Executive Summary

The City of Gresham (City) provides comprehensive services for stormwater collection, conveyance, and water quality treatment. The City has developed basin-specific stormwater master plans as part of its management program for each of the City's four basins: West Gresham, Kelly Creek, Johnson Creek and Fairview Creek. The goal of these master plans is to outline a City strategy intended to proactively address stormwater capacity (e.g., flooding) and water quality issues. The City updates these Master Plans as needed to reflect changes in land use, regulatory climates, or infrastructure requirements.

The City has developed the following Stormwater Master Plan (Master Plan) for the Fairview Creek Basin. The Fairview Creek Basin drains the central and northern portions of Gresham (Figure ES-1). The Master Plan was developed both to help the City assess the Fairview Creek Basin based on current conditions and issues, and to allow the City to accommodate future changes.

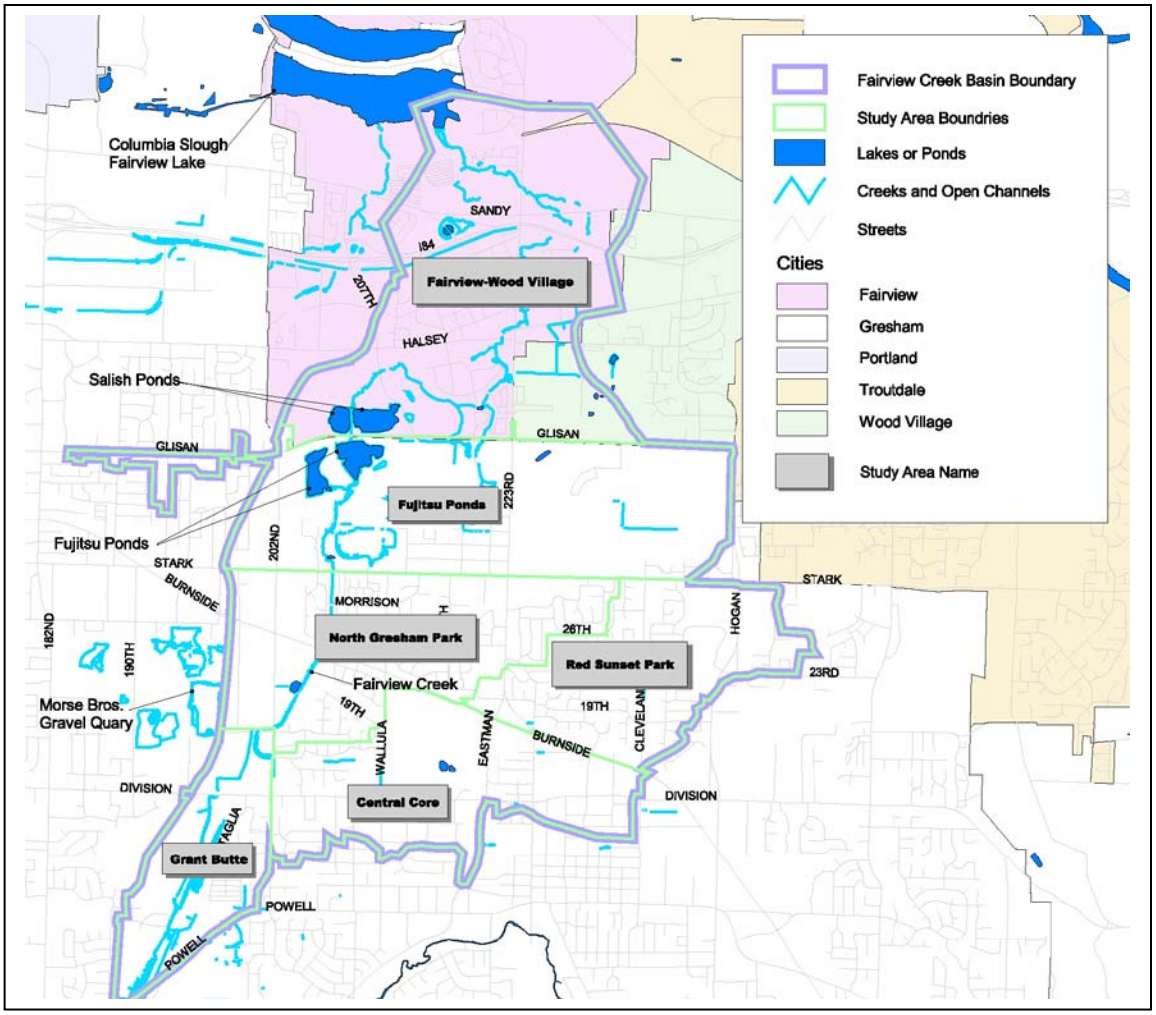


Figure ES-1. Basin and Study Area Boundaries

The Master Plan development process first inventoried the existing conveyance system information (e.g., pipe location and size) and creek characteristics (e.g., channel shape). Current land uses and City zoning classifications were then used to evaluate the system functions under future development conditions. System functions were evaluated into two categories: 1) conveyance system issues such as building/structure flooding and pipe capacity, and 2) stormwater quality.

