

Stormwater Management Background Report

Introduction

This Stormwater Management background paper is a part of *We Love Lake Oswego: Planning for People, Places and Prosperity*, a multi-year effort to guide the physical, economic, social, cultural and environmental development of Lake Oswego in the next 20 years. The report addresses the Statewide Planning Goal requirements of Stormwater Management (Section 2 of Goal 11), the National Pollutant Discharge Elimination System (NPDES) and the City's Municipal Separate Storm Sewer System (MS4) Permit.

Currently, the City is updating its stormwater code and design manual. Since the Comprehensive Plan was last updated in 1994, best practices in stormwater management policy and design have evolved on local, state and national levels. Concurrently new development has changed Lake Oswego's landscape while changes in rainfall and storm systems have affected stormwater resource planning and management. Stormwater is water produced from rainfall or storms. This document provides an overview of current conditions, trends and innovations in stormwater planning and guiding questions for policy discussion. A separate background paper addresses water quality. This information will support the City and community of Lake Oswego in developing a decision-making framework for managing stormwater in the next 20 years.

Policy Questions to Consider:

1. When the City replaces aging stormwater infrastructure, how should it consider Best Management Practices?
2. Residential homes are the most significant generator of stormwater in Lake Oswego. How do we encourage residential stormwater Best Management Practices?
3. How do we develop funding sources to pay for stream restoration efforts associated with stormwater management where needed and who funds the efforts?
4. What updates are needed to align the 2008 Clean Stream Plan with Goal 11-related policies?

Existing Goals

Statewide Planning Goal 11:

To plan and develop a timely, orderly and efficient arrangement of public facilities and services as a framework for urban and rural development.

The City of Lake Oswego's 1994 Existing Comprehensive Plan Goal 11:

The City shall reduce stormwater problems, which cause flooding, erosion, and water quality problems.

Statewide Planning Goal 6:

To maintain and improve the quality of the air, water and land resources of the state.

Stormwater planning for people, places and prosperity

As the City develops key elements of the Comprehensive Plan update, sustainability – defined for Lake Oswego as meeting the vital human needs of the present without compromising our ability to meet future needs – is an important consideration. Strategic questions will aid in the decision-making framework moving forward. Planning in a sustainable way means looking at the community as an interrelated system that includes places around us (the natural and built environment), people (that live and work here), and prosperity (of the local economy) that supports society's needs.

People: Stormwater BMPs can take the shape of bioswales, wetlands and green streets, which help contribute to water quality.

Places: Stormwater BMPs, like low impact development and green infrastructure, can enhance natural landscapes and biodiversity, creating more vibrant and healthy ecosystems. Green infrastructure provides the City with an opportunity to grow its network of green spaces, including wildlife habitat.

Prosperity: Stormwater BMPs work to preserve the region's valued natural resources for future generations– clean water, healthy fisheries and attractive places to live. Green infrastructure (GI) provide important ecosystem services such as water filtration and flood control that otherwise need to be managed with traditional infrastructure, which, in some cases, can be less effective and cost more than LID or GI in the long run. GI contributes to creating desirable neighborhoods that will be attractive for live, work and play.

Background

The City of Lake Oswego surrounds Oswego Lake and lies in the eastern portion of the Tualatin Valley, approximately eight miles south of Portland. Lake Oswego is characterized by its steep hillsides, rises, and forested ridges that surround Oswego Lake. There are two sub-basins within Lake Oswego's Urban Services Boundary (USB): the Tualatin River and the Lower Willamette. Each sub-basin within the City's USB is a complex system of topography, vegetation and hydrology. Water flows through the sub-basin via a network of interconnected creeks and streams, pipes and inlets, swales, and ponds which collect stormwater runoff that eventually makes its way to the Tualatin or Willamette Rivers.

Existing Conditions

The City of Lake Oswego has separate wastewater and stormwater infrastructure systems. In separated systems, sanitary sewage wastewater is processed at a treatment plant while surface

stormwater runoff is left untreated. Lake Oswego's storm drainage system is a significant part of the City's overall public infrastructure. As of June 2012, the system encompasses approximately 200 miles of public and private stormwater pipe, approximately 7,600 public and private stormwater inlets/catch basins, and 178 miles of publicly owned streets. Many areas within the Urban Services Boundary do not have public stormwater infrastructure and stormwater drains to waterways through informal channels or is discharged directly into onsite facilities.

