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Appendix C

Technical Reports and Data

Appendix C.1

Demand Projections for High and Low Conservation Assumptions

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Demand Projections for High and Low Conservation Assumptions

In the Mojave Water Agency demand forecast model, three possible outcomes in per-capita use were evaluated for the Single-Family Residential use sector, based upon a range of possible conservation levels, as described in Section 3.1. These SFR demand forecasts were then incorporated into regional demand projections for MWA. 2010 SFR use averaged 145 gallons per capita per day (GPCD) in the Mojave Basin Area and 113 GPCD in the Morongo Area. Recognizing the potential for additional conservation in the SFR sector, three possibilities were developed to book-end the possible range in future SFR GPCD based upon varying levels of conservation:

1. No conservation beyond the year 2010: GPCD remains flat at the 2010 level (145 GPCD in the Mojave Basin and 113 GPCD in the Morongo Area). This represents the high end of the range.

2. Extreme conservation on a regional basis: GPCD in the Mojave Basin decreases by 2020 to the current Morongo Area level of 113 GPCD, and GPCD in Morongo decreases 5 percent (to 107 GPCD). This represents the low end of the range.

3. Moderate conservation. Halfway between the high end of the range and the low end of the range as defined above (133 GPCD by 2020 for Mojave and 110 GPCD by 2020 for Morongo).

The regional demand projection included in the body of the Mojave Region IRWM Plan assumes moderate conservation is achieved in the SFR use sector. To be conservative, the other two scenarios were also evaluated and are included below.

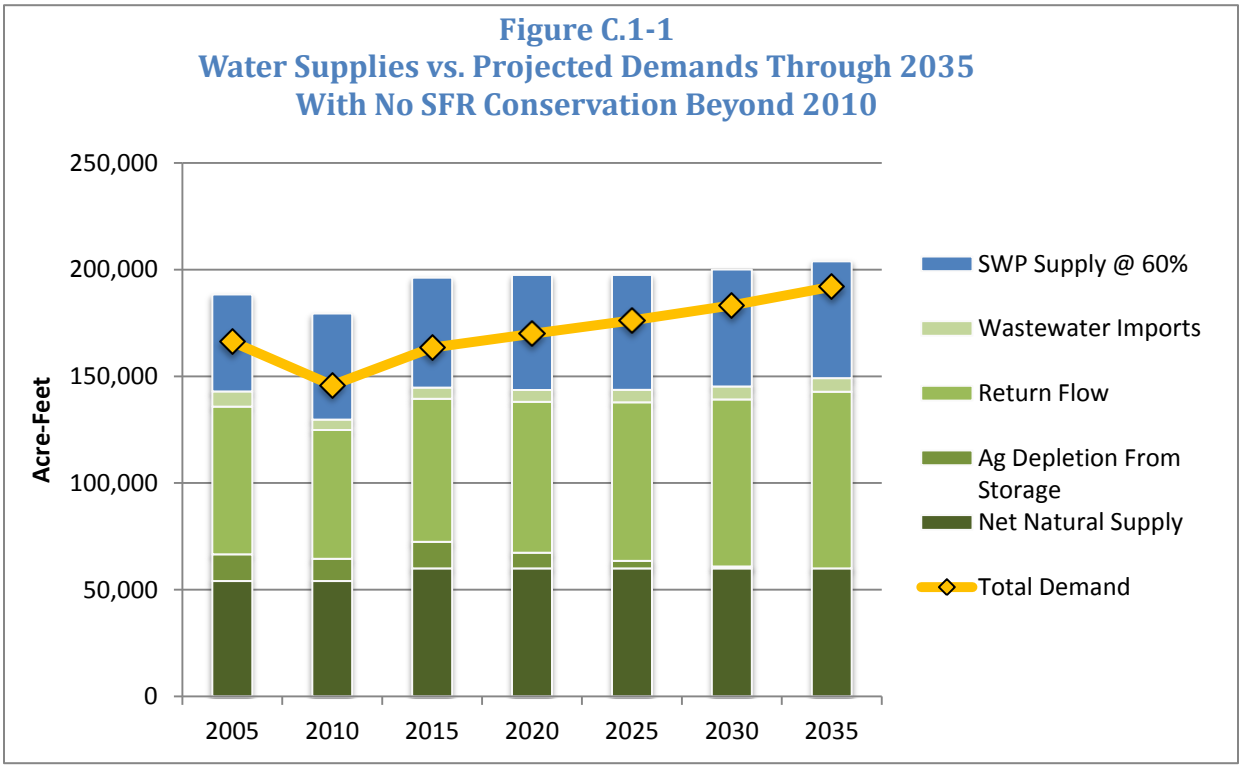
With no conservation (no reduction in SFR GPCD beyond the year 2010), available water supplies are sufficient to meet regional demand projections through the year 2046. Table C.1-1 and Figures C.1-1 and C.1-2 represent available water supplies and demands under this scenario through 2035 and 2060, respectively.