This system was evaluated using a computer simulation model that uses the City's rainfall design standards and routes the related run-off through the system. Based on the results of the model simulation, site-specific recommendations were made and integrated into the City's Capitol Improvement Program (CIP). Details of this Master Plan development process and results are provided below.

Existing System

The Fairview Creek Basin is approximately 5.9 square miles in size; of that, approximately 2,760 acres (4.3 square miles) lies within the City limits. For analysis and mapping purposes, the Basin was divided into six study areas as shown on Figure ES-1: Red Subset Park, Central Core, Grant Butte, North Gresham Park, Fujitsu Ponds, and Fairview-Wood Village. The Fairview-Wood Village study area lies outside the City limits and therefore was not analyzed as a part of this Master Plan. The Basin is highly developed with an average imperviousness of approximately 60% under current development conditions within the Gresham City limits.

Within each study area, the conveyance system was classified as one or more of the following: storm drains, open channels (i.e., Fairview Creek and ditches), culverts, lakes/detention ponds, areas served by dry wells (stormwater sumps), and floodplain storage. Stormwater is conveyed through the Red Sunset Park and Central Core study areas through a storm drain system that discharges to Fairview Creek near 16th Avenue and Birdsdale Avenue. The Fairview Creek "headwaters" originate just north of Powell Boulevard in the Grant Butte study area and the ultimate receiving water is the Columbia Slough. Development has modified the creek and drainage patterns over time, which has resulted in a creek that has been straightened and incised for a majority of its course. Dry wells are located throughout the Basin and discharge stormwater into the ground. Performance of these dry wells and the connectivity with the groundwater table was not considered in the Master Plan analysis.

In 2002, an assessment of the Fairview Creek watershed was prepared for the Fairview Creek Watershed council (*Fairview Creek Watershed Assessment, October 2002).* This document provides a detailed discussion of the historic conditions of Fairview Creek and an assessment of sediment sources, channel modifications, water quality, and fish and fish habitat. The document closes with an evaluation of the Fairview Creek watershed condition.

For the water quality analysis, the sub-basins were grouped into "water quality analysis" sites. These sites were selected by using outfalls to Fairview Creek as the downstream location and then identifying the sub-basin areas that contribute to the outfall runoff. The water quality analysis sites contain one or more of the delineated sub-basins.

Model Development and Calibration

The stormwater conveyance system was evaluated using the XPSWMM model. The model was used to generate stormwater runoff for existing and future land use conditions, and to route that runoff through the conveyance system. The model was initially developed based on existing land use conditions and calibrated to actual rainfall and flow monitoring data supplied by the City. The calibrated model was updated to include estimates of future development based on the City's Comprehensive Plan and then used to identify conveyance system problems and recommendations. The conveyance system model analyzed the conveyance system using the 10-, 50-, and the 100-year rainfall return events.

XPSWMM was also used as a tool in the stormwater quality analysis. The water quality module of XPSWMM is a build-up/wash-off model used to simulate pollutant runoff concentrations and loadings. It is important to note that the model results are tools to assist in planning and are not precise predictive measurements. The water quality storm (6-month return interval) was used to evaluate areas of potential water quality concern. The water quality model was verified based on results of actual data collected at an outfall to Fairview Creek.

