

1 PUBLIC HEARING DRAFT

2
3 **Sunset Area Surface Water Master Plan**

4
5
6
7 Prepared for
8 **City of Renton**

9
10
11
12
13
14
15
16 Prepared by
17 **CH2MHILL**

18
19 1100 112th Avenue NE
20 Bellevue, WA 98004



32
33 *with edits based on comments made*
34 *during the public hearing period*
35
36
37

38 *—March 2011—*

39 *April 13, 2011*

1 Contents

2	Contents	iii
3	1 Introduction	1
4	Purpose.....	1
5	Planned Action Study Area.....	1
6	Community Input.....	1
7	Priority Levels.....	2
8	2 Study Area Characteristics	3
9	Drainage Basins and Land Cover.....	3
10	Groundwater.....	7
11	Drainage System.....	7
12	3 Applicable Regulations	9
13	Federal.....	9
14	State.....	9
15	Local.....	9
16	Sunset Area Revised Flow Control Strategy.....	10
17	4 Proposed Projects	13
18	Green Connections.....	13
19	Sunset Terrace Sub-Regional Facility.....	1918
20	Conveyance Improvements.....	2120
21	5 Project Implementation	25
22	Project Planning Cost Estimate.....	26
23	6 References	2927
24		

1	Tables
2	1 Targeted Level of Flow Control Mitigation by Public Infrastructure Projects
3	2 Priority Level 1 Projects and Costs
4	3 Priority Level 2 Projects and Costs
5	Figures
6	1 Drainage Basins
7	2 Soil Types & Aquifer Protection Zone
8	3 Steep Slope Areas
9	4 Green Connections
10	5 Typical Sections for Harrington and Jefferson Avenue NE
11	6 Typical Sections for Edmonds Avenue NE and NE 12 th Street
12	7 Sub-Regional Flow Control Facility
13	8 Proposed Stormwater Drainage Conveyance System
14	Appendices
15	A. Summary of Expected New Effective Impervious Area
16	B. Summary of Peak Flow Rates for the Study Area
17	C. Opinion of Cost

1 Introduction

2 Purpose

3 This Surface Water Master Plan was written to guide the City of Renton's surface water
4 management program within the Sunset Planned Action Study Area. It also identifies
5 surface water projects and priority needs and develop long-term solutions that meet
6 regulatory requirements, reflect the community's priorities, and can be funded by the City
7 or through future developments. A study was conducted in support of this master plan to
8 evaluate surface water infrastructure improvements necessary to support the
9 redevelopment of the Sunset Terrace public housing community and associated
10 neighborhood growth and revitalization, including other public service and infrastructure
11 improvements (e.g., transportation improvements). This Surface Water Master Plan is
12 prepared in conjunction with a Sunset Terrace Planned Action Environmental Impact
13 Statement.

14 Planned Action Study Area

15 The study area for the Surface Water Master Plan is generally bounded by NE 21st Street on
16 the north, Monroe Avenue NE on the east, NE 7th Street on the south, and Edmonds
17 Avenue NE on the west. [The development of the study area started in the mid 1940's. The
18 City utilities, includes storm drains, serving the area were installed as the area developed.
19 The age of some of the existing storm drains infrastructure is estimated to be more than fifty
20 years old.](#) The study area land uses include mixed-use, mixed-income residential,
21 commercial, and retail properties. The businesses are primarily located along Sunset
22 Boulevard and NE 12th Street.

23 The Sunset Area Community Investment Strategy developed by the City of Renton in 2009
24 identified several residential streets in the neighborhood, designated as "Green
25 Connections," that would be transformed to improve pedestrian and bicyclist mobility,
26 improve stormwater quality, mitigate the quantity of stormwater runoff, and create an
27 inviting corridor to enhance the neighborhood.

28 Community Input

29 In 2009, a Sunset Community Investment Strategy (CIS) was initiated to create a blueprint
30 for the public investment that can be coordinated and phased in over the coming years.
31 Some of the projects listed below were based on the result of the CIS. Elements of the
32 Surface Water Master Plan were also included in the Planned Action environmental impact
33 statement process, which includes scoping meetings and comment periods, the Draft
34 Environmental Impact Statement (EIS) and comments, and responses to comments in the
35 Final EIS.

1 Priority Levels

2 Priority levels were assigned to projects identified in this plan. These priority levels are
3 intended to inform decisions on the timing of the projects and the expenditure of limited
4 resources, and are defined as follows:

5 **Priority Level 1:** Projects with priority level 1 are deemed critical because they
6 address an immediate system deficiency or coincide with redevelopment of Sunset
7 Terrace or other public infrastructure improvements to support the potential
8 redevelopment. For example, the Harrington Avenue Green Connections projects,
9 which improve pedestrian mobility and safety between important public spaces and
10 schools within the Sunset Area, are priority level 1.

11 **Priority Level 2:** Priority level 2 projects are not immediately necessary and could be
12 implemented to support redevelopment or to reduce costs by constructing them
13 concurrently with other public infrastructure improvements, e.g. lower priority
14 Green Connections.

DRAFT

1 2 Study Area Characteristics

2 Drainage Basins and Land Cover

3 The Planned Action Study Area is currently developed for residential and commercial land
4 uses. In general, the stormwater runoff from this area drains to roadside ditches, catch
5 basins, and storm drains. The runoff is collected and conveyed into larger storm drains
6 within the major streets and discharges into local creeks and drainage tributaries. No
7 stream, water body, or water-related critical area is located in or immediately adjacent to the
8 Planned Action Study Area, and no local flooding has been reported in the area. The Study
9 Area is not within a special flood hazard area mapped by the Federal Emergency
10 Management Agency (FEMA).

11 The Planned Action Study Area comprises approximately 269 acres of urban developed
12 area. The area drains to three tributary creeks: Honey Creek, May Creek (Lower May
13 Creek), and Johns Creek. All three creeks are part of the Greater Lake Washington
14 Watershed (Water Resources Inventory Area [WRIA] 8 in King County). Lake Washington,
15 the receiving water body from May Creek and Johns Creek, is the second largest natural
16 lake in Washington. Most of the immediate watershed is highly developed and urban, with
17 63 percent fully developed.

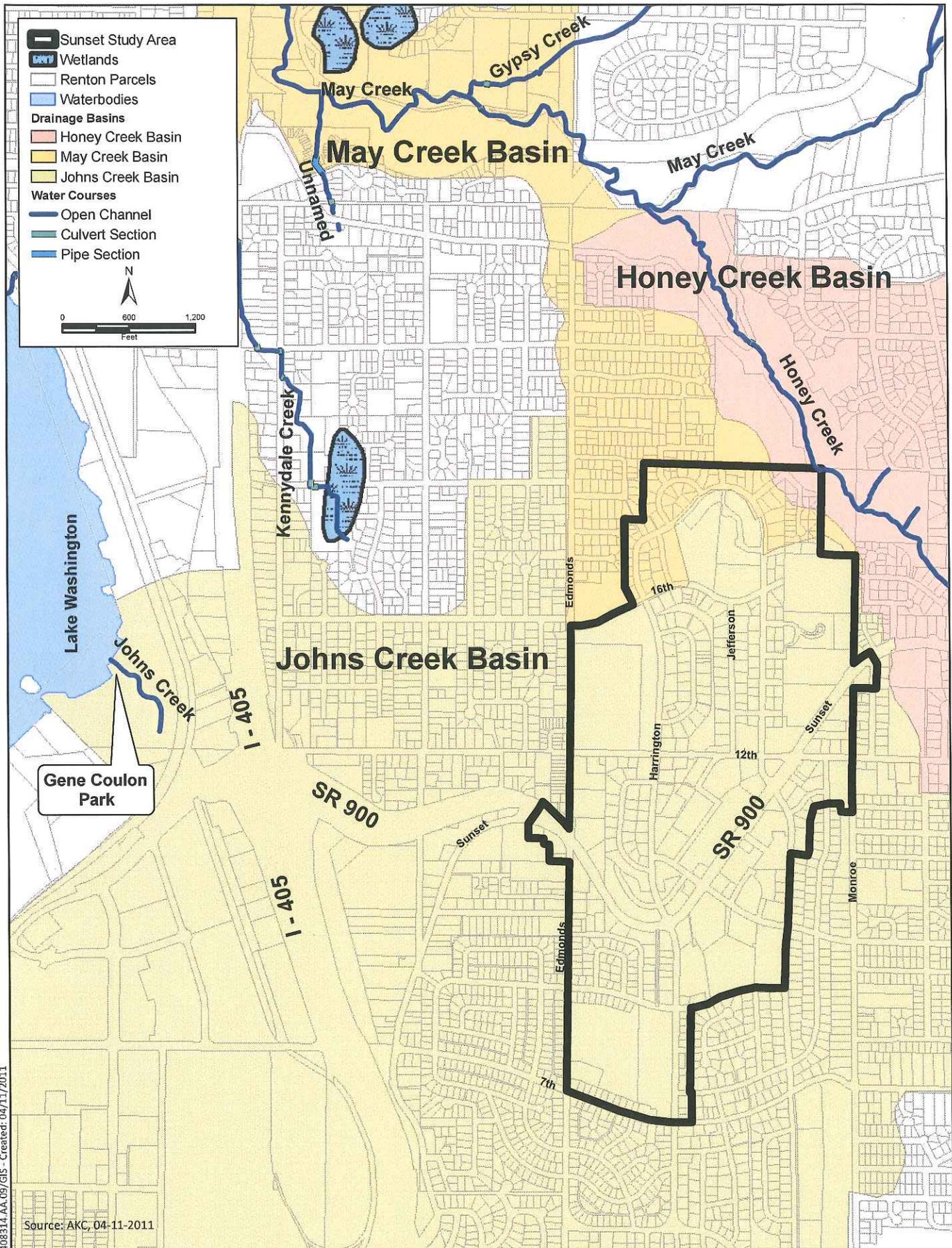
18 Approximately three (3) acres at the northeast corner of the study area drain to Honey
19 Creek, which is a tributary to May Creek. The northwest corner of the study area, which
20 includes 23 acres of primarily single-family residential land use, drains to May Creek. The
21 balance of the study area, approximately 243 acres of mixed single-family residential,
22 multifamily residential, and commercial uses, drains to Johns Creek (Figure 1). The existing
23 and preferred alternatives land cover summary are shown in Table A-2 in Appendix A.