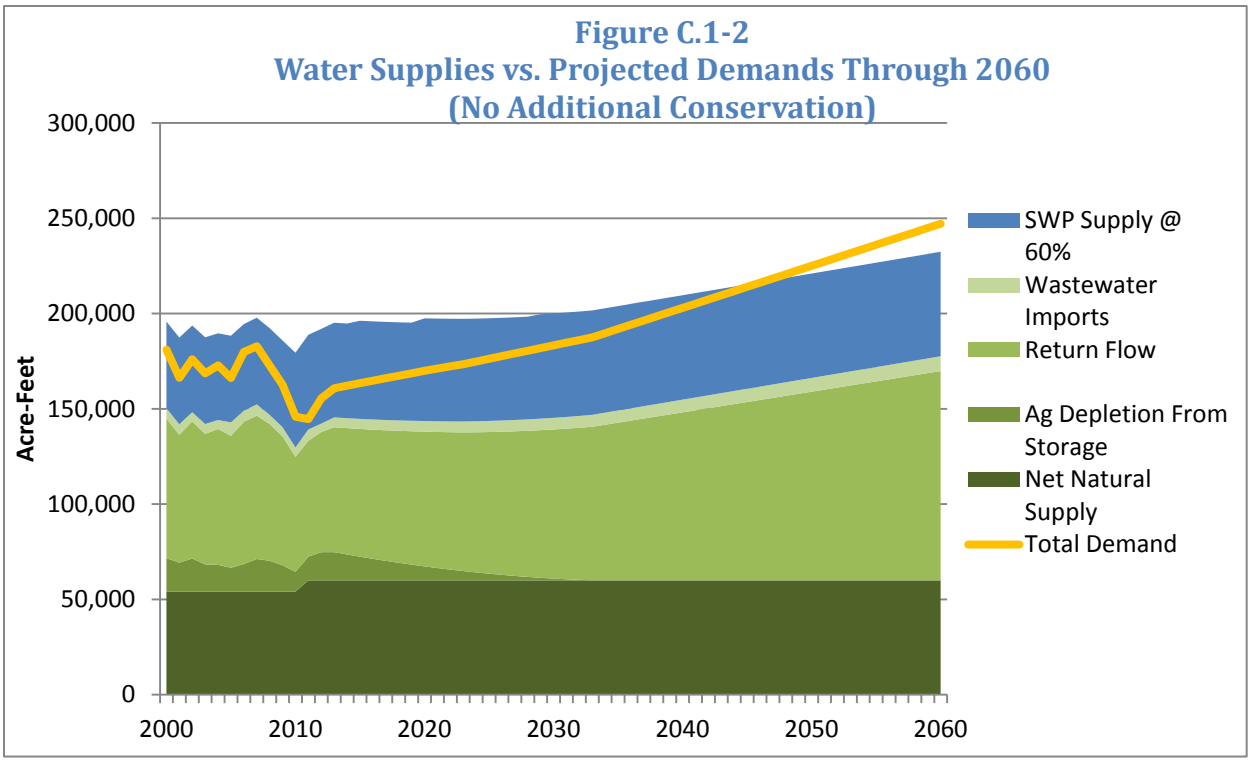
Table C.1-1
Summary of Current and Planned Water Supplies (afy)
WITH NO SINGLE-FAMILY RESIDENTIAL CONSERVATION BEYOND 2010

Water Supply Source	2010	2015	2020	2025	2030	2035
Existing Supplies						
Wholesale (Imported)						
SWP [(a)]	49,680	51,480	53,880	53,880	54,778	54,778
Local Supplies[(b)]						
Net Natural Supply	54,045	59,973	59,973	59,973	59,973	59,973
Agricultural Depletion from Storage[(c)]	10,425	12,434	7,348	3,517	942	0
Return Flow[(d)]	60,393	67,041	70,728	74,329	78,255	82,776
Wastewater Import[(e)]	4,895	5,274	5,551	5,829	6,107	6,385
Total Existing Supplies	**179,438**	**196,202**	**197,480**	**197,528**	**200,055**	**203,912**
Projected Demands[(f)]	***145,875***	***163,463***	***169,916***	***176,253***	***183,290***	***191,927***

Notes:
(a) Assumes 60% of Table A amount as the long-term supply until 2029 and then assume 61% in 2029 and after, based on the California Department of Water Resources 2009 contractor Delivery Reliability Report for MWA.
(b) Source: MWA's demand forecast model.
(c) Refer to Section 3.3.2 for an explanation of this supply.
(d) Refer to Section 3.3.3 for an explanation of this supply.
(e) Refer to Section 3.2.2.4 for an explanation of this supply.
(f) See Section 3.3 Water Demands, Table 3-10, assuming "no" conservation.

Figure C.1-1
Water Supplies vs. Projected Demands Through 2035
With No SFR Conservation Beyond 2010





With extreme conservation, available water supplies are sufficient to meet regional demand projections through the year 2060. Table C.1-2 and Figures C.1-3 and C.1-4 represent available water supplies and demands under this scenario through 2035 and 2060, respectively.

