



G. GLAC IRWMP Flood Management Objectives and Targets

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GLAC-IRWMP

Flood Management Objectives & Targets

Introduction

Within the GLAC Region, the Los Angeles County Flood Control District (LACFCD), U.S. Army Corps of Engineers and many Los Angeles County cities share a joint responsibility in managing flood risk. The LACFCD is the main regional agency able to address large regional drainage needs and uses available funds to operate and maintain the existing flood control facilities and systems that transect various cities and other municipalities.

During years of heavy rainfall, the existing flood control system has largely prevented serious flooding that once plagued the Los Angeles area many years ago. Yet some areas may still experience flooding during heavy rainfall seasons. Within each subregion of the GLAC Region, there are areas with unmet drainage needs, especially in high risk flood prone areas. The unmet drainage needs could be caused by undersized or non-existing stormwater conveyance systems. In other instances, areas may have adequate sized drainage systems but are in low elevations that may require a stormwater retaining structure to retain water until receiving waters such as the ocean or river have subsided. However, availability of land for detention or retention ponds or basins may be a constraint. Other subregions may experience significant amounts of accumulated sediment over the course of the next 20 years which place subregions at risk of future flooding and/or reduced water conservation benefits.

Much of the existing stormwater infrastructure (i.e., storm drains, levees, pump stations, etc.) in the region is approaching or has exceeded its planned useful design life and will require billions of dollars in increased maintenance and repair activities to continue functioning. Often required maintenance is postponed until sufficient funding can be set aside, resulting in additional degradation of the systems and even higher repair costs. Planning efforts to rehabilitate flood control facilities should also consider other potential beneficial uses of those facilities which include environmental ecosystem restoration or recreation enhancements.

Moreover, the GLAC Region's water supply management agencies are actively pursuing strategies aimed at achieving water independence by maximizing local water resources such as stormwater, groundwater and recycling opportunities. The IRWM process will identify projects to simultaneously replace various existing impervious gray infrastructure with permeable green infrastructure such as Low Impact Designs (LIDs) and other groundwater infiltration/recharge methods where feasible.

Currently, the LACFCD and the Army Corps of Engineer operate dams that capture, store, and release stormwater for groundwater recharge providing a local water supply alternative to imported water. The LACFCD is the primary agency responsible for groundwater replenishment operations in Los Angeles County. Water supplies throughout Southern California are dependent on storm conditions which vary from year to year due to cycles of changing ocean temperatures



and currents. The LACFCD and the U.S. Army Corps of Engineers have built the main infrastructure to conserve water and reduce flood risks in order to cope with these highly variable storm conditions and runoff. In typical years, the LACFCD infiltrates more than 270,000 acre-feet (AF) of captured stormwater, imported water, and recycled water into the various groundwater basins in Los Angeles County. In wetter years that number can exceed 700,000 AF and in drier years may be little more than 150,000 AF.

Some climate change predictions for the Southwestern United States advise that rainfall patterns will change, causing less snow in mountains and heavier rainfall periods and events that could potentially overwhelm the LACFCD system leading to less stormwater conservation, more property damage, and greater maintenance and operational demands. Working in conjunction with the Bureau of Reclamation, LACFCD is preparing “The LA Basin Stormwater Conservation Study” (Basin Study) that will address adaptation to climate change and become another foundation for future IWRM efforts and targets. Taking into account climate change and population growth projections, the Basin Study will identify alternatives, conduct trade-off analyses, and develop recommendations to help bridge the gap between current and future stormwater supply and water demands in the Los Angeles Basin (which overlaps many of the GLAC subregions). The Basin Study will evaluate modifications and operational changes to existing LACFCD facilities and analyze the potential for new facilities to capture additional stormwater for water supply. The LACFCD will be in a position to strategically partner with other agencies to seek funding to build flood prevention works such as retarding basins and pipe augmentation to allow stormwater to seep into the ground.

By identifying unmet drainage needs, sediment management activities, and other flood facility enhancements, flood management objectives and targets can be established to define the issue and provide a baseline for moving forward and from which to measure progress. The following sections provide the overall goal as well as objectives and discussion of targets.

IRWM Goal: *Reduce flood risk to protect life and property using an integrated flood management approach.*

Unmet Drainage Needs

Objective: Reduce flood risk in flood prone areas by either increasing protection or decreasing needs¹ using integrated flood management approaches.

Targets

¹ Increasing protection would be accomplished by providing physical management techniques, whereas decreasing risk might include purchasing flood prone properties and removing unnecessary structures that might otherwise be subject to flooding and/or flood insurance claims.

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To identify a community's flood risk, the Federal Emergency Management Agency (FEMA) conducts a Flood Insurance Study. FEMA has already completed this study for some municipalities. The study includes statistical data for river flow, storm tides, hydrologic/hydraulic analyses, and rainfall and topographic surveys. FEMA uses this data to create the flood hazard maps that outline different flood risk areas. Land areas that are at high risk for flooding are called Special Flood Hazard Areas (SFHAs), or floodplains. These areas are indicated on Flood Insurance Rate Maps (FIRMs). Many private and public parcels as well as buildings on these parcels are within the SFHAs.

The targets were developed through a process using geospatial data that included the currently defined 2011 SFHAs (processed from FEMA FIRM maps)², parcel ownership, parcel land use categories, and whether buildings or structures are present. The target acreages listed in Table 1 consist of the sum of parcel areas in each subregion that intersect with refined SFHAs, which consisted of a subset of the 2011 SFHAs categorized as containing structures but not categorized as reservoirs, dams, lakes, debris basins, floodways, flood structures, detention basins, harbors, marina, tidal zones and a general water category. Land use data were compiled from 2005 and 2008 surveys for the Counties of Ventura, Los Angeles, and Orange. These geospatial coverages were clipped to the defined IRWMP drainage areas by subregion. Because the supplied SFHA layer did not, in all instances, match up with the land uses and/or aerial photography, some adjustments were necessary to determine land use category boundaries. Parcels that intersected the 2011 refined SFHA were selected to determine parcel area that is partially or wholly within the SFHA. The presence of structures was determined through development records and was defined as presence or absence of a structure. Because development records were not available for the counties of Ventura and Orange, the qualifying parcels that were at least partially within the SFHA, within the IRWMP boundaries, and had structures were identified using aerial imagery. Land use categories from the 2008 effort were used as the defined land uses. However, in some cases the 2008 land uses were further refined by using 2005 land use categories (e.g., single family residential to include high density and low density single family residential; agriculture to include animal husbandry and nurseries and vineyards; and open space and recreation to include golf courses).

Table 1 shows Unmet Drainage Needs targets, expressed in acres for each subregion which were calculated based on the method described below the table. These areas are shown in Figure 1 below, and in Figures A-1 through A-5 in Exhibit A. Total Regional acreage targeted as Unmet Drainage needs is about 11,380 acres. Each parcel, and the land upstream, provides a management opportunity in which drainage needs may be mitigated to reduce high flooding risk.

For integrated planning purposes, these areas could be considered as properties that may have risk to human safety and property. Properties with structures may have an increase in safety and property damage risk. By identifying these properties as targets within the plan, especially those with structures, a longer term solution can be developed to reduce this risk. Steps to further refine

² FEMA is currently revising the process for determining SFHAs. When new SFHAs are finalized by FEMA, the Flood Management maps and goals should be updated accordingly.

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the objectives would be to conduct a risk and damage potential analysis that could help prioritize the parcel areas associated with the flooding hazard areas based upon their development, use and risk for damage and or level of damage that could occur.

In the interim, the LACFCD continues to prepare engineering studies, coordinate the revision of FIRMs, and assists the public on floodplain matters. Although most of the urban areas in the GLAC Region have been developed, there will be future opportunities during various development and redevelopment in the GLAC Region to reduce urban stormwater runoff by reducing impermeable surfaces. The LACFCD will guide and inspect new flood control facilities built by private developers in the unincorporated areas prior to transferring new flood facilities to the LACFCD for operation and maintenance. In addition, the LACFCD will continue to provide engineering services such as reviewing hydrology and preparing legal descriptions within the flood right-of-way. Such services include advising other planning authorities, such as cities, regarding appropriate land use and development within flood affected areas.