24 Soil

25 The soils influencing the design and function of the study area generally consist of urban
26 soils (largely fill) and glacially derived outwash and till deposits. Figure 2 shows the surface
27 soil as mapped by the Natural Resources Conservation Service. The northern and southern
28 area consists of outwash soil, which is generally very permeable and has a good infiltration
29 rate. The central and western portion of the study area generally consists of till soil, which is
30 a dense, unsorted mixture of gravel, sand, silt, and clay. Till soil is less permeable than
31 outwash soil and has limited infiltration capacity. Much of the central portion of the study
32 area is designated as urban soils, which are difficult to classify due to the variable nature of
33 the soil; however, for the purposes of this study, urban soils are assumed to exhibit similar
34 infiltration characteristics as till soil. Figure 2 shows the soil conditions of the study area.
35 Figure 3 shows the area of steep slopes where an infiltration facility is not allowed per City
36 of Renton code.

1 Figure 1. Drainage Basins

DRAFT



408314.AA.09/GIS - Created: 04/11/2011

Source: AKC, 04-11-2011



Figure 1
DRAINAGE BASINS
 City of Renton Sunset Area Master Drainage Plan

1 Figure 2. Soil Types & Aquifer Protection Zone

DRAFT

1 Figure 3. Steep Slope Areas

DRAFT

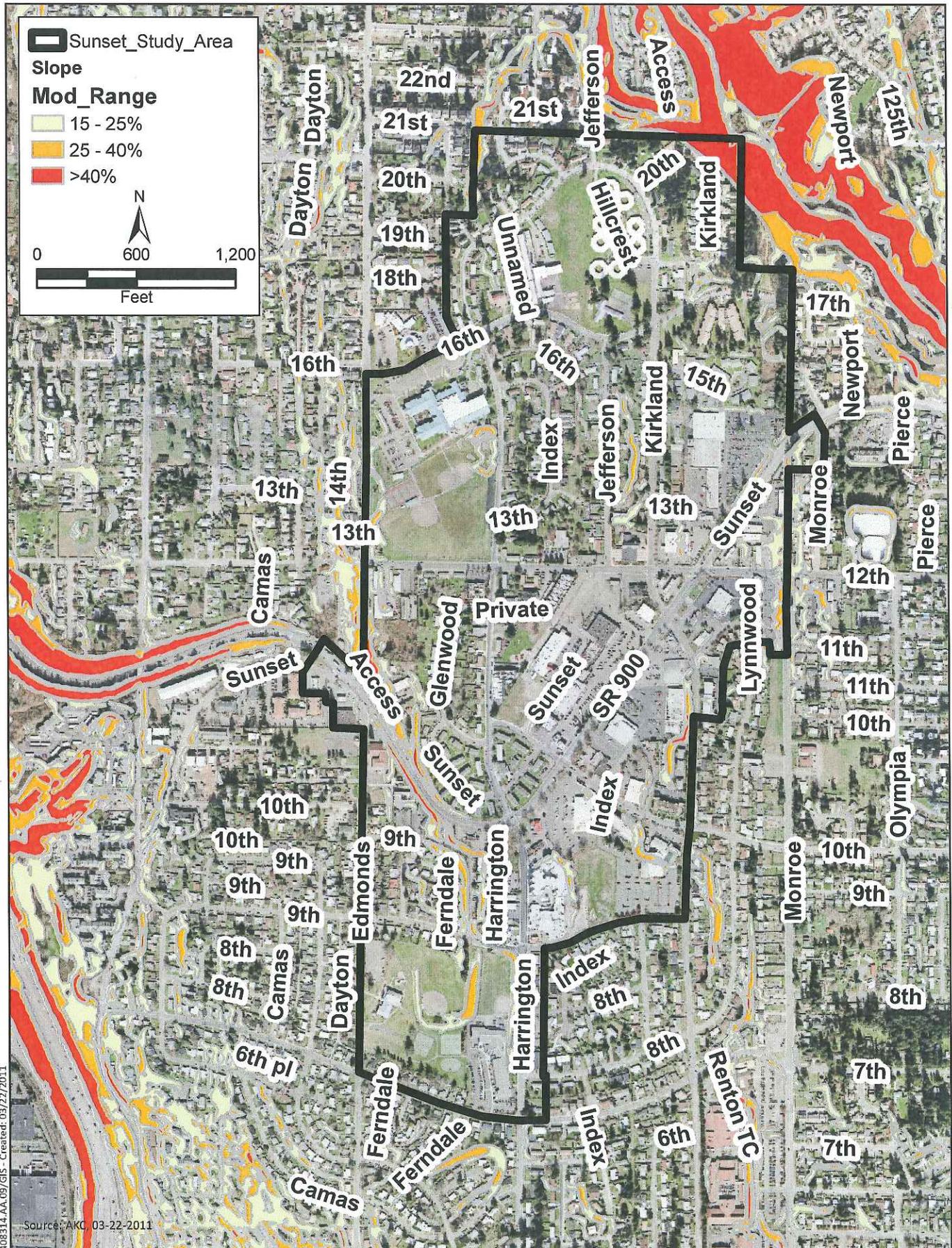


Figure 3
Steep Slope Hazard Areas
City of Renton Sunset Area Master Drainage Plan

1 **Groundwater**

2 The Planned Action Study Area is within the City's Aquifer Protection Zone 2. The
3 protection areas are the portions of an aquifer within the zone of capture, and the recharge
4 area for wells owned or operated by the City. Zone 2 is the land area situated between the
5 365-day groundwater travel time contour and the boundary of the zone of potential capture
6 wells. This aquifer is the sole drinking water source for the City of Renton. The Planned
7 Action Study Area south of Sunset Boulevard lies within the source area of Cedar Valley
8 Sole Source Aquifer, designated by the U.S. Environmental Protection Agency, which is also
9 part of the City's Aquifer Protection Zone 2. The limits of the Aquifer Protection Zone and
10 infiltration potential within the study area are presented in Figure 2.

11 **Drainage System**

12 **May Creek Basin**

13 Approximately 26 acres within the northern portion of the study area drain to the May
14 Creek Basin. This area is largely developed under single-family residential land use. There is
15 one storm drain system in the study area in May Creek Basin. This system extends along NE
16 16th Street beginning west of Index Avenue NE and drains westward and then north on
17 Edmonds Avenue NE. This system eventually drains to May Creek.

18 May Creek is 7 miles long and originates in the steep forested slopes of Cougar and Squak
19 mountains and in the highlands of the Renton Plateau. The entire basin encompasses an
20 area of fourteen (14) square miles that drains to the southeast portion of Lake Washington
21 (City of Renton and King County 2001). The May Creek Basin also includes other tributaries:
22 Honey Creek, Boren Creek, and the north, east, and south forks of May Creek. May Creek
23 and its tributaries are designated by Washington Department of Ecology (Ecology) as "Class
24 AA" (superior) because May Creek is a feeder stream to Lake Washington. Class AA waters
25 can be used for water supply (domestic, industrial, and agricultural), stock watering, fish
26 spawning, wildlife habitat, and recreation (Foster Wheeler Environmental 1995).

27 **Johns Creek Basin**

28 Most of the study area is within the John's Creek Basin. The land use in this basin is mainly
29 single-family residential, schools, and commercial/industrial development. A small portion
30 is used for multi-family or high-density housing. The upper basin is dominated by
31 residential and commercial land use, and the lower basin is dominated by industrial and
32 commercial uses.

33 Johns Creek discharges to Lake Washington at Gene Coulon Park in Renton. Johns Creek
34 extends upstream in a southeasterly direction for less than 1 mile. Because of its proximity
35 to Lake Washington, the stream water elevation is controlled by Lake Washington, and
36 therefore it is considered to be a flow-control-exempt-major-receiving water body per the
37 City amendment to the *King County Surface Water Design Manual* (City of Renton 2010a). The
38 Johns Creek Basin covers approximately 1,236 acres and is located east of the Cedar River, in
39 the northeastern portion of Renton. The drainage system serving the overall basin consists

1 primarily of roadside ditches and storm drain pipes. There are three primary storm
2 drainage systems in this basin: Sunset Boulevard, NE 9th Street, and NE 7th Street.

3 **Sunset Boulevard Storm Drainage System**

4 Record drawings indicate the Sunset Boulevard (SR 900) storm drainage system was
5 constructed in the 1970s. The system consists of 30-inch-diameter pipe downstream of the
6 study area, west of Edmonds Avenue NE. The main trunk of the storm drainage system
7 extends along Sunset Boulevard. This storm drain directly collects runoff from Sunset
8 Boulevard and adjacent properties. This trunk also receives flows from drainage systems on
9 adjacent streets and a 12-inch diameter storm drain on Harrington Avenue NE (south of NE
10 10th Street) was constructed in the 1950s.

11 This system also conveys runoff from Edmonds Avenue NE between Sunset Boulevard and
12 south of NE 16th Street, Harrington Avenue NE, and NE 10th Street immediately north of
13 Sunset Boulevard. The Edmonds Avenue NE system conveys runoff from the NE 12th Street
14 system, Harrington Avenue NE system, Jefferson Avenue NE, and Kirkland Avenue NE.
15 The NE 12th Street system was upgraded in the early 1980s into 36-inch-diameter pipe from
16 Kirkland Avenue NE to Edmonds Avenue NE. The system remains as 12-inch-diameter
17 pipe east of Kirkland Avenue NE. The Kirkland Avenue NE system is a 12-inch-diameter
18 pipe that starts at NE 16th Avenue. It was built pre-1950. Currently, the stormwater runoff
19 from Harrington Avenue NE and Jefferson Avenue flows on the street surface and is
20 intercepted by the storm drain on NE 12th Street.

21 **NE 9th Street Storm Drainage System**

22 The NE 9th Street system drains the area south of Sunset Boulevard to NE 9th Street. It
23 starts west of Monroe Avenue NE and drains west. It intercepts a storm drain at Harrington
24 Avenue NE. The combined system continues to flow west, then turns north at Ferndale
25 Circle NE, then turns west and becomes an 18-inch-diameter pipe. This system turns west
26 again, crossing under Edmonds Avenue NE toward NE 9th^h Place.

27 **NE 7th Street Storm Drainage System**

28 The NE 7th Street system starts east of the study area from Monroe Avenue NE. This system
29 drains west and intercepts two storm drains at Harrington Avenue NE. Only a small portion
30 of the study area drains into this storm drain.

1 3 Applicable Regulations

2 This chapter summarizes the federal, state, and local stormwater regulations that all
3 developments should comply with. Also, the Sunset Terrance Area specific flow control
4 strategy is discussed.