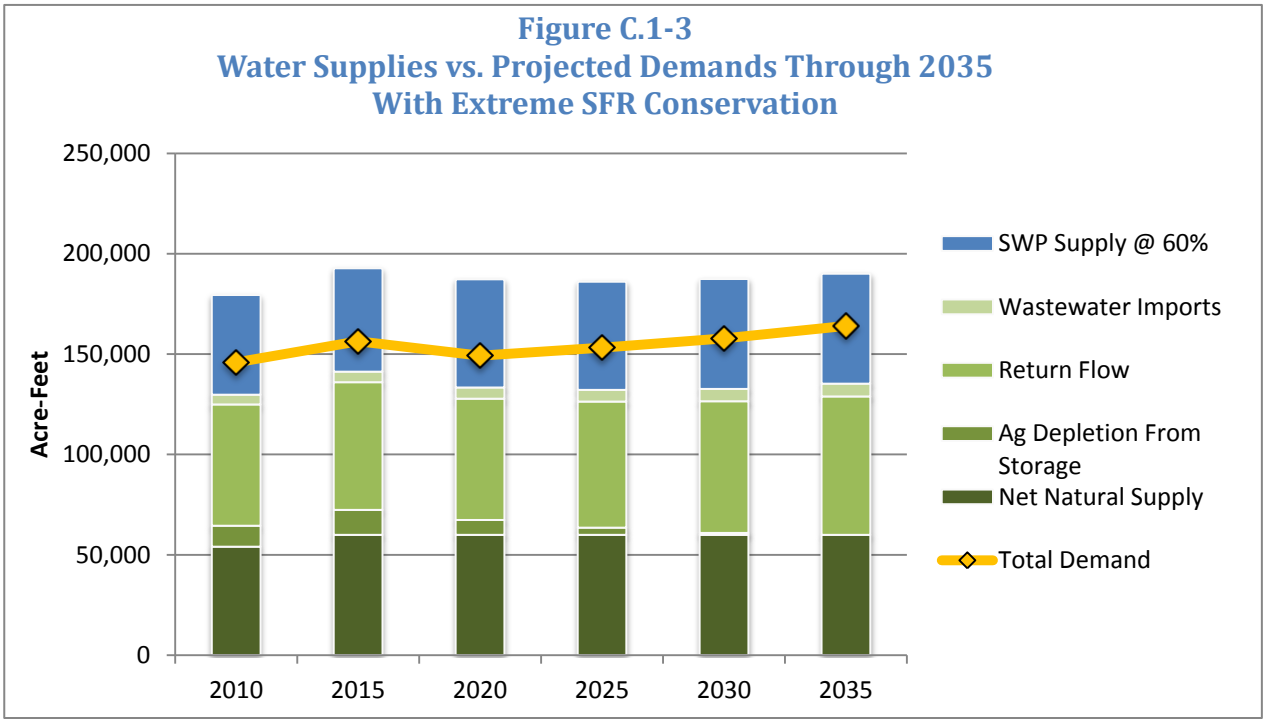
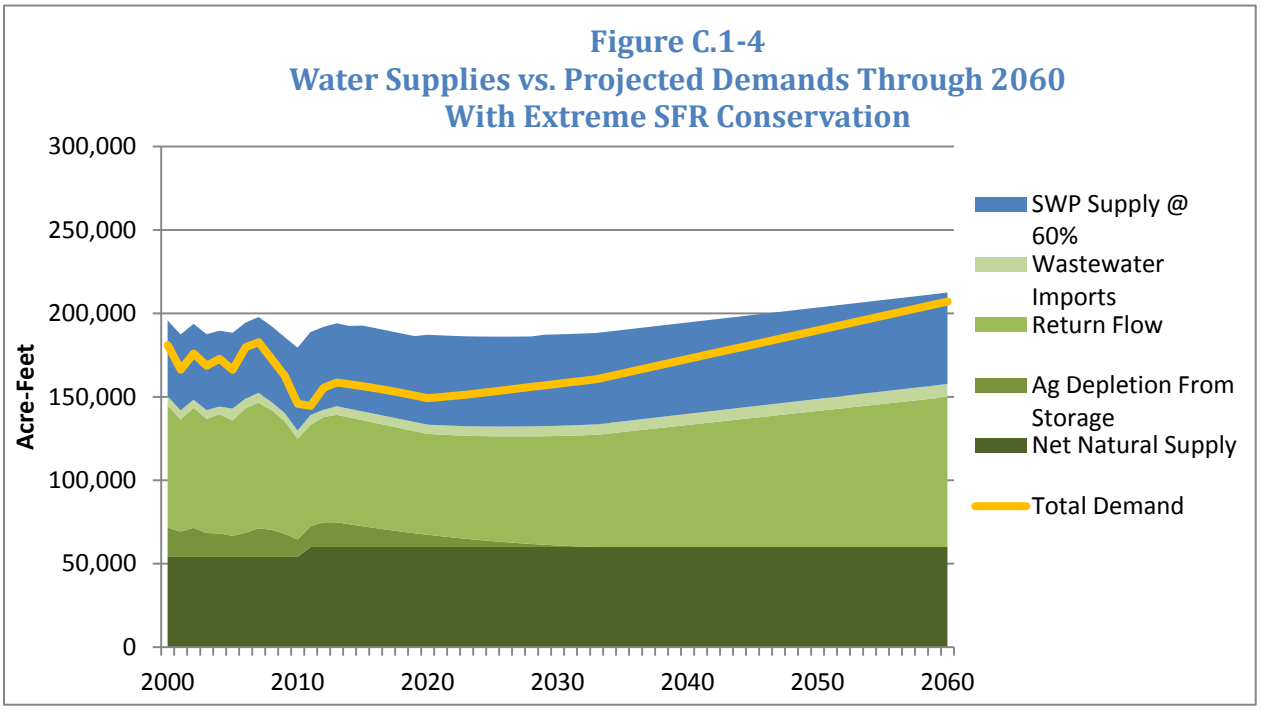