The NPDES MS4 Phase I permit requires all non-storm water runoff and all storm water runoff from the 85th percentile of a 24-hour storm event for drainage areas tributary to a Best Management Practice (BMP) or LID project to be captured and/or treated. Within each jurisdictional area and watershed, MS4 permittees (which includes cities, the unincorporated areas of Los Angeles County, and the LACFCD) can collaborate and form Enhanced Watershed Management Plans (EWMP) to comprehensively evaluate and prioritize opportunities to achieve these water quality requirements as well as other benefits including flood control and water supply, if warranted or feasible. Likewise, projects proposed by the GLAC IRWM include retrofitting parks, streets, single family homes and schools to hold stormwater as well as other regional water resource infrastructure projects.

However, most LID and BMP projects will not abate serious flooding and unmet drainage needs. The Basin Study will identify new facilities and operational modification at existing LACFCD water recharge and retention facilities to prevent flooding, conserve stormwater, and address unmet drainage needs. Stormwater from underground storm drains enters various retention/ recharge basins and slowly discharges to receiving waters or percolates into the groundwater. Drains designed to handle severe storms that outlet into receiving water may require acquisition of additional land and/or construction of new retention facilities to retain stormwater to alleviate flooding. The Basin Study will evaluate potential infiltration sites taking into account soil characteristics, geologic stability, groundwater basin condition, conveyance, diversion, outlet requirements, site remediation requirements, property valuation and availability, environmental impact, regulatory requirements, community impact, multi-use potential, and other factors deemed necessary. The LACFCD role in the GLAC IRWMP process will be to explore opportunities to partner with other municipalities and seek grants to acquire property and build new retention basins and improve or widen channels to alleviate flooding in the target areas and/or maximize the opportunities to remove impermeable surfaces.

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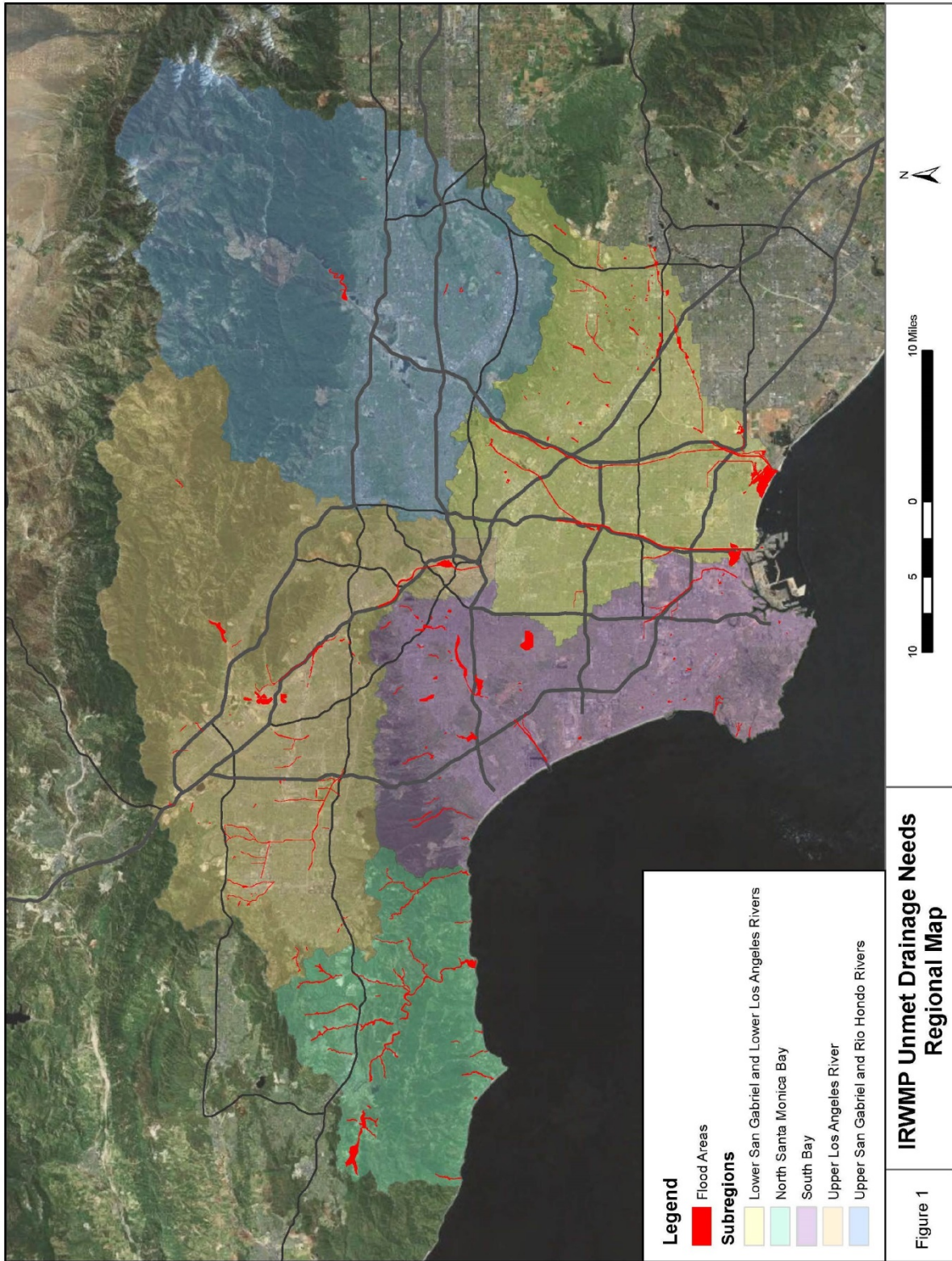


Table 1. Unmet Drainage Needs Targets Reported by Subregion

Unmet Drainage Needs (Acres)	North Santa Monica Bay*	Upper Los Angeles River	Upper San Gabriel and Rio Hondo Rivers	Lower San Gabriel and Los Angeles Rivers*	South Bay*	GLAC Region
Subregion Total	2,760	1,970	250	4,090	2,310	11,380

*Note that coastal flooding issues must also be addressed yet targets were not developed as part of this IRWMP update. See Section 4.4 for discussions on climate change.

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Sediment Management

Objective: Manage sediment through removal and/or other techniques using integrated flood management approaches.

Targets

Proper management of sediment is necessary to protect public safety, property, and ensure adequate quality of life and improve recreational opportunities at coastal beaches. The accumulation of sediment within reservoirs, debris basins and streams can reduce the storage capacity in those facilities which reduces the potential for providing water supply benefits and preventing flooding. When accumulation occurs within the stream channel, localized street flooding or inundation of public and private property may occur. Recent catastrophic fires in the region have also resulted in heavy sedimentation at downstream dam and debris basin facilities drastically reducing flood management and water storage capabilities. Sediment from the reservoirs and debris basins are hauled to various LACFCD sediment placement sites. These sediment placement sites are filling up as well and have reduced the capacity to take additional sediment.

Targets for sediment removal were provided by the LACFCD, based on 20-year projections presented in the agency’s Sediment Management Plan for maintenance of regional reservoirs and debris basins. For reservoirs, planning quantities were based on a goal of no net increase in the amount of accumulated sediment in the reservoirs, which was determined based on historical records. For debris basins, historical records were used to estimate sediment inflow volumes over 20-year rolling periods. The planning quantity was the 80th percentile of these datasets, split up among the Flood Maintenance Areas (South, West, and East). The historical records include recent fire events such as the Station Fire. The reservoirs and debris basins were mapped and the projections were summed according to the subregion the reservoir or debris basin facility was located in to produce the targets presented below.

The following table provides the sediment targets determined in the Sediment Management Plan. Values include combined volumes of reservoirs and debris basins by subregion. The locations of these reservoirs and debris basins are shown in Figure 2 and Figures B-1 through B-5 in Exhibit B.

Table 2. Sediment Management Targets Reported by Subregion

Sediment Management Needs (Million Cubic Yards)	Upper Los Angeles River		Upper San Gabriel and Rio Hondo Rivers		Lower San Gabriel and Los Angeles Rivers*		GLAC Region
	North Santa Monica Bay*	Upper Los Angeles River	Upper San Gabriel and Rio Hondo Rivers	Lower San Gabriel and Los Angeles Rivers*	South Bay*		
Subregion Total	0.23	27.6	39.7	--	--	67.5	

*Note that coastal sediment management issues must also be addressed yet targets were not developed as part of this IRWMP update.