5 Federal

6 Federal stormwater regulations in the Clean Water Act (33 U.S.C. §1251 et seq.) are typically
7 promulgated through local stormwater requirements (see below). Projects proposed as part
8 of the Sunset Area Surface Water Master Plan will need to meet the requirements of Section
9 7 of the Endangered Species Act (16 U.S.C. §1531 et seq.), which is regulated by the U.S.
10 Department of the Interior, National Marine Fisheries Service, and U.S. Fish and Wildlife
11 Service.

12 State

13 For projects with an area of disturbance exceeding one (1) acre, the City is required to file a
14 Notice of Intent with Ecology for coverage under the National Pollutant Discharge
15 Elimination System (NDPES) program's General Permit for Stormwater Discharges
16 Associated with Construction Activities. These filings typically require projects to provide
17 erosion-control measures consistent with Ecology's *Stormwater Management Manual for*
18 *Western Washington* (Ecology 2005).

19 The City of Renton is required to administer a stormwater management program developed
20 in accordance with the Western Washington Municipal Stormwater NDPES phase II Permit.
21 Among the specific obligations set forth in this NDPEs permit, the City is required to adopt
22 by ordinance a stormwater design manual that is equivalent to the 2005 Ecology manual.
23 Therefore, the City has adopted the 2009 King County Surface Water Design Manual with
24 City amendments (City of Renton 2010a) for the design, construction, and maintenance of
25 stormwater management systems and facilities that are approved through the development
26 permit process. Permanent stormwater features must meet the manual's design standards
27 or be equivalent.

28 Local

29 RMC 4-3-050, Critical Areas Regulations, addresses the requirements for development
30 within or adjacent to the aquifer protection areas or any other critical area (i.e., flood hazard
31 areas, erosion hazard areas, wetland, streams, etc).

32 Renton Municipal Code (RMC) 4-6-030 and Ordinance No. 5526 address storm drain
33 utilities. Technical requirements for the design of stormwater facilities are contained in the
34 *King County Surface Water Design Manual* (King County 2009) and the City amendments to
35 the manual (City of Renton 2010a).

1 The City's drainage (surface water) management standards are focused on reducing
2 potential impacts from new impervious surfaces, replaced impervious surface, new
3 pervious surface, and land disturbing activity (2009 KCSWDM and City Amendment).
4 Redevelopment and new development exceeding the thresholds specified in the 2009
5 KCSWDM (as amended by the City) are required to comply with the requirements set forth
6 in the manual, including stormwater treatment and flow control BMPs. The majority of the
7 Planned Action Study Area was developed prior to the advent of modern stormwater
8 requirements (e.g., implementation of the 1990 *King County Surface Water Design Manual*) or
9 under less stringent requirements.

10 The drainage (surface water) standards also require the use of flow-control best
11 management practices (BMPs), where feasible. Flow-control BMPs include many low-
12 impact development techniques such as infiltration, dispersion, rain gardens, permeable
13 pavements, vegetative roofs, rainfall harvesting, reduction of impervious area, and retention
14 of native vegetation. Projects should implement full dispersion or full infiltration of roof
15 runoff where feasible. Where runoff from impervious surfaces cannot feasibly be dispersed
16 or infiltrated, the code requires that a minimum portion of the site or impervious area be
17 managed through these practices. Small lots of less than 22,000 square feet are required to
18 provide either full infiltration/dispersion of stormwater, where feasible, or, where not
19 feasible, provide flow-control BMPs for an impervious area equal to 10 percent of the site
20 area (for lots smaller than 11,000 square feet) or 20 percent of the site area (for lots between
21 11,000 square feet and 22,000 square feet). For lots larger than 22,000 square feet, the total
22 allowable impervious area exceeds 65 percent for all zoning classifications; therefore, all
23 potential new or redevelopment projects within the study area are required to comply with
24 the flow-control requirements for Large Lot High Impervious BMP requirements that
25 require flow-control BMPs to manage 10 percent of the site or 20 percent of the target
26 impervious surface, whichever is less. The flow control BMP requirement shall be applied to
27 the project site regardless to whether a flow control facility is required. Additional flow
28 controls may be required within the Johns Creek Basin to match peak flows under existing
29 conditions. Areas within May Creek and Honey Creek basins are required to comply with
30 the more stringent Flow Control Duration Standard, which the stormwater runoff release
31 from the site requires matching ~~to the existing forested~~forested predevelopment conditions.

32 **Sunset Area Revised Flow Control Strategy**

33 Redevelopment in the study area will comply with all the stormwater regulations and
34 requirements (federal, state and City of Renton). Proposed development and redevelopment
35 projects will provide flow control BMPs (AKA low-impact development practices) onsite as
36 feasible, and water quality treatment onsite. The sub-regional facility and Green
37 Connections will provide flow control mitigation for approximately 5.7 acres of effective
38 impervious area. After flow control BMPs (as feasible and applicable) are implemented on a
39 proposed development site within the Johns Creek Basin, any additional required flow
40 control mitigation maybe fulfilled off-site by the City's sub-regional facility and Green
41 Connections. To do so, project applicants will need to demonstrate that the net effective
42 impervious area for the development or redevelopment site, constructed public
43 infrastructure improvements and post-2011 projects for the entire Sunset area is less than or

1 equal to the current (2011) existing conditions. Flow control mitigation for all targeted
2 surfaces will be required to be met on-site under the following conditions:

- 3 • Proposed projects precede construction of the public infrastructure improvements
- 4 • Connection to the downstream drainage system is not available.
- 5 • Net new effective impervious area of the proposed project plus projects constructed
6 in the Study area after 2011 (after implementing Flow Control BMPs) exceeds 5.7
7 acres (or the total area mitigated by the constructed public infrastructure projects)
- 8 • Or a combination of the three conditions above.

9 No public infrastructure projects are proposed within the May Creek Basin and therefore
10 individual development or redevelopment projects will be required to comply with the
11 appropriate flow control requirements on-site.

1 4 Proposed Projects

2 As part of the Planned Action Draft EIS (City of Renton 2010b) and the Sunset Community
3 Investment Strategy (City of Renton 2009), several stormwater projects were identified,
4 including a sub-regional flow control facility, Green Connections using low-impact
5 development facilities (LID), a new conveyance system, and upsizing of the existing system.
6 These projects will provide flow control, water quality improvements, or conveyance
7 capacity for future redevelopment.

8 Green Connections

9 Green Connections involves street improvements meeting the City of Renton Complete
10 Street requirements. Complete Streets include features that enhance the pedestrian
11 experience such as wider sidewalks, narrower travel lanes for vehicles, and landscaping in
12 the form of rain garden/planters. Harrington Avenue NE, Jefferson Avenue NE, Edmonds
13 Avenue NE, 12th Street, and two alleys were identified as potential locations for Green
14 Connection improvements. Ten segments of Green Connections improvements were
15 identified for potential implementation. Three segments are located on Harrington Avenue
16 NE. Another three segments are located on NE 12th Street and Edmonds Avenue NE. One
17 segment is on Jefferson Avenue NE. Two segments are on alleys: one is west of Jefferson
18 Avenue NE, and the other one is west of Harrington Avenue NE. A last segment is on the
19 sidewalk between NE 16th Street and Index Avenue. Figure 4 shows the location of the
20 Green Connection projects.

21 The primary storm drainage features of the Green Connections projects consist of roadside
22 rain gardens and permeable sidewalks. Roadside rain gardens receive stormwater runoff
23 from the roadway and, in limited instances, from adjacent properties. The runoff is treated
24 by flowing through the bioretention soil mix (consisting of sandy loam soils and compost)
25 and vegetation, and then infiltrated into the native ground during smaller storms. During
26 larger or higher-intensity storms, the stormwater runoff will continue to infiltrate as allowed
27 by the native soil, with excess runoff stored temporarily in the soil and the active storage
28 within the rain garden. Once the storage and infiltration capacity of the rain garden is
29 exceeded, runoff would then overflow into the street curb and gutter and/or the street
30 storm drain systems. Where native soil infiltration capacity is limited, the rain gardens
31 would be installed with subsurface underdrains to collect the treated water that filters
32 through the bioretention soils. A storm drain system will be needed to convey the overflow
33 runoff from the rain garden and to meet the City's storm drain design standard. Only the
34 cost of the Low Impact Development improvements (e.g. rain gardens, porous sidewalks,
35 etc.) associated with the green connections are shown in Table 2. The storm drain
36 conveyance systems needed for street improvements are includes as part of the street
37 improvements cost estimates included in the capital facilities plan.