TABLE C.1-2
SUMMARY OF CURRENT AND PLANNED WATER SUPPLIES (AFY)
WITH EXTREME SINGLE-FAMILY RESIDENTIAL CONSERVATION

Water Supply Source	2010	2015	2020	2025	2030	2035
Existing Supplies						
Wholesale (Imported)						
SWP [a]	49,680	51,480	53,880	53,880	54,778	54,778
Local Supplies[b]						
Net Natural Supply	54,045	59,973	59,973	59,973	59,973	59,973
Agricultural Depletion from Storage[c]	10,425	12,434	7,348	3,517	942	0
Return Flow[d]	60,393	63,547	60,446	62,874	65,611	68,927
Wastewater Import[e]	4,895	5,274	5,551	5,829	6,107	6,385
Total Existing Supplies	**179,438**	**192,708**	**187,198**	**186,073**	**187,411**	**190,063**
Projected Demands[f]	***145,875***	***156,402***	***149,172***	***153,158***	***157,812***	***164,034***

Notes:
(a) Assumes 60% of Table A amount as the long-term supply until 2029 and then assume 61% in 2029 and after, based on the California Department of Water Resources 2009 contractor Delivery Reliability Report for MWA.
(b) Source: MWA's demand forecast model.
(c) Refer to Section 3.3.2 for an explanation of this supply.
(d) Refer to Section 3.3.3 for an explanation of this supply.
(e) Refer to Section 3.2.2.4 for an explanation of this supply.
(f) See Section 3.3 Water Demands, Table 3-10, assuming "extreme" conservation.

Figure C.1-4
Water Supplies vs. Projected Demands Through 2060
With Extreme SFR Conservation



Appendix C.2

Mojave Region Flood Infrastructure

MOJAVE REGION FLOOD INFRASTRUCTURE

SBCFCD System #	Facility Name	Reach Limits	Type
4-101-1A	West Fork Mojave River	West and above Forks Dam to Los Flores; for upstream see Zone-5 (US Forest Service)	River
4-101-1B	Deep Creek	East above Forks Dam (US Forest Service)	Creek
4-101-1C	Mojave River	Forks Dam to Rock Springs Rd.	River
4-101-1D	Mojave River	Rock Springs Rd. to Bear Valley Rd.	River
4-101-1E	Mojave River	Bear Valley Rd. to Upper Narrows	River
4-101-1F	Mojave River	Upper Narrows to AT&SF Bridge	River
4-101-1G	Mojave River	AT&SF Bridge to Mill St.	River
4-101-1H	Mojave River	Mill St. to Bryman Rd.	River
4-101-1I	Mojave River	Bryman Rd. to Vista Rd.	River
4-101-1J	Mojave River	Vista Rd. to Hinkley Rd.	River
4-101-1K	Mojave River	Hinkley Rd. to Lenwood Rd.	River
4-101-1L	Mojave River	Lenwood Rd. to 1st St., Barstow	River
4-101-1M	Mojave River	1st St. to Yermo-Daggett Rd.	River
4-101-1N	Mojave River	Yermo-Daggett to Minneola Rd.	River
4-101-1O	Mojave River	Minneola Rd. to Harvard Rd.	River
4-101-1P	Mojave River	Harvard Rd. to Afton Canyon	River
4-103-1A	Antelope Creek Wash	Mojave River to Canyon mouth; partial FCD (R/W only)	Wash
4-104-1A	Oro Grande Wash; COE	Mojave River to upstream of Center St.	Wash
4-106-1A	Oro Grande Wash	COE Inlet upstream to W. line of Sec 21; partial FCD	Wash
4-106-1B	Oro Grande Wash	W. line of Sec 21 upstream of to I-15 (formerly 6-203-1A)	Wash
4-106-1C	Oro Grande Wash	Upstream of I-15 (formerly 6-203-1B)	Wash
4-107-1A	Buckthorn Wash	Mojave River to Helendale Rd.	Wash
4-107-1B	Buckthorn Wash	Helendale Rd. to Mountain Springs Rd. (R/W only)	Wash
4-107-1C	Buckthorn Wash	Mountain Springs Rd. west to Horseshoe Trail	Wash
4-108-1A	Fremont Wash	Mojave River to Silver Lakes Parkway	Wash
4-108-1B	Fremont Wash	Silver Lakes Parkway to 600' downstream Shadow Mountain Rd. (R/W only)	Wash
4-109-6A	Turner Ditch	Turner Rd. to Mojave River (Victorville)	Ditch
4-201-1A	Desert Knolls Wash	Mojave River to Apple Valley Rd.	Wash
4-201-1B	Desert Knolls Wash	Apple Valley Rd. to Tao Rd.	Wash
4-201-1C	Desert Knolls Wash	Upstream from Tao Rd. (NDC)	Wash
4-351-1A	Swarthout Creek	LA County Line to SH-2 (formerly 6-101-1A)	Creek
4-351-1B	Swarthout Creek	SH-2 to Sheep Creek (NDC) (formerly 6-101-1B)	Creek
4-352-1A	Flume Creek	South of Swarthout Creek (formerly 6-102-1A)	Creek