Since the Comprehensive Plan was last updated in 1994, several changes have occurred that are relevant to the 2012 Stormwater Management Plan (SWMP), the City's regulatory implementation plan tied to the MS4 permit. Below is a list of the policies, issues and changed circumstances that have occurred since 1994:

1. The City was issued its first MS4 permit from the Department of Environmental Quality in 1995. This permit allows the City to discharge stormwater to waters of the state provided the provisions of the permit are met. Pursuant to this permit and the subsequent renewals, the City has implemented several BMPs, including public involvement and education, regular maintenance of the storm system, illicit discharge detection and elimination, adoption of erosion control standards, implementation of water quality standards for new development, and enhancement of riparian areas, such as restoration projects along many creeks and streams in Lake Oswego to help filter toxins out before they reach waterways.
2. In some areas, urbanization has compounded storm drainage problems by increasing the volume of stormwater. Because of the increased volume, the existing systems tend to become undersized over time. The City will be addressing the discharge of this stormwater volume through a Hydromodification Assessment during this permit term. Hydromodification is the changes in the volume, speed, or timing of high and low flows in a water body, generally a stream or river. A major cause is development, which changes vegetation and covers land with roofs, sidewalks, streets, and parking lots. Rainwater, unable to soak into soil, rushes with flash-flood-like intensity to streams.
5. The Tualatin Total Maximum Daily Load (TMDL) was approved by EPA in 2001. The City is the Designated Management Agency for the implementation of the Water Quality Management Plan for affected areas within its jurisdiction.
6. The Willamette TMDL was approved by EPA in 2006; the City is the Designated Management Agency for the implementation of the Water Quality Management Plan for affected areas within its jurisdiction.
7. In 2010 Council adopted a resolution directing staff to study whether watershed-based environmental management, including linking the surface water management program with Sensitive Lands, was feasible.

8. The City will likely receive an Underground Injection Control (UIC) permit for the drywells within the jurisdiction of the City.
9. The City's Sewer Inceptor in Oswego Lake has been replaced, improving water quality in the lake by eliminating overflows that occur during storm events.
10. The Erosion Control Standards were removed from the Development Standards and inserted as a stand-alone chapter in the City Code. This amendment requires all activities with erosion impacts to comply with the Erosion Control Chapter regardless of whether a development permit is necessary.
11. The Lake Oswego Public Facilities Plan was adopted in 1997. This document identifies the major facilities and capacity improvements to urban infrastructure and services that are necessary to support land uses allowed by the Comprehensive Plan for the period of 1997-2017). These facilities include water, sewer, surface water management, and substantial transportation system improvements. The City is updating the stormwater code and design manual; this will be used to update the stormwater portion of the PFP and meet the City's Periodic Review requirements.
12. The Sensitive Lands Ordinance, LOC Article 50.16 was adopted in 1997 to:
 - (a) protect wildlife habitat;
 - (b) protect and improve water quality;
 - (c) control and prevent water pollution for the protection of public health and safety;
 - (d) comply with federal laws including the Clean Water Act and the Endangered Species Act;
 - (e) comply with State Land Use Goal 5; and
 - (f) comply with Metro's Urban Growth Management Functional Plan (Title 3).
13. The Clean Streams Plan(adopted in 2009) addresses public education, water quality, flooding, maintenance, best management practices, and other issues related to surface water management. The Clean Streams Plan is not directly linked to the MS4 permit, nor is it a regulatory component of the MS4 permit; rather, it was drafted to assess and identify current surface water management efforts and needs; to provide efficient and economical service delivery in compliance with regulatory requirements; and to support community goals identified in the Comprehensive Plan.
14. The Second Look Task Force was charged with reviewing the environmental and regulatory purposes of Sensitive Lands regulations, and providing recommendations to the Planning Director for changes that comply with Metro and State Standards, increase flexibility and clarity, and maintain the community's commitment to the natural environment. The final report (2010) outlines recommendations for revisions to the Sensitive Lands program and considerations and documentation that served as the basis for these recommendations.

