

**KELLEY CREEK HEADWATERS
DRAFT PUBLIC FACILITIES PLAN
(4-10-09)**

WATER SYSTEM

1. System Description/Condition Assessment

Existing Conditions. The Kelley Creek Headwaters area is currently rural in nature, with some residential development. Water supplies in the area are served through individual wells that tap into the groundwater aquifer beneath the valley. In addition, there is no domestic water distribution system in place in Kelley Creek Headwaters. As the area is developed to the level of urban development proposed in the Urban Growth Diagram, Gresham's water distribution system will need to expand to provide service to this area.

Gresham currently provides water service to approximately half of city residents, businesses, and industries. The Gresham water system is supplied from the Portland Water Bureau ("PWB") Bull Run System and Columbia River well field sources as well as shared groundwater facilities with the Rockwood Water PUD ("RWPUD"). Gresham currently has seven supply connections from PWB and one supply connection from RWPUD. Gresham has emergency connections via normally closed valves in the water system with RWPUD, Lusted Water District, and City of Troutdale.

The City of Gresham water system has seven service levels. Pressure to the system is provided directly by gravity from the PWB system or from eight water reservoirs supplied from booster pumping stations. Gresham's overall system Average Day Demand ("ADD") is approximately 7 million gallons and the Maximum Day Demand ("MDD") was approximately 13.3 million gallons. The water system's 8 reservoirs have approximately 28.5 million-gallons ("MG") of total storage. There are seven pump stations, approximately 257 miles of pipeline, and approximately 35 miles of water service pipeline. The system is monitored and controlled by a central supervisory control and data acquisition ("SCADA") system. The SCADA system allows water system operators to monitor and operate reservoirs, pump stations, and supply connections via a central computer control. This ability has enabled efficient operation of the water system by controlling peak demands from the PWB conduits.

Water Distribution. The City of Gresham will deliver water to future urban development in Kelley Creek Headwaters Area upon completion of needed transmission line backbones in Pleasant Valley.

The Kelley Creek Headwaters has elevations between 510 feet and 800 feet. The Kelley Creek Headwaters planning area abuts the City's South Hills Service Level. This service level will be expanded into the Kelley Creek headwater area. The South Hills Service Level, which will have an overflow elevation of 940 feet, can serve elevations between 630 feet and 817 feet. The South Hills Service Level currently comprises of about 533 acres and includes the South Hill Reservoir. This reservoir has a capacity of 2.6 million gallons (MG). Water is supplied to this

service level through the Regner Road Pump Station #8 with a current capacity of 2,200 gallons per minute (gpm).

2. System Analysis

Water demand from the proposed development was generated by applying an estimated demand per acre of new developable land based on the *2006 Water System Master Plan*. The demands for each service level from the *2006 Water System Master Plan* were projected over a 20-year planning horizon. These projected demands were divided by the current service level acres to obtain a demand per acre for each service level. This value was then used with the new service level areas to estimate the Kelley Creek Headwaters demand. The area of each new service level did not include Metro open space.

Based on the demands projected from the *2006 Water System Master Plan*, the anticipated maximum average day demand generated from the Kelley Creek Headwaters development totals 0.072 million gallons per day. Table 2 shows the results of this analysis for the service level.

Table A1: Projected Kelley Creek Headwaters demand based on projected flows in existing service level.

Service Level	Existing Area (acres)	Projected 2025 Average Day Demand (mgd)	Projected 2025 Average Day Demand per Acre (mgd/acre)	New Kelley Creek Area Buildable (acres)	Projected Kelley Creek Average Day Demand (based on acreage) (mgd)	Total New Area (acres)	New Projected 2025 Average Day Demand (mgd)
South Hills	533	0.91	0.001167	61.5	0.072	594.5	0.98

* To verify the projected demand estimate, based on 2006 Water Master Plan , 150 residences times 2.73 persons per household times 115 Gallon Per Person Per Day (gppd) Demand is 115 is 0.047 mgd.