MOJAVE REGION FLOOD INFRASTRUCTURE

SBCFCD System #	Facility Name	Reach Limits	Type
4-353-1A	Heath Creek	SH-2 to Canyon mouth (formerly 6-103-1A)	Wash
4-354-1A	Sheep Creek	South of Lone Pine Rd. (formerly 6-104-1A)	Creek
4-354-1B	Sheep Creek	Lone Pine Rd. to SH-2 (formerly 6-104-1B)	Creek
4-354-1C	Sheep Creek	SH-2 to SH-138 (NDC) (formerly 6-104-1C)	Creek
4-354-1D	Sheep Creek	SH-138 to Cal Aqueduct; partial FCD (formerly 6-104-1D)	Creek
4-354-1E	Sheep Creek	Aqueduct to El Mirage Dry Lake (NDC) (formerly 6-104-1E)	Creek
4-355-1A	Adelanto East Channel	SH-395 to Lee Ave. (formerly 6-202-1A)	Channel
4-355-1B	Adelanto East Channel	Lee Ave. to Pearman (Ext.) (formerly 6-202-1B)	Channel
4-356-1A	Adelanto West Channel	East Channel confluence to Rancho Rd.	Channel
4-357-1A	Horse Canyon	Canyon mouth to Aqueduct (NDC) (formerly 6-105-1A)	Canyon
4-401-6A	D Street SD	Mojave River to AT&SF RR	Storm Drain
4-402-1A	Mojave Drive Channel	Puesta Del Sol to Mojave Drive (formerly 6-201-1A)	Channel
4-402-1B	Mojave Drive Channel	Mojave Dr. to 375' downstream Midtown Rd. (formerly 6-201-1B)	Channel
4-402-1C	Mojave Drive Channel	375' downstream Midtown Rd. to Seneca Rd. (formerly 6-201-1C)	Channel
4-405-1A	El Evado Channel	Rancho Rd to Hopland St	Channel
4-405-1B	El Evado Channel	Hopland St to Mojave Dr (VV City Drainage Easement)	Channel
4-410-1A	Horsethief Canyon	Zone 4 Boundary to Little Horsethief confluence (formerly 5-604-1A)	Canyon
4-410-1B	Horsethief Canyon	Upstream of Little Horsethief Canyon confluence (formerly 5-604-1B)	Canyon
4-411-1A	Little Horsethief Canyon	Upstream of Horsethief Canyon confluence (formerly 5-605-1A)	Canyon
4-501-1A	Southwest Barstow Channel	Above AT&SF RR	Channel
4-501-1B	Southwest Barstow Channel	AT&SF RR to Mojave River (AT&SF RR)	Channel
4-502-1A	North Barstow Channel	Mojave River to 5000’ upstream of Old Hwy 58	Channel
4-503-1A	Arrowhead Channel	Mojave River to SH-58	Channel
4-504-1A	Dean Wash Channel	Mojave River to Main St. (Barstow)	Channel
4-504-1B	Dean Wash Channel	Main St. to Rimrock	Channel
4-504-1C	Dean Wash Channel	Rimrock to 5500’ upstream (R/W only)	Channel
4-505-1A	Armory Channel	Barstow Rd. to Muriel Dr. (Barstow)	Channel
4-506-1A	Kitchen Wash	Mojave River to Rimrock 1250’ west of Montara (NDC)	Wash
4-507-1A	Waterman Road Channel	Mojave River to 675’ upstream of Old Hwy 58 (Barstow Bakersfield Hwy)	Channel
4-601-1A	Lenwood Channel	Lenwood Spreading Grounds to AT&SF RR	Channel
4-601-1B	Lenwood Channel	AT&SF RR to Mojave River	Channel
4-701-1A	Yermo Flood Channel	West of Ghost Town Rd.	Channel
4-701-1B	Yermo Flood Channel	Ghost Town Rd. to UPRR	Channel
4-701-1C	Yermo Flood Channel	South of UPRR (partial right of way; approx. 1400')	Channel