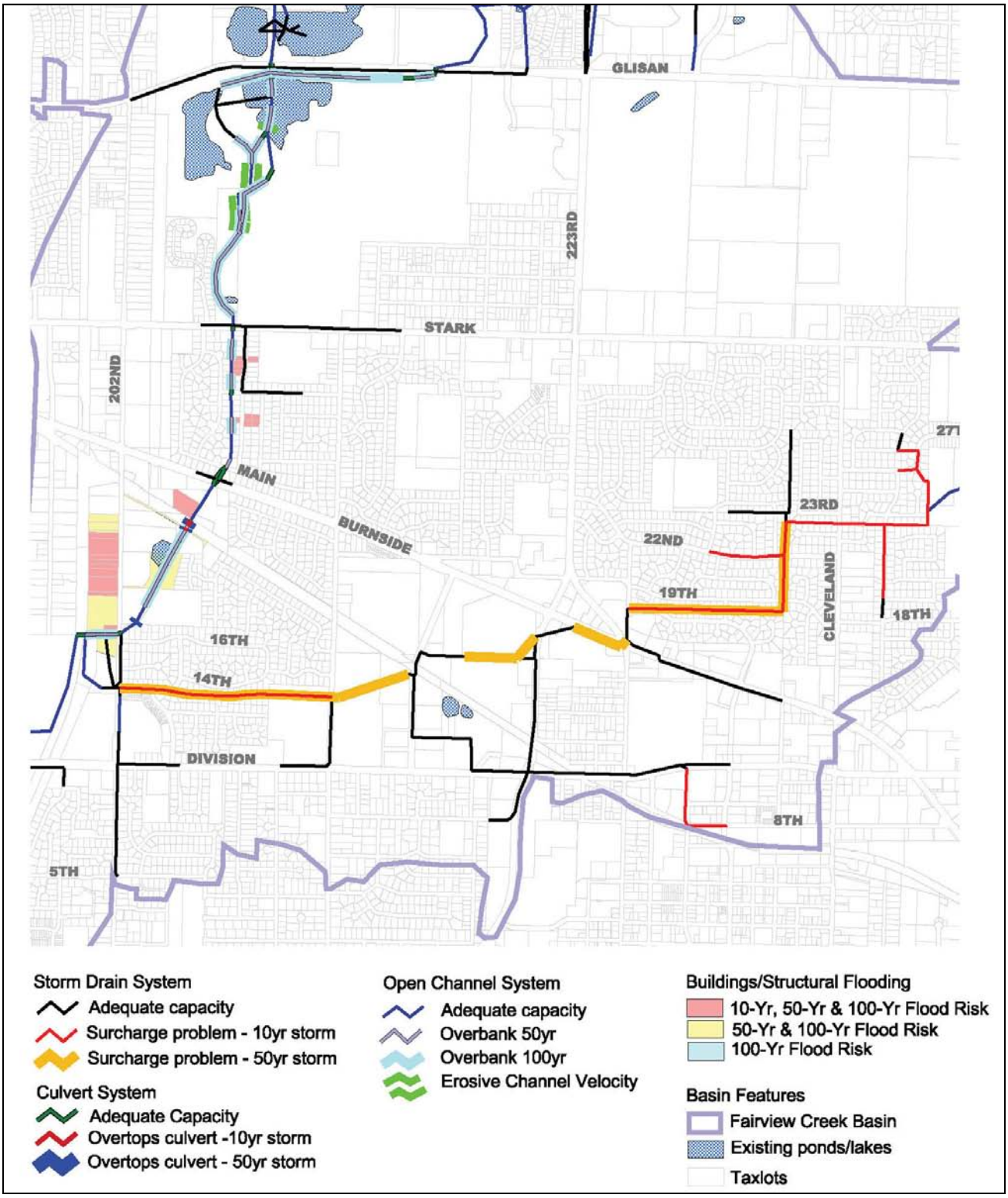
System Analysis and Alternative Identification

The system analysis was divided into two groups: system conveyance and water quality. System elements were considered "problems" if they did not meet pre-determined evaluation criteria. These criteria included items such as the capacity for pipes or culverts to pass design storms, potential for structure flooding, roadway overtopping, stream channel erosion, or elevated pollutant concentrations.

Alternatives to these problems were then developed and evaluated against a set of criteria including cost, implementation or construction feasibility, and perceived benefits. In the following pages, the identified problems and an overview of the alternatives considered are presented, first for system conveyance and then for water quality.

System Conveyance

Open channel conveyance, hydraulic analysis of culverts, roadway overtopping, structure flooding, and stormwater sewer conveyance elements were all evaluated as part of the water quality analysis. Figure ES-2 on the following page shows areas that were considered conveyance problems based on the results of the model output. A majority of the conveyance-related items were considered "problems" during larger storm events (e.g., 50-year events).



ES-2. Conveyance System Problem Areas

Alternatives to address the conveyance system problems included pipe improvements, detention only, and a combination of pipe improvements and detention. Pipe improvements are intended to improve the physical conveyance system (pipes and culverts) and eliminate surcharges and problems such as roadway overtopping. Detention alternatives evaluated measures that could be used to reduce the amount of water in the pipes or creek at any one time. Detention helps to alleviate problems such as flooding, erosive channel velocity, as well as overtopping. These conveyance system alternatives were modeled in the XPSWMM model to determine their effectiveness. The City evaluated the results of this analysis, and alternatives that best met the alternative criteria were recommended for inclusion into the City's CIP.

