Appendix E: Public Comment Matrix

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Antelope Valley Region
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Executive Summary Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
ES-5		11/20/2013 Stakeholder meeting			Add footnote to the last sentence of the supply section: "The number for TSY used in this 2013 IRWMP Update is selected strictly for long-term planning purposes and is not intended to answer the questions being addressed within the adjudication process."	Comment is incorporated on p. ES-5.
ES-4	3	A. Jaramillo (LACWD)	The amount of water supply available varies considerably due to changes in weather, rain and snow, and other conditions. All water supplies within the Antelope Valley Region come from two sources: (1) local rain and snow, or (2) imports of water from outside the Antelope Valley Region. The local water supplies come from rainfall and snowmelt that percolate into the groundwater aquifers or are captured in Littlerock Reservoir. Current estimates of water supplies made available from local rainfall and snowmelt vary widely. Imported water comes from the State Water Project, which has historically varied as well.	All water supplies within the Antelope Valley Region come from two sources: (1) local rain and snowmelt that percolate into the groundwater aquifers or are captured in Littlerock Reservoir, or (2) imports of water from outside the Antelope Valley Region via the State Water Project. The amount of water supply available varies considerably due to changes in weather, rain and snow, and other conditions.	The point is that supplies are variable and uncertain, not the estimates.	Comment is incorporated on p. ES-4.

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ES-5	3	A. Jaramillo (LACWD)			See comment in Section 3.1.6.4 re: WSSP2 extraction capacity	Comment is incorporated in Section 3.
ES-10	Table ES-4	T. Chen (LACWD)	Littlerock Creek Groundwater Recharge and Recovery Project		Not an implementation project, feasibility study is expected in 2015. Project is conceptual.	Comment is acknowledged. This project was considered to have sufficient information for a preliminary economic analysis and is therefore identified as an implementation project for the 2013 IRWMP Update.
ES-4	3	W. Deal (EAFB)	The local water supplies come from rainfall and snowmelt that percolate into the groundwater aquifers or are captured in Littlerock Reservoir		Does Amarogsa, 2 Fairmont dams, Big Rock Dam – provide a water source? Or harvesting?	Comment is acknowledged. Littlerock Reservoir is the only significant surface water facility addressed in the Plan.
ES-6	3	W. Deal (EAFB)	In addition, a salt and nutrient management plan is being developed that will help to monitor and maintain water quality conditions in the Antelope Valley groundwater basin.		Suggest moving to end of paragraph – currently stuck between two arsenic sentences.	Comment is incorporated on p. ES-6.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
ES-6	3	W. Deal (EAFB)	Portions of the Antelope Valley Region are also subject to flooding from uncontrolled runoff in the nearby foothills, which can be aggravated by lack of proper drainage facilities and defined flood channels. This runoff can negatively affect the water quality of downstream water bodies, and can create stagnant ponds in places where clay soils beneath the surface do not allow for percolation to occur. At the same time, the Region recognizes that downstream benefits of floodwaters are also important. The need for regional coordination of flood control efforts becomes more readily apparent as urban development and paved surfaces increase throughout the Antelope Valley Region along with the frequency of local flood events.	Much of the Antelope Valley Region is subject to flooding from natural runoff through alluvial fans in the nearby foothills. As these flood waters move into developed areas, many which of these developed areas lack sufficient proper drainage facilities creating sometimes, severe, impacts to infrastructure. The runoff across impervious developed surfaces can contaminate these flood waters with constituents common in developed areas such as petroleum products. The Region recognizes that downstream habitat benefits of floodwaters are important. The need for regional coordination of flood control efforts integrated with natural habitat protection becomes more readily apparent as urban development and paved surfaces increase throughout the Antelope Valley Region.	Provided suggested rewrite	Comment is incorporated on p. ES-6.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
ES-6	3	W. Deal (EAFB)	The actions identified in the AV IRWM Plan can help to preserve open space and natural habitats in the greater the Antelope Valley Region while maximizing surface water and groundwater management efforts.	The actions identified in the AV IRWM Plan can help to preserve open space and natural habitats in the greater Antelope Valley Region while maximizing surface water and groundwater management efforts.	Delete "the" before Antelope (editorial)	Comment is incorporated on p. ES-6.
ES-6	3	W. Deal (EAFB)	The Antelope Valley Region has many unique environmental features, and several plant and animal species are only found in this area. As the pressure for growth expands out into undeveloped or agricultural lands, the need to balance industry and growth against protection of endangered species and sensitive ecosystems requires difficult decisions and trade-offs, each resulting in a variety of unique impacts on water demands and supplies in the Region. The actions identified in the AV IRWM Plan can help to preserve open space and natural habitats in the greater the Antelope Valley Region while maximizing surface water and groundwater management efforts.	The Antelope Valley Region has many unique environmental features dependent on natural surface flow such as dry lakebeds (Rosamond, Buckhorn,Rogers), Piute Ponds, mesquite bosques, alkali mariposa lily, Joshua tree woodlands, desert tortoise, Le Contes thrasher, tricolored blackbirds, to name just a few. Part of the Antelope Valley wash areas are incorporated into a Significant Ecological Area designated by Los Angeles County intended to provide added protection to the sensitive natural resources within that area. As the pressure for growth expands out into undeveloped or agricultural lands, the need to balance industry and growth against protection of endangered species and sensitive ecosystems requires difficult decisions and trade-offs, each resulting	Fleshed out the environmental features with some specific facts to clarify the challenges.	Comments are incorporated on p. ES-6.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
				in a variety of unique impacts on water demands and supplies in the Region. The actions identified in the AV IRWM Plan can help to preserve open space and natural habitats in the greater Antelope Valley Region while maximizing surface water and groundwater management efforts.		
ES-6	3	W. Deal (EAFB)	***Water Management and Land Use*** What people do on the land of the Antelope Valley and how they do it directly impacts many aspects of life, including the water cycle, within the Antelope Valley Region. Historically throughout California, land use planning and water use planning have been done almost independently of one another. The challenges identified within the Plan clearly show a need for much closer collaboration between land use planning efforts and water management planning efforts. Continued development within the Antelope Valley Region depends heavily on the successful completion of the objectives presented in the Plan to meet the growing	***Water Management and Land Use*** What people do on the land of the Antelope Valley and how they do it directly impacts many aspects of life, including the water cycle, within the Antelope Valley Region. Historically throughout California, land use planning and water use planning have been done almost independently of one another. The challenges identified within the Plan clearly show a need for much closer collaboration between land use planning efforts and water management planning efforts. Continued development within the Antelope Valley Region depends heavily on the successful completion of the objectives presented in the Plan to balance the growing demand for development, and	Expanded last sentence – original didn't seem to address all the issues.	Comment is incorporated on p. ES-6.

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			demand for recreational opportunities while minimizing or avoiding the loss of local culture and values.	recreational opportunities while minimizing or avoiding major impacts to natural resources, agriculture, and the loss of local culture and values.		
ES-8	5	W. Deal (EAFB)	determine what regional water management strategies should be included in the IRWM Plan, the Region considered the RMS listed and defined in Section 5 of the IRWM Plan.	determine what regional water management strategies should be included in the IRWM Plan, the Stakeholders considered the RMS listed and defined in Section 5 of the IRWM Plan.	Replaced "Region" with Stakeholders	Comment is incorporated on p. ES-9.
ES-10	6,7	W. Deal (EAFB)	The projects proposed by stakeholders are expected to help the Region to meet the objectives and targets described in Section 4..	The projects proposed by stakeholders are expected to help the Region to meet the Water Supply Management and some of the Water Quality Management objectives and targets described in Section 4. Development of projects to address the Flood Management, Environmental Resource Management, Land Use Planning/Management objectives and targets need to be a priority in order to provide a true integrated water management effort.	Revised sentence to highlight important needs and weaknesses of the plan lest these issues get lost in all the words. This does not mean the best that could be done wasn't done it's just a recognition that a lot more still needs to happen.	Comment is incorporated on p. ES-10.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
ES-11	8	W. Deal (EAFB)	The Stakeholders and RWMG have chosen these projects because they directly address the objectives and targets to achieve better management of resources within the Antelope Valley Region.	The Stakeholders and RWMG have chosen these projects because they directly address the objectives and targets of what seems to be the most pressing issue and well developed projects to achieve better management of water supply and water quality resources within the Antelope Valley Region.	Clarified why the projects were actually chosen. These projects didn't come from a large pool as the best – they were the best from what was proposed perhaps but nearly all the proposed projects dealt with only two of the objectives.	Comment is incorporated on p. ES-11.

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Section 1 Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
1-24	1.3.3	11/20/2013 Stakeholder meeting			Add footnote to Section 1.3.3 either after second sentence or end of paragraph: "The number for TSY used in this 2013 IRWMP Update is selected strictly for long-term planning purposes and is not intended to answer the questions being addressed within the adjudication process."	Footnote has been added to Section 1.3.3.
I-3	1	W. Deal (EAFB)	On November 23, 2009, the Antelope Valley Region successfully completed the Region Acceptance Process (RAP) with the Department of Water Resources (DWR). The RAP was the first step in becoming eligible for Proposition 84 grant funding and helps to define certain aspects of the Region. Specifically, the RAP documents describe contact information, governing structure, RWMG	On November 23, 2009, the Antelope Valley Region successfully completed the Region Acceptance Process (RAP) with the Department of Water Resources (DWR). The RAP was the first step in becoming eligible for Proposition 84 grant funding and helps to define certain aspects of the Region. Specifically, the RAP documents contact information, governing structure, RWMG	Deleted the word describe - note below the RAP documents ~~describe~~ contact information, governing structure, RWMG	This comment is incorporated in Section 1, but the language was changed to "… the RAP provides documentation of contact information …".
I-4	1	W. Deal (EAFB)	Recycled water and stormwater are secondary sources of water supply. A portion of the recycled water from the Antelope Valley Region's two large water reclamation plants, Los Angeles County Sanitation Districts' (LACSD) plants in Palmdale and Lancaster, are used for maintenance of wetlands, agricultural irrigation, landscape irrigation, and a recreational park. The expansion of recycled water use continues in the Region.	Recycled water and stormwater are secondary sources of water supply. A portion of the recycled water from the Antelope Valley Region's two large water reclamation plants, Los Angeles County Sanitation Districts' (LACSD) plants in Palmdale and Lancaster, are used for maintenance of the Piute Ponds wetlands, agricultural irrigation, landscape irrigation, and Apollo Park Lake. The expansion of recycled water use continues in	Specified the name of the "wetlands" and "recreational park"	This comment is incorporated in Section 1.1.

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				the Region.		
	1	W. Deal (EAFB)	Stormwater runoff from the Antelope Valley and the surrounding mountains and hills is usually carried by ephemeral streams. Except during the largest rainfall events, stormwater runoff quickly percolates into the stream bed and recharges the groundwater basin. Runoff that reaches the dry lakes carries sediment and provides soil resurfacing benefits to EAFB. Subsequently the runoff is generally lost to evaporation. Historically, water supplies within the Antelope Valley Region had been used primarily for agriculture; however, due to population growth beginning in the mid-1980s, water demands from residential and industrial uses have increased significantly and this trend is expected to continue. Projections indicate that approximately 1.17 million people will reside in the Antelope Valley Region by the year 2035, an increase of nearly 161 percent.	Surface flow (storm water runoff) from the surrounding mountains (San Gabriel, Tehachapi) and hills across alluvial fans and through deeply excised washes makes its way from the headwaters filling vernal pool like clay pan depressions, wetlands such as Piute Ponds, percolating into sand dunes where water is sequestered for summer use to the lowest point (Rosamond, Buckhorn, Rogers Lakebeds). As the surface flow makes its way to the lakes it drops the larger sediment and brings silty clay. The surface flow and clay fills in and re-establishes the surface structure which protects the lakes from wind erosion benefitting the Valley and Edwards AFB with cleaner air and sustains the surficial strength of the lakes which is important to the operational mission of Edwards AFB.	Reworded to reflect the natural environment, provide a more accurate perspective on what the surface water flow accomplishes. Stating is quickly percolates and is lost to evaporation leaves the reader with the sense that the runoff has little value. The agricultural portion of this paragraph has nothing to do with surface flow and should be its on paragraph or deleted. The structure of this section seems to be: 1. State Water Project 2. Surface Flow 3. Groundwater	This comment is incorporated into Section 1.1 with wording changes: "Surface flows (i.e., storm water runoff) from the surrounding San Gabriel Mountains, Tehachapi Mountains, and hills cross alluvial fans and flow through deeply excised washes. The flows make their way from the wash headwaters, filling vernal pool clay pan depressions and wetlands such as Piute Ponds, before either percolating into sand dune areas where water is sequestered for summer use or flowing to the lowest points in the Valley at Rosamond, Buckhorn, and Rogers dry lakebeds. As the surface flow makes its way to the lakebeds it allows the larger sediments to settle out first and transports smaller silty clay further into the Valley interior. The surface flow and silty clay helps to fill in and re-establish the soil surface structure, which protects the lakebed areas from wind erosion, sustains the surficial strength of the lakes (important to the operational mission of EAFB), and sustains local habitats. Some surface flows ultimately evaporate. structure, which protects the lakebed area"s

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						from wind erosion, sustains the surficial strength of the lakes (important to the operational mission of EAFB), and sustains local habitats. Some surface flows ultimately evaporate.
1-10	1	W. Deal (EAFB)	Operation of LACSD facilities influence the community and environment in the Antelope Valley by providing effluent to landscape and agricultural irrigation, industrial process water, recreational impoundments, wildlife habitat maintenance, and groundwater replenishment. Expansion of recycled water use in the Antelope Valley continues.	Operation of LACSD facilities influence the community and environment in the Antelope Valley by providing effluent to landscape and agricultural irrigation, industrial process water, recreational impoundments, wildlife habitat maintenance (such as Piute Ponds Complex and Apollo Park), and groundwater replenishment. Expansion of recycled water use in the Antelope Valley continues.	Added names to the wildlife habitat maintenance areas	This comment is incorporated in Section 1.2.1.6 with minor wording changes.
1-2		A. Jaramillo (LACWD)	…. accelerated development of the Antelope Valley Region and were attempting to identify appropriate actions to address the growing pressure on water services.	…. accelerated development of the Antelope Valley Region and were attempting to identify appropriate actions to address the increased need for water services.		This comment is incorporated in Section 1.
1-10	1.2.1.7	A. Jaramillo (LACWD)	LACWWD 40 has designed many of its groundwater wells so that excess treated imported water in the LACWWD 40's distribution system can be injected through the wells and stored until a future time when it is needed. This program is called aquifer storage and recovery.	LACWD 40 has implemented an aquifer storage and recovery program and equipped many of its groundwater wells so that excess treated imported water in the LACWD 40's distribution system can be injected through the wells and stored until a future time when it is needed.	Use new LACWD logo & replace all references to LACWWD 40 with LACWD 40	This comment is incorporated in Section 1.2.1.7.
1-10	1.2.1.7	A. Jaramillo (LACWD)	LACWWD 40 is also working with AVEK to utilize large undeveloped areas in the Antelope Valley to deliver imported water and allow it to infiltrate into the ground where it will be stored.	LACWD 40 is also working with AVEK to store water at their Water Supply Stabilization Project 2 water bank.		This comment is incorporated in Section 1.2.1.7.

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1-10 and 1-11	1.2.1.7	A. Jaramillo (LACWD)	LACWWD 40 also has an agreement with the Los Angeles County Sanitation Districts to use over 13,000 acre-feet of highly treated wastewater produced at their Palmdale and Lancaster Water Reclamation Plants on the North Los Angeles County Regional Recycled Water Project. This recycled water will be made available through construction of a completely separate distribution system for irrigation and other applications that do not require the water to be drinkable.	LACWD 40 also has an agreement with the Los Angeles County Sanitation Districts (LACSD) to purchase up to 13,500 acre-feet of tertiary treated recycled water produced at their Palmdale and Lancaster Water Reclamation Plants. The City of Lancaster and City of Palmdale are currently working with the LACSD on separate purchase agreements and LACWD 40 will subsequently modify their existing agreement. The recycled water will be made available through construction of the North Los Angeles County Regional Recycled Water Project which will be a completely separate distribution system for irrigation and other non-potable uses.	Re-word and add the suggested text	This comment is incorporated in Section 1.2.1.7.
1-12	Table 1-1	A. Jaramillo (LACWD)	LACWWD 40 Supplies water to portions of Los Angeles County	LACWD 40 Supplies water to portions of the Antelope Valley region in Los Angeles County		This comment is incorporated in Table 1-1.
1-24	1.3.3	A. Jaramillo (LACWD)	The IRWM Plan's water supply analysis is based on assumptions made regarding availability and reliability of the groundwater supply and was used to identify specific objectives and planning targets for the IRWM Plan. Thus it is possible that the outcome of the adjudication may require a change in the assumptions as well as the objectives and planning targets, which may delay implementation of the IRWM Plan.	The IRWM Plan's water supply analysis is based on estimates made regarding availability and reliability of the groundwater supply and was used to identify specific objectives and planning targets for the IRWM Plan. Thus it is possible that the outcome of the adjudication may require a change in the estimates as well as the objectives and planning targets, which may delay implementation of the IRWM Plan.		This comment is incorporated in Section 1.3.3.

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Section 2 Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
2-8	2	J. Hoerricks (WVCWD)	Not listed	Map should list our district. 250th West to Three Points Road – from just south of the 138 to Ave A	You see the boundary on 2-29 as a residential rectangle in the extreme west LA County	Comment is incorporated in Section 2.2 and Figure 2-3.
2-24	2.4.2.2	T. Chen (LACWD)	TDS does not pose substantial health risks at drinking water concentrations, but high TDS concentrations can negatively impact sensitive crops and cause corrosion and scaling in pipes.	There are no known health effects associated with the ingestion of TDS in drinking water. However, high TDS concentrations can negatively impact sensitive crops and cause corrosion and scaling in pipes.	Per the World Health Organization (WHO), “no recent data on health effects associated with the ingestion of TDS in drinking-water appear to exist.” TDS affects aesthetics only.	Comment is incorporated in Section 2.4.2.2
2-24	2.4.2.2	T. Chen (LACWD)	As with TDS, chloride does not pose substantial health risks at drinking water concentrations. Elevated chloride concentrations do, however, have substantial negative impacts on sensitive crops and cause corrosion in pipes.	As with TDS, there are no known health effects associated with the ingestion of chloride in drinking water. Chloride concentrations in excess of about 250 ppm can affect taste in water. Also, elevated chloride concentrations have substantial negative impacts on sensitive crops and cause corrosion in pipes.	Per WHO, “chloride concentrations in excess of about 250 mg/litre can give rise to detectable taste in water, but the threshold depends upon the associated cations. Consumers can, however, become accustomed to concentrations in excess of 250 mg/litre. No health-based guideline value is proposed for chloride in drinking-water.”	Comment is incorporated in Section 2.4.2.2
2-24	2.4.2.2	T. Chen (LACWD)	Arsenic is an emerging contaminant of concern in the Antelope Valley Region and has been observed in Los Angeles County Waterworks District (LACWWD) 40, PWD, and Quartz Hill Water District (QHWD) wells.	Arsenic is a concern in the Antelope Valley Region and has been observed in Los Angeles County Waterworks District (LACWWD) 40, PWD, and Quartz Hill Water District (QHWD) wells.	Too close to Contaminants of Emerging Concern (CEC) which are unregulated and may be new contaminants or those that may have been present but not detected.	Comment is incorporated in Section 2.4.2.2

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
2-24 to 2-25	2.4.2.2	T. Chen (LACWD)	Drinking water standards have been set to protect consumers served by public water systems from the effects of exposure to chromium. In 2008, the USEPA began a review of chromium-6 health effects and when this human health assessment is finalized EPA will determine if the current chromium standard should be revised.	Drinking water standards have been set to protect consumers served by public water systems from the effects of exposure to total chromium. On August 23, 2013, CDPH proposed an MCL for chromium-6 of 10 ppb. Completion of the rulemaking process may take up to 12 months after the proposal.	The current drinking water standard is for ***total*** chromium. The State proposed a drinking water standard for Cr-6.	Comment is incorporated in Section 2.4.2.2
2-25	2.4.2.3	11/20/2013 Stakeholder meeting			Add footnote (need to change footnote and #): "The number for TSY used in this 2013 IRWMP Update is selected strictly for long-term planning purposes and is not intended to answer the questions being addressed within the adjudication process."	Comment is incorporated in Section 2.4.2.3
2-26	2.4.2.4	11/20/2013 Stakeholder meeting			Add footnote: "The number for TSY used in this 2013 IRWMP Update is selected strictly for long-term planning purposes and is not intended to answer the questions being addressed within the adjudication process."	Comment is incorporated in Section 2.4.2.4
2-29	2	J. Hoerricks (WVCWD)	No text	The residential areas described for our district are zoned A-1 2.5 and some residences have ranch/farm functions.		Comment is incorporated in Section 2.2 and Figure 2-3.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
2-32	2	J. Hoerricks (WVCWD)	2.5.3 Social and Cultural Values	Neenach is 34 miles NW of Lancaster. Neenach residents tend to associate more with the mountain communities than with the AV.	http://en.wikipedia.org/wiki/Neenach,_CA No AV Press delivery. We get the Mountain Enterprise in Neenach.	Comment is acknowledged. No response necessary. WVCWD is added to Figure 2-3.
2-35-2-36	2	J. Hoerricks (WVCWD)	Economics/population/demographics	Sharing a zip code with western Lancaster (93536), we get merged with their data.	Are customers are older and lower in income (fixed income retirees and off-griders) than those in western Lancaster.	Comment is acknowledged. No census data was available for Neenach.
2-37	2	J. Hoerricks (WVCWD)	No listing for Neenach	See above		Comment is acknowledged. No census data was available for Neenach.