MOJAVE REGION FLOOD INFRASTRUCTURE

SBCFCD System #	Facility Name	Reach Limits	Type
4-710-1A	Daggett Channel	East Channel, I-40 to Mojave River	Channel
4-710-1B	Daggett Channel	West Channel; National Trails to I-40	Channel
5-210-1A	Arrowbear Creek	Deep Creek to Arrowbear Lake; (R/W only)	Creek
5-210-1B	Arrowbear Creek	Upstream from Arrowbear Lake (R/W only)	Creek
5-312-1A	Seeley Creek	200' north of Vista Ln (USFS Boundary) to SH-138	Creek
5-312-1B	Seeley Creek	SH-138 to Brookside (Partial R/W only)	Creek
5-312-1C	Seeley Creek	Brookside to upstream (R/W only)	Creek
5-313-1A	Seeley Creek (West Branch)	700' downstream SH-138 Confluence w/ Seeley Creek to Fernwood Drive	Creek
5-313-1B	Seeley Creek (West Branch)	Fernwood Drive to Whispering Pines	Creek
5-314-1A	Sequoia Drain	Seeley Creek to Cedar Way (R/W only)	Storm Drain
5-510-1A	Hunsaker Drain	Encina Way Ext. to Whispering Pines	Storm Drain
5-602-1A	Cleghorn Canyon	Upstream from Lake Silverwood	Canyon
5-603-1A	Sawpit Canyon	Upstream from Lake Silverwood	Canyon
5-606-1A	Miller Canyon	Upstream from Lake Silverwood	Canyon
5-607-1A	Deep Creek	From Zone 5 Boundary Line upstream	Creek
6-301-6A	Lucerne Valley SD	Lucerne Dry Lake to Rabbit Springs Rd.	Storm Drain
6-301-6B	Lucerne Valley SD	Rabbit Springs Rd. to Vic. Foothill Rd	Storm Drain
6-301-6C	Lucerne Valley SD	Foothill Rd. to Pitzer Buttes (R/W only)	Storm Drain
6-302-1A	Lucerne Valley West Channel	confluence w/ Lucerne Valley SD to vicinity Pitzer Buttes	Channel
6-404-1A	Mesquite Creek	Copper Mt. to Mesquite Lake (Partial R/W only)	Creek
6-405-1A	Indian Cove Creek	Indian Cove to Mesquite Creek	Creek
6-451-1A	Yucca Creek	south of 29 Palms Hwy	Creek
6-451-1B	Yucca Creek	29 Palms Hwy to Old Woman Springs Rd.	Creek
6-451-1C	Yucca Creek	Old Woman Springs Rd. to Coyote Creek (Partial R/W)	Creek
6-452-1A	Quail Wash	4100' upstream 29 Palms Hwy to confluence Joshua Tree Wash	Wash
6-452-1B	Joshua Tree Wash	Canyon mouth to Confluence Yucca Creek (Partial R/W)	Wash
6-452-1C	Coyote Creek Wash	Confluence of Yucca Creek and Joshua Tree Wash to Copper Dry Lake	Wash
6-453-5A	Quail Wash Levee; COE	3750' upstream of 29 Palms Hwy to 29 Palms Hwy	Levee
6-454-1A	Old Woman Springs Creek	Old Woman Springs Rd. to Paxton Rd.	Creek
6-454-1B	Old Woman Springs Creek	Paxton Rd. to Yucca Creek	Creek
6-455-1A	Water Canyon Channel	3000' upstream Sunnyslope Dr. to Yucca Creek	Channel
6-456-1A	Long Canyon Channel	8250' upstream Golden Bee Dr. to confluence w/ Hospital Channel (Partial R/W)	Channel

MOJAVE REGION FLOOD INFRASTRUCTURE

SBCFCD System #	Facility Name	Reach Limits	Type
6-456-1B	Long Canyon Channel	Confluence w/ Hospital Channel to Yucca Creek	Channel
6-457-1A	Covington Wash Channel	Yucca Creek to Yucca Mesa Rd.	Channel
6-457-1B	Covington Wash Channel	Yucca Mesa Rd. to Yucca Trail	Channel
6-457-1C	Covington Wash Channel	Yucca Trail to 4250’ upstream Juarez Dr.; partial R/W	Channel
6-458-1A	Hospital Channel	Long Canyon Channel to El Dorado Dr.; partial R/W	Channel
6-458-1B	High School Channel	Hospital Channel to Grand Ave.	Channel
6-459-1A	Burnt Mountain Wash	Yucca Creek to 500' upstream of 29 Palms Hwy	Wash
6-459-1B	Burnt Mountain Wash	500' upstream 29 Palms Hwy to San Andreas	Wash
6-475-1A	Pinion Creek	upstream of Golf Course (R/W only)	Creek
6-475-1B	Pinion Creek Drain	Pinion Dr. to Pinion Creek SBCDE	Drain
6-486-1A	Church Street Channel	Yucca Creek u/s to Onaga Trail	Channel

Appendix C.3

Climate Change Vulnerability Checklist

Draft Climate Change Vulnerability Checklist

Mojave Integrated Regional Water Management Plan

Identification of watershed characteristics that could potentially be vulnerable to future climate change is the first step in assessing the climate change vulnerabilities in the Region. In the context of this analysis, vulnerability is defined as the degree to which a system is exposed to, susceptible to, and able to cope with and adapt to, the adverse effects of climate change, consistent with the definition in the recently issued Climate Change Handbook for Regional Water Planning and consistent with climate change requirements in the Proposition 84 IRWM Plan Guidelines (October 2012).

This Climate Change Vulnerability Checklist for the Mojave Region is a required element for an IRWM Plan and was provided by the Department of Water Resources (DWR) in its Climate Change Handbook found at http://www.water.ca.gov/climatechange/CCHandbook.cfm.

The questions found in the checklist are identified by number and are **bold** and italicized. This checklist is intended to be an appendix to the IRWM Plan. For the questions with no checks in the boxes, this indicates the answer being "no". A checked box means "yes". Therefore, the more boxes checked in a category indicates the more vulnerable the Region is to that category/element of climate change.

I. Water Demand

☑ ***Are there major industries that require cooling/process water in your planning region?***

- As average temperatures increase, cooling water needs may also increase.
- Identify major industrial water users in your region and assess their current and projected needs for cooling and process water.

☑ ***Does water use vary by more than 50% seasonally in parts of your region?***

- Seasonal water use, which is primarily outdoor water use, is expected to increase as average temperatures increase and droughts become more frequent.
- Where water use records are available, look at total monthly water uses averaged over the last five years (if available). If maximum and minimum monthly water uses vary by more than 25%, then the answer to this question is "yes".
- Where no water use records exist, is crop irrigation responsible for a significant (say >50%) percentage of water demand in parts of your region?

☐ ***Are crops grown in your region climate-sensitive? Would shifts in daily heat patterns, such as how long heat lingers before night-time cooling, be prohibitive for some crops?***

- Fruit and nut crops are climate-sensitive and may require additional water as the climate warms.

