

**ARVIN COMMUNITY SERVICES DISTRICT  
ARVIN, CALIFORNIA**

**2020  
URBAN WATER MANAGEMENT PLAN**



Prepared By:

Arvin Community Services District  
309 Campus Drive  
Arvin, CA 93203  
(661) 854-2127

Dee Jaspar & Associates, Inc.  
2730 Unicorn Road #A  
Bakersfield, CA 93308  
(661) 393-4796

**ARVIN COMMUNITY SERVICES DISTRICT  
ARVIN, CALIFORNIA**

**2020 URBAN WATER MANAGEMENT PLAN**

**INDEX**

CHAPTER 1 -	INTRODUCTION AND OVERVIEW	Page 1
CHAPTER 2 -	PLAN PREPARATION	Page 3
2.1	PUBLIC PARTICIPATION	Page 3
2.2	AGENCY COORDINATION	Page 4
2.3	IMPLEMENTATION	
CHAPTER 3 -	SYSTEM DESCRIPTION	Page 5
3.1	DESCRIPTION OF THE SERVICE AREA	Page 5
3.2	SERVICE AREA MAP AND POPULATION	Page 13
CHAPTER 4 -	SYSTEM DEMANDS	Page 15
4.1	WATER USE	Page 15
4.2	WATER DEMAND PROJECTIONS	Page 18
CHAPTER 5 -	BASELINES AND TARGETS	Page 21
	2020 COMPLIANCE	Page 25
	WATER USE REDUCTION PLAN	Page 25
CHAPTER 6 -	WATER SUPPLY CHARACTERIZATION	Page 27
6.1	WATER SOURCES	Page 27
6.2	WASTEWATER	Page 36
6.3	STORMWATER	Page 37
6.4	CLIMATE CHANGE EFFECTS	Page 37
6.5	ENERGY USE	Page 38
CHAPTER 7 -	WATER SUPPLY RELIABILITY ASSESSMENT	Page 40
7.1	WATER SUPPLY RELIABILITY	Page 40
CHAPTER 8 -	WATER SHORTAGE CONTINGENCY PLAN	Page 47
8.1	THE PLAN	Page 47
8.2	STAGES OF ACTION	Page 48

8.3	IMPACTS ON REVENUE AND EXPENDITURES	Page 51
8.4	CATASTROPHIC SUPPLY INTERRUPTION	Page 52
8.5	SEISMIC RISK ASSESSMENT AND MITIGATION PLAN	Page 53
CHAPTER 9 -	DEMAND MANAGEMENT MEASURES	Page 54
9.1	WATER DEMAND MANAGEMENT MEASURES	Page 54
9.1.1	METERING	Page 54
9.1.2	RATE STRUCTURE TO ENCOURAGE CONSERVATION	Page 54
9.1.3	WATER AUDITS	Page 54
9.1.4	PUBLIC EDUCATION AND OUTREACH	Page 55
9.1.5	MANAGING SYSTEM LOSSES	Page 55
9.1.6	WATER CONSERVATION	Page 56
CHAPTER 10 -	PLAN ADOPTION, SUBMITTAL AND IMPLEMENTATION	Page 57
APPENDICIES		
-	PUBLIC HEARING NOTICE	
-	PROOF OF PUBLICATION	
-	DISTRICT SERVICE MAP	
-	MINUTES OF THE SPECIAL MEETING OF THE BOARD	
-	AWWA WATER AUDIT REPORTING WORKSHEET	
-	WATER SHORTAGE CONTINGENCY PLAN	
-	MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN	

## CHAPTER 1

### INTRODUCTION AND OVERVIEW

#### Purpose

This 2020 Urban Water Management Plan (“UWMP” or “Plan”) is an update of the 2015 Plan. Arvin Community Services District (“ACSD” or “District”) is an Urban Water Supplier serving **4163** customers.

Urban Water Suppliers with more than 3,000 customers are required to file UWMPs with the Department of Water Resources (“DWR”) in years ending with six and one, in accordance with Section 10621 of the California Water Code (“Water Code”). The Arvin Community Services District’s 2020 UWMP addresses the following requirements of the Water Code. The UWMP is to provide:

- A description of the service area of the District
- An estimate of the 2020 population of the District
- Determination of Year 2020 compliance with the provisions of SBX7-7
- A description of the District’s climate and demographic factors
- Consideration of the effects of climate change on water supply and consumption
- Identification of the existing and planned water resources of the District
  - Consideration of the effects of the groundwater management policies Arvin-Edison Water Storage District (“AEWSD”) – the major agricultural water purveyor in the area
  - Consideration of the effects of the Sustainable Groundwater Management Act (SGMA) on groundwater supplies
  - Consideration of the effects of a prolonged drought on groundwater supplies
  - Description of the groundwater basin, which is the sole source of the District’s water supply
  - Opportunities for cooperative efforts by ACSD and AEWSD in groundwater management projects
  - Consideration of the sufficiency and sustainability of the groundwater supply
  - Projection of population growth, water conservation, and the groundwater demands
- A description of the reliability of the groundwater supply and its vulnerability to seasonal or climactic shortage
- A discussion the constraints on water supplies
- A presentation of water loss audits (appendix) and a discussion of District programs implemented to reduce water loss
- A statement addressing the consistency of the District’s water supply
- A discussion of the District’s demand management measures

- A description of the District's anticipated water supply projects
- The District's water use projections
- Water use projections for lower income families
- The District's water shortage contingency plan, modified to incorporate the 2020 changes in reporting requirements to include response actions to be taken in times of shortages
- A water service reliability assessment
- Consideration of energy use for pumping and water treatment
- A discussion of the effects of a seismic event on District facilities
- A discussion of the success of the Arsenic Mitigation Project that has resulted in the construction of new wells and new storage facilities

## CHAPTER 2

### PLAN PREPARATION

#### 2.1 PUBLIC PARTICIPATION

Arvin Community Services District prepared this DRAFT Urban Water Management Plan with input from the community at a board meeting held on September 7, 2021. This plan reflects information current as of December 31, 2020.

#### 2.2 AGENCY COORDINATION

ACSD will send copies of this plan to the City of Arvin, the County of Kern, Arvin Edison Water Storage District, and the Kern County Water Agency (“KCWA”).

ACSD encourages public participation in all of its planning efforts by having semi-monthly Board of Director’s meetings which are open to the public. All District policies are set by the Board at these semi-monthly meetings. This UWMP was available for review in the District’s office before the public hearing in September. A public hearing will be held on September 7, 2021, at which the Board of Directors will accept public comment and if comments are affirmative, the Board will adopt the 2020 Urban Water Management Plan.

ACSD is located within Arvin Edison Water Storage District. AEWSD reviewed the administrative draft of this UWMP.

**Table 2-1**  
**Coordination with Appropriate Agencies**

Agencies	Participated in developing the plan	Commented on the draft	Attended public meetings	Was contacted for assistance	Was sent a copy of the draft plan	Was sent a notice of intention to adopt	Not involved / No information
KCWA					X		
AEWSD					X		
City of Arvin					X		
County of Kern					X		

## **2.3 IMPLEMENTATION**

This 2020 UWMP will be implemented on the day that it is adopted by the District's Board of Directors.

## **CHAPTER 3**

### **SYSTEM DESCRIPTION**

#### **3.1 DESCRIPTION OF THE SERVICE AREA**

ACSD was created in 1957 for the purpose of providing domestic water to the citizens of the City of Arvin and to a lesser extent, to lands outside the City boundary. ACSD is regulated by the State Water Resources Control Board, Division of Drinking Water. Over 95% of the service area population is within the City of Arvin. The District is Public Water System No.1510001.

The current service area encompasses approximately 5 square miles within the City of Arvin, together with a few small residential tracts and individual services that are located in the County of Kern. The District is situated at the south end of the San Joaquin Valley, approximately 110 miles north of Los Angeles and 290 miles south of San Francisco. It is about 5 miles west of the foot of the southern end of the Sierra Nevada Mountain chain, which mountains are also known as the “Tehachapis”.

The District experienced a rapid population growth in the first 8 years of the first decade of the 21<sup>st</sup> century. However this growth slowed over the last two years of the decade. Presently, new residential services are added to the system as subdivisions build out. Residential development has continued on a moderate pace and can be considered as in-fill development within the existing District boundaries.

The ground surface within the service area slopes gently downward from east to west (about 5 feet across the City) and about 50 feet downward from north to south. Ground surface elevations in the ACSD Service Area are about 400 feet MSL.

The climate is typical of the lower San Joaquin Valley. Summers are hot and dry with temperatures often exceeding 100°F. Winters are cool with temperatures ranging from 40°F to 60°F, occasionally dropping below 32°F. The night and morning fog that is synonymous with the south end of the San Joaquin Valley occurs with reduced frequency, likely due to the effects of climate change.



2010-2020 Weather Conditions in the vicinity of Arvin Community Services District

At the weather station at the AEWSD headquarters, annual rainfall ranged from about 0.5 inches to 8.6 inches in the years 2011 – 2020. Average annual rainfall averaged 6 inches with most rainfall occurring between November and May. Predominant winds during the winter are less than 10 mph from the northwest. High winds occasionally occur through the year producing dust storms.

Charts plotting average annual temperature, evapotranspiration (ETo), and precipitation for the period 2011 – 2020 follow. These charts, while admittedly only an approximation, show about a 1.7°F increase in average air temperature over the 10-year period, an increase of about 0.2°F per year. Precipitation trended downward at about 0.3 inches per year. Evapotranspiration trended upwards at about 3 inches over the 10-year period, or about 0.3 inches per year. These are rough estimations based on information from AEWSD’s weather station about 5 miles away from the City of Arvin. However, they provide an estimation of the increase in outdoor water use that can be expected without making some changes in the type of outdoor landscaping in ACSD’s service area.

**Table 3-1**  
**Arvin-Edison Water Storage District Weather Station**  
**Climate Data -Ten Year Averages 2011 - 2020**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
<b>Monthly Avg. Eto (in)</b>	1.67	2.64	4.11	5.79	7.62	9.01	9.34	8.69	6.34	4.44	2.35	1.58	63.55
<b>Avg. Rainfall (in)</b>	0.79	0.56	1.22	0.68	.56	0.07	0.10	0.08	0.20	0.37	0.52	0.81	5.95
<b>Avg. Temp. (° F)</b>	48.6	52.7	57.8	63.7	69.5	78.6	83.8	82.4	76.4	65.8	54.4	47.2	-

Chart 3-1

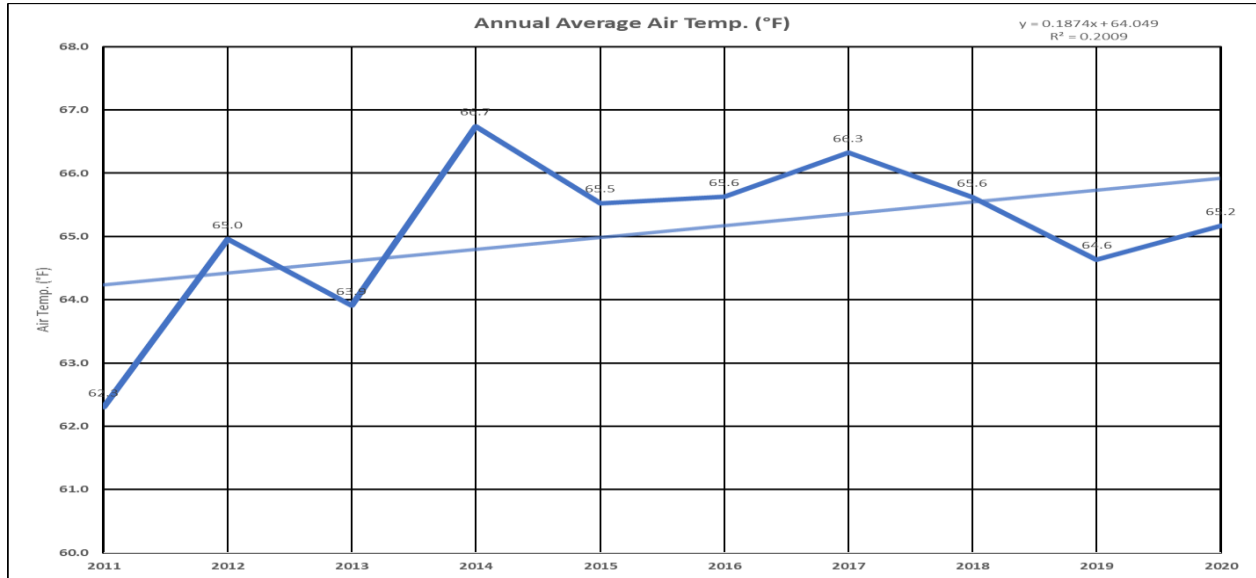


Chart 3-2

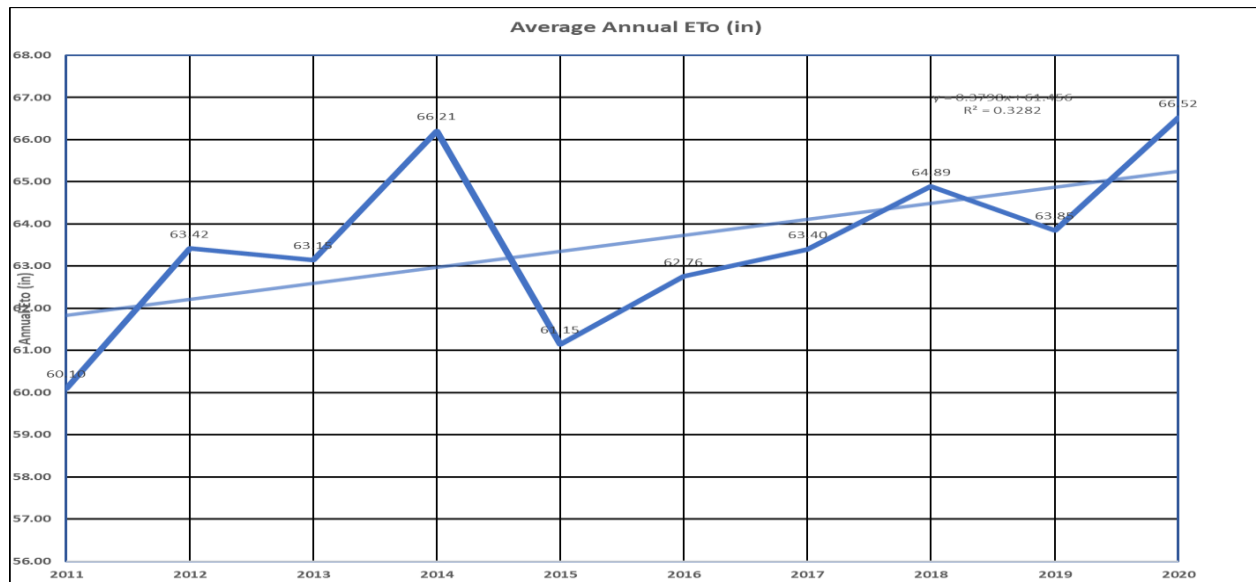
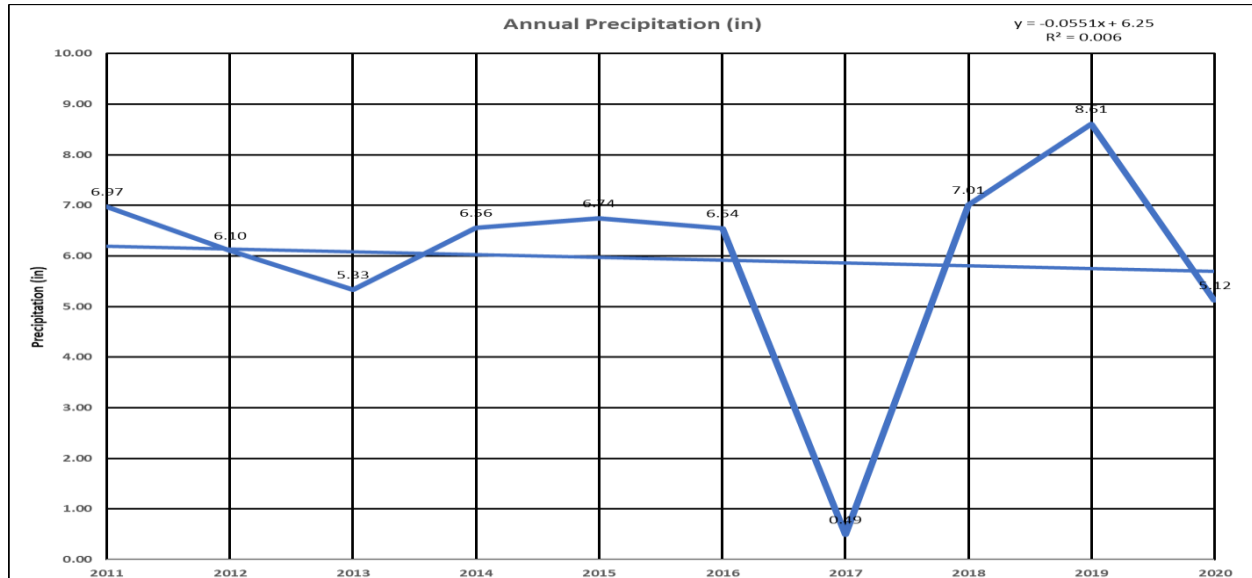


Chart 3-3



Land Use Categories and Percentages of Service Accounts in Each Category

Land use within the District is primarily residential with commercial activities generally centered along the main street of the town. Agricultural commodity processing and packing plants are located along the east side of the city. There are several parks located throughout the District, one high school, two junior high/middle schools, a vocational school, and two elementary schools.

The District has the following classes of service accounts (percentages are approximate):

- 1.) *Single Family Residential (91%)*
- 2.) *Multi-Family Residential (3%)*
- 3.) *Commercial / Institutional (4%)*
- 4.) *Industrial (0.3%)*
- 5.) *Landscape Irrigation (0.9%)*
- 6.) *Other (less than 0.8%)*

The following Submittal Table 2-1 presents the 2020 number of municipal connections together with the volume of water supplied. The system is 100% metered.

Submittal Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 *
<i>Add additional rows as needed</i>			
1510001	Arvin Community Services District	4,163	837
<b>TOTAL</b>		<b>4,163</b>	<b>837</b>
<b>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>			
Units are MG			

This Plan is an Individual UWMP.

Submittal Table 2-2: Plan Identification		
Select Only One	Type of Plan	Name of RUWMP or Regional Alliance if applicable (select from drop down list)
<input checked="" type="checkbox"/>	<b>Individual UWMP</b>	
<input type="checkbox"/>	Water Supplier is also a member of a RUWMP	
<input type="checkbox"/>	Water Supplier is also a member of a Regional Alliance	
<input type="checkbox"/>	<b>Regional Urban Water Management Plan (RUWMP)</b>	
NOTES:		

ACSD is a water retailer and reports on a calendar year basis. The unit of measure for this report is Million Gallons and Million Gallons per Day.

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
<input type="checkbox"/>	Supplier is a wholesaler
<input checked="" type="checkbox"/>	Supplier is a retailer
Fiscal or Calendar Year (select one)	
<input checked="" type="checkbox"/>	UWMP Tables are in calendar years
<input type="checkbox"/>	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP * (select from drop down)	
Unit	MG
<i>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i>	
NOTES:	

ACSD does not purchase water from wholesale suppliers. Due to its isolated location, and the unavailability of surface water, ACSD relies wholly on groundwater. It’s residents pay an ad-valorem property tax to Arvin-Edison Water Storage District for the groundwater benefit that is provided by AEWS’s recharge and recovery programs.

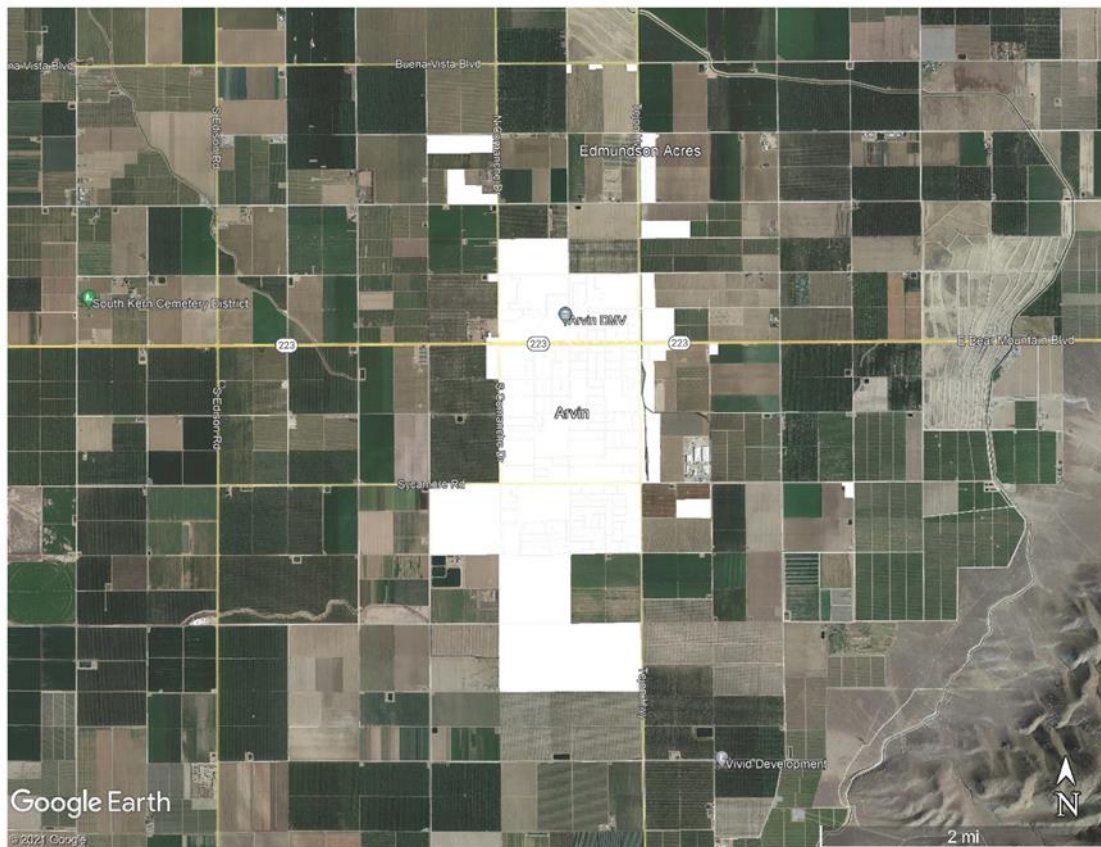
<b>Submittal Table 2-4 Retail: Water Supplier Information Exchange</b>
The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Wholesale Water Supplier Name
<i>Add additional rows as needed</i>
N/A
ACSD does not purchase water from wholesale suppliers.