15. City Council Resolution 10-51A (2010) directed staff to implement revisions to the City's Sensitive Lands program based on recommendations from the Second Look Task Force. The direction by Council includes making changes to the code that would provide more flexible development options to property owners and researching ways in which the City could engage in watershed-based environmental management that links Sensitive Lands with surface water management, while maintaining environmental protections and compliance with Metro and state standards. Many of the recommended changes were implemented between 2010 and 2012. Others are being, or will soon be, addressed. The stormwater design manual and code update are addressing some of the watershed-based options and development options through the use of incentives, education and guidance from the City.

Regulatory Obligations

The City of Lake Oswego must comply with various federal and state regulations that limit the amount of pollutants that can be discharged in surface water to streams and rivers; govern infiltration of stormwater into the ground; and protect Endangered Species Act-listed fish and fish habitat.

National Pollutant Discharge Elimination System (NPDES)

Beginning in 1990, the U.S. Environmental Protection Agency (EPA) required communities of 100,000 or more to obtain "Phase I" NPDES permits for their municipal separate storm sewer systems (MS4). An MS4 is a conveyance or system of conveyances (e.g., roads with drainage systems, municipal streets, catch basins, curbs, gutters, manmade channels or storm drains) owned or operated by a governmental entity that discharges to waters of the State. Polluted stormwater runoff is commonly transported through MS4s and is often discharged untreated into local waterbodies. To prevent harmful pollutants from being washed or dumped into an MS4, operators must obtain a NPDES permit and develop a stormwater management program to reduce its quantity and improve its quality of stormwater; for Lake Oswego, it is the 2012 Stormwater Management Plan. EPA has delegated the NPDES-MS4 Program to the State of Oregon and is administered through the Oregon Department of Environmental Quality (DEQ).

Although Lake Oswego has a population of less than 50,000, the State of Oregon required Lake Oswego and 12 other nearby jurisdictions in Clackamas County (which collectively have a population greater than 100,000) to be co-permittees subject to Phase I program requirements starting in 1995. The City of Lake Oswego is required to renew its NPDES-MS4 permit from DEQ every five years.

Table 1: NPDES Co-Permittees
Clackamas County
Clackamas County Service District No. 1
Surface Water Management Agency of Clackamas County
City of Gladstone
City of Happy Valley

City of Johnson City
City of Lake Oswego
City of Milwaukie
City of Oregon City
City of River Grove
City of West Linn
City of Wilsonville
Oak Lodge Sanitary District

The NPDES permit requires the City to implement BMPs to improve the quality of stormwater before discharging to the City's lakes, rivers, and streams. A BMP is an activity, device, or structure that serves as a means of reducing or eliminating the generation of pollution or the movement of pollution towards stream, rivers, and lakes. The permit also requires that performance indicators be developed for each BMP, and a monitoring plan be established to determine the effectiveness of the program. A Stormwater Management Plan is submitted to DEQ describing the City's program for meeting NPDES permit requirements. Yearly reports are submitted to DEQ describing progress in meeting those requirements. The MS4 permit requires the City's update of the stormwater code and design manual.

Total Maximum Daily Load and 303D listings

Under the federal Clean Water Act, the State of Oregon is required to develop a list of impaired or threatened waters within the state. To meet this mandate, DEQ establishes water quality standards and prepares a list of impaired waters known as the 303(d) List. Waters are added to the 303(d) list if they do not meet the water quality standards set by DEQ. To address water quality issues in these 303(d) listed waters, TMDLs are developed by DEQ, and approved by EPA for identified contaminants. A TMDL is the total amount of a contaminant (for example phosphorous, bacteria, temperature, or mercury) a water body can accept without violating the water quality standard.

Implementation plans, called Water Quality Management Plans, are prepared to meet the TMDL goals and are administered by Designated Management Agencies (DMAs). Lake Oswego is a DMA for select tributaries and mainstem sections of the Tualatin River, Springbrook Creek, Tryon Creek, Oswego Lake, and the Willamette River. Strategies for meeting TMDL requirements are included in the Stormwater Management Plan developed for the City's NPDES permit.