Maximum day demands will be estimated from the projected average day demands by using a peaking factor of 1.9 as determined in the *2006 Water System Master Plan*. For the Kelley Creek Headwaters development, given the absence of industrial and commercial development, fire flow demands only reflect two potential types of residential development. Considerations in determining water service in the Kelley Creek Headwaters area are:

- 1,750 gpm for Low Density Residential customers with homes larger than 3,600 square feet
- 1,000 gpm for Low Density Residential customers with homes at or less than 3,600 square feet
- Overall storage requirements based on the following: The sum of 25% of MDD (peaking equalization) plus fire flow storage plus 2 times ADD.
- Pumping requirement based on supplying MDD.
- Source requirement based on supplying MDD times 25% for Gresham's South Hills service levels.

The following process was used to evaluate water demands associated with Kelley Creek Headwaters:

- Establish new service level boundaries within the planning area to determine the area to be added to the existing South Hills Service Level. The shape of the new service level was determined based on area topography and location to the existing service levels.
- Define pipe networks and projected flows for the land use concepts developed during planning. The networks were designed to provide as much system looping as possible, and to locate mains in existing or proposed road right-of-way to the greatest extent possible.
- Determine the pipe size for the distribution network in Kelley Creek Headwaters.
- Evaluate the system to determine whether adequate fire protection is available.
- Evaluate the system to determine whether adequate storage is available.

Based on specific design criteria, a looped 8-inch waterline would be desired to supply flows to meet these demands during a Maximum Day Demand scenario. The estimate presented provides a looped main solution which can meet the minimum fire flows for residential development (1,000 gpm). The location of residential building sites within the Kelley Creek Headwaters area is the determining factor to the layout of the 8-inch waterline facility.

3. Summary of Future Needs

Based on the analysis of the proposed water distribution system, recommendations for water system improvements were developed. Improvements are summarized below.

- A new 8-inch water main in Rodlun and Regner Roads and an 8 inch connection between the two mains will need to be installed to accommodate the demands anticipated in Kelley Creek Headwaters.

A map showing the approximate location of the proposed water system improvements is included below.

Map

Based on the above assumptions, the area within Kelley Creek Headwaters Area would be served by a looped water supply system resulting in the installation of approximately 7,490 feet of 8 inch ductile iron pipe (DIP).

The City of Gresham will be participating in ongoing discussions with Clackamas County, the City of Damascus, and the Sunrise Water Authority to determine the appropriate service provider for areas south of the Multnomah County line lying in northern Clackamas County.

4. Funding Plan

Evaluation of the Kelly Creek area indicated that no regional facilities are anticipated to be constructed. The primary funding sources for the development of the water system in Kelley Creek Headwaters will include development exactions for frontage and local street improvements and standard system development charges (SDCs). The developer and/or property owners benefited from water system installation will be responsible for funding water system improvements.

5. Goals, Policies and Action Measures

Goals and Policies. Applicable goals and policies that relate to the provision of public facilities in the existing comprehensive plan for the City of Gresham also apply to the Kelley Creek Headwaters PFP.

The City of Gresham and Clackamas County will work cooperatively to identify an efficient solution for extending water service to portions of Clackamas County that are adjacent to the Kelley Creek Headwaters plan area. Any agreement between Gresham and the County does not anticipate annexation of this area to Gresham and will comply with provisions of ORS 195 for urban service providers.

Action Measures.

1. Update the SDC improvement project list to include relevant near-term projects.
2. Continue to coordinate with the Clackamas County, the City of Damascus, the Sunrise Water Authority, and other stakeholders to establish plan for providing water service for the area adjacent to Kelley Creek Headwaters and lying within Clackamas County.

SANITARY SEWER SYSTEMS

1. System Description/Condition Assessment

Existing Conditions. The Kelley Creek Headwaters area is currently rural in nature, with some residential development. Sanitary sewage generated in the Kelley Creek Headwaters area is currently treated by on-site subsurface disposal systems. When the area is developed to the level of urban development proposed in the Urban Growth Diagram, this type of treatment will not be adequate.