The total 20-year planning quantity for the target sediment management reduction is 67.5 MCY, with approximately 57.9 MCY resulting from reservoirs and 9.6 MCY from debris basins.

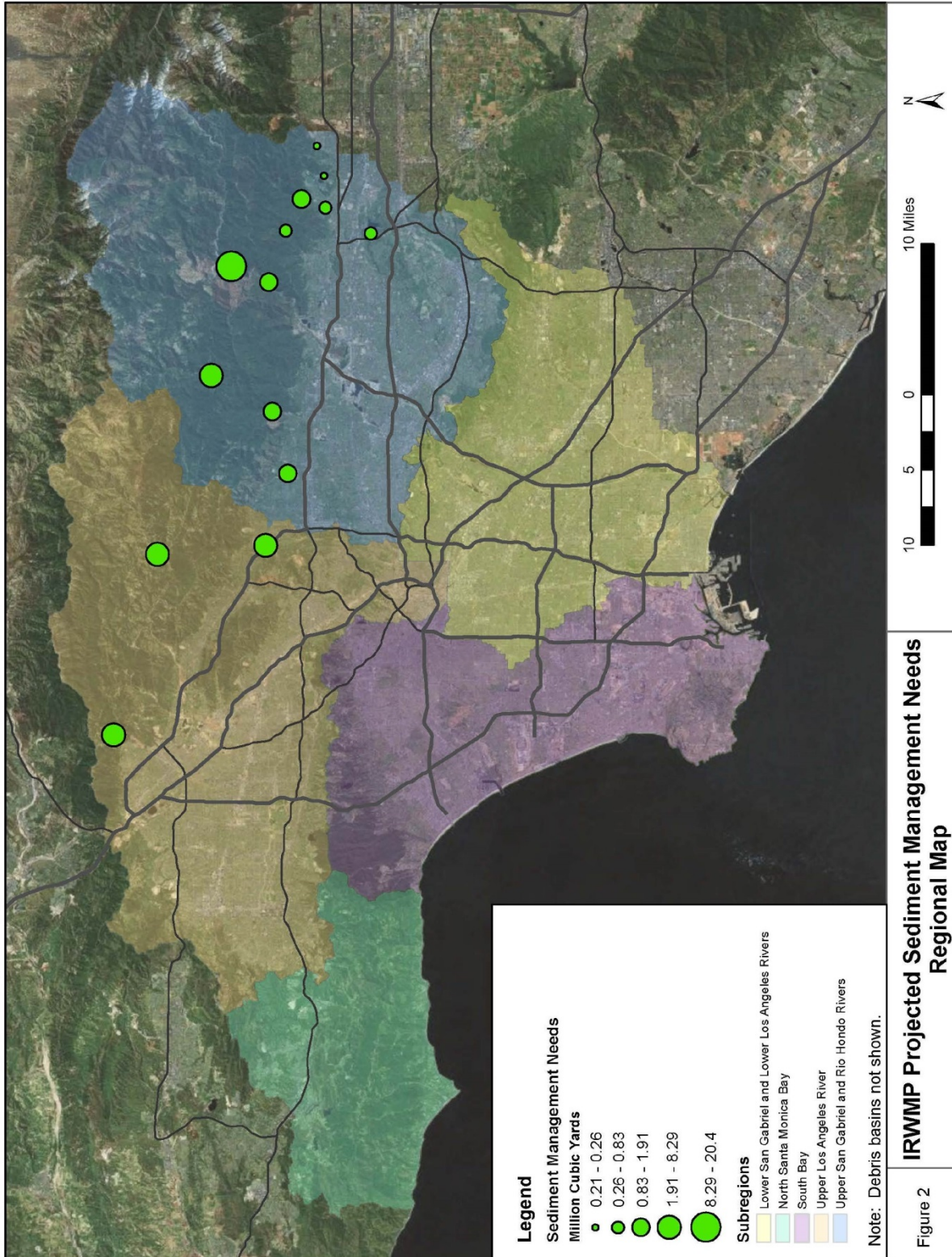
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Comprehensive and integrated goals can be met at a local and regional level when considering existing plans for sediment management within the coastal environment, especially around creek and river mouths and shores. The Coastal Regional Sediment Management Plan – Los Angeles County which is in draft form is being authored by the Coastal Sediment Management Workgroup, the Army Corps of Engineers, and several other regional partners. The Army Corps of Engineers Planning Guidance Notebook (ACOE, 2000); and the Los Angeles County Sediment Management Plans (LACDPW and LACFCD, 2012) are also excellent planning resource documents.

The Sediment Management strategic plan outlines potential alternatives to achieve these targets. The alternatives will be explored in the future.

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Development of Future Objectives and Targets

The LACFCD and U.S. Army Corps of Engineers have constructed a comprehensive system of infrastructure for the control and conservation of flood and storm waters, including dams, spreading grounds, debris basins, and an extensive flood control channel network.

Over time, additional objectives have emerged for the system beyond its original intended purpose. In an era when stewardship of local natural resources has become more prominent, public perception of the system has been trending towards its use for broader purposes such as recreational uses, open spaces, water quality enhancement, restored ecosystems, and habitats.

To address the desire for a broader range of usage, the LACFCD developed planning documents for the County's major rivers: Los Angeles River Master Plan (1996) and San Gabriel River Corridor Master Plan (2006). The purpose of these documents is to identify ways to revitalize the publicly-owned right-of-ways along the rivers into urban resources. Over the last 20 years, more than 24 miles of greenways and trails including the Tujunga Wash Greenway, multiuse facilities such as the Dominguez Gap Wetlands in Long Beach, and over 60 miles of bicycle trails along the rivers have been developed.

The LACFCD has adopted a regional approach in managing the system and has collaborated with local agencies, non-governmental organizations, and the public to achieve a more comprehensive and balanced system without compromising flood protection and water supply for the millions of residents in the greater Los Angeles area. The future of the system depends upon an alliance between these parties. The LACFCD and the Army Corps will need funding to carry out activities to improve efficiency of dams, take advantage of water storage opportunities, and provide multiple benefits such as increased water supply, ecosystem restoration, and the building of recreational greenways. The various agencies in the GLAC IRWM will also identify projects that replace various existing impervious gray infrastructure with permeable green infrastructure to recharge the groundwater supply. Once these assessments and prioritization efforts are established and targets have quantifiable figures, the LACFCD intends to add an additional objective and target which will address the use of the existing infrastructure.

The LACFCD is in the beginning phase of creating a new methodology to assess the condition of its infrastructure. Other municipalities may also need to begin or complete this exercise. Once this assessment is complete and an inventory of existing infrastructure deficiencies have been identified along with the completion of the Basin Study, the LACFCD will be in a position to prioritize infrastructure projects that will maximize future flood protection and water conservation. The LACFCD, municipalities and the Army Corps will need funding to carry out activities to improve efficiency of dams, take advantage of water storage opportunities, and provide multiple benefits such as increased water supply, ecosystem restoration, beach sediment replenishment and the building of recreational greenways. The various agencies in the GLAC IRWM Region will also identify projects that replace various existing impervious gray infrastructure with permeable green infrastructure to recharge the groundwater supply where feasible. Once these assessments and

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Exhibit A – Maps of Unmet Drainage Need Targets by IRWMP Subregion

The following pages contain the subregional maps showing Unmet Drainage Needs for:

- **North Santa Monica Bay (A-1)**
- **Upper Los Angeles River (A-2)**
- **Upper San Gabriel and Rio Hondo (A-3)**
- **Lower San Gabriel and Los Angeles Rivers (A-4)**
- **South Santa Monica Bay (A-5)**

Note: The following maps show flood areas that extend into the flood plains around their respective channels but may appear like thick lines of unmet drainage given the scale of the maps.

