

4.4 Water

4.4.1: Affected environment

Groundwater

The natural groundwater cycle is composed of:

- **Interception** - is the portion of rainfall that never reaches the ground surface or that evaporates off vegetation and forest cover back into the atmosphere.
- **Evapotranspiration** - is the process where living plants absorb water from the roots and transport water up through their leaves and is a seasonal effect that peaks during the spring and summer growing season.
- **Runoff** - is the portion of precipitation that flows off the land as surface water flow and generally occurs as sheet flow during periods of sustained precipitation.
- **Recharge** - is the portion of precipitation that infiltrates the soil and passes into deeper groundwater bodies and aquifers.

Evapotranspiration

Evapotranspiration is the combined loss of water to the atmosphere through evaporation and through transpiration from plants. Techniques developed by Palmer-Havens for the application of the Thornthwaite method were used to estimate the potential evapotranspiration, or the theoretical maximum amount of water that could be used under ideal conditions.

Assuming that soils have an available water capacity of 6 inches, estimates also have been made of the actual evapotranspiration. Potential evapotranspiration in midsummer exceeds actual evapotranspiration by approximately 2 inches in the drier areas and by 1 inch on the wetter slopes of the Cascades.

Runoff

Runoff is the water that is removed by flow over the surface of the soil. The rapidity of runoff and the amount of water removed are affected by slope; by the texture, structure, and porosity of the surface layer; by the vegetation; and by the prevailing climate. Relative degrees of runoff are as follows:

| Term | Degree of runoff |
|--------|---|
| Ponded | None of the water runs off the soil. The water either moves through the soil or evaporates. |

| | |
|------------|--|
| Very slow | Water is on the surface for long periods or enters the soil immediately. Very little water is removed as runoff. |
| Slow | Water covers the soil for significant periods or enters the soil. Only a small amount is removed as runoff. |
| Medium | A moderate amount of water enters the soil profile, and free water is on the surface only for short periods. The loss of water through runoff does not reduce seriously the supply available for plant growth. |
| Rapid | Most precipitation moves rapidly over the soil, and a small part moves through the soil profile. |
| Very rapid | A very large amount of water runs off the soil, and a very small part moves through the profile. |

Source: US Department of Agriculture (USDFA) Soil Conservation Service (SCS),

Aquifer recharge

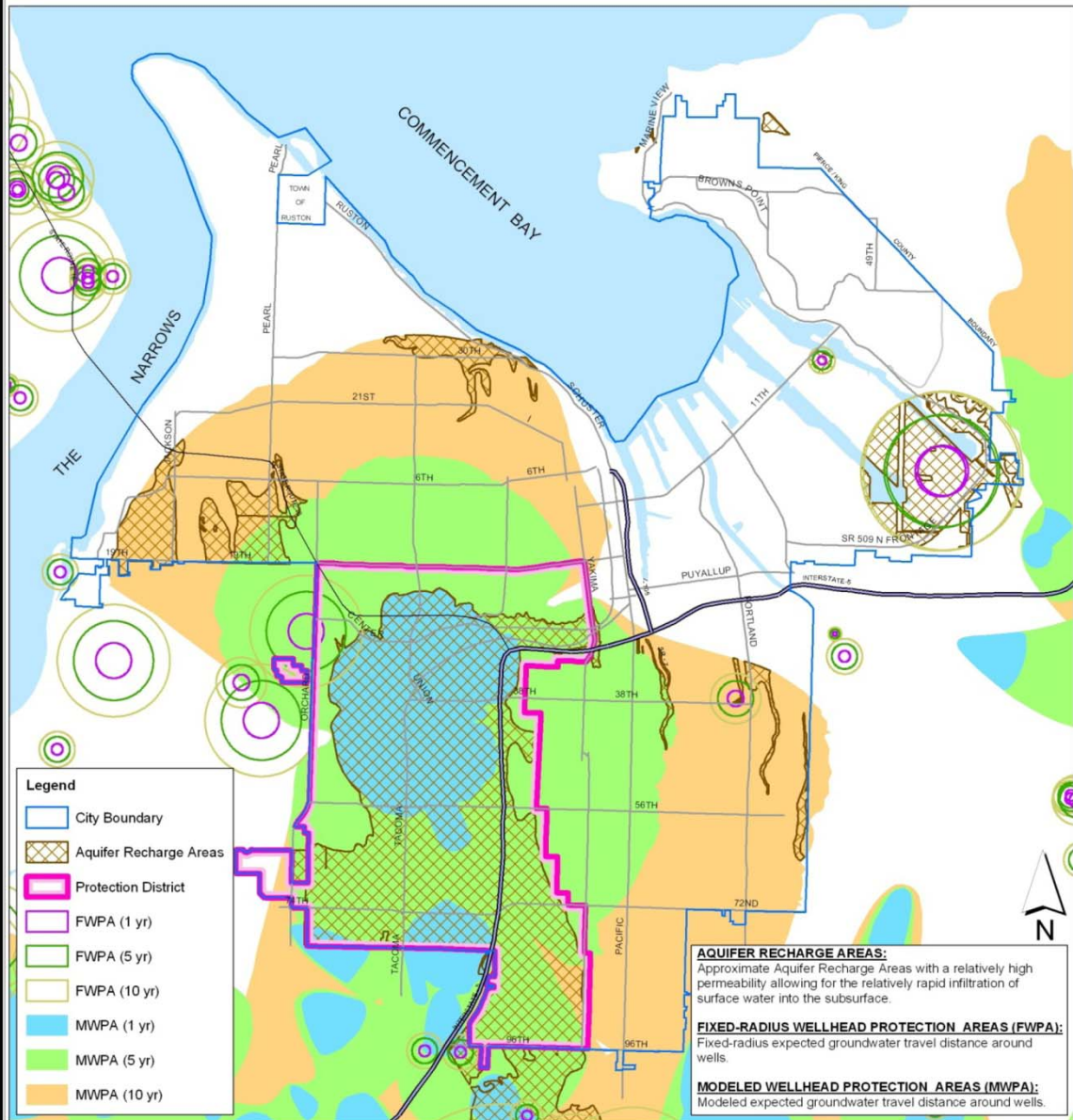
The Clover-Chambers Creek Watershed aquifer system is the largest identified aquifer in the area. It is a large groundwater resource area that encompasses central Pierce County, areas to the south and west of the City of Tacoma, and extends into city boundaries, most notably in the South Tacoma area.