Underground Injection Control

The UIC is a federal program that is a part of the Safe Drinking Water Act. The program's goal is to protect groundwater aquifers from contamination due to underground injection systems. DEQ operates Oregon's UIC Program for the EPA.

A UIC system is used for discharging stormwater into the ground. UICs can also be used for septic effluent and other fluids, but stormwater is the most common use. Drywells, which are

bottomless manholes with holes in the sides, are commonly used as UICs. Their use is encouraged by many jurisdictions because they help replenish the groundwater table, and they protect streams from erosion due to increased stormwater flow rates and volumes that occur with new developments. However, if the stormwater is not treated properly, or if the groundwater table is close to the surface, then there is potential to contaminate the groundwater with pollutants in the stormwater.

DEQ requires the City to review all their existing UICs and register those UICs with the state, if they are not already registered. DEQ allows UICs to remain in use if they meet certain requirements and can be “rule authorized”, and if they can’t be rule authorized, they must be permitted or decommissioned. The City of Lake Oswego currently has 32 UICs, all of which have been registered with DEQ. None of the UICs are currently Rule Authorized or permitted. The City needs to evaluate each of their UICs to determine if they can be Rule Authorized, and if they cannot, then they will need to be either permitted through DEQ or abandoned; this work is currently under way.

UIC permits will have requirements for managing, monitoring, and reporting on the condition of these UICs. In addition, the number of UICs owned by the City has an impact on the permit requirements. Municipalities with over 50 UICs will have stricter requirements for managing and monitoring. The City is attempting to maintain a total UIC count less than 50 in order to minimize both the staff time and the financial resources that will need to be dedicated to this program.

Endangered Species Act (ESA)

Species of Salmon and Steelhead in the Pacific Northwest have been listed as endangered or threatened under the ESA. Under federal ESA legislation, this listing requires that endangered or threatened fish and their habitat be protected. The law prohibits any action that causes a “taking” of any listed species, which means harming or harassing a listed species or modifying a significant amount of its critical habitat. City programs have the option to apply for protection from liability for harming fish and fish habitat if the programs meet certain criteria and are approved by the National Marine Fisheries Service (NMFS). NMFS currently lists 13 approved “limits”, or exceptions, to the take prohibition. These limits are either approved programs or categories of activities NMFS may evaluate for approval in the future. An example of a category NMFS may evaluate in the future is Municipal, Residential, Commercial, and Industrial development and redevelopment activities. If jurisdictions submit programs for management of these activities to NMFS, they will evaluate the programs for an exception to the take prohibition.

Metro Title 3

Title 3 is a component of Metro’s Urban Growth Management Functional Plan, the long-range growth management plan for the region that addresses water quality and flood management conservation. The City of Lake Oswego completed a planning process to implement the flood management component of Title 3 and is currently in the process to comply with the water quality component of Title 3.

The goal of Title 3 is to protect the region's health and public safety by reducing flood and landslide hazards, controlling soil erosion and reducing pollution of the region's waterways. Title 3 specifically implements the Oregon Statewide Land Use Goals 6 (Air, Water and Land Resources Quality) and 7 (Areas Subject to Natural Disasters and Hazards) by protecting streams, rivers, wetlands and floodplains by avoiding, limiting or mitigating the impact on these areas from development.

The water quality component of Title 3 contains performance standards related to streams, rivers and wetlands. The purpose of these standards is to protect and allow enhancement of water quality. Water quality resource areas include rivers, streams and wetlands and the associated protected vegetated corridor. The performance standards require erosion and sediment control, planting of native vegetation on the stream banks when new development occurs and prohibition of the storage of new uses of uncontained hazardous material in water quality areas. The performance standards apply to development in Water Quality Resource Areas and development which may cause temporary or permanent erosion on any property.

Metro area cities are required to amend their comprehensive plans and implementing ordinances to adopt all or part of the Title 3 code language that substantially complies with the performance standards and the intent of Title 3, and adopt either the Metro Water Quality Area Map or a map that substantially complies with the Metro map. The City is not technically in compliance with Title 3, but anticipates compliance by the end of 2010 or soon thereafter.