Water Quality

Model-simulated water quality concentrations were used to identify water quality analysis sites that had potential water quality problems. Water quality analysis sites were delineated by using outfalls to Fairview Creek as the downstream location and then identifying the sub-basin areas that contribute to the outfall. By design, most of the creek outfalls/water quality sites are aligned with major roads within the Basin. The analysis included major streets that are under the jurisdiction of Multnomah County (i.e., Burnside Street, Stark Street, Glisan Street, and Division Street).

Elevated concentrations were determined using Oregon water quality standards or guidance limits. The total load contribution in kilograms of each water quality analysis site was calculated by multiplying the concentration by the flow. According to the model, all water quality sites had elevated concentrations for at least one modeled pollutant. However, areas that have existing development *or* do not have current plans for water quality treatment were considered problem areas. These problem areas are summarized in Table ES-1 below.

Table ES-1. Water quality analysis sites with potential water quality problems

Street	Problem Areas
Division Street	• Concentrations exceeded guidance levels for phosphorus, lead, and zinc. • Twenty-three acres feature older residential development; 6 acres include Division Street and small areas of open space.
Burnside East	• Model results showed that all water quality concentrations exceeded guidance concentrations. • Approximately 8 acres support an older residential neighborhood and smaller new residential area, and 11 acres constitute Burnside Street.
Burnside West	• Phosphorus, TSS, lead, and copper exceeded guidance criteria. • This area consists of existing industrial/commercial developments and Burnside Street.
Stark East	• Phosphorus, TSS, lead, and copper exceeded guidance criteria. • Stark Street contributes to 4 acres of this area. Also contains 32 acres of residential areas and small collector streets.
Stark West	• Phosphorus, TSS, lead, and copper exceeded guidance criteria. • The 11-acre area is residential land use and supporting residential roads.
Glisan	• Phosphorus, TSS, lead, and copper exceeded guidance criteria • Residential development accounts for 32 acres; and the Glisan Street right-of-way is 25 acres.

The feasibility of providing water quality treatment was evaluated for each water quality analysis site. Conceptual alternatives included structural pollution reduction facilities (PRF), such as sedimentation manholes, vegetated treatment facilities (e.g., swales), or a combination of both. Each site was evaluated independently and factors that influenced the recommended plan were the existing conveyance system (e.g., pipe depth), available land for vegetated facilities, cost, size of treatment area, and operation and maintenance. The City evaluated the results of this analysis, and alternatives that best met the above criteria were recommended for inclusion into the City's CIP.

Capital Improvement Projects

The result of the Master Plan process is a series of recommended projects and order-of-magnitude costs for inclusion into the City's CIP. The recommended plan for the Fairview Creek Basin includes 14 CIP projects shown on Figure ES-3 on page 8. The CIP projects are divided into the following general improvement categories:

- ***Storm drain improvements*** including pipe replacement/up-sizing and hydraulically parallel pipes for increased conveyance.
- ***Open channel and culvert improvements*** including culvert replacements and channel conveyance improvements to reduce flooding risk to buildings and homes. This category also includes projects to improve wildlife habitat.
- ***Detention improvements*** for reducing runoff peak flow that include new diversion and outlet storm drains. Detention improvements also include a water quality component.
- ***Water quality improvements*** including swales, diversions to detention/water quality facilities, structural PRF for reducing target pollutants and monitoring recommendations to validate water quality problem model results.