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Section 3 Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
		W. Deal (EAFB)	Figure 3-1 – surface runoff line (red) goes straight to water leaving	Add box interrupting this line for habitat usage - Piute Ponds, other wetlands, clay pan/vernal pools, sand dune water sequestration, dry lakebed resurfacing	The surface runoff as we have all agreed provides a beneficial use it does not just leave the system	Comment is incorporated in Section 3.1, Figure 3-1.
3-6	3.1.2	D. Chisam (AVEK)	Table A water is a reference to the amount of water listed in "Table A" of the contract between the SWP and the contractors and represents the maximum amount of water a contractor may request each year. AVEK, which is the third largest state water contractor, has a Table A Amount of 141,400 AFY. Approximately three (3) percent of AVEK's Table A Amount has historically been delivered to areas outside of the Antelope Valley Region leaving about 137,150 AFY available within the Region		Is this refereeing to delivery to AVEK customers outside the plan boundary if so that should be clarified	Comment is incorporated in Section 3.1.2.
3-7	3.1.2	D. Chisam (AVEK)	To accommodate the need to store water during the winter months for use in the dry summer months, AVEK has planned water banking projects to increase their ability to fully use their SWP allotment. AVEK recently completed the Water Supply Stabilization Project (WSSP-2) that allows them to store up to 23,000 AFY of water (35,000 AFY total storage for all of the parties involved) during winter months when M&I demands are low (AVEK 2011).		the actual capacity of wssp 2 is 150,000 af and we have 35,000 in storage at the present time	Comment is incorporated in Section 3.1.2.

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3-7	3.1.2	D. Chisam (AVEK)	SWP deliveries to AVEK do not incorporate conveyance capacity restrictions in this Plan since SWP reliability reduces delivery estimates to a low quantity. With the addition of the WSSP-2 water banking project, AVEK is able to beneficially use up to 104,750 AFY. This assumes 400 AF/day deliveries from June 15 to September 31 that are limited by conveyance capacity and 150 AF/day deliveries for the rest of the year that are limited by demands. This is equivalent to 81,750 AFY before the addition of the 23,000 AFY that can be stored in the completed WSSP-2 water storage bank. Because the SWP reliability is 60% for an average year, AVEK's estimated average year SWP delivery is only about 83,700 AFY, which is below the maximum conveyance capacity and thus is not affected. Higher SWP allocations may be constrained in wetter years, but such scenarios are not analyzed in this Plan. Future water banking projects will allow AVEK to maximize the amount of SWP deliveries they can put to beneficial use.		150,000 capacity storage and recover is currently 20 MGD that will increase to 50 MGD over the next 10 years	Comment is incorporated in Section 3.1.2.

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3-11	3.1.3.1	D. Chisam (AVEK)	Table 3-4		this chart is confusing the it would appear that there maybe 85,000 people but most would be using groundwater the the actual imported water per capita water would be closer to .314 I understand what your trying to do but this chart creates more confusion that it solves	Comment is incorporated with new language in Section 3.1.3.1. Population numbers in Table 3-4 do not include private well owners.
3-17	3	W. Deal (EAFB)	Lancaster WRP: ….. Approximately 3 mgd of effluent from the Lancaster WRP is used to maintain wetlands at the Piute Ponds and 0.5 mgd is reused at the Apollo Lakes Regional Park to maintain the water level in the lakes and for irrigation.	Lancaster WRP: ……. It is estimated between 5 and 7 mgd of effluent from the Lancaster WRP is used to maintain wetlands at Piute Ponds. Higher amounts are required in years when flushing than years of maintenance. Note: Amounts needed are in the process of being determined.	3 mgd is inaccurate please change	Comment is incorporated in Section 3.1.4.1.
3-17	3.1.4	Erika deHollan (LACSD)	Distribution Pipeline: As shown in Figure 3-5, the recycled water distribution system in Lancaster, which serves Apollo Lakes and Nebeker Ranch, has been expanded for urban reuse as part of the Division Corridor Project. Figure 3-5 also shows the LACWD 40 Recycled Water Backbone distribution pipeline which is intended to further expand urban reuse in the Antelope Valley Region. This expansion throughout the Antelope Valley Region is a direct result of the substantial coordination and cooperation between Kern and Los Angeles Counties. Lancaster WRP: The Lancaster	Distribution Pipeline: As shown in Figure 3-5, the recycled water distribution system in Lancaster, which serves sites such as Apollo Lakes ~~and Nebeker Ranch~~, has been expanded for urban reuse as part of the Division Street Corridor Project. Figure 3-5 also shows the LACWD 40 Recycled Water Backbone distribution pipeline which is intended to further expand urban reuse in the Antelope Valley Region. This expansion throughout the Antelope Valley Region is a direct result of the substantial coordination and cooperation between Kern and Los Angeles Counties.	3-17	Comments are incorporated in Section 3.1.4.1.

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			WRP, built in 1959 and located north of the City of Lancaster, is owned, operated, and maintained by Los Angeles County Sanitation District No. 14 (LACSD 14). Lancaster WRP, which has a permitted capacity of 18.0 mgd, treated an average flow of 14.1 mgd in 2012 to tertiary standards for agricultural irrigation, wildlife habitat, maintenance, and recreation. Approximately 3 mgd of effluent from the Lancaster WRP is used to maintain wetlands at the Piute Ponds and 0.5 mgd is reused at the Apollo Lakes Regional Park to maintain the water level in the lakes and for irrigation. Palmdale WRP: Palmdale WRP, built in 1953 and located on two sites adjacent to the City of Palmdale, is owned, operated, and maintained by LACSD 20. Palmdale WRP, which has a permitted capacity of 12.0 mgd. The plant treated an average flow of 9.04 mgd in 2012 to tertiary standards. All tertiary treated water is used for agricultural and municipal reuse.	Lancaster WRP: The Lancaster WRP, built in 1959 and located north of the City of Lancaster, is owned, operated, and maintained by Los Angeles County Sanitation District No. 14 (LACSD 14). Lancaster WRP, which has a permitted capacity of 18.0 mgd, treated an average flow of 14.1 mgd in 2012 to tertiary standards for agricultural and landscape irrigation, municipal and industrial (M&I) reuse, wildlife habitat, maintenance, and recreation. ~~Approximately 3 mgd of effluent from the Lancaster WRP is used to maintain wetlands at the Piute Ponds and 0.5 mgd is reused at the Apollo Lakes Regional Park to maintain the water level in the lakes and for irrigation.~~ Recycled water produced at the Lancaster WRP and accounted for environmental maintenance and recreation reuse at Apollo Community Regional Park and Piute Ponds is not included in the potential availability (Table 3-11), since these flows will not likely be available for other M&I use in the Antelope Valley. Palmdale WRP: Palmdale WRP, built in 1953 and located on two sites adjacent to the City of Palmdale, is owned, operated, and maintained by LACSD 20. Palmdale WRP, which has a permitted capacity of 12.0 mgd. The plant treated an average flow of 9.04 mgd in 2012 to tertiary standards. All tertiary		

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				treated water is used for agricultural and ~~municipal~~ M&I reuse.		
3-17	3.1.4	Erika deHollan (LACSD)	Table 3-11	• Revise Lancaster WRP values: 2012 – 10,000 2015 – 11,000 2020 – 13,000 2025 – 14,000 2030 – 16,000 2035 – 17,000 • "Total Study Area" values will need to be recalculated (as well as references to these values throughout the Plan). • For Lancaster WRP, delete footnote "a" and change "b" to "LWRP water availability excludes water used for environmental maintenance~~includes 3.03 mgd (3,400 AFY) already contracted to users~~."	3-17	Comment is incorporated in Section 3.1.4.1.
3-18	3.1.4	Erika deHollan (LACSD)	Figure 3-15		3-18	Unclear on how to respond to this comment.
3-18	Fig 3-5	A. Jaramillo (LACWD)			The solid line between Ave M and the Palmdale WRP should be dashed since the facilities have not been constructed yet	Comment is incorporated in Figure 3-5.

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3-19	3.1.4	Erika deHollan (LACSD)	Table 3-12	• Change table title to: Summary of Current and Projected Recycled Water Use Demands (AFY) in the Antelope Valley • Delete lines for Piute and Apollo Park. • For North LA/Kern County Regional Recycled Water Project, 3 AF were used in 2010. • Recalculate "Total Recycled Water Demand" values. • Add footnote: "Demands do not include recycled water use for environmental maintenance."	3-19	Comment is incorporated in Section 3.1.4, Table 3-12.
3-19	3.1.4.2	Erika deHollan (LACSD)	Table 3-12 summarizes the existing and projected recycled water demand as listed in the 2014 Salt and Nutrient Management Plan for the Antelope Valley (Appendix F). While expanded recycled water use in the Antelope Valley Region is highly likely, only current recycled water uses are included in this IRWM Plan's supply and demand calculations to show the need for increased end use of recycled water supply. Current M&I recycled water demand for both the Lancaster and Palmdale WRPs is assumed to be about 5,332 AFY with only about 5,252 AFY in 2010. Current demands for recycled water include: • Apollo Community Regional Park (Apollo Park): Tertiary recycled water produced by	Table 3-12 summarizes the existing and projected recycled water demand as listed in the 2014 Salt and Nutrient Management Plan for the Antelope Valley (Appendix F). While expanded recycled water use in the Antelope Valley Region is highly likely, only current recycled water uses are included in this IRWM Plan's supply and demand calculations to show the need for increased end use of recycled water supply. Recycled water used for environmental and recreational area maintenance at Piute Ponds and Apollo Community Regional Park is not included in demands since it was excluded from the recycled water availability in Table 3-11. Current M&I recycled water ~~demand~~ use for both the Lancaster and Palmdale WRPs is ~~assumed to be about 5,332~~ approximately 82 AFY.	3-19	Comments are incorporated in Section 3.1.4.2.

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			LACSD 14 at the Lancaster WRP is used to maintain a series of lined recreational lakes. Water from the lakes is used for landscape irrigation at the park as well. Apollo Park uses 250 AFY of recycled water. • Piute Ponds: Tertiary recycled water produced by LACSD 14 at the Lancaster WRP is conveyed to the Piute Ponds on the Edwards AFB where it maintains a marsh-type habitat. This includes discharge at the series of shallow impoundments just south of the Piute Ponds that are maintained in the winter for recreational duck hunting. The Piute Ponds use 5,000 AFY of recycled water. • North LA/Kern County Regional Recycled Water Project: To date, only a portion of the recycled water backbone project has been built. The Division Street Corridor uses an average of 2.0 AFY (personal communication with Aracely Jaramillo, LACWD 40) and the Palmdale Regional Recycled Water Authority's water line to McAdam Park in Palmdale using about 80 AFY (personal communication with Gordon Phair, City of Palmdale). The Palmdale water line	Approximately ~~with only about~~ ~~5,252~~3 AFY was used in 2010. Current demands for recycled water include those for the ~~:~~ ~~Apollo Community Regional Park (Apollo Park): Tertiary recycled water produced by LACSD 14 at the Lancaster WRP is used to maintain a series of lined recreational lakes. Water from the lakes is used for landscape irrigation at the park as well. Apollo Park uses 250 AFY of recycled water.~~ ~~Piute Ponds: Tertiary recycled water produced by LACSD 14 at the Lancaster WRP is conveyed to the Piute Ponds on the Edwards AFB where it maintains a marsh-type habitat. This includes discharge at the series of shallow impoundments just south of the Piute Ponds that are maintained in the winter for recreational duck hunting. The Piute Ponds use 5,000 AFY of recycled water.~~ North LA/Kern County Regional Recycled Water Project: To date, only a portion of the recycled water backbone project has been built. The Division Street Corridor uses an average of 2~~.0~~ AFY (personal communication with Aracely Jaramillo, LACWD 40), with approximately 3 AFY used in 2010. ~~and t~~The Palmdale Regional Recycled Water Authority's water line to McAdam Park in Palmdale ~~using~~ uses about 80 AFY (personal communication with Gordon		

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			was not built until after 2010.	Phair, City of Palmdale), but . Tthe Palmdale water line was not built until after 2010.		
3-19	3.1.4.2	A. Jaramillo (LACWD)	To date, only a portion of the recycled water backbone project has been built. The Division Street Corridor uses an average of 2.0 AFY (personal communication with Aracely Jaramillo, LACWD 40)	To date, only a portion of the recycled water backbone project has been built. The Division Street Corridor uses an average of 2.0 AFY (Erika DeHollan, LACSD)	Reference primary information source	Comments are incorporated in Section 3.1.4.2.
3-19	3.1.4.2	W. Deal (EAFB)	Piute Ponds: Tertiary recycled water produced by LACSD 14 at the Lancaster WRP is conveyed to the Piute Ponds on the Edwards AFB where it maintains a marsh-type habitat. This includes discharge at the series of shallow impoundments just south of the Piute Ponds that are maintained in the winter for recreational duck hunting. The Piute Ponds use 5,000 AFY of recycled water.	Piute Ponds: Tertiary recycled water produced by LACSD 14 at the Lancaster WRP is conveyed to the Piute Ponds Complex on Edwards AFB where it sustains the wetland area. It is currently estimated that Piute Ponds uses between 5,500 and 6,500 AFY of recycled water depending on flushing requirements. Note: Amounts needed are in the process of being determined.	Deleted shallow impoundments, corrected amounts	Comments from LACSD were incorporated into Section 3.1.4.2 and address this comment as well.
3-19	Table 3-12	W. Deal (EAFB)	5,000	5,500 to 6,500	Changed amounts	Comments from LACSD were incorporated into Section 3.1.4.2 and address this comment as well.
3-22	3.1.6.3	A. Jaramillo (LACWD)	Total sustainable yield (TSY) is composed of natural recharge and return flows	Total sustainable yield (TSY) is composed of natural recharge, supplemental recharge from imported water and associated return flows	Natural recharge and return flow only = Native safe yield	Comment is incorporated in Section 3.1.6.3.

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3-22	3.1.6.3	A. Jaramillo (LACWD)	These estimates are added to natural recharge to get TSY. As part of the current adjudication proceedings, the TSY has been determined to be 110,000 AFY (i.e., natural recharge and return flows). A list of documents that reference estimates for TSY, natural recharge, and return flows are included in Appendix H.	These estimates are added to recharge to get TSY. As part of the current adjudication proceedings, the TSY has been determined to be 110,000 AFY (i.e., recharge and return flows). A list of documents that reference estimates for TSY, natural recharge, and return flows is listed in Appendix H.	Delete natural from natural recharge, as appropriate	Comment is incorporated into Section 3.1.6.3.
3-23	3.1.6.3	11/20/2013 Stakeholder meeting			Add foot note to last paragraph, first sentence: "The number for TSY used in this 2013 IRWMP Update is selected strictly for long-term planning purposes and is not intended to answer the questions being addressed within the adjudication process."	Comment is incorporated into Section 3.1.6.3.
3-23	3.1.6.3	A. Jaramillo (LACWD)	It is important to note that the value for TSY may be revisited by the Court after a period of monitoring and documentation. If the TSY number is revised in the future for any reason, the IRWMP will be updated to reflect those changes.	Although unlikely, it is important to note that the value for TSY may be revisited by the Court after a period of monitoring and documentation. If a motion is filed with the Court to revise the TSY, the IRWMP will be updated to reflect the subsequent decision.		Comment is incorporated into Section 3.1.6.3.
3-23	3.1.6.4	A. Jaramillo (LACWD)	AVEK's WSSP-2 project was completed in 2010 and can store up to 35,000 AFY. This project is a collaboration between several agencies. AVEK can store up to 23,000 AFY SWP water or water from water transfers with the remainder of the storage distributed between the other agencies	AVEK's WSSP-2 project was completed in 2010 and can store up to 500,000 AF. This project is a collaboration between several agencies. AVEK can recharge up to 23,000 AFY SWP water or water from water transfers with the remainder of the storage distributed between the other agencies	Verify WSSP2 storage volume and recharge capacity. Is 35,000 AFY the extraction capacity? from how many wells and will they all be completed by 2015?	Comment is incorporated into Section 3.1.6.4. Includes updated number from AVEK for WSSP-2 existing capacity of 150,000 AFY and withdrawal capacity of 23,000 AFY.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
3-23	3.1.6.4	D. Chisam (AVEK)	AVEK's WSSP-2 project was completed in 2010 and can store up to 35,000 AFY. This project is a collaboration between several agencies. AVEK can store up to 23,000 AFY SWP water or water from water transfers with the remainder of the storage distributed between the other agencies.		23,000 annually to a maximum of 150,000	Comment is incorporated into Section 3.1.6.4. Includes updated number from AVEK for WSSP-2 existing capacity of 150,000 AFY and withdrawal capacity of 23,000 AFY.
3-23	3.1.8.2 and 3.1.8.3	A. Jaramillo (LACWD)			Delete 'natural' from 'natural recharge'	Comment is incorporated into Section 3.1.6.3.
3-30	3.1.8.2 and 3.1.8.3	A. Jaramillo (LACWD)			Verify values based on confirmation of storage volume and extraction capacity	Comment is incorporated into Sections 3.1.8.2 and 3.1.8.3 based on input from AVEK.
3-30	3.1.8.3	D. Chisam (AVEK)	This Plan assumes that AVEK's WSSP-2 water bank will be in operation during the planning horizon and that a sufficient amount of wet years or water transfers will have occurred between dry year periods to keep the bank at full capacity prior to a four-year dry period. The full capacity of the bank is 35,000 AFY; therefore it is assumed that approximately ¼ of this amount would be used each year of the 4-year dry period (about 8,000 AFY). It is possible that banked water will not be available during a multi-dry year, in which case the mismatch would be more severe (up to 37,000 AFY).		150,000 a f capacity with a recovery capacity of 20 to 50 MGD	Comment is incorporated into Sections 3.1.8.2 and 3.1.8.3 based on input from AVEK.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
3-31 to 3-33	Fig 3-11 to 3-13 & Table 3-14 to 16	A. Jaramillo (LACWD)			Reference primary information source	Information sources were identified in Sections 3.1.1 through 3.1.4.
3-33	3.1.8.3	D. Chisam (AVEK)	Figure 3-12		assuming 50 MGD that would mean 56,000af or a 21,000 a f shortage in 3035	The Plan assumes only current projects will be operational, thus explaining the need for additional projects. The impacts of planned projects is discussed in Section 6.
3-35	3.1.9.4	A. Jaramillo (LACWD)	AVEK's Quartz Hill WTP will require an expansion to approximately 97 mgd to treat LACWD 40's projected demands (LACWD 40 1999). Furthermore, as previously mentioned,		Delete. I believe the expansion to 90 mgd was completed	Comment is incorporated in Section 3.1.9.4.
3-35	3.1.9.4	A. Jaramillo (LACWD)	LACWD 40's facilities improvements will include new wells, reservoirs and pipelines throughout its system to meet current and projected water supply requirements. Additional connections with AVEK will be needed to maximize use of available imported water. LACWD 40 is pursuing the use of recycled water as an alternative source for irrigation and recharge purposes.	LACWD 40's facilities improvements will include well efficiency and rehabilitation projects, reservoirs and pipelines throughout its system to meet current and projected water supply requirements. LACWD 40 is pursuing the use of recycled water as an alternative source for irrigation and recharge purposes.	Update.	Comment is incorporated in Section 3.1.9.4.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
3-35	3.1.9.4	D. Chisam (AVEK)	LACWD 40's facilities improvements will include new wells, reservoirs and pipelines throughout its system to meet current and projected water supply requirements. Additional connections with AVEK will be needed to maximize use of available imported water. LACWD 40 is pursuing the use of recycled water as an alternative source for irrigation and recharge purposes.		Also WW40 and other customers from AVEK could re regulate their water deliveries to use a more consistent annual supply deliveries in the winter months that would allow the use of all the table A water without any storage or recharge.	Comment is incorporated in Section 3.1.9.4.
3-43	3.2.2.1	A. Jaramillo (LACWD)			Add info regarding Quartz Hill WTP expansion to 90 mgd	Comment is incorporated in Section 3.2.2.1.
3-44	3.2.3	T. Chen (LACWD)	Tertiary treated effluent from the Region's three water reclamation plants will be of sufficient quality to meet unrestricted use requirements.		Verify the number of reclamation plants, I know of five: EAFB Main, EAFB Research Lab, LACSD 14, LACSD 20, and RCSD.	This comment is addressed in Section 3.2.3. EAFB plants are not included

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
3-47	3.3.1	W. Deal (EAFB)	**3.3.1 Regional Flood Management Issues and Needs** The key issues, needs, challenges, and priorities for the Antelope Valley Region with respect to flood management include the following, which are discussed in greater detail below: □ Lack of coordination throughout Antelope Valley Region; □ Poor water quality of runoff; □ Nuisance water and dry weather runoff; □ Difficulty providing flood control without interfering with groundwater recharge; □ Desire of EAFB to receive sediments into the dry lakes to maintain operations area. □ Baseline flooding and sediment/erosion not well defined □ No development guidelines for alluvial fans	**3.3.1 Regional Flood Management Issues and Needs** The key issues, needs, challenges, and priorities for the Antelope Valley Region with respect to flood management include the following, which are discussed in greater detail below: □ Lack of coordination throughout Antelope Valley Region; □ Poor water quality of runoff; □ Nuisance water and dry weather runoff; □ Difficulty providing flood control without interfering with groundwater recharge; □ Desire of EAFB to receive sediments into the dry lakes to maintain operations area. □ Baseline flooding and sediment/erosion not well defined □ No development guidelines for alluvial fans - Protection of habitat processes and sensitive habitats which rely on surface flow such as Antelope Valley Significant Ecological Areas (SEA), Piute Ponds, clay pans, mesquite woodlands, dry lakes	Added key issue at bottom to keep the downstream habitats on the table. Please add.	Comment is incorporated in Section 3.3.1.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
3-49	3.3.1.2	W. Deal (EAFB)	Ideally stormwater programs would be developed through stakeholder involvement as part of an integrated program that would identify concepts and projects developed to maximize flood control benefits, water quality benefits, and water supply benefits.	Ideally stormwater programs would be developed through stakeholder involvement as part of an integrated program that would identify concepts and projects developed to maximize flood control benefits, water quality benefits, water supply benefits, and protection of natural surface flow routes and levels thereby protection natural environment downstream.	Added natural environment protection downstream – last sentence	Comment is incorporated in Section 3.3.1.2.
3-49	3.3.1.5	W. Deal (EAFB)	**Desire of Edwards AFB to Receive Sediments into the Dry Lakes to Maintain Operations Area** Sediment carried by stormwater flows eventually ends up on the dry lake beds at EAFB that have been established as emergency landing runways. Flood waters and the resulting siltation act to "resurface" and naturally restore the elevations of the dry lake beds. Flood waters also provide benefits to local habitats and for dust control. The balance between these benefits and periodic flooding is currently being studied by EAFB, and once understood it will provide an indication of the amount of sediment and water needed. The results will provide the downstream constraints that will inform the development of a regional integrated flood management program that optimizes flood control, water quality and water supply benefits. It is also important to note that periodic flood flows	**Habitat and Lakebed requirements to protect natural processes** Stormwater runoff within the Antelope Valley is carried by ephemeral streams. Between 0.36 inches and 0.56 inches of rainfall in the first 24 hours is required to saturate the soils and initiate surface flow runoff. As runoff moves from the headwaters to the lakebeds it percolates into the stream beds recharging the groundwater, flows through well-defined washes changing to braided alluvial fan washes topping the channels and flowing as sheet flow across the lower valley floor filling clay pan depressions (similar to vernal pools and potholes), wetlands (most notable being Piute Ponds), percolating into sand dunes where the water is sequestered for later use, down the valley floor into the dry lakebeds at Edwards	Yes it is imperative to the operational mission at EAFB that the sediment load as well as the surface flow which provides the resurfacing is maintained. However, this should be addressed along with other downstream issues. Rewrote to reflect current issues and take this from an Edwards AFB only issue to reflect the AV issue of which Edwards is part. If these features are not maintained not only will EAFB suffer so will the surrounding communities. This should reflect the natural environment and processes, provide a more accurate perspective on what the surface water flow accomplishes. This could be shortened and tweeked of course but should relay to you the issue to be highlighted. EAFB would like and plans to continue to study how much is needed to keep the lakebeds healthy but that may not happen in the timeframe required by our surrounding communities. The surrounding communities may want to consider also developing a study which would assist in answering the outstanding questions to be used when moving forward with water banking projects and flood control.	Comments are incorporated in Section 3.3.1.5 and in the bullet list at the beginning of Section 3.3.1.