Numerous individual and public water systems in Pierce County, including Tacoma, use this aquifer as a water supply. The aquifer provides a significant amount of drinking water for Tacoma, supplying as much as 40% of the total water demand during periods of peak summer use. Protection of both the quantity and quality of this groundwater aquifer is imperative.

A clear relationship exists between uses of land and the quantity and quality of groundwater. Rainfall replenishes the aquifer in a process known as recharge. Land developed with impervious surfaces (areas which water cannot penetrate to reach the groundwater) can impact the quantity of groundwater.

Activities occurring on the surface above the aquifer can impact the quality of the groundwater below. Contaminants from land use activities, if not controlled, can seep into the groundwater. Pinpointing the exact sources of contamination is a very complex process because of the many potential sources.

Aquifer Recharge & Wellhead Protection Areas Environmental Policy Element



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City of Tacoma
Community & Economic Development



NOTE: This map is for reference only.



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Remedial action to clean up contaminated groundwater is typically very expensive and in some instances not practical. Tacoma's policy is to emphasize prevention, and to commit to a long-term effort to adopt and implement groundwater protection programs.

The nature of groundwater flow within aquifers is such that contamination in part of the aquifer may affect water quality through large areas of the aquifer. Because of the potential for contamination, inter-governmental coordination in aquifer protection is necessary.

Efforts to determine the extent of groundwater pollution and the sources of such pollution are a continuing process. Effective groundwater protection requires the combined efforts of a number of governmental departments and agencies, including Tacoma Water, Pierce County, the City of Lakewood, the Tacoma-Pierce County Health Department, Washington State Department of Health, and others.

Long-term protection of aquifers is thought to depend to a significant degree upon control of certain types of surface and subsurface land use activities. Control of land use activities generally occurs through such mechanisms as zoning, building codes and health and sanitary codes. Zoning controls combined with Best Management Practices (BMP) and Best Available Science (BAS) are considered appropriate measures for groundwater protection because they can be applied in a geographically specific manner and can include provisions to control specific uses or activities that are potential sources of contamination.

Because of the complexity of potential contamination, development of zoning regulations is considered only one step in a long-term groundwater management effort. Other efforts include public education and awareness, business education or regulation as necessary, an enhanced monitoring program, capital improvements (i.e., land acquisition around a public water supply well's area of influence) and the development of recharge areas.

For further protection, the identified area of the aquifer vulnerable to contamination has been designated as an environmentally sensitive area. The principal advantage in this designation is that development, previously considered exempt will now be subject to the environmental review process mandated by the State.

Groundwater protection measures should not inhibit desirable development but rather be used as a positive factor to safeguard one of the city's vital assets - its plentiful and safe water supply. As technology advances and more information are made available, other actions may be necessary. The city shall continue to strenuously pursue all possible methods to have a safe and pure water supply.

Tacoma water source

Tacoma's most important source of groundwater is the South Tacoma Channel, an approximately 4-mile long valley located in the north-west part of the Clover-Chambers Creek Watershed. The Tacoma Water Division has extensively developed the groundwater resources of the South Tacoma Channel through the construction of a well field consisting of 13 high-yield production wells. Groundwater from the channel produces about 10% of the 80,000,000 gallon per day average demand for Tacoma Water, and about 36% of the 140,000,000 gallon per day peak water demand.