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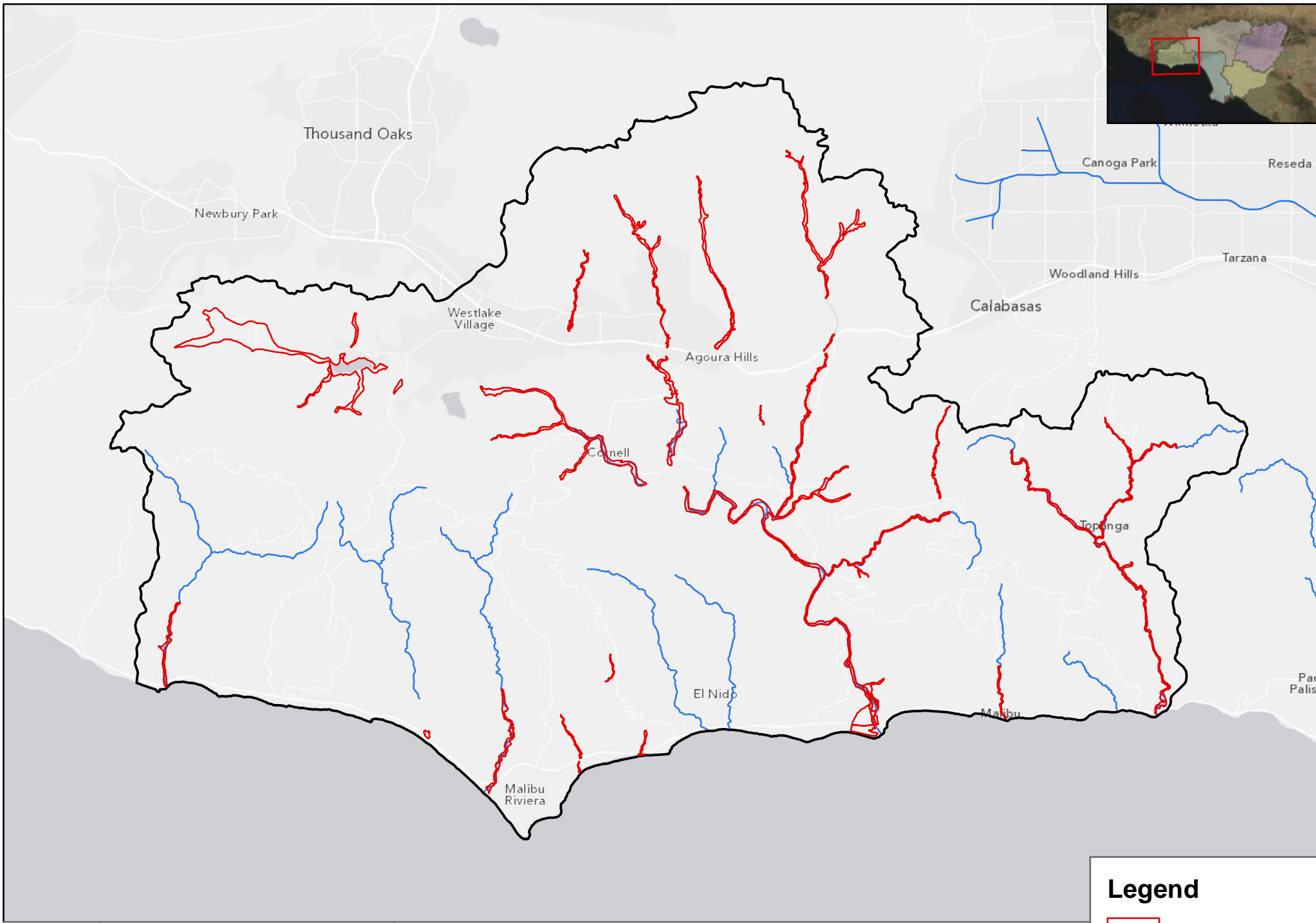
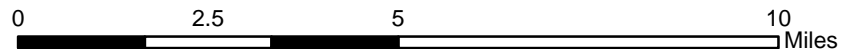


Figure A1

IRWMP Flood Targets
North Santa Monica Bay Subregion



Legend

- Flood Areas
- Major Channels

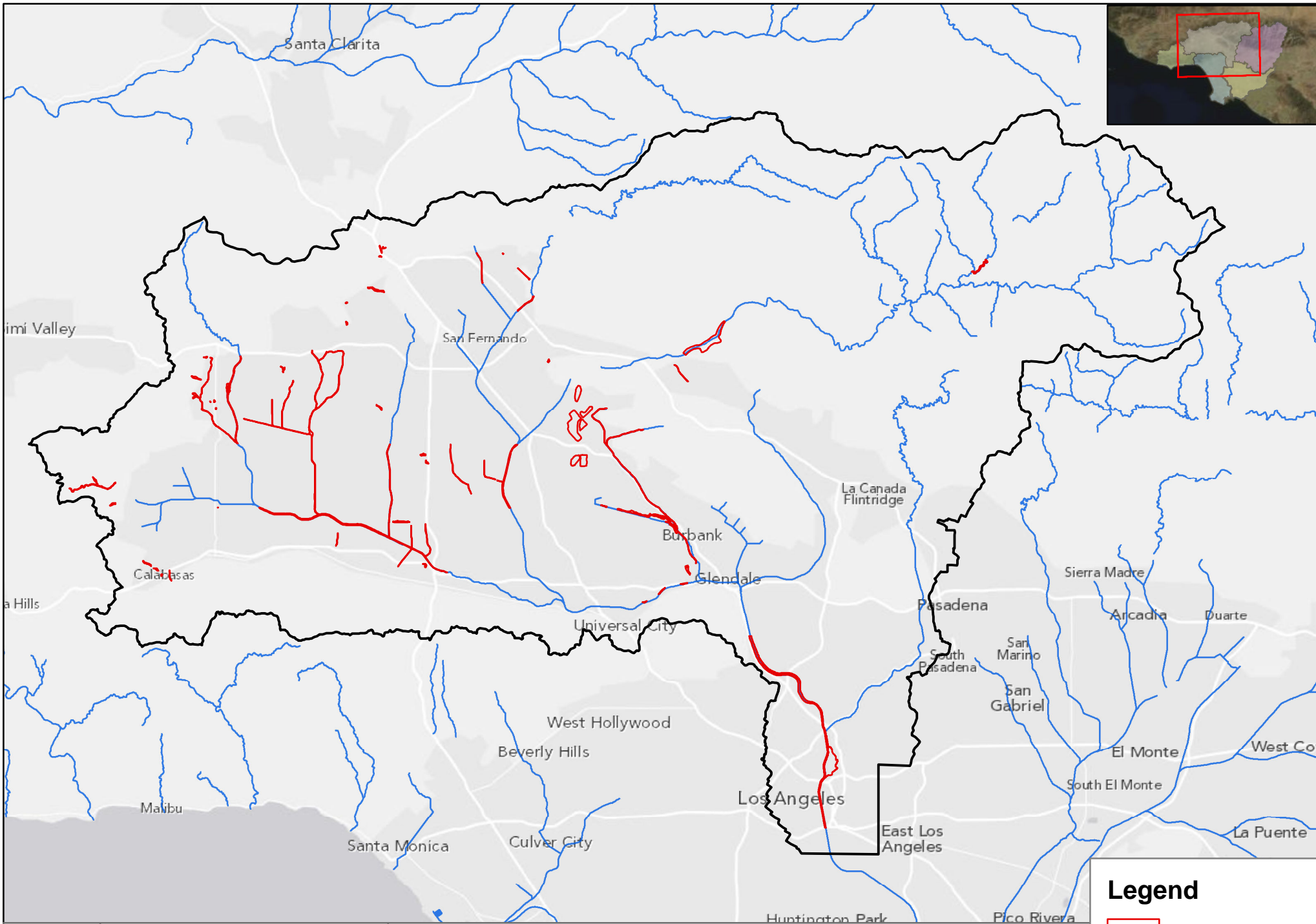
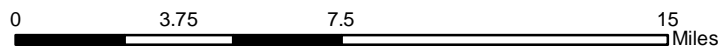