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			can have negative consequences at EAFB. For example, in 1983, stormwater flows were large enough to cause the runways to be out of operation (LADPW 1987).	AFB. The amount of flow depends on the size of the storm, how much rainfall has already occurred recently, etc. It has been documented in "Surface Flow Study Technical Report, Edwards Air Force Base, April 2012" that a 5 year storm (approximately 2.5 inches) is sufficient to provide 946 +/- 189 acre feet of surface water flow to Rosamond Lake with the peak discharge measured at 92 cfs. The total sediment discharge measured was 1,542 metric tons. However the error rate is pretty high at +/- 30%. Rogers and Buckhorn Lake were not measured. Stormwater runoff is important to downstream habitat values throughout the Valley and are seen at Edwards AFB as particularly valuable to sustain the surface structure of the dry lakebeds for their operational missions, the overall air quality of the Antelope Valley for both EAFB and the surrounding communities, and the Piute Pond Complex's wetland functions and values.	As to the LADPW, 1987 quote – this does not relay a true picture of the issue. Yes, in 1983 runways were out of operation but this happens whenever there is a 5 year plus storm, it is recognized at this point the need for this storm flow. It is recognized the negative longterm impacts caused when the flows are cut off. EAFB adjusts to these temporary flooding events for the long term benefit to the overall lakebeds.	

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
3-50	3.4	W. Deal (EAFB)	However, the Antelope Valley Region is home to numerous desert washes (Little Rock Creek, Big Rock Creek), as well as man-made lakes (Little Rock Creek Reservoir, Lake Palmdale), sag ponds (an enclosed depression formed where active or recent fault movement results in impounded drainage), and areas of rising groundwater. Freshwater marsh and alkaline meadow habitat is found in the vicinity of Piute Ponds. While wetland and riparian areas are limited in the Antelope Valley Region, these areas are important resources to birds migrating along the Pacific Flyway (LACSD 2004).	However, the Antelope Valley Region is home to numerous desert washes (Little Rock Creek, Big Rock Creek, Amargosa Creek, Cottonwood Creek System), as well as man-made lakes (Little Rock Creek Reservoir, Lake Palmdale), sag ponds (an enclosed depression formed where active or recent fault movement results in impounded drainage), and areas of rising groundwater. Freshwater marsh, wetland, and alkaline meadow habitat is present within the Piute Pond Complex. Wetland and wash areas are found within the Mesquite woodland. While wetland and riparian areas are limited in the Antelope Valley Region, these areas are important resources to birds migrating along the Pacific Flyway (LACSD 2004).	Added more creeks to the list, reworded Piute sentence and added mesquite wetland/wash.	Comment is incorporated in Section 3.4.
3-53	3.4.1	W. Deal (EAFB)	**3.4.1 Regional Environmental Resource Issues and Needs** The following is a list of the key issues, needs, challenges, and priorities for environmental management within the Antelope Valley Region, as determined by the stakeholders: □ Conflict among industry, growth, and preservation of open space/Desire to preserve open space;	**3.4.1 Regional Environmental Resource Issues and Needs** The following is a list of the key issues, needs, challenges, and priorities for environmental management within the Antelope Valley Region, as determined by the stakeholders: □ Conflict among industry, growth, and preservation of natural areas and open space/Desire to preserve open space;	Reworded to add natural areas: Conflict among industry, growth, and preservation of natural areas and open space/Desire to preserve open space	Comment is incorporated in Section 3.4.1.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
3-55	3.5.1.1	W. Deal (EAFB)	**3.5.1.1 Growing Public Demand for Recreational Opportunities** The Antelope Valley Region offers many recreational opportunities. The Antelope Valley Region has over 410 acres of developed park land including 27 parks, 22 softball fields, five baseball fields, 21 soccer fields and 17 tennis courts. In addition there are over 3,000 acres of natural park land. Antelope Valley Region is also home to the 1,700 acre California Poppy Reserve and the Arthur B. Ripley Desert Woodland State Park.	**3.5.1.1 Growing Public Demand for Recreational Opportunities** The Antelope Valley Region offers many recreational opportunities. The Antelope Valley Region has over 410 acres of developed park land including 27 parks, 22 softball fields, five baseball fields, 21 soccer fields and 17 tennis courts. In addition there are over 3,000 acres of natural park land, and approximately 5,600 acres of upland and wetland natural areas at Piute Ponds. Antelope Valley Region is also home to the 1,700 acre California Poppy Reserve and the Arthur B. Ripley Desert Woodland State Park.	Added Piute Ponds to the list of areas. These are available to the community for nature based recreational pursuit with easy to obtain access letters to the area.	Comment is incorporated in Section 3.5.1.1.
3-58	3.5.1.4	W. Deal (EAFB)	Other environmental impacts from soil disturbance and vegetation cover loss include increased dust storms and lifestyle disturbance. Dust storms can cause road closures, a decline of populations in rural areas, and loss of utility services among other things. As land use in the Antelope Valley changes impacts to these resources need to be considered and balanced.	Other environmental impacts from soil disturbance and vegetation cover loss include increased dust storms and lifestyle disturbance. Dust storms can cause road closures, a decline of populations in rural areas, and loss of utility services among other things. As land use in the Antelope Valley changes impacts to these resources need to be considered and balanced. As flood control and surface flow runoff diversion is considered impacts to the dry lakebeds need to be considered and balanced as lack of surface water flow to maintain the cryptobiotic surface structure will cause breakdown of the lakebed surface structure and add to the AV dust storm issues.	3-58	Comment is incorporated in Section 3.5.1.4.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
ES-5	3	A. Jaramillo (LACWD)			See comment in Section 3.1.6.4 re: WSSP2 extraction capacity	Comment is incorporated in the Executive Summary.

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Section 4 Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
4-9	4.3	Erika deHollan (LACSD)	Objective: Maximize beneficial use of recycled water.		Revise numbers based on revisions to Tables 3-11 and 3-12.	Comment is incorporated in Section 4.3.
4-9	4.4	Wanda Deal (EAFB)	In some areas of the Valley, underlying impervious soils will cause stormwater to pool and become nuisance water until it eventually evaporates. In addition, the Region recognizes that it may be vulnerable to potential increases in flooding due to projected changes in precipitation caused by climate change.	~~In some areas of the Valley, underlying impervious soils will cause stormwater to pool and become nuisance water until it eventually evaporates. In addition,~~ the Region recognizes that it may be vulnerable to potential increases in flooding due to projected changes in precipitation caused by climate change.	This appears to be referring to the clay pan depressions which provide wetland type habitat to many wildlife species. The invertebrates (such as fairy shrimp) depend on the surface flow filling of these areas with impervious soils to exist and subsequently provide food for migrating birds. So although it may eventually evaporate it isn't nuisance water and is providing a beneficial use. In addition sand dunes which exist beside these clay pans also have impervious soils beneath them which pools water and allows the dunes to maintain moist soils (sequestering it) to be used by the vegetation during the dry summers.	Comment is incorporated in Section 4.4.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
4-10	4.4	Wanda Deal (EAFB)	One example of the importance of maintaining natural flood flow areas is Rosamond Dry Lake at the lowest elevation in the watershed. This lake requires significant flooding to maintain the biological crust that protects the lakebed surface from breaking down during high wind events. By protecting the lakebed surface, the air quality in the Antelope Valley is protected, and the operational mission of Edwards AFB is protected by providing a suitable surface to test experimental aircraft and processes, which in turn provides jobs to Antelope Valley residents.	One example of the importance of maintaining natural flood flow areas is Rosamond Dry Lake at the lowest elevation in the watershed. This lake requires significant flooding to maintain the biological crust that protects the lakebed surface from breaking down during high wind events. By protecting the lakebed surface, the air quality in the Antelope Valley is protected, and the operational mission of Edwards AFB is protected by providing a suitable surface to test experimental aircraft and processes, which in turn provides jobs to Antelope Valley residents.	This example was on the money and also applies to Rogers and Buckhorn Dry Lakes.	Comment is acknowledged. No response necessary.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
4-10	4.4	Wanda Deal (EAFB)	None	While optimizing the balance between protecting existing beneficial uses of stormwater and capturing stormwater for new uses the natural habitats downstream, Piute Ponds as an example, is very dependent on the natural flows. Although sustained through the years by recycled water the dramatic stormflows are still a major component of the system providing more water in 4 days during a 5 year storm than the Sanitation District can in a month. The power of this stormflow provides needed clearing of vegetation, sediment, and water to wetland and wet meadow areas not reached by the Sanitation District but important to sensitive wildlife and plant life. A major alkali mariposa lily population exists in the Piute Pond Complex and requires surface water flow to maintain.	Suggest add Piute as an important natural area which needs to be considered in this equation.	Comment is incorporated into Section 4.4

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Section 5 Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
5-7	5.2	D. Chisam (AVEK)	□ *System Reoperation* – increases reliability and control of water movement between imported water turnouts, surface and groundwater storage supply locations, and demand locations and therefore increases overall reliability of water supplies □ *Water Transfers* – increase the amount of imported water supplies available to the Region and therefore reduces the Regional gap between supply and demand; supports adaptation to climate change impacts that increase overall demands and/or reduce supplies		Consider using imported water as the first supply to maximize the use of imported water without capital facilities leaving the groundwater for future shortage periods.	Comment is acknowledged. The RMS discussion in Section 5.2 does not prioritize or recommend the order of implementation for the strategies. Maximizing imported water use before transfers or groundwater could be the best strategy for implementation.
5-8	5.2	D. Chisam (AVEK)	□ *System Reoperation* – increases reliability and ability to move water throughout the Region; greater flexibility allows for increased use of alternate supplies during a SWP disruption □ *Water Transfers* – may increase access to stored SWP water that could be delivered during a SWP disruption		(Same comment) Consider using imported water as the first supply to maximize the use of imported water without capital facilities leaving the groundwater for future shortage periods.	Comment is acknowledged. The RMS discussion in Section 5.2 does not prioritize or recommend the order of implementation for the strategies. Maximizing imported water use before transfers or groundwater could be the best strategy for implementation.

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
5-9	5.2	D. Chisam (AVEK)	*System Reoperation* – increases reliability and ability to move water throughout the Region; allows greater control of the draw and fill of water banks in relation to demands located throughout the Region and therefore allows for groundwater supplies to be obtained from areas that are managed *Water Transfers* – increases the amount of imported water supply that could be available for groundwater recharge or in-lieu supply		(Same comment) Consider using imported water as the first supply to maximize the use of imported water without capital facilities leaving the groundwater for future shortage periods.	Comment is acknowledged. The RMS discussion in Section 5.2 does not prioritize or recommend the order of implementation for the strategies. Maximizing imported water use before transfers or groundwater could be the best strategy for implementation.

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Section 6 Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
6-2	6.1	11/20/2013 Stakeholder meeting			Add footnote to 4th sentence of 2nd paragraph (mid paragraph after "Therefore. . . water balance"): "The number for TSY used in this 2013 IRWMP Update is selected strictly for long-term planning purposes and is not intended to answer the questions being addressed within the adjudication process."	Comment is incorporated in Section 6.1.
6-4, 6-5 & 6-14	Table 6-2 Table 6-3	T. Chen (LACWD)	Littlerock Creek Groundwater Recharge and Recovery Project	Status: Conceptual	Feasibility study for this project is expected in 2015. Project status should be conceptual (three locations).	Comment is acknowledged. This project was considered to have sufficient information for a preliminary economic analysis and is therefore identified as an implementation project for the 2013 IRWMP Update.
6-5	6.1	D. Chisam (AVEK)	Table 6-2 – Aquifer Storage and Recovery Project: Injection Well Development (WSSP-2) 12,000 AFY	150,000 AFY		This should refer to LACWD 40's ASR project. A correction was made in Table 6-2.
6-5	6.1	D. Chisam (AVEK)	Table 6-2 Eastside Banking & Blending Project 1,000 AFY	10,000 AFY		Comment is incorporated in Table 6-2.

6-6	6.1	Erika deHollan (LACSD)	The recycled water projects shown in Table 6-1 are classified as recycled water production, recycled water conveyance, recycled water conversion, and recycled water recharge. As discussed in Section 3, 26,000 AFY of recycled water is currently produced at water reclamation facilities. Of this 26,000 AFY, it is assumed that approximately 5,250 AFY are currently used for non-potable reuse, as described in Section 3). After current uses are removed from the 26,000 AFY of production, 20,750 AFY of unused recycled water remains. A number of implementation projects were identified that can utilize this water, including approximately 1,000 AFY of conveyance facilities, 625 AFY of conversion for non-potable reuse, and 5,000 AFY of groundwater recharge… …It is expected that by 2035, an additional 10,000 AFY of recycled water production will be available (as discussed in Section 3)…	The recycled water projects shown in Table 6-1 are classified as recycled water production, recycled water conveyance, recycled water conversion, and recycled water recharge. As discussed in Section 3, approximately 20~~6~~,000 AFY of tertiary-treated recycled water is currently ~~produced~~ available ~~at water reclamation facilities~~for these recycled water projects, and only approximately 82 AFY of this supply is currently used for the completed recycled water use conversions . ~~Of this 26,000 AFY, it is assumed that approximately 5,250 AFY are currently used for non-potable reuse, as described in Section 3).~~ ~~After current uses are removed from the 26,000 AFY of production, 20,750 AFY of unused recycled water remains.~~ A number of implementation projects were identified that can utilize ~~this~~ the available recycled water, including approximately 1,000 AFY of conveyance facilities, 625 AFY of conversion for non-potable reuse, and 5,000 AFY of groundwater recharge. It is expected that by 2035, an additional 11~~0~~,000 AFY of recycled water production will be available ~~(as~~ discussed in Section 3).		Comment is acknowledged and language has been revised in Section 6.1 to reflect most of these changes. Some AFY numbers for recycled water and water banks have also been updated.

6-7		11/20/2013 Stakeholder meeting			Add footnote to bottom of the page: "The number for TSY used in this 2013 IRWMP Update is selected strictly for long-term planning purposes and is not intended to answer the questions being addressed within the adjudication process."	Comment is incorporated in Section 6.1.
6-7	6.1	Erika deHollan (LACSD)	[first paragraph] In total, approximately 2,000 AFY of recycled water projects have been identified…		Should this number match the projected reuse in Table 3-12?	Comment is incorporated in Section 6.1.
6-9	6.1	A. Jaramillo (LACWD)	Actual stabilization of groundwater levels will be assessed from a Watermaster who will be appointed at a later time.	Actual stabilization of groundwater levels is expected to be monitored by the Court through a watermaster or other court appointed agent.		Comment is incorporated in Section 6.1.
6-13	6.1	Erika deHollan (LACSD)	[first paragraph] Since the use of recycled water is limited to landscaping and other non-potable uses, it would be important to identify uses for the water beyond those for which its uses are currently dedicated or planned.	Since the ~~use of~~ recycled water produced in the Antelope Valley is ~~limited~~ currently used only for ~~to~~ landscaping and other non-potable uses, it would be important to identify uses for the water beyond those for which its uses are currently dedicated or planned.	It seems like the intention is to note that there is a small number of actual uses of recycled water implemented in the AV today rather than indicate that there is a limit on what the water can be used for.	Comment is incorporated into Section 6.1.
6-16	6.2	Erika deHollan (LACSD)	[first sentence of last paragraph] Currently, the Region uses 21% of recycled water to meet demand, or 5,300 AFY of recycled water use out of the 26,000 AFY currently available.	Currently, the Region uses ~~21%~~a small amount (82 AFY) of the available 20,000 AFY of recycled water to meet recycled water project demands~~, or 5,300 AFY of recycled water use out of the 26,000 AFY currently available~~.		Comment is incorporated in Section 6.2.

6-17	6.2	Erika deHollan (LACSD)	[first full sentence in top paragraph] The proposed recycled water conversion and recharge projects shown in Table 6-2 would increase the recycled water used to 12,300 AFY out of the 36,000 AFY recycled water projected to be available in 2035, or 34%. An additional 23,700 AFY of recycled water projects will need to be identified in order to meet this target. Groundwater recharge projects using recycled water are expected to fulfill much of this need.		Revise numbers based on revisions to Tables 3-11 and 3-12.	Comment is acknowledged. This language is deleted from Section 6.2.

6-16	6.2	T. Chen (LACWD)	**Identify Contaminated Portions of the Aquifer.** The planning target, which is provided in order to gauge success on meeting the water quality management objectives, is to identify and prevent migration of contaminated portions of the aquifer. The Salt and Nutrient Management Plan (SNMP) for the Antelope Valley, prepared concurrently with this IRWM Plan update, identified and mapped the concentrations of a number of pollutants present in the Region's aquifer, including TDS, nitrate/nitrite, chloride, arsenic, chromium and boron. Additional monitoring and evaluation efforts may be necessary to further study those contaminants found to be exceeding MCLs in the Region's aquifers. Refer to the SNMP for detailed information about contaminant identification.	**Identify Contaminated Portions of the Aquifer.** The planning target, which is provided in order to gauge success on meeting the water quality management objectives, is to identify and prevent migration of contaminated portions of the aquifer. The Salt and Nutrient Management Plan (SNMP) for the Antelope Valley, prepared concurrently with this IRWM Plan update, identified and analyzed various constituents found in the Region's aquifer. Additional monitoring and evaluation efforts may be necessary to further study those contaminants that jeopardize the Region's water quality objectives. Refer to the SNMP for information about the Region's groundwater quality.		Comment is incorporated in Section 6.2.

6-16	6.2	T. Chen (LACWD)	**Map Contaminated Portions of Aquifer.** The planning target, which is provided in order to gauge success on meeting the water quality management objectives, is to map the contaminated portions of the aquifer and monitor contaminant movement. As described above, the SNMP for the Antelope Valley identified and mapped the concentrations of a number of pollutants present in the Region's aquifer, including TDS, nitrate/nitrite, chloride, arsenic, chromium and boron. Additional monitoring and evaluation efforts may be necessary to further map those contaminants found to be exceeding MCLs in the Region's aquifers. Continued tracking and mapping of constituents may be necessary to better understand the Region's groundwater issues. Refer to the SNMP for detailed information about contaminant mapping.	**Map Contaminated Portions of Aquifer.** The planning target is to map the contaminated portions of the aquifer and monitor contaminant movement. The SNMP mapped the concentrations for select constituents. Additional monitoring, evaluation and mapping efforts may be necessary to better understand the Region's groundwater issues. Refer to the SNMP for available contaminant concentration maps.	May only have concentration maps for TDS, chloride and nitrate.	Comment is incorporated in Section 6.2.

6-17	6.2	T. Chen (LACWD)	**Develop Management Program for Nitrate and TDS.** TDS and nitrate are of particular… • TDS management measures: … • Nitrate management measures: … Development of a management program…	Development of a management program and projects for these pollutants of concern, as well as for other emerging contaminants as they are identified, would contribute to meeting the objective of protecting the aquifer from contamination. Additionally, the SNMP found that, based on the Antelope Valley Groundwater Basin's baseline water quality and project source water quality, managing salt and nutrient loadings on a sustainable basis is feasible with a minimal number of implementation measures.	Move sentence, "The SNMP…" to the end of the paragraph immediately after management measure lists. The current paragraph structure may infer that the TDS and nitrate management measures are suggested in the SNMP.	Comment is incorporated in Section 6.2.
6-18	6.2	T. Chen (LACWD)	A monitoring program was suggested during ongoing SNMP efforts for the Antelope Valley to ensure continuous tracking of dischargers' actions to reduce the impact on groundwater. It is suggested that monitoring wells be placed near existing drinking water wells, and near projects that may impact groundwater quality (such as recharge projects), and suggested a number of constituents to be monitored and reported (i.e., TDS, nitrogen species, chloride, arsenic, chromium, fluoride, boron and constituents of emerging concern).	The SNMP includes a monitoring component to ensure the groundwater quality is consistent with applicable SNMP water quality objectives. Select drinking water wells, near projects that may impact groundwater quality (such as recharge projects), will be used as monitoring locations. Refer to the SNMP for monitoring and reporting details.		Comment is incorporated in Section 6.2.