The availability of groundwater resources is particularly critical during the summer, the period of peak demand for water. That period generally coincides with the time of the year when the amount of surface water available for diversion to the Tacoma system from the Green River is reduced due to seasonally declining flows. Therefore, the South Tacoma Channel is not only a critical component of Tacoma's current water supply, but its role may become even more vital in future years.

The South Tacoma Channel's geology is characterized by highly porous sands and gravels. These geologic factors make this aquifer not only highly productive but also highly susceptible to contamination.

Groundwater features

Generally, groundwater in the MLK subarea is of good quality. However, depending on location, thickness and intensity of adjacent urban uses - groundwater deposits can be contaminated by unfiltered stormwater runoff containing surface fertilizers, oil and grease pollutants and on occasion, by animal wastes. The deposits may be tapped for commercial purposes, but can be limited for public consumption in some areas.

Permeability

Permeability is the quality of a soil that enables water and air to move through it. Terms used to describe permeability are:

| Permeability | Inches per hour |
|---------------------|------------------------|
| Very slow | Less than 0.06 |
| Slow | 0.06 |
| Moderately slow | 0.20 |
| Moderate | 0.63 |
| Moderately rapid | 2.00 |
| Rapid | 6.30-20.00 |
| Very rapid | More than 20.00 |

Source: US Department of Agriculture (USDFA) Soil Conservation Service (SCS).

Contamination

Land uses contaminated surface and ground water sources within the MLK subarea where old gas stations’ fuel tanks leaked gasoline, vehicle maintenance areas dumped oils and fluids, and industrial uses including laundries dumped or leaked chemical solvents of various kinds.

These historical activities contributed contaminated materials and fluids that drained through the soils to fragipan then frequently flowed between the soil and fragipan to down slope off-site deposits.

The Tacoma-Pierce County Health Department identified Abandoned Commercial Tank (ACT) sites of 19 former gas station sites within the MLK subarea that are potentially contaminated from on-site historical activities and which there are no records of storage tank removals or environmental cleanup.

The Tacoma-Pierce County Health Department identified 15 other sites that have had storage tanks removed and another 11 for which Washington State has recorded a cleanup. These cleanup sites may or may not have been gas stations and could have been industrial activities, such as laundries and vehicle maintenance shops that contributed contaminants.

The sites are generally located along MLK Jr Way or South 11th Street which were the historical key transportation corridors.

In most cases, particularly on level properties, possible contaminants are likely contained on-site and may be remediated through soil excavation and replacement.

In other cases, however, the contaminants may have flowed off-site through the soils then down slope to collect in subsurface deposits in the South and North Downtown subareas.

The Tacoma-Pierce County Health Department has also inventoried these down slope deposits with the intent of identifying possible methods

of remediating contaminant sources and deposits.

Wetlands

Wetlands are land areas inundated or saturated with surface water or ground water at a frequency and duration to support vegetation adapted to life in saturated soil conditions.

Wetlands in Tacoma are designated in accord with the Washington State Wetland Identification and Delineation Manual and evaluated using the Washington State Department of Ecology (Ecology) 5 class rating system.

Ecology’s wetland classifications

| | Definition | Criteria |
|-----|---|---|
| I | Wetlands that meet one or more of the following criteria: | <ul style="list-style-type: none"> ▪ Documented habitat for federal or state endangered or threatened fish, animal, or plant species ▪ High quality native wetland communities ▪ Wetlands of exceptional local significance |
| II | Wetlands not defined as Category I and meet one or more of the following criteria: | <ul style="list-style-type: none"> ▪ Documented habitats for state sensitive plant, fish or animal species, ▪ Wetlands containing plant, fish or animal species listed as priority species by Dept. of Fish and Wildlife, ▪ Wetland types with significant functions that may not be replicated through creation or restoration, ▪ Wetlands with significant habitat value of 22+ points on the habitat rating system, ▪ Documented wetland of local significance. |
| III | Wetlands that do not satisfy Category I, II, or IV and show a moderate level of functions | <ul style="list-style-type: none"> ▪ Vernal pools that are isolated, and wetlands with a moderate level of functions |
| IV | Wetlands with the lowest level of functions, are often heavily disturbed, and meet the | <ul style="list-style-type: none"> ▪ Hydrologically isolated wetlands less or equal to 1 acre in size, have only 1 wetland class, and are dominated (80% or more) by a |

| | | |
|---|---|--|
| | following criteria: | single-non-native plant species, <ul style="list-style-type: none"> Hydrologically isolated wetlands less or equal to 2 acres in size, have only 1 wetland class, and are covered (90% or more) by non-native plant species. |
| V | Wetlands found in ditches, ponds, canals, etc. intentionally constructed for agricultural uses; or wetlands accidentally created from irrigation water and meet all the following criteria: | <ul style="list-style-type: none"> Located above the floodplain, No primary association with rare, threatened, or endangered species, Water only from irrigation runoff or leakage. |

Source: Washington State Department of Ecology (Ecology)

There are no major documented wetlands or wet areas within the MLK subarea.