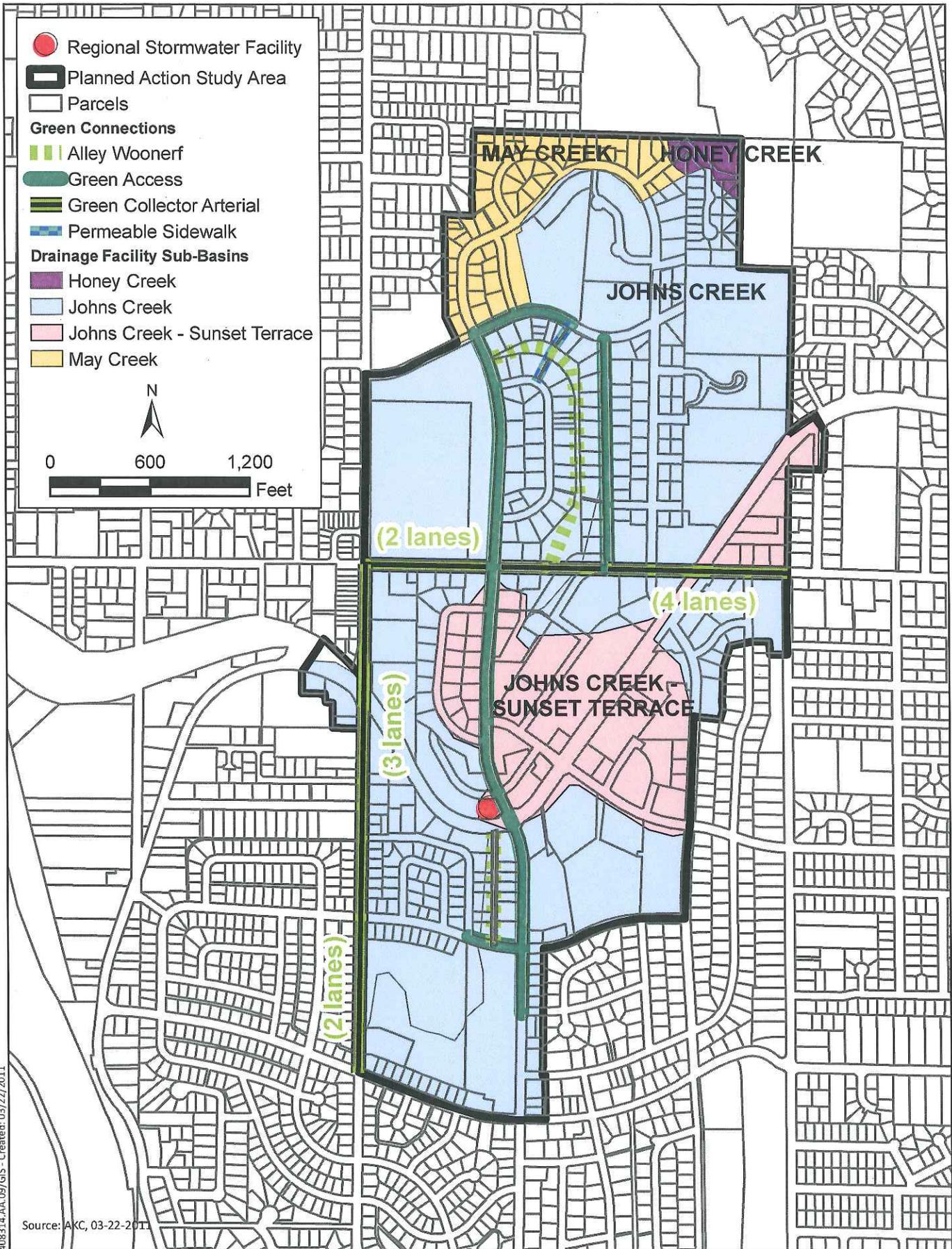
1 **Residential Access Streets**

- 2 Harrington Avenue, Jefferson Avenue, NE 16th Street, and NE 9th Street are classified as
3 Residential Access Streets in the City of Renton Compete Street Ordinance (5517). Per this
4 Ordinance residential access streets requires a right-of-way width of 53 feet for a two-lane
5 road. This breaks down into 20 feet of paved roadway, 6 feet of parking on one side of the
6 street, a 6-foot-wide sidewalk, and an 8-foot planter strip on both sides of the street.

DRAFT

1 Figure 4 Green Connections

DRAFT



408314.AA.09/GIS - Created: 03/22/2011

Source: AKC, 03-22-2011



Figure 4
Green Connections
City of Renton Sunset Area Master Drainage Plan

1 The existing right-of-way on these streets is 60 feet; thus there is an additional 7 feet of space
2 that can be used for low-impact development features. The proposed Green Connection
3 typical street section would include 20 feet of paved roadway with 6 feet of parking on one
4 side of the street, an 8-foot sidewalk on one side of the street and a 5-foot sidewalk on the
5 other side of the street, and a 6-foot planter and a 12-foot rain garden on one side of the
6 street. It requires a total of 58 feet of street width. Figure 5 shows the proposed roadway
7 section.

8 **Harrington Avenue NE**

9 Three segments of Green Connections are proposed in Harrington Avenue Ne. The northern
10 segment on Harrington Avenue NE is between NE 16th Street and NE 12th Street. This
11 Green Connection corridor would be enhanced by narrowing the through-traffic lanes to
12 calm traffic, creating wide planter areas and wider sidewalks as shown in the City's
13 complete street section. The 2 10 feet of vehicle travel lanes will be centered on the street
14 right-of-way. A rain garden (12 feet wide) and the 6-foot parking with 6-foot-wide planter
15 will be generally alternating on either side of the street. An 8-foot-wide sidewalk will be on
16 the west side of Harrington adjacent to the McKnight Middle School and a 5-foot sidewalk
17 on the east. At the end of the block, rain gardens will be on both sides of the street.
18 Depending on the need for street parking, parking may be available on both sides of the
19 street at selected locations.

20 The middle segment is between NE 12th Street and Sunset Boulevard. A portion of
21 Harrington Avenue NE will be vacated, becoming an open space for Sunset Terrace, and
22 there will be no Green Connection in this portion. The last segment is the south segment,
23 between Sunset Boulevard and NE 8th Place, and on NE 9th Street between Harrington
24 Avenue NE and Index Avenue NE. The street improvements for the middle and south
25 segments would be similar to the north segment.

26 **Jefferson Avenue**

27 Jefferson Avenue NE is a residential access street, like Harrington Avenue NE. The typical
28 2-lane street section used on Harrington Avenue NE will be used on Jefferson Avenue NE as
29 well. It will have two 10-foot travel lanes in the center, with the rain gardens either on
30 alternating sides or both sides of the street.

31 **Collector Arterials**

32 NE 12th Street and Edmonds Avenue NE is classified as collector arterial in the City of
33 Renton Complete Street Ordinance. The required width for a collector arterial includes a 83-
34 foot right-of-way for a two-lane road and 94-foot right-of-way for a three-lane road. The
35 street section generally requires 30 feet of paved roadway for vehicle and bicycle lanes, 8
36 feet of parking, and 8-foot sidewalks and 8-foot planter strips on both sides of the street. The
37 proposed typical street section for this Green Connection would include a minimum of 30
38 feet for paved roadway, 8 feet of parking, an 8-foot planter strip on one side of the street, a
39 16-foot rain garden on the other side of the street, and 8-foot-wide sidewalks on both sides
40 of the street. Figure 6 shows the proposed two-lane, three-lane, and four-lane roadway
41 sections.

42

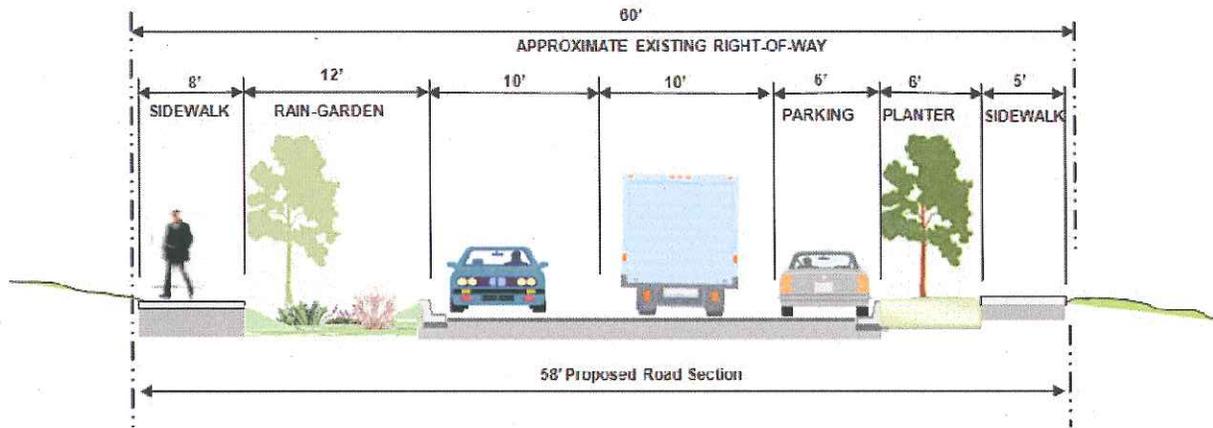
1 Figure 5. Typical Sections for Harrington and Jefferson Avenue NE

2

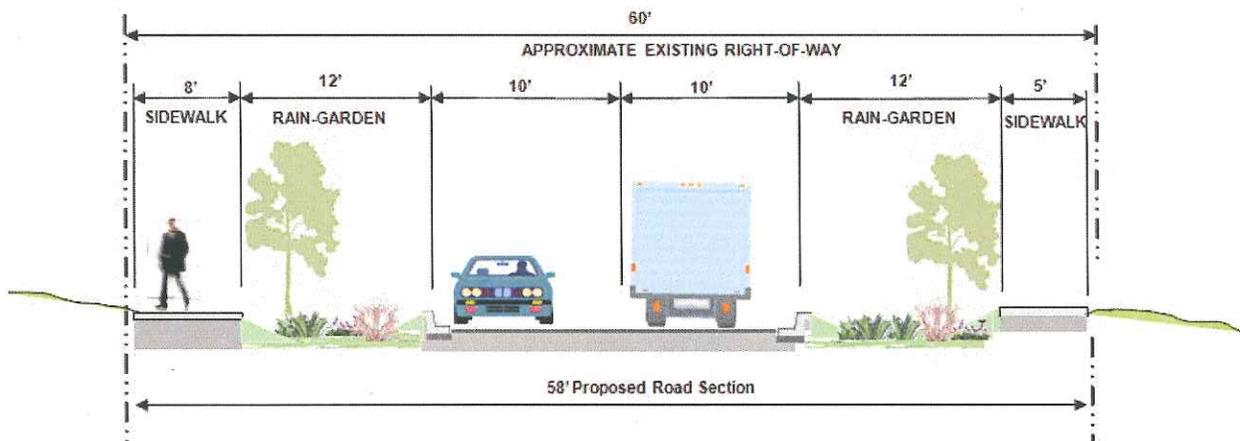
DRAFT

Figure 5: Harrington Avenue Sections

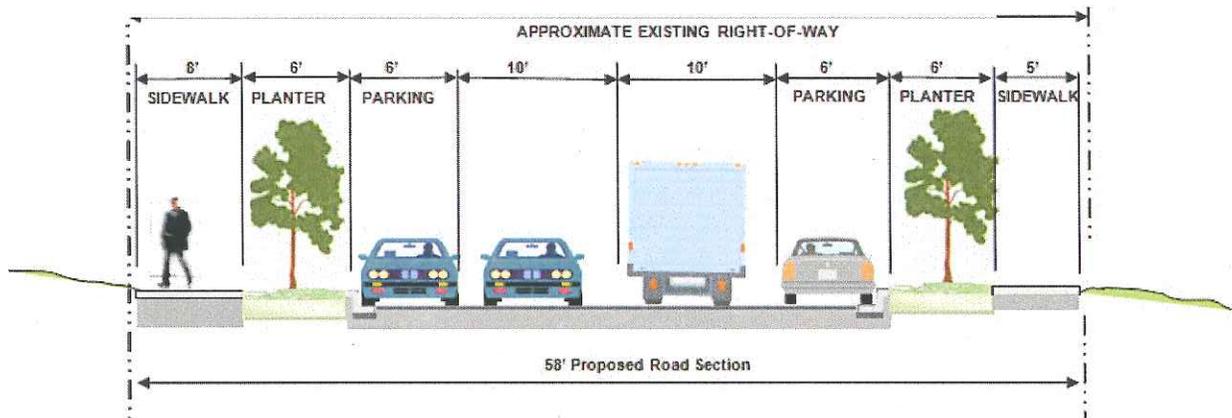
Section 1: Rain Garden on West Side of Harrington