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Section 7 Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
No comments submitted on Section 7						

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Section 8 Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
8-8	8.2.6	A. Jaramillo (LACWD)	For example, the RWMG elected LACWD 40 to interface with DWR for the Proposition 84 grant efforts.	For example, the RWMG elected the SWCA to interface with DWR for the Proposition 84 grant efforts.	Isn't this done by SWCA/PWD?	Comment is incorporated in Section 8.2.6.
8-12	Table 8-2	A. Jaramillo (LACWD)	Grant App Funds: 100% RWMG	Grant App Funds: 100% Project proponents or RWMG	Pert the MOU, RWMG only committed to funding grant applications for IRWM Plan updates. Funding project grant applications is voluntary	Comment is incorporated in Section 8.3.2, Table 8-2.
8-18	Table 8-3	A. Jaramillo (LACWD)	Groundwater Safe Yield Estimated range of the potential safe yield of the Antelope Valley Groundwater Basin	Total Sustainable Yield Total Sustainable Yield	Reference Appendix I instead of listed documents; I don't think there is groundwater safe yield discussion within the Plan	Comment is incorporated in Section 8.5, Table 8-3.
8-31	8.6.1	E. deHollan (LACSD)	Table 8-4 (first row on p. 8-31) Increase infrastructure and establish policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.		Revise numbers based on revisions to Table 3-11.	Comment is incorporated in Section 8.6, Table 8-4.

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Appendices Compiled Comments

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
	App J	T. Chen (LACWD)	Multi-Use Wildlife Habitat Restoration Project (Antelope Valley Duck Hunting)	Contact info for Aracely Jaramillo Phone: (626) 300-3353 Email: AJaramillo@dpw.lacounty.gov	Wrong contact number and email. Delete "?" for co-sponsor.	Comment is incorporated (now Appendix K)
	App J	T. Chen (LACWD)	Littlerock Creek Groundwater Recharge and Recovery Project (PWD)		Do not see the similar Lancaster project referred to in the project description. Project should be conceptual, completed feasibility study is anticipated in 2015.	Comment is acknowledged. This project was considered to have sufficient information for a preliminary economic analysis and is therefore identified as an implementation project for the 2013 IRWMP Update.
	App J	T. Chen (LACWD)	Palmdale Power Plant Project (City of Palmdale)		Estimated date listed is 2014. According to Palmdale website, construction will take 27-30 months. Construction has not started.	Comment is incorporated (now Appendix K)
	App J	T. Chen (LACWD)	Solar Power System at K-8 Division	Project Description: The system **is** a 350-kilowatt…	Change sponsor to LACWD 40.	Comment is incorporated (now Appendix K)

Page No.	Section No.	Commenter	Original Text	Suggested Text	Comment	Response
	App J		Quartz Hill Storm Drain (LACDPW)	Construction of a storm drain, including several lateral connections and catch basins, to provide stormwater collection and conveyance. The project connects to existing and new drainage facilities, with the improvements located mainly along 50th Street, from Avenue M-8 to Avenue K-8.	Revise project description	Comment is incorporated (now Appendix K)
	App J		North Los Angeles/Kern County Regional Recycled Water Project – Phase 2 (LACWD 40, City of Palmdale)	The construction of the recycled water supply system would be phased overtime and it is anticipated that all phases of construction would be completed by **2014**.	Revise project description. The Estimated years of construction & start-up is not complete as noted, should be 2014	Comment is incorporated (now Appendix K)
	App J		North Los Angeles/Kern County Regional Recycled Water Project – Division Street Corridor		Change the project sponsor to City of Lancaster.	Comment is incorporated (now Appendix K)
	App J		Avenue K Transmission Main, Phases I-IV		This is an "implementation" project, not conceptual.	Comment is incorporated (now Appendix K)
	App J		North Los Angeles/Kern County Regional Recycled Water Project – Phase 3		Delete project	This will remain as a conceptual project per discussion with LACWD 40 on 12/31/2013 (now Appendix K)
	App J		North Los Angeles/Kern County Regional Recycled Water Project – Phase 4		Delete project	This will remain as a conceptual project per discussion with LACWD 40 on 12/31/2013 (now Appendix K)

Appendix F: Integrated Flood Management Summary Document

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Final Draft Technical Memorandum

Antelope Valley IRWMP 2007 Update

Subject: **Task 2.3.7 Integrated Flood Management Summary Document**

Prepared For: Antelope Valley State Water Contractors Association

Prepared by: Paul Glenn

Reviewed by: Brian Dietrick

Date: December 31, 2013

Table of Contents

1 Purpose

The purpose of this technical memorandum (TM) is to compile the previous related TMs into one complete Integrated Flood Management Summary Document. The previous TMs include:

- Task 2.3.1-- Flood Management Document Matrix
- Task 2.3.2--Flood Protection Needs
- Task 2.3.3-- Methodology to Catalog and Prioritize Flood Projects
- Task 2.3.4--Regional Vision for Multi-Benefit Flood Protection - Recommended Actions to Implement Integrated Flood Management
- Task 2.3.5--NFIP Community Rating System (CRS) Participation
- Task 2.3.6--Coordination Between Flood Protection and Stormwater Quality

1.1 Definition of Integrated Flood Management

Integrated Flood Management (IFM) is an integrated approach to flood management that focuses on maximizing the net benefits of a floodplain and infrastructure developed to manage flooding. The integrated approach considers water resources management, land use planning, environmental stewardship, and sustainability along with flooding issues when developing policies, plans and projects. Typical benefits that can be obtained through an integrated approach include improvements in water quality, increases in water supply, and enhancements in riparian habitat and wildlife corridors.

2 Existing Environment

The existing environment consists of a closed groundwater basin that does not discharge to outside receiving water bodies. Within the basin are three counties, three cities and a large U.S. Air Force base, which include:

- Kern County
- Los Angeles County
- San Bernardino County
- City of Palmdale
- City of Lancaster
- California City
- Edwards Air Force Base

This section presents the watershed characteristics, flood mapping, existing and historical flooding, existing projects, and planned projects.

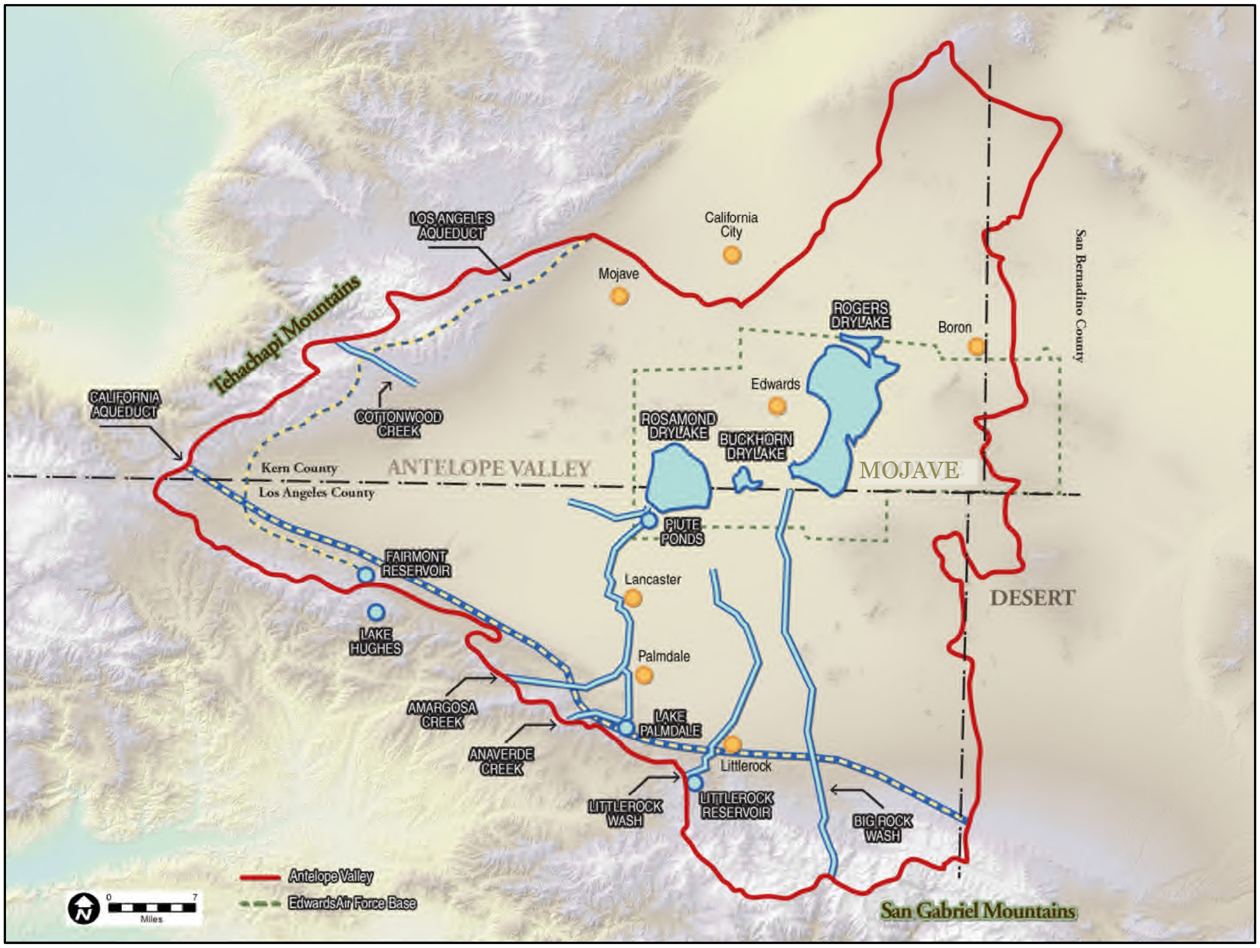
2.1 Watershed Characteristics

Major characteristics of the Antelope Valley Watershed are shown in Figure 2-1 and include:

- Closed basin - encompasses approximately 2,400 square miles; no regional outflow of surface or groundwater
- Bounded by the peninsular Tehachapi Mountains on the Northwest, together with the San Gabriel and the San Bernardino Mountains on the Southwest
- Terminal dry lakes/playas are predominantly clay - little groundwater recharge; significant losses to evaporation
- Four playas are all located on Edwards Air Force Base; the corresponding surface areas include Rosamond (21 square miles), Rich (3 square miles), Buckhorn (10 square miles), and Rogers (35 square miles)
- Approximately 80 percent of watershed is characterized by a low to moderate slope (0-7 percent); and the remaining 20 percent consists of foothills and rugged mountains which reach up to 3,600 feet in elevation
- Watershed boundaries and surface drainage patterns are difficult to define within the low-relief terrain lakebed portions of the watershed
- Mostly rural; sparsely populated in many areas; however the western and southern parts of the Antelope Valley along the foothills/alluvial fan have been urbanized
- High desert climate
- Three major watersheds are tributary to Rosamond Lake including (1) Cottonwood Creek (drainage area = 373 square miles), (2) Amargosa Creek (drainage area = 256 square miles), and (3) Little Rock Wash (drainage area = 144 square miles)
- Watershed area tributary to Rogers Lake is approximately 708 square miles primarily through Big Rock Creek; and the tributary watershed area to Rich Lake is 376 square miles
- Buckhorn Lake tributary area includes portions of Rosamond and Rogers watersheds

- Little Rock Reservoir provides some limited flood storage within the upper portion of the watershed (surface area = 150 acres, elevation 3,200, original storage capacity = 4,300 acre-feet and currently has a useable storage capacity of 3,000 acre-feet of water)

Figure 2-1: Boundary of Antelope Valley Watershed and Major Flood-Related Features

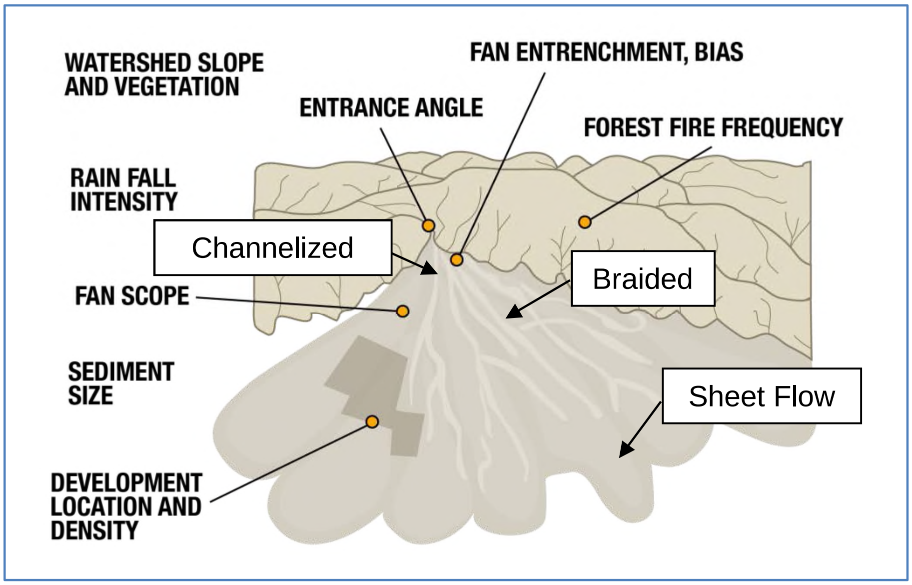


2.1.1 Floodplain/Geomorphology

Details of the floodplain/geomorphology of the watershed include:

- Much of the valley floor is subject to inundation and shallow flooding with unpredictable flow paths
- Floor of the Antelope Valley Watershed is formed by coalescing alluvial fans below the foothills which generally lacks defined natural channels and is subject to unpredictable sheet flow patterns
- Alluvial fans are an erosional feature - unpredictable flow paths/braided patterns; not channelized, difficult to provide control structures, sheet flows are common, development exists on the alluvial fans themselves
- Flood dynamics of an idealized alluvial fan can be characterized by several zones which are defined beginning from the apex as: (1) channelized zone (foothills), (2) braided zone (upstream fan areas), and (3) sheet flow zone (downstream fan areas) as shown in Figure 2-2.

Figure 2-2: Alluvial Fan Geomorphology and Flood Features



- Multiple alluvial fans coalesce or overlap below the foothill canyons (known as bajadas) and create complex flooding patterns
- Most of the surface waters are ephemeral streams due to arid conditions and only flow in direct response to precipitation
- Existing roadways may modify and concentrate flows in the shallow floodplain areas
- Channels experience migration/erosion/sediment deposition
- Location of the stream channel on a fan is often erratic due to the rapid expansion of the width and highly variable sediment load
- Dry lakebeds or playas are essentially flat surfaces with little topographic relief
- Shallow flooding often occurs along highly unpredictable flow paths because the source of the flow may be variable, topographic relief may be low, channels may shift or may be nonexistent, or sediment and debris may be deposited or removed during or after a flood
- Sheet flooding on the lower valley floor (i.e., the lower fringes of the alluvial fans) occurs due to limited topographic relief and this makes it difficult to define the level of flood hazards

2.1.2 Drainage Infrastructure

Details of the drainage infrastructure within the watershed include:

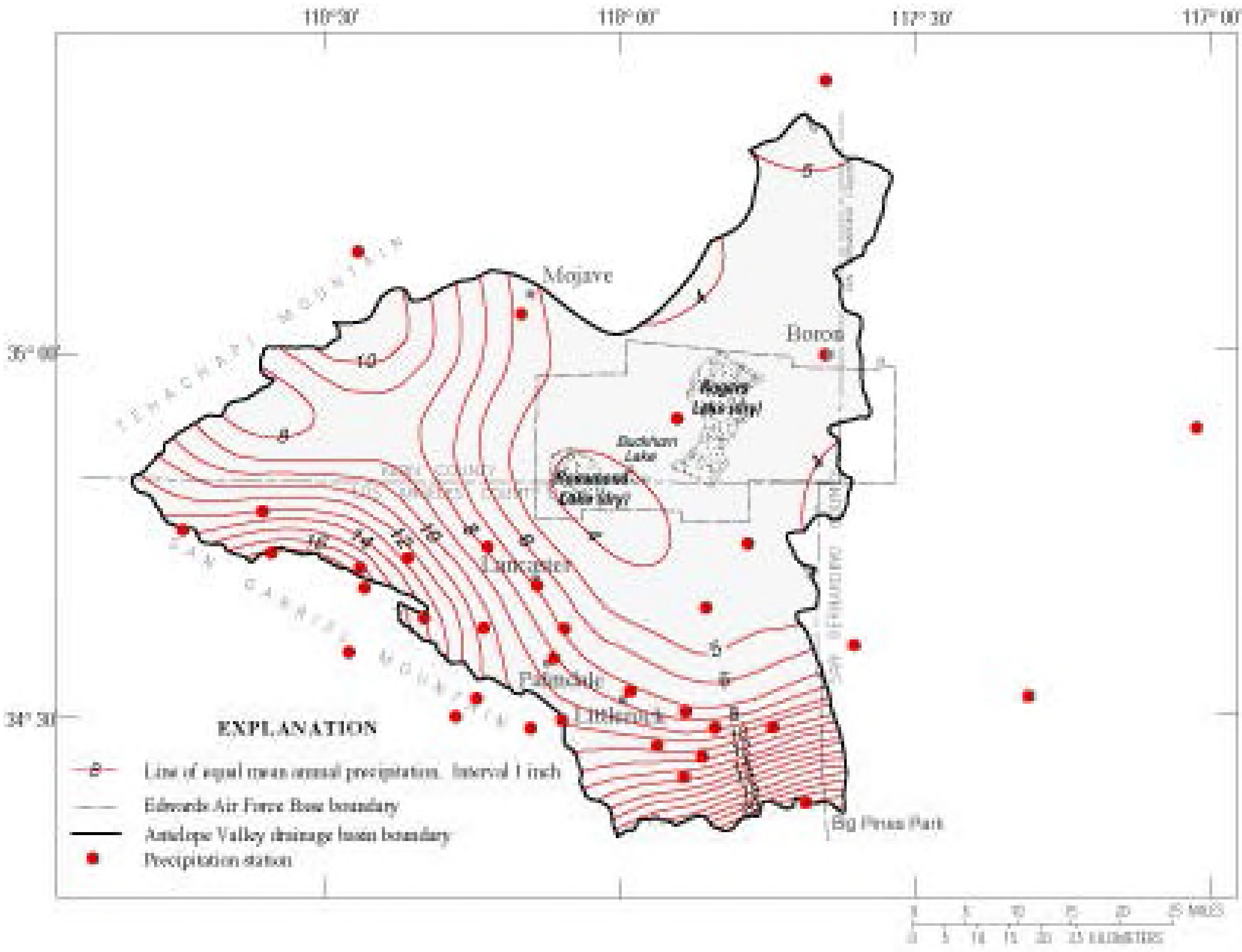
- Not a significant amount of regional flood infrastructure compared with other, more-densely urbanized areas of Los Angeles County; primarily natural drainage paths and patterns
- The limited regional flood control facilities are generally located in urban areas and include some channelized reaches of creeks, stream bank revetments of different types, and localized protective structures
- Urban drainage facilities have limited hydraulic capacity and are not designed to accommodate regional overland flooding that exceeds the smaller urban watershed
- Urban drainage facilities generally consist of local retention/detention basins, street drainage inlets, underground storm drain pipes, and culverts

2.1.3 Meteorologic / Hydrologic Response

Details of the meteorologic/hydrologic response of the watershed include:

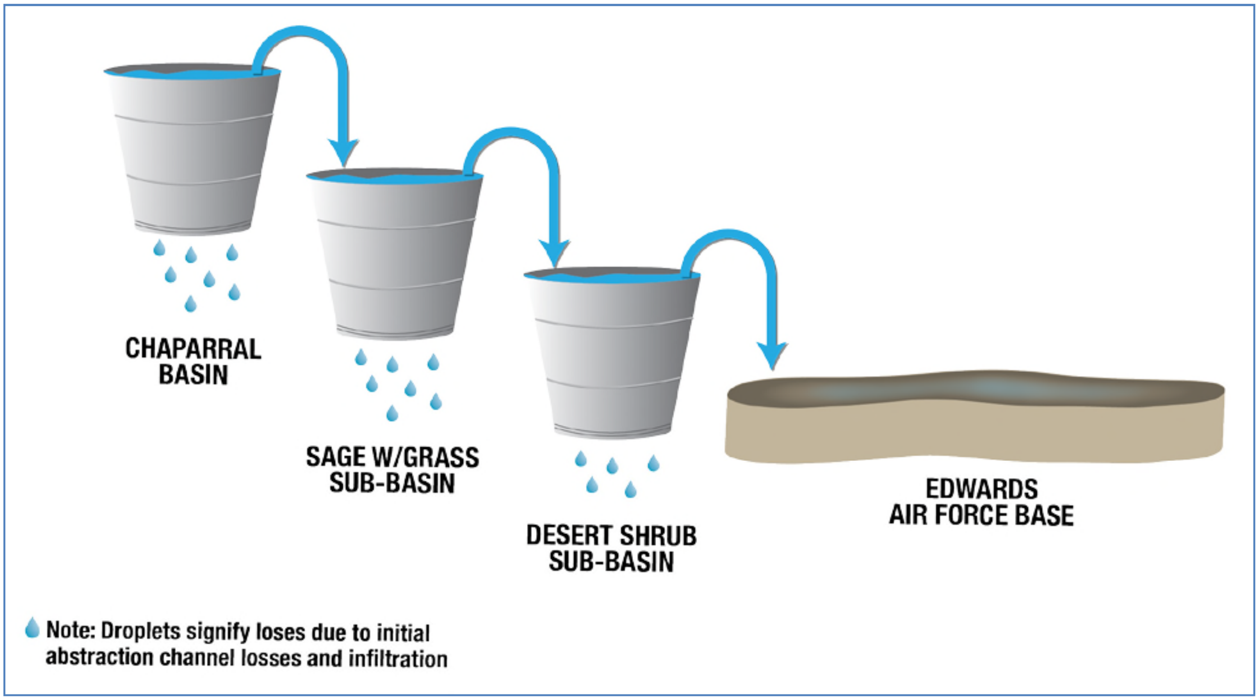
- Precipitation can vary considerably within the watershed based on elevation as shown in Figure 2-3; average annual precipitation in the Antelope Valley ranges from about 20 inches in the mountains to less than 4 inches on the valley floor