Stormwater

Surface water drainage (stormwater) is generated when rain fall encounters hard or impervious surfaces. Most stormwater is intercepted and evapotranspired by vegetation in a natural state. Plant root systems hold the soil in place and absorb most excess moisture.

The amount of stormwater runoff generated from road, roof, parking lot, and other impervious surfaces created by urban development can be of a higher volume than what existed in the natural state. Storms can generate peak flows that are much greater than existed when the land was in a natural state with vegetative cover.

Stormwater runoff from driveways and parking lots also transports pollutants such as gas and oil as well as residues from pesticides, fertilizers, and other chemicals used in lawn care, as well as animal waste in agricultural areas. Non-point source pollution accumulates as water runs over hard surfaces and is carried to the nearest body of water.

Surface runoff

The Pacific Northwest is divided into two sub-regions based on stormwater runoff characteristics.

West of the Cascade Mountains - runoff is generally high, reflecting relatively heavy precipitation and moderate levels of evapotranspiration. In fact, the runoff yield west of the Cascades is unrivaled in the conterminous US. Yields of more than 80 inches are common in the Coast and Cascade ranges, while some of the windward slopes of the Olympic Mountains contribute 160 inches. Streams west of the Cascades produce about 66% of the total runoff from the Pacific Northwest although they drain less than 25% of the region.

East of the Cascade Mountains - generates markedly lower levels of stormwater runoff, contributing less than 10 inches, and most of the surface waters originate in relatively small mountainous areas.

South and central Tacoma drains into the Flett and Chambers Creek drainage basins. North Tacoma including the MLK subarea drains into the Puyallup River, Thea Foss Waterway, and then into Puget Sound.

Until recent decades the temporal patterns of runoff largely reflected natural phenomena within a drainage basin including:

- the mean elevation of the drainage basin;
- its location in either marine or continental subregions of the Pacific Northwest;
- the type and extent of natural vegetation within the drainage basin; and
- the structure of aquifer units underlying the basin.

Tacoma's Surface Water Management Utility

Tacoma's Stormwater Management Program is administered by the Surface Water and Environmental Compliance Sections of Environmental Services, Science and Engineering Division of Public Works. The division's current work includes:

- Inspecting business activities and permitting and inspecting new construction projects.
- Collecting and evaluating stormwater and sediment quality monitoring data.
- Implementing a source control and monitoring program focused in the watershed of the Thea Foss Waterway Superfund Cleanup, and enhancing habitat areas to restore beneficial uses.
- Mapping, maintaining and cleaning a stormwater system that includes approximately 575 miles of storm pipe, 10,000 manholes, 18,300 catch basins, 400

outfalls, 4 pump stations, and 47 stormwater ponds and other treatment and flow control facilities.

- Rehabilitating and replacing aging infrastructure and improving the storm system with capital projects to address identified water quantity and quality issues.
- Providing public education about stormwater and surface water management and sharing information with staff from federal, state and neighboring municipal governments, environmental groups, businesses and interested citizens.
- Participating in regional watershed councils and committees.
- Ensuring the city activities and operations are in compliance with NPDES permit requirements.

Tacoma Stormwater Management Program (SWMP) 2010

Tacoma's Stormwater Management Program (SWMP) was updated in 2010 to reflect the following changes:

- NPDES Municipal Stormwater Permit modifications that were issued by Ecology June 17, 2009
- Work accomplished in 2008 and 2009 to meet the permit requirements and deadlines
- Program effectiveness evaluation

The SWMP requirements are listed in Tacoma's National Pollutant Discharge Eliminations System (NPDES) Municipal Stormwater Permit, which regulates the discharge of stormwater from the city's storm system to surface and ground waters. This program guides the storm drainage system operations of the City through the end of the NPDES permit term in 2012.

Storm drainage requirements

Storm water runoff and flows are calculated as a function of the watershed area, the amount of impervious surface, the type of collection system in place, soils types, topography, and storm intensity and duration.

Normally, as development occurs, the amount of impervious surface area increases and the collection of runoff can be more efficient. Runoff rates, if not controlled, will rise dramatically, and can be 10 times more than that of a natural, undeveloped site.

Rainfall events, detention and piping design criteria, and pollutant controls determine storm drainage protection capacity requirements. Storm drainage capacity estimates must account for the use of natural systems versus piping

alternatives, the sensitivity of natural systems, desired levels of protection against flood damage, and protection of the receiving waters quality.