Section 2: Rain Garden on Both Sides



Section 3: Parking on Both Sides

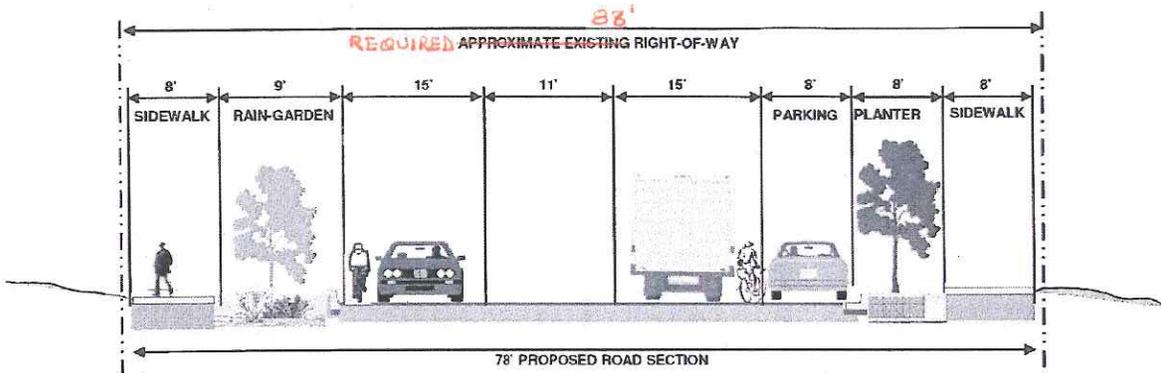


1 Figure 6. Typical Sections for Edmonds Avenue NE and NE 12th Street

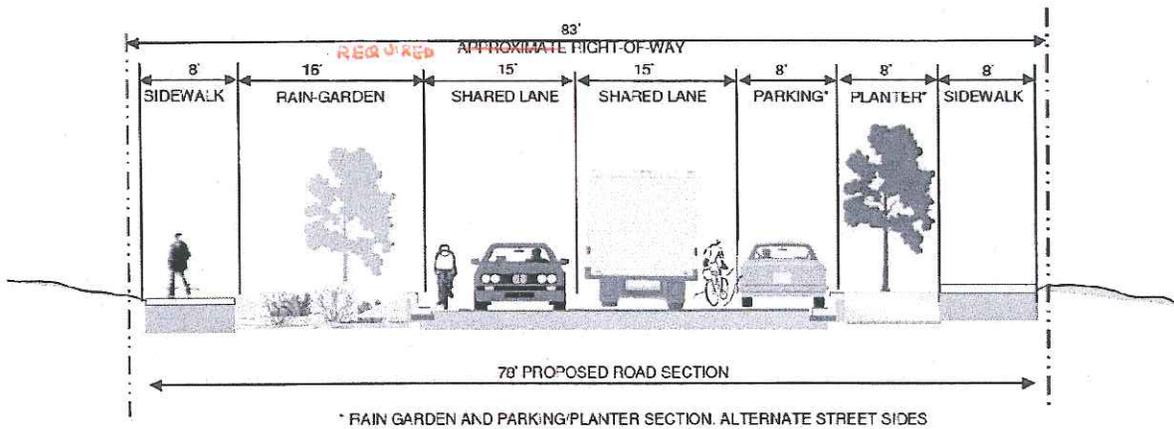
2

DRAFT

Section 1: Collector Arterial with Left Turn Lane (Edmonds Ave.)



Section 2: Collector Arterial, 2-Lane with Shared Roadway (12th St & Edmonds Ave.)



Section 3: 4-Lane Collector Arterial, No Parking (12th Street)

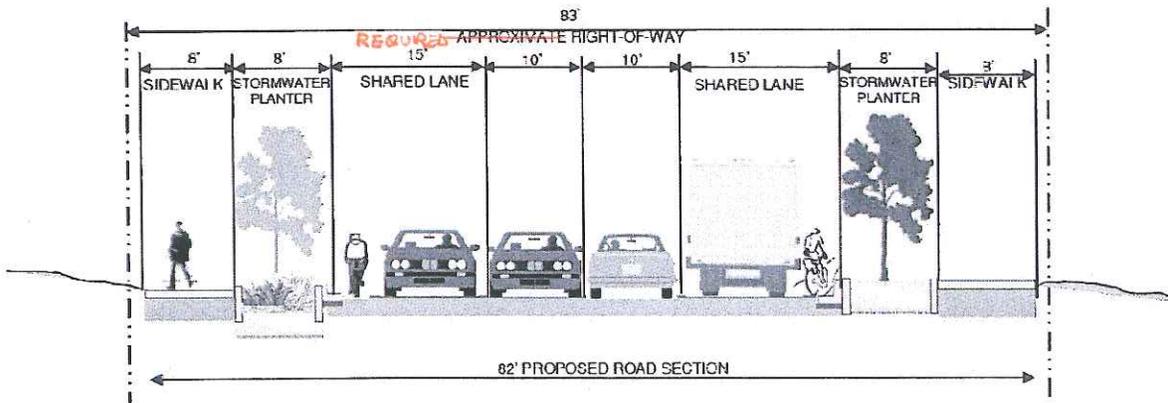


Figure 6
Edmonds and 12th Street Sections

1 The Green Connection on collector arterial includes Edmonds Avenue from 7th Avenue to
2 NE 12th Street, then continues eastward on NE 12th Street to Monroe Avenue NE. Three
3 typical sections are proposed for these two collector arterials. These sections are shown in
4 Figure 6.

5 **Other Green Connection Improvements**

6 Green alleys are proposed in two locations. One is on the parcel between Jefferson Avenue
7 and Index Avenue, north of NE 12th Street, and the other is in the alley between Harrington
8 Avenue and Glennwood Avenue, south of Sunset Boulevard. Green alleys consist of a
9 narrow conventional asphalt driving aisle with adjacent permeable pavement shoulders for
10 delineating areas for pedestrians and infiltrating stormwater.

11 Pervious sidewalk is proposed between Index Avenue and NE 16th Street, connecting the
12 Index Avenue neighborhood to the Hillcrest neighborhood.

13 **Sunset Terrace Sub-Regional Facility**

14 Sunset Terrace is located between Sunset Boulevard (SR 900), Edmonds Ave, and NE 12th
15 Street. It is currently a multi-family and retail commercial use area. Under the Preferred
16 Alternative in the Planned Action Final Environmental Impact Statement, the Sunset Terrace
17 public housing community would be redeveloped into a mixed-use, mixed-income
18 residential and commercial space with public amenities. An open space/park would be
19 centered in this redevelopment, which has been identified as a potential location for a sub-
20 regional stormwater facility. To maximize the open space area, most of this sub-regional
21 facility will be underground. It is proposed to be located at the northwest corner of the open
22 space, which allows public usage of most of the park space and allows maintenance access
23 from NE 10th Street.

24 The Sunset Community Investment Strategy identified three additional potential locations
25 for sub-regional stormwater facilities in the John's Creek Basin: at Hillcrest Terrace, on a
26 vacant lot north of Sunset Park, and in Highland Park. Through analysis of the potential
27 land use changes and redevelopment under the Preferred Alternative of the Planned Action
28 Final EIS, it was determined that up to 2.6 acres of the 5.7 acres of additional effective
29 impervious surface area could be created at full build-out conditions. It was determined that
30 a single facility could meet the flow control needs of this new impervious area. The
31 construction of the sub-regional facility can be part of the redevelopment and optimize the
32 construction cost. This facility can provide flow control protection and water quality
33 treatment in the basin in advance of the rest of the redevelopment.

34 A sub-regional facility will provide stormwater infiltration as practical to control the runoff
35 volume and reduce potential pollutants. Pre-treatment will be provided prior to infiltration
36 via rain gardens. Stormwater runoff volume that cannot be infiltrated will be detained in an
37 underground vault and will be released matching existing flow conditions.

38 **Soil**

39 The soil at the proposed sub-regional facility site is at the boundary of glacial till and
40 advance outwash soil. Further soil exploration is needed for the final design of the facility to

1 determine the soil properties onsite. The sub-regional facility will be sized using low
2 infiltration rates typical of till soil conditions.

3 **Tributary and Land Cover**

4 The tributary area draining to this facility could be from Sunset Terrace, Sunset Boulevard
5 from 10th Street to Monroe Avenue, Glennwood Avenue, and Sunset Lane or some private
6 parcels along Sunset Lane. To maximize the water quality treatment benefit of pretreatment
7 and infiltration, it is preferable to convey stormwater runoff from public roadways (e.g.,
8 Sunset Boulevard), which has the highest pollutant loading. The actual contributing area
9 will be determined based on the redevelopment of NE 10th Street and Sunset Boulevard in
10 the future.

11 **Facility Design**

12 The facility is preliminarily sized to provide flow control for the expected 2.6 acres of
13 increase in impervious surface area related to the redevelopment. Table 1 summarizes the
14 targeted design level for flow control for the subregional facility and Green Connections
15 projects. The stormwater runoff from Sunset Boulevard will drain to NE 10th Street, then
16 flow to a series of rain gardens with a total bottom area of 3,100 square feet on the north side
17 of the proposed Sunset Terrace Park. The rain gardens would provide pretreatment for the
18 water flowing through the bioretention soil and vegetation. Perforated drains pipes beneath
19 the rain garden would collect treated runoff and distribute the water to an infiltration
20 gallery south of the rain garden. It would have a bottom area of 12,500 square feet to
21 increase the available area for infiltration into the native soil. Flows that exceed the
22 infiltration capacity of the rain garden and infiltration gallery would overflow into a
23 conventional storm drain system, and into an underground detention vault west of the
24 infiltration gallery. The detention vault is preliminarily sized to have an active storage
25 volume of 0.38 acre-feet. The vault would control the release rate of the water, matching the
26 peak flow rate for the existing conditions. Figure 7 shows the conceptual layout of the sub-
27 regional facility and Appendix A shows the summary of analysis of the expected new
28 effective impervious area.

29 Upon further investigation of the native soil infiltration capacity, design modifications could
30 include either increasing the size of the detention vault and eliminating the infiltration
31 gallery (if infiltration is largely infeasible) or decreasing the size of the detention vault (if the
32 infiltration rate is greater than the preliminary sizing assumption of 0.25 inch/hour).