Figure 2-3: Average Rainfall (Isopluvial Contours) for Antelope Valley Region



- Rainfall-runoff watershed response varies based on elevation within the watershed and corresponding soil types
- Watershed response is conceptually described as a series of "leaky buckets" representing different elevation intervals which are interconnected and once the threshold amount of rainfall exceeds the initial soil losses then water cascades down to the next level in the watershed, ultimately the lakebed, as shown in Figure 2-4

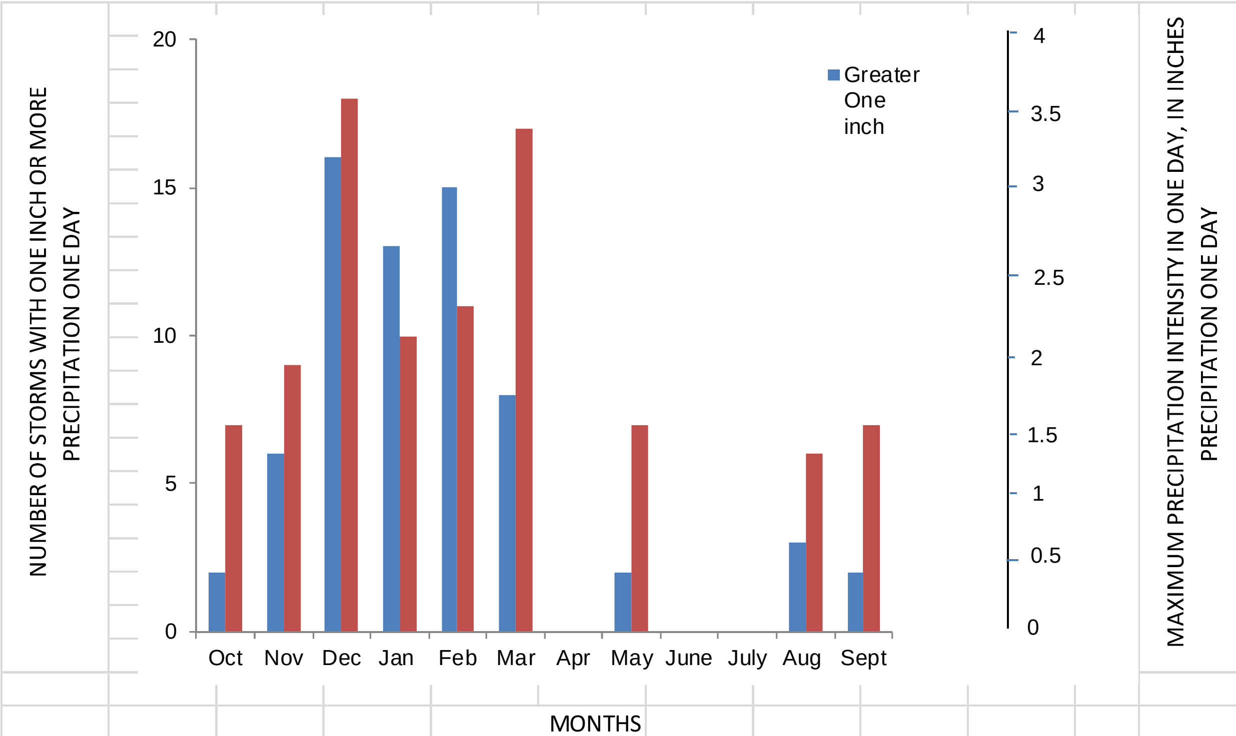
Figure 2-4: "Leaky Bucket" Concept for Antelope Valley Watershed



- Larger storm events may result in magnified flood flows generated from "cascading" watersheds where watershed boundaries may coalesce and combine because of limited hydraulic capacity or undefined floodplains
- It has been previously estimated that 70 percent of the runoff volume to the dry lake beds is generated from the lowest mountain watershed area and 15 percent of the runoff volume is associated with rainfall falling directly on the lake
- Typically, frequent wildfires in Southern California result in burn conditions that can change the surface soil layer and dramatically reduce infiltration while increasing runoff
- Flashy storms occur - high flow volumes, low frequency, high volumes of sediment transfer
- The historical average estimated 100-year 24-hour rainfall varies within the Antelope Valley from 3.55 inches at EAFB to higher amounts in the mountainous area similar to the average rainfall distribution shown above in Figure 2-3. This reflects the orographic lifting effects of the mountains on rainfall as well as west-to-east rain shadow[1] across the valley floor.
- Rainfall is caused by three types of storms in the Valley which include (1) low-pressure systems originating in the Gulf of Alaska or near the Hawaiian Islands, (2) low pressure systems originating from the tropics during the late summer and early fall, and (3) cloudbursts[2] or thunderstorm covering small areas and originating from convective uplifting during the summer and early fall.
    - Most storms greater than 1-inch of precipitation in one day are from frontal or low-pressure systems that are most prevalent during December through March as shown in Figure 2-5.

[1] "Rain shadow" refers to a region in the lee of mountains that receives less rainfall than the region windward of the mountains.
[2] A "cloudburst" is an extreme amount of precipitation, sometimes with hail and thunder, which normally lasts no longer than a few minutes but is capable of creating flood conditions.

Figure 2-5: Seasonal Distribution of Storms in Palmdale (1932-1992)



2.2 Flood Mapping

Regional mapping of the existing flood hazards for the Antelope Valley has been prepared by FEMA as part of the National Flood Insurance Program (NFIP). NFIP requires each community to identify 100-year recurrence interval flood prone areas as part of adopting floodplain management regulations. The minimum federal flood protection goals and requirements are administered by FEMA as part of the NFIP. The NFIP, originally established in 1968, provides low-cost federally subsidized flood insurance to those communities that participate in this program. Participation in the program requires that the community adopt floodplain regulations which meet the requirements of the NFIP defined in 44CFR Chapter 1 Part 59, including mapping of existing flood hazards.

Hydrologic and hydraulic studies are required to analyze the delineation of the 100-year recurrence interval floodplain envelope. However, flooding and sedimentation within the Antelope Valley do not occur in a typical riverine system. These processes occur in alluvial fans that are difficult to simulate numerically. The published FEMA flood hazard maps provide an approximation of the regional floodplain limits based on the standards for FEMA alluvial fan hazards. The mapped flood hazards focus on regional flood hazards and do not evaluate localized flooding, particularly in urbanized areas; so there could be areas that flood in small storm events that are not captured within a mapped flood hazard zone under FEMA.

Alluvial fan flooding presents unique problems in terms of quantifying flood hazards, assessing sediment transport characteristics, devising reliable flood protection schemes, and evaluating impacts of various projects on flow and sediment dynamics. Standard one-dimensional (1-d) methods developed for flow and sediment routing in confined streams with simple channel geometry are usually inadequate for alluvial fan applications. This makes the accuracy of regional flood hazard delineation questionable since the mapping is based on fixed channel geometry without erosion and does not necessarily consider (1) shallow flooding and unknown redistribution of flows, (2) complex hydraulics, (3) loss of channel hydraulic capacity because of sedimentation/deposition, and (4) additional flow contributions from upstream cascading watersheds. These are just a few of the issues that should be understood when reviewing the flood hazard mapping on alluvial fans and desert valley floor areas. However, even with these identified issues, the published flood hazard maps provide an initial approximation of the general flooding boundaries.

2.2.1 Definition of Flood Hazard Risks

The FEMA flood hazard zones shown represent the areas susceptible to the 1 percent annual chance flood (commonly referred to as the "100-year flood"), and the 0.2 percent annual chance flood ("500-year flood"). The 1 percent annual chance flood has at least a 1 percent chance of occurring in any given year. FEMA designates these areas as Special Flood Hazard Areas (SFHA) and requires flood insurance for properties in these areas as a condition of any mortgage backed by federal funds.

2.2.2 Existing Floodplain Hazard Mapping – Antelope Valley

The existing published FEMA flood hazard mapping illustrates general characteristics of the floodplain and provides an understanding of the extent of the existing flood potential within the valley (Figure 2-6). A key item that is immediately apparent from the floodplain mapping is that the entire EAFB and Air Force Plant 42 areas are not part of the published mapping. This does not mean that the areas are not associated with flood hazards, only that mapping is not provided because it is located on federal lands and those areas are not mapped. Other general trends regarding the floodplain that can be deduced from the mapping include: (1) floodplains are very well-defined in the lower mountains/foothill areas where there are incised streams; (2) valley floor and alluvial fan areas result in wide floodplains with patterns of flow that redistribute and split to other channels downstream; (3) linear floodplain boundaries for locations of shallow flooding are present in several locations, but this appears to be associated with political boundaries and not necessarily with physical boundaries (this reflects different time periods when the mapping was performed); (4) shallow flooding floodplains encompass urbanized portions of Palmdale and Lancaster; (5) all the floodplains illustrate the general surface drainage patterns that are directed to the playas at EAFB. It is apparent that uncertainties and discrepancies exist in the flood hazard mapping, particularly near local government boundaries where there are minimal hydraulic influences. The mapping should be used cautiously because of its approximate nature and because it does not necessarily define the magnitude of flooding.

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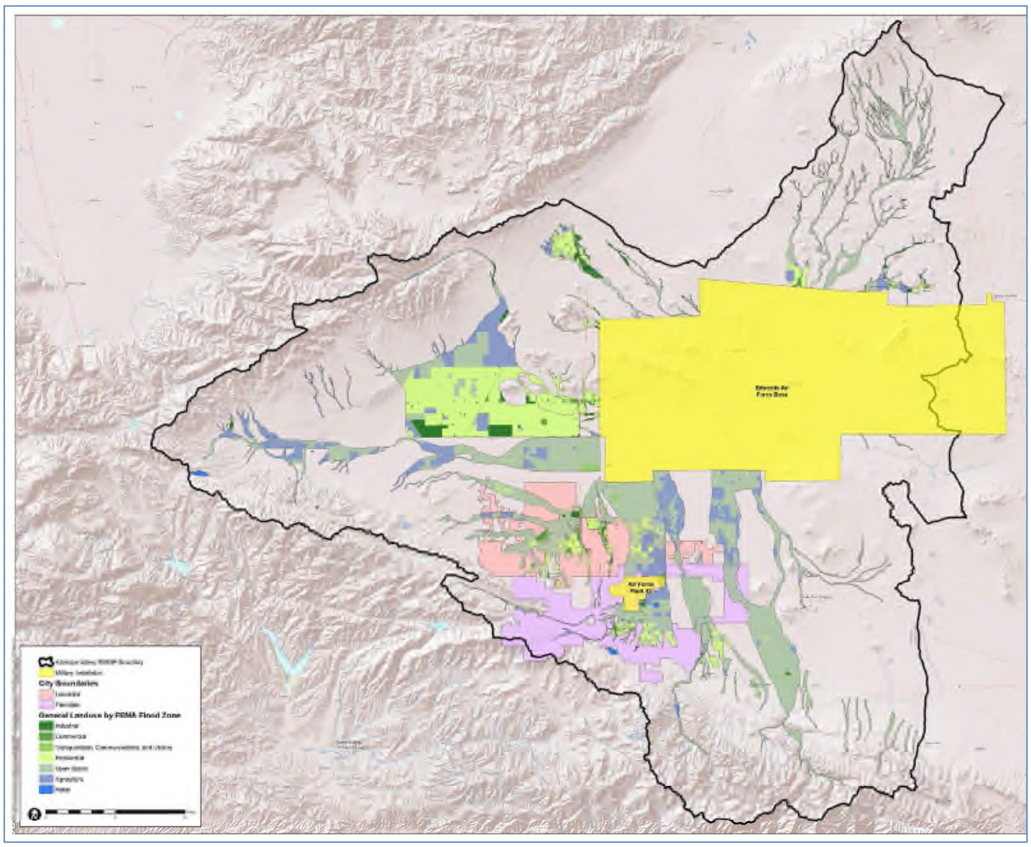
Figure 2-6: Antelope Valley General Land Use by FEMA Flood Zone



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2.2.3 Flood Hazard Mapping Compared to Land Use

An initial assessment of the magnitude of the existing "flood risk" (which correlates directly to the potential flood damage) can be developed through quantifying encroachments upon different types of land-use within the floodplain. Any area located within a 100-year floodplain flood hazard area is considered to be at "high risk" of flooding. An overlay of the land use plan with the mapped flood hazard zones is shown in Figure 2-6. This generalized mapping overlay can be utilized as an effective planning tool. The land use areas which have a high dollar value for damages within flood hazard zones represent locations to target and prioritize for projects.

The magnitudes of general land-use designations within the flood hazard zones have been summarized for both Los Angeles County and Kern County in Table 2-1and Table 2-2, respectively. The FEMA flood hazard zone "A" designates the 100-year floodplain, although there are various different types of flood hazards within zone "A" for insurance purposes, some of which are defined by FEMA as follows:

- Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies.
- Zone AE: Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods.
- Zone AH: Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet.
- Zone AO: Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone.

The mapping indicates that the majority of the areas have land use zoning that is compatible with the floodplain being zoned primarily for "open space." However, it is important to note the other general land uses within the floodplain, particularly the more urban type of uses which would result in more extensive flood damage.

Table 2-1: LA County Land Use Designations and FEMA Flood Hazard Zones

Los Angeles County – Land Use Designation with Mapped FEMA Flood Hazard Zone		
FEMA Flood Zone	**General Land Use**	**Total (ac)**
1 Pct Annual Chance Flood Hazard Contained in Channel	Commercial	3
	Open Space	13
	Residential	1
	Transportation, Communications, and Utilities	43
	Water	28
1 Pct Annual Chance Flood Hazard Contained in Channel Total		**89**
A	Agriculture	13,459
	Commercial	65
	Industrial	83
	Open Space	53,966
	Residential	802
	Transportation, Communications, and Utilities	1,453
	Water	609
A Total		**70,436**
AE	Agriculture	17
	Industrial	18
	Open Space	3,756
	Residential	19

Los Angeles County – Land Use Designation with Mapped FEMA Flood Hazard Zone		
FEMA Flood Zone	General Land Use	Total (ac)
	Transportation, Communications, and Utilities	7
	Water	4
AE Total		**3,821**
AH	Commercial	5
	Industrial	206
	Open Space	620
	Transportation, Communications, and Utilities	99
AH Total		**930**
AO	Agriculture	25
	Commercial	80
	Industrial	42
	Open Space	2,612
	Residential	93
	Transportation, Communications, and Utilities	92
AO Total		**2,944**
Grand Total		**78,219**

Table 2-2: Kern County Land Use Designations and FEMA Flood Hazard Zones

Kern County – Land Use Designation with Mapped FEMA Flood Hazard Zone		
Flood Zone	General Land Use Category	Total Area (ac)
A	Agriculture	13,476
	Commercial	872
	Industrial	5,657
	Open Space	25,885
	Residential	37,746
	Transportation, Communications, and Utilities	376
A Total		**84,011**
AE	Agriculture	53
	Commercial	12
	Industrial	11
	Residential	74
AE Total		**149**
AH	Agriculture	549
	Commercial	180
	Industrial	5
	Open Space	513
	Residential	708
	Transportation, Communications, and Utilities	2
AH Total		1,958
AO	Agriculture	447
	Commercial	138
	Industrial	486
	Open Space	131
	Residential	381

Kern County – Land Use Designation with Mapped FEMA Flood Hazard Zone		
Flood Zone	General Land Use Category	Total Area (ac)
	Transportation, Communications, and Utilities	44
AO Total		**1,627**
Grand Total		**87,746**

2.3 Existing and Historical Flooding

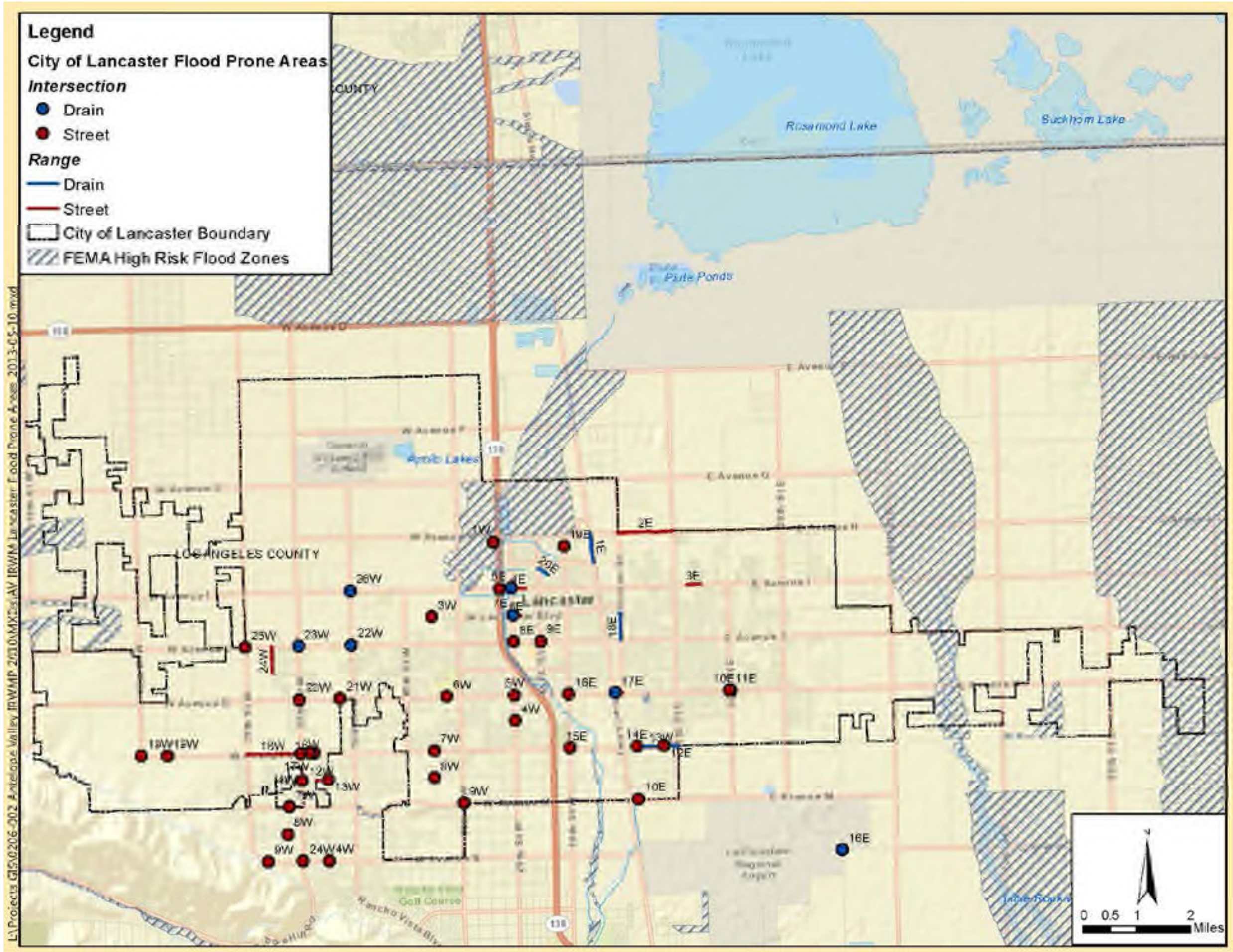
Information was collected on current, ongoing flood problems in the Cities of Lancaster and Palmdale, and in unincorporated areas of Los Angeles and Kern Counties. Each of these areas is discussed below. Information for EAFB, which includes parts of both unincorporated Los Angeles and Kern Counties, was not available at the time of this document.

For the municipalities and unincorporated county areas, localized problems are associated with historical chronic flooding that generally occurs after major storms. They are identified as locations of known flooding which require maintenance, including sediment removal. Generally, these problems occur at locations where existing drainage facilities are insufficient or not present.

2.3.1 Lancaster

Localized flooding areas in the City of Lancaster are shown in Figure 2-7 as documented by city maintenance staff. This figure also indicates the FEMA high risk flood zones (Zone A). It is important to note that areas of local flood concern do not necessarily correlate to FEMA's high-risk flood zones.