### 3.2 SERVICE AREA

The District serves the City of Arvin and some small areas within the County, primarily Edmundson acres – which was added to the Districts’ service area in 2010. The 2020 population, determined by the US Census, is estimated to be 21,800.

The community is classified as a Severely Disadvantaged Community with a Median Household Income of \$38,464 in 2019.

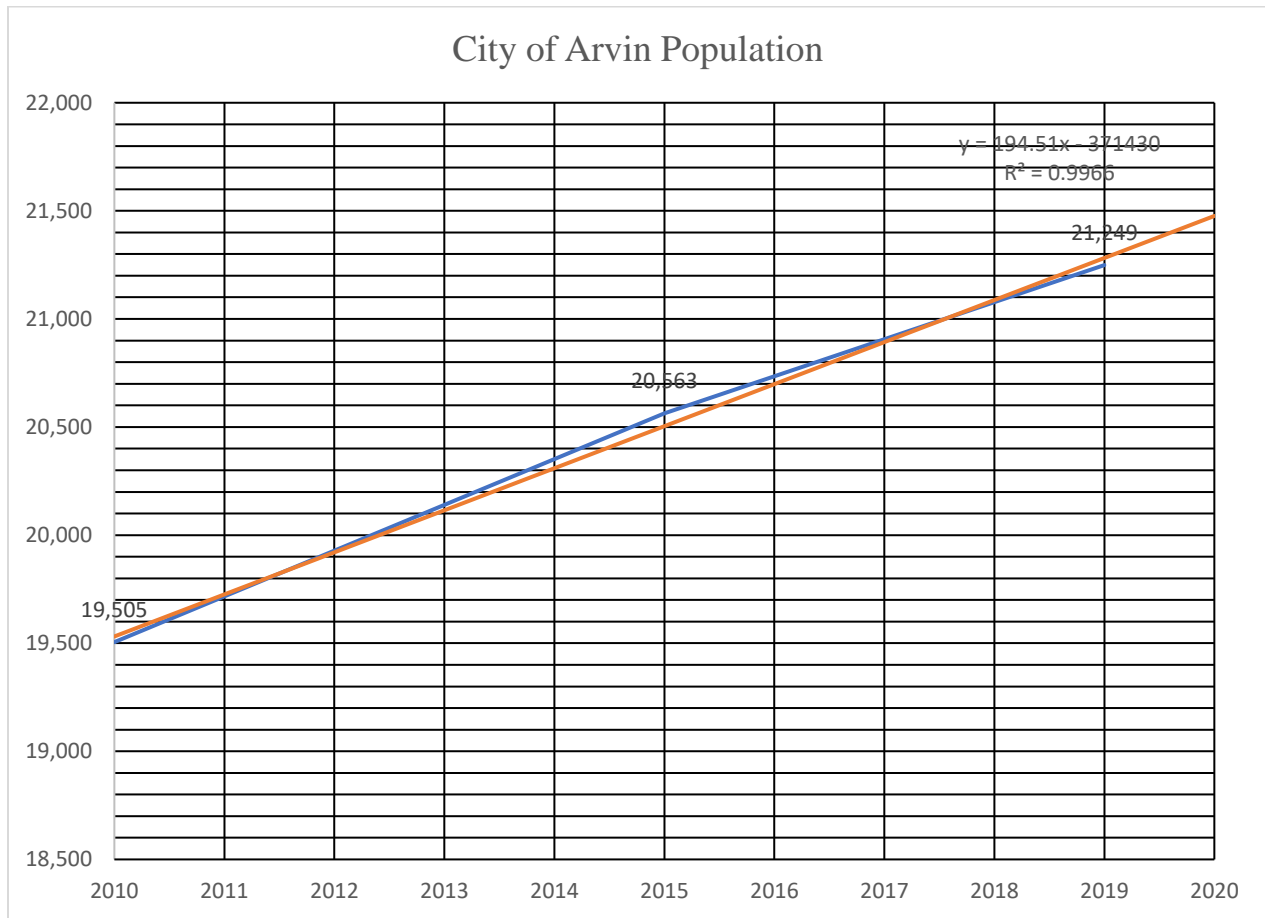
The 2010 UWMP used population data from the State of California Department of Finance. The 2015 UWMP used the DWR Population Tool. This update uses population information from the US Census. The following is a depiction of the 2020 Service Area.



Note the groundwater recharge ponds to the east (right) of ACSD’s service area. These recharge ponds are operated by Arvin Edison Water Storage District.

At the time of the 2015 UWMP, District population had grown at a rate of about 3.0% over the period from 2000 to 2015. The number of connections over the same period had increased at a rate of about 2.6%. This indicates a slight increase in the number of persons per connection. The 2020 DWR population tool estimates for the population for the year 2020 appear to be unusually high. This is likely due to the procedure is based on extrapolation of the number of persons per connection. For this reason it was decided to use the US Census (ACS) population estimate for 2019 and extrapolate the population number to the year 2020.

**Chart 3-4  
Population Growth**



The following is the population projection for ACSD. Based on the above formula for the trendline for population growth.



Submittal Table 3-1 Retail: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045(opt)
	21,800	22,775	23,745	24,720	25,690	
NOTES:						

## CHAPTER 4

### SYSTEM DEMANDS

#### 4.1 WATER USE

##### ACSD Service Area

The number of connections within ACSD’s service area has gradually increased over the past years. This is illustrated in the following Table 4-A, which sets forth historic water production and water deliveries for 2001 – 2020. All values in the following tables are in million gallon (MG) units.

Table 4-A  
Historic Water Production and Deliveries

	Number of Connections	Water Production (MG)	Water Deliveries (MG)
2001	2,624	840	699
2002	2,758	845	735
2003	2,829	928	751
2004	2,892	940	750
2005	2,996	895	744
2006	3,194	981	815
2007	3,390	1085	776
2008	3,448	946	781
2009	3,497	1039	815
2010	3,564	960	749
2011	3,598	918	739
2012	3,631	934	784
2013	3,632	980	793
2014	3,703	915	805
2015	3,776	635	577
2016	3,865	822	684
2017	3,892	851	719
2018	4,042	762	750
2019	4,052	830	731
2020	4,163	837	763

Table 4-B  
**ACSD Water Statistics for 2020**

Month	Water Sales (cf)	Water Sales (gal)	Water Pumped (gal)	Water Loss (gal)	Water Loss (%)
Jan	5,914,500	44,243,000	44,237,000	-6,000	0%
Feb	5,224,000	39,077,900	49,068,500	9,990,600	20%
Mar	6,454,600	48,283,200	53,429,000	5,145,800	10%
Apr	6,130,400	45,858,200	57,368,000	11,509,800	20%
May	8,442,200	63,151,800	81,034,000	17,882,200	22%
Jun	11,766,100	88,016,200	90,680,200	2,664,000	3%
Jul	13,886,400	103,877,100	104,561,400	684,300	1%
Aug	10,998,700	82,275,700	97,389,000	15,113,300	16%
Sep	10,719,200	80,184,800	81,584,000	1,399,200	2%
Oct	9,936,000	74,326,100	73,751,000	-575,100	-1%
Nov	6,752,500	50,511,900	55,960,000	5,448,100	10%
Dec	5,804,600	43,421,100	48,171,000	4,749,900	10%
<b>Total</b>	<b>102,029,200</b>	<b>763,178,416</b>	<b>837,233,100</b>	<b>74,006,100</b>	<b>9%</b>

There is a significant difference in the “Water Production” and the “Water Deliveries” in Table 4-A. The difference between the water produced and the water deliveries in the six year period from 2015-2020 averaged 12% and is thought to be due to two principal causes: 1. pipe breaks, and 2. differences in the accuracy of the pump station meters and the individual service meters. It is suspected that the “losses” are not truly water that is “lost” but that a significant amount of the water “loss” is due to these metering differences. In 2020, the District’s water loss savings program reduced the losses to 9% (Table 4-B). This was achieved through meter testing and replacement of faulty meters, public awareness programs, and replacement of sections of District pipelines that exhibit a high failure rate. Pipe replacement will continue until all of the old pipe that is subject to frequent failures is replaced.

**Low Income Family Water Demands**

The City of Arvin is classified as a Severely Disadvantaged, Low-income Community. About 37% of its families with children under 18 years of age are below the Federal Poverty Level of \$24,250 for families of 4 and \$28,410 for families of 5. The average home occupancy in Arvin is 4.5 persons per household (2010 U. S. Census data). The average population per District connection is about 5.5 persons per connection, which includes apartment housing.

**Submittal Table 4-1 Retail: Demands for Potable and Non-Potable<sup>1</sup> Water - Actual**

Use Type	2020 Actual		
<p><b>Drop down list</b>                      May select each use multiple times                      These are the only Use Types that will be recognized by the WUEdata online submittal tool</p>	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume <sup>2</sup>
Add additional rows as needed			
Single Family			600
Multi-Family			71
Commercial			25
Industrial			15
Institutional/Governmental			20
Landscape			32
Losses			74
<b>TOTAL</b>			<b>837</b>

<sup>1</sup> Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.  
<sup>2</sup> Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.



**Submittal Table 4-3 Retail: Total Water Use (Potable and Non-Potable)**

	2020	2025	2030	2035	2040	2045 (opt)
Potable Water, Raw, Other Non-potable <i>From Tables 4-1R and 4-2 R</i>	837	1,057	1,101	1,147	1,193	0
Recycled Water Demand <sup>1</sup> <i>From Table 6-4</i>	0	0	0	0	0	0
Optional Deduction of Recycled Water Put Into Long-Term Storage <sup>2</sup>						
<b>TOTAL WATER USE</b>	837	1,057	1,101	1,147	1,193	0

<sup>1</sup> Recycled water demand fields will be blank until Table 6-4 is complete

<sup>2</sup> Long term storage means water placed into groundwater or surface storage that is not removed from storage in the same year. Supplier **may** deduct recycled water placed in long-term storage from their reported demand. This value is manually entered into Table 4-3.

Amounts are in MG

Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss <sup>1,2</sup>
12/2016	200
12/2017	175
12/2018	150
12/2019	100
12/2020	74
<sup>1</sup> Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.	
<sup>2</sup> Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.	
MG. The amounts hereon are to be revised.	

Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections	
<b>Are Future Water Savings Included in Projections?</b> (Refer to Appendix K of UWMP Guidebook) <i>Drop down list (y/n)</i>	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	SBX7-7; CWC 10608.24; Chap. 4, p.19, Table 4-2
<b>Are Lower Income Residential Demands Included In Projections?</b> <i>Drop down list (y/n)</i>	Yes

The City of Arvin is classified as a Severely Disadvantaged, Low-income Community. About 37% of its families with children under 18 years of age are below the Federal Poverty Level of \$24,250 for families of 4 and \$28,410 for families of 5.

## CHAPTER 5

### BASELINES AND TARGETS

The Water Conservation Act of 2009, requires each municipal water supplier to meet its interim water conservation target by December 31, 2015 (CWC 10608.24).

Methodology 3: Base Daily Per Capita Water Use was selected for the 2010 UWMP and that Methodology is used herein for the confirmation of the 2015 and 2020 Targets developed for the 2010 UWMP, and for the determination of the District's compliance with the 2015 and 2020 Targets. The updated calculations presented in the 2015 UWMP confirmed the District's 2010 determination of the 2020 and 2015 Targets. The tables herein confirm that the District achieved its 2015 and 2020 Targets.

The District does not deliver recycled water to its constituents and therefore a baseline period of 10 years was used.

<b>SB X7-7 Table 0: Units of Measure Used in 2020 UWMP*</b> <i>(select one from the drop down list)</i>
Million Gallons
<i>*The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.</i>
NOTES:

As explained earlier on Page 13 herein, the US Census Bureau American Community Survey estimates of 2019 population for the City of Arvin was used for the 2020 population determination. The 2019 population estimate was extrapolated one year to the year 2020 based on the population trends experienced by the District from 2010 through 2019.



<b>SB X7-7 Table 2: Method for 2020 Population Estimate</b>	
<b>Method Used to Determine 2020 Population</b> (may check more than one)	
<input checked="" type="checkbox"/>	<b>1. Department of Finance (DOF) or American Community Survey (ACS)</b>
<input type="checkbox"/>	<b>2. Persons-per-Connection Method</b>
<input type="checkbox"/>	<b>3. DWR Population Tool</b>
<input type="checkbox"/>	<b>4. Other</b> DWR recommends pre-review
ACS data only through 2019 - extrapolated population to 2020. Added Edmundson Acres 2019 assuming not much change in this small community.	

The following table lists the 2020 population as determined by the procedure previously described.

<b>SB X7-7 Table 3: 2020 Service Area Population</b>	
<b>2020 Compliance Year Population</b>	
<b>2020</b>	21,800
NOTES:	

The following table presents the 2020 gross water use. This is the amount of water pumped from the District’s groundwater resource. The District calibrates the water meters on the production

wells to obtain as accurate a measurement of pumped groundwater as possible. Meters are install with the proper distances upstream and downstream with meters installed in straight runs of pipe.

<b>SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment</b> Complete one table for each source.			
<b>Name of Source</b>		Groundwater	
<b>This water source is (check one) :</b>			
<input checked="" type="checkbox"/>	The supplier's own water source		
<input type="checkbox"/>	A purchased or imported source		
Compliance Year 2020	Volume Entering Distribution System <sup>1</sup>	Meter Error Adjustment <sup>2</sup> <i>Optional</i> (+/-)	Corrected Volume Entering Distribution System
	837	-	837
<sup>1</sup> <i>Units of measure (AF, MG , or CCF) must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.</i>			
<sup>2</sup> <i>Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document</i>			
Units are MG			

**SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility** (For use only by agencies that are deducting process water using Criteria 4)

**Criteria 4**  
Disadvantaged Community. A "Disadvantaged Community" (DAC) is a community with a median household income less than 80 percent of the statewide average.

**SELECT ONE**  
"Disadvantaged Community" status was determined using one of the methods listed below:

**1. IRWM DAC Mapping tool** <https://gis.water.ca.gov/app/dacs/>

If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

**2. 2020 Median Income**

	California Median Household Income*		Service Area Median Household Income	Percentage of Statewide Average	Eligible for Exclusion? Y/N
<input checked="" type="checkbox"/>	2020	\$75,235	\$38,464	51%	YES
*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.					

NOTES

The City of Arvin is a severely disadvantaged community, with a median household income of \$38,464. This is 51% of the California Median Household Income of \$75,235.

The following Table SB X7-7 Table 9 2020 Compliance table develops the SB X7-7 compliance information for the District. The 2020 Compliance Target was 127 GPCD. The District achieved 105 GPCD, well within the 2020 Compliance Target.

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD <sup>1</sup>	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD <sup>1,2</sup>	Did Supplier Achieve Targeted Reduction for 2020?
	Enter "0" if Adjustment Not Used			TOTAL Adjustments <sup>1</sup>	Adjusted 2020 GPCD <sup>1</sup> <i>(Adjusted if applicable)</i>		
	Extraordinary Events <sup>1</sup>	Weather Normalization <sup>1</sup>	Economic Adjustment <sup>1</sup>				
105	-	-	-	-	105	127	YES
<sup>1</sup> All values are reported in GPCD							
<sup>2</sup> <b>2020 Confirmed Target GPCD</b> is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.							
NOTES:							

### Water Use Reduction Plan

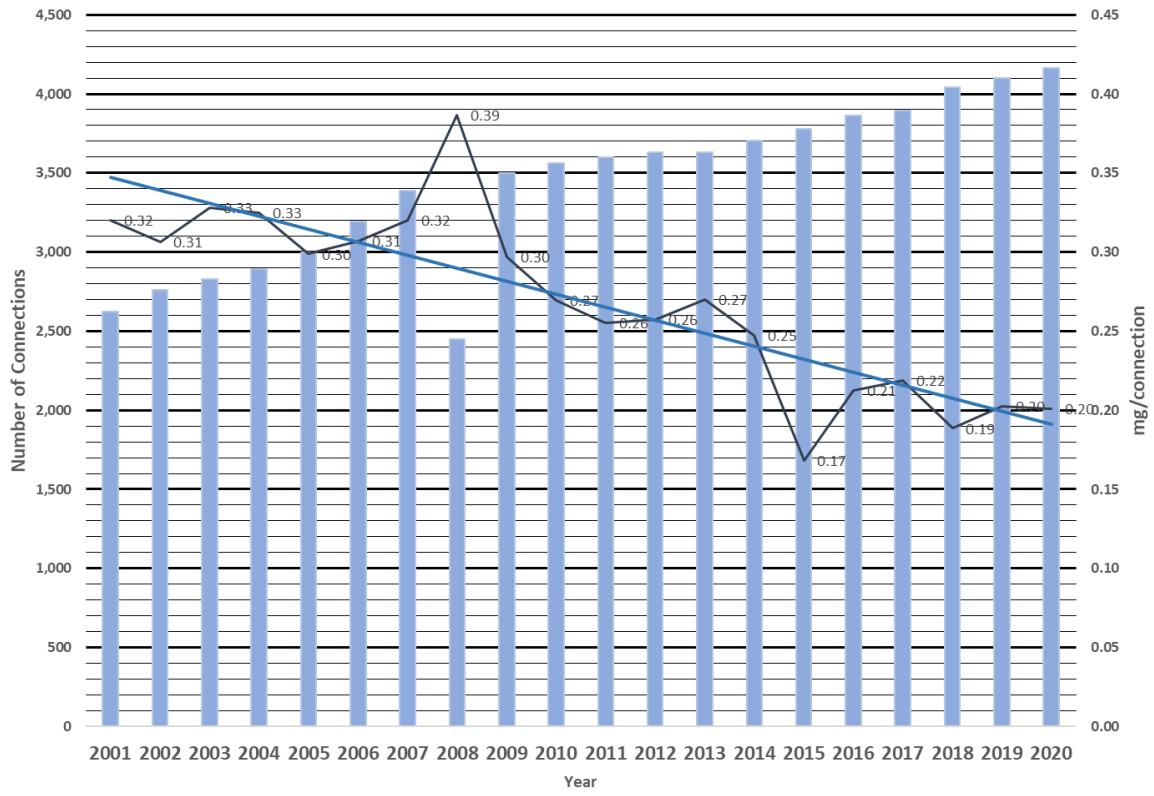
The City of Arvin is classified as a severely disadvantaged community. The cost of water is a factor that governs water use. The District is 100% metered. Each residence is billed monthly according to its water use. The residents are more aware of their water costs than in more affluent communities, where the monthly water bill is a smaller part of the monthly budget. Therefore the community is involved in policing itself and residents frequently report to the Board about water waste in the community.

The District encourages water conservation through the measures detailed in the District's Water Shortage Contingency Planning. Additionally the District patrols the community and contacts residents that are wasting water. See Chapter 9, Demand Management Measures.

The following chart, Table 5-A shows the trend in unit water production from 2001 through 2020. The units are in million gallons of water produced versus the number of connections. The trend is easy to see. In 2001 unit water production was 0.32 million gallons per connection per year. In 2020 the unit water production had reduced to about 0.20 million gallons per connection, a 38% reduction. The reduction is a result of the water conservation policies implemented by the District, the effects of the long-term drought, the community's awareness of the importance of the groundwater supply, and the community's dependence on the irrigated agriculture for jobs. Fines have not been needed for these reductions.

Table 5-A

Historic Unit Water Production



## CHAPTER 6

### WATER SUPPLY CHARACTERIZATION

#### 6.1 WATER SOURCES

##### GROUNDWATER

The District depends on groundwater for 100% of its water supply. The District is located in the Kern County sub-basin of the Tulare Lake Basin, within the Kern River Hydrographic Unit. Subbasin No. 5-22.14. This Subbasin has been identified as being a Critically Overdrafted Groundwater Basin. Basin 5-22.14 is not an adjudicated groundwater basin.

The District's system is as follows:

- Seven active water wells
- An eight well scheduled to be on-line by the end of 2022
- 1.5 million gallons of above-ground water storage with booster pumping plant

Three of the District's water supply wells are less than 3 years old, two are less than 5 years old, one is about 10 years old, another about 40 years old. The District's new one-million gallon storage tank and booster pumping facility were placed in service this year. This facility allows for blending water from multiple wells and provides emergency storage for catastrophic events. The District is nearing the completion of its Arsenic Mitigation Project wherein it drilled the above-mentioned new wells to replace six old wells that were contaminated with arsenic and other regulated contaminants. The only remaining well to be drilled as a part of this project is the last well, and drilling should begin in July of this year, 2021.

The total combined capacity of the wells is approximately 7,000 gpm. The wells can produce at total of approximately 11,000 acre-feet per year. Actual water demand is about 3,000 acre-feet per year. The District has multiple groundwater sources and above-ground storage. This enhances the reliability of the system and allows flexibility in its operation. Most of the equipment is new and therefore should not require repair or replacement for a number of years.

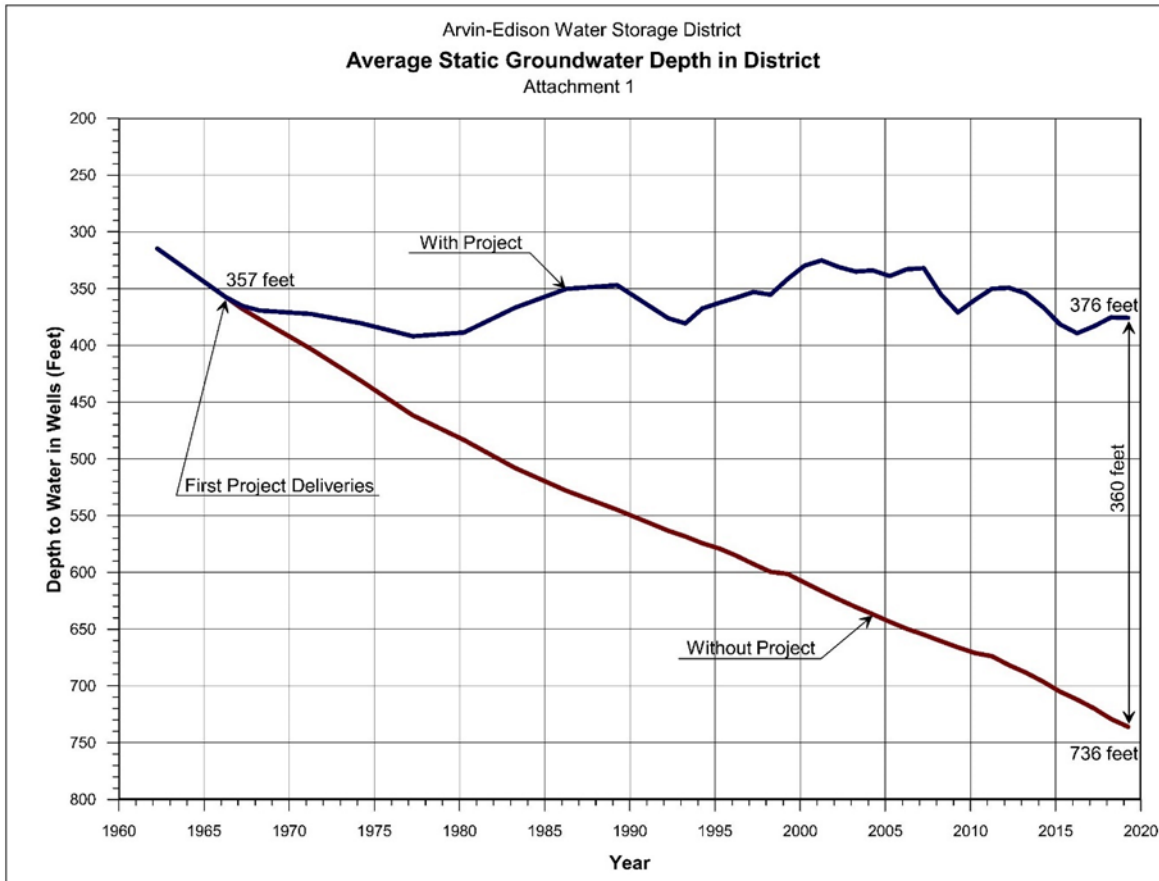
ACSD is within the boundaries of AEWSD. ACSD landowners pay an annual

groundwater benefit charge on their property tax bills to AEWS D due to the benefit that is derived from the importation of surface water by AEWS D. This has reduced reliance groundwater pumping for AEWS D and stabilized groundwater levels. AEWS D has been importing surface water into its service area since 1966. In addition, AEWS D also imports surface water for direct recharge into the groundwater basin via the AEWS D’s recharge facilities. In addition to the stabilized groundwater levels, there is also a groundwater quality benefit since the bulk of the imported water originates in the Sierras and is imported via the Friant-Kern Canal. However, AEWS D also imports water supplies from the State Water Project (California Aqueduct) and the Kern River.