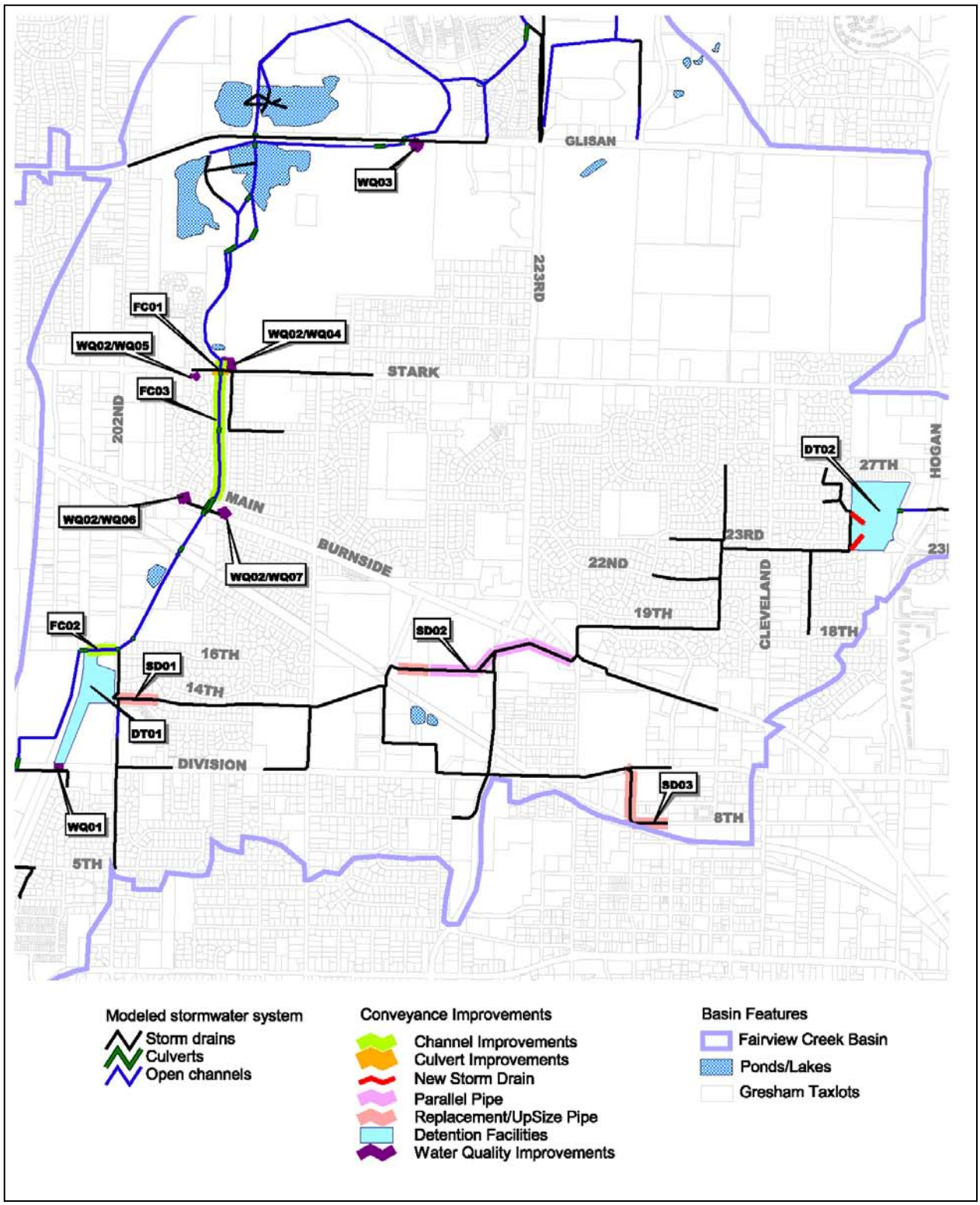
City staff ranked each proposed CIP project based on several weighted criteria such as cost, funding, safety and environmental benefits. Table ES-2 on the following page presents the estimated cost, ranking and placement into near term and long-term CIPs.

Table ES-2. CIP Project Implementation Order and Cost Summary

Project Priority		Capital Cost[1]	Rating[2]	0-5 yr CIP	Long-term CIP
ID	Project Name				
DT01	Birdsdale site detention and water quality	$1,822,500	39.20	■	
DT02	Red Sunset park detention	$115,800	34.40	■	
SD01	Storm drain improvement, Birdsdale to Riverside	$483,400	23.40	■	
WQ02	Water quality monitoring	$22,200	23.20	■	
FC02	Fairview Creek improvements, Ruby Junction to Birdsdale	$43,500	22.80	■	
WQ01	Division Street diversion	$69,300	22.60	■	
FC03	Fairview Creek improvements, Burnside to Stark re-vegetation	$14,400	21.80	■	
WQ03	Glisan Street water quality swale	$133,400	19.20		■
SD02	Storm drain improvement, Burnside to Civic Drive	$1,522,400	18.40		■
WQ05	Stark Street West pollution reduction facility	$64,900	17.80		■
WQ06	Burnside West pollution reduction facility	$51,900	17.80		■
WQ07	Burnside East pollution reduction facility	$51,900	17.80		■
WQ04	Stark Street water quality swale	$171,900	16.80		■
FC01	Fairview Creek improvements, Stark Street culvert	$236,700	14.80		■
SD03	Storm drain improvement, Division to Kelly	$265,500	9.60		■
	Totals	$5,069,700		$2,571,100	$2,498,600

Notes:

1. Engineering News Record, Construction Cost Index of 6589
2. Maximum possible score is 66



ES-3. Recommended Improvements

For a full copy of this Master Plan please contact the Department of Environmental Services, 503-618-2525.