Figure A2

IRWMP Flood Targets
Upper Los Angeles River
Subregion



Legend

- Flood Areas
- Major Channels

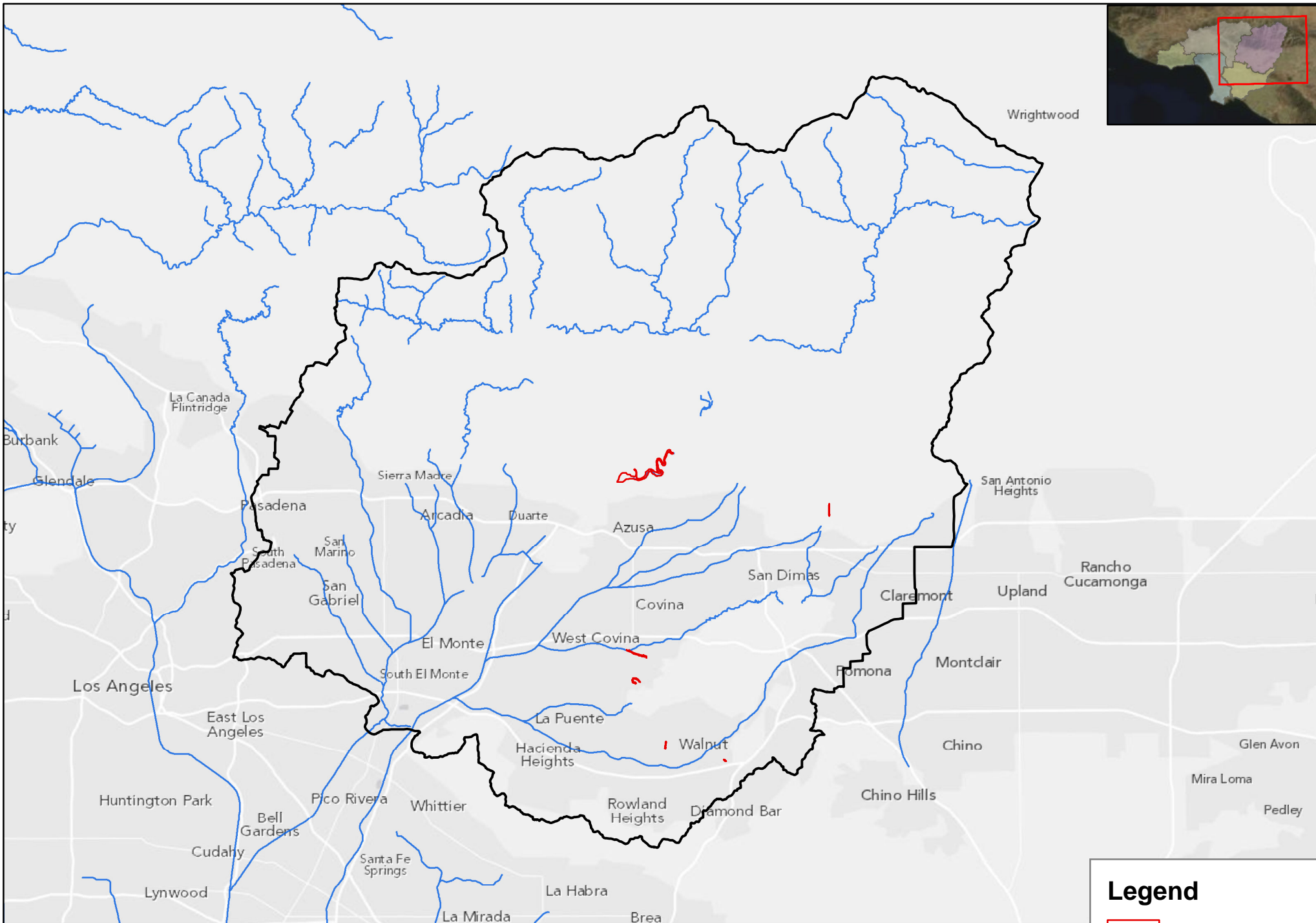
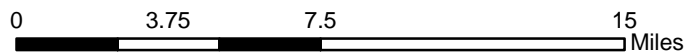


Figure A3

IRWMP Flood Targets
Upper San Gabriel and Rio Hondo Rivers Subregion



Legend

- Flood Areas
- Major Channels

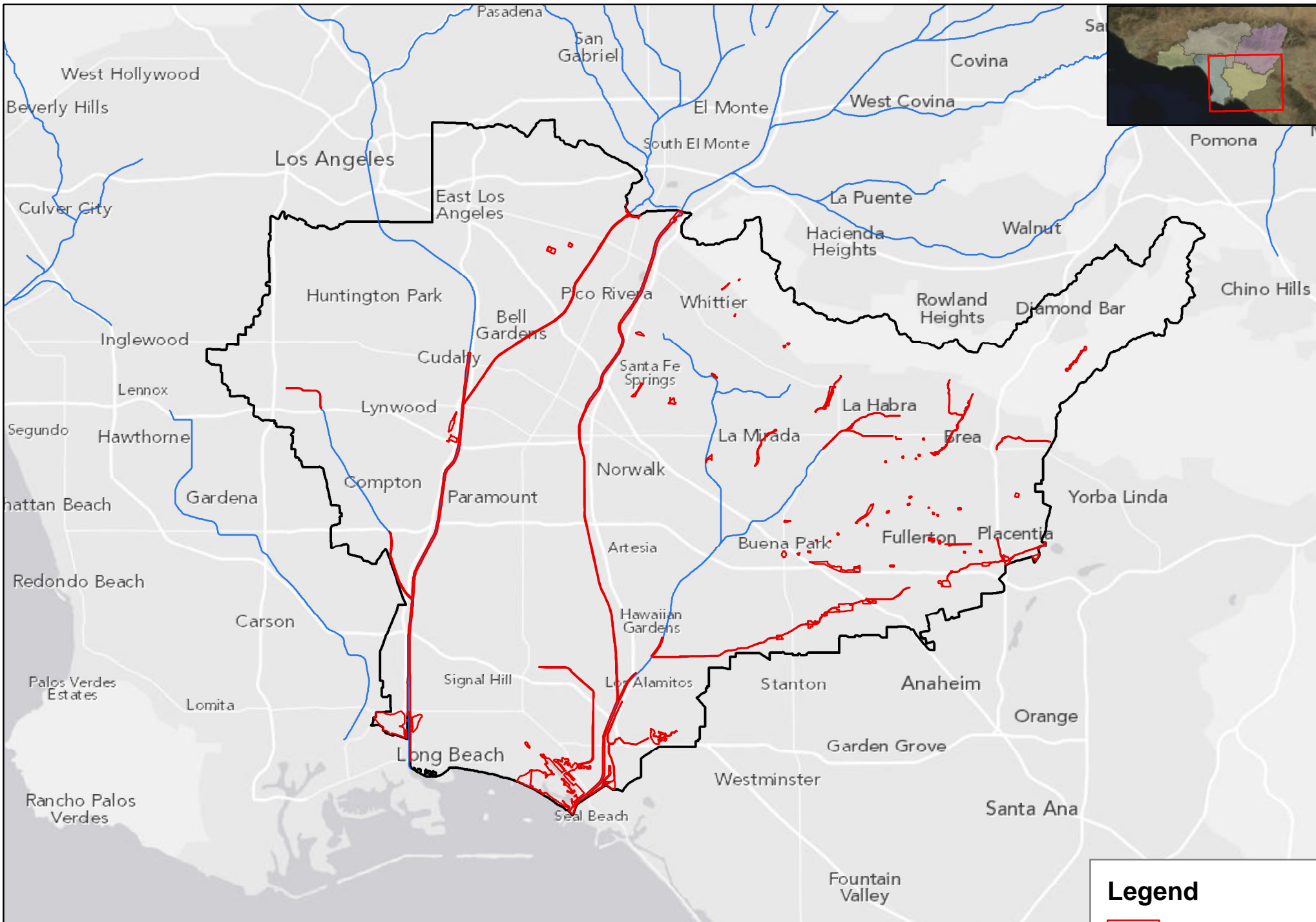
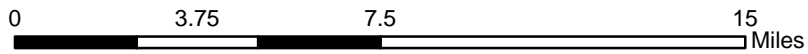