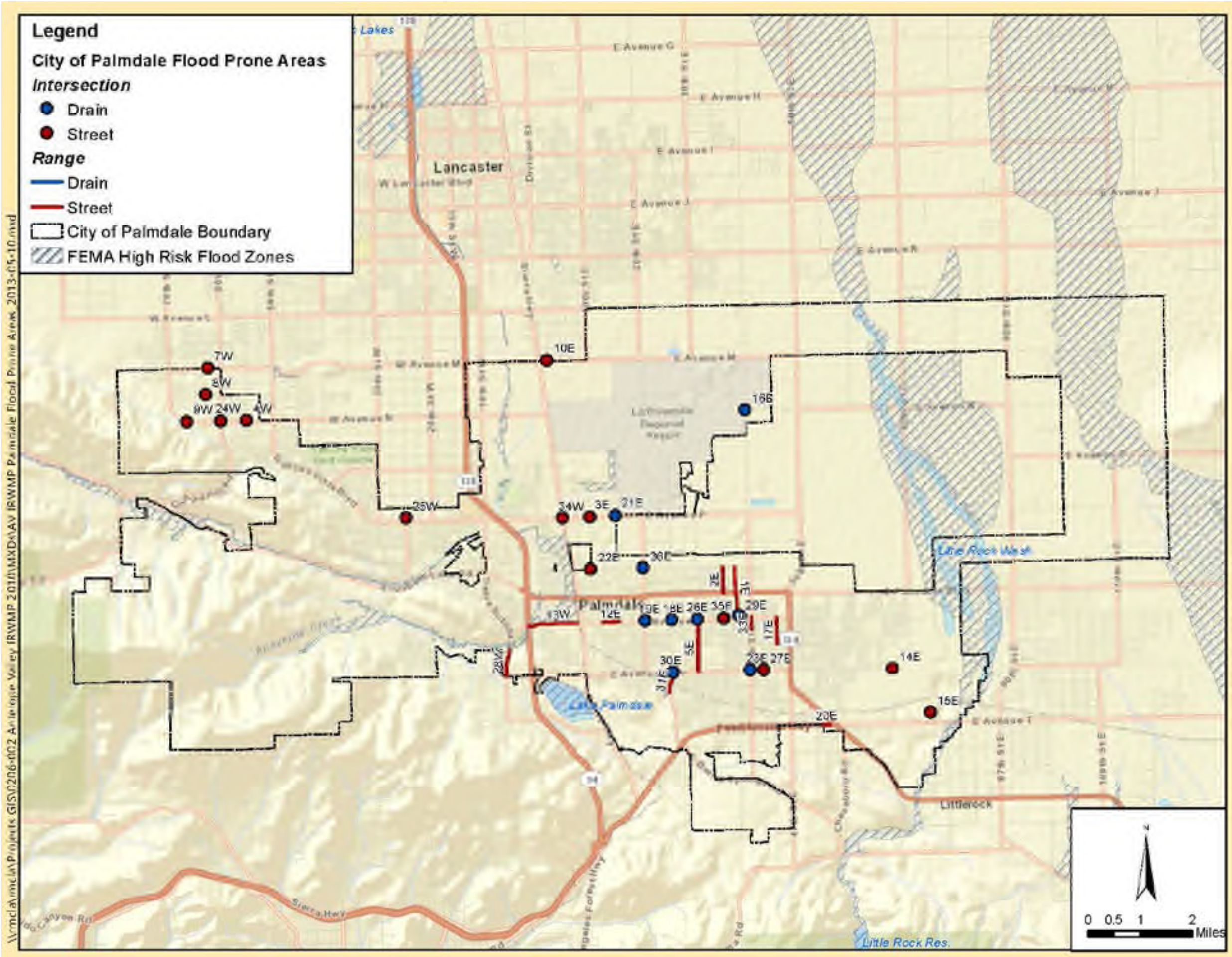
Figure 2-7: Localized Flooding Areas in the City of Lancaster



2.3.2 Palmdale

Localized flooding areas in the City of Palmdale are shown in Figure 2-8 as documented by city maintenance staff. This figure also indicates the FEMA high risk flood zones (Zone A). It is important to note that areas of local flood concern do not necessarily correlate to FEMA's high-risk flood zones.

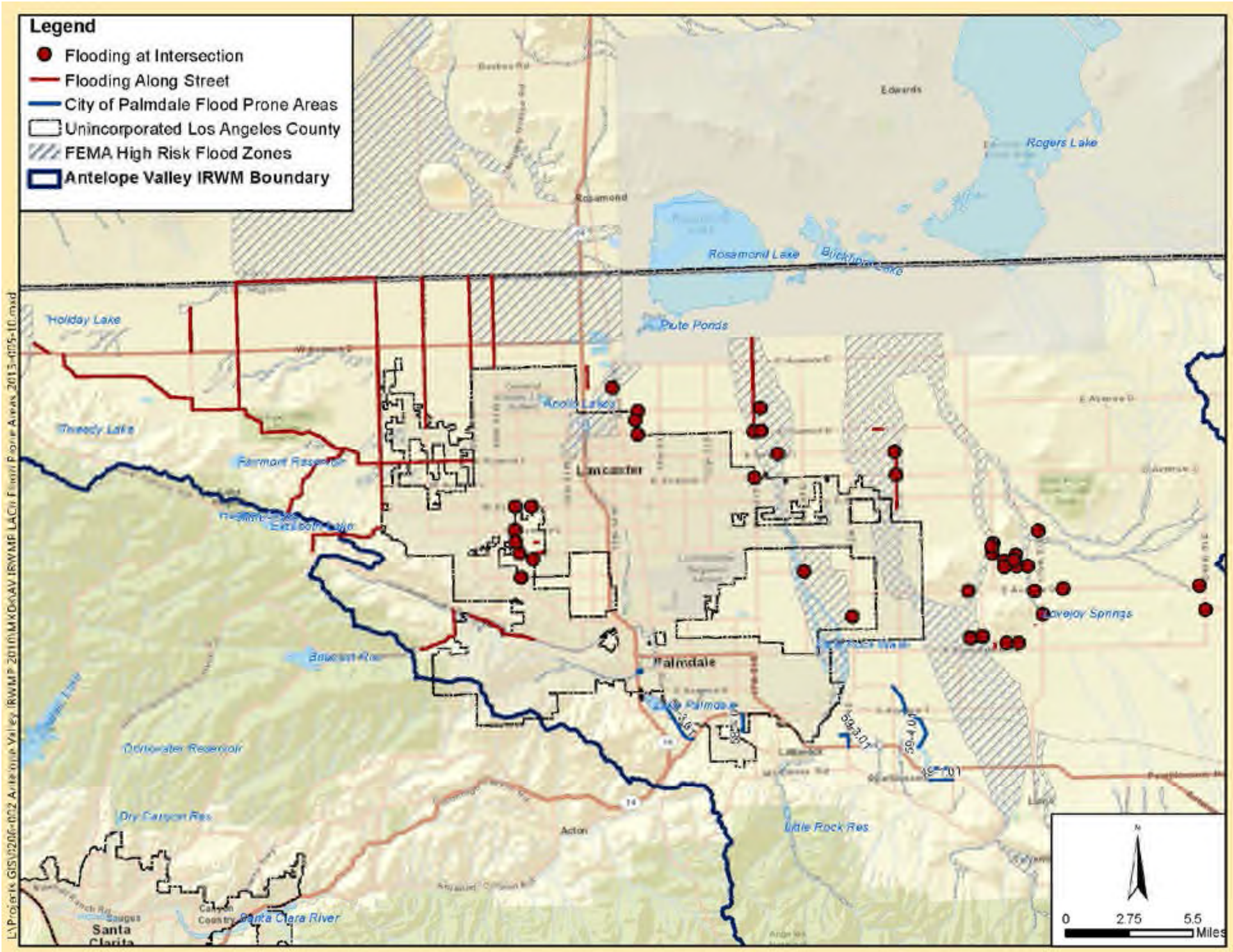
Figure 2-8: Localized Flooding Areas in the City of Palmdale



2.3.3 Unincorporated Los Angeles County

Localized flooding areas in unincorporated Los Angeles County are shown in Figure 2-9 as documented by county maintenance staff. This figure also indicates the FEMA high risk flood zones (Zone A). It is important to note that areas of local flood concern do not necessarily correlate to FEMA's high-risk flood zones.

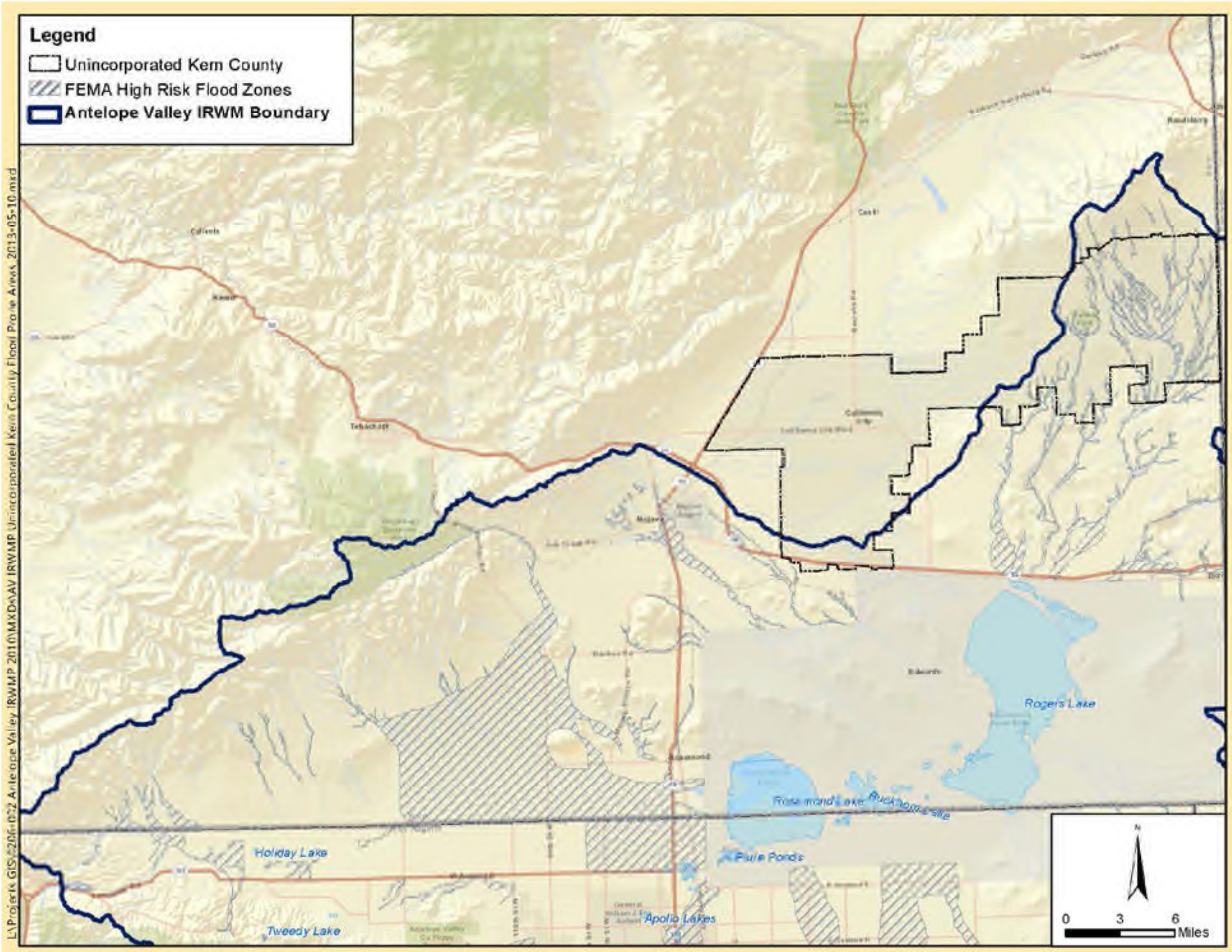
Figure 2-9: Localized Flooding Areas in Unincorporated Los Angeles County



2.3.4 Unincorporated Kern County

Localized flooding areas have not been identified for unincorporated Kern County. Figure 2-10 indicates the FEMA high risk flood zones. Localized flooding areas should be identified for these portions of the Region.

Figure 2-10: Localized Flooding Areas in Unincorporated Kern County



2.4 Existing Plans and Projects

The existing plans and projects in the Region that are considered as IFM are described below.

2.4.1 Existing Plans

Model Water Efficient Landscape Ordinance

The Water Conservation in Landscaping Act of 2006 requires cities, counties, and charter cities and charter counties to adopt landscape water conservation ordinances by January 1, 2010. Pursuant to this law, the Department of Water Resources (DWR) has prepared a Model Water Efficient Landscape Ordinance (Model Ordinance) for use by local agencies. The Model Ordinance became effective on September 10, 2009.

Under the Model Ordinance, all local agencies must adopt a water efficient landscape ordinance by January 1, 2010 or may adopt the state Model Ordinance. In addition, local agencies may collaborate and craft a region-wide ordinance. The adopted ordinance must be as effective as the Model Ordinance in regards to water conservation.

The objectives of the existing DWR Model Water Efficient Landscape Ordinance are:

- Promote the values and benefits of landscapes while recognizing the need to invest in water and other resources as efficiently as possible.
- Establish a structure for planning, designing, installing, maintaining and managing water efficient landscapes in new and rehabilitated projects.
- Establish provisions for water management practices and water waste prevention for established landscapes.
- Use water efficiently without waste by setting a Maximum Applied Water Allowance as an upper limit for water use and reduce water use to the lowest practical amount.

Examples of projects included under DWR's Model Water Efficient Landscape Ordinance are:

- Irrigation weather control/soil moisture sensing irrigation controllers
- Rain shutoff sensors
- Graywater systems
- Rainwater collection--**flood mitigation**
- Green roofs--**flood mitigation**
- Restoration/protection of native vegetation--**flood mitigation**

Existing landscape ordinances in the Region include:

- *City of Palmdale Landscape Ordinances* – The City of Palmdale has a Landscape Ordinance (Ordinance No. 1176) and a Water Conservation Ordinance (Ordinance No. 1362). The Water Conservation Ordinance includes stormwater management. It is highly recommended to implement stormwater best management practices (BMPs) into the landscape, irrigation, and grading design plans to minimize runoff and increase on-site retention and infiltration, **which aid in the reduction of flooding**. The City of Palmdale’s Water Conservation Ordinance is provided in Appendix B.
- *Palmdale Water District* - The Palmdale Water District currently provides rebates and programs for weather-based irrigation controls and turf removal programs for residential and commercial customers. Additional information is available on their website (http://www.palmdalewater.org/Rebate.aspx).
- *California Water Service Company* – The 2010 California Water Service Company (CWSC) Urban Water Management Plan contains guidelines for Water Efficient Landscapes that CWSC uses at its properties, including renovations. For the efficient use of water, grading of a project site shall be designed to minimize soil erosion, runoff, water waste and follow the grading design criteria, **which aid in the reduction of flooding**. Ordinances for the City of Lancaster portions in the CWSC service area can be found on their website (https://www.calwater.com/conservation/ordinances.php).
- *City of Lancaster* – The City of Lancaster has landscape and water wasting ordinances in place for the efficient use of water in the City.

Informational Websites/Public Outreach

Informational websites and public outreach efforts educate the public about water quality measures that can have an impact on flood control through the encouragement of infiltration and vegetation treatment of runoff. Programs that specifically encourage water conservation improve stormwater quality by preventing stormwater runoff from carrying materials away from irrigation sites. Water quality and water conservation programs within the Region include:

- *Antelope Valley Water Partners Outreach* - The Antelope Valley Water Partners (http://dpw.lacounty.gov/wwd/web/avlinks.aspx) consists of four water districts: Los Angeles County Waterworks District 40, Palmdale Water District, Quartz Hill Water District and

Rosamond Community Services District. The Antelope Valley Water Partners provide information on water savings and water saving improvements to make residential homes and irrigation systems more water efficient. The partners offer the following programs to help customers conserve water throughout the year:

- Rebates for water saving devices (e.g. rain shut-off irrigation sensor)
- Free in-home water use audits
- Free water saving devices at community events
- Free drought tolerant plant guides

- *S/N Management Plan Website and Outreach*
  - The Antelope Valley Integrated Regional Water Management Plan website (www.avwaterplan.org) provides information on projects, stakeholders and outreach. It also includes information specific to the salt and nutrient (S/N) management planning process for the Region. The Antelope Valley Integrated Regional Water Management Plan is a multi-county collaborative effort developed to address regional concerns about water supply reliability, water quality, flood protection, environmental resources, land use management and climate change impacts in the Antelope Valley. The scope of work for the S/N Management Plan is located on the website where the final version of the S/N Management Plan will also be available when complete in 2014.
  - The Association of California Water Agencies (ACWA), a coalition of 450 public water agencies, has launched a statewide public education program, entitled "California's Water: A Crisis We Can't Ignore," to educate Californians about critical challenges now confronting the State's water supply and delivery system. The ACWA website (www.acwa.com) also provides information for salt and nutrient management plans by organizing and posting webinars on S/N information.
- *Council for Watershed Health (CWH) Website and Outreach* - Since 1996, the CWH has been Southern California's hub for essential watershed research and analysis. CWH's programs are focused on four major areas: improving water quality, increasing water supplies through sustainable landscapes and stormwater reuse, facilitating integrated planning and management, and educating decision-makers about water issues. The CWH's urban stormwater program uses research, planning and education to achieve quality and reliability of local water resources through increasing conservation, recycling, and the use of local water resources. Although CWH's focus areas are the Los Angeles River and the San Gabriel River watersheds, CWH's urban stormwater research and studies are applicable to other regions

  (http://www.watershedhealth.org/programsandprojects/urbanstormwater.aspx).
- *Environmental Protection Agency (EPA)* – The EPA's website provides additional stormwater information regarding the NPDES Stormwater Program, urban polluted runoff, managing wet weather with green infrastructure, and LID

  (http://cfpub.epa.gov/npdes/stormwater/swbasicinfo.cfm).

Stormwater Management Plans

Prior to March 10, 2003, Los Angeles County and the Los Angeles County Flood Control District were governed by the Phase I Municipal Separate Storm Sewer Systems (MS4) permit in the Los Angeles Basin Area. The Phase I MS4 permit required all County facilities to comply with the Model Program "Public Agency Activities". This program required specific BMPs for the reduction of stormwater pollutant intrusion to the storm drain system. The County requires all field yards, including those located within the Antelope Valley, to comply with the Phase I requirements that became effective February 1, 2003.

As of August 2003, Stormwater Management Plans (SWMPs)[3] were mandated to be developed to address the requirements of the Phase II General Municipal National Pollutant Discharge Elimination System (NPDES) Permit for regulated small MS4s. According to federal regulations, the purpose of the Phase II permit is to regulate stormwater discharges from small MS4s. The General permit requires regulated small MS4s to develop and implement a SWMP to effectively prohibit non-stormwater discharges and reduce the discharge of pollutants to the "Maximum Extent Practicable".

The City of Palmdale, City of Lancaster and unincorporated Los Angeles County areas were automatically designated as a small MS4 by the U.S. Environmental Protection Agency because they are located within an urbanized area defined by the Census Bureau. Unincorporated Los Angeles County areas that are designated as urbanized are the communities of Littlerock, Pearlblossom and Quartz Hill. Each agency filed a notice of intent to comply with the State Water Resources Control Board Small MS4 General Permit and submitted a SWMP in 2003. Communities in the Kern County portion of the Region were not designated as small MS4s, but instead fall under Kern County's NPDES permit obtained in 2001.

2.4.2 Existing Projects

The Antelope Valley Region has already implemented projects that provide flood protection, groundwater recharge, water supply, and/or habitat restoration benefits. Other potential projects are in development now and are being tracked by the IRWM process. All of these projects provide multiple benefits that include flood protection. Table 2-3 summarizes IFM Projects in the Antelope Valley Region that were previously submitted for acceptance into the IRWM Plan. The list is not intended to be a comprehensive or definitive list, and it reflects projects that are in various stages of development.

Table 2-3: IFM Projects in the Antelope Valley Region

Project Description	Proponents	Benefits
Local retention/detention basins, street drainage inlets, underground storm drain pipes, and culverts	City of Palmdale City of Lancaster Quartz Hill	Flood: peak flow reduction Quality: sedimentation reduction
Wastewater, recycled water, surface water, imported water and groundwater monitoring	Antelope Valley-East Kern Los Angeles County Sanitation Districts Edward Air Force Base Rosamond Community Services District Palmdale Water District	Quality: water quality data collection

[3] http://www.swrcb.ca.gov/water_issues/programs/stormwater/swmp/la_county_swmp.pdf

Project Description	Proponents	Benefits

Adopted Model Water Efficient Landscape Ordinances:
- City of Palmdale
  o Landscape ordinances that require implementation of irrigation weather control, rain shutoff sensors, etc.
- Palmdale Water District
  o ET/Smart, SWAT tested, controller rebate program
- California Water District – City of Lancaster
  o Irrigation design plan (weather based irrigation controllers)
  o Grading design plan (Capture of runoff for 10-year event required for landscape areas greater than 5,000 square feet)
- City of Lancaster
  o Landscape ordinance that require implementation of dedicated landscape water meters, weather-based irrigation controllers, soil management plans, etc.
  o Water wasting ordinance that prohibits irrigation runoff from properties, requires leaks be remedied, etc.
	City of Palmdale
	Palmdale Water District
	California Water Service Company – City of Lancaster
	City of Lancaster
		Flood: peak flow reduction
		Quality: sedimentation, urban runoff loading reduction

Informational Websites/Public Outreach - SNMP website and outreach: www.avwaterplan.org www.acwa.com - Council for Watershed Health website and outreach: http://watershedhealth.org/Default.aspx - EPA: http://cfpub.epa.gov/npdes/stormwater/swbasicinfo.cfm	LA County Waterworks District No. 40 LACSD Council for Watershed Health Environmental Protection Agency	Flood: peak flow reduction Quality: sedimentation, urban runoff loading reduction
Stormwater Management Plans	City of Palmdale City of Lancaster Los Angeles County (Littlerock, Pearlblosson and Quartz Hill)	Flood: peak flow reduction Quality: pollutant reduction

2.5 Planned Projects

Potential projects submitted for acceptance to the 2013 Integrated Regional Water Management Plan (IRWMP) include planned flood control projects for the Region that may provide both flood control and stormwater quality benefits. The projects put forward are summarized in Table 2-4 and are further described after the table.