The City of Gresham owns and operates a wastewater treatment facility that treats wastewater for over 107,000 residents, businesses, and industries in the City. Through its wastewater management program, the City is able to provide high quality service to ratepayers while protecting the area's sensitive surface water features. Wastewater receives a high level of secondary treatment at the City's facility on NE Sandy Boulevard and is discharged to the Columbia River.

Gresham's service area contains seven major sewer basins totaling approximately 14,171 acres (22 square miles). In addition to the seven sewer basins, the City also accepts wastewater flows from the City of Fairview (228 acres) and the City of Wood Village (604 acres), and a small amount of flow from the City of Portland. The service area extends from the Columbia River at an elevation of approximately 10 feet to the southern edge of Multnomah County at an approximate elevation of 1,000 feet. The service area is bordered by the City of Portland to the west and Fairview, Troutdale, and unincorporated Multnomah County to the north and east.

Due to the topography of Kelley Creek Headwaters, a large percentage of wastewater generated from the urban development would require pumping to gravity conveyance systems thence to the existing wastewater treatment plant.

For planning purposes, it was assumed that all wastewater generated in Kelley Creek Headwaters would be conveyed to the City of Gresham's existing collection system and ultimately to the City's treatment plant.

Sewage Collection. The proposed sewage collection system will be a network of pipes used to convey wastewater from the Kelley Creek Headwaters planning area to the City's existing system. In general, the most cost-effective and reliable method of conveying wastewater is to locate new pipes in existing or proposed road right-of-way, to use gravity conveyance of wastewater to the greatest extent possible, and to minimize the number of stream crossings.

The Kelley Creek Headwaters planning area lies in two collection basins in the City of Gresham: Johnson Creek and Kelley Creek. Analysis of in the 2001 *Wastewater System Master Plan* showed that upstream of Regner Road, the Johnson Creek interceptor has adequate capacity to serve existing residents through build-out of the service area. Downstream of Regner Road the size of the interceptor increases significantly, ranging from 30 inches immediately downstream of Regner Road to 42 inches upstream of the Linneman Pump Station. Preliminary analysis in the Master Plan indicated that this portion of the interceptor can accept up to 10 cubic feet per

second (cfs) of additional flow (from outside of the current service area) without exceeding the hydraulic capacity of the system.

The sewage collection system refers to the infrastructure that serves development in Pleasant Valley. The topography within Kelley Creek area is such that the majority of the waste generation is within one drainage basin. The Kelley Creek basin will need to be pumped to conveyance system improvements within Pleasant Valley along Butler Road. Once Pleasant Valley improvements have been completed, sanitary sewage will be diverted to a small lift station along Rodlun Road and pumped to the gravity system in Butler Road. Thence wastewater conveyance will proceed to the Linnemann Pump Station.

Additional improvements have occurred at the Linneman Pump Station and downstream force main and interceptors to the treatment plant to accommodate additional flows from outside of the current service area.

2. **System Analysis**

Sewage flows from the proposed development were generated by applying unit flow factors to various land use types, and adding infiltration and inflow (I/I) associated with the 1 in 5 year rainfall event. This “design storm” is established in the Oregon Administrative Rules (OAR) 340-041-120 sections 13 and 14 as the minimum condition under which the City must be able to convey and treat wastewater with no overflows. Unit flow factors and I/I assumptions were similar to the 2001 *Master Plan* and the 2004 *Pleasant Valley Master Plan*. The area of each new service did not include Metro open space.

The following process was used to evaluate wastewater needs associated with Kelley Creek Headwaters:

- Establish sewershed boundaries (sewer service sub-areas) within the planning area to define areas tributary to the model nodes (manholes). The shape of the sewersheds was determined based on projected future land use and area topography.
- Define pipe networks and projected flows for the land use concept developed during planning. The network was designed to use gravity for conveyance to the greatest extent possible, and to locate sewers in existing or proposed road right-of-way to the greatest extent possible.
- Determine pipe size and slope for the collection system network associated with the land use concept.
- Compare alternatives based on evaluation criteria established in project goals and policies.
- Apply evaluation results to selected Concept Plan land use and transportation network to develop final recommendations for wastewater system improvements.