Storm drains and drainage ditches

Tacoma Environmental Services is responsible for installing and maintaining storm drains and drainage ditches in public areas and along city streets.

Storm drains and ditches divert water and debris after a storm away from street surfaces, and public access areas so that the stormwater can be safely channeled into creeks, gulches, streams, lakes, or Commencement Bay.

The system consists of inlets or catch basins, open channels and ditches, underground pipelines, and detention ponds.

Tacoma Environmental Services Maintenance Division routinely cleans drains and ditches to remove any obstacles obstructing the flow of water and makes structural improvements to ensure that the system is efficiently and reasonably handling water flow.

Residents are reminded to never dispose of leaves, grass clippings, or trash into the drainage system or in a location, such as a roadway, where debris could be swept into the system by storm water. Such actions may result in serious flooding after the next storm.

MLK storm drainage system

Stormwater in the MLK subarea is collected through a system of catch basins and a network of piped storm sewers located within the street rights-of-way.

4.4.2: Impacts

Both alternatives

Both alternatives will continue development of the lands within the MLK area for urban uses and activities to various intensities. Additional urban development of previously undeveloped lands or of a higher intensity of previously committed lands could erode soils and enter surface water runoff degrading the quality of surface water runoff if not properly managed.

Inadequate on-site treatment could create pollutants that enter surface water runoff and degrade the quality and/or be absorbed into the seasonal high water table and thereby the underground water supply system.

If effective grading and landscaping measures are not provided, additional or more intensive urban developments could cause severe erosion risks with irreversible damage to surface water runoff and stormwater collection outfalls into sensitive wetlands and anadromous fish-bearing waters including the Puget Sound.

Inadequately located or designed urban infrastructure including roads, parking lots, and other improvements that are not sited on level lands and/or that are not planted with adequate ground covering materials could cause silting conditions to contaminate surface water and stormwater systems and fill and pollute plant and fish-bearing waters including Puget Sound.

The development of more intense urban activities will create more impervious surfaces thereby increasing the quantity of surface water runoff that if not properly managed can:

- discharge pollutants into surface waters,
- automobile oils and greases onto parking lots and roads,
- fertilizers, pesticides, and other chemicals into lawns and landscaped areas, and
- effluent from failed septic systems and industrial discharge sources.

In addition, urban construction activities may also increase the erosion of soils during or following poorly maintained or designed site improvements or constructions. All construction activities can cause the erosion of site soils that enter and pollute surface water bodies if not properly contained or managed. The degree of erosion and sedimentation may be affected by the:

- timing of construction,
- degree of vegetation removed,
- amount of un-vegetated soil or fill material to be exposed to the forces of rainfall and runoff, and
- effectiveness of on-site erosion control measures.

Added together, these pollutants may eliminate fish habitat and threaten the use of surface and groundwater for domestic water supplies and fish rearing.

Alternative 1: No-action

Under a no-action alternative, the prevailing 2012 Tacoma Comprehensive Plan, Zoning Ordinance and Map, and Development Regulations would remain in effect and all MLK planning and implementation policies would continue to be coordinated with these

documents. The present plan and policies or no-action would result in the following:

- **Mixed use zoning** - would remain as designated in the current zoning map including the Neighborhood Mixed Use (NRX), Residential Mixed Use (RCX), Neighborhood Commercial Mixed Use (NCX), and Hospital/Medical Mixed Use (HMX) districts that would promote development and redevelopment of existing committed lands to higher intensity buildings.

Alternative 2: MLK Subarea Plan

Alternative 2: MLK Subarea Plan will conform to the 2012 Tacoma Comprehensive Plan but amend the Zoning Map to result in the following impacts:

- **Mixed use zoning** - will be slightly revised to retain and protect existing single-family housing stock and neighborhood in the south end of the subarea and older apartment buildings and churches adjacent to MultiCare Health Systems hospital development in the north end of the subarea. This will retain existing usable building stock and avoid potentially fragmented and ill-advised redevelopment activities with construction related runoff.

4.4.3: Mitigating conditions/policies

Both alternatives

Critical areas - include wetlands, areas of critical recharging effect on aquifers used for potable water (aquifer recharge areas), fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas representing a variety of ecosystems providing necessary biological and physical functions.

Critical areas can also present threats to human safety and to public and private property if not protected and monitored.

In accordance with GMA - Tacoma prepared a comprehensive land use plan that identified critical areas and adopted regulations for protection while accommodating reasonable use of private property.

Chapter 4 Environmental Element of Tacoma's Comprehensive Plan was updated in 2011 as required by the State Growth Management Act (GMA) and was adopted as part of the Tacoma Municipal Code. Chapter 4 identifies the goals, policies, guidelines, and requirements of GMA "to designate and classify ecologically sensitive

and hazardous areas and to protect these areas and their functions and values, while also allowing for reasonable use of private property”.