AEWS D has contracts for and purchases surface water from the federal Central Valley Project (“CVP”) Friant Division and operates groundwater recharge facilities covering 1,650 acres, that benefit its entire approximately 132,000 acres, which includes ACSD. According to AEWS D’s 2003 Groundwater Management Plan, AEWS D has been importing surface water into its service area since 1966. As of 2020, it had imported over 8,300,000 acre-feet of surface water, and had recharged approximately 2,500,000 acre-feet (net) of water to the groundwater basin through its 2020 Water Year (February 2020). Prior to AEWS D’s project, groundwater levels were declining and groundwater overdraft was estimated at 126,000 acre-feet per year. Average static groundwater depths in 1966 were about 370 feet and without the AEWS D project, static water levels were projected to increase to 736 feet by the year 2020. With AEWS D’s project, the average groundwater levels were about 376 feet by the end of 2020. Recent drought conditions may cause groundwater levels to decrease once again and may replicate the conditions experienced in 2015. However, AEWS D’s water project has clearly benefitted lands within its boundaries, including ACSD, and by inspection of the following chart, fluctuations in groundwater levels due to variations in surface water supplies are a normal condition. AEWS D’s program has resulted in a reliable groundwater supply for the District. It should be noted that as a result of the San Joaquin River Settlement, AEWS D’s supplies from the Friant Division of the CVP are being reduced, although the ultimate reduction after mitigation measures are implemented is not presently known. The following chart “Average Static Groundwater Depth in District” shows the history of the AEWS D groundwater conditions. Average groundwater levels have varied from 300 to 400 feet depth over the history of the AEWS D project, from the time of the first surface water deliveries in 1966<sup>1</sup>.

1. Executive Summary, Management Area Plan, Arvin-Edison Management Area, Kern Subbasin, Dec. 2019.

A jointly-issued report by AEWSD and ACSD.



The above-referenced Executive Summary (see footnote at the bottom of the previous page) reports that the sustainable yield of the Management Area is approximately 0.80 acre-feet per acre per year, taken over the entire 105,630 Acre Management Area. A study conducted in 2019 determined that the total area within ACSD’s boundary was 2,447 acres. Urban developed lands covered 1,491 acres of the district. The total groundwater pumping for the year 2020 was 837 mg, or 2,568 acre-feet. At a sustainable yield of 0.80 acre-feet per acre, the sustainable yield for the urban lands within the district is about 1,193 acre-feet. On this basis the district fell short of its allocated sustainable yield by 1,375 acre-feet. However, measurements of water processed by the City of Arvin’s wastewater treatment plant indicate that about 387 mg (1,188 acre-feet) were processed in 2020 (the latest information from the City of Arvin). If this water were converted to groundwater recharge ACSD would be very nearly in balance. Currently it is used to grow forage crops. AEWSD currently has plans to enhance its groundwater recharge efforts by adding more recharge area (ref. the above-referenced Management Area report). AEWSD, in conjunction with Kern Delta Water District, is currently developing approximately 150 acres of recharge basins about two miles northeast of the city of Arvin. ACSD will be interfacing with



AEWSD to determine what future projects can be jointly implemented to further reduce groundwater overdraft. However, when inspecting the above chart, and the updated chart in the referenced Management Area document, one discerns that groundwater storage, as measured by groundwater levels, has been relatively stable since 1966.

Listed below are the annual volumes of water pumped by the District. The groundwater basin is 5-22.14 the San Joaquin Valley Basin, Kern Subbasin.

Submittal Table 6-1 Retail: Groundwater Volume Pumped						
<input type="checkbox"/>	Supplier does not pump groundwater. The supplier will not complete the table below.					
<input type="checkbox"/>	All or part of the groundwater described below is desalinated.					
Groundwater Type <i>Drop Down List</i> <i>May use each category multiple times</i>	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
<i>Add additional rows as needed</i>						
Alluvial Basin	5-22.14 San Joaquin Valley - Kern Subbasin	822	851	762	830	837
	<b>TOTAL</b>	822	851	762	830	837
<b>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>						
Units are million gallons						

Water from the City of Arvin’s sewage treatment facility is recycled for irrigation of forage crops on lands west of the District. This use of the recycled water generated from the District’s groundwater is used to replace water that would otherwise be pumped from the groundwater basin for irrigation purposes. Therefore the District benefits from the City of Arvin’s wastewater program. The wastewater has not been considered a candidate for tertiary treatment for reapplication on lands within the District’s service area.

There is no plan to use wastewater in the service area, wastewater was not projected to be used in 2020 and there are no plans to expand the use of wastewater in the service area.

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020						
<input type="checkbox"/> There is no wastewater collection system. The supplier will not complete the table below.						
Percentage of 2020 service area covered by wastewater collection system (optional)						
Percentage of 2020 service area population covered by wastewater collection system (optional)						
Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? <i>Drop Down List</i>	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? <i>Drop Down List</i>	Is WWTP Operation Contracted to a Third Party? <i>(optional) Drop Down List</i>
City of Arvin	Metered	387	N/A		No	No
<b>Total Wastewater Collected from Service Area in 2020:</b>		387				
<b>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3 .</b>						
NOTES:						

The following Tables 6-3R through 6-6R are included. However, there are no plans to use recycled water in the near future. These tables reflect that situation.

**Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020**

<input checked="" type="checkbox"/> No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.											
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number (optional) <sup>2</sup>	Method of Disposal <i>Drop down list</i>	Does This Plant Treat Wastewater Generated Outside the Service Area? <i>Drop down list</i>	Treatment Level <i>Drop down list</i>	2020 volumes <sup>1</sup>				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
<b>Total</b>							0	0	0	0	0

<sup>1</sup> Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.  
<sup>2</sup> If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at <https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility>

NOTES:

**Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area**

<input checked="" type="checkbox"/> Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.										
Name of Supplier Producing (Treating) the Recycled Water:										
Name of Supplier Operating the Recycled Water Distribution System:										
Supplemental Water Added in 2020 (volume) <i>Include units</i>										
Source of 2020 Supplemental Water										
Beneficial Use Type <i>Insert additional rows if needed.</i>	Potential Beneficial Uses of Recycled Water (Describe)	Amount of Potential Uses of Recycled Water (Quantity) <i>Include volume units<sup>1</sup></i>	General Description of 2020 Uses	Level of Treatment <i>Drop down list</i>	2020 <sup>1</sup>	2025 <sup>1</sup>	2030 <sup>1</sup>	2035 <sup>1</sup>	2040 <sup>1</sup>	2045 <sup>1</sup> (opt)
Agricultural irrigation										
Landscape irrigation (exc golf courses)										
Golf course irrigation										
Commercial use										
Industrial use										
Geothermal and other energy production										
Seawater intrusion barrier										
Recreational impoundment										
Wetlands or wildlife habitat										
Groundwater recharge (IPR)										
Reservoir water augmentation (IPR)										
Direct potable reuse										
Other (Description Required)										
<b>Total:</b>					0	0	0	0	0	0
<b>2020 Internal Reuse</b>										

<sup>1</sup> Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

NOTES:

**Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual**

<input checked="" type="checkbox"/>	Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below. If recycled water was not used in 2020, and was not predicted to be in 2015, then check the box and do not complete the table.
-------------------------------------	---

Beneficial Use Type	2015 Projection for 2020 <sup>1</sup>	2020 Actual Use <sup>1</sup>
<i>Insert additional rows as needed.</i>		
Agricultural irrigation		
Landscape irrigation (exc golf courses)		
Golf course irrigation		
Commercial use		
Industrial use		
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Description Required)		
<b>Total</b>	<b>0</b>	<b>0</b>

<sup>1</sup> Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.

NOTE:

Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
<input checked="" type="checkbox"/>	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
<i>Add additional rows as needed</i>			
<b>Total</b>			<b>0</b>
<b>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>			
NOTES:			

Expected water supply projects or programs are not planned in the near future due to the fact that the District has nearly completed a \$12m program to drill new water supply wells and abandon old contaminated wells. The District is exploring some future cooperative projects with AEWS.

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
<input checked="" type="checkbox"/>	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
<input type="checkbox"/>	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type <i>Drop Down List</i>	Expected Increase in Water Supply to Supplier* <i>This may be a range</i>
	<i>Drop Down List (y/n)</i>	<i>If Yes, Supplier Name</i>				
<i>Add additional rows as needed</i>						
<b>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>						
NOTES:						

Submittal Table 6-8 Retail: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
<p><b>Drop down list</b> May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool</p>		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Groundwater (not desalinated)	ACSD relies totally on groundwater	837	Drinking Water	
<b>Total</b>		<b>837</b>		<b>0</b>
<i>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i>				
Units are in MG.				

Arvin-Edison Water Storage District has prepared a Groundwater Sustainability Plan that recognizes Arvin Community Services District’s need for a sustainable water supply. The goal is to reduce the impact of water shortages as much as possible during times of drought, and to enhance recharge, manage and/or capture floodwater, develop new supplies, and reduce overall water demand and groundwater pumping. Both districts are working together to minimize the impacts of water shortages on both municipal and agricultural water users.

The following Submittal Table 6-9 presents the projected water supplies for the years 2025 through 2040. The issue for ACSD will not be the ability to pump groundwater, as ACSD has demonstrated in previous sections of this plan – it has a brand-new system with deep wells. The issue will be the effects of a drought on water quality. Projections are made based on the 2020 target value of 127 gpcd and population projections from the trendline of Chart 3-4 and Submittal Table 3.1, p. 14.



### **6.3 STORMWATER**

The City sumps catch a small amount of the floodwaters that originate in the foothills to the east of the City. This water percolates into the groundwater basin. However, floodwaters are infrequent and capture and recharge of these flood flows is not considered a feasible alternative for the District. However, ACSD is considering jointly participating with AEWS in studying opportunities to expand AEWS's recharge facilities capture and recharge excess flows in the Friant-Kern Canal that are available in wet years.

### **6.4 CLIMATE CHANGE EFFECTS**

Climate experts forecast that temperatures will increase from 1°C to 4°C by 2050 and that precipitation will change from a minus 15% to a positive 25% in the same time frame. Charts 3-1, 3-2 and 3-3, show temperature, ETo, and precipitation measured at the Arvin Edison Water Storage District weather station for the period 2011 through 2020.

The trendline temperature projection for 2020 is 65.9°F (i.e. where the trend line intersects the 2020 year ordinate), The average nine-year trend was 0.18°F per year with an R<sup>2</sup> of 0.20, indicating a great deal of scatter. However, if that trend is used the temperature in 2050 would be about 71.5°F, an increase of 5.6°F or 3.1°C.

The trendline projection for Eto for 2020 is 65.2 inches. The nine-year trend was 0.38 inches per year – with an R<sup>2</sup> of 0.3, indicating a lot of scatter in the data. Projecting this trend out to 2050 would indicate that the Eto for that time period would be on the order of 76.6 inches. That is a 17% increase in Eto.

The trendline projection for Precipitation for 2020 is about 5.7 inches. The nine-year trend was 0.06 inches decline per year with and R<sup>2</sup> of 0.01, even less than those of Eto and temperature. However – this is greatly influenced by the 2017 precipitation – which was about 0.50 inches, or about 10% of “normal” precipitation. Nevertheless, if this trend continued through 2050 the precipitation would be on the order of 5.5 inches, a decline of 4%.

It is understood that the R<sup>2</sup> values are low, but it is also understood that the projections of the effects of climate change are very approximate. However, given that the trends established by the local information are within the range of the projections of climate change, the values are sufficient to predict expected climate changes over the next five years. So – what is expected for ACSD? It appears that temperatures will go up about 0.2°F per year, Eto will go up about 0.4 inches per year – meaning that outdoor watering will go up if the amount of exterior landscaping remains unchanged, and that precipitation will possibly drop an average of 0.1 inches per year, slightly increasing the dependency of landscaping on groundwater.

Given that exterior water use in Arvin is on the order of 50% of total water use, and the average gallons per capita per day is in the neighborhood of 105 – 127 gpcd, then the exterior use is about 53-63 gpcd.



## 6.5 ENERGY USE

The district uses wells to extract groundwater from the underlying aquifer and these same wells pressurize the distribution system, except for two storage tanks with booster pumps.

There are seven production wells, one of which went into service in 2021. An eighth is planned to be placed into service in 2022. There are five new wells in this group, the oldest of the five was placed in service in 2015 and the newest in 2021.

As a result of this program, the energy use reported for 2020 may not reflect the energy use going forward. Once all of the new wells are in service and the system is “trimmed out” by the district, the energy use that is reported in future UWMPs will reflect the most efficient operation of the system’s wells and booster plants.

The following table, Table 6-B, tabulates the 2020 energy used for extracting and transmitting domestic water in the District’s distribution system. Wells No. 10, 13, 14 were most used, Wells No. 16 and 17 are new wells, and Well No. 12 was placed in service in 2021. Well No. 11 is rarely used as the arsenic concentration in this well is often above the MCL. Wells No. 6 and 8 are old wells that were taken out of service in 2020 and destroyed. Both had arsenic concentrations above the MCL> The amount listed as Storage System were re-boostered from the District’s 500,000 gallon storage tank at Headquarters on Campus Drive.

Table 6-B

Water Transmission Energy			
Account #	Name	Usage	Usage Unit
0020431398-	Well No. 10	675,165	KWH
0020431398-	Well No. 11	45,675	KWH
0447407424	Well No. 14	746,891	KWH
0785263492	Well No. 16	355,048	KWH
2523838358	Well No. 13	696,742	KWH
3069482424	Well No. 6 (Destroyed)	101,764	KWH
3569445887	Storage System	46,963	KWH
564266959	Well No. 8 (Destroyed)	0	KWH
7367559197	Well No. 12	NONE	KWH
9097792310	Well No. 17	484,209	KWH
<b>Total</b>		<b>3,152,459</b>	<b>KWH</b>

The following Table O-1A reports the District’s 2020 energy use for groundwater extraction, transmission and treatment. The District is currently completing a project that began in 2012 involving replacing aging and arsenic-contaminated wells with new, uncontaminated wells. This project will be completed in 2022. Table O-1A reports on the energy use of a combination of older wells together with the new wells.

**Urban Water Supplier:** Arvin Community Services District

**Water Delivery Product** (If delivering more than one type of product use Table O-1C)

Retail Potable Deliveries

Table O-1A: Recommended Energy Reporting - Water Supply Process Approach									
Enter Start Date for Reporting Period	1/1/2020	Urban Water Supplier Operational Control							
End Date	12/31/2020	Water Management Process						Non-Consequential Hydropower (if applicable)	
<input type="checkbox"/> Is upstream embedded in the values reported?									
	Water Volume Units Used	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	MG	0	0	0	0	837	837	0	837
Energy Consumed (kWh)	N/A						3152459		3152459
Energy Intensity (kWh/vol. converted to MG)	N/A	0.0	0.0	0.0	0.0	0.0	3766.4	0.0	3766.4
<b>Quantity of Self-Generated Renewable Energy</b>									
0 kWh									
<b>Data Quality</b> (Estimate, Metered Data, Combination of Estimates and Metered Data)									
Metered Data									
<b>Data Quality Narrative:</b>									
Energy used is from local power supplier's billings - which are derived from district's wells and booster pumping plants. The district extracts groundwater and places directly into the water distribution system. There are two storage tanks: 1. 500,000 gallons with booster pumps and 2. 1,000,000 gallon storage tank placed into service in 2021. This plant is also equipped with booster pumps but did not see service in 2020. Because the billing dates do not coincide with the calendar year, the energy use is not exactly the annual use - but is a close estimate.									
<b>Narrative:</b>									
The district is completing a project undertaken in 2012 to replace its aging wells, wells that were contaminated with arsenic and some volatile organic compounds. There are five new wells and one new storage tank and associated booster pumping plant. One of the newer wells is equipped with an activated carbon treatment plant = flow-through vessels that create an extra 5 - 10 psi pressure drop. This energy is accounted for in the well's energy use, as the well provides the pressure for extraction, treatment, and distribution.									

The District is looking into installation of solar energy to supplement the peak daily power demand from the wells. The peak power demand occurs in the summertime when solar energy input is also at its peak.

## CHAPTER 7

### WATER SUPPLY RELIABILITY ASSESSMENT

#### 7.1 WATER SUPPLY RELIABILITY

Groundwater provides domestic quality water for the District. From the time of the creation of the District until the present, and well into the future, groundwater will be the only source of water.

Section 6.1, above, discusses the AEWS D groundwater management program and the effects that AEWS D's successful program has had on stabilizing groundwater levels within the basin. Groundwater will continue to be a reliable source for the ACSD well into the future because of the effectiveness of AEWS D's program. The Management Area Plan, prepared jointly by AEWS D and ACSD, and referenced in Section 6.1 of this report, describes the condition of the underlying aquifer and the groundwater management programs that are in place.

The effects of drought on groundwater in the District are not directly reflected in the availability of the supply – but rather – in the depth of the groundwater and the effects of lowering groundwater levels on water quality. Pumps must be set deep enough to provide reliable service in times of extended drought. In extreme cases, the effects of lowering groundwater levels can be that the groundwater drops below the depth of the well itself, and therefore renders the well inoperable. At this time none of the District's wells are in danger of going dry. The wells are relatively new and depths are well below the groundwater levels. A single dry year usually has a minimal effect on groundwater levels in the area. However, multiple dry years do have an effect and this is due to several reasons: 1. Increased pumping of groundwater by those who have temporarily lost their surface water supplies, 2. Lower groundwater levels resulting from the absence of surface water for direct recharge, 3. Reduced groundwater recharge from excess surface water application to crops and landscaping, 4. Reduced groundwater recharge due to the absence of rainfall, resulting in reduction or absence of stream and river flows, and 5. Lower groundwater levels may have an adverse effect on the groundwater quality for domestic use.

Therefore it is necessary that municipal water purveyors that depend on groundwater to assure that adequate groundwater recharge occurs and that wells are sufficiently deep in order to provide water during times of extended drought (occasionally pumps must be lowered in the wells due to changes in groundwater levels.)

The District’s existing wells are of varying depths. Well depths, together with the static water levels, are listed below.

Table 7-A  
Current Well Information

Well Identifier	Well Depth (Feet Below Ground Surface)	Static Water Levels (Feet Below Ground Surface)
Well 10	1000	270
Well 11	1080	480
Well 12	825	394
Well 13	965	430
Well 14	920	380
Well 16	910	363
Well 17	935	370
Well 18	TBD	TBD

Well 18 will be drilled in 2021 and placed in service in 2022.

Groundwater levels in the AEWS-ACSD Management Area have been stable for many years, as previously discussed. These levels will remain relatively stable in the future. It is not a question of the availability of the water supply, ACSD’s wells are very deep compared to the current and forecast groundwater levels. ACSD’s wells will have access to the groundwater for many years in the future if the current recharge programs continue and are expanded. Questions remain as to: 1. The effects of groundwater level fluctuations on water quality, and 2. The extent of new restrictions on groundwater pumping promulgated by local and state government resulting from the current SGMA regulations.

The answer to the water quality question will be developed by future studies of groundwater quality as water levels fluctuate with sequential droughts and rainy periods and the effects of a warming climate. The answers to the second question are currently being developed as the first five years of the operation of the Sustainable Groundwater Management Act (“SGMA” or the “Act”) pass and data gathered during this period results in restrictions on groundwater pumping for agriculture and municipal use.

It has been observed that groundwater quality changes with groundwater depth. The District is testing that premise and monitoring the changes in quality with groundwater depth on several wells. It appears that 2021 may be a good year to gather information due to the anticipated lowering of groundwater levels due to the drought.

In anticipation of the effects of possible future restrictions on groundwater pumping,

AEWSD and ACSD entered into a Memorandum of Understanding in 2019 to address the possibility of groundwater allocations in the Management Area. The MOU contemplated that: a.) gross pumping by ACSD will remain in the neighborhood of 1.8 acre-feet per acre, b.) that the agencies would cooperate in developing any applicable groundwater sustainability projects to maintain sustainable groundwater conditions, and c.) that the two agencies would comply with the applicable provisions of the Act, and to the extent applicable, (i) that there would be an equal allocation to urban and agricultural lands (measured in af per acre), (ii) that a market mechanism be included to provide for transfers within AEWSD of pumping allocations required by Section 10726.4(a)(3) of the Act, and (iii) a right to ASCD to purchase any pumping allocations offered for sale through such approved market mechanism up to the quantity actually needed by ACSD to serve its customers, not to exceed 1.8 af/acre of developed urban lands.

The following Table 7-1R presents the anticipated groundwater supply availability for the year types indicated in the table. In this tabulation, the 5<sup>th</sup> dry year is a repeat of 2015.

Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)			
Year Type	Base Year If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	Available Supplies if Year Type Repeats	
		<input type="checkbox"/>	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		<input checked="" type="checkbox"/>	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available *	% of Average Supply
Average Year	2011	900	100%
Single-Dry Year	2015	900	100%
Consecutive Dry Years 1st Year	2012	900	100%
Consecutive Dry Years 2nd Year	2013	900	100%
Consecutive Dry Years 3rd Year	2014	900	100%
Consecutive Dry Years 4th Year	2015	900	100%
Consecutive Dry Years 5th Year	2015	900	100%
Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.			
<b>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>			
Units are MG			

The following Tables 7-2R and 7-3R show the normal year supply and demand and the single dry year, and Table 7-4R shows multiple dry years.

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals (autofill from Table 6-9)	1,057	1,101	1,147	1,193	0
Demand totals (autofill from Table 4-3)	1,057	1,101	1,147	1,193	0
Difference	0	0	0	0	0
Units are MG					

### Single Dry Year

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	1,057	1,101	1,147	1,193	
Demand totals*	951	990.9	1,032	1,074	
Difference	106	110	115	119	0
<b>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>					
Units are MG. For a single dry year, ACSD would implement a 10% voluntary water savings goal.					

In accordance with the District’s Water Shortage Contingency Plan this first year would be considered a Drought Watch Year. The water savings in that stage is voluntary, up to 10% savings. The supply, because the District is in the AEWSD-ACSD Management Area, would remain the same. Likely there would be no drop, or a slight drop in groundwater levels.

The District's Plan calls for action when the state or local agency call for water conserving measures.

While the District's water supply would remain relatively constant, the District is committed to water conservation action levels in order to preserve the groundwater resource for the community and its agricultural neighbors, who also rely on groundwater. ACSD's customers very likely depend on the viability of the neighboring agriculture to provide the jobs that are the source of income to the community.

The Water Shortage Contingency Plan calls for four stages of action that require increasing levels of conservation, up to a 50% conservation level, which, in the community of Arvin, nearly eliminates the use of water for landscaping purposes.

## Multiple Dry Years

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	1,057	1,101	1,147	1,193	
	Demand totals	951	991	1,032	1,074	
	Difference	106	110	115	119	0
Second year	Supply totals	1,057	1,101	1,147	1,193	
	Demand totals	846	881	918	954	
	Difference	211	220	229	239	0
Third year	Supply totals	1,057	1,101	1,147	1,193	
	Demand totals	740	771	803	835	
	Difference	317	330	344	358	0
Fourth year	Supply totals	1,057	1,101	1,147	1,193	
	Demand totals	634	661	688	716	
	Difference	423	440	459	477	0
Fifth year	Supply totals	1,057	1,101	1,147	1,193	
	Demand totals	529	551	574	597	
	Difference	529	551	574	597	0
Sixth year <i>(optional)</i>	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
<b>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</b>						
Units are MG. Year 1 = 10% savings (Drought Watch). Year 2 = 20% savings (Drought Alert). Year 3 = 30% savings (Drought Critical). Year 4 = 40% savings (Drought Critical). Year 5 = 50% savings (Drought Emergency)						



Table 7-5  
Five-Year Drought Risk Assessment Table

2021		Total
Total Water Use		1,057
Total Supplies		1,057
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		0
WSCP - use reduction savings benefit		106
Revised Surplus/(shortfall)		106
Resulting % Use Reduction from WSCP action		10%
2022		Total
Total Water Use		1,057
Total Supplies		1,057
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		0
WSCP - use reduction savings benefit		211
Revised Surplus/(shortfall)		211
Resulting % Use Reduction from WSCP action		20%
2023		Total
Total Water Use		1,057
Total Supplies		1,057
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		0
WSCP - use reduction savings benefit		317
Revised Surplus/(shortfall)		317
Resulting % Use Reduction from WSCP action		30%
2024		Total
Total Water Use		1,057
Total Supplies		1,057
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		0
WSCP - use reduction savings benefit		423
Revised Surplus/(shortfall)		423
Resulting % Use Reduction from WSCP action		40%
2025		Total
Total Water Use		1,057
Total Supplies		1,057
Surplus/Shortfall w/o WSCP Action		0
<b>Planned WSCP Actions</b> (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		0
WSCP - use reduction savings benefit		529
Revised Surplus/(shortfall)		529
Resulting % Use Reduction from WSCP action		50%

## CHAPTER 8

### WATER SHORTAGE CONTINGENCY PLAN

#### 8.1 THE PLAN

This Water Shortage Contingency Plan addresses the Arvin Community Services District's (District) policy to reduce water consumption in the community of Arvin during a drought emergency. The District is 100% metered.

The Arvin Community Services District has not experienced a severe water supply shortfall due to a drought in its 58 years of existence because the groundwater resource underlying the District has remained stable as a result of importation of surface water by AEWS. Therefore the District has been able to pump 100% of its water demand in years of drought. An extended drought increases the possibility that the District will have to lower its pumps. However, the supply would remain relatively stable. The District has seven wells, with combined capacity of 7,000 gpm. The eighth well will add another estimated 1,000 gpm to this total in 2022. Currently the wells can deliver 1.5 times the amount of water that is delivered on the maximum day. Booster pumps at the two tank sites add an additional 5,000 gpm of pumping capacity to meet peak hour demands. Emergency generators are stationed at three of the newer wells. The system has capacity to meet water demands.

The issue herein is the ability of the District to meet demands during an extended period of drought. Records of water levels since 1966 show that the AEWS program of groundwater management that was implemented at that time has been effective in stabilizing groundwater levels. The physical risk of an extended drought would be lowering groundwater levels that would reduce the well production somewhat and could possibly effect water quality. However, a majority of the wells (five out of seven) are either brand new or very young. They are deep and have plenty of penetration into the water bearing zones in the underlying aquifer.

The issue of water quality effects, as mentioned in the previous chapter, is being studied. This will continue over the next five to ten years and will allow the District to better plan for these effects.

The following is the District's plans to deal with a water shortage in the event of simultaneous dry years and for dealing with a catastrophic event such as the effects of an earthquake

## 8.2 STAGES OF ACTION

The Plan calls for four stages of action to take place in the event that the State of California and/or the local agency, declares a drought emergency requiring certain levels of water conservation. While the District’s water supply will remain relatively constant because of the availability of ground water, the District is committed to the following water conservation action levels in order to preserve the groundwater resource for the community and its neighbors who also rely on groundwater. The District encourages water conservation as a general practice and views the following actions as steps to be taken in the event of an unusually series of dry years that requires water conservation activities to be implemented over and above the normal water conservation activities.

The District’s appended Water Shortage Ordinance lists in detail the four stages of action that will be implemented in a drought emergency situation. Hereon is listed the four general categories of action and the water conservation goal of each stage. Each successive stage implements the conditions of the previous stage(s) so that the effect is accumulative as the Plan progresses through the stages. These four stages were established in 2015 and are considered valid today. However, they only consider up to a 50% supply shortage. Therefore a fifth stage has been added that considers a supply reduction of greater than 50%.

Table 8-A  
Stages of Supply Reduction

Stages of Water Shortage Contingency Plan		
Stage	Maximum Percent Supply Reduction	Water Supply Condition
1	10%	Voluntary. Drought Watch. Based on Requirements established by the State or the local agency.
2	25%	Mandatory. Drought Alert. Second year of a drought. Based on State or local agency determination of required reduction.
3	40%	Mandatory. Drought Critical. Third year of a drought. Based on State or local agency determination of required reduction.
4	50%	Mandatory. Drought Emergency. Fourth year of a drought. Based on State or local agency determination of required reduction.
5	> 50%	Mandatory. Extreme Drought Emergency. Fifth year of a drought. Based on State or local agency determination of required reduction.

The plan includes fines for continued violation of the conservation measures, requires that all leaks be repaired in an expeditious manner, restricts filling or re-filling of ornamental ponds, restricts vehicle washing, implements penalties for excessive water use, and at the option of the District’s Board of Directors, places a moratorium on new water services.

The following Submittal Table 8-1 shows the corresponding Stages applied to Shortage Levels. There is a fair degree of overlap in Table 8-A Stage 3, and Shortage Levels 3 and 4 in Table 8-1.

Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	Percent Shortage Range	Shortage Response Actions (Narrative description)
1	Up to 10%	Voluntary. Drought Watch. Based on Requirements established by the State or the local agency.
2	Up to 20%	Mandatory. Drought Alert. Second year of a drought. Based on State or local agency determination of required reduction.
3	Up to 30%	Mandatory. Drought Critical. Third year of a drought. Based on State or local agency determination of required reduction.
4	Up to 40%	Mandatory. Drought Critical. Third year of a drought. Based on State or local agency determination of required reduction.
5	Up to 50%	Mandatory. Drought Emergency. Fourth year of a drought. Based on State or local agency determination of required reduction.
6	>50%	Mandatory. Extreme Drought Emergency. Fifth year of a drought. Based on State or local agency determination of required reduction.
NOTES:		

The following Submittal Table 8-2 offers a brief description of the actions to be taken at the various Shortage Levels.

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions <i>Drop down list</i> <i>These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.</i>	How much is this going to reduce the shortage gap? <i>Include units used (volume type or percentage)</i>	Additional Explanation or Reference <i>(optional)</i>	Penalty, Charge, or Other Enforcement? <i>For Retail Suppliers Only</i> <i>Drop Down List</i>
<i>Add additional rows as needed</i>				
1	Expand Public Information Campaign	Voluntary reduction of 10%		No
	Increase Water Waste Patrols	Voluntary reduction of 10%		No
	Landscape - Restrict or prohibit runoff from landscape irrigation	Voluntary reduction of 10%		No
	Landscape - Limit landscape irrigation to specific times	Voluntary reduction of 10%		No
	Landscape - Limit landscape irrigation to specific days	Voluntary reduction of 10%		No
	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Voluntary reduction of 10%		No
2	Expand Public Information Campaign	Mandatory reduction up to 20%		Yes
	CII - Restaurants may only serve water upon request			
	Water Features - Restrict water use for decorative water features, such as fountains	Mandatory reduction up to 20%		Yes
	Other - Require automatic shut of hoses	Mandatory reduction up to 20%		Yes
	Other water feature or swimming pool restriction	Mandatory reduction up to 20%		Yes
3	Offer Water Use Surveys	Mandatory reduction of up to 30%		Yes
	CII - Commercial kitchens required to use pre-rinse spray valves	Mandatory reduction of up to 30%		Yes
	CII - Lodging establishment must offer opt out of linen service	Mandatory reduction of up to 30%		Yes
	Pools - Allow filling of swimming pools only when an appropriate cover is in place.	Mandatory reduction of up to 30%		Yes
	Pools and Spas - Require covers for pools and spas	Mandatory reduction of up to 30%		Yes
4	Offer Water Use Surveys	Mandatory reduction of up to 40%		Yes
	Other - Prohibit use of potable water for construction and dust control	Mandatory reduction of up to 40%		Yes
	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Mandatory reduction of up to 40%		Yes
	Decrease Line Flushing	Mandatory reduction of up to 40%		Yes
5	Moratorium or Net Zero Demand Increase on New Connections	Mandatory reduction of up to 50%		Yes
6	Landscape - Prohibit all landscape irrigation	Mandatory reduction of greater than 50%		Yes
NOTES:				

The following Submittal Table 8-3 addresses Supply Augmentation Actions that may be taken by water suppliers who have access to neighboring suppliers or have another means of augmenting their water supply. Unfortunately, the District is isolated, about 30 miles from the nearest major municipal supplier, and does not have a surface water supply or treatment plant. There are no opportunities for transfers, exchanges, purchases, rain seeding, nor are there stored emergency supplies other than the District's 1.5 million gallons of storage.

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier <i>Drop down list</i> <i>These are the only categories that will be accepted by the WUdata online submittal tool</i>	How much is this going to reduce the shortage gap? <i>Include units used (volume type or percentage)</i>	Additional Explanation or Reference <i>(optional)</i>
<i>Add additional rows as needed</i>			
There are not many opportunities to augment the District's supply other than to have enough back up capacity in wells. Hauling in water in certified trucks, and providing bottled water would be the only temporary actions that could be taken, and only in an emergency.			

The following pages are from the District's 2015 UWMP. These sections deal with the Impacts on Revenue and Expenses, a Catastrophic Supply Interruption.

### 8.3 IMPACTS ON REVENUE AND EXPENDITURES

#### Impacts on Revenue with Implementation of Water Shortage Contingency Plan Revenue Impacts Based on Water Delivery Reductions

Planned Reduction	Budgeted Revenue	Reduced Revenue	Reduction
0%	\$3,395,645	\$3,395,645	\$0
10%	\$3,395,645	\$3,242,841	\$152,804
25%	\$3,395,645	\$2,899,032	\$496,613
40%	\$3,395,645	\$2,486,461	\$909,184
50%	\$3,395,645	\$2,177,033	\$1,218,612

## **Discussion**

The District will work to reduce power costs by encouraging water use in off peak periods of the day. Power costs will be reduced due to reduced water deliveries. The District will look for opportunities for cost savings by deferring certain maintenance items that can be temporarily deferred with little impact on District operations. District's operations will be streamlined to the extent that it can be while maintaining the integrity of the system.

The above revenue and expenditure impacts are anticipated for each of the Water Reduction Stages in the Water Shortage Contingency Plan. The District conducted a Proposition 218 Rate Study with the intent of increasing water rates to the level that will provide the required amounts of income to balance the District's expenses. This was done in 2016 and rates have been adjusted in accordance with the results of the Rate Study. This has placed the District on firm financial ground.

## **Water Shortage Contingency Plan Resolution**

A copy of the District's Resolution adopting the Water Shortage Contingency Plan is appended.

## **8.4 CATASTROPHIC SUPPLY INTERRUPTION**

### **8.4.1 Action to Be Undertaken For A Catastrophic Interruption of Water Supplies**

The following actions are planned to be implemented in the event of a catastrophic event. The District has prepared an emergency action plan which includes telephone numbers of key personnel, number for emergency responders, a plan for assessing system status and reactivating the system as quickly as possible, and a plan prioritizing the actions that need to be taken during and shortly after an emergency.

- Assess the status of water system / Reactivate as quickly as possible
  - Issue a "Boil Water" notice
  - Isolate broken mains / repair system pipe breaks
  - Assess the condition of water production facilities / repair as necessary / reactivate as quickly as possible / provide water for fire protection / implement emergency system disinfection
  - Utilize District's portable power generators as necessary
- Provide bottled water as necessary

## **8.5 SEISMIC RISK ASSESSMENT AND MITIGATION PLAN**

District facilities are relatively new – having been built in the last eight years, and three have been placed in service in the last two years. They were designed to the latest seismic standards.

The Kern County Multi-Jurisdictional Hazard Mitigation Plan for Arvin Community Services District is Appended.



## **CHAPTER 9**

### **DEMAND MANAGEMENT MEASURES**

#### **9.1 WATER DEMAND MANAGEMENT MEASURES**

The District encourages the conservation of the community's water resources through programs that educate the citizens about water waste and encourage water users to use the water resource wisely. The District has in place a prohibition of water waste that is not contingent on water shortages or drought. It also encourages the active participation of the community to monitor and report water waste to the manager. District staff personally contacts and confers with violators to educate them about wise use of their water supply.

##### **9.1.1 METERING**

The District is 100% metered and watches water use – contacting users that have an inordinate amount of water use compared to their historical use. This could be a meter misread, a pipe break on the users' property, or an unattended hose left running in the yard. The District has implemented a meter testing and replacement program. Additional programs that the District has implemented is a distribution-line valve testing and repair/replacement program.

##### **9.1.2 RATE STRUCTURE TO ENCOURAGE CONSERVATION**

The District conducted a Proposition 218 Rate Study and implemented a new rate structure in January 2017. This rate structure encourages water savings. However, tiered rate structures to encourage conservation must be based on actual cost of the service and cannot be arbitrarily constructed. The rate structure has a base rate component that will assure that the District's fixed costs are met, and the variable costs of the service will be the actual cost of delivering the water to water users. Conservation will be encouraged through education programs, water patrols, water audits, and customer relations.

##### **9.1.3 WATER AUDITS**

The District performed an AWWA Water Audit for the first time as a part of the 2015 UWMP. Water audits are conducted annually in the District's system. The water loss

calculated from the software indicates a real loss of about 9%. However, some assumptions had to be made in order to perform the audit, and these assumptions will be verified over the coming years as the water loss program is developed.

#### **9.1.4 PUBLIC EDUCATION AND OUTREACH**

The District Board Meetings are held twice a month on Monday nights. The public is invited to these meetings and often attends. Additionally the District works with the Community Water Center (CWC), a non-profit organization, to get information out about the status of the District's programs. CWC often attends the Board Meetings. The District also works with the Rural Community Water Center (RCAC), a non-profit organization, also involved in the city, and is often at the Board Meetings. Occasionally the District holds community meetings with State Water Boards or EPA to communicate the status of the several projects that the District is conducting with both agencies.

The District also communicates with water users via their water bills, usually limited messages about saving water, water quality efforts, etc. Nearly all water users pay their bills over the counter at the District Office and there they can ask questions about their bills, about the District's programs, or comment on their observations of people wasting water in the community.

The District also has three vending machines installed at the District Office that dispense arsenic-free water to hand-carried water bottles (1 gallon to 5 gallon size) for people to use for drinking and cooking. There is no cost to the customer. This program was financed by a grant from the Department of Water Resources. Additionally the RCAC installed about 50 point-of-use devices that remove arsenic from the water at the tap on a separate grant from the State Waterboards. The District does the testing of the devices. These are installed in public locations such as schools, libraries and public buildings. These will slowly be decommissioned as the District's Arsenic Phase 2 Project has completed five new wells that meet the new arsenic standard, and a sixth one is planned to be placed on line in 2022.

#### **9.1.5 MANAGING SYSTEM LOSSES**

The District plans to initiate a main-line valve location and exercising program in the next fiscal year. The issue is that the valve boxes have been covered up by re-paving projects, inattention to maintenance of as-built and facility drawings, so that many of the valves are lost, or when found, do not work. Additionally, the philosophy many years ago

was to minimize the number of valves because they required exercising and maintenance to keep them in serviceable shape. The result is that, during a pipe failure event, it is difficult to shut off individual lines because of lost valves or inoperative valves and therefore entire sections of the City must be shut down in order to repair a leak. The Water Audit program described above will also aid in the location of actual water and revenue losses.

#### **9.1.6 WATER CONSERVATION**

A result of the prolonged drought is that the residents of Arvin are keenly aware of the impacts of a drought and have been very successful with their water conservation efforts. The District managed to end the year well within its water conservation goal. During the drought (and in the present one), residents were advised of required conservation efforts in the local paper, on the water bills and through communication with District Staff. District staff patrolled the neighborhoods and contacted residents who were wasting water or were not complying with the Stage 2 water restrictions. Residents also kept track of each other and reported water wasting to the District so the District staff could make a visit and educate people who were out of compliance. For 2016, the District self-certified a conservation goal of 14%, and the goal increased every year until 2020. In 2020 the District met the 20% level, as required by SB X7-7.

**CHAPTER 10**

**PLAN ADOPTION, SUBMITTAL AND IMPLEMENTATION**

<b>Submittal Table 10-1 Retail: Notification to Cities and Counties</b>		
City Name	60 Day Notice	Notice of Public Hearing
<i>Add additional rows as needed</i>		
City of Arvin	Yes	Yes
County Name <i>Drop Down List</i>	60 Day Notice	Notice of Public Hearing
<i>Add additional rows as needed</i>		
Kern County	Yes	Yes
Arvin-Edison Water Storage District		

Copies of the Notice to the City of Arvin, the County of Kern and Arvin-Edison Water Storage District are appended.

The Notice of Public Hearing published in the \_\_\_\_\_ is appended.

The Public Hearing was held on September 7, 2021, and at the Boards’ pleasure, the plan was adopted that day. The Resolution of Adoption of the 2020 Urban Water Management Plan together with a separate resolution adopting the Water Shortage Contingency Plan, are appended.

## APPENDICES

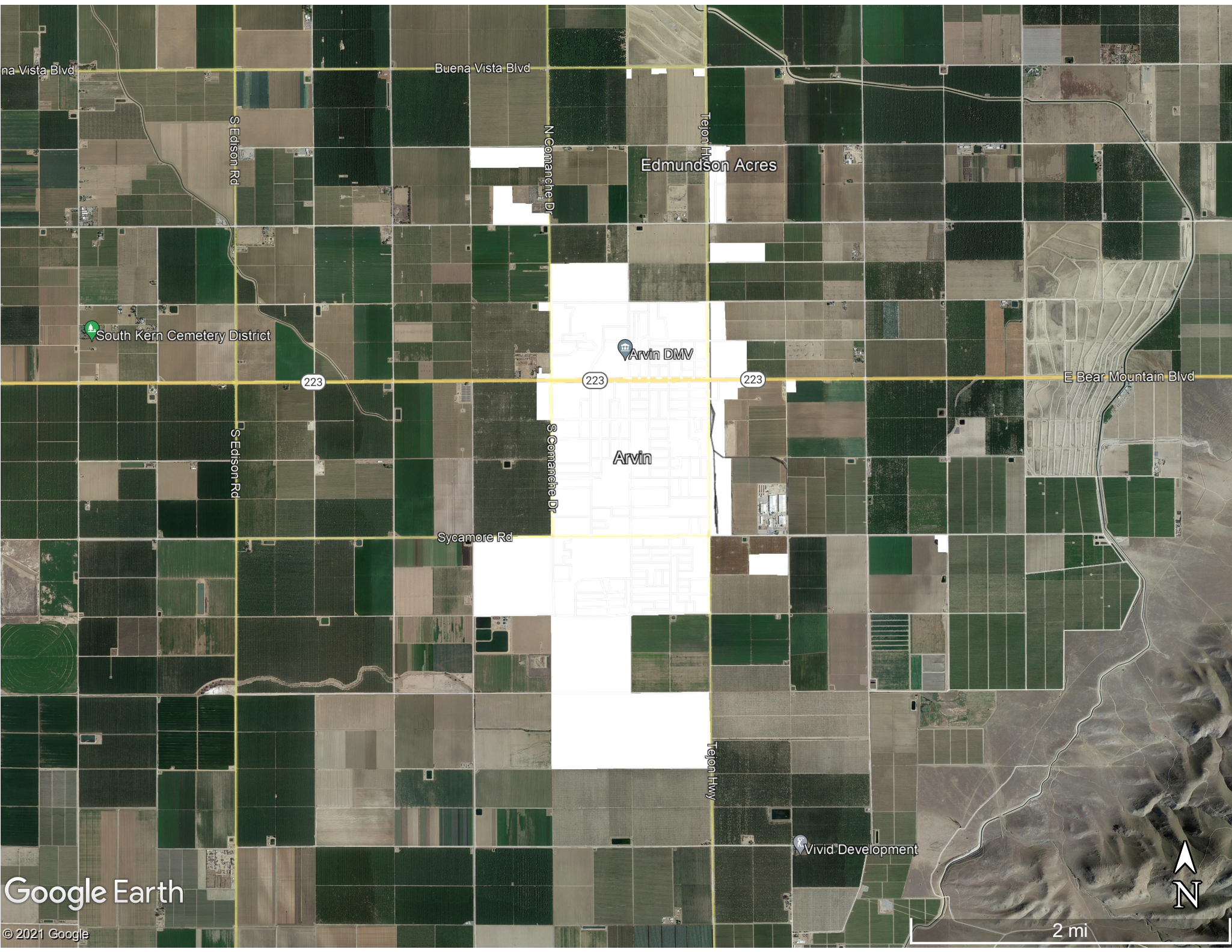
- PUBLIC HEARING NOTICE
- PROOF OF PUBLICATION
- DISTRICT SERVICE MAP
- MINUTES OF THE SPECIAL MEETING OF THE BOARD OF DIRECTORS,  
\_\_\_\_\_
- AWWA WATER AUDIT REPORTING WORKSHEET
- WATER SHORTAGE CONTNGENCY PLAN
- ACSD MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN
- RESOLUTION ADOPTING THE 2020 UWMP
- RESOLUTION ADOPTING THE 2020 WATER SHORTAGE CONTINGENCY PLAN

## PUBLIC HEARING NOTICE

## PROOF OF PUBLICATION

## DISTRICT SERVICE MAP





na Vista Blvd

Buena Vista Blvd

S Edison Rd

N Comanche Dr

Tejon Hwy

Edmundson Acres

South Kern Cemetery District

Arvin DMV

223

223

223

E Bear Mountain Blvd

S Edison Rd

S Comanche Dr

Arvin

Sycamore Rd

Tejon Hwy

Vivid Development

Google Earth

© 2021 Google



2 mi

MINUTES OF THE SPECIAL MEETING OF THE BOARD OF DIRECTORS,  
SEPTEMBER 7, 2021

# AWWA WATER AUDIT REPORTING WORKSHEET



# AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0  
American Water Works Association.  
Copyright © 2014. All Rights Reserved.