33 The intent of the subsurface infiltration gallery is to preserve open space for active space
34 and recreation. The rain garden is proposed to be located in the northwest corner of the
35 open space to provide a landscaped buffer between the open space and the street. Figure 7
36 shows the conceptual layout of the facility. The stormwater runoff could be conveyed from
37 storm drains on Sunset Lane or S 10th Street. The discharge from the detention vault will
38 connect to an existing storm drain on Sunset Boulevard at Harrington Avenue S by a new
39 storm drain under the vacated Harrington Avenue.

40

TABLE 1
Targeted Level of Flow Control Mitigation by Public Infrastructure Projects

	Title	Targeted Flow Reduction of Flow Control BMPs or Facility	Net Effective Impervious Area Reduction (ac)
1	Sunset Terrace Regional Facility	100%	2.6
2	Harrington Avenue NE Green Connection	30%	0.6
3	Jefferson Avenue NE Green Connection	30%	0.5
4	Alley Green Connections (Harrington, Jefferson Alleys)	50%	0.5
5	Collector Arterial Green Connection (Edmonds Avenue NE and NE 12 th Street)	20%	1.5
	Total		5.7

Note: Net effective impervious area reduction includes new/reduced impervious area to construct proposed section (e.g., new sidewalks) and effective performance of flow control BMPs within the Green Connection project.

1

2 **Conveyance Improvements**

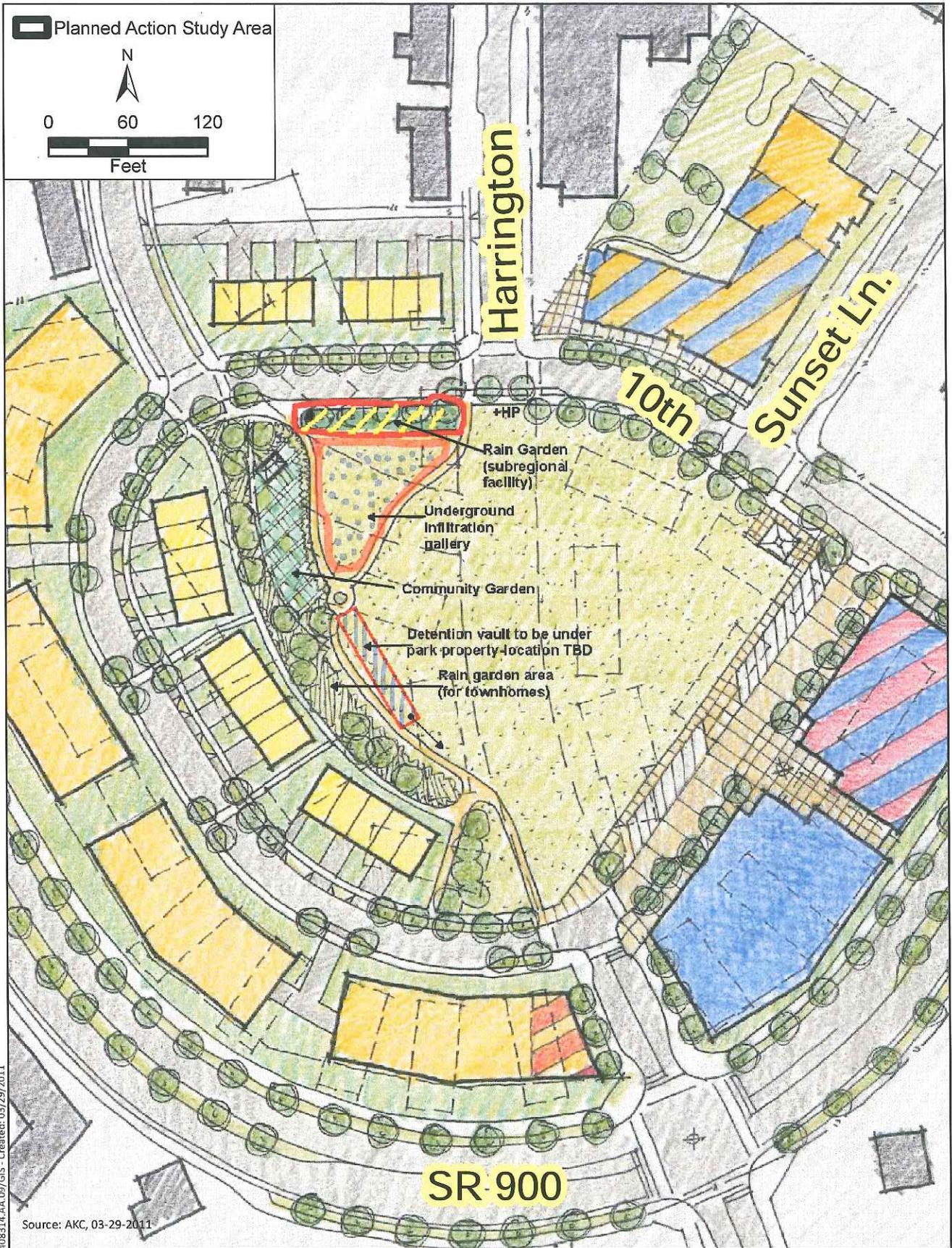
3 The future development is expected to increase effective impervious surface area. A
 4 schematic storm drain network model was developed to estimate the design peak flow for
 5 planning purposes. This model uses Santa Barbara Unit Hydrograph methodology with
 6 Type 1A storm rainfall distribution using StormShed2G computing software. Seven
 7 conveyance system improvements are proposed. The conveyance improvements are shown
 8 in Figure 8 and are classified based on the condition of the existing storm drain system and
 9 the concurrence with other transportation improvements below. The peak flow rate
 10 summary of the sub-tributary area is included in Appendix B.

11 **New Storm Drains with Green Connections**

12 Harrington Avenue NE and Jefferson Avenue NE currently do not have a storm drain
 13 system. With the street improvements for the proposed Green Connections, a new storm
 14 drain will be required. The conveyance system improvements in Harrington Avenue NE are
 15 separated to match the same segments for the Green Connection street improvements. It is
 16 assumed that the stormwater storm drain conveyance improvements needed with the street
 17 improvements would occur concurrently with the proposed Green Connections
 18 improvements to decrease costs.

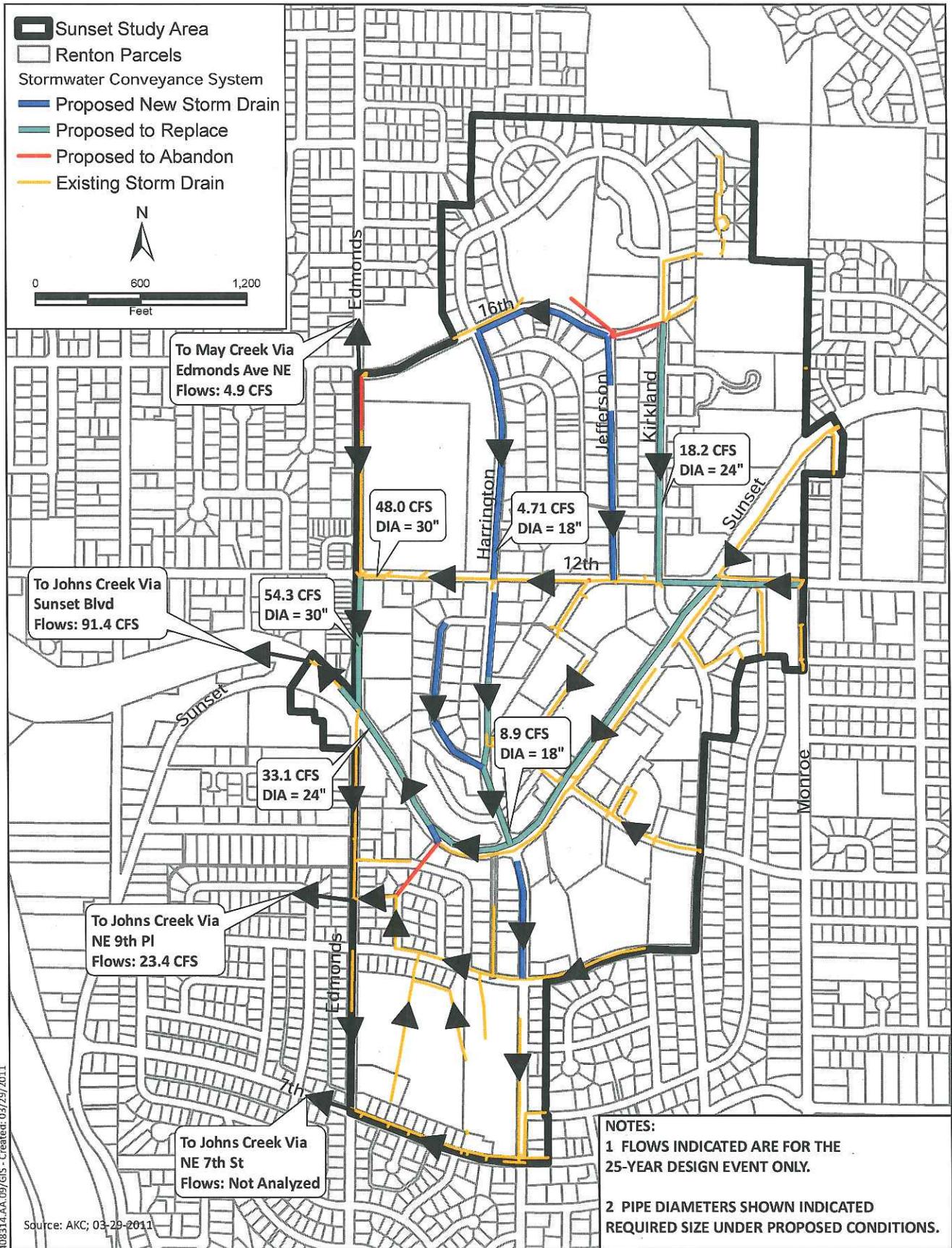
1 Figure 7. Sub-Regional Flow Control Facility

DRAFT



1 Figure 8. Proposed Stormwater Drainage Conveyance System

DRAFT



408314.AA.09/GIS - Created: 03/29/2011

Source: AKC; 03-29-2011



Figure 8
 STORMWATER DRAINAGE CONVEYANCE SYSTEM
 City of Renton Sunset Area Master Drainage Plan

1 **Replace Storm Drains with Green Connections**

2 The Edmonds Avenue NE and NE 12th Street storm drain systems are undersized for both
3 existing and future redevelopment conditions. The proposed conveyance system
4 improvements are separated to match the segments for Green Connections. It is assumed
5 that these storm drain conveyance improvements needed for the street improvements
6 would occur concurrently with the proposed the ~~that these conveyance improvements~~
7 would occur concurrently with the proposed the Green Connections improvements to
8 decrease costs.

9 **Replace Existing Storm Drain without Street Improvement**

10 The existing storm drain system of Kirkland Avenue NE is undersized for existing and
11 future development conditions. No Green Connections or street improvements are
12 proposed for Kirkland Avenue NE, and therefore these improvements are assumed to occur
13 independently.

14 **New Storm Drain without Street Improvement**

15 Glennwood Avenue NE currently has no conveyance system and will require a new storm
16 drain system to serve as a connection for future redeveloped properties. No Green
17 Connections or street improvements are proposed for Glenwood Avenue NE, and therefore
18 these improvements are assumed to occur independently.

19 **Replace Existing Storm Drain with Street Improvement**

20 Sunset Boulevard is a major east-west arterial connecting the Sunset Terrace neighborhood,
21 the Renton Highland area, and Interstate I-405. As part of redevelopment plan for Sunset
22 Terrace, improvements on Sunset Boulevard are proposed to provide the Complete Street
23 section requirements, including bicycle lanes, planter strips, and sidewalks.

24 The current GIS map shows that a portion of the eastbound Sunset Boulevard storm drain
25 system will leave the street right-of-way and go underneath several private properties near
26 NE 9th Street and Ferndale Circle NE. Then this system will continue west under NE 9th
27 Place down to the valley. With the improvements on Sunset Boulevard, it is preferable to
28 reroute these conveyance system back and remain along the Sunset Boulevard. A field
29 investigation is needed to confirm the location and routing of this storm drain. Further
30 analysis is needed to verify the capacity of the storm drain downstream of the study area.

31 City of Renton staff has indicated that the storm drain system at NE 9th Place may have
32 capacity issues further downstream. Further engineering analysis is needed to determine
33 whether to continue to route the stormwater runoff from Sunset Boulevard to this storm
34 drain system.

5 Project Implementation

Consistent with existing and proposed goals and policies, two priority levels for surface water improvements have been identified in order to prioritize projects presented in this plan. Conceptual project solutions were developed for other problems based on the Sunset Community Investment Strategy (City of Renton 2009) and other information provided by the City. The development of a conceptual project solution began with a review of the study area to determine if property is available for a detention facility and the need to upsize the existing pipe systems or the need to add a new pipe system where there is no existing system. Pipe capacity was analyzed with a schematic hydrological and hydraulic model using Santa Barber Unit Hydrograph method and hydraulic grade line analysis.

Project implementation requires future engineering analysis, soil exploration, and engineering design to confirm all assumptions and design information. For the conveyance system, the design will provide protection at the level of a 25-year storm. The flow control facilities will maximize infiltration where feasible and control release rates to match the 2-, 10-, and 100-year runoff rates for existing pre-development conditions.

Table 2 and Table 3 show the projects that are categorized for priority level 1 and level 2. The implementation of each project depends on the availability of City funding, the possible developer contribution, and the pace and scale of redevelopment happening in this area in the future.

TABLE 2
Priority Level 1 Projects and Costs

	Title	Description	Opinion of Cost
1	Sunset Terrace Regional Facility	Sunset Terrace Regional Facilities including bioretention swale, infiltration gallery, and detention vault	\$722,700.00
2a ^a	Harrington Avenue NE Green Connection - Segment 1	Segment 1 from 16th Street to 12th Street. Construct rain gardens on the sides of the street.	\$602,250.00
2b ^a	Harrington Avenue NE Green Connection - Segment 2	Segment 2 from NE 12th Street to NE 10th Street. Construct rain gardens on the sides of the street.	\$328,500.00
2c ^a	Harrington Avenue NE Green Connection - Segment 3	Segment 3 from Sunset Blvd. to NE 9th Street. Construct rain garden on the sides of the street.	\$459,900.00
Total			\$2,113,350.00

Note: The cost represents the construction cost in March 2011 dollars.
^a Cost only includes the low impact development features; the storm drain conveyance cost is part of the street improvements.

TABLE 3
Priority Level 2 Projects and Costs

	Title	Description	Opinion of Cost
3	Glennwood Avenue NE Storm Drainage Conveyance Improvements	Construct new storm drainage pipes.	\$328,500.00
4 ^a	NE 12th Street Green Connection	From Jefferson Avenue NE to Edmunds Avenue NE. Construct rain garden on the sides of the street.	\$646,050.00
5a ^a	Edmunds Avenue NE Green Connection	From NE 12th Street to NE 10th Place. Construct rain garden on the sides of the Street.	\$372,300.00
5b ^a	Edmunds Avenue NE Green Connection	From NE 10th Place to NE 6th Place. Construct rain garden on the sides of the Street.	\$755,550.00
6	Kirkland Avenue NE Storm Drainage Conveyance Improvements	Upsize existing storm drainage pipes	\$602,250.00
7	Jefferson Avenue NE Green Connection	From NE 16th Street to NE 12th Street. Construct rain garden on the sides of the Street.	\$328,250.00
Total			\$3,032,900.00

Note: The cost represents the construction cost in March 2011 dollars.

^a Cost only include the low impact development features; the storm drain conveyance cost is part of the street improvements.

1 Project Planning Cost Estimate

2 A conceptual estimate of construction cost has been prepared for these new projects. These
3 costs are shown in Table 1 for Priority Level 1 and Table 2 for Priority Level 2. The cost tables
4 in this chapter present the construction cost estimates in March 2011 dollars. The cost for the
5 Green Connection is only included the LID features. The cost for the conveyance system is
6 part of the roadway improvement cost, when one is proposed. However, if street
7 improvements are not proposed, the new or replaced conveyance cost would be included in
8 the estimates. The cost estimates do not include design engineering and construction plans
9 development, the purchase of right-of-way or construction easement, City administration,
10 and construction management. The breakdown of the summary of cost is included in
11 Appendix C.

12 These improvements would be needed within the 2011-2030 time frame. The project costs
13 and funding sources for these projects are identified in the Sunset Area Community Capital
14 Facilities Plan found within the City's Capital Facilities Element.

15 Funding for the surface water master plan improvements will come through a variety of
16 sources and means. Public funding will be sought through grant programs, dedication of
17 funds through City Council or partial funding through available utility fees. Where public
18 funding cannot be secured, the remaining funding will be provided by future development

- 1 through a combination of frontage improvements and fee assessments under various
- 2 structures depending on applicable city codes, implementation schedule and rate of
- 3 redevelopment such as collection of impact fees, fee in lieu of mitigation and special
- 4 assessment districts.

DRAFT

1 6 References

- 2 City of Renton. 2010a. *Amendments to King County Surface Water Design Manual*. Available at:
3 [http://rentonwa.gov/uploadedFiles/Government/PW/UTILITIES/Surface_Water/City%](http://rentonwa.gov/uploadedFiles/Government/PW/UTILITIES/Surface_Water/City%20Amendments%20to%20the%20King%20County%20Surface%20Water%20Design%20Manual.pdf)
4 [20Amendments%20to%20the%20King%20County%20Surface%20Water%20Design%20Man](http://rentonwa.gov/uploadedFiles/Government/PW/UTILITIES/Surface_Water/City%20Amendments%20to%20the%20King%20County%20Surface%20Water%20Design%20Manual.pdf)
5 [ual.pdf](http://rentonwa.gov/uploadedFiles/Government/PW/UTILITIES/Surface_Water/City%20Amendments%20to%20the%20King%20County%20Surface%20Water%20Design%20Manual.pdf). February 2010.
- 6 City of Renton. 2010b. *Draft Sunset Area Community Planned Action NEPA/SEPA*
7 *Environmental Impact Statement*. Prepared for City of Renton and Renton Housing Authority.
8 Available at:
9 [http://rentonwa.gov/uploadedFiles/Business/CED/planning/2010/Vol1_SunsetArea-](http://rentonwa.gov/uploadedFiles/Business/CED/planning/2010/Vol1_SunsetArea-PA_DraftEIS.pdf)
10 [PA_DraftEIS.pdf](http://rentonwa.gov/uploadedFiles/Business/CED/planning/2010/Vol1_SunsetArea-PA_DraftEIS.pdf). December 2010.
- 11 City of Renton. 2009. *Sunset Community Investment Strategy*. Available at:
12 [http://rentonwa.gov/uploadedFiles/Business/EDNSP/planning/091123-SunsetCIG-](http://rentonwa.gov/uploadedFiles/Business/EDNSP/planning/091123-SunsetCIG-FinalReport-Adopted-lowres.pdf)
13 [FinalReport-Adopted-lowres.pdf](http://rentonwa.gov/uploadedFiles/Business/EDNSP/planning/091123-SunsetCIG-FinalReport-Adopted-lowres.pdf). Adopted November 23, 2009.
- 14 City of Renton and King County. 2001. *May Creek Basin Action Plan*. April 2001.
- 15 Foster Wheeler Environmental Corporation. 1995. *May Creek Current and Future Conditions*
16 *Report*. August. Washington State Department of Ecology. 2009.
- 17 King County. 2009. *King County, Washington, Surface Water Design Manual*. King County
18 Department of Natural Resources and Parks. Available at:
19 [http://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/surface-water-](http://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/surface-water-design-manual/SWDM-2009.pdf)
20 [design-manual/SWDM-2009.pdf](http://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/surface-water-design-manual/SWDM-2009.pdf). January 9, 2009.
- 21 Washington Department of Ecology. 2005. *Stormwater Management Manual for Western*
22 *Washington*. Available at:
23 <http://www.ecy.wa.gov/programs/wq/stormwater/manual.html>. April 2005.

Appendix A – Summary of Expected New Effective Impervious Surface Area

Table A-1. Existing Land Cover Summary

	Total Area (acres)	Total Impervious Area (acres)	Total Pervious Area (acres)	Total PGIS ^a (acres)	Total Untreated PGIS ^a (acres)	Effective Impervious
Planned Action Study Area	255.40	161.17	94.23	92.863 .31	88.1056	161.17
Potential Sunset Terrace Redevelopment Subarea ^b	12.64	4.58	8.06	1.77	1.77	4.58
Total	268.46	165.90	102.56	95.14	90.39	165.90

^aPGIS = pollution-generating impervious area

^bThe Sunset Terrace Redevelopment Subarea is slightly smaller than the subarea in the DEIS due to the adjusted boundary at Sunset Boulevard and Harrington Ave.

Table A-2. Land Cover Summary—Preferred Alternative

	Total Area (acres)	Total Impervious Area (acres)	Total Pervious Area (acres)	Total PGIS (acres)	Total Untreated PGIS (acres)	Effective Impervious (acres)
Planned Action Study Area	255.40	174.40	81.00	76.44	46.26	165.41
Potential Sunset Terrace Redevelopment Subarea ^a	12.64	6.1	6.54	1.7	0	3.66

^aThe area is reduced by 0.42 acre due to the adjusted boundary from Sunset Boulevard and Harrington Ave.

Table A-3. Change in Land Cover Summary—Preferred Alternative

Project Area	Net Change in Impervious Area (acres)	Net Change in PGIS Area (acres)	Net Change in Untreated PGIS (acres)	Net Change in Effective Impervious Area (acres) ^a
Planned Action Study Area	13.23 (8.215%)	-16.41 (-17.786%)	-41.84 (-47.5%)	4.24 (2.6%) ^b
Potential Sunset Terrace Redevelopment Subarea	1.337 (74.290%)	-0.13 (-7.1%)	-1.7783 (-100%)	-1.047 (-22.6%) ^b

Note: All areas are expressed relative to existing conditions. See Section 3.3 of the Draft Environmental Impact Statement (Table 3.3-1) for a summary of existing conditions.

^aImpervious area not directly connected to a stream or drainage system.

^bThe net change in effective impervious area within the Johns Creek Basin, excluding mitigation through regional detention, is equal to 2.63 acres. Within the May Creek Basin, the net change is equal to 0.54 acre.

Appendix B – Summary of Peak Flow Rates for the Study Area

Table B-1. The Existing Conditions Area Breakdown for the Sub-Tributary Area

Sub-Basin Area	Existing Condition									
	Impervious				Pervious Lawn			Forest		
	Road (ac)	Roof (outwash) (ac)	Roof (till) (ac)	Total Impervious (ac)	Outwash (ac)	Till (ac)	Forest (ac)	Total Area (ac)		
1	6.4	7.31	16.95	30.66	6.63	6.39	0.80	44.48		
2	5.5	2.46	-	7.96	1.96	-	-	9.92		
3	1.91	0.34	0.65	2.90	6.51	12.31	-	21.72		
4	4.92	2.12	4.25	11.29	2.88	4.25	-	18.42		
5	0.92	0	1.71	2.63	5.41	1.25	-	9.29		
6	3.77	0	11.67	15.44	-	4.46	-	19.90		
7	2.47	0	9.22	11.69	-	5.21	-	16.90		
9	8.79	0	17.88	26.67	0.02	6.03	-	32.72		
10	1.3969	3.7514.58	14.04	30.01	45.4419.77	2.91	-	52.69		
11	5.58	4.78	0.92	11.28	1.37	0.55	-	13.20		
12	2.15	10.83	0.39	13.37	4.66	-	-	18.03		
13	12.30	-	4.3	16.60	-	-	-	16.60		
Total	56.1005	42.42	81.98	180.5005	49.206	43.34	0.80	273.85		

Table B-2. The Proposed Conditions Area Breakdown for the Sub-Tributary Area

Sub-Basin Area	Preferred Proposed Condition										Total Area (ac)
	Impervious					Pervious Lawn					
	Road (ac)	Roof (outwash) (ac)	Roof (till) (ac)	Total Impervious (ac)	HSGB (ac)	HSGC (ac)	Forest (ac)	Total Area (ac)			
1	6.40	7.85	17.36	31.61	6.09	5.98	0.80	44.48			
2	5.50	2.74	-	8.24	1.67	-	-	9.91			
3	1.91	0.34	0.65	2.90	6.51	12.305	-	21.72			
4	4.92	2.86	5.1	12.88	2.14	3.4	-	18.42			
5	0.92	3.55	2.37	6.84	1.86	0.59	-	9.29			
6	3.77	0.00	13.9	17.67	-	2.23	-	19.90			
7	2.47	0.00	9.45	11.92	-	4.98	-	16.90			
9	8.79	0.00	18.24	27.03	0.02	5.67	-	32.72			
10.0	1.394	15.4	13.7	30.4	49.018.99	3.263	-	52.697			
11	5.58	5.52	1.31	12.41	0.63	0.16	-	13.20			
12	2.14	13.17	0.37	15.68	2.32	0.03	-	18.03			
13	12.30	-	4.3	16.60				16.60			
Total	56.09	51.39	86.74	194.22	40.23	38.60	0.80	273.85			

The stormwater runoff peak flow rate is calculated using Santa Barbara Unit Hydrograph (SBUH) (TR55) methodology and it was computed by the Stormshed2G program.

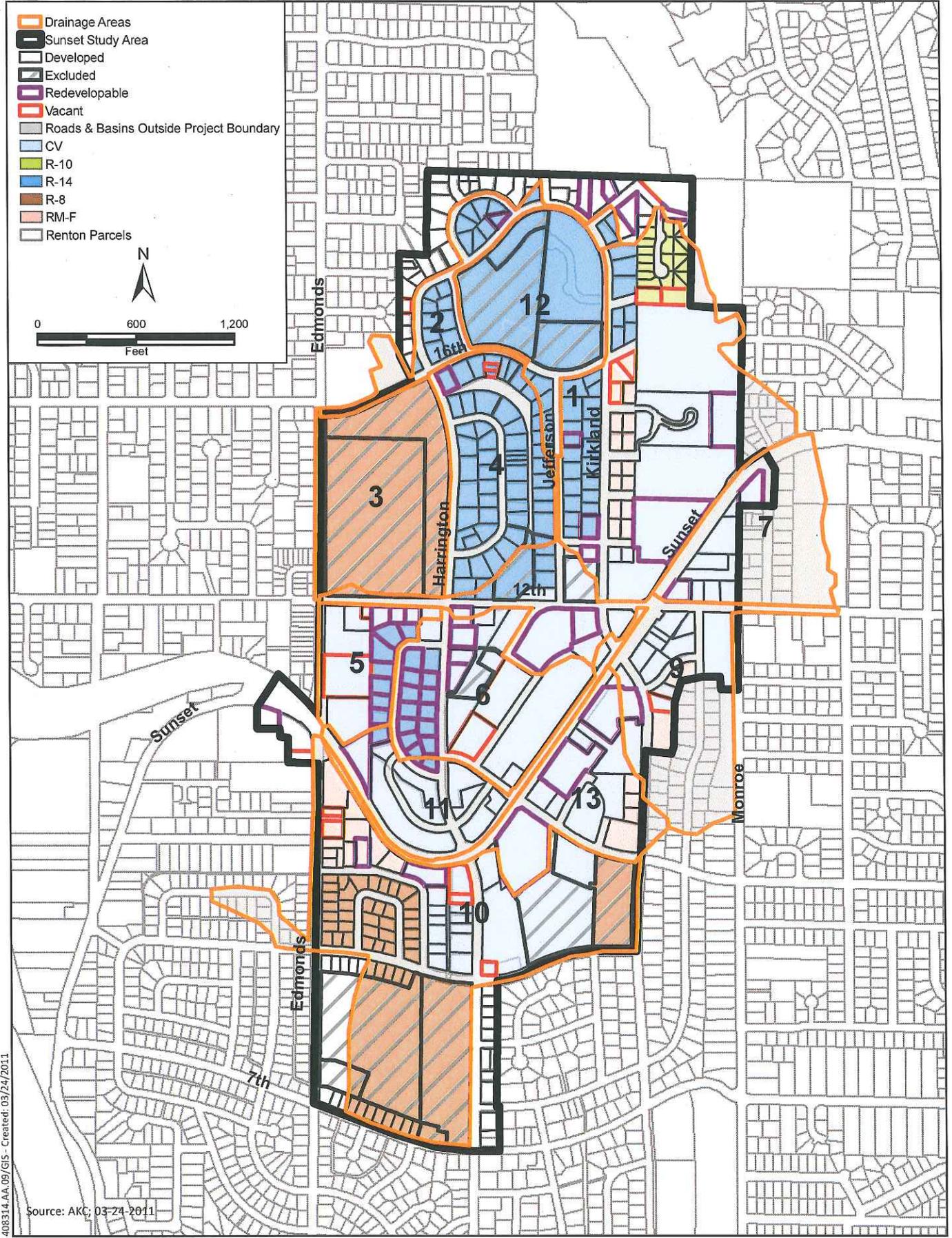
Table B-3. Existing Conditions Stormwater Runoff Peak Flow Rate

Sub-Basin Area	Stormwater Runoff Peak Flow Rate			
	Design Event (SBUH)			
	2-year	10-year	25-year	100-year
1	8.4	14.7	18.1	21.5
2	2.3	4.0	4.9	5.9
3	2.2	4.9	6.4	7.9
4	3.1	5.5	6.8	8.1
5	1.5	3.1	3.9	4.8
6	4.4	7.1	8.5	9.9
7	4.2	6.9	8.3	9.7
9	9.5	15.2	18.1	21.0
10	15.9 14.0	24.2 28.8	35.7 29.6	42.8 35.1
11	3.6	6.2	7.5	8.9
12	4.1	6.7	8.1	9.4
13	4.5 6.0	3.9 3.5	4.7 10.9	6.0 12.5

Table B-4. Proposed Conditions Stormwater Runoff Peak Flow Rate

Sub-Basin Area	Stormwater Runoff Peak Flow Rate			
	Design Event (SBUH)			
	2-year	10-year	25-year	100-year
1	8.4	14.8	18.2	21.6
2	2.3	4.0	4.9	5.9
3	2.2	4.9	6.4	7.9
4	3.2	5.6	6.9	8.2
5	1.7	3.3	4.1	5.0
6	4.8	7.5	8.9	10.3
7	4.2	6.9	8.3	9.7
9	9.6	15.3	18.2	21.1
10	9.0 14.2	18.3 24.4	23.4 29.9	28.7 35.4
11	2.5	4.4	5.4	6.4
12	1.5 4.7	3.5 7.4	4.7 8.8	5.6 10.2
13	6.0	9.3	10.9	12.5

Figure 1. Storm Drainage Basins



408314.AA.09/GIS - Created: 03/24/2011

Source: AKC, 03-24-2011



Figure 01
STORMWATER DRAINAGE BASINS
 City of Renton Sunset Area Master Drainage Plan

Appendix C – Opinion of Cost