Best Available Science (BAS) – was used to develop Tacoma’s policies and development regulations to protect the functions and values of critical areas. BAS involved:

- adopting information from local, state, or federal natural resource agencies that are appropriate for local circumstances;
- consulting with a qualified scientific expert or team to assess applicability to the local critical area; and
- determining if a person is a qualified scientific expert - has professional credentials or certifications, advanced degrees, years of experience in the specific field, and/or peer-reviewed publications or other professional publications.

Aquifer recharge

Applicable Law - Chapter 90.44 RCW and Department of Ecology’s Chapter 246-290 WAC, addresses groundwater protection by, among other things, calling for the Department of Ecology in cooperation with local governments to initiate development of groundwater protection programs.

In 1988, Tacoma adopted the South Tacoma Groundwater Protection District, which is codified in Chapter 13.09 of the Tacoma Municipal Code. The provisions of this Chapter are implemented principally by the Tacoma-Pierce County Health Department, in cooperation with Tacoma Water Division, Tacoma Public Works Environmental Services Division, and others.

This regulation addresses business use and handling of hazardous materials within the South Tacoma Groundwater Protection area. In addition, the ordinance contains spill prevention and management requirements as well as certain restrictions on specific ‘high-risk’ commercial and industrial land uses. Stormwater infiltration is generally prohibited within the South Tacoma Groundwater Protection District due to the potential movement of contaminants to the underlying aquifers.

GMA declares that cities shall develop comprehensive plans that address “critical areas” management for preservation and protection. Aquifer recharge areas are one of several critical areas designated for protection by the city under the following policies:

E-ARA-1 Groundwater Protection

Protect and preserve the quantity and quality of Tacoma’s groundwater supply.

E-ARA-2 Natural Area Retention

Encourage the retention of sufficient natural areas to maintain a balance between development and the need for adequate recharge of the aquifer in order to assure a continued adequate groundwater supply.

E-ARA-3 Management Techniques

Encourage the development and use of alternative mechanisms for preventing and reducing the risk of groundwater contamination (e.g., by process or product changes) and disposal (e.g., through resource recovery and recycling).

E-ARA-4 Performance Criteria

Encourage the development of performance criteria and guidelines which address siting, design, construction and operation of commercial and industrial structures and activities to prevent groundwater contamination.

E-ARA-5 Economic Benefit

Coordinate with the Chamber of Commerce and the Economic Development Board to ensure that the groundwater protection program is used as a positive factor in attracting new business and industry to the area.

E-ARA-6 Groundwater Protection Program

Support a coordinated effort of City, County, State and Federal departments and agencies to develop a comprehensive program that will ensure incorporation of groundwater protection measures into all potentially disruptive development activities.

E-ARA-7 Public Awareness Education

Support a public awareness/education program for users and handlers of toxic and hazardous materials and the general public concerning groundwater pollution problems and necessary remedial actions.

E-ARA-8 Monitoring

Support an ongoing effort to monitor groundwater quality in order to determine the effectiveness of the groundwater program over time.

Source: Chapter 4 Environmental Element, Tacoma Comprehensive Plan 2011

Contamination

Environmental remediation - is the prevention of contamination and the clean-up of identified contaminated sites to improve the quality of Tacoma’s environment. Tacoma has defined the following policies for dealing with hazardous sites:

E-ER-1 Comprehensive Cleanup Strategies

Encourage improvement of the environmental

quality of Commencement Bay, its associated waterways, and the Tacoma watershed, including all nearshore and adjacent upland areas through comprehensive cleanup strategies.

ER-2 Contaminated Sites Encourage the identification and characterization of all contaminated sites which adversely affect the City's shoreline areas, surface waters, groundwater, and soils.

E-ER-3 Source Control
Encourage source control of all contaminated sites within and adjacent to the City's shoreline areas or which impact shoreline areas or surface waters.

E-ER-4 Public/Private Partnerships
Encourage public and public/private partnerships to ensure the most comprehensive, timely and cost-effective cleanup actions.

E-ER-5 Best Management Practices
Ensure the use of Best Management Practices by private industry and municipal government to prevent recontamination of wetlands, streams, shorelines, groundwater and other aquatic areas.

E-ER-6 Best Available Science
Ensure the use of Best Available Science Practices by private industry and municipal government to prevent recontamination of wetlands, streams, shorelines, groundwater and other aquatic areas. Special attention should be placed on anadromous fisheries.

E-ER-7 Intergovernmental Partnerships
Coordinate and cooperate with State and Federal programs (e.g., Department of Ecology, Environmental Protection Agency) in encouraging and monitoring the remediation of contaminated sites.