? Click to access definition  
+ Click to add a comment

Water Audit Report for: **Arvin Community Services District (1510001)**  
Reporting Year: **2019** / 1/2019 - 12/2019

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

**All volumes to be entered as: MILLION GALLONS (US) PER YEAR**

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

----- Enter grading in column 'E' and 'J' ----->

Master Meter and Supply Error Adjustments

**WATER SUPPLIED**

Volume from own sources:	+ ?	5	830.100	MG/Yr
Water imported:	+ ?	n/a	0.000	MG/Yr
Water exported:	+ ?	n/a	0.000	MG/Yr

Pcnt:	Value:	MG/Yr
+ ?	2	
+ ?		
+ ?		

**WATER SUPPLIED:** **830.100** MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**AUTHORIZED CONSUMPTION**

Billed metered:	+ ?	8	731.820	MG/Yr
Billed unmetered:	+ ?	n/a	0.000	MG/Yr
Unbilled metered:	+ ?	8	0.980	MG/Yr
Unbilled unmetered:	+ ?	4	10.376	MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

**AUTHORIZED CONSUMPTION:** **743.176** MG/Yr

Click here: ?  
for help using option buttons below

Pcnt: 1.25% Value: MG/Yr

Use buttons to select percentage of water supplied OR value

Pcnt: 0.25% Value: MG/Yr

0.15% Value: MG/Yr  
0.25% Value: MG/Yr

**WATER LOSSES (Water Supplied - Authorized Consumption)**

**86.924** MG/Yr

**Apparent Losses**

Unauthorized consumption: + ? **2.075** MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	6	1.101	MG/Yr
Systematic data handling errors:	+ ?	8	1.830	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:** **5.006** MG/Yr

**Real Losses (Current Annual Real Losses or CARL)**

Real Losses = Water Losses - Apparent Losses: ? **81.918** MG/Yr

**WATER LOSSES:** **86.924** MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:** ? **98.280** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:	+ ?	8	65.0	miles
Number of active AND inactive service connections:	+ ?	10	4,250	
Service connection density:	?		65	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 3 60.0 psi

**COST DATA**

Total annual cost of operating water system:	+ ?	10	\$2,954,702	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	\$1.76	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5		\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

**\*\*\* YOUR SCORE IS: 64 out of 100 \*\*\***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

**PRIORITY AREAS FOR ATTENTION:**

Based on the information provided, audit accuracy can be improved by addressing the following components:

- 1: Volume from own sources
- 2: Variable production cost (applied to Real Losses)
- 3: Customer metering inaccuracies



# AWWA Free Water Audit Software: System Attributes and Performance Indicators

WAS v5.0

American Water Works Association.  
Copyright © 2014, All Rights Reserved.

Water Audit Report for: **Arvin Community Services District (1510001)**  
 Reporting Year: **2019**    **1/2019 - 12/2019**

**\*\*\* YOUR WATER AUDIT DATA VALIDITY SCORE IS: 64 out of 100 \*\*\***

**System Attributes:**

	Apparent Losses:	<b>5.006</b>	MG/Yr
+	Real Losses:	<b>81.918</b>	MG/Yr
=	<b>Water Losses:</b>	<b>86.924</b>	MG/Yr

? Unavoidable Annual Real Losses (UARL): **21.66** MG/Yr

Annual cost of Apparent Losses: **\$11,777**

Annual cost of Real Losses:

Valued at **Variable Production Cost**  
Return to Reporting Worksheet to change this assumption

**Performance Indicators:**

Financial:	{	Non-revenue water as percent by volume of Water Supplied:	<b>11.8%</b>	
		Non-revenue water as percent by cost of operating system:	<b>0.4%</b>	Real Losses valued at Variable Production Cost

Operational Efficiency:	{	Apparent Losses per service connection per day:	<b>3.23</b>	gallons/connection/day
		Real Losses per service connection per day:	<b>52.81</b>	gallons/connection/day
		Real Losses per length of main per day*:	<b>N/A</b>	
		Real Losses per service connection per day per psi pressure:	<b>0.88</b>	gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL): **81.92** million gallons/year

? Infrastructure Leakage Index (ILI) [CARL/UARL]: **3.78**

\* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline



# AWWA Free Water Audit Software: Water Balance

WAS v5.0

American Water Works Association.  
Copyright © 2014, All Rights Reserved.

Water Audit Report for:	Arvin Community Services District (1510001)	
Reporting Year:	2019	1/2019 - 12/2019
Data Validity Score:	64	

	Water Exported <i>0.000</i>	Billed Water Exported				
<b>Own Sources</b> (Adjusted for known errors)  <b>830.100</b>	<b>Water Supplied</b>  <b>830.100</b>	<b>Authorized Consumption</b>  <b>743.176</b>	<b>Billed Authorized Consumption</b>  <b>731.820</b>	<b>Billed Metered Consumption (water exported is removed)</b>  <b>731.820</b>	<b>Revenue Water</b>  <b>731.820</b>	
				<b>Billed Unmetered Consumption</b>  <b>0.000</b>		
			<b>Unbilled Authorized Consumption</b>  <b>11.356</b>	<b>Unbilled Metered Consumption</b>  <b>0.980</b>	<b>Non-Revenue Water (NRW)</b>  <b>98.280</b>	
			<b>Unbilled Unmetered Consumption</b>  <b>10.376</b>			
<b>Water Imported</b>  <b>0.000</b>	<b>Water Losses</b>  <b>86.924</b>	<b>Apparent Losses</b>  <b>5.006</b>	<b>Unauthorized Consumption</b>  <b>2.075</b>			
			<b>Customer Metering Inaccuracies</b>  <b>1.101</b>			
			<b>Systematic Data Handling Errors</b>  <b>1.830</b>			
		<b>Real Losses</b>  <b>81.918</b>	<b>Leakage on Transmission and/or Distribution Mains</b> <i>Not broken down</i>			
			<b>Leakage and Overflows at Utility's Storage Tanks</b> <i>Not broken down</i>			
			<b>Leakage on Service Connections</b> <i>Not broken down</i>			



# AWWA Free Water Audit Software: Dashboard

WAS v5.0

American Water Works Association.  
Copyright © 2014, All Rights Reserved.

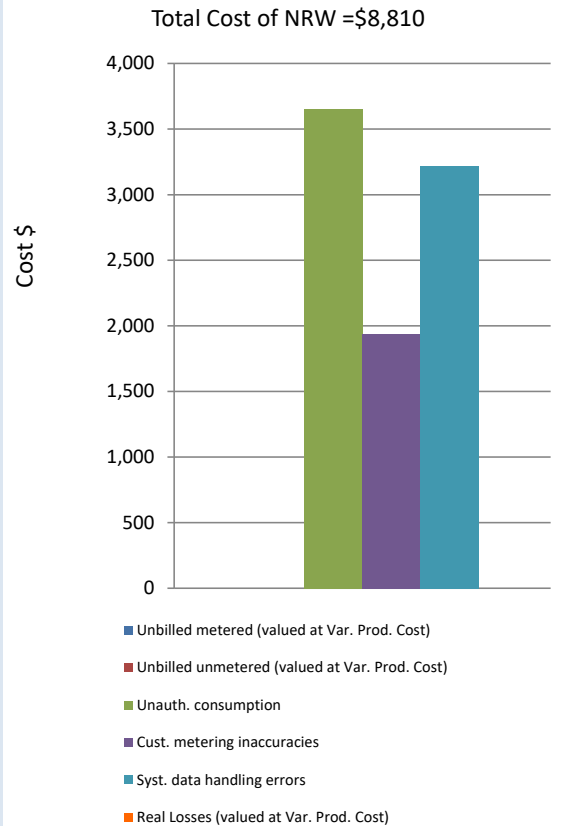
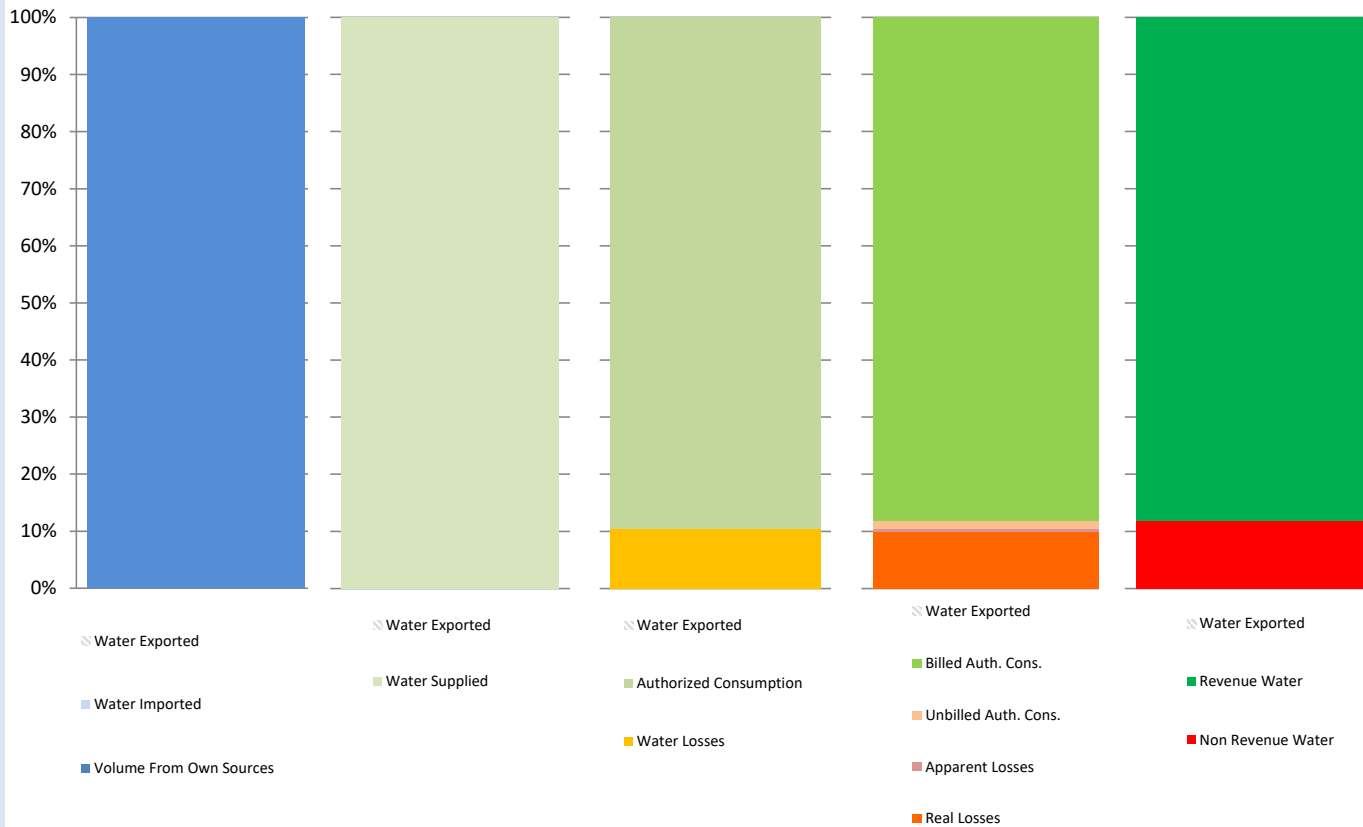
The graphic below is a visual representation of the Water Balance with bar heights proportional to the volume of the audit components

Water Audit Report for: **Arvin Community Services District (1510001)**

Reporting Year: **2019**    **1/2019 - 12/2019**

Data Validity Score: **64**

- Show me the VOLUME of Non-Revenue Water
- Show me the COST of Non-Revenue Water



# AWWA Free Water Audit Software: Grading Matrix

WAS 5.0

American Water Works Association. Copyright © 2014. All Rights Reserved.

The grading assigned to each audit component and the corresponding recommended improvements and actions are highlighted in yellow. Audit accuracy is likely to be improved by prioritizing those items shown in red

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
<b>WATER SUPPLIED</b>											
<b>Volume from own sources:</b>	Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)	Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing or electronic calibration conducted.	25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing or electronic calibration conducted.	Conditions between 2 and 4	50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing or electronic calibration conducted.	Conditions between 4 and 6	At least 75% of treated water production sources are metered, <u>or</u> at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually, with less than 10% found outside of +/- 3% accuracy. Procedures are reviewed by a third party knowledgeable in the M36 methodology.
Improvements to attain higher data grading for "Volume from own Sources" component:		<u>to qualify for 2:</u> Organize and launch efforts to collect data for determining volume from own sources	<u>to qualify for 4:</u> Locate all water production sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered water production sources and replace any obsolete/defective meters.		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all source meters; specify the frequency of testing. Complete installation of meters on unmetered water production sources and complete replacement of all obsolete/defective meters.		<u>to qualify for 8:</u> Conduct annual meter accuracy testing and calibration of related instrumentation on all meter installations on a regular basis. Complete project to install new, or replace defective existing, meters so that entire production meter population is metered. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing and calibration of related instrumentation for all meter installations. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to further improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Volume from own sources master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its sources of supply	Inventory information on meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined	No automatic datalogging of production volumes; daily readings are scribed on paper records without any accountability controls. Flows are not balanced across the water distribution system; tank/storage elevation changes are not employed in calculating the "Volume from own sources" component and archived flow data is adjusted only when grossly evident data error occurs.	Conditions between 2 and 4	Production meter data is logged automatically in electronic format and reviewed at least on a monthly basis with necessary corrections implemented. "Volume from own sources" tabulations include estimate of daily changes in tanks/storage facilities. Meter data is adjusted when gross data errors occur, or occasional meter testing deems this necessary.	Conditions between 4 and 6	Hourly production meter data logged automatically & reviewed on at least a weekly basis. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and/or error is confirmed by meter accuracy testing. Tank/storage facility elevation changes are automatically used in calculating a balanced "Volume from own sources" component, and data gaps in the archived data are corrected on at least a weekly basis.	Conditions between 6 and 8	Continuous production meter data is logged automatically & reviewed each business day. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Tank/storage facility elevation changes are automatically used in "Volume from own sources" tabulations and data gaps in the archived data are corrected on a daily basis.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically balances flows from all sources and storages; results are reviewed each business day. Tight accountability controls ensure that all data gaps that occur in the archived flow data are quickly detected and corrected. Regular calibrations between SCADA and sources meters ensures minimal data transfer error.
Improvements to attain higher data grading for "Master meter and supply error adjustment" component:		<u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature.	<u>to qualify for 4:</u> Install automatic datalogging equipment on production meters. Complete installation of level instrumentation at all tanks/storage facilities and include tank level data in automatic calculation routine in a computerized system. Construct a computerized listing or spreadsheet to archive input volumes, tank/storage volume changes and import/export flows in order to determine the composite "Water Supplied" volume for the distribution system. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps.		<u>to qualify for 6:</u> Refine computerized data collection and archive to include hourly production meter data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Use daily net storage change to balance flows in calculating "Water Supplied" volume. Necessary corrections to data errors are implemented on a weekly basis.		<u>to qualify for 8:</u> Ensure that all flow data is collected and archived on at least an hourly basis. All data is reviewed and detected errors corrected each business day. Tank/storage levels variations are employed in calculating balanced "Water Supplied" component. Adjust production meter data for gross error and inaccuracy confirmed by testing.		<u>to qualify for 10:</u> Link all production and tank/storage facility elevation change data to a Supervisory Control & Data Acquisition (SCADA) System, or similar computerized monitoring/control system, and establish automatic flow balancing algorithm and regularly calibrate between SCADA and source meters. Data is reviewed and corrected each business day.		<u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters. Continue to replace or repair meters as they perform outside of desired accuracy limits. Stay abreast of new and more accurate water level instruments to better record tank/storage levels and archive the variations in storage volume. Keep current with SCADA and data management systems to ensure that archived data is well-managed and error free.
Water Imported:	Select n/a if the water utility's supply is exclusively from its own water resources (no bulk purchased/ imported water)	Less than 25% of imported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of imported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of imported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of imported water sources are metered, meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually for all meter installations. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Imported Volume" component: <i>(Note: usually the water supplier selling the water - "the Exporter" - to the utility being audited is responsible to maintain the metering installation measuring the imported volume. The utility should coordinate carefully with the Exporter to ensure that adequate meter upkeep takes place and an accurate measure of the Water Imported volume is quantified.)</i>		<u>to qualify for 2:</u> Review bulk water purchase agreements with partner suppliers; confirm requirements for use and maintenance of accurate metering. Identify needs for new or replacement meters with goal to meter all imported water sources.	<u>To qualify for 4:</u> Locate all imported water sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered imported water interconnections and replace obsolete/defective meters.		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all imported water meters, planning for both regular meter accuracy testing and calibration of the related instrumentation. Continue installation of meters on unmetered imported water interconnections and replacement of obsolete/defective meters.		<u>to qualify for 8:</u> Complete project to install new, or replace defective, meters on all imported water interconnections. Maintain annual meter accuracy testing for all imported water meters and conduct calibration of related instrumentation at least annually. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Conduct meter accuracy testing for all meters on a semi-annual basis, along with calibration of all related instrumentation. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Continue to conduct calibration of related instrumentation on a semi-annual basis. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.



Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Water imported master meter and supply error adjustment:	Select n/a if the Imported water supply is unmetered, with Imported water quantities estimated on the billing invoices sent by the Exporter to the purchasing Utility.	Inventory information on imported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined. Written agreement(s) with water Exporter(s) are missing or written in vague language concerning meter management and testing.	No automatic datalogging of imported supply volumes; daily records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Imported supply metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis by the Exporter with necessary corrections implemented. Meter data is adjusted by the Exporter when gross data errors are detected. A coherent data trail exists for this process to protect both the selling and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly Imported supply metered data is logged automatically & reviewed on at least a weekly basis by the Exporter. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and to correct for error confirmed by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling and the purchasing Utility.	Conditions between 6 and 8	Continuous Imported supply metered flow data is logged automatically & reviewed each business day by the Importer. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the Exporter. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling and purchasing Utility at least once every five years.
Improvements to attain higher data grading for "Water imported master meter and supply error adjustment" component:		<u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the selling and purchasing Utility.	<u>to qualify for 4:</u> Install automatic datalogging equipment on Imported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the Exporters to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.		<u>to qualify for 6:</u> Refine computerized data collection and archive to include hourly Imported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.		<u>to qualify for 8:</u> Ensure that all Imported supply metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.		<u>to qualify for 10:</u> Conduct accountability checks to confirm that all Imported supply metered data is reviewed and corrected each business day by the Exporter. Results of all meter accuracy tests and data corrections should be available for sharing between the Exporter and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreement between the selling and the purchasing Utility, at least every five years.		<u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the Exporter to help identify meter replacement needs. Keep communication lines with Exporters open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.
Water Exported:	Select n/a if the water utility sells no bulk water to neighboring water utilities (no exported water sales)	Less than 25% of exported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of exported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of exported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy.	Conditions between 8 and 10	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Exported Volume" component:  (Note: usually, if the water utility being audited sells (Exports) water to a neighboring purchasing Utility, it is the responsibility of the utility exporting the water to maintain the metering installation measuring the Exported volume. The utility exporting the water should ensure that adequate meter upkeep takes place and an accurate measure of the Water Exported volume is quantified.)		<u>to qualify for 2:</u> Review bulk water sales agreements with purchasing utilities; confirm requirements for use & upkeep of accurate metering. Identify needs to install new, or replace defective meters as needed.	<u>To qualify for 4:</u> Locate all exported water sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered exported water interconnections and replace obsolete/defective meters		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all exported water meters. Continue installation of meters on unmetered exported water interconnections and replacement of obsolete/defective meters.		<u>to qualify for 8:</u> Complete project to install new, or replace defective, meters on all exported water interconnections. Maintain annual meter accuracy testing for all exported water meters. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Water exported master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its exported supply interconnections.	Inventory information on exported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined. Written agreement(s) with the utility purchasing the water are missing or written in vague language concerning meter management and testing.	No automatic datalogging of exported supply volumes; daily readings are scribed on paper records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Exported metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis, with necessary corrections implemented. Meter data is adjusted by the utility selling (exporting) the water when gross data errors are detected. A coherent data trail exists for this process to protect both the utility exporting the water and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly exported supply metered data is logged automatically & reviewed on at least a weekly basis by the utility selling the water. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and to correct for error found by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling (exporting) utility and the purchasing Utility.	Conditions between 6 and 8	Continuous exported supply metered flow data is logged automatically & reviewed each business day by the utility selling (exporting) the water. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and any error confirmed by meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling (exporting) Utility and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the utility selling (exporting) the water. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling Utility and purchasing Utility at least once every five years.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Water exported master meter and supply error adjustment" component.		<p><u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the utility selling (exporting) the water and the purchasing Utility.</p>	<p><u>to qualify for 4:</u> Install automatic datalogging equipment on exported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the purchasing utilities to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.</p>		<p><u>to qualify for 6:</u> Refine computerized data collection and archive to include hourly exported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.</p>		<p><u>to qualify for 8:</u> Ensure that all exported metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.</p>		<p><u>to qualify for 10:</u> Conduct accountability checks to confirm that all exported metered flow data is reviewed and corrected each business day by the utility selling the water. Results of all meter accuracy tests and data corrections should be available for sharing between the utility and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreements with the purchasing utilities, at least every five years.</p>		<p><u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the purchasing utilities to help identify meter replacement needs. Keep communication lines with the purchasing utilities open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.</p>
<b>AUTHORIZED CONSUMPTION</b>											
Billed metered:	n/a (not applicable). Select n/a only if the entire customer population is not metered and is billed for water service on a flat or fixed rate basis. In such a case the volume entered must be zero.	Less than 50% of customers with volume-based billings from meter readings; flat or fixed rate billing exists for the majority of the customer population	At least 50% of customers with volume-based billing from meter reads; flat rate billing for others. Manual meter reading is conducted, with less than 50% meter read success rate, remaining accounts' consumption is estimated. Limited meter records, no regular meter testing or replacement. Billing data maintained on paper records, with no auditing.	Conditions between 2 and 4	At least 75% of customers with volume-based, billing from meter reads; flat or fixed rate billing for remaining accounts. Manual meter reading is conducted with at least 50% meter read success rate; consumption for accounts with failed reads is estimated. Purchase records verify age of customer meters; only very limited meter accuracy testing is conducted. Customer meters are replaced only upon complete failure. Computerized billing records exist, but only sporadic internal auditing conducted.	Conditions between 4 and 6	At least 90% of customers with volume-based billing from meter reads; consumption for remaining accounts is estimated. Manual customer meter reading gives at least 80% customer meter reading success rate; consumption for accounts with failed reads is estimated. Good customer meter records exist, but only limited meter accuracy testing is conducted. Regular replacement is conducted for the oldest meters. Computerized billing records exist with annual auditing of summary statistics conducted by utility personnel.	Conditions between 6 and 8	At least 97% of customers exist with volume-based billing from meter reads. At least 90% customer meter reading success rate; at least 80% read success rate with planning and budgeting for trials of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) in one or more pilot areas. Good customer meter records. Regular meter accuracy testing guides replacement of statistically significant number of meters each year. Routine auditing of computerized billing records for global and detailed statistics occurs annually by utility personnel, and is verified by third party at least once every five years.	Conditions between 8 and 10	At least 99% of customers exist with volume-based billing from meter reads. At least 95% customer meter reading success rate; at minimum 80% meter reading success rate, with Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) trials underway. Statistically significant customer meter testing and replacement program in place on a continuous basis. Computerized billing with routine, detailed auditing, including field investigation of representative sample of accounts undertaken annually by utility personnel. Audit is conducted by third party auditors at least once every three years.
Improvements to attain higher data grading for "Billed Metered Consumption" component.	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	<p><u>to qualify for 2:</u> Conduct investigations or trials of customer meters to select appropriate meter models. Budget funding for meter installations. Investigate volume based water rate structures.</p>	<p><u>to qualify for 4:</u> Purchase and install meters on unmetered accounts. Implement policies to improve meter reading success. Catalog meter information during meter read visits to identify age/model of existing meters. Test a minimal number of meters for accuracy. Install computerized billing system.</p>		<p><u>to qualify for 6:</u> Purchase and install meters on unmetered accounts. Eliminate flat fee billing and establish appropriate water rate structure based upon measured consumption. Continue to achieve verifiable success in removing manual meter reading barriers. Expand meter accuracy testing. Launch regular meter replacement program. Launch a program of annual auditing of global billing statistics by utility personnel.</p>		<p><u>to qualify for 8:</u> Purchase and install meters on unmetered accounts. If customer meter reading success rate is less than 97%, assess cost-effectiveness of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system for portion or entire system; or otherwise achieve ongoing improvements in manual meter reading success rate to 97% or higher. Refine meter accuracy testing program. Set meter replacement goals based upon accuracy test results. Implement annual auditing of detailed billing records by utility personnel and implement third party auditing at least once every five years.</p>		<p><u>to qualify for 10:</u> Purchase and install meters on unmetered accounts. Launch Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system trials if manual meter reading success rate of at least 99% is not achieved within a five-year program. Continue meter accuracy testing program. Conduct planning and budgeting for large scale meter replacement based upon meter life cycle analysis using cumulative flow target. Continue annual detailed billing data auditing by utility personnel and conduct third party auditing at least once every three years.</p>		<p><u>to maintain 10:</u> Continue annual internal billing data auditing, and third party auditing at least every three years. Continue customer meter accuracy testing to ensure that accurate customer meter readings are obtained and entered as the basis for volume based billing. Stay abreast of improvements in Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) and information management. Plan and budget for justified upgrades in metering, meter reading and billing data management to maintain very high accuracy in customer metering and billing.</p>
Billed unmetered:	Select n/a if it is the policy of the water utility to meter all customer connections and it has been confirmed by detailed auditing that all customers do indeed have a water meter; i.e. no intentionally unmetered accounts exist	Water utility policy does not require customer metering; flat or fixed fee billing is employed. No data is collected on customer consumption. The only estimates of customer population consumption available are derived from data estimation methods using average fixture count multiplied by number of connections, or similar approach.	Water utility policy does not require customer metering; flat or fixed fee billing is employed. Some metered accounts exist in parts of the system (pilot areas or District Metered Areas) with consumption read periodically or recorded on portable dataloggers over one, three, or seven day periods. Data from these sample meters are used to infer consumption for the total customer population. Site specific estimation methods are used for unusual buildings/water uses.	Conditions between 2 and 4	Water utility policy does require metering and volume based billing in general. However, a liberal amount of exemptions and a lack of clearly written and communicated procedures result in up to 20% of billed accounts believed to be unmetered by exemption; or the water utility is in transition to becoming fully metered, and a large number of customers remain unmetered. A rough estimate of the annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 4 and 6	Water utility policy does require metering and volume based billing but established exemptions exist for a portion of accounts such as municipal buildings. As many as 15% of billed accounts are unmetered due to this exemption or meter installation difficulties. Only a group estimate of annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 6 and 8	Water utility policy does require metering and volume based billing for all customer accounts. However, less than 5% of billed accounts remain unmetered because meter installation is hindered by unusual circumstances. The goal is to minimize the number of unmetered accounts. Reliable estimates of consumption are obtained for these unmetered accounts via site specific estimation methods.	Conditions between 8 and 10	Water utility policy does require metering and volume based billing for all customer accounts. Less than 2% of billed accounts are unmetered and exist because meter installation is hindered by unusual circumstances. The goal exists to minimize the number of unmetered accounts to the extent that is economical. Reliable estimates of consumption are obtained at these accounts via site specific estimation methods.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Billed Unmetered Consumption" component:		to qualify for 2: Conduct research and evaluate cost/benefit of a new water utility policy to require metering of the customer population; thereby greatly reducing or eliminating unmetered accounts. Conduct pilot metering project by installing water meters in small sample of customer accounts and periodically reading the meters or datalogging the water consumption over one, three, or seven day periods.	to qualify for 4: Implement a new water utility policy requiring customer metering. Launch or expand pilot metering study to include several different meter types, which will provide data for economic assessment of full scale metering options. Assess sites with access difficulties to devise means to obtain water consumption volumes. Begin customer meter installation.		to qualify for 6: Refine policy and procedures to improve customer metering participation for all but solidly exempt accounts. Assign staff resources to review billing records to identify errant unmetered properties. Specify metering needs and funding requirements to install sufficient meters to significant reduce the number of unmetered accounts		to qualify for 8: Push to install customer meters on a full scale basis. Refine metering policy and procedures to ensure that all accounts, including municipal properties, are designated for meters. Plan special efforts to address "hard-to-access" accounts. Implement procedures to obtain a reliable consumption estimate for the remaining few unmetered accounts awaiting meter installation.		to qualify for 10: Continue customer meter installation throughout the service area, with a goal to minimize unmetered accounts. Sustain the effort to investigate accounts with access difficulties, and devise means to install water meters or otherwise measure water consumption.		to maintain 10: Continue to refine estimation methods for unmetered consumption and explore means to establish metering, for as many billed remaining unmetered accounts as is economically feasible.
Unbilled metered:	select n/a if all billing-exempt consumption is unmetered.	Billing practices exempt certain accounts, such as municipal buildings, but written policies do not exist; and a reliable count of unbilled metered accounts is unavailable. Meter upkeep and meter reading on these accounts is rare and not considered a priority. Due to poor recordkeeping and lack of auditing, water consumption for all such accounts is purely guesstimated.	Billing practices exempt certain accounts, such as municipal buildings, but only scattered, dated written directives exist to justify this practice. A reliable count of unbilled metered accounts is unavailable. Sporadic meter replacement and meter reading occurs on an as-needed basis. The total annual water consumption for all unbilled, metered accounts is estimated based upon approximating the number of accounts and assigning consumption from actively billed accounts of same meter size.	Conditions between 2 and 4	Dated written procedures permit billing exemption for specific accounts, such as municipal properties, but are unclear regarding certain other types of accounts. Meter reading is given low priority and is sporadic. Consumption is quantified from meter readings where available. The total number of unbilled, unmetered accounts must be estimated along with consumption volumes.	Conditions between 4 and 6	Written policies regarding billing exemptions exist but adherence in practice is questionable. Metering and meter reading for municipal buildings is reliable but sporadic for other unbilled metered accounts. Periodic auditing of such accounts is conducted. Water consumption is quantified directly from meter readings where available, but the majority of the consumption is estimated.	Conditions between 6 and 8	Written policy identifies the types of accounts granted a billing exemption. Customer meter management and meter reading are considered secondary priorities, but meter reading is conducted at least annually to obtain consumption volumes for the annual water audit. High level auditing of billing records ensures that a reliable census of such accounts exists.	Conditions between 8 and 10	Clearly written policy identifies the types of accounts given a billing exemption, with emphasis on keeping such accounts to a minimum. Customer meter management and meter reading for these accounts is given proper priority and is reliably conducted. Regular auditing confirms this. Total water consumption for these accounts is taken from reliable readings from accurate meters.
Improvements to attain higher data grading for "Unbilled Metered Consumption" component:		to qualify for 2: Reassess the water utility's policy allowing certain accounts to be granted a billing exemption. Draft an outline of a new written policy for billing exemptions, with clear justification as to why any accounts should be exempt from billing, and with the intention to keep the number of such accounts to a minimum.	to qualify for 4: Review historic written directives and policy documents allowing certain accounts to be billing-exempt. Draft an outline of a written policy for billing exemptions, identify criteria that grants an exemption, with a goal of keeping this number of accounts to a minimum. Consider increasing the priority of reading meters on unbilled accounts at least annually.		to qualify for 6: Draft a new written policy regarding billing exemptions based upon consensus criteria allowing this occurrence. Assign resources to audit meter records and billing records to obtain census of unbilled metered accounts. Gradually include a greater number of these metered accounts to the routes for regular meter reading.		to qualify for 8: Communicate billing exemption policy throughout the organization and implement procedures that ensure proper account management. Conduct inspections of accounts confirmed in unbilled metered status and verify that accurate meters exist and are scheduled for routine meter readings. Gradually increase the number of unbilled metered accounts that are included in regular meter reading routes.		to qualify for 10: Ensure that meter management (meter accuracy testing, meter replacement) and meter reading activities for unbilled accounts are accorded the same priority as billed accounts. Establish ongoing annual auditing process to ensure that water consumption is reliably collected and provided to the annual water audit process.		to maintain 10: Reassess the utility's philosophy in allowing any water uses to go "unbilled". It is possible to meter and bill all accounts, even if the fee charged for water consumption is discounted or waived. Metering and billing all accounts ensures that water consumption is tracked and water waste from plumbing leaks is detected and minimized.
Unbilled unmetered:		Extent of unbilled, unmetered consumption is unknown due to unclear policies and poor recordkeeping. Total consumption is quantified based upon a purely subjective estimate.	Clear extent of unbilled, unmetered consumption is unknown, but a number of events are randomly documented each year, confirming existence of such consumption, but without sufficient documentation to quantify an accurate estimate of the annual volume consumed.	Conditions between 2 and 4	Extent of unbilled, unmetered consumption is partially known, and procedures exist to document certain events such as miscellaneous fire hydrant uses. Formulae is used to quantify the consumption from such events (time running multiplied by typical flowrate, multiplied by number of events).	Default value of 1.25% of system input volume is employed	Coherent policies exist for some forms of unbilled, unmetered consumption but others await closer evaluation. Reasonable recordkeeping for the managed uses exists and allows for annual volumes to be quantified by inference, but unsupervised uses are guesstimated.	Conditions between 6 and 8	Clear policies and good recordkeeping exist for some uses (ex. water used in periodic testing of unmetered fire connections), but other uses (ex. miscellaneous uses of fire hydrants) have limited oversight. Total consumption is a mix of well quantified use such as from formulae (time running multiplied by typical flow, multiplied by number of events) or temporary meters, and relatively subjective estimates of less regulated use.	Conditions between 8 and 10	Clear policies exist to identify permitted use of water in unbilled, unmetered fashion, with the intention of minimizing this type of consumption. Good records document each occurrence and consumption is quantified via formulae (time running multiplied by typical flow, multiplied by number of events) or use of temporary meters.
Improvements to attain higher data grading for "Unbilled Unmetered Consumption" component:		to qualify for 5: Utilize the accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use. to qualify for 2: Establish a policy regarding what water uses should be allowed to remain as unbilled and unmetered. Consider tracking a small sample of one such use (ex: fire hydrant flushing).	to qualify for 5: Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use. to qualify for 4: Evaluate the documentation of events that have been observed. Meet with user groups (ex: fire hydrants - fire departments, contractors to ascertain their need and/or volume requirements for water from fire hydrants).		to qualify for 5: Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process, and should focus on other components since the volume of unbilled, unmetered consumption is usually a relatively small quantity component, and other larger-quantity components should take priority.	to qualify for 6 or greater: Finalize policy and begin to conduct field checks to better establish and quantify such usage. Proceed if top-down audit exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policy and procedures for various unmetered usages. For example, ensure that a policy exists and permits are issued for use of fire hydrants by persons outside of the utility. Create written procedures for use and documentation of fire hydrants by water utility personnel. Use same approach for other types of unbilled, unmetered water usage.		to qualify for 10: Refine written procedures to ensure that all uses of unbilled, unmetered water are overseen by a structured permitting process managed by water utility personnel. Reassess policy to determine if some of these uses have value in being converted to billed and/or metered status.		to maintain 10: Continue to refine policy and procedures with intention of reducing the number of allowable uses of water in unbilled and unmetered fashion. Any uses that can feasibly become billed and metered should be converted eventually.

APPARENT LOSSES

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Unauthorized consumption:		Extent of unauthorized consumption is unknown due to unclear policies and poor recordkeeping. Total unauthorized consumption is guesstimated.	Unauthorized consumption is a known occurrence, but its extent is a mystery. There are no requirements to document observed events, but periodic field reports capture some of these occurrences. Total unauthorized consumption is approximated from this limited data.	conditions between 2 and 4	Procedures exist to document some unauthorized consumption such as observed unauthorized fire hydrant openings. Use formulae to quantify this consumption (time running multiplied typical flowrate, multiplied by number of events).	Default value of 0.25% of volume of water supplied is employed	Coherent policies exist for some forms of unauthorized consumption (more than simply fire hydrant misuse) but others await closer evaluation. Reasonable surveillance and recordkeeping exist for occurrences that fall under the policy. Volumes quantified by inference from these records.	Conditions between 6 and 8	Clear policies and good auditable recordkeeping exist for certain events (ex: tampering with water meters, illegal bypasses of customer meters); but other occurrences have limited oversight. Total consumption is a combination of volumes from formulae (time x typical flow) and subjective estimates of unconfirmed consumption.	Conditions between 8 and 10	Clear policies exist to identify all known unauthorized uses of water. Staff and procedures exist to provide enforcement of policies and detect violations. Each occurrence is recorded and quantified via formulae (estimated time running multiplied by typical flow) or similar methods. All records and calculations should exist in a form that can be audited by a third party.
Improvements to attain higher data grading for "Unauthorized Consumption" component:		to qualify for 5: Use accepted default of 0.25% of volume of water supplied. to qualify for 2: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)	to qualify for 5: Use accepted default of 0.25% of system input volume to qualify for 4: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)		to qualify for 5: Utilize accepted default value of 0.25% of volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process.	to qualify for 6 or greater: Finalize policy updates to clearly identify the types of water consumption that are authorized from those usages that fall outside of this policy and are, therefore, unauthorized. Begin to conduct regular field checks. Proceed if the top-down audit already exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policies to ensure that all known occurrences of unauthorized consumption are outlawed, and that appropriate penalties are prescribed. Create written procedures for detection and documentation of various occurrences of unauthorized consumption as they are uncovered.		to qualify for 10: Refine written procedures and assign staff to seek out likely occurrences of unauthorized consumption. Explore new locking devices, monitors and other technologies designed to detect and thwart unauthorized consumption.		to maintain 10: Continue to refine policy and procedures to eliminate any loopholes that allow or tacitly encourage unauthorized consumption. Continue to be vigilant in detection, documentation and enforcement efforts.
Customer metering inaccuracies:	select n/a only if the entire customer population is unmetered. In such a case the volume entered must be zero.	Customer meters exist, but with unorganized paper records on meters; no meter accuracy testing or meter replacement program for any size of retail meter. Metering workflow is driven chaotically with no proactive management. Loss volume due to aggregate meter inaccuracy is guesstimated.	Poor recordkeeping and meter oversight is recognized by water utility management who has allotted staff and funding resources to organize improved recordkeeping and start meter accuracy testing. Existing paper records gathered and organized to provide cursory disposition of meter population. Customer meters are tested for accuracy only upon customer request.	Conditions between 2 and 4	Reliable recordkeeping exists; meter information is improving as meters are replaced. Meter accuracy testing is conducted annually for a small number of meters (more than just customer requests, but less than 1% of inventory). A limited number of the oldest meters are replaced each year. Inaccuracy volume is largely an estimate, but refined based upon limited testing data.	Conditions between 4 and 6	A reliable electronic recordkeeping system for meters exists. The meter population includes a mix of new high performing meters and dated meters with suspect accuracy. Routine, but limited, meter accuracy testing and meter replacement occur. Inaccuracy volume is quantified using a mix of reliable and less certain data.	Conditions between 6 and 8	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for various types of meters.	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Statistically significant number of meters are tested in audit year. This testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for these meters.	Good records of all active customer meters exist and include as a minimum: meter number, account number/location, type, size and manufacturer. Ongoing meter replacement occurs according to a targeted and justified basis. Regular meter accuracy testing gives a reliable measure of composite inaccuracy volume for the customer meter population. New metering technology is embraced to keep overall accuracy improving. Procedures are reviewed by a third party knowledgeable in the M36 methodology.
Improvements to attain higher data grading for "Customer meter inaccuracy volume" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	to qualify for 2: Gather available meter purchase records. Conduct testing on a small number of meters believed to be the most inaccurate. Review staffing needs of the metering group and budget for necessary resources to better organize meter management.	to qualify for 4: Implement a reliable record keeping system for customer meter histories, preferably using electronic methods typically linked to, or part of, the Customer Billing System or Customer Information System. Expand meter accuracy testing to a larger group of meters.		to qualify for 6: Standardize the procedures for meter recordkeeping within an electronic information system. Accelerate meter accuracy testing and meter replacements guided by testing results.		to qualify for 8: Expand annual meter accuracy testing to evaluate a statistically significant number of meter makes/models. Expand meter replacement program to replace statistically significant number of poor performing meters each year.		to qualify for 9: Continue efforts to manage meter population with reliable recordkeeping. Test a statistically significant number of meters each year and analyze test results in an ongoing manner to serve as a basis for a target meter replacement strategy based upon accumulated volume throughput.	to qualify for 10: Continue efforts to manage meter population with reliable recordkeeping, meter testing and replacement. Evaluate new meter types and install one or more types in 5-10 customer accounts each year in order to pilot improving metering technology.	to maintain 10: Increase the number of meters tested and replaced as justified by meter accuracy test data. Continually monitor development of new metering technology and Advanced Metering Infrastructure (AMI) to grasp opportunities for greater accuracy in metering of water flow and management of customer consumption data.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Systematic Data Handling Errors:	Note: all water utilities incur some amount of this error. Even in water utilities with unmetered customer populations and fixed rate billing, errors occur in annual billing tabulations. Enter a positive value for the volume and select a grading.	Policies and procedures for activation of new customer water billing accounts are vague and lack accountability. Billing data is maintained on paper records which are not well organized. No auditing is conducted to confirm billing data handling efficiency. An unknown number of customers escape routine billing due to lack of billing process oversight.	Policy and procedures for activation of new customer accounts and oversight of billing records exist but need refinement. Billing data is maintained on paper records or insufficiently capable electronic database. Only periodic unstructured auditing work is conducted to confirm billing data handling efficiency. The volume of unbilled water due to billing lapses is a guess.	Conditions between 2 and 4	Policy and procedures for new account activation and oversight of billing operations exist but needs refinement. Computerized billing system exists, but is dated or lacks needed functionality. Periodic, limited internal audits conducted and confirm with approximate accuracy the consumption volumes lost to billing lapses.	Conditions between 4 and 6	Policy and procedures for new account activation and oversight of billing operations is adequate and reviewed periodically. Computerized billing system is in use with basic reporting available. Any effect of billing adjustments on measured consumption volumes is well understood. Internal checks of billing data error conducted annually. Reasonably accurate quantification of consumption volume lost to billing lapses is obtained.	Conditions between 6 and 8	New account activation and billing operations policy and procedures are reviewed at least biannually. Computerized billing system includes an array of reports to confirm billing data and system functionality. Checks are conducted routinely to flag and explain zero consumption accounts. Annual internal checks conducted with third party audit conducted at least once every five years. Accountability checks flag billing lapses. Consumption lost to billing lapses is well quantified and reducing year-by-year.	Conditions between 8 and 10	Sound written policy and procedures exist for new account activation and oversight of customer billing operations. Robust computerized billing system gives high functionality and reporting capabilities which are utilized, analyzed and the results reported each billing cycle. Assessment of policy and data handling errors are conducted internally and audited by third party at least once every three years, ensuring consumption lost to billing lapses is minimized and detected as it occurs.
Improvements to attain higher data grading for "Systematic Data Handling Error volume" component:		<u>to qualify for 2:</u> Draft written policy and procedures for activating new water billing accounts and oversight of billing operations. Investigate and budget for computerized customer billing system. Conduct initial audit of billing records by flow-charting the basic business processes of the customer account/billing function.	<u>to qualify for 4:</u> Finalize written policy and procedures for activation of new billing accounts and overall billing operations management. Implement a computerized customer billing system. Conduct initial audit of billing records as part of this process.		<u>to qualify for 6:</u> Refine new account activation and billing operations procedures and ensure consistency with the utility policy regarding billing, and minimize opportunity for missed billings. Upgrade or replace customer billing system for needed functionality - ensure that billing adjustments don't corrupt the value of consumption volumes. Procedurize internal annual audit process.		<u>to qualify for 8:</u> Formalize regular review of new account activation process and general billing practices. Enhance reporting capability of computerized billing system. Formalize regular auditing process to reveal scope of data handling error. Plan for periodic third party audit to occur at least once every five years.		<u>to qualify for 10:</u> Close policy/procedure loopholes that allow some customer accounts to go unbilled, or data handling errors to exist. Ensure that billing system reports are utilized, analyzed and reported every billing cycle. Ensure that internal and third party audits are conducted at least once every three years.		<u>to maintain 10:</u> Stay abreast of customer information management developments and innovations. Monitor developments of Advanced Metering Infrastructure (AMI) and integrate technology to ensure that customer endpoint information is well-monitored and errors/lapses are at an economic minimum.
<b>SYSTEM DATA</b>											
Length of mains:		Poorly assembled and maintained paper as-built records of existing water main installations makes accurate determination of system pipe length impossible. Length of mains is guesstimated.	Paper records in poor or uncertain condition (no annual tracking of installations & abandonments). Poor procedures to ensure that new water mains installed by developers are accurately documented.	Conditions between 2 and 4	Sound written policy and procedures exist for documenting new water main installations, but gaps in management result in an uncertain degree of error in tabulation of mains length.	Conditions between 4 and 6	Sound written policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper records with regular field validation; or electronic records and asset management system in good condition. Includes system backup.	Conditions between 6 and 8	Sound written policy and procedures exist for permitting and commissioning new water mains. Electronic recordkeeping such as a Geographical Information System (GIS) and asset management system are used to store and manage data.	Conditions between 8 and 10	Sound written policy exists for managing water mains extensions and replacements. Geographic Information System (GIS) data and asset management database agree and random field validation proves truth of databases. Records of annual field validation should be available for review.
Improvements to attain higher data grading for "Length of Water Mains" component:		<u>to qualify for 2:</u> Assign personnel to inventory current as-built records and compare with customer billing system records and highway plans in order to verify poorly documented pipelines. Assemble policy documents regarding permitting and documentation of water main installations by the utility and building developers; identify gaps in procedures that result in poor documentation of new water main installations.	<u>to qualify for 4:</u> Complete inventory of paper records of water main installations for several years prior to audit year. Review policy and procedures for commissioning and documenting new water main installation.		<u>to qualify for 6:</u> Finalize updates/improvements to written policy and procedures for permitting/commissioning new main installations. Confirm inventory of records for five years prior to audit year; correct any errors or omissions.		<u>to qualify for 8:</u> Launch random field checks of limited number of locations. Convert to electronic database such as a Geographic Information System (GIS) with backup as justified. Develop written policy and procedures.		<u>to qualify for 10:</u> Link Geographic Information System (GIS) and asset management databases, conduct field verification of data. Record field verification information at least annually.		<u>to maintain 10:</u> Continue with standardization and random field validation to improve the completeness and accuracy of the system.
Number of active AND inactive service connections:		Vague permitting (of new service connections) policy and poor paper recordkeeping of customer connections/billings result in suspect determination of the number of service connections, which may be 10-15% in error from actual count.	General permitting policy exists but paper records, procedural gaps, and weak oversight result in questionable total for number of connections, which may vary 5-10% of actual count.	Conditions between 2 and 4	Written account activation policy and procedures exist, but with some gaps in performance and oversight. Computerized information management system is being brought online to replace dated paper recordkeeping system. Reasonably accurate tracking of service connection installations & abandonments; but count can be up to 5% in error from actual total.	Conditions between 4 and 6	Written new account activation and overall billing policies and procedures are adequate and reviewed periodically. Computerized information management system is in use with annual installations & abandonments totaled. Very limited field verifications and audits. Error in count of number of service connections is believed to be no more than 3%.	Conditions between 6 and 8	Policies and procedures for new account activation and overall billing operations are written, well-structured and reviewed at least biannually. Well-managed computerized information management system exists and routine, periodic field checks and internal system audits are conducted. Counts of connections are no more than 2% in error.	Conditions between 8 and 10	Sound written policy and well managed and audited procedures ensure reliable management of service connection population. Computerized information management system, Customer Billing System, and Geographic Information System (GIS) information agree; field validation proves truth of databases. Count of connections recorded as being in error is less than 1% of the entire population.
Improvements to attain higher data grading for "Number of Active and Inactive Service Connections" component:	Note: The number of Service Connections does not include fire hydrant leads/lines connecting the hydrant to the water main	<u>to qualify for 2:</u> Draft new policy and procedures for new account activation and overall billing operations. Research and collect paper records of installations & abandonments for several years prior to audit year.	<u>to qualify for 4:</u> Refine policy and procedures for new account activation and overall billing operations. Research computerized recordkeeping system (Customer Information System or Customer Billing System) to improve documentation format for service connections.		<u>to qualify for 6:</u> Refine procedures to ensure consistency with new account activation and overall billing policy to establish new service connections or decommission existing connections. Improve process to include all totals for at least five years prior to audit year.		<u>to qualify for 8:</u> Formalize regular review of new account activation and overall billing operations policies and procedures. Launch random field checks of limited number of locations. Develop reports and auditing mechanisms for computerized information management system.		<u>to qualify for 10:</u> Close any procedural loopholes that allow installations to go undocumented. Link computerized information management system with Geographic Information System (GIS) and formalize field inspection and information system auditing processes. Documentation of new or decommissioned service connections encounters several levels of checks and balances.		<u>to maintain 10:</u> Continue with standardization and random field validation to improve knowledge of system.
	Note: if customer water	Gratings 1-9 apply if customer properties are unmetered, if customer meters exist and are located inside the customer building premises, or if the water utility owns and is responsible for the entire service connection piping from the water main to the customer building. In any of these cases the average distance between the curb stop or boundary separating utility/customer responsibility for service connection piping, and the typical first point of use (ex: faucet) or the customer meter must be quantified. Gratings of 1-9 are used to grade the validity of the means to quantify this value. (See the "Service Connection Diagram" worksheet)									Either of two conditions can be met for a grading of 10:

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Average length of customer service line:	meters are located outside of the customer building next to the curb stop or boundary separating utility/customer responsibility, then the auditor should answer "Yes" to the question on the Reporting Worksheet asking about this. If the answer is Yes, the grading description listed under the Grading of 10(a) will be followed, with a value of zero automatically entered at a Grading of 10. See the Service Connection Diagram worksheet for a visual presentation of this distance.	Vague policy exists to define the delineation of water utility ownership and customer ownership of the service connection piping. Curb stops are perceived as the breakpoint but these have not been well-maintained or documented. Most are buried or obscured. Their location varies widely from site-to-site, and estimating this distance is arbitrary due to the unknown location of many curb stops.	Policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. The piping from the water main to the curb stop is the property of the water utility, and the piping from the curb stop to the customer building is owned by the customer. Curb stop locations are not well documented and the average distance is based upon a limited number of locations measured in the field.	Conditions between 2 and 4	Good policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. Curb stops are generally installed as needed and are reasonably documented. Their location varies widely from site-to-site, and an estimate of this distance is hindered by the availability of paper records of limited accuracy.	Conditions between 4 and 6	Clear written policy exists to define utility/customer responsibility for service connection piping. Accurate, well-maintained paper or basic electronic recordkeeping system exists. Periodic field checks confirm piping lengths for a sample of customer properties.	Conditions between 6 and 8	Clearly worded policy standardizes the location of curb stops and meters, which are inspected upon installation. Accurate and well maintained electronic records exist with periodic field checks to confirm locations of service lines, curb stops and customer meter pits. An accurate number of customer properties from the customer billing system allows for reliable averaging of this length.	Conditions between 8 and 10	a) Customer water meters exist outside of customer buildings next to the curb stop or boundary separating utility/customer responsibility for service connection piping. If so, answer "Yes" to the question on the Reporting Working asking about this condition. A value of zero and a Grading of 10 are automatically entered in the Reporting Worksheet. b) Meters exist inside customer buildings, or properties are unmetered. In either case, answer "No" to the Reporting Worksheet question on meter location, and enter a distance determined by the auditor. For a Grading of 10 this value must be a very reliable number from a Geographic Information System (GIS) and confirmed by a statistically valid number of field checks.
Improvements to attain higher data grading for "Average Length of Customer Service Line" component:		<u>to qualify for 2:</u> Research and collect paper records of service line installations. Inspect several sites in the field using pipe locators to locate curb stops. Obtain the length of this small sample of connections in this manner.	<u>to qualify for 4:</u> Formalize and communicate policy delineating utility/customer responsibilities for service connection piping. Assess accuracy of paper records by field inspection of a small sample of service connections using pipe locators as needed. Research the potential migration to a computerized information management system to store service connection data.		<u>to qualify for 6:</u> Establish coherent procedures to ensure that policy for curb stop, meter installation and documentation is followed. Gain consensus within the water utility for the establishment of a computerized information management system.		<u>to qualify for 8:</u> Implement an electronic means of recordkeeping, typically via a customer information system, customer billing system, or Geographic Information System (GIS). Standardize the process to conduct field checks of a limited number of locations.		<u>to qualify for 10:</u> Link customer information management system and Geographic Information System (GIS), standardize process for field verification of data.		<u>to maintain 10:</u> Continue with standardization and random field validation to improve knowledge of service connection configurations and customer meter locations.
Average operating pressure:		Available records are poorly assembled and maintained paper records of supply pump characteristics and water distribution system operating conditions. Average pressure is guesstimated based upon this information and ground elevations from crude topographical maps. Widely varying distribution system pressures due to undulating terrain, high system head loss and weak/erratic pressure controls further compromise the validity of the average pressure calculation.	Limited telemetry monitoring of scattered pumping station and water storage tank sites provides some static pressure data, which is recorded in handwritten logbooks. Pressure data is gathered at individual sites only when low pressure complaints arise. Average pressure is determined by averaging relatively crude data, and is affected by significant variation in ground elevations, system head loss and gaps in pressure controls in the distribution system.	Conditions between 2 and 4	Effective pressure controls separate different pressure zones; moderate pressure variation across the system, occasional open boundary valves are discovered that breach pressure zones. Basic telemetry monitoring of the distribution system logs pressure data electronically. Pressure data gathered by gauges or dataloggers at fire hydrants or buildings when low pressure complaints arise, and during fire flow tests and system flushing. Reliable topographical data exists. Average pressure is calculated using this mix of data.	Conditions between 4 and 6	Reliable pressure controls separate distinct pressure zones; only very occasional open boundary valves are encountered that breach pressure zones. Well-covered telemetry monitoring of the distribution system (not just pumping at source treatment plants or wells) logs extensive pressure data electronically. Pressure gathered by gauges/dataloggers at fire hydrants and buildings when low pressure complaints arise, and during fire flow tests and system flushing. Average pressure is determined by using this mix of reliable data.	Conditions between 6 and 8	Well-managed, discrete pressure zones exist with generally predictable pressure fluctuations. A current full-scale SCADA System or similar realtime monitoring system exists to monitor the water distribution system and collect data, including real time pressure readings at representative sites across the system. The average system pressure is determined from reliable monitoring system data.	Conditions between 8 and 10	Well-managed pressure districts/zones, SCADA System and hydraulic model exist to give very precise pressure data across the water distribution system. Average system pressure is reliably calculated from extensive, reliable, and cross-checked data. Calculations are reported on an annual basis as a minimum.
Improvements to attain higher data grading for "Average Operating Pressure" component:		<u>to qualify for 2:</u> Employ pressure gauging and/or datalogging equipment to obtain pressure measurements from fire hydrants. Locate accurate topographical maps of service area in order to confirm ground elevations. Research pump data sheets to find pump pressure/flow characteristics	<u>to qualify for 4:</u> Formalize a procedure to use pressure gauging/datalogging equipment to gather pressure data during various system events such as low pressure complaints, or operational testing. Gather pump pressure and flow data at different flow regimes. Identify faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) and plan to properly configure pressure zones. Make all pressure data from these efforts available to generate system-wide average pressure.		<u>to qualify for 6:</u> Expand the use of pressure gauging/datalogging equipment to gather scattered pressure data at a representative set of sites, based upon pressure zones or areas. Utilize pump pressure and flow data to determine supply head entering each pressure zone or district. Correct any faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) to ensure properly configured pressure zones. Use expanded pressure dataset from these activities to generate system-wide average pressure.		<u>to qualify for 8:</u> Install a Supervisory Control and Data Acquisition (SCADA) System, or similar realtime monitoring system, to monitor system parameters and control operations. Set regular calibration schedule for instrumentation to insure data accuracy. Obtain accurate topographical data and utilize pressure data gathered from field surveys to provide extensive, reliable data for pressure averaging.		<u>to qualify for 10:</u> Annually, obtain a system-wide average pressure value from the hydraulic model of the distribution system that has been calibrated via field measurements in the water distribution system and confirmed in comparisons with SCADA System data.		<u>to maintain 10:</u> Continue to refine the hydraulic model of the distribution system and consider linking it with SCADA System for realtime pressure data calibration, and averaging.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
<b>COST DATA</b>											
Total annual cost of operating water system:		Incomplete paper records and lack of financial accounting documentation on many operating functions makes calculation of water system operating costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to estimate the major portion of water system operating costs.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. However, gaps in data are known to exist, periodic internal reviews are conducted but not a structured financial audit.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited periodically by utility personnel, but not a Certified Public Accountant (CPA).	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited at least annually by utility personnel, and at least once every three years by third-party CPA.	Conditions between 8 and 10	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited annually by utility personnel and annually also by third-party CPA.
Improvements to attain higher data grading for "Total Annual Cost of Operating the Water System" component:		<u>to qualify for 2:</u> Gather available records, institute new financial accounting procedures to regularly collect and audit basic cost data of most important operations functions.	<u>to qualify for 4:</u> Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6:</u> Establish process for periodic internal audit of water system operating costs; identify cost data gaps and institute procedures for tracking these outstanding costs.		<u>to qualify for 8:</u> Standardize the process to conduct routine financial audit on an annual basis. Arrange for CPA audit of financial records at least once every three years.		<u>to qualify for 10:</u> Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10:</u> Maintain program, stay abreast of expenses subject to erratic cost changes and long-term cost trend, and budget/track costs proactively
Customer retail unit cost (applied to Apparent Losses):	Customer population unmetered, and/or only a fixed fee is charged for consumption.	Antiquated, cumbersome water rate structure is used, with periodic historic amendments that were poorly documented and implemented, resulting in classes of customers being billed inconsistent charges. The actual composite billing rate likely differs significantly from the published water rate structure, but a lack of auditing leaves the degree of error indeterminate.	Dated, cumbersome water rate structure, not always employed consistently in actual billing operations. The actual composite billing rate is known to differ from the published water rate structure, and a reasonably accurate estimate of the degree of error is determined, allowing a composite billing rate to be quantified.	Conditions between 2 and 4	Straight-forward water rate structure in use, but not updated in several years. Billing operations reliably employ the rate structure. The composite billing rate is derived from a single customer class such as residential customer accounts, neglecting the effect of different rates from varying customer classes.	Conditions between 4 and 6	Clearly written, up-to-date water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average residential rate using volumes of water in each rate block.	Conditions between 6 and 8	Effective water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average composite consumption rate, which includes residential, commercial, industrial, institutional (CII), and any other distinct customer classes within the water rate structure.	Conditions between 8 and 10	Current, effective water rate structure is in force and applied reliably in billing operations. The rate structure and calculations of composite rate - which includes residential, commercial, industrial, institutional (CII), and other distinct customer classes - are reviewed by a third party knowledgeable in the M36 methodology at least once every five years.
Improvements to attain higher data grading for "Customer Retail Unit Cost" component:		<u>to qualify for 2:</u> Formalize the process to implement water rates, including a secure documentation procedure. Create a current, formal water rate document and gain approval from all stakeholders.	<u>to qualify for 4:</u> Review the water rate structure and update/formalize as needed. Assess billing operations to ensure that actual billing operations incorporate the established water rate structure.		<u>to qualify for 6:</u> Evaluate volume of water used in each usage block by residential users. Multiply volumes by full rate structure.	<u>Launch effort to fully meter the customer population and charge rates based upon water volumes</u>	<u>to qualify for 8:</u> Evaluate volume of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to qualify for 10:</u> Conduct a periodic third-party audit of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to maintain 10:</u> Keep water rate structure current in addressing the water utility's revenue needs. Update the calculation of the customer unit rate as new rate components, customer classes, or other components are modified.
Variable production cost (applied to Real Losses):	Note: if the water utility purchases/imports its entire water supply, then enter the unit purchase cost of the bulk water supply in the Reporting Worksheet with a grading of 10	Incomplete paper records and lack of documentation on primary operating functions (electric power and treatment costs most importantly) makes calculation of variable production costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to roughly estimate the basic operations costs (pumping power costs and treatment costs) and calculate a unit variable production cost.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. Electric power and treatment costs are reliably tracked and allow accurate weighted calculation of unit variable production costs based on these two inputs and water imported purchase costs (if applicable). All costs are audited internally on a periodic basis.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Pertinent additional costs beyond power, treatment and water imported purchase costs (if applicable) such as liability, residuals management, wear and tear on equipment, impending expansion of supply, are included in the unit variable production cost, as applicable. The data is audited at least annually by utility personnel.	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent primary and secondary variable production and water imported purchase (if applicable) costs tracked. The data is audited at least annually by utility personnel, and at least once every three years by a third-party knowledgeable in the M36 methodology.	Conditions between 8 and 10	Either of two conditions can be met to obtain a grading of 10: 1) Third party CPA audit of all pertinent primary and secondary production and water imported purchase (if applicable) costs on an annual basis, or; 2) Water supply is entirely purchased as bulk imported water, and unit purchase cost serves as the variable production cost.
Improvements to attain higher data grading for "Variable Production Cost" component:		<u>to qualify for 2:</u> Gather available records, institute new procedures to regularly collect and audit basic cost data and most important operations functions.	<u>to qualify for 4:</u> Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6:</u> Formalize process for regular internal audits of production costs. Assess whether additional costs (liability, residuals management, equipment wear, impending infrastructure expansion) should be included to calculate a more representative variable production cost.		<u>to qualify for 8:</u> Formalize the accounting process to include direct cost components (power, treatment) as well as indirect cost components (liability, residuals management, etc.) Arrange to conduct audits by a knowledgeable third-party at least once every three years.		<u>to qualify for 10:</u> Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10:</u> Maintain program, stay abreast of expenses subject to erratic cost changes and budget/track costs proactively

# WATER SHORTAGE CONTINGENCY PLAN



## CHAPTER 8

### WATER SHORTAGE CONTINGENCY PLAN

#### 8.1 THE PLAN

This Water Shortage Contingency Plan addresses the Arvin Community Services District's (District) policy to reduce water consumption in the community of Arvin during a drought emergency. The District is 100% metered.

The Arvin Community Services District has not experienced a severe water supply shortfall due to a drought in its 58 years of existence because the groundwater resource underlying the District has remained stable as a result of importation of surface water by AEWS. Therefore the District has been able to pump 100% of its water demand in years of drought. An extended drought increases the possibility that the District will have to lower its pumps. However, the supply would remain relatively stable. The District has seven wells, with combined capacity of 7,000 gpm. The eighth well will add another estimated 1,000 gpm to this total in 2022. Currently the wells can deliver 1.5 times the amount of water that is delivered on the maximum day. Booster pumps at the two tank sites add an additional 5,000 gpm of pumping capacity to meet peak hour demands. Emergency generators are stationed at three of the newer wells. The system has capacity to meet water demands.

The issue herein is the ability of the District to meet demands during an extended period of drought. Records of water levels since 1966 show that the AEWS program of groundwater management that was implemented at that time has been effective in stabilizing groundwater levels. The physical risk of an extended drought would be lowering groundwater levels that would reduce the well production somewhat and could possibly effect water quality. However, a majority of the wells (five out of seven) are either brand new or very young. They are deep and have plenty of penetration into the water bearing zones in the underlying aquifer.

The issue of water quality effects, as mentioned in the previous chapter, is being studied. This will continue over the next five to ten years and will allow the District to better plan for these effects.

The following is the District's plans to deal with a water shortage in the event of simultaneous dry years and for dealing with a catastrophic event such as the effects of an earthquake

#### 8.2 STAGES OF ACTION

The Plan calls for four stages of action to take place in the event that the State of California and/or the local agency, declares a drought emergency requiring certain levels of

water conservation. While the District’s water supply will remain relatively constant because of the availability of ground water, the District is committed to the following water conservation action levels in order to preserve the groundwater resource for the community and its neighbors who also rely on groundwater. The District encourages water conservation as a general practice and views the following actions as steps to be taken in the event of an unusually series of dry years that requires water conservation activities to be implemented over and above the normal water conservation activities.

The District’s appended Water Shortage Ordinance lists in detail the four stages of action that will be implemented in a drought emergency situation. Hereon is listed the four general categories of action and the water conservation goal of each stage. Each successive stage implements the conditions of the previous stage(s) so that the effect is accumulative as the Plan progresses through the stages. These four stages were established in 2015 and are considered valid today. However, they only consider up to a 50% supply shortage. Therefore a fifth stage has been added that considers a supply reduction of greater than 50%.

Table 8-A  
Stages of Supply Reduction

Stages of Water Shortage Contingency Plan		
Stage	Maximum Percent Supply Reduction	Water Supply Condition
1	10%	Voluntary. Drought Watch. Based on Requirements established by the State or the local agency.
2	25%	Mandatory. Drought Alert. Second year of a drought. Based on State or local agency determination of required reduction.
3	40%	Mandatory. Drought Critical. Third year of a drought. Based on State or local agency determination of required reduction.
4	50%	Mandatory. Drought Emergency. Fourth year of a drought. Based on State or local agency determination of required reduction.
5	> 50%	Mandatory. Extreme Drought Emergency. Fifth year of a drought. Based on State or local agency determination of required reduction.

The plan includes fines for continued violation of the conservation measures, requires that all leaks be repaired in an expeditious manner, restricts filling or re-filling of ornamental ponds, restricts vehicle washing, implements penalties for excessive water use, and at the option of the District’s Board of Directors, places a moratorium on new water services.

The following Submittal Table 8-1 shows the corresponding Stages applied to Shortage Levels. There is a fair degree of overlap in Table 8-A Stage 3, and Shortage Levels 3 and 4 in Table 8-1.