Overview of 2012 Stormwater Management Plan

The Plan implements the NPDES-MS4 permit. It includes eight major stormwater BMP categories (outlined below). The report specifies measurable goals associated with each BMP and tracking measures that the City will report on for its MS4 annual reports.

Element #1: Reducing illicit discharge detection and elimination

- Implement measures to prevent, contain, and remove illicit discharges to the City's MS4 system

Element #2: Screening industrial and commercial facilities

- Track and proactively inspect industrial discharges and other potential high pollutant source facilities to the City's MS4 system:

Element #3: Controlling erosion associated with construction

- Implement control measures including inspections and enforcement to reduce or prevent soil erosion from occurring during development.

Element #4: Educating residents and City staff about behaviors that can reduce pollutant discharge

- Inform the public and influence behaviors in order to reduce pollutant discharge into the MS4 through public education, outreach, coordination, and training.

Element #5: Involving residents

- The process must include provisions for receiving and considering public comments on the monitoring plan, due to the Department September 1, 2012, annual reports, SWMP revisions, and the TMDL pollutant load reduction benchmark development.

Element #6: Controlling post-construction site runoff

- Continue to review all new development applications for compliance with existing stormwater quality standards; the City is currently addressing these goals through the stormwater design manual and code update:
 - Beginning during permit year 1, review current City of Lake Oswego municipal code provisions for consistency with MS4 NPDES permit language.
 - Beginning during permit year 1, review the City's *Surface Water Technical Handbook* and other local jurisdiction's stormwater design manuals and revise, adopt, or develop a manual for the City that is consistent with MS4 NPDES permit language.
 - Update the City's existing post-construction design standards and code language in accordance with permit requirements by November 1, 2014.

Element #7: Preventing pollution generated by municipal operations

- Implement appropriate operations and maintenance and other pollution prevention practices.

Element #8: Operating and maintaining facilities

- Implement appropriate operations and maintenance practices for structural stormwater facilities.

SUMMARY OF EMERGING ISSUES, CHALLENGES AND TRENDS

Trends and Emerging Issues

1. Stormwater Management Strategies

When the Comprehensive Plan was last updated in 1994, stormwater management strategies focused mainly on the installation of centralized facilities for controlling flooding. Management strategies permit conditions, and BMPs used for improving stormwater quality have changed remarkably and the latest research shows that centralized detention facilities are not effective in protecting streams from erosion. The use of decentralized facilities that mimic natural processes or facilities sized to match flow durations (the amount of time a facility releases stormwater at a particular flow rate) rather than matching peak flow rates is more effective at protecting streams. (The state of stormwater practice now favors a distributed system of vegetated and non-vegetated controls to best mimic the natural hydrologic function of a watershed.)

2. Council Resolution 10-51A

Council Resolution 10-51A directed staff to report on the pros and cons, funding mechanisms, and an implementation plan to organize and operate internal resources to support watershed-based environmental management, including integrating the stormwater and sensitive lands programs.

3. Sustainability

Reducing impervious surfaces in new development through the use of pervious pavements, swales, and rain gardens to address stormwater management are gaining popularity. Methods that restore or mimic natural processes are thought to be more effective.

4. Land Development Patterns

Current trends are for redevelopment of residential areas, where smaller, older homes are being replaced with larger homes. This trend results in a reduction of pervious area (“pervious” refers to surfaces that allow rainwater to pass through them and be absorbed into the ground) and contributes to increasing amounts of runoff from residential areas. Other than infill, the city has little available land for new development. In addition, larger lots in the urban area are subdividing to create smaller lots with multiple homes and driveways.

Opportunities & Constraints

- The City’s current stormwater code allows many developments to avoid having to treat stormwater runoff. The stormwater design manual utilized by the City was never adopted by the City Council and contains outdated requirements. Recommendations in the Clean Streams Plan include revisions to codes and manuals, and a review of City Code for impediments to allowing sustainable and low impact development approaches. If the recommendations are not implemented, the City will continue to allow new developments to avoid meeting stormwater treatment requirements, and the requirements developers do follow will be out of date and ineffective.
- Monitoring of streams, public education plans, and the implementation of new stormwater management practices are mandated in the City’s NPDES permit, which is up for renewal every five years. As permit requirements continue to increase in complexity, they often necessitate additional staffing, funding, and the development of new programs and projects.