Figure A4

IRWMP Flood Targets
 Lower San Gabriel and
 Lower Los Angeles Rivers Subregion



Legend

- Flood Areas
- Major Channels

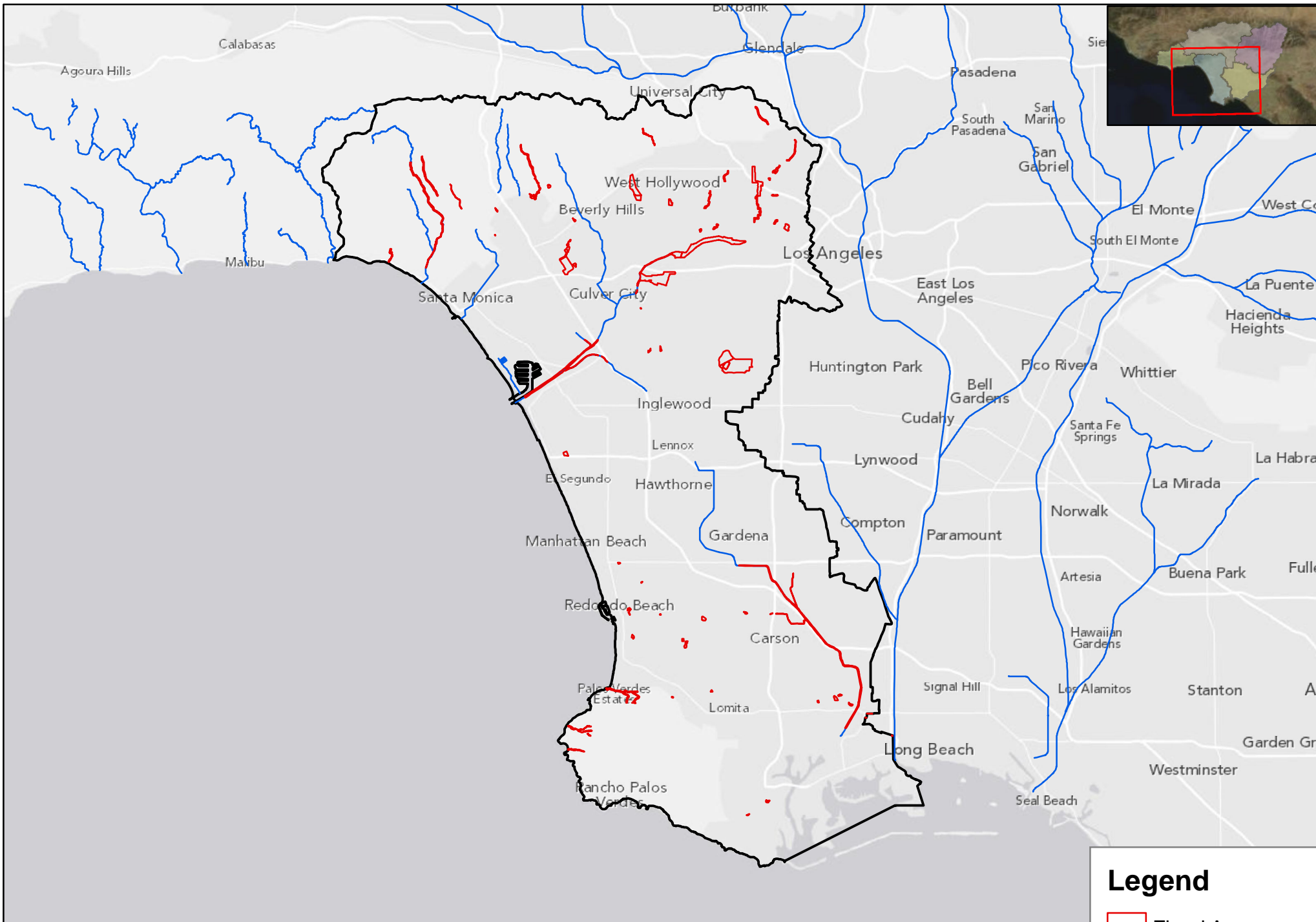
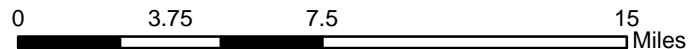


Figure A5

IRWMP Flood Targets
South Bay Subregion



Legend

- Flood Areas
- Major Channels

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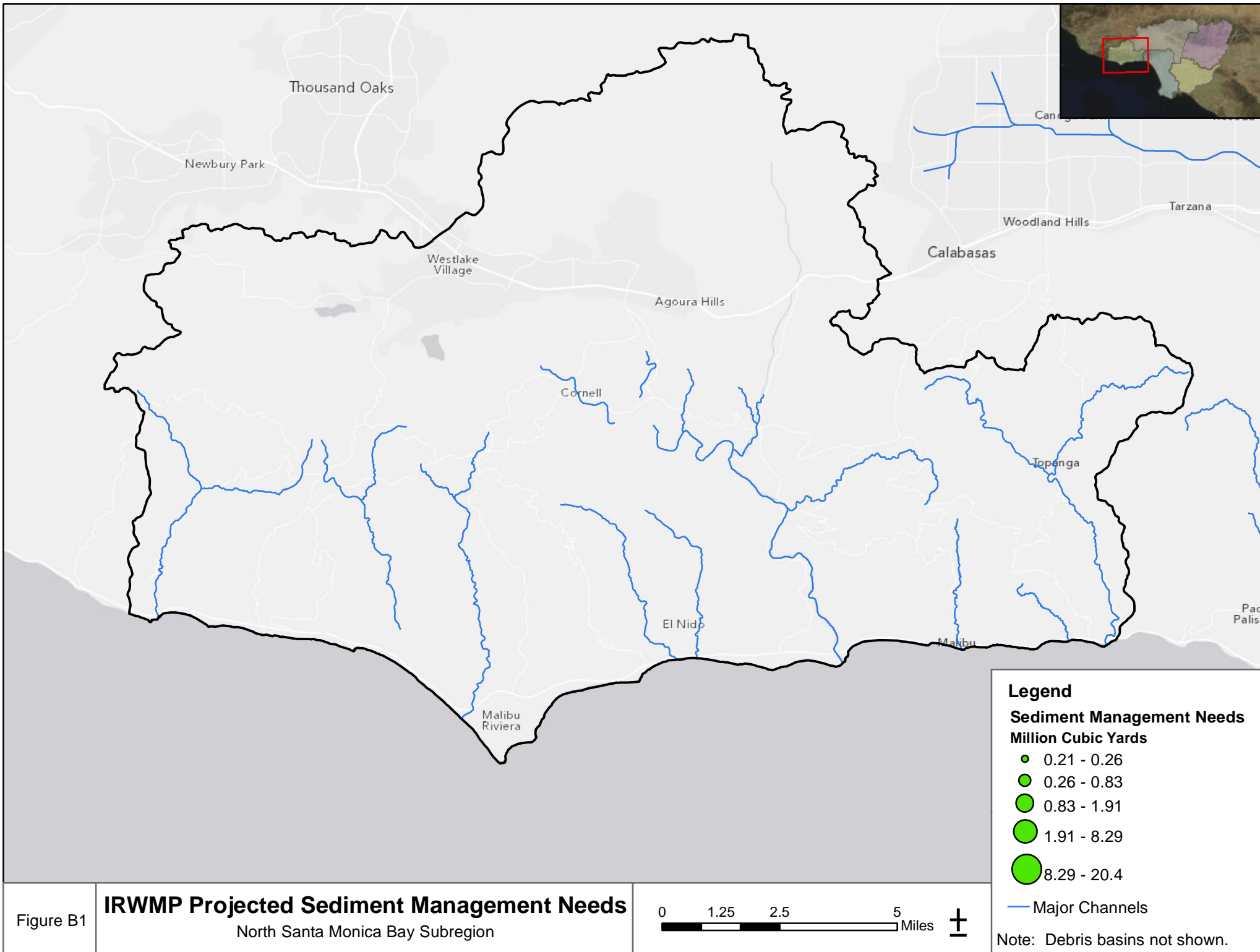