<b>Submittal Table 8-1 Water Shortage Contingency Plan Levels</b>		
<b>Shortage Level</b>	<b>Percent Shortage Range</b>	<b>Shortage Response Actions (Narrative description)</b>
1	Up to 10%	Voluntary. Drought Watch. Based on Requirements established by the State or the local agency.
2	Up to 20%	Mandatory. Drought Alert. Second year of a drought. Based on State or local agency determination of required reduction.
3	Up to 30%	Mandatory. Drought Critical. Third year of a drought. Based on State or local agency determination of required reduction.
4	Up to 40%	Mandatory. Drought Critical. Third year of a drought. Based on State or local agency determination of required reduction.
5	Up to 50%	Mandatory. Drought Emergency. Fourth year of a drought. Based on State or local agency determination of required reduction.
6	>50%	Mandatory. Extreme Drought Emergency. Fifth year of a drought. Based on State or local agency determination of required reduction.
NOTES:		

The following Submittal Table 8-2 offers a brief description of the actions to be taken at the various Shortage Levels.

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions <i>Drop down list</i> <i>These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.</i>	How much is this going to reduce the shortage gap? <i>Include units used (volume type or percentage)</i>	Additional Explanation or Reference <i>(optional)</i>	Penalty, Charge, or Other Enforcement? <i>For Retail Suppliers Only</i> <i>Drop Down List</i>
<i>Add additional rows as needed</i>				
1	Expand Public Information Campaign	Voluntary reduction of 10%		No
	Increase Water Waste Patrols	Voluntary reduction of 10%		No
	Landscape - Restrict or prohibit runoff from landscape irrigation	Voluntary reduction of 10%		No
	Landscape - Limit landscape irrigation to specific times	Voluntary reduction of 10%		No
	Landscape - Limit landscape irrigation to specific days	Voluntary reduction of 10%		No
	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Voluntary reduction of 10%		No
2	Expand Public Information Campaign	Mandatory reduction up to 20%		Yes
	CII - Restaurants may only serve water upon request			
	Water Features - Restrict water use for decorative water features, such as fountains	Mandatory reduction up to 20%		Yes
	Other - Require automatic shut of hoses	Mandatory reduction up to 20%		Yes
	Other water feature or swimming pool restriction	Mandatory reduction up to 20%		Yes
3	Offer Water Use Surveys	Mandatory reduction of up to 30%		Yes
	CII - Commercial kitchens required to use pre-rinse spray valves	Mandatory reduction of up to 30%		Yes
	CII - Lodging establishment must offer opt out of linen service	Mandatory reduction of up to 30%		Yes
	Pools - Allow filling of swimming pools only when an appropriate cover is in place.	Mandatory reduction of up to 30%		Yes
	Pools and Spas - Require covers for pools and spas	Mandatory reduction of up to 30%		Yes
4	Offer Water Use Surveys	Mandatory reduction of up to 40%		Yes
	Other - Prohibit use of potable water for construction and dust control	Mandatory reduction of up to 40%		Yes
	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Mandatory reduction of up to 40%		Yes
	Decrease Line Flushing	Mandatory reduction of up to 40%		Yes
5	Moratorium or Net Zero Demand Increase on New Connections	Mandatory reduction of up to 50%		Yes
6	Landscape - Prohibit all landscape irrigation	Mandatory reduction of greater than 50%		Yes
NOTES:				

The following Submittal Table 8-3 addresses Supply Augmentation Actions that may be taken by water suppliers who have access to neighboring suppliers or have another means of augmenting their water supply. Unfortunately, the District is isolated, about 30 miles from the nearest major municipal supplier, and does not have a surface water supply or treatment plant. There are no opportunities for transfers, exchanges, purchases, rain seeding, nor are there stored emergency supplies other than the District's 1.5 million gallons of storage.

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier <i>Drop down list</i> <i>These are the only categories that will be accepted by the WUdata online submittal tool</i>	How much is this going to reduce the shortage gap? <i>Include units used (volume type or percentage)</i>	Additional Explanation or Reference <i>(optional)</i>
<i>Add additional rows as needed</i>			
There are not many opportunities to augment the District's supply other than to have enough back up capacity in wells. Hauling in water in certified trucks, and providing bottled water would be the only temporary actions that could be taken, and only in an emergency.			

The following pages are from the District's 2015 UWMP. These sections deal with the Impacts on Revenue and Expenses, a Catastrophic Supply Interruption.

### 8.3 IMPACTS ON REVENUE AND EXPENDITURES

#### Impacts on Revenue with Implementation of Water Shortage Contingency Plan Revenue Impacts Based on Water Delivery Reductions

Planned Reduction	Budgeted Revenue	Reduced Revenue	Reduction
0%	\$3,395,645	\$3,395,645	\$0
10%	\$3,395,645	\$3,242,841	\$152,804
25%	\$3,395,645	\$2,899,032	\$496,613
40%	\$3,395,645	\$2,486,461	\$909,184
50%	\$3,395,645	\$2,177,033	\$1,218,612

#### Discussion

The District will work to reduce power costs by encouraging water use in off peak periods of the day. Power costs will be reduced due to reduced water deliveries. The District will look for opportunities for cost savings by deferring certain maintenance items that can be temporarily deferred with little impact on District operations. District's operations will be streamlined to the extent that it can be while maintaining the integrity of the system.

The above revenue and expenditure impacts are anticipated for each of the Water

Reduction Stages in the Water Shortage Contingency Plan. The District conducted a Proposition 218 Rate Study with the intent of increasing water rates to the level that will provide the required amounts of income to balance the District's expenses. This was done in 2016 and rates have been adjusted in accordance with the results of the Rate Study. This has placed the District on firm financial ground.

**WATER SHORTAGE CONTINGENCY PLAN RESOLUTION**

A copy of the District's Resolution adopting the Water Shortage Contingency Plan is appended.

ARVIN COMMUNITY SERVICES DISTRICT  
MULTI-JURISDICTIONAL HAZARD REDUCTION PLAN



# **KERN COUNTY**

## **MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN**

### **JURISDICTIONAL ANNEX**

WATER DISTRICT



### **ARVIN COMMUNITY SERVICES DISTRICT**





INTENTIONAL BLANK PAGE



# Kern County

Multi-Jurisdiction Hazard Mitigation Plan

## ARVIN COMMUNITY SERVICES DISTRICT (ACSD.)

Water District Participating Jurisdiction Annex

Adoption Record.....	iv
<b>Section 1. Arvin Community Services District.....</b>	<b>1-1</b>
1.1 Purpose.....	1-1
1.2 Planning Methodology.....	1-1
1.3 What's New.....	1-2
<i>1.3.1 Mitigation Successes.....</i>	<i>1-2</i>
1.4 Risk Assessment.....	1-4
<i>1.4.1 Hazard Screening Criteria.....</i>	<i>1-4</i>
<i>1.4.2 Hazard Risk Ranking.....</i>	<i>1-6</i>
<i>1.4.3 Vulnerability Assessment.....</i>	<i>1-7</i>
1.5 Mitigation Strategy.....	1-16
<i>1.5.1 Capabilities Assessment.....</i>	<i>1-16</i>
<i>1.5.2 Mitigation Actions.....</i>	<i>1-21</i>

### List of Figures

Figure 1-1: Arvin Community Services District Location.....	1-2
Figure 1-2: Newly-Installed Storage Tank.....	1-3
Figure 1-3: Connecting to New District Wells.....	1-3
Figure 1-4: Arvin Community Services District Risk Assessment.....	1-8
Figure 1-5: Arvin CSD – FEMA Flood Zone Vulnerability & Exposure Snapshot.....	1-9
Figure 1-6: Arvin CSD – EQ S. San Andreas Mojave N. Vulnerability & Exposure Snapshot.....	1-10
Figure 1-7: Arvin CSD Drought Severity Timeline - Middle Kern-Upper Tehachapi-Grapevine.....	1-11
Figure 1-8: Guidance for Problem Statements.....	1-13
Figure 1-9: Mitigation Action Key.....	1-21



## List of Tables

Table 1-1: Planning Committee Members .....	1-1
Table 1-2: Completed Mitigation Actions .....	1-2
Table 1-3: Hazard Prioritization .....	1-5
Table 1-4: Document Review Crosswalk .....	1-6
Table 1-5: Arvin Community Services District Problem Statements.....	1-14
Table 1-6: Planning and Regulatory Capabilities Summary .....	1-17
Table 1-7: Administrative and Technical Capabilities Summary .....	1-18
Table 1-8: Financial Capabilities Summary .....	1-19
Table 1-9: Education and Outreach Capabilities Summary .....	1-20
Table 1-10: Arvin Community Services District Mitigation Actions .....	1-23

## Adoption Record

To comply with DMA 2000, the County Board of Supervisors and participating jurisdictions have officially adopted this Kern County Multi-Jurisdictional Hazard Mitigation Plan Volume 1 and Volume 2. The adoption of the MJHMP in its entirety recognizes the jurisdictions' commitment to reducing the impacts of natural hazards within the County and Cities. See below record of adoption.



# Section 1. Arvin Community Services District

## 1.1 Purpose

This Annex details the hazard mitigation planning elements specific to the Arvin Community Services District (District). This Annex is not intended to be a standalone document but appends to and supplements the information contained in Volume 1 of the plan document. As such, all sections of the umbrella plan, including the planning process and other procedural requirements apply to and were met by the District. This Annex provides additional information specific to the District, with a focus on providing additional details on the planning process, risk assessment, and mitigation.

### *Hazard Mitigation Plan Point of Contact*

**Primary Point of Contact**

Raul Barraza Jr., General Manager  
 Arvin Community Services District  
 309 Campus Dr  
 Arvin, CA 93203  
 Telephone: (661) 854-2127  
 E-mail Address: rbarraza@arvincsd.com

**Alternate Point of Contact**

Alexis Gaona, Chief Operator  
 Arvin Community Services District  
 309 Campus Dr  
 Arvin, CA 93203  
 Telephone: (661) 854-2127  
 E-mail Address: agaona@arvincsd.com

## 1.2 Planning Methodology

The Arvin Community Services District followed the planning process detailed in Volume 1, Section 3, including participating in the County Hazard Mitigation Planning Committee (HMPC) and Steering Committee and formulating their own internal planning team to support the broader planning process. Internal planning participants and their positions are shown in Table 1-1

**Table 1-1: Planning Committee Members**

Planning Committee Members	Department
Raul Barraza Jr.	General Manager
Alexis Gaona	Chief Operator

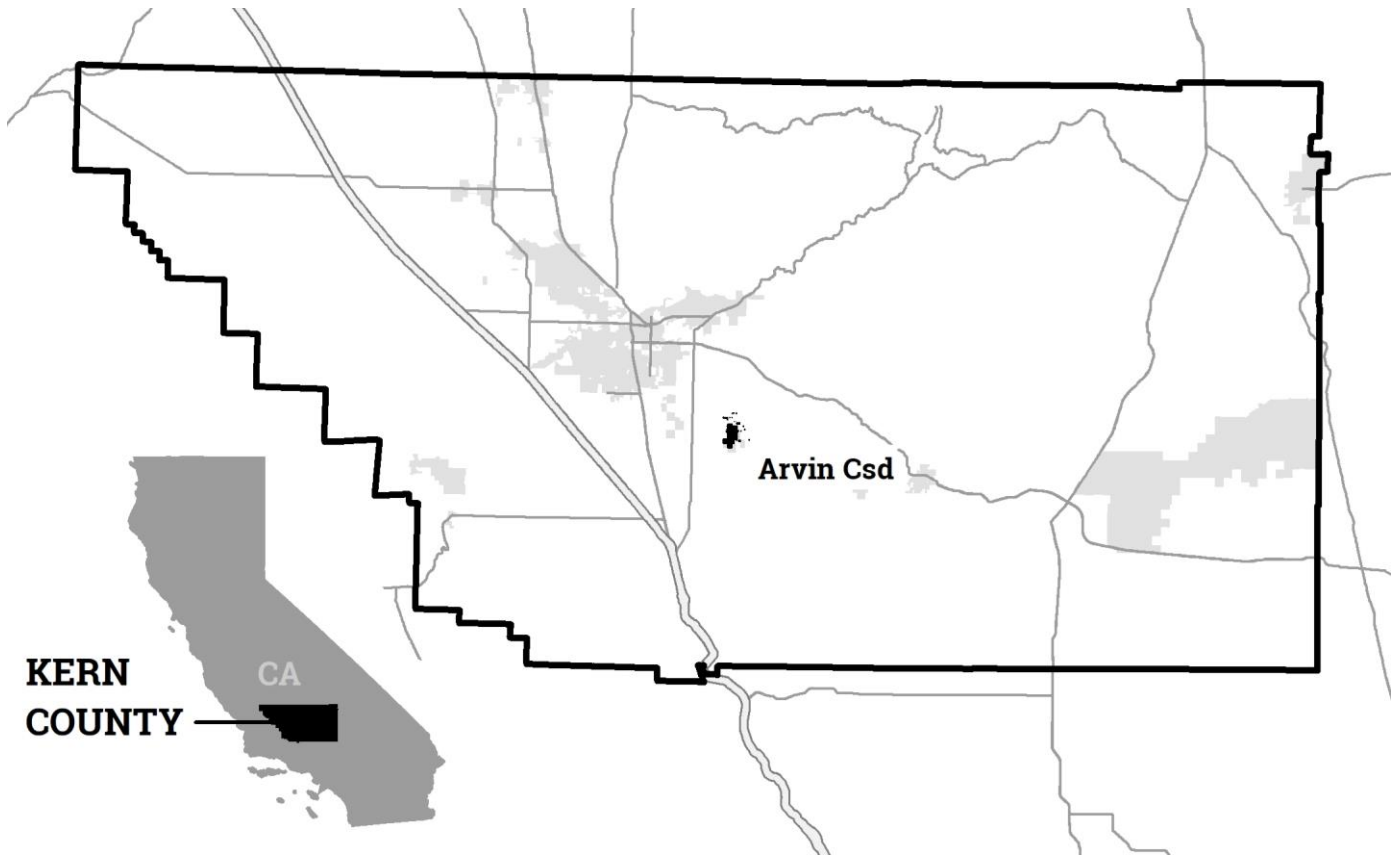


Figure 1-1: Arvin Community Services District Location

### 1.3 What's New

The Arvin Community Services District has been making improvements toward reducing natural hazard risks to life and property since the existing MJHMP was adopted.

The District reevaluated previous mitigation actions, including considerations of progress made on mitigation efforts, and retained them as pending or ongoing in Table 1-10; no table for cancelled mitigation actions is included. Completed mitigation actions are described in Table 1-2.

#### 1.3.1 Mitigation Successes

The District has successfully completed multiple mitigation actions, listed in Table 1-2, and the following describes its other success stories.

Table 1-2: Completed Mitigation Actions

Mitigation No.	Hazard Type	Status	Year	Primary Agency	Title/Description	Responsible Party
ma-FL-ACSD-140	Flood	Completed	2005	Arvin CSD	Well protection from floods	Arvin Community Services District



**SUCCESS STORY: Arsenic Mitigation Project: Well Replacement and Additional Water Storage**

The District has completed six new wells in the past four years and taken all historic wells offline. As part of the same project, the District also completed construction of a one-million-gallon storage tank, shown in Figure 1-2. This more than \$14 million project added resiliency to the District's system in many different ways. The new groundwater wells ensure better water quality moving forward with reduced arsenic and TCP levels, including resulting in less water quality impacts during time of drought. The wells have new seismic and flood construction elements. In particular, these new wells mean that one of the District's 2005 mitigation action to retrofit older wells for flood resiliency are complete. The storage tank adds to the District's drought preparedness as well. Construction to connect to the new wells is shown in Figure 1-3.



**Figure 1-2: Newly-Installed Storage Tank**



**Figure 1-3: Connecting to New District Wells**

**SUCCESS STORY: New Supervisory Control and Data Acquisition (SCADA) System**

The District recently installed a new SCADA system that will allow the District to monitor groundwater production and distribution in real time. This system will allow for better response to any hazard event and to better address drought by understanding real time impacts as they occur.



## 1.4 Risk Assessment

The intent of this section is to profile the Arvin Community Services District's hazards and assess the District's vulnerabilities, distinct from that of the County-wide planning area. The hazard profiles in Volume 1 discuss overall impacts to the planning area and describes the hazard problem description, hazard extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. For more information on Risk Assessment Methodologies, see Vol. 1 and Appendix A.

### 1.4.1 Hazard Screening Criteria

Planning Team members from each participating jurisdiction collectively discussed which hazards should be profiled in the Plan and which should not. The results of that discussion can be found in Table 1-3. Detailed hazard profiles of the most significant County-wide hazards are described in Section 4 of Volume 1. The Planning Team reviewed previously-prepared hazard mitigation plans and other relevant documents to determine the realm of natural hazards that have the potential to affect the Arvin Community Services District. Table 1-4 provides a crosswalk of relevant planning documents and the hazards discussed therein. The crosswalk was used to develop a preliminary hazards list, providing a framework for the Planning Team members to evaluate which hazards were truly relevant to the Arvin Community Services District and which ones were not. Section 1.4.2 below describes the hazard risk ranking process that was performed by the planning team which prioritized hazards that are specifically relevant to the Arvin Community Services District.



Table 1-3: Hazard Prioritization

Hazard Type	Explanation
Climate Change	High priority county-wide, profiled as part of Flood, Wildfire, and Severe Weather hazard.
Dam failure	High priority county-wide, profiled hazard.
Drought	High priority county-wide, profiled hazard
Dust Storms	High priority county-wide; profiled as part of Severe Weather
Earthquake/ Geologic Hazards	High priority county-wide, profiled hazard
Extreme Heat	Profiled as part of Severe Weather hazard
Extreme Cold	Extreme cold is rare in Kern County and not profiled in this plan
Flood	High priority county-wide, profiled hazard
Hail	Hail events are rare in Kern County and not profiled in this plan
Fog	While fog events do occur within Kern County, they are rare and are not considered a priority
Hazardous Material	While hazardous materials can release and impact the County, there are better avenues to address this hazard outside this Plan.
High Winds/ Straight Line Winds	High priority county-wide, profiled as part of Severe Weather
Insect Hazards	While insects including Africanized honeybee and pine bark beetle exist in Kern County, this was not considered a priority and pests are not profiled in this plan
Levee Failure	High priority county-wide, profiled as part of Dam Failure
Lightning	Lightning was not identified as a priority for this plan.
Pandemic Disease	While pandemic disease can impact the County, there are better avenues to address this hazard outside this plan.
Radon	This hazard was not identified as a priority
Severe Thunderstorm	Severe thunderstorms are rare in Kern County and not profiled in this plan.
Slope Failure	High priority county-wide, profiled hazard
Soil Hazards	High priority county-wide, profiled hazard
Terrorism/Human Caused Threats	While terrorism is certainly a threat to the County and participating jurisdictions, it is best addressed in other plans as this HMP does not address human caused threats.
Tornado	Impacts to the County from tornados are extremely unlikely, if any.
Volcanic Activity	Due to distance from volcanoes and the limited chance of an eruption, this hazard was not identified as a priority.
Wildfire	High priority county-wide, profiled hazard
Winter Storm / Freeze Events	Profiled as part of Severe Weather hazard





Table 1-4: Document Review Crosswalk

	2014 Kern County MJHMP	2012 Arvin General Plan	2009 Kern County General Plan	2018 California State HMP
<b>Hazards</b>				
Agricultural Pests		■		■
Climate Change	■	■		■
Dam Failure	■		■	■
Drought	■			■
Earthquake	■		■	■
Flood	■	■	■	■
Insect Hazards	■			
Landslide	■		■	■
Levee Failure	■			■
Manmade Hazards			■	■
Pandemic Disease	■			■
Sea Level Rise				■
Severe Weather	■			■
Soil Hazards	■	■	■	
Terrorism & Tech Hazards				■
Tsunami				■
Volcano	■			■
Wildfire	■		■	■

### 1.4.2 Hazard Risk Ranking

The District’s Planning Team used the same hazard prioritization process as the Kern County Planning Committee. This process is described in detail in Section 4.3.1 of Vol. 1. Figure 1-4 displays the results of the hazard risk ranking exercise that was performed by the Planning Team. The Planning Team chose to assess the District’s vulnerability to following hazards:

- flood
- drought
- earthquake

All of these hazards have been profiled in Vol. 1 of this document. The purpose of this annex to specifically address the District’s vulnerability to these specifically-identified hazards.



### 1.4.3 Vulnerability Assessment

Assessing vulnerabilities exposes the unique characteristics of individual hazards and begins the process of narrowing down which areas within the Arvin Community Services District's jurisdiction are vulnerable to specific hazard events. The vulnerability assessment included field visits and a GIS overlaying method for examining such vulnerabilities more in depth. Using these methods, participating jurisdictions estimated vulnerable populations, infrastructure, and potential losses from hazards.

#### 1.4.3.1 Risk Assessment

Each participating jurisdiction developed a risk matrix that assessed the probability and impact of various hazards within the jurisdiction. Figure 1-4 is the jurisdiction's risk assessment, which was completed in part using the web based and interactive Risk Assessment Mapping Platform (RAMP), accessed via the project website at [www.mitigatehazards.com](http://www.mitigatehazards.com). RAMP allows interactive discovery of robust risk, vulnerability, and exposure data developed especially for Kern County. RAMP is a mapping platform built specifically for mitigation planning. It displays County/jurisdiction facilities and buildings overlaid with natural hazards layers to bring interactivity and individual discovery to the GIS analysis performed for the MJHMP. See Vol. 1 for a detailed description of RAMP. The Planning Team used RAMP in meetings and as needed to understand vulnerabilities to the Arvin Community Services District. Users interactively filter facilities and buildings by natural hazard zones and/or construction characteristics.

#### 1.4.3.2 Snapshot Exposure Maps

The included snapshot maps, displayed below in Figure 1-5 through Figure 1-7, illustrate the Kern County Water District's vulnerability to specific hazards. Figures include:

- Figure 1-5: Arvin CSD – FEMA Flood Zone Vulnerability & Exposure Snapshot
- Figure 1-6: Arvin CSD – EQ S. San Andreas Mojave N. Vulnerability & Exposure Snapshot
- Figure 1-7: Arvin CSD Drought Severity Timeline - Middle Kern-Upper Tehachapi-Grapevine

Based on the above risk assessment, the snapshot maps focus on those hazards prioritized by the jurisdiction. These maps helped the Planning Team understand the exposure of population, parcels, and critical infrastructure to specific hazards. Each map contains an exposure summary that displays the percent of the population, the improvement and content value of parcels, and the amount of critical infrastructure that is exposed to each respective hazard.



# Risk Assessment Matrix Definitions

## PROBABILITY RATING

The likelihood of a hazard event occurring within a time period?

PROBABILITY	Highly Likely	<b>Highly likely</b> - 100% annual probability. Or Likely to occur every year in your lifetime.
	Likely	<b>Likely</b> - between 10 & 100% annual probability. Or will occur several times in your lifetime.
	Possible	<b>Possible</b> - between 1 & 10% annual probability. Or Likely to