3. **Summary of Future Needs**

Based on the analysis of the sewer system scenarios and the final Urban Growth Diagram map, recommendations for sewer system improvements were developed. These recommendations include pumped and gravity collection systems to serve the Kelley Creek Headwaters community, and improvements to existing infrastructure in the City to convey the additional flow from Kelley Creek Headwaters to the City's treatment plant. Improvements are summarized below.

- A new 8-inch gravity sewer will convey wastewater from the development areas on Regner Road to existing sanitary sewer interceptors. This new sewer will be routed in existing or proposed roadways.
- A new sanitary sewer lift station and force main at the lowest elevation on Rodlun Road will convey sanitary sewage to a new 8-inch gravity collector which will then convey flows to existing gravity sewer lines in Pleasant Valley.

A map showing the approximate location of the proposed wastewater system improvements is included below.

Map

Gresham recently expanded its sewage treatment plant and has capacity to serve Kelley Creek Headwaters. This flow would likely be introduced to Gresham's system at the east end of the Pleasant Valley trunk line to Rodlun Road.

With the build-out of Pleasant Valley, the closest pipeline with capacity to accept flow from Kelley Creek Headwaters will be located near the northwest corner of Kelly Creek Headwaters area near the intersection of Rodlun Road and Pleasant Valley Phase 1. A total of 5,705 feet of sewer pipe will be needed to convey the flow towards the Linneman pump station.

4. **Funding Plan**

Evaluation of the Kelly Creek area indicated that no regional facilities are anticipated to be constructed. The primary funding sources for the development of the wastewater system in Kelley Creek Headwaters will include development exactions for frontage and local street improvements and standard system development charges (SDCs). The developer and/or property owners will be responsible for funding water system improvements.

5. **Goals, Policies and Action Measures**

Goals and Policies. Applicable goals and policies that relate to the provision of public facilities in the existing comprehensive plan for the City of Gresham also apply to the Kelley Creek Headwaters PFP.

Action Measures.

1. Continue to coordinate with the City of Damascus and/or Water Environment Services of Clackamas County to determine the appropriate service provider for Sunshine Valley.
2. If Gresham is to provide treatment for any portion of flow from the City of Damascus, participate with City of Damascus and/or Water Environment Services of Clackamas County on an alignment study to identify the appropriate alignment for a new interceptor to convey wastewater to Gresham's wastewater treatment plant.

TRANSPORTATION SYSTEM

1. System Description/Condition Assessment

The primary purpose of this section of the Kelley Creek Headwaters Urban Growth Diagram [UGD] is to ensure coordination of planned transportation system improvements with other public utility and infrastructure improvements. The transportation system needs and proposed remedies shall be consistent with the City's Transportation System Plan and current public works standards upon annexation. Other than a brief overview of system needs and general remedies, the UGD does not address transportation issues in detail.

Kelley Creek Headwaters Area occupies a unique geographical location within a series of lava domes and wooded buttes in the southeast portion of the Portland metropolitan region. The area contains a significant environmentally sensitive stream, Kelley Creek, and wetlands. While these natural features provide scenic vistas and recreational opportunities, they also provide challenges from a transportation perspective.

The area is currently served by a transportation system that was designed primarily to serve the farm-to-market travel needs of the agricultural uses that once occupied the valley. Foster Road, 172nd Avenue, Jenne Road, 190th Avenue, 182nd Avenue, Sunnyside Road and Butler Road are the primary routes that connect Kelley Creek to other parts of the region.

2. System Analysis

The existing roadway network within the study area has mostly rural characteristics. Based on current development patterns, the majority of trips from the study area will travel to the north currently and to the south as Rodlun Road is extended into Clackamas County. Regner Road will carry vehicle traffic between Multnomah and Clackamas Counties.

The City's street functional classifications coordinate with classifications adopted by Multnomah County, Metro, and ODOT. Table 1 lists the functional classification definitions for the City. The Gresham Transportation System Plan contains additional detail regarding the functional street classifications. Within the study area, Rodlun Road is not classified by Gresham or Metro.