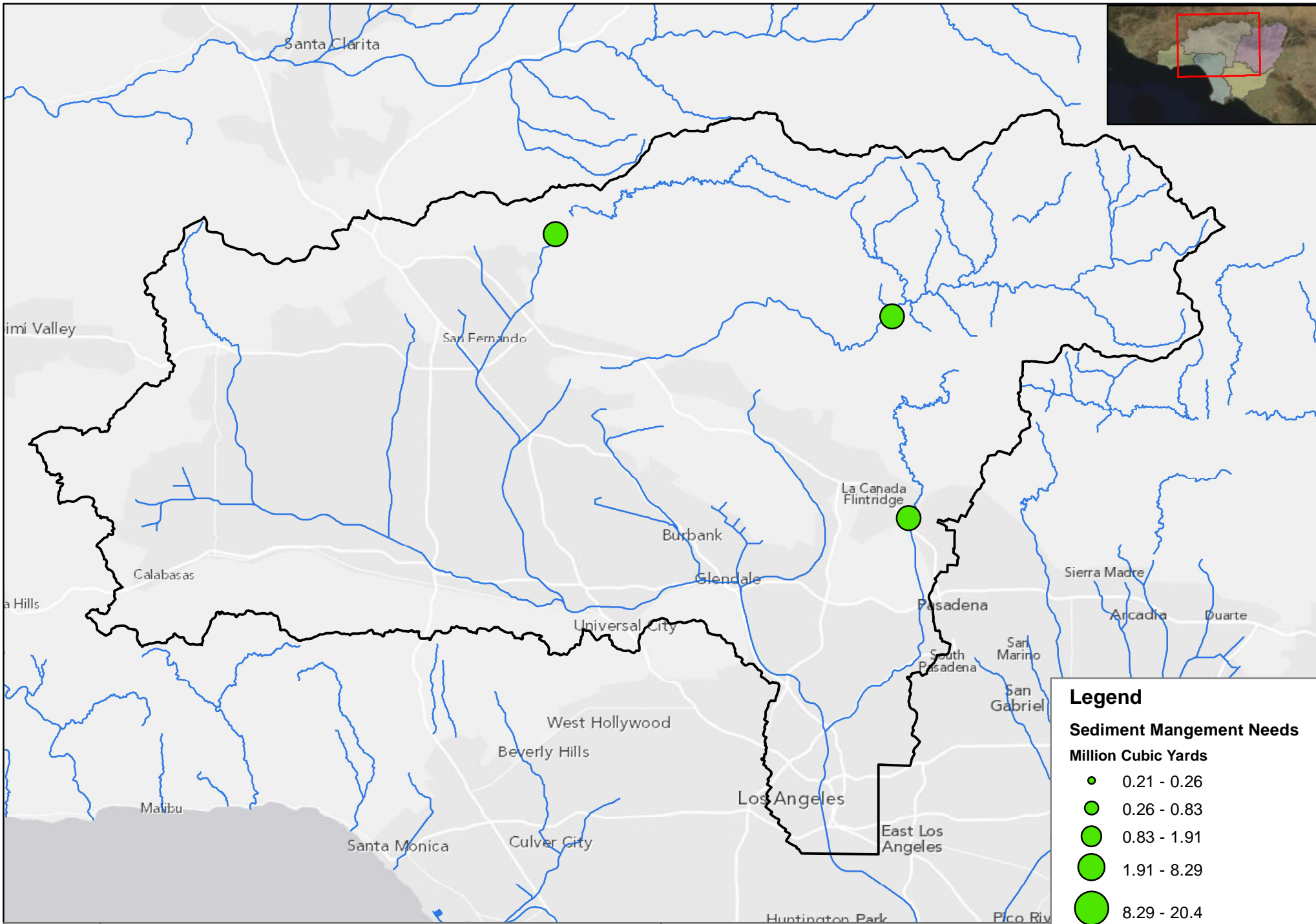
Exhibit B – Maps of Sediment Management Targets by IRWMP Subregion

The following pages contain the subregional maps showing locations of the Sediment Management Needs for:

- **North Santa Monica Bay (B-1)**
- **Upper Los Angeles River (B-2)**
- **Upper San Gabriel and Rio Hondo (B-3)**
- **Lower San Gabriel and Los Angeles Rivers (B-4)**
- **South Santa Monica Bay (B-5)**

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Legend

Sediment Management Needs
Million Cubic Yards

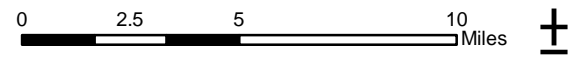
- 0.21 - 0.26
- 0.26 - 0.83
- 0.83 - 1.91
- 1.91 - 8.29
- 8.29 - 20.4

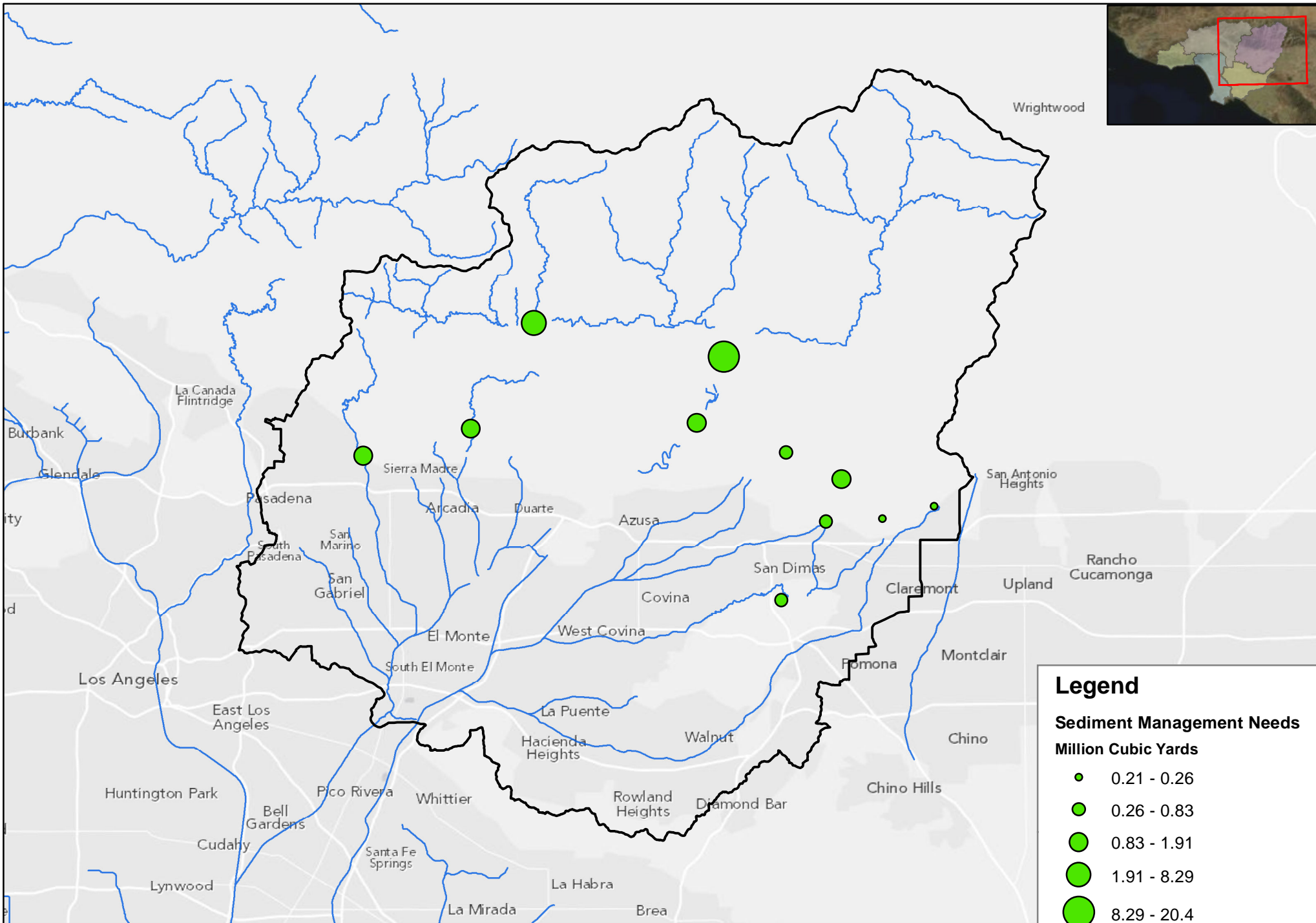
— Major Channels

Note: Debris basins not shown.

Figure B2

IRWMP Projected Sediment Management Needs
 Upper Los Angeles River Subregion





Legend

Sediment Management Needs
Million Cubic Yards

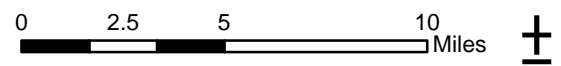
- 0.21 - 0.26
- 0.26 - 0.83
- 0.83 - 1.91
- 1.91 - 8.29
- 8.29 - 20.4

— Major Channels

Note: Debris basins not shown.