Table 2-4: Planning Projects that Provide Both Flood Control and Stormwater Quality Benefits

Project Name	Proponent	Description of Benefits
45th Street East Groundwater Recharge and Flood Control Basin	City of Palmdale	Flood: peak flow reduction Quality: sedimentation
Antelope Valley Watershed Surface Flow Study	Edwards Air Force Base	Flood: assess impacts of stormwater and upstream flood management projects Quality: assess impacts of sediment load
Avenue Q and 20th Street East Groundwater and Flood Control Basin (Q-West Basin)	City of Palmdale	Flood: peak flow reduction Quality: sedimentation
Avenue R and Division Street Groundwater Recharge and Flood Control Basin	City of Palmdale	Flood: peak flow reduction Quality: sedimentation, soil aquifer treatment
Barrel Springs Groundwater Recharge and Flood Control Basin	City of Palmdale	Flood: peak flow reduction Quality: sedimentation, soil aquifer treatment
Big Rock Creek In-River Spreading Grounds	Los Angeles County Department of Public Works (LACDPW)	Flood: peak flow reduction Quality: sedimentation, soil aquifer treatment
Hunt Canyon Groundwater Recharge and Flood Control Basin	City of Palmdale	Flood: peak flow reduction Quality: sedimentation, soil aquifer treatment
Little Rock Creek In-River Spreading Grounds	LACDPW	Flood: peak flow reduction Quality: sedimentation, soil aquifer treatment
Littlerock Creek Groundwater Recharge and Recovery Project	Palmdale Water District	Flood: peak flow reduction Quality: sedimentation, soil aquifer treatment
Littlerock Dam Sediment Removal	Palmdale Water District	Flood: peak flow reduction Quality: sedimentation
Lower Amargosa Creek Recharge Project	City of Palmdale	Flood: peak flow reduction Quality: sedimentation, soil aquifer treatment

Project Name	Proponent	Description of Benefits
Stormwater Harvesting	Leona Valley Town Council	Flood: peak flow reduction, volume reduction Quality: urban runoff loading reduction
Upper Amargosa Creek Flood Control, Recha rge, and Habitat Restoration Project	City of Palmdale	Flood: peak flow reduction, channel stabilization Quality: sedimentation, soil aquifer treatment, arsenic reduction

45th Street East Groundwater Recharge and Flood Control Basin

The 45th Street East Groundwater Recharge and Flood Control Basin Project is located in the City of Palmdale and includes the construction of a new approximately 2,083 acre-feet (AF) drainage basin near 45th Street East and Avenue P-8 on property currently owned by Los Angeles World Airports. By reducing contaminated stormwater runoff and capturing peak flows, both flood control and water quality benefits would be provided. The project will also add approximately 208 acres of new wildlife habitat.

Antelope Valley Watershed Surface Flow Study

The Antelope Valley Watershed Surface Flow Study will characterize the Antelope Valley surface water flow from the San Gabriel and Tehachapi Mountains to Rosamond and Rogers Lakes. The study will determine the amount of flow in the tributaries, determine health of lakebeds, and determine how much water is required to either keep them healthy or make them healthy. The study will also determine the impacts of implementing current and future proposed water diversion/removal projects and impacts of continued retention basin development. The study will quantify potential effects of future flood management projects and consider the influence of sediment loads to the dry lake beds. By assessing the impacts of stormwater, upstream flood management projects and sediment loads both water quality and flood control benefits would be provided.

Avenue Q and 20th Street East Groundwater and Flood Control Basin (Q-West Basin)

The Q-West Basin project is located in the City of Palmdale and entails the acquisition and construction of an approximately 1,612 AF detention basin located between Avenue P-12 and Avenue Q from 20th Street East to 30th Street East. This project would create approximately 161 acres of new wildlife habitat and improve water quality as a result of reducing contaminated stormwater runoff. By capturing peak flows and reducing sediment loads, the project would provide both flood control and water quality benefits.

Avenue R and Division Street Groundwater Recharge and Flood Control Basin

The City of Palmdale proposes to construct a 950 AF basin on 93 acres located at the northeast corner of Avenue R and Division St. including all necessary and associated grading, inlet/outlet structures, spillway, and storm drain piping as part of its stormwater collection and conveyance system. The project has the ability to provide for wildlife habitat, conservation, and stormwater capture. By capturing peak flows and reducing contaminated stormwater runoff, both flood control and water quality benefits would be provided.

Barrel Springs Groundwater Recharge and Flood Control Basin

The Barrel Springs Groundwater Recharge and Flood Control Basin Project is located in the City of Palmdale and consists of construction of an 878 AF detention basin in the Barrel Springs area upstream of Old Harold Road and 25th Street East, on a 40-acre, City-owned property. The project would provide flood control and water quality benefits for the City of Palmdale by capturing peak flows, reducing contaminated stormwater runoff and increasing soil aquifer treatment. The project will also create approximately 40 acres of habitat.

Big Rock Creek In-River Spreading Grounds

The Big Rock Creek drainage area is 23 square miles. The creek runs from the San Gabriel Mountains north into the Antelope Valley. The Los Angeles County Flood Control District (part of the LACDPW) proposes to develop a spreading ground facility near the San Gabriel Mountain foothills in order to increase groundwater recharge. The facility will include earthen levees in and adjacent to the creek to capture and recharge stormwater from the creek into the groundwater basin. By capturing peak flows, reducing contaminated stormwater runoff and increasing soil aquifer treatment, both flood control and water quality benefits would be provided.

Hunt Canyon Groundwater Recharge and Flood Control Basin

The Hunt Canyon Groundwater Recharge and Flood Control Basin Project is sponsored by the City of Palmdale and entails construction of a new 3,000 AF detention/ recharge basin, located south of Pearblossom Highway at 57th Street East. The basin would be used to store aqueduct water to allow recharge into the aquifer, and it would act as a detention basin during severe storms thus providing flood control benefits. Approximately 300 acres of new wildlife habitat would be created by construction of this project. The project would also provide water quality benefits by reducing contaminated stormwater runoff.

Littlerock Creek In-River Spreading Grounds

The Littlerock Creek In-River Spreading Grounds is sponsored by LACDPW and consists of a spreading ground facility near the San Gabriel Mountain foothills in order to increase groundwater recharge. The facility will include earthen levees in and adjacent to the creek to capture and recharge stormwater from the creek into the groundwater basin. Developing an in-stream groundwater recharge facility will increase groundwater recharge by an estimated 7,600 AF per wet-year. This project will improve the health and long-term sustainability of the basin, increase local groundwater supplies, reduce the Region’s reliance on water imports, and provide flood control and water quality benefits.

Littlerock Creek Groundwater Recharge and Recovery Project

The Littlerock Creek Groundwater Recharge and Recovery Project (LCGRRP) is sponsored by Palmdale Water District and involves groundwater recharge using imported water, local stormwater runoff, and recycled water from the Palmdale WRP. The Littlerock Creek Groundwater Recharge and Recovery Project would be a run-of river recharge project, utilizing the existing active natural channel system and a series of shallow recharge basins in the adjacent floodplain to recharge State Water Project water, stormwater, and recycled water. The recharge and recovery capacities of the project are projected to be about 43,000 AF per year (AFY) and 14,000 AFY, respectively. Preliminary groundwater modeling studies have demonstrated that the LCGRRP will substantially reduce drawdown of the aquifer in the Palmdale Water District’s service area and in areas surrounding the project. The recharge project will provide flood control and water quality benefits by capturing peak flows, reducing contaminated stormwater runoff and increasing soil aquifer treatment.

Littlerock Dam Sediment Removal

The Littlerock Dam Sediment Removal Project will remove up to 900,000 cubic yards of sediment that has been accumulated from runoff into Littlerock Reservoir, and up to 40,000 cubic yards on an annual basis after the initial sediment is removed. The project would provide water quality and flood control benefits by reducing sediment and increasing peak flow capture during certain times of year. The project also includes a grade control structure that will protect the identified habitat of the endangered Arroyo toad.

Lower Amargosa Creek Recharge Project

The Lower Amargosa Creek Recharge Project is located in City of Palmdale and consists of development of in-stream recharge of water from the State Water Project blended with recycled water. The project would provide more than 1,000 AF of detention basin. The detention basin will capture peak flows, reduce contaminated stormwater runoff and increase soil aquifer treatment, providing flood control and water quality benefits.

Stormwater Harvesting

The Stormwater Harvesting Project includes the construction of stormwater collection and conveyance facilities, water filtration devices, and cisterns and collection tanks. Through advanced filtration methods, this project can be expanded to create potable water for residential uses. Once fully implemented, it is estimated that water conservation of up to 25 AFY could be realized. The project will provide flood control and water quality benefits by capturing peak flows and reducing urban runoff loading.

Upper Amargosa Creek Flood Control, Recharge, and Habitat Restoration Project

This project’s proposed improvements include: expanding the size and capacity of the natural recharge area; developing and preserving an ephemeral stream habitat; channelization of Amargosa Creek (soft bottom); and providing a grade separation of 20th Street West over Amargosa Creek. The project will increase capture of 14,600 to 53,600 AFY and provide 20 acres of flood protection capacity. The project will also create 25 acres of open space/habitat. By capturing peak flows, providing channel stabilization, reducing stormwater runoff and increasing soil aquifer treatment, flood control and water quality benefits will be provided.

3 Potential Opportunities, Constraints, and IFM Strategies

The characteristics of the region provide background into understanding the potential opportunities as well as constraints for developing IFM solutions for the Region. Flood management projects are planned and implemented to reduce risk to public safety and property while maximizing other benefits like water supply and environmental restoration. For every “problem”, which can be thought of as an undesirable condition, there are “opportunities” that offer chances for improvement and “constraints” that limit implementation. The Antelope Valley includes flat valleys with numerous alluvial fans that have urban development surrounded by rainfall-collecting steep terrain. The geographic as well as meteorologic conditions are conducive to sudden flooding. The semi-arid climate, wherein total rainfall is typically concentrated in a few short months, adds to the uncertainty of flood prediction. In addition, the unique issues associated with the watershed conditions limit the application of conventional flood management solutions. The Region’s flood management opportunities/constraints may be divided into four major categories: (1) physical conditions, (2) regulatory, (3) land-use, and (4) environmental/biological.

3.1 Valley Opportunities and Constraints

Physical

Different physical features define the types of flooding issues since they greatly influence the response of the watershed. The nature of the flooding created by the topography also results in different constraints and limits the ability to apply different conventional solutions for flood hazard mitigation.

Table 3-1: Physical Flood Management Opportunities and Constraints

Opportunity/Constraint	Relevance
Closed watershed system with no outlet to the ocean such that stormwater is recharged in foothills or evaporated from dry lakebeds	• Limits suitable locations for recharge • Planning is difficult because watershed has a unique response relative to rainfall events that is difficult to predict
Existing roadway and utility crossings create hydraulic conveyance limitations (e.g., California aqueduct, Highway 14, etc.)	• Hydraulic limitations represent potential target areas for fixes that may reduce flooding and sedimentation
Existing facilities and structures are located within the floodplain	• Need to define existing flood risk from existing facilities/uses within the floodplain
Sediment delivery occurs with flood flows from foothill areas	• Excessive sediment delivery causes deposition at downstream locations with flatter slopes • High sediment yields “bulk” the flood waters and increase depth of flooding
Limited topographic relief/slope that limits hydraulic conveyance	• Conveyance channel sizes will increase further downstream within the watershed because of reduced slopes
Soils/geology are primarily alluvial deposits that are highly erodible	• Channel migration routinely occurs • Erosion hazards for development adjacent to channels

Specialized geographic/geomorphic features which include alluvial fans, bajadas, and playas	• Hydraulic conditions are unique (i.e., as compared to riverine systems) and conventional flood management solutions are not applicable
Topographic features result in steep slopes in the mountains/foothills and extremely flat slopes on the valley floors	• Changes in hydraulic conveyance and sediment delivery because of the change in slopes

Regulatory

The existing regulations related to floodplain management and flood control influence the existing level of flood protection provided to the community.

Table 3-2: Regulatory Flood Management Opportunities and Constraints

Opportunity / Constraint	Reference
No regional flood agencies exist other than LA & Kern Counties	• Flooding problems within Antelope Valley are unique to the valley and different from the coastal areas which are influenced primarily by riverine flood sources • Comprehensive master plan required that reflects the regional and integrated thought process for flood management and environmental considerations
FEMA/NFIP requirements for community floodplain regulations apply	• NFIP requirements have the most influence on floodplain restrictions
No specialized design standards for desert drainage or flood protection/flood management	• Different standards are required for the valley types of flood hazards and the potential available solutions • Specialized manual of criteria and standards should be developed for desert drainage which encompasses the hydrology, sediment/erosion, and unique hydraulic conditions (based on design work in similar desert areas of the Southwest)
Accuracy of flood hazard mapping for valley floor and alluvial fans has uncertainty	• Flooding and sedimentation on alluvial fans are complex processes that are difficult to simulate numerically (model) • Alluvial fan flooding presents unique problems in terms of quantifying flood hazards, assessing sediment transport characteristics, devising reliable flood protection schemes, and evaluating impacts of various projects on flow and sediment dynamics
Water quality limitations and restrictions are based on the Basin Plan and identified TMDLs	• Water quality restrictions should be implemented as part of the regional planning solution

Land Use

Existing land use and future proposed development should be closely coordinated with the existing mapped flood hazards. Land use restrictions are one of the primary tools for floodplain management in order to reduce flood risks.

Table 3-3: Land Use Management Opportunities and Constraints

Opportunity/Constraint	Relevance
Various urban/commercial land use and additional manmade encroachments are located within the floodplain	• Limitations of development and land use restrictions are needed within active flood hazard zones

Environmental/Biological

Existing biological resources within the floodplain corridor present an opportunity to integrate the preservation of these resources into regional planning efforts. However, these resources can also represent constraints in terms of the types of solutions that can be used for flood mitigation and in terms of higher costs.

Table 3-4: Environmental/Biological Flood Management Opportunities and Constraints

Opportunity/Constraint	Relevance
Environmental permitting limitations for activities/structures within the floodplain (i.e., endangered species)	• Additional costs and/or limitations on the potential solutions available
An Antelope Valley Significant Ecological Area (SEA) is located within the central portion of the Antelope Valley, primarily east of the cities of Palmdale and Lancaster; it includes the tributary creeks to Little Rock and Big Rock Creeks (partially within U.S. Forest Service land) downstream to the valley floor and northward across the historic floodplain zones to Rosamond, Buckhorn, and Rogers dry lakes on the Los Angeles/Kern County boundary	• Existing floodplains and streams, particularly inside the SEA, are valuable biological resources

3.2 Potential IFM Strategies

Commonly-utilized IFM strategies that are applicable to Antelope Valley are presented below.

Strategy Application No.1 - Watershed Management Planning

IFM Objectives / Principles:

- Land use planning
- LID policies
- Natural resource preservation
- Sustainable development
- Water quality
- Runoff management

Description of Representative Actions / Elements:

Apply core underlying watershed management planning guidelines in developing the proposed strategies and infrastructure for future development. These guidelines would ensure that development (i) mimics existing runoff and infiltration patterns within the project area, (ii) does not exacerbate peak flow rates or water volumes within or downstream of the project area, (iii) maintains the geomorphic structure of the major tributaries within the project area, (iv) maintains coarse sediment yields, storage and transport processes, (v) uses a variety of strategies and programs to protect water quality, and (vi) acknowledges downstream beneficial uses. The principles refine the planning framework and identify key physical and biological processes and resources at both the watershed and sub-basin level. The Watershed Planning Principles focus also on the fundamental hydrologic and geomorphic processes of the overall watersheds and of the sub-basins. These principles can be utilized to guide the initial planning of the development program relative to watershed resources and to minimize impacts thereto through careful planning by integrating the initial baseline technical watershed assessments. Non-structural watershed protection planning principles would include minimization of impervious areas/preservation of open spaces and dependent natural habitats, prioritization of soils for development and infiltration, and establishment of riparian buffer zones. Examples of watershed planning principles that can be used include:

Principle 1 – Recognize and account for the hydrologic response of different terrains at the sub-basin and watershed scale.

Principle 2 – Emulate, to the extent feasible, the existing runoff and infiltration patterns in consideration of specific terrains, soil types and ground cover.

Principle 3 – Address potential effects of future land use changes on hydrology.

Principle 4 – Minimize alterations of the timing of peak flows of each sub-basin relative to the mainstem creeks and important creek tributaries.

Principle 5 – Maintain and/or restore the inherent geomorphic structure of major tributaries and their floodplains.

Principle 6 – Maintain coarse sediment yields, storage and transport processes.

Principle 7 – Protect water quality by using a variety of strategies, with particular emphasis on natural treatment systems such as water quality wetlands, swales and infiltration areas and application of Best Management Practices within development areas to assure comprehensive water quality treatment prior to the discharge of urban runoff into the floodplain corridor

Potential Benefits:

- Integrated land planning process with watershed functions
- Managed runoff from development and commercial watershed activities
- Maintain natural runoff process
- Minimize long term maintenance costs within floodplain
- Protect downstream beneficial natural biological processes

Strategy Application No.2- Floodplain Management

IFM Objectives / Principles:

- Integrated land use planning
- Natural floodplain corridor preservation
- Sediment management / stream stability
- Natural streambed groundwater recharge

Description of Representative Actions / Elements:

Facilitating improved alignment and coordination between land use and flood management would result in better understanding of flood risk and potential impacts to proposed developments, as well as improved decision making. Specifically, flood risk information has the potential to influence land use policy decisions related to developing and expanding communities within a floodplain, which would result in reductions to flood damage claims and long-term O&M costs on projects. At the planning stage, additional measures might be incorporated into the initial proposed projects that could provide community benefits, such as setback areas that act as greenways or trails, and greatly reduce the need to retrofit or replace undersized infrastructure in the future. Too often, regional and land use policymakers realize flood risk and economic losses only after a damaging flood event. Some of the additional actions associated with this item include defining increased floodways to limit development along the floodplain fringe, floodplain retreat through purchase of properties within the floodplain, and ensuring that different land uses are compatible with the floodplain risks.

Potential Multiple Water Resource Benefits:

- Reduction in flood damage subsidies to chronic flood locations

Strategy Application No.3 – Stream Stabilization

IFM Objectives / Principles:

- Sediment control
- Increased floodplain capacity
- Water quality
- Reduce negative impacts of sediment deposition downstream

Description of Representative Actions / Elements:

Channel erosion, with substantial stream incision, can be a large contributor of sediment to downstream receiving waters and deposition in portions of channels that reduce flood capacity. In addition, increased sediment transport will "bulk" the runoff flows in the channel and further diminish the flood conveyance capacity. Watershed based regional studies/investigations of the fluvial processes and watershed sediment yields as well as geomorphic assessments/monitoring can evaluate those critical locations within the watershed that require stabilization. Stream erosion and sedimentation adversely impact water quality beneficial uses of both the stream and the receiving waters, and sediment TMDL. Stabilization of the natural alluvial channel system to eliminate future erosion of the streambed and streambank will assist in critical channel areas as a major sediment source as well as disrupting the loss of vegetative habitat within the floodplain. Detailed streambed stability assessments provide part of the technical support for the evaluation of the benefits of and opportunities for alternative stream stabilization / restoration techniques to ensure that the natural geomorphic and fluvial processes are maintained in balance. Stream stabilization and sediment control efforts should also recognize beneficial downstream impacts of sediment transport.

Potential Benefits:

- Minimize maintenance in floodplains
- Reduce long term operations costs
- Reduce apparent peak discharge through reduced sediment bulking
- Reduce loss of land
- Improve recharge in streambed
- Reduce sediment deposition in riverine /estuarine habitat areas
- Recognize beneficial downstream impacts of sediment transport

Strategy Application No. 4 – Watershed Sediment Control / Erosion Management

IFM Objectives / Principles:

- Land use planning
- Development sustainability
- Water quality enhancement

Description of Representative Actions / Elements:

Soil is considered a water pollutant because it can significantly affect water used for public consumption, recreation and habitat. Therefore, the most effective way to control soil erosion is at its source. Erosion control best management practices (BMPs) are required on all land disturbance sites to provide a defense against soil erosion in addition to different commercial activities within the watershed. Watershed planning that implements different BMPs can be applied, as well as the modification of commercial activities to minimize sediment disturbances. There are also natural areas which may be de-stabilized and be a significant sediment source which require specialized treatments to reduce the amount of sediment production. Sediment control efforts should also recognize beneficial downstream impacts of sediment transport.

Potential Benefits:

- Receiving waters improved water quality
- Reduce flooding through reduced sediment bulking of flows
- Reduction of sediment deposition in undesirable locations within floodplain
- Recognize beneficial downstream impacts of sediment transport

Strategy Application No.5 – Multi-Function Flood Storage / Recharge Basins

IFM Objectives / Principles:

- Flood reduction
- Groundwater recharge
- Stormwater recycling / alternative water source

Description of Representative Actions / Elements:

Regional watershed evaluation and planning to provide flood peak flow attenuation through either off-channel or adjacent in-channel temporary flood volume storage. The reduction in peak flow rates will minimize downstream flooding. In addition, the stored flood runoff volumes can be recharged into the aquifer to enhance groundwater supplies. Coordination with groundwater management agencies should be performed on a watershed basis to determine the optimum location to ensure that maximum recharge can be provided to the aquifer since different areas of the watershed may not provide any benefit to groundwater supplies. Coordination of both groundwater and flood benefits is necessary as part of advance planning with multiple agencies. In addition, floodplain enlargement can result in increased habitat corridors as well as improving the in-channel flood storage capabilities.

Potential Benefits:

- Reduced flooding downstream

- Stormwater recycling and additional water source capture

Strategy Application No.6 – Urban Water Quality Treatment / Retention

IFM Objectives / Principles:

- Water reuse / recycling
- Groundwater recharge
- Natural floodplain protection
- Stream stabilization
- Water quality treatment
- Urban flood management

Description of Representative Actions / Elements:

Management of urban stormwater runoff and the associated water quality as well as increased runoff quantities impacting the natural floodplain corridors which result in a variety of impacts, not just increased flooding. Projects involving the capture of dry weather flows provide an opportunity to recycle this water source, often considered a waste-stream in the past

Potential Benefits:

- Improved water quality and reduced impacts to downstream receiving waters
- Restoration of natural floodplain functions
- Reduced impacts of urban hydromodification

Strategy Application No. 7 – Floodplain Habitat Corridor Preservation / Buffer

IFM Objectives / Principles:

- Vegetation buffer
- Habitat preservation
- Stream corridor stabilization

Description of Representative Actions / Elements:

Wetlands and floodplain vegetation can provide a hydrologic buffer to watershed responses through reduced velocity and increased time. The watershed vegetation can buffer the intensity of rainfall events and the corresponding watershed response, which can reduce flooding downstream. The preservation of natural vegetation reduces water flow connectivity by interrupting surface flows of water.