Based on the classification system below, Rodlun Road would be viewed to be a Community street. Regner Road will be classified as a collector.

Table C1 – Street Functional Parameter Classification Definitions

<i>Street Classification</i>	<i>Volume</i>	<i>Design Speed</i>	<i>Travel Lanes</i>
Principal Arterial	35,000 to 60,000	45 to 55	4 to 6
Arterial	15,000 to 40,000	35 to 45	4
Boulevard	15,000 to 40,000	25 to 35	4
Collector	10,000 to 20,000	25 to 35	2
Community Street	3,500 to 10,000	25 to 35	2

Source: City of Gresham Transportation System Plan, 2002

3. Summary of Future Needs

The city street designations in the Gresham Transportation System Plan were applied to the Kelley Creek Headwater area Public Facility Plan. The street design type designations and cross-section elements were taken from the Pleasant Valley Plan area, since it is the most recent new development that incorporates Green Street components into new street designs. The proposed Street Functional Class Plan for the Kelley Creek Headwaters area was illustrated in Table C1.

Other aspects of the proposed functional class include:

- Safety issues exist for all modes of travel due to topography, awkward intersections and high speeds and traffic volumes. Walking and biking is made difficult by the lack of facilities for these modes of travel.
- There is a need to develop a connection of rural streets adequate to serve future growth in Kelley Creek Headwaters and northern Clackamas County, while protecting environmentally sensitive areas and adjacent neighborhoods and rural reserves from the effects of urbanization. Green street designs will help reduce impervious surface area and incorporate on-site stormwater management within the right-of-way through the use of vegetative filter strips, swales, linear detention basins, infiltration trenches, permeable pavement and tree planting. Street alignments should follow natural contours and features as much as possible, which can help optimize implementation of green street designs.
- The topography of Kelley Creek and the need to protect area streams may require the construction of retaining walls to separate the roadway from sensitive areas.
- The existing population base in Kelley Creek Headwaters cannot finance the “backbone” transportation improvements that are needed to serve future development. These improvements will serve local needs of the Kelly Creek Headwaters community and should, therefore, be supported by development. Contrarily, existing Gresham residents and business owners should not have to support development in Kelley Creek Headwaters.
- The future street system needs to provide connectivity from Kelley Creek Headwaters to major streets in Gresham and Clackamas County.
- Kelley Creek Headwaters transportation corridor also will serve as a utility corridor for essential utilities. Coordination is needed between service providers to ensure investment in public facilities is sequenced in a manner that adequately supports planned urban development.

A map showing the approximate location of the proposed transportation system improvements is included below.

Map

The Kelley Creek Headwaters area plan will include special Green Street designs for local streets. Based on the above assumptions, the area within Kelley Creek Headwaters would be served through the installation of a green parkway design.

4. Funding Plan

Evaluation of the Kelly Creek area indicated that no regional facilities are anticipated to be constructed. The primary funding sources for the development of the transportation system in Kelley Creek Headwaters will include development exactions for frontage and local street improvements and standard transportation improvement fees (TIFs).

5. Goals, Policies and Recommended Actions

Goals and Policies. Applicable goals and policies that relate to the provision of transportation facilities in the existing comprehensive plans for Gresham also apply to the Kelley Creek Headwaters Urban Growth Diagram. In addition to those goals and policies, the following policies are made part of this plan.

1. The City of Gresham and Clackamas County will work cooperatively to identify necessary public facility improvements in Kelley Creek Headwaters. Gresham will take lead responsibility for updating the Kelley Creek Headwaters Urban Growth Diagram. In this capacity, Gresham will inform public works and transportation staff member from adjacent jurisdictions and urban service providers as defined in ORS 195 to share information about planned capital improvements and discuss policy issues affecting the provision of public facilities.
2. Adjacent jurisdictions and other urban service providers will work cooperatively on necessary urban service agreements and intergovernmental agreements to ensure clarity regarding transfer of ownership of transportation facilities.
3. Gresham and Clackamas County will work toward developing an intergovernmental agreement, if necessary, to ensure the provision of necessary municipal infrastructure in county roads for that part of Clackamas County that is adjacent to the Kelley Creek Headwaters plan area. If agreement between Gresham and the County does not anticipate annexation of this area to Gresham, it will comply with provisions of ORS 195 for urban service providers.