Figure B3

IRWMP Projected Sediment Management Needs
 Upper San Gabriel and Rio Hondo Rivers Subregion



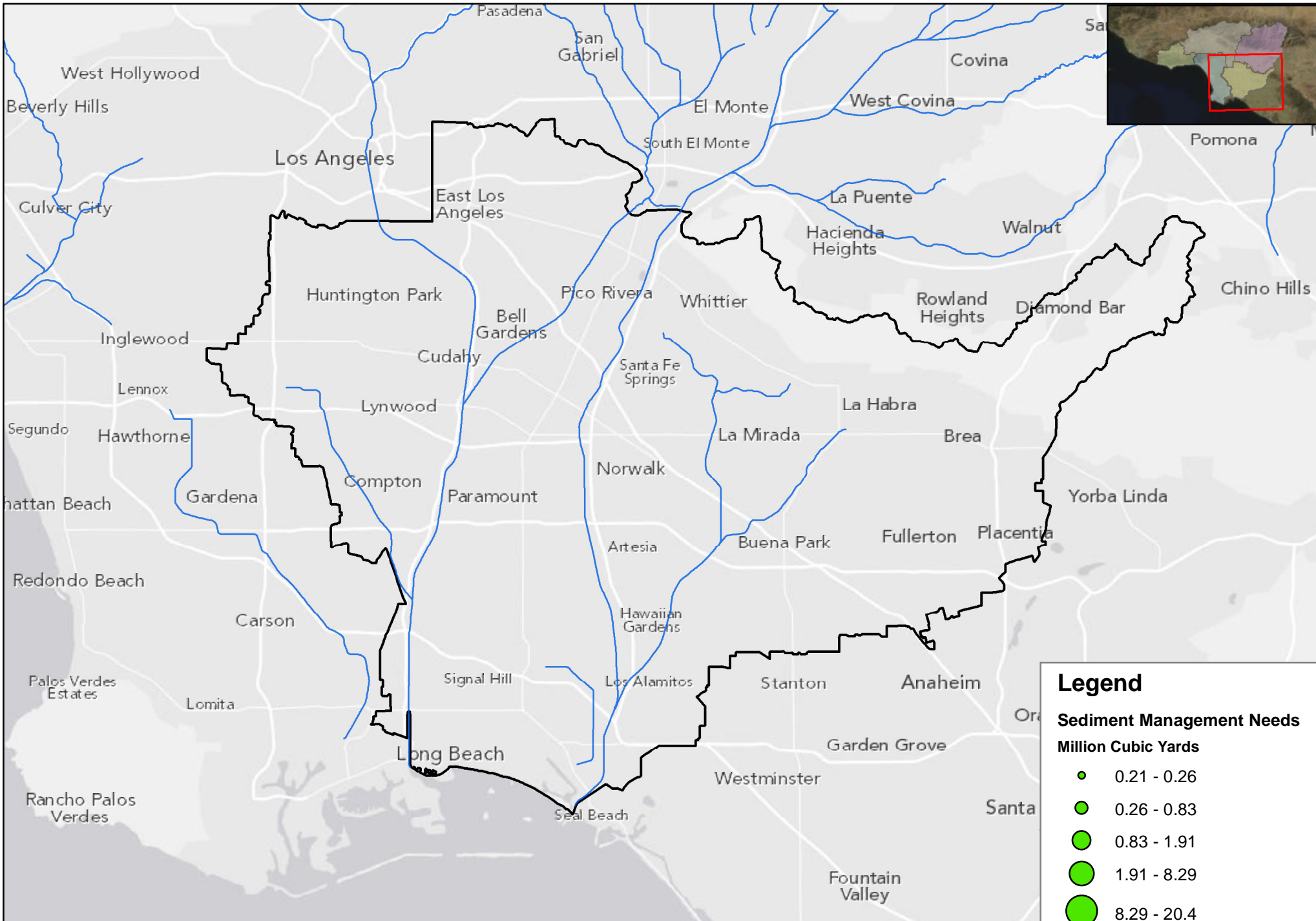


Figure B4

IRWMP Projected Sediment Management Needs

Lower San Gabriel and
 Lower Los Angeles Rivers Subregion

0 1.25 2.5 5 Miles



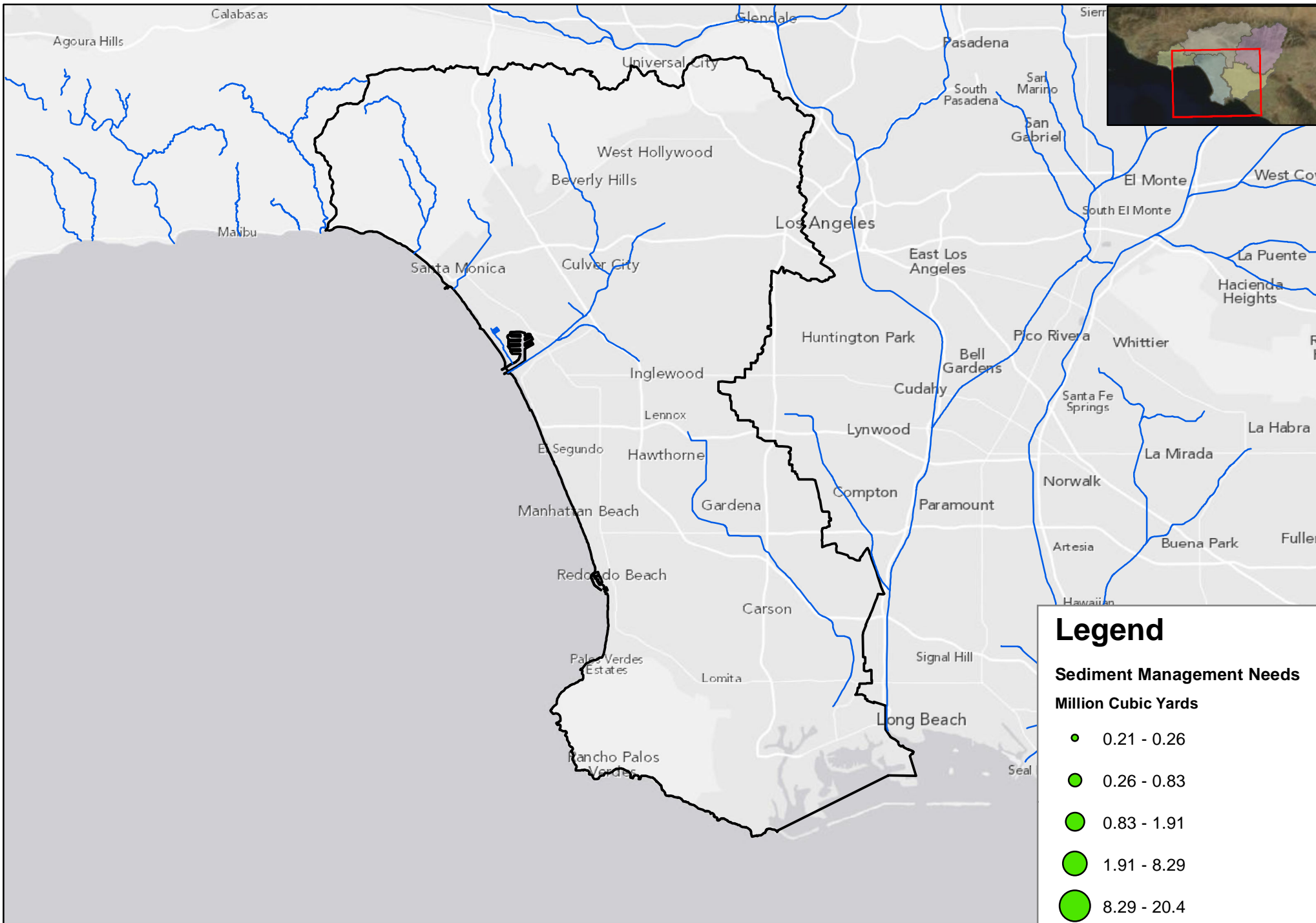


Figure B5

IRWMP Projected Sediment Management Needs
South Bay Subregion

0 2.5 5 10 Miles



Legend

Sediment Management Needs

Million Cubic Yards

- 0.21 - 0.26
- 0.26 - 0.83
- 0.83 - 1.91
- 1.91 - 8.29
- 8.29 - 20.4

— Major Channels

Note: Debris basins not shown.