☐ ***Do groundwater supplies in your region lack resiliency after drought events?***

- Droughts are expected to become more frequent and more severe in the future. Areas with a more hardened demand may be particularly vulnerable to droughts and may become more dependent on groundwater pumping.

☑ ***Are water use curtailment measures effective in your region?***

- Droughts are expected to become more frequent and more severe in the future. Areas with a more hardened demand may be particularly vulnerable to droughts.

☐ ***Are some instream flow requirements in your region either currently insufficient to support aquatic life, or occasionally unmet?***

- Changes in snowmelt patterns in the future may make it difficult to balance water demands. Vulnerabilities for ecosystems and municipal/agricultural water needs may be exacerbated by instream flow requirements that are:

1. not quantified,
2. not accurate for ecosystem needs under multiple environmental conditions including droughts, and
3. not met by regional water managers.

II. Water Supply

☑ ***Does a portion of the water supply in your region come from snowmelt?***

- Snowmelt is expected to decrease as the climate warms. Water systems supplied by snowmelt are therefore potentially vulnerable to climate change.
- Where watershed planning documents are available, refer to these in identifying parts of your region that rely on surface water for supplies; if your region contains surface water supplies originating in watersheds where snowpack accumulates, the answer to this question is "Yes."
- Where planning documents are not available, identify major rivers in your region with large users. Identify whether the river's headwaters are fed by snowpack.

☑ ***Does part of your region rely on water diverted from the Delta, imported from the Colorado River, or imported from other climate-sensitive systems outside your region?***

- Some imported or transferred water supplies are sources from climate-sensitive watersheds, such as water imported from the Delta and the Colorado River.

☐ ***Does part of your region rely on coastal aquifers? Has salt intrusion been a problem in the past?***

- Coastal aquifers are susceptible to salt intrusion as sea levels rise, and many have already observed salt intrusion due to over-extraction, such as the West Coast Basin in southern California.

☐ ***Would your region have difficulty in storing carryover supply surpluses from year to year?***

- Droughts are expected to become more severe in the future. Systems that can store more water may be more resilient to droughts.

☐ ***Has your region faced a drought in the past during which it failed to meet local water demands?***

- Droughts are expected to become more severe in the future. Systems that have already come close to their supply thresholds may be especially vulnerable to droughts in the future.

☑ ***Does your region have invasive species management issues at your facilities, along conveyance structures, or in habitat areas?***

- As invasive species are expected to become more prevalent with climate change, existing invasive species issues may indicate an ecological vulnerability to climate change.

III. Water Quality

? ***Are increased wildfires a threat in your region? If so, does your region include reservoirs with fire-susceptible vegetation nearby which could pose a water quality concern from increased erosion?***

- Some areas are expected to become more vulnerable to wildfires over time. To identify whether this is the case for parts of your region, the California Public Interest Energy Research (PIER) Program has posted wildfire susceptibility projections as a Google Earth application at: http://cal-adapt.org/fire/. These projections are only the results of a single study and are not intended for analysis, but can aid in qualitatively answering this question. Read the application's disclaimers carefully to be aware of its limitations.

☑ ***Does part of your region rely on surface water bodies with current or recurrent water quality issues related to eutrophication, such as low dissolved oxygen or algal blooms? Are there other water quality constituents potentially exacerbated by climate change?***

- Warming temperatures will result in lower dissolved oxygen levels in water bodies, which are exacerbated by algal blooms and in turn enhance eutrophication. Changes in streamflows may alter pollutant concentrations in water bodies.

☐ ***Are seasonal low flows decreasing for some waterbodies in your region? If so, are the reduced low flows limiting the waterbodies' assimilative capacity?***

- In the future, low flow conditions are expected to be more extreme and last longer. This may result in higher pollutant concentrations where loadings increase or remain constant

☐ ***Are there beneficial uses designated for some water bodies in your region that cannot always be met due to water quality issues?***

- In the future, low flows are expected decrease, and to last longer. This may result in higher pollutant concentrations where loadings increase or remain constant.

☐ ***Does part of your region currently observe water quality shifts during rain events that impact treatment facility operation?***

- While it is unclear how average precipitation will change with temperature, it is generally agreed that storm severity will probably increase. More intense, severe storms may lead to increased erosion, which will increase turbidity in surface waters. Areas that already observe water quality responses to rainstorm intensity may be especially vulnerable.

IV. Sea Level Rise

☐ ***Has coastal erosion already been observed in your region?***

- Coastal erosion is expected to occur over the next century as sea levels rise.

☐ ***Are there coastal structures, such as levees or breakwaters, in your region?***

- Coastal structures designed for a specific mean sea level may be impacted by sea level rise.

☐ ***Is there significant coastal infrastructure, such as residences, recreation, water and wastewater treatment, tourism, and transportation) at less than six feet above mean sea level in your region?***

- Coastal flooding will become more common, and will impact a greater extent of property, as sea levels rise. Critical infrastructure in the coastal floodplain may be at risk.
- Digital elevation maps should be compared with locations of coastal infrastructure.

☐ ***Are there climate-sensitive low-lying coastal habitats in your region?***

- Low-lying coastal habitats that are particularly vulnerable to climate change include estuaries and coastal wetlands that rely on a delicate balance of freshwater and salt water.