Source: Chapter 4 Environmental Element, Tacoma Comprehensive Plan 2011

Inventory of potential pollutant generating sites - Environmental Services is generating an inventory of potential stormwater pollutant generating sites for source control inspections. The list of 4,907 commercial/business facilities and 1,401 multi-family facilities is compiled and distilled from city stormwater utility account information. It is as complete as possible using the limited tools available.

Tacoma considers this list the starting point and will take a geographic "door to door" approach to updating and revising this list. Inspectors will refer to the list to assure that all of the known businesses and land uses are included in survey efforts and modify as the on-site inspections are conducted through the city.

Additionally, a wastewater and stormwater survey has been developed and attached to Tacoma's annual business license renewal forms to identify potential pollutant generating sites with existing stormwater facilities and the maintenance frequency of those facilities.

Potential pollutant generators include:

- All tax lots that have mapped impervious area used to calculate surface water rates and charges
- Commercial, industrial and governmental sites with specific business practices that may impact stormwater quality
- All multifamily sites with four or more residences

In addition to the planned source control inspections, all Pollution Complaint responses (inspections, spill response, complaints, sanitary sewer overflows) are investigated promptly and coordinated with other agencies as appropriate.

The complaints are documented in the Source Control database and are used to identify other pollutant generating sources, such as mobile or home-based businesses. The database information is reviewed prior to conducting an inspection.

Environmental Compliance staff also review all new and renewed home occupation business licenses. Inspectors are trained to regularly perform drive-by observations while travelling through areas of concern.

Business compliance with source control requirements - investigation and enforcement occurs in response to all legitimate water quality complaints to the Environmental Compliance Source Control Program.

There are an estimated 6,308 sites that could qualify for inspection. The list of potential pollutant generating sites includes 4,907 commercial/business sites and 1,401 multifamily properties.

Environmental Compliance has adopted a geographic inspection strategy that focuses on door-to-door compliance inspections in assigned areas throughout the city. The inspectors inspect a minimum of 20% of these sites annually (including follow up compliance inspections at the same site toward the 20% inspection rate) to assure BMP effectiveness and compliance with source control requirements.

Investigation and enforcement occurs in response to all legitimate water quality

complaints to the Environmental Compliance Source Control Program.

The Environmental Compliance Section has been using a custom database used for tracking spills, complaints, business inspections and flooding claims since 2003. Regular updates and refinements have been made to facilitate advanced data management for tracking inspections.

Progressive enforcement policy and documentation - in order for Tacoma to implement a progressive enforcement policy to compel sites to come into compliance with stormwater requirements within a reasonable time period, the Environmental Compliance Section uses incremental enforcement as defined in the City's Draft Stormwater Compliance Policy and Tacoma Municipal Code Chapter 12.08.

Enforcement procedures may include phone calls, reminder letters, follow-up inspections, warning letters, Notices of Violation, and civil penalties. Municipal Code Chapter 12.08 provides for inspection of all properties served by the sanitary or storm sewer systems.

The Environmental Compliance inspectors contact Ecology as standard operating procedure for all serious source control violations that present a severe threat to human health or the environment. In addition, Environmental Compliance requests assistance from Ecology with non-responsive enforcement cases and continues to do so to facilitate prompt compliance. Environmental Compliance refers violations in the South Tacoma Groundwater Protection District to the Tacoma-Pierce County Health Department for follow up.

The city documents all inspection and enforcement activities in the Environmental Services inspection database and business inspection files.

Stormwater impacts from roads, streets, and parking lots - Public Works employees follow the guidelines in the Regional Road Maintenance Endangered Species Act (ESA) Program (RRMP) for street and parking lot maintenance.

The Regional Road Maintenance ESA Program provides a consistent, regional program that can be used by any agency wishing to limit, reduce, or eliminate the prohibition on take of threatened species under the ESA 4(d) Rule. The Program Guidelines provide BMPs for

maintenance work that reduces surface water impacts on receiving waters.

Tacoma has an ESA Coordinator staff person who provides training and technical assistance to city crews on how to implement the maintenance BMPs. The ESA Coordinator also facilitates regular meetings to share ideas and information about best management practices between city departments.

These ESA guidelines and the BMPs listed in Tacoma's Surface Water Management Manual are implemented in maintenance of parking lots, streets, roads, and highways that are owned or operated by the city, as well as for the maintenance activities listed in the NPDES Municipal Stormwater Permit Section including pipe cleaning, cleaning of culverts, ditch maintenance, street cleaning, road repair and resurfacing, snow and ice control, utility installation, vegetation management, dust control and pavement striping maintenance.

Tacoma provides documentation to Ecology of the BMPs implemented under the ESA guidelines in the Annual NPDES Stormwater Report.