Potential Benefits:

- Reduction of streambank/streambed erosion through natural protection
- Enhanced wildlife habitat benefits
- Natural water quality biological uptake benefits

Strategy Application No. 8 - Enhanced Floodplain Storage / Recharge

IFM Objectives / Principles:

- Floodplain preservation
- Flood storage / groundwater recharge
- Peak flow reduction
- Flooding reduction
- Maintenance of natural hydrologic processes

Description of Representative Actions / Elements:

Use of the floodplain to provide temporary in-channel storage to reduce peak flow rates downstream. The identification of potential flood storage areas within the floodplain involves integrating wetland and floodplain beneficial functions into floodplain management planning. Protection of floodplain and wetland vegetation from erosion is particularly important for high velocity areas

Potential Benefits:

- Enhanced groundwater supplies
- New water source
- Habitat enhancement and increased corridor width

Strategy Application No. 9 - Coordination between programs/agencies for water management and flood management planning.

IFM Objectives / Principles:

- Communication between agencies within watershed
- Watershed planning guidance / regulations
- Enhanced water supplies
- Water management

Description of Representative Actions / Elements:

Improving coordination between regional water management and flood management planning is a key strategy to increase implementation of IFM projects. Existing planning groups and forums should be utilized to the extent possible. By coordinating water and flood management planning with balanced representation, a common understanding of flood management, water supply, water quality, environmental stewardship, public safety, and economic sustainability factors may be developed. Where possible, policy changes that promote this holistic approach to IFM should be proposed and sponsored (e.g., changes to existing IRWM legislation). In addition, coordination in the watershed planning process provides the opportunity to optimize the benefits of joint-use regional facilities to maximize water resources as well as flood mitigation benefits.

Potential Benefits:

- Maintaining a natural watershed response
- Increased groundwater replenishment
- Reduced flood damage
- Reduction in flood maintenance

Strategy Application No. 10 - Watershed / floodplain information management and data exchange

IFM Objectives / Principles:

- Communication between agencies within watershed
- Community involvement
- Increased watershed monitoring

Description of Representative Actions / Elements:

Improving the watershed database to ensure that different watershed stakeholders have access to the available information and studies being performed. The sharing and the exchange of data, information, knowledge among experts, general public, policy makers, and floodplain managers in a transparent manner is essential for comprehensive planning and effective management. Significant studies and mapping information are being developed within the watershed with single functions, but they could become a valuable regional, integrated asset if shared with other users and could help to reduce costs. Fragmentation of data is common, and providing a common data repository and manager supports the technical foundation for comprehensive planning.

Potential Benefits:

- Improved tracking and monitoring of watershed characteristics
- Reduction in data acquisition needs
- Enhanced community involvement in watershed, including active participation in data collection

3.3 Community Rating System (CRS) Participation

The National Flood Insurance Program (NFIP) Community Rating System (CRS) is a voluntary program that communities can participate in to encourage implementation of floodplain management activities that exceed the minimum NFIP standards. These minimum standards specify that communities (1) incorporate the requirements into their subdivision, zoning, and other land use ordinances or building codes or (2) adopt a separate floodplain management ordinance. The standards include the following requirements:

- Special Flood Hazard Areas (SFHAs) - development must have a permit from the community.
- V Zones - these are areas along coasts subject to inundation by the 1% annual chance flood with additional hazards associated with storm-induced waves. Development is discouraged, though not prohibited; and it is required that the lowest horizontal structural member be above the Base Flood Elevation (BFE) and be built on piles or columns or otherwise properly anchored to resist erosion. Additionally, areas below the BFE must have break away walls.

The CRS allows numerical scoring of the different floodplain management activities in addition to the above listed requirements. Scores above the minimum NFIP requirements are eligible for reductions in flood insurance premiums. CRS discounts for eligible communities on flood insurance premiums range from 5% to 45%. Those discounts provide an incentive for new flood protection activities that can help protect lives and property in the event of a flood.

Flood insurance premium rates are discounted to reward community actions that meet the three goals of the CRS: (1) reduce flood damage to property; (2) strengthen and support the insurance aspects of the NFIP; and (3) encourage a comprehensive approach to floodplain management. Based on the total number of points earned, the CRS places a community into one of ten "Classes." The discount on flood insurance is based on the Class. A general indication of the points required for each Class designation as well as the corresponding insurance premium reduction is illustrated in **Table 3-5**. For example, if the community earns 4,500 or more points it is placed in Class 1, and qualifying property owners in the floodplain receive a 45% discount. If a community does not apply or fails to receive at least 500 points, it is placed in Class 10, and property owners get no discount. The County of Los Angeles has been a participant in the CRS since 1991 and has qualified for a CRS Class rating of 7, for a 15% discount on flood insurance in SFHAs.

Table 3-5: CRS Class and Insurance Premium Reduction

Credit Points	Rate Class	Premium Reduction SFHA*	Premium Reduction Non-SFHA*
4,500+	1	45%	10%
4,000 – 4,499	2	40%	10%
3,500 – 3,999	3	35%	10%
3,000 – 3,499	4	30%	10%
2,500 – 2,999	5	25%	10%
2,000 – 2,499	6	20%	10%
1,500 – 1,999	7	15%	5%
1,000 – 1,499	8	10%	5%
500 – 999	9	5%	5%
0 – 499	10	0	0

* SFHA = Special Flood Hazard Area

The CRS Classes are based on 19 different creditable flood management activities that are organized under four general categories which include: (1) 300-public information, (2) 400-mapping and regulations, (3) 500-flood damage reduction, and (4) 600-flood preparedness. Credit points are assigned to the different activities as shown in Table 3-6 based upon the extent to which an activity advances the three goals of the CRS. A given community can choose to undertake some or all of the 19 different CRS activities, but the community is required do Activity 310, *Elevation Certificate*, at a minimum; and if the community has designated repetitive losses then it must also do Activity 510, *Floodplain Management Planning*. All the other activities are optional.

Section 401 of the *Coordinator's Manual* is important relative to the specific flood hazards in the Antelope Valley because this section discusses the additional credits for mapping "special flood hazards," recognizing that the mapping and regulatory standards of the NFIP do not adequately address all flood problems. Communities may receive credits for mapping, preserving open space, and regulating new development in areas subject to the following seven special flood-related hazards: (1) uncertain flow paths, (2) closed basin lakes, (3) ice jams, (4) land subsidence, (5) mudflow hazards, (6) coastal erosion, and (7) tsunamis. Locally, the Antelope Valley is subject to the hazard of "uncertain flow paths" due to the existence of alluvial fans in the Region. Table 3-6 indicates the CRS activities and the potential points that may be awarded for implementing these activities.

Table 3-6: CRS Activities and Points Awarded

Activity	Maximum Possible Points[1]	Maximum Points Earned[2]	Average Points Earned	Percentage of Communities Credited
300 Public Information Activities				
310 Elevation Certificates	116	116	46	100%
320 Map Information Service	90	70	63	93%
330 Outreach Projects	350	175	63	90%
340 Hazard Disclosure	80	57	14	68%
350 Flood Protection Information	125	98	33	92%
360 Flood Protection Assistance	110	65	49	41%
370 Flood Insurance Promotion	110	0	0	0%
400 Mapping and Regulations				
410 Floodplain Mapping	802	585	65	50%
420 Open Space Preservation	2,020	1,548	474	68%
430 Higher Regulatory Standards	2,042	784	214	98%
440 Flood Data Maintenance	222	171	54	87%
450 Stormwater Management	755	540	119	83%
500 Flood Damage Reduction Activities				
510 Floodplain Mgmt. Planning	622	273	123	43%
520 Acquisition and Relocation	1,900	1,701	136	23%
530 Flood Protection	1,600	632	52	11%
540 Drainage System Maintenance	570	449	214	78%
600 Flood Preparedness Activities				
610 Flood Warning and Response	395	353	144	37%
620 Levees	235	0	0	0%
630 Dams	160	0	0	0%

1 The maximum possible points are based on the 2013 Coordinator's Manual
2 The maximum points earned are converted to the 2013 Coordinator's Manual from the highest credits attained by a community as of October 1, 2011. Growth adjustments and new credits for 2013 are not included.

3.3.1 Cost and Benefits for Participation in CRS

Although there is no fee charged to apply for participation in the CRS, the community still incurs costs. These costs are associated with implementing creditable floodplain management activities and the staff time needed to document those activities. The costs also include staff time to prepare for and participate in the recertification process and verification visits. These are not insignificant costs. The implementation costs should be evaluated and compared to the benefits achieved through reducing the class rating and the corresponding reduced insurance rates. Few, if any, of the CRS activities will produce premium reductions equal to or greater than the cost of their implementation. In considering whether to undertake a new floodplain management activity, a community must consider all of the benefits the activity will provide (not just insurance premium reductions) in order to determine whether it is worth implementing.

Potential benefits of participation in CRS include:

- Reduction in flood insurance premiums for residents and businesses; the dollar savings varies according to the CRS class, the number of policies, and the amount of coverage.

- Enhanced public safety, reduction in damage to property and public infrastructure, avoidance of economic disruption and losses, reduction in human suffering, and protection of the environment provided by the credited activities.
- Opportunity to evaluate the effectiveness of a community's flood program against state and nationally recognized benchmarks.
- Opportunity to get training and technical assistance in designing and implementing credited flood protection activities.
- Initiation of new public information activities; these activities to build a knowledgeable constituency within the community.
- Development of an effective motivator to continue implementing flood protection programs during the "dry years."
- Mutual support among participating CRS communities.

4 Conclusions and Recommendations

It is clear from the discussions that precede this section that an IFM approach could be implemented in the Antelope Valley that would not only reduce flooding, but improve water quality and increase water supply. A general framework for the application of an IFM approach throughout the Antelope Valley that will maximize water resources benefits is summarized below and more specific recommendations follow.

1. **Increase collaboration/communication between agencies responsible for municipal and regional floodplain management**
   - Develop framework and process for different levels of communication between floodplain managers
   - Provide regional working forum (*Watershed/Floodplain Managers Forum*) for agencies and local government that allows increased collaboration with regular meetings
   - Provide basis for a regional work-group forum of floodplain managers and watershed stakeholders that allows increased collaboration with regular meetings. Utilize existing industry forums or planning groups, such as the Floodplain Mangers Association, to establish these initial working groups.
2. **Improve understanding and accuracy of regional and local flood risks on a watershed basis**
   - Develop understanding of the different types of flooding from both regional and local levels and examine specific flood problems (i.e., inventory common "hot spots" with chronic problems)
   - Provide methodology to define the magnitude of flood risks; this will better prioritize the level of flood risk and potential flood damage
   - Review common recurring flood damage losses and evaluate the sources of these flood problems
3. **Develop regional watershed database to assist in flood management planning that will provide a data exchange of information for all watershed stakeholders**
   - Ensure that different watershed stakeholders have access to the available information and studies being performed
   - Develop community-based watershed groups to provide monitoring of floodplains and reduce costs of performing these services while increasing the active field database
   - Collect and compile watershed mapping information related to flood hazards and watershed information in a GIS format
   - Develop an updated GIS database of the existing flood control and flood management infrastructure
4. **Develop an inclusive "watershed based" planning strategy, which includes collaboration with all stakeholder groups, to minimize conflicts and define specific watershed goals**
   - Develop understanding of the different priority goals of the watershed stakeholders based on the common recurring flooding issues/problems/hazards, not necessarily based on institutional or political boundaries
   - Involve environmental groups and other agencies (e.g., Edwards Air Force Base) in the planning process

5. **Initiate understanding and awareness of IFM**
   - Prepare educational material and information on the background of IFM to foster a better understanding of the approach
   - Provide examples of IFM projects to assist in understanding
   - Provide information to stakeholders to ensure an understanding of watershed processes from the top of the watershed to the bottom.
6. **Identify applicable IFM strategies that may be implemented on a watershed basis**
   - Define common types of IFM strategies which integrate different planning principles on different scales (1) watershed level, (2) city level, and (3) neighborhood/local level
   - Develop regional mapping of both opportunities and constraints related to IFM
   - Develop a specialized GIS based tool which defines the locations of IFM projects at a regional scale, illustrates multiple benefits, and provides a method for prioritizing flood management projects
7. **Develop a watershed planning guidance program for implementing IFM through different land planning regulations**
   - Develop a watershed planning process framework with key planning principles for implementing IFM that focuses on linking sustainability, water resource management, and land use planning to flood management
   - Prepare guidance on integrating "land use planning" as a central element of IFM and explain how it can be utilized for different types of floodplain hazard issues
   - Develop an overall guidance document that provides stakeholders with the basis for watershed planning with IFM

4.1 Recommended Stakeholder Collaboration

The Antelope Valley is unique with regard to floodplain management administration since there are multiple county jurisdictions as well as federal lands (i.e., EAFB and Air Force Plant 42). There are a variety of stakeholders, such as the local cities and other agencies, which are directly involved with implementation of floodplain management policies. The fragmentation of floodplain management responsibility makes watershed scale planning more difficult. It is recommended that a Watershed/Floodplain Managers Forum be established that promotes collaboration with the floodplain managers and with the other water resource agencies. The current work group (i.e., the Flood Committee) established as part of the 2013 IRWMP Updates can be utilized as the initial framework for the forum. This forum would assist in defining the framework and process for different levels of communication of the different levels of flood managers and watershed stakeholders. The process will define different strategies and media for communication; it will also disseminate information about planning and management activities. In addition, the forum can engage the managers and stakeholders with workshops in order to encourage participation in the plan development and execution. This working forum is a critical element that should continue into the future after the initial plan structure has been developed. It can be used as a regular vehicle for communication and collaboration to ensure effective watershed planning and execution.

4.2 Recommendations for CRS Participation

Local communities and other watershed stakeholders in the Antelope Valley can become involved in the CRS program. The County of Los Angeles is already a participant, so many of the regional floodplain management elements are being administered through that agency. The CRS activities and program that the county has developed can be utilized to implement more specific activities that focus directly on the needs of the Antelope Valley. The following are recommendations for participating in CRS activities, based on achieving the maximum benefit to cost ratio in terms of the highest CRS points rating:

Initial Activities:

- Obtain and review the CRS documentation that Los Angeles County has developed as part their community program in the four different categories. Utilize these activities already performed by the county as a guide and foundation to build upon.
- Contact Los Angeles County and the cities of Lancaster, Palmdale, Rosamond, and Mojave to see what CRS activities, if any, are already being implemented.
- Investigate the approximate rating of the community as the scoring baseline to help quantify the benefits from additional flood management activities. A simple way to determine whether the Antelope Valley qualifies for a Class 9 credit (500 credit points) is the CRS "Quick Check," an excel spreadsheet. By using the Quick Check spreadsheet, a community can estimate its potential CRS credit. The Quick Check uses average credits at the element level. It can be found at www.CRSresources.org/200. (The CRS Quick Check spreadsheet is attached to this technical memo for reference)
- Assess "gaps" where additional items could easily be implemented using the Quick Check as an initial inventory of the floodplain management program activities
- Determine if there are any repetitive loss properties within their communities. As a basic requirement for joining the CRS, communities with properties that have received repeated flood insurance claims payments must map the areas affected, and communities with 10 or more properties must prepare, adopt, and implement a plan to reduce damage in repetitive loss areas. These steps are presented below:
    - Review and describe its repetitive loss problems
    - Prepare a map of the repetitive loss area(s)
    - Undertake an annual outreach project to the repetitive loss area(s) and submit a copy of the outreach project with each year's recertification
    - Prepare a floodplain management plan for its repetitive loss area(s)
- Develop a Floodplain Management Plan (FMP) that assesses the flooding hazards, summarizes previous and current management programs, describes potential mitigation strategies, and presents a plan for future action. It is also intended to address concerns with Repetitive Loss (RL) properties. This is a significant work effort to develop this planning document and could result in substantial costs.

Public Information (300 series) Activities:

- Prepare public information brochures that cover the following flood protection topics:
    - Causes and extent of flooding
    - What is being done about flooding
    - What to do during a flood
    - How people can protect their homes
    - Flood insurance
    - Taking care of drainage ways
- Establish a public information outreach strategy team. It need not be a formal organization. The team must have at least three members. At least one team member must be someone familiar with the community's floodplain management program, such as the CRS Coordinator. At least one member must be a representative from outside community government. This could be someone

from the public schools, a neighborhood association, the Red Cross, insurance agencies, utilities, or other offices involved in education or floodplain management.

- Provide the library and other offices with a list of appropriate flood protection references, government publications, internet websites, and maps. The list should include ordering or contact information for each item.
- Prepare news releases and news articles on flood protection measures and the progress of implementing flood management activities for the local newspapers at least once every quarter.
- Prepare a homeowner's property protection manual and make available for interested residents and businesses.
- Hold public outreach meetings with selected groups, including schools and teachers, to help members become familiar with flooding, flood protection measures, natural floodplain and wetland functions, and community services.
- Develop public education campaigns and materials to improve preparedness and awareness; and cooperate with local educational institutions, hospitals, media outlets, and libraries in distributing these materials.
- Meet with the local chapter of the Association of Realtors® to discuss and promote greater understanding of flood risks, flood insurance, available resources, and the importance of disclosing flood risk information to prospective renters and buyers.
- Inform and assist property owners who want to protect themselves from flooding.
    - Provide flood elevation, flood zone, and dam inundation information to inquirers.
    - Conduct site visits to review flooding and drainage problems, and provide advice to owners.

Mapping and Regulations (400 series) Activities

- Perform more detailed floodplain mapping studies of the major washes, particularly the alluvial fans, to provide a more detailed assessment of the flooding patterns. In particular, the alluvial fans result in unconfined flows which require specialized hydraulic models in order to evaluate the distribution or spread of flows. Provide improved floodplain mapping study beyond the minimum performed through the FEMA Flood Insurance Study (FIS).
- Adjust the General Plan to preserve more of the active floodplain or flood hazard areas as open space or park area. Review the different allowed land uses within the flood hazard areas and consider modifying some of these uses to restrict development within the floodplain where appropriate.

Flood Damage Reduction (500 series) Activities

- Develop program to annually or more frequently inspect channels to prevent the deposition of debris.
- Develop ordinance to prevent the dumping of debris within mapped floodplains.

Flood Preparedness (600 series) Activities

- Assist the County to establish an ongoing program to add new gages to the County's ALERT system each year. For maximum credit under the NFIP CRS, a community must have at least one stream gage for each major developed drainage basin or one gage for every 10 square miles.
- Encourage active participation of all municipalities in a countywide system to improve the overall effectiveness of flood warning in this portion of the County.
- Tie flood response actions in the Emergency Operations Plan to flood stages.
- Conduct quarterly drills to test Emergency Operations Center Activation procedures.

- Develop emergency operations and mitigation plans for each critical facility. These plans should identify tasks to be implemented by the facilities, the amount of warning time needed to complete operational and mitigation tasks, and the resources necessary to complete their assigned missions.

4.3 Recommendations for Flood Control and Stormwater Quality Projects

Potential planned flood control and water quality projects that could be implemented are summarized in Table 4-1 and are described in detail following the table. Many of the techniques and BMPs have demonstrated not only water quality improvements, but also documented reductions of flood flows in Los Angeles County.

Table 4-1: Potential Projects that could Provide Flood Control and Stormwater Quality Benefits

Project Description	Potential Proponents	Potential Benefits
Stormwater BMPs Types of projects include: • Alternative Turnarounds • Conservation Easements • Eliminating Curbs and Gutters • Green Parking • Green Roofs • Regional Infrastructure Planning • Low Impact Development (LID) – see below • Open Space Design • Protection of Natural Features • Redevelopment • Riparian/Forested Buffer • Street Medians	Counties Municipalities Water Purveyors Water Retailer Advocacy groups	Flood: peak flow reduction Quality: sedimentation, urban runoff loading reduction
Low Impact Development (LID) Type of projects include: • Bioretention Cells • Rain Gardens • Tree Boxes • Cisterns And Rain Barrels • Green Roofs • Permeable And Porous Pavement • Grass Swales • Depression Grading • Sidewalk Storage • Soil Amendments • Gutter Disconnections (retrofit)	Counties Municipalities Water Purveyors Water Retailer Advocacy groups	Flood: peak flow reduction Quality: sedimentation, urban runoff loading reduction

Stormwater Best Management Practices

The Cities and towns of Lancaster, Palmdale, Littlerock, Pearlblossom and Quartz Hill each have an existing SWMP. Depending on the size of the development, new development and redevelopment projects require the implementation of the most effective combination of BMPs for stormwater/urban runoff pollution control.

BMPs address the increased volume and rate of runoff from impervious surfaces, and the concentration of pollutants in the runoff. BMPs can include site design, source control and structural BMPs such as infiltration devices, ponds, filters and constructed wetlands. Site design and maintenance programs such as LID practices preserve/recreate natural landscape features or minimize effective imperviousness and management measures such as maintenance practices, street sweeping, public education and outreach programs. Examples of BMPs projects include:

- Alternative Turnarounds
- Conservation Easements
- Eliminating Curbs and Gutters
- Green Parking
- Green Roofs
- Regional Infrastructure Planning
- Low Impact Development (LID) – see next section
- Open Space Design
- Protection of Natural Features
- Redevelopment
- Riparian/Forested Buffer
- Street Design and Patterns

Low Impact Development

Low impact development (LID) is an approach to managing stormwater and urban runoff at the source. LID allows stormwater to be captured, filtered onsite, infiltrated into the ground or be reused for landscaping. For new development and redevelopment projects in the Cities of Lancaster, Palmdale, Littlerock, Pearlblossom and Quartz Hill, LID projects can be implemented for stormwater/urban runoff pollution control. LID includes non-structural BMPs which are practices to preserve/recreate natural landscape features or minimize effective imperviousness and management measures such as maintenance practices, street sweeping, public education and outreach programs. Examples of LID projects include:

- Bioretention cells
- Rain Gardens
- Tree boxes
- Cisterns and Rain Barrels
- Green roofs
- Permeable and porous pavement
- Grass swales
- Depression grading
- Sidewalk storage
- Soil Amendments
- Gutter disconnections (retrofit)

A specific example of a successful LID program is the Stormwater Infiltration Retrofit Pilot Program sponsored by Orange County Coastkeeper, a nonprofit clean water organization in Orange County. This Pilot Program converted 10 individual residential parcels into LID demonstrations to reduce water pollution and conserve water. The total stormwater capture capacity for the program was about 15,700 gallons per year.

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