

# **ORANGE COUNTY STORMWATER PROGRAM**

## **APPENDIX E7**

### **IDENTIFICATION OF RETROFITTING OPPORTUNITIES – EXISTING CHANNEL ASSESSMENT**

**November 2003**

A cooperative project between the County of Orange, Orange County Flood Control District and the incorporated cities of Orange County

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## **1 INTRODUCTION**

### **1.1 Background**

In response to EPA's promulgation of the Clean Water Act storm water permit regulations in 1990, the County of Orange (singularly referred to as the Principal Permittee), the Orange County Flood Control District and the incorporated cities of Orange County (all three collectively referred to as Permittees) have obtained, renewed and complied with several area-wide NPDES Stormwater Permits from the Santa Ana and San Diego Regional Water Quality Control Boards (subsequently referred to as the Santa Ana Board, the San Diego Board or collectively as the Regional Boards).

Each permit renewal has required the Permittees to implement ongoing stormwater quality management programs and develop additional programs in order to control pollutants in stormwater discharges. Along with other new programs, the most recent Third Term Permit issued by the Santa Ana Board required the Permittees within the Santa Ana Region to evaluate opportunities for reconfiguring flood control facilities to provide pollution control or enhance beneficial uses.

The specific water pollutant control program elements of the Orange County NPDES Stormwater Program are documented in the Drainage Area Management Plan (DAMP), which serves as the Permittees' primary policy and implementation document for compliance with the NPDES Stormwater permit. The main objective of the DAMP is to fulfill the commitment of the Permittees to present a plan that satisfies NPDES permit requirements and to evaluate the impacts of urban stormwater quality on beneficial uses.

As a result of the Third Term Permit requirements, the Permittees prepared an updated 2003 DAMP which includes enhanced existing programs and new programs that serve as the foundation for a series of model programs, local implementation plans, and watershed implementation plans. The DAMP incorporates a water quality planning process to systematically evaluate the impacts of urban stormwater quality on beneficial uses to determine actual impairments and potential corrective actions. Consistent with the Third Term Santa Ana Permit requirements, the DAMP water quality planning process includes an assessment of existing flood control channels within the Santa Ana Region for their potential for modification to provide water quality benefits and enhance beneficial uses.

## **1.2 Purpose**

The purpose of the flood control channel assessment is to identify locations within the flood control channel system that, based on a qualitative assessment, appear to have potential for modification to provide a water quality (pollution control) function or enhance beneficial uses. However, before any final selection of potential retrofit locations can occur, a quantitative engineering study must be conducted to ensure that the potential reconfiguration for water quality improvement does not adversely affect the primary flood control/drainage function of the facility. Also, project design and costs must be developed, environmental documents, right-of-way issues, and other permits must be addressed, and funding must be secured before a potential retrofit for any particular location can be implemented. Therefore, this assessment of existing flood control channels is not itself an actual implementation program or plan, but rather a first step in identifying opportunities for channel modification that will be investigated further and refined.

## **1.3 Approach**

The approach for the assessment of existing channels consisted of identifying major channel segments throughout the countywide flood control channel system, and then assessing, qualitatively, the potential to modify these segments within existing right-of-way constraints to provide for enhanced water quality benefit. Information on existing in-channel features (e.g. trash booms) and potential proposed or planned in-channel projects was compiled and incorporated in the assessment.

In identifying channel segments, major channels were defined as those with a three character alpha-numeric designation (e.g. A01), and were based on drainage system maps maintained by the Orange County Flood Control District (DISTRICT). A discrete channel segment was defined as a segment that remained relatively homogeneous, so that the channel cross section, slope, and discharge (no large laterals entering the segment) would all be relatively constant. Only channel segments that the DISTRICT owned or had easements for were included in this assessment, as implementing retrofit projects in privately-owned channels would be less feasible than implementing projects in channels already under public ownership. As for easements, some may contain language restricting channel use solely to flood control purposes, which would preclude retrofit for water quality or other non-flood control related purposes. To the extent possible, channel segments were also defined by major landmarks such as road crossings to facilitate their identification.

The removal of existing channel lining (e.g. concrete or riprap) to return the channel to an unlined condition requires significant engineering analysis and is highly unlikely due to physical land and economic constraints. Further, the removal of channel lining would reduce the conveyance capacity of the channel, which is generally impractical. Therefore, the focus of the assessment was primarily on unlined (earthen) channel segments, although existing lined channel segments were considered for trash/debris removal devices in segments where a maintenance access is available. Unlined channels were assessed for the following potential project opportunities:

1. Create planted/wetland areas. Channel segments were evaluated for the potential to increase habitat value and receiving water quality by creating a planted/wetland area. Since introducing a vegetated lining on an unlined channel may reduce flood conveyance capacity by loss of channel depth or increased channel roughness, the potential to create a wetland/planted area was limited to those channel segments where there appeared to be sufficient right-of-way to accommodate an increased channel width.
2. Reduce channel erosion. Earthen channel segments were assessed for the potential to reduce erosion and thus discharges of sediment to receiving waters where: 1) observed erosion would potentially threaten nearby infrastructure (e.g. roads, buildings, etc.); 2) observed erosion would impact habitat resources; 3) erosion was observed in channels listed as impaired for sediment, siltation or turbidity; or 4) erosion was observed in channels included in an area subject to a Total Maximum Daily Load (TMDL) for sediment. Potential modifications and stabilization measures for areas include the use of an alternative lining such as riprap or articulated concrete mat.
3. Install trash booms. Trash booms are in place at several channel locations in the County. Additional potential locations for installing of trash booms were identified by considering locations of existing channel maintenance ramps and the proximity of upstream areas with primarily commercial/industrial land uses.

Unlined, vegetated natural channels were identified and considered, but were only included for potential reconfiguration if a problem such as bank or bed erosion was observed as discussed above. It was assumed that reconfiguring natural vegetated channels, absent any observable deficiencies, would result in fewer environmental benefits than leaving the natural channel as is.

**2 EXISTING AND PLANNED FLOOD CONTROL CHANNEL WATER QUALITY RETROFIT PROJECTS**

As part of this flood control channel assessment, both existing features for pollution reduction and proposed/planned projects to reconfigure flood control channels for pollution reduction/water quality improvement were inventoried. Existing projects do not include existing features such as natural, vegetated channels, in-channel basins, or low-flow diversions. Rather, existing features refers to “add-on” retrofit channel features for pollution control that were not constructed as part of the original facility. Therefore, for the purposes of this assessment, existing features consist of trash/debris booms that have been installed in various channels throughout the County. Planned projects are those that consist of or include a component to modify a flood control channel section to provide water quality improvement or habitat enhancement and that have been identified in a long-term improvement plan, watershed study, or grant funding request. It is important to note that planned projects that have been identified by a particular agency or watershed study are for planning and budgeting purposes only, and thus are subject to further prioritization, approval and funding availability.

**2.1 Existing Channel Retrofit Features**

Existing retrofit features consist of trash/debris booms that have been installed in flood control channels and harbors to remove floatable material as well as habitat restoration projects. Table 1 below provides summary of the trash/debris booms currently installed throughout Orange County.

**Table 1. Trash/Debris Booms within Orange County**

<b>Watershed</b>	<b>Channel</b>	<b>Location</b>
Westminster	Federal Channel	Near 22 Freeway and 405 Freeway
Westminster	East Garden Grove-Wintersberg Channel	At Farm Bridge, Pacific Coast Highway
Westminster	Bolsa Chica Channel	Upstream of Edinger
	Bolsa Chica Channel	At Seabring Ave
Talbert / Lower Santa Ana River Watershed	Greenville-Banning Channel	Upstream of Hamilton in the Greenville

<b>Watershed</b>	<b>Channel</b>	<b>Location</b>
		Banning Channel
Newport Bay	Upper Newport Bay	Near Sunset Aquatic Center
	Santa Ana-Delhi Channel	Downstream of Mesa Drive
San Diego Creek	El Modena – Irvine Channel	At confluence of Peters Canyon Channel
	Peters Canyon Channel	At confluence of El Modena – Irvine Channel
San Clemente Coastal Streams	Prima Deshecha Channel	Downstream of Avenida Vista Grande

## **2.2 Planned Projects**

Planned projects include those listed on the Orange County Flood Control District’s Seven-Year Projects Plan that include in-channel or basin improvements (Table 2). Projects listed in the Flood Control District’s Seven-Year Plan may provide an opportunity to incorporate water quality/habitat enhancement features. It is important to note that the Flood Control District’s Seven-Year Plan is for planning purposes only, and that listed projects may or may not be implemented as they are subject to further prioritization and funding availability. Dual or multi-purpose projects will have a higher likelihood for implementation. Grant funding may also accelerate implementation, otherwise a proposed project will be subject to funding availability. Projects consisting solely of pump station and culvert crossing improvements are not listed in Table 2. Planned projects also include those identified by other stakeholders (e.g. cities and/or local water districts) through watershed planning studies or in grant funding applications (Table 3).

**Table 2. Potential Retrofit Sites Within the Seven-Year Orange County Flood Control Projects Plan**

<b>Channel ID</b>	<b>Channel Name</b>	<b>Description/Location</b>
<b>Planned Projects FY 2003-2004</b>		
C01	Los Alamitos Retarding Basin	New pump station. Reconstruction of a new pump station and partially regrading of existing basin to handle 100-year peak flows.
C05	E.G.G.-Wintersburg Ch.	Haster Basin. This segment of the channel system exists as a retarding basin, which will be regraded and a new pump station will be constructed to regulate the flow.
<b>Planned Projects FY 2004-2005</b>		
A03	Fullerton Creek Ch.	Knott to Station 93+00. The existing trapezoidal concrete-lined channel (26-foot base width) will be improved as a rectangular concrete-lined channel (32-foot wide).
C02	Bolsa Chica Ch.	Retarding Basin. Construction of new basin to retard 100-year flow from Bolsa Chica channel. (Federal land and permission to build need to be obtained)

The following projects are subject to funding availability for future years and further prioritization.

<b>Planned Projects FY 2005-2006</b>		
A03	Fullerton Creek Ch.	Station 93+00 to Western Ave. The existing trapezoidal concrete-lined channel (26-foot base width) will be improved as a rectangular concrete-lined channel (32-foot wide).
C05	E.G.G.-Wintersburg Ch.	Sta. 86+50 to Springdale. The existing trapezoidal, rip-rap lined channel will be improved as a rectangular channel, soft bottom (120 feet wide) with vertical sheet pile walls.
<b>Planned Projects FY 2006-2007</b>		
B01	Carbon Creek Ch.	Western to Orange. One-half of the existing trapezoidal, rip-rap channel (5-foot bottom width, slope is 2:1, will be improved as an “L” shaped channel lined with concrete.
C04	Westminster Ch.	Hoover to Beach. The existing trapezoidal/rectangular, concrete-lined channel will be improved as a concrete lined channel.

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C05	E.G.G.-Wintersburg Ch.	Springdale to Edwards. The existing trapezoidal, rip-rap lined channel will be improved as a rectangular channel, soft bottom (120-foot wide) with vertical sheet pile walls.
F06	Peters Canyon Ch.	San Diego Cr. (F05) to Barranca. Existing rip rapped and earthen trapezoidal channel to be improved. Improvement to be designed.
L02	Trabuco Creek Ch.	300' d/s of Del Obispo to 1600' u/s. Existing 2:1 rip-rap channel to be improved. No design yet.
<b>Planned Projects FY 2007-2008</b>		
C05	E.G.G.-Wintersburg Ch.	Edwards to Goldenwest. The existing trapezoidal, rip-rap lined channel will be improved as a rectangular channel, soft bottom (120-foot wide) with vertical sheet pile walls.
C05	E.G.G.-Wintersburg Ch.	Confluence w/C06 to Beach Blvd. The existing trapezoidal, rip-rap lined channel will be improved as a concrete-lined rectangular channel (60-foot wide).
C06	Oceanview Ch.	Bushard to Brookhurst. The existing trapezoidal, rip-rap lined channel (15-foot base width) will be improved as a concrete-lined trapezoidal channel.
F06	Peters Canyon Ch.	Barranca to Warner – Phase I. Existing rip rapped and earthen trapezoidal channel to be improved. Improvement to be designed.
<b>Planned Projects FY 2008-2009</b>		
A03	Fullerton Creek Ch.	Western to Beach. Existing concrete rectangular channel to be improved. No design yet.
C05	E.G.G.-Wintersburg Ch.	Beach Blvd. To Woodruff St. The existing trapezoidal, rip-rap channel will be improved as a rectangular concrete-lined channel (60 feet wide).
F06	Peters Canyon Ch.	Barranca to Warner—Phase II. Existing rip-rap and earthen trapezoidal channel to be improved. Improvement to be designed.

**Table 3. Potential Projects Identified in Watershed Studies or Submitted Grant Applications**

<b>Watershed</b>	<b>Channel/Location</b>	<b>Description</b>
Westminster	Bolsa Chica Channel	Linear treatment system for runoff in channel using vegetated wetlands and subsurface sand filtration
San Diego Creek	San Diego Creek Channel	In-line low-flow treatment using vegetated wetlands/basins.
San Diego Creek	Santa Ana/Santa Fe Channel	In-line low-flow treatment using vegetated wetlands/basins.
San Diego Creek	Peters Canyon Channel	In-line low-flow treatment using vegetated wetlands/basins.

### **3 CHANNEL SEGMENT ASSESMENT**

The results of the flood control channel assessment are presented in Table 4 on the following pages. The channel segments listed are those where there appear to be opportunities for retrofit based on the approach discussed in Section 1.3. Potential channel retrofit locations are also shown on the map provided in Exhibit A.

**Table 4. Potential Flood Control Channel Retrofit Locations**

Map Location Number	Channel ID	Channel Name	Location	Description	Potential Retrofit Opportunity
1	A02	BREA CREEK CHANNEL	RAMP IS NEAR INTERSECTION OF CHANNEL AND RAIL ROAD	Concrete channel	Trash Boom
2	A03	FULLERTON CREEK CHANNEL	RAMP IS AT COMMONWEALTH AND CHANNEL INTERSECTION	Concrete channel	Trash Boom
3	A04	BREA CANYON	BETWEEN IMPERIAL HWY AND AROVISTA PARK	Rectangular concrete and trapezoidal riprap channel	Trash Boom
4	C03	ANAHEIM-BARBER CITY CHANNEL	RAMP IS AT CHANNEL AND SIOUX INTERSECTION	Concrete channel	Trash Boom
5	C04	WESTMINSTER CHANNEL	BETWEEN MCFADDEN AV AND GRAHAM ST	Trapezoidal earth channel	Revetment
6	C04	WESTMINISTER CHANNEL	RAMP IS AT GOLDEN WEST AND CHANNEL INTERSECTION	Concrete channel	Trash Boom
7	C06	OCEAN VIEW CHANNEL	BETWEEN MONTCLAIR AND THE CONFLUENCE AT EAST GARDEN GROVE WINTERSBURG CHANNEL	Trapezoidal riprap and earth channel	Revetment
8	D03	GREENVILLE-BANNING CHANNEL	BETWEEN CENTENNIAL RD AND WARNER AV	Trapezoidal earth channel	Revetment
9	E02	CARBON CANYON DIV CHANNEL	FROM MIRALOMA AV TO E LA PALMA AV	Trapezoidal earth channel	Revetment
10	E10	FLETCHER CHANNEL	BETWEEN PAMPAS ST AND SANTA ANA RIVER	Trapezoidal concrete and earthen channel	Revetment/Vegetated Area (upon confirmation of right-of-way limits and channel capacity)
11	F02	SANTA ANA GARDENS	FROM W EDINGER AV TO SAINT ANDREW PL	Trapezoidal earth channel	Revetment

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<b>Map Location Number</b>	<b>Channel ID</b>	<b>Channel Name</b>	<b>Location</b>	<b>Description</b>	<b>Potential Retrofit Opportunity</b>
		CHANNEL			
12	F08	LANE CHANNEL	FROM GILLETTE AVE TO ARMSTRONG AVE	Trapezoidal earth channel	Revetment
13	F08	LANE CHANNEL	FROM ARMSTRONG AVE TO TURN IN GILLETE AVE	Trapezoidal earth channel	Revetment
14	F08	LANE CHANNEL	FROM GILLETTE AVE TO JUST SOUTH OF MORSE AVE/ MCCABE WAY INTERSECTION	Trapezoidal earth channel	Revetment
15	F08	LANE CHANNEL	FROM JUST SOUTH OF MORSE AVE/MCCABE INTERSECTION TO THE CONFLUENCE AT THE SAN DIEGO CREEK	Trapezoidal earth channel	Revetment

#### **4 CONCLUSION**

The purpose of the flood control channel assessment is to identify locations within the flood control channel system that, based on a qualitative assessment, appear to have potential for modification to enhance beneficial uses or provide a water quality (pollution control) function. Based on an identification and field review of channel segment locations for flood control channels within the Santa Ana Region Permit Area of Orange County, 15 locations were identified as having the potential for reconfiguration. However, before final selection and implementation of these identified potential retrofit locations can occur, quantitative analyses must be conducted to ensure that the flood control/drainage function of the channels is not compromised, and project specific design, cost estimate, and environmental permitting/coordination work must also be conducted. For channel segments where the potential retrofit opportunity was related only to protection of adjacent infrastructure from erosion, a corrective project would be undertaken as part of the Flood Control District's maintenance program when there is an actual threat to adjacent infrastructure.

**EXHIBIT A**

**MAP OF POTENTIAL CHANNEL RETROFIT LOCATIONS**

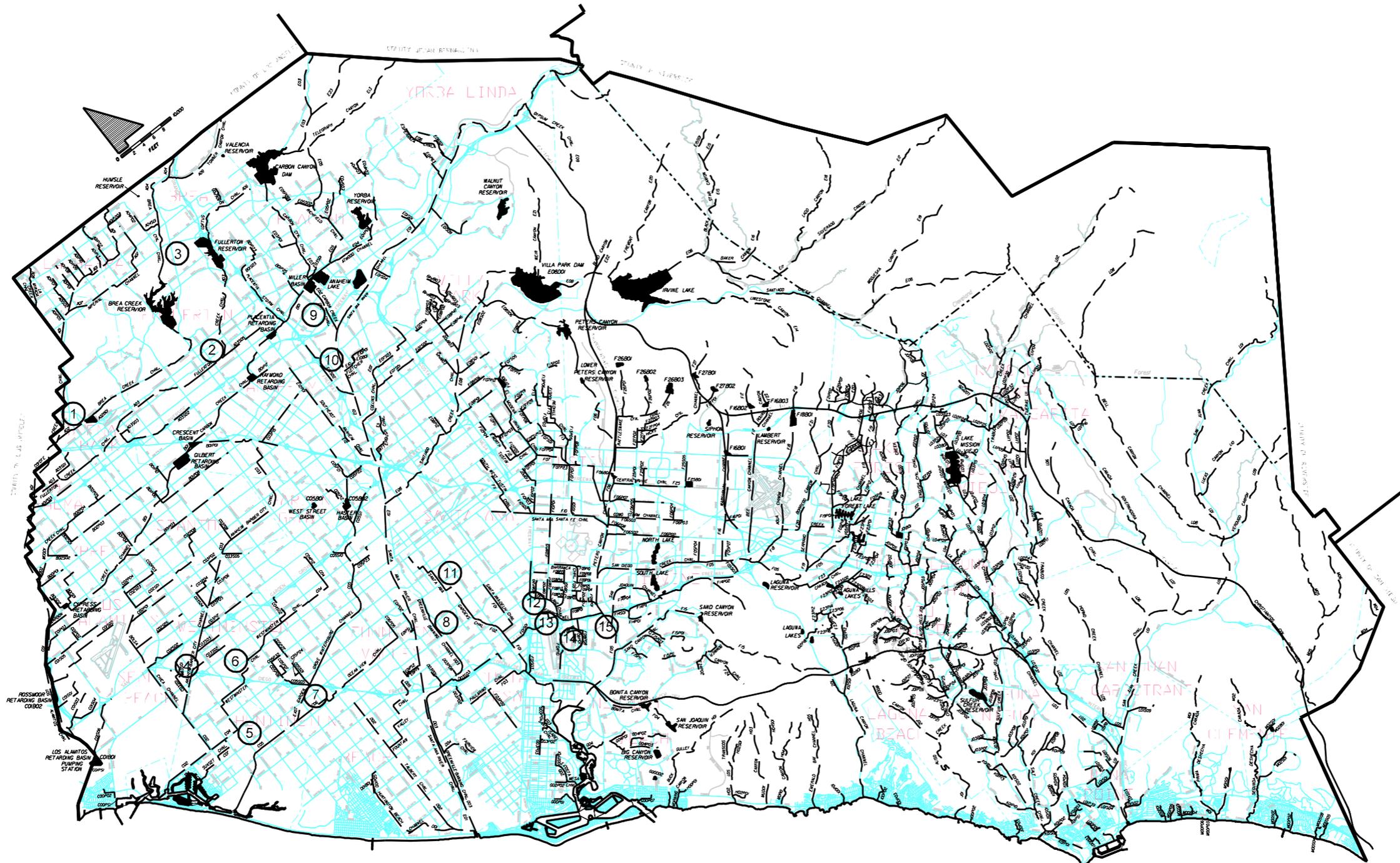
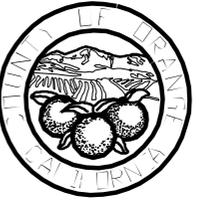


Exhibit A: Potential Channel Retrofit Locations



LEGEND

-  BASIN, RESERVOIRS AND LAKES
-  FLOOD CONTROL NETWORK
-  POTENTIAL RETROFIT LOCATION (REFER TO TABLE 4)