Ongoing training is provided to applicable city work crews by the ESA Coordinator. The training includes updated information from the latest version of the Tacoma Surface Water Management Manual, IDDE reporting for field crews, and how to identify sensitive areas or situations that may require a special permit.

The ESA program is also being expanded to include development of specific standard operating procedures for implementing BMPs on commonly performed maintenance activities, a more formalized internal compliance monitoring program in coordination with Environmental Services Environmental Compliance staff; technical assistance on job site evaluation.

Tacoma's Street Sweeping Program removes sediment and associated contaminants from the street surfaces before it enters the municipal separate storm sewer system (MS4). The Street Sweeping Program is one of the best management practices the city uses to reduce stormwater impacts from roads and streets.

The program provides street sweeping services on a scheduled rotation for major arterials, 12 business districts (including the Hilltop Business District within the MLK subarea), and residential areas which are divided into 7 sweeping districts.

Sewer Transmission Maintenance Section also provides sweeping services as needed in response to emergency calls, special events, and customer requests. The Transmission Maintenance Section also provides basin-scale storm pipe cleaning services throughout the city prioritized based on receiving water, spill response or other source control observations in the stormwater collection system.

The allocation of maintenance resources within the Surface Water Utility is prioritized by the asset management program which includes impacts to receiving waters as key criteria. Special projects are planned and completed on an as-needed basis and interrupt the standard catch basin area cleaning schedule. Typically, the pipe cleaning project areas include the collection system draining public streets and private property runoff upstream of a given public storm system outfall.

Stormwater runoff water quality and retention

Washington State Department of Fish & Wildlife (DFW) specifies guidelines for water quality (and sometimes quantity) impacts on downstream fish and shellfish resources that apply to projects of more than 5,000 square feet of impervious surface. DFW also requires pre- and post-development runoff rates be analyzed using a continuous simulation model (such as the US EPA HSPF computer program) or a rainfall event simulation model.

According to computer simulation model results and DFW guidelines, project detention ponds must meet the following performance criteria:

- 50% of the pre-development, 2-year, peak-release rate for the 2-year developed storm design, and the
- Pre-developed, 25-year, peak-release rate for the 25-year, developed design storm.

DFW guidelines also specify water quality best management practice guidelines for the development of bio-filtration channels for sedimentation and erosion control practices, and channel maintenance. DFW guidelines require cities bordering natural drainage features to develop stormwater runoff, operation, and maintenance ordinances that:

- Control off-site water quality and quantity (as related to quality) impacts,
- Use source control and treatment best management practices,
- Use best management practices of the 6-month design storm for all proposed new developments,

- Use infiltration with appropriate precautions as the first consideration in stormwater management,
- Protect stream channels and wetlands, and
- Use erosion and sedimentation controls for new construction and re-development projects.

The Washington State Department of Ecology (DOE) published a technical guidance manual for meeting the above requirements as well as for providing education programs, growth management planning coordination, watershed planning, and enforcement.

Mitigation

Mitigation sequencing identifies preferred options to use when the proposed activity cannot be avoided or minimized to cause the least amount of impact. Mitigation sequencing is listed in the order of preference.

- Avoiding the impact by not taking a certain action;
- Minimizing the impact by limiting the degree of the action, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- Minimizing or eliminating the hazard by restoring or stabilizing using approved engineering or other methods;
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the proposed action;
- Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; or
- Monitoring the impact and taking appropriate corrective measures.

Specific mitigation measures for wetlands and geologically hazardous areas are included in Tacoma's development regulations.

Alternative 2: MLK Subarea Plan

In addition to the mitigation measures listed under both alternatives, Alternative 2: MLK Subarea Plan will also implement the following measures to mitigate impacts on water conditions:

32: Native habitat - plant street trees, reforest open spaces, remove invasive species, and promote use of native and drought resistant plants to restore wildlife habitat in and around

MLK's public facilities and within MLK's green, urban, and parkway street corridors.

33: Stormwater – develop rain gardens, green roofs and walls, bio-filtration swales, and other green development features in and around the MLK subarea's public facilities and within the MLK area's green and urban streets as well as in new project developments.

34: Brownfields – identify all known sites of hazardous materials including former gas stations and laundries, develop appropriate mitigation strategies, and create a funding source for proactively mitigating the sites to support redevelopment.

4.4.4: Unavoidable adverse impacts

Under both alternatives, the Chapter 4 Environmental Element of Tacoma's Comprehensive Plan and applicable development, critical areas, and stormwater requirements will provide sufficient protection for sensitive environmental lands, particularly lands that could be subject to aquifer, groundwater, surface and stormwater runoff.

However, Alternative 2: MLK Subarea Plan will better preserve some existing single family neighborhoods, utilize green street typologies, adopt form-based design guidelines, encourage green building characteristics, and support development of a contaminated site remediation strategy.