Future Changing Conditions

- Stormwater Code Revision and Design Manual Revision (In Process)
 - A Surface Water Code/Surface Water Design Manual Revisions project is being initiated as a result of the findings of the Clean Streams Plan (Otak/City of Lake Oswego, 2009), the City of Lake Oswego’s MS4 Permit Renewal Package (Oswego, URS/City of Lake, 2008; Otak/City of Lake Oswego, 2009), and technical reports produced in support of City activities related to surface water (Cole & Harris, 2004), (Lemke & Cole, 2007), (Lemke & Cole, 2009). This project is also a result of numerous City Council Goals related

to water quality improvement, Low Impact Development (LID) and protection of water resources within the City.

The MS4 Permit issued on 3/16/2012 indicates that the City's code be reviewed and updated on a regular interval and that the City use iterative management to improve the City's local MS4 program. The TMDLs in place for the Willamette River and Tualatin River also outline local codes as a best management practice to maintain and improve water quality.

SUSTAINABILITY CONSIDERATIONS AND PROPOSED INDICATORS

Sustainable stormwater practices are normally considered synonymous with Low Impact Development (LID) Approaches. LID seeks to mimic natural hydrologic responses in a built environment through the use of decentralized practices. Rain gardens, planters, infiltration strips, and pervious pavement all seek to dispose of runoff at the source in a way that reduces environmental impacts. This is contrasted with traditional stormwater approaches where runoff is collected in catch basins and pipes, and conveyed either directly to the receiving water, or to a detention or water quality facility.

Stormwater sustainability can go beyond LID practices. Other measures can include:

1. Capture and Reuse of Stormwater

Rainwater harvesting and reuse, such as for toilet flushing or irrigation, reduces the amount of potable water used for such purposes, and it reduces a site's impact on the environment by capturing runoff that would otherwise be conveyed to receiving waters. The City has seen some use of this practice with businesses and homes. Because most rainfall occurs in the winter, and the largest potential use of water (irrigation) occurs mostly in the summer, this use can be challenging because of storage needs. However, businesses and some homes have found ways to collect and store enough rainwater to make this use feasible. The current code revisions will allow for this practice, as allowed by state law and building codes.

2. Maintenance and Monitoring Practices that Reduce Carbon Footprint

An example of a practice the City is using today includes the cleaning of catch basins. Catch basin cleaning practices developed with the City's latest NPDES permit requirements and discussed in the Clean Streams Plan tracks the amount of sediment removed from catch basins. This data will be collected and analyzed so that the city is not cleaning some catch basins more than they should be, and not cleaning others frequently enough.

3. Environmental Site Design

LID can be used individually as an effective means to treat and dispose of stormwater. However, a true LID uses reduced road widths, separated sidewalks, clustering of homes, and other measures to significantly reduce or eliminate stormwater leaving the site. These

measures, along with other sustainable building practices, can produce a sustainable community or building.

4. Evaluating BMPS for Sustainability

With the Clean Streams Plan, an evaluation matrix (Appendix G) was developed to review BMPs commonly used for treating water quality for sustainability. Ranking criteria include:

- Their impact on the ecosystem;
- Maintenance needs;
- Use of sustainable materials;
- Short term and long term energy needs;
- Waste production;
- Cost efficiency; and
- Promotion of sustainable businesses.

These criteria were used to rank different classifications of BMPs including basins, swales, filters, and infiltration measures. Appendix G of the Clean Streams Plan includes a matrix that was developed for ranking each of these BMPs for these criteria. This appendix also includes a more detailed discussion of the ranking criteria.

Stormwater infrastructure shares with other utilities the opportunity to provide more sustainable construction practices, and the life of the structure can be extended through asset management. The Plan recommends the City develop sustainability guidelines/practices for capital project delivery and develop and implement a formal asset management program.

As discussed within the code section reviews, it is also recommended that the City review their policies and codes for impediments to implementing sustainability measures such as for storage and reuse of stormwater, and for implementing development and redevelopment projects that utilize sustainable and low impact development measures for managing stormwater.