☐ ***Are there areas in your region that currently flood during extreme high tides or storm surges?***

- Areas that are already experiencing flooding during storm surges and very high tides, are more likely to experience increased flooding as sea levels rise.

☐ ***Is there land subsidence in the coastal areas of your region?***

- Land subsidence may compound the impacts of sea level rise.

☐ ***Do tidal gauges along the coastal parts of your region show an increase over the past several decades?***

- Local sea level rise may be higher or lower than state, national, or continental projections.
- Planners can find information on local tidal gauges at http://tidesandcurrents.noaa.gov/sltrends/sltrends_states.shtml?region=ca.

V. Flooding

☑ ***Does critical infrastructure in your region lie within the 200-year floodplain? DWR's best available floodplain maps are available at:***
http://www.water.ca.gov/floodmgmt/lrafmo/fmb/fes/best_available_maps/.

- While it is unclear how average precipitation will change with temperature, it is generally agreed that storm severity will probably increase. More intense, severe storms may lead to higher peak flows and more severe floods.
- Refer to FEMA floodplain maps and any recent FEMA, US Army Corps of Engineers, or DWR studies that might help identify specific local vulnerabilities for your region. Other follow-up questions that might help answer this question:

1. What public safety issues could be affected by increased flooding events or intensity? For example, evacuation routes, emergency personnel access, hospitals, water treatment and wastewater treatment plants, power generation plants and fire stations should be considered.
2. Could key regional or economic functions be impacted from more frequent and/or intense flooding?

☐ ***Does part of your region lie within the Sacramento-San Joaquin Drainage District?***

- The SSJDD contains lands that are susceptible to overflows from the Sacramento and San Joaquin Rivers, and are a key focus of the Central Valley Flood Protection Plan. (http://www.water.ca.gov/cvfmp/program.cfm).

☐ ***Does aging critical flood protection infrastructure exist in your region?***

- Levees and other flood protection facilities across the state of California are aging and in need of repair. Due to their overall lowered resiliency, these facilities may be particularly vulnerable to climate change impacts.
- DWR is evaluating more than 300 miles of levees in the San Joaquin and Sacramento Rivers Valleys and the Delta (http://www.water.ca.gov/levees/).

☑ ***Have flood control facilities (such as impoundment structures) been insufficient in the past?***

- Reservoirs and other facilities with impoundment capacity may be insufficient for severe storms in the future. Facilities that have been insufficient in the past may be particularly vulnerable.

☑ ***Are wildfires a concern in parts of your region?***

- Wildfires alter the landscape and soil conditions, increasing the risk of flooding within the burn and downstream areas. Some areas are expected to become more vulnerable to wildfires over time. To identify whether this is the case for parts of your region, the California Public Interest Energy Research Program (PIER) has posted wildfire susceptibility projections as a Google Earth application at: http://cal-adapt.org/fire/. These projections are the results of only a single study and are not intended for analysis, but can aid in qualitatively answering this question. Read the application's disclaimers carefully to be aware of its limitations.

VI. Ecosystem and Habitat Vulnerability

☑ ***Does your region include inland or coastal aquatic habitats vulnerable to erosion and sedimentation issues?***

- Erosion is expected to increase with climate change, and sedimentation is expected to shift. Habitats sensitive to these events may be particularly vulnerable to climate change.

☐ ***Does your region include estuarine habitats which rely on seasonal freshwater flow patterns?***

- Seasonal high and low flows, especially those originating from snowmelt, are already shifting in many locations.

☑ ***Do climate-sensitive fauna or flora populations live in your region?***

- Some specific species are more sensitive to climate variations than others.

☑ ***Do endangered or threatened species exist in your region? Are changes in species distribution already being observed in parts of your region?***

- Species that are already threatened or endangered may have a lowered capacity to adapt to climate change.

☐ ***Does the region rely on aquatic or water-dependent habitats for recreation or other economic activities?***

- Economic values associated with natural habitat can influence prioritization.

☐ ***Are there rivers in your region with quantified environmental flow requirements or known water quality/quantity stressors to aquatic life?***

- Constrained water quality and quantity requirements may be difficult to meet in the future.

☐ ***Do estuaries, coastal dunes, wetlands, marshes, or exposed beaches exist in your region? If so, are coastal storms possible/frequent in your region?***

- Storm surges are expected to result in greater damage in the future due to sea level rise. This makes fragile coastal ecosystems vulnerable.

☑ ***Does your region include one or more of the habitats described in the Endangered Species Coalition's Top 10 habitats vulnerable to climate change (http://www.itsgettinghotoutthere.org/)?***

- These ecosystems are particularly vulnerable to climate change.

☐ ***Are there areas of fragmented estuarine, aquatic, or wetland wildlife habitat within your region? Are there movement corridors for species to naturally migrate? Are there infrastructure projects planned that might preclude species movement?***

- These ecosystems are particularly vulnerable to climate change.

VII. Hydropower

☐ ***Is hydropower a source of electricity in your region?***

- As seasonal river flows shift, hydropower is expected to become less reliable in the future.

☑ ***Are energy needs in your region expected to increase in the future? If so, are there future plans for hydropower generation facilities or conditions for hydropower generation in your region?***

- Energy needs are expected to increase in many locations as the climate warms. This increase in electricity demand may compound decreases in hydropower production, increasing its priority for a region.