STORMWATER MANAGEMENT SYSTEM AND NATURAL RESOURCES IMPROVEMENT PLAN

1. System Description/Condition Assessment

Existing Conditions. The Kelley Creek Headwaters (KCH) area is located south of Gresham's Urban Growth Boundary and immediately east of the Pleasant Valley Plan District. Current land use in the area includes forestry, livestock pasture, rural residences, and passive parks and open space. The KCH area consists of moderate to steep slopes. Typical of rural areas, stormwater runoff is currently conveyed overland in ditches, flowing to natural drainages and eventually to Kelley Creek. Kelley Creek flows west/northwest through the central and western portions of the area, with several tributary streams flowing into Kelley Creek from the hillsides north and south of Rodlun Road. Kelley Creek eventually flows to Johnson Creek near the intersection of SE 162nd Avenue and Foster Road.

Portions of central and eastern KCH area have been cleared for farming, residential housing, and roadways, but the majority remains forested. The pasture areas are dominated by mixed non-native pasture grasses. Areas adjacent to residential homes typically include non-native ornamental plant species.

Dominant overstory species within the forested areas include Douglas fir, western red cedar, big leaf maple, and red alder. The understory is typically dominated by vine maple, red elderberry, salmonberry, snowberry, and sword fern. Non-native species, including Himalayan blackberry, English ivy, and English holly are present along the disturbed edges of the open spaces, or within recently logged tracts of land.

Shallow roadside ditches are present along portions of Rodlun Road, as well as the west side of Alder Ridge Road. In each case, the ditches are located between the roadway and adjacent hillsides, not between the roadway and the creek. The primary function of the ditches appears to be to prevent upslope water from flowing across the roadway, not to convey stormwater runoff from the roadway. Stormwater runoff from roads and other developed areas within the Kelley Creek Headwaters area generally flow directly into the vegetated areas along the road.

As a result of their proximity to the road surfaces and adjacent private properties, the ditches currently convey some untreated stormwater runoff into Kelley Creek, but most of the flow in these ditches is from natural sources. These sources include natural runoff from undeveloped areas, as well as groundwater discharge directly into the ditches or upslope sources. This is evidenced by flowing water in the ditches for up to several days following a precipitation event.

Riparian vegetation along Kelley Creek and its tributaries is variable in width and cover. Tributaries within undeveloped areas that have not been logged recently generally retain a healthy riparian area consisting of native forest, and are greater than 100 feet wide. As the tributaries pass through pasture land, near residences, or logged areas, the forested riparian areas are generally much narrower, and typically have fewer native understory species. Rodlun Road parallels the north bank of Kelley Creek for nearly one-half mile through the central portion of

the headwater area, and consequently has less riparian vegetation than the less disturbed south bank. The proximity of Rodlun Road to Kelley Creek is contributing to sediment entering the stream, constricts natural channel configuration, and limits floodplain development and the lateral extent of riparian vegetation. Stream and riparian improvements recommended for the area in general include control of noxious vegetation and planting of native trees, shrubs, and herbaceous plants in the riparian corridor, removing or upsizing culvert crossings, and creating opportunities for the stream to access adjacent floodplain areas during small flood events.

Downstream, Johnson Creek frequently floods in Portland's Lents neighborhood. As the upper headwaters of Johnson Creek, the future hydrology of the KCH area will have a direct impact on this situation. Therefore, the stormwater management plan and design requirements for KCH should utilize every available tool to prevent exacerbating downstream flooding.

2. Stormwater System Analysis

The recommended stormwater management system for KCH is intended to minimize the impact of development (both on water quality and flow rates and volumes) and maintain or restore watershed functionality using the goals and recommendations described below.

Design Criteria. To the maximum extent practicable, Green Development Practices and Green Street Standards shall be used to reduce the rate and volume of stormwater discharge to the natural stream channels in the Environmentally Sensitive/Restoration Area ("ESRA") to a level that is no greater than pre-development conditions for storms up to and including the 25-year, 24-hour storm. Green Development Practices include rain gardens, stormwater planters, and the use of porous paving materials. Where Green Development Practices cannot be used to manage stormwater, traditional stormwater facilities shall be used to meet quality and detention requirements per the City of Gresham's Water Quality Manual and Public Works Standards.

Due to the limited size of drainage basins within the Kelley Creek Headwaters area and challenging topography, large regional facilities (detention ponds) will not be utilized to manage stormwater. Rather, each development project shall manage stormwater using the City of Gresham's Green Development Practices Manual (for private property) and Green Street Standards (for public street improvements). Both components use techniques and processes that mimic natural hydrology to the greatest extent practical, reducing impacts of runoff to pre-development conditions, or improving over current conditions. The sizing of Green Development Practice and Green Street facilities is a function of native soil infiltration rates, impervious surface to manage, and the magnitude of storm events to manage. For the Kelley Creek Headwaters area, the 25-year, 24-hour storm is the controlling storm for facility sizing.

Rather than routing runoff to underground pipes for conveyance, wherever practicable, runoff shall be conveyed through open swales. Vegetated swales located between the roadway and sidewalks and drainage channels located along Habitat Conservation Areas (HCAs) will slow the flow of runoff and also provide some infiltration. These swales and drainage channels will generally have an 8-foot top width, 2-foot bottom width, and 4:1 side slope. In areas where the standard swale geometry does not provide adequate capacity, a 10-foot top width shall be provided.

With proper maintenance, the drainage channels will provide water quality treatment prior to discharge of stormwater to Kelley Creek.

3. Natural Resources Improvements

Throughout the Kelley Creek watershed, there are issues of noxious weed growth that needs to be addressed, including Himalayan blackberry, English ivy, clematis, English holly, and reed canarygrass. In addition, improved streambank stability, stream shading, and native plant detritus inputs for macroinvertebrate support and salmonid feeding would be realized with increase native tree and shrub cover. The City will incorporate the KCH area into its volunteer-based restoration efforts as the area annexes into the city.

The highest priority for improved stream conditions has been identified on a Metro-owned property at 8282 SE Rodlun Road. An undersized culvert under a driveway restricts flow in Kelley Creek mainstem to the extent that storm flows have frequently overtopped the banks, spilled over the driveway, and caused erosion of the streambank. Past efforts to address the ongoing erosion lead to heavy armoring of approximately 100 feet of the bank with concrete and asphalt chunks. The proposed improvement project would address the undersized culvert, remove the armoring, re-grade the slope, add a terrace shelf along this stretch of stream, improve access to the historic floodplain, and add native tree and shrub cover.

4. Summary of Future Needs

On-site Green Development Practices. Stormwater management goals rely on Green Development Practices on private property and within public streets to manage increases in stormwater flow rates and volumes, facilitating infiltration and evapotranspiration. Green Development Practices are a set of techniques that mimic and incorporate the predevelopment hydrology of a site into future development. Green Development Practices include site management techniques that minimize (1) disturbance to existing soils, tree canopy, and other sensitive natural resource features and (2) impervious surfaces, to reduce the production of surface runoff. They also manage runoff through techniques that use natural areas and landscaping to treat, retain, attenuate, and infiltrate stormwater within each development site instead of using traditional piped collection and conveyance systems.

An approved Stormwater Management Plan will be required in the new KCH area. Stormwater management plans provide a mechanism for the City to review how development proposals for stormwater facilities meet the requirements for stormwater management. The intention is that the stormwater management plans be submitted and approved along with site plan or preliminary development plat approval.

Within the HCAs, improvement efforts will be implemented to increase wildlife support and riparian function. Protecting and enhancing the tree canopy adjacent to riparian areas will also be an important component of the plan to meet expected Total Maximum Daily Load (TMDL) limitations for temperature in the Kelley Creek Headwaters basin.

Coordination is needed between Gresham and the new City of Damascus regarding stormwater system planning and design guidelines for the portion of the area in Damascus (south of Multnomah County). A consistent approach regarding stormwater conveyance standards, development setbacks, allowed uses in HCAs, and other issues related to stormwater management should be identified in an intergovernmental agreement.

The City of Gresham will not be responsible for NPDES and TMDL compliance for KCH until areas are annexed into the City.

Public stormwater infrastructure that benefits the entire KCH area includes the installation of stormwater facilities to manage stormwater runoff from approximately 3,000 feet of Rodlun and Regner roadway improvements. A culvert and stream improvement project is proposed to address ongoing erosion, stream stability, and riparian function.

5. Funding Plan

Evaluation of the Kelly Creek area indicated that no regional facilities outside of KCH are anticipated to be constructed. The primary funding sources for the development of the stormwater system in Kelley Creek Headwaters will include development exactions for frontage and local street improvements and standard system development charges (SDCs). The developer and/or property owners will be responsible for funding stormwater system improvements.

5. Goals, Policies, and Action Measures

Goals and Policies. Applicable goals and policies that relate to the provision of public facilities in the existing comprehensive plan for the City of Gresham also apply to the Kelley Creek Headwaters Urban Growth Diagram. The City shall manage stormwater and natural resources to minimize impacts on localized and downstream flooding and to protect water quality and aquatic habitat.

The following policies are made part of this plan:

- 1) Manage stormwater through the use of Green Development Practices [GDP] per the City of Gresham's Green Development Practices Manual. GDPs rely on infiltration, bio-retention, and evapotranspiration or other processes that mimic the natural hydrologic cycle.
- 2) Incorporate Green Street designs per the City of Gresham's Green Street Standards.
- 3) Design culvert improvements for existing and proposed stream crossings to eliminate barriers to fish passage.
- 4) Stormwater management shall avoid a net negative impact on nearby streams, wetlands, groundwater, and other water bodies.
- 5) The quantity of stormwater after development shall be equal to or less than the quantity of stormwater before development, wherever practicable.
 - a. Development shall mitigate all project impervious surfaces through retention and onsite infiltration to the maximum extent practicable for up to the 25-year storm event. Stormwater discharges from on-site facilities shall be conveyed via an approved drainage facility.

- b. Where lots are too small for on-site stormwater facilities, adjacent private developments may manage stormwater in a shared facility that is appropriately sized and meets water quality and flow control design standards.
 - c. Public stormwater facilities shall be designed such that the rate and duration of flow discharging from facilities for up to the 25-year storm does not lengthen the period of time the stream channel sustains erosion causing flows.
 - d. Conveyance swales and public stormwater facilities shall be designed to provide conveyance for the 100-year storm event.
- 6) The quality of stormwater after development shall be equal to or better than the quality of stormwater before development, as much as is practicable, based on the following criteria:
 - a. Stormwater facilities shall be designed to achieve at least 70% removal of the Total Suspended Solids (“TSS”) from the flow entering the facility for the design storm specified in the City of Gresham Water Quality Manual.
 - b. Stormwater facilities shall meet the requirements for established Total Maximum Daily Load limitations, as provided under the Federal Clean Water Act, Oregon Law, Administrative Rules and other legal mechanisms.
 - 7) Stormwater facilities shall be designed to safely convey the less frequent, higher flows through or around facilities without damage.
 - 8) Public stormwater facilities shall be designed using approaches that integrate stormwater and vegetation such as swales, trees, vegetated planters and wetlands.
 - 9) Noxious vegetation will be controlled within available resources, and streamside areas will be densely vegetated wherever possible to improve stream shading, streambank stability, and aquatic habitat.
 - 10) The encroachment of structures and other permanent improvements over public and private stormwater facilities and within public stormwater easements, drainage ways, creeks, streams, seasonal waterways, seeps and springs is prohibited.

Action Measures:

- Review stormwater utility rates and modify as appropriate to support maintenance of facilities in the Kelley Creek Headwaters area.
- Look for opportunities to enhance natural resource areas through the construction and maintenance of stormwater facilities