground Waters of the State of Washington (WAC 173-200) and Maximum Contaminant Levels (MCLs) for Public Water Supplies (WAC 246-290) for anthropogenic compounds.

11. Plan Completion Rate

Completing the identified Major Programmatic Actions at the identified schedule is key to accomplishing desired outcomes. The plan completion rate will be determined by dividing the number of plans, programs and projects completed by the number of plans, programs and projects scheduled to be completed. This will be calculated annually and at the end of the plan timeframe (end of 2016).

Targets:

- ✓ 90% of the programmatic actions completed on schedule
- ✓ 80% of the capital project actions completed on schedule

Target for capital actions is lower than programmatic actions because there is more uncertainty due to elements that are outside of the City's control such as permits from other agencies and property issues (acquisition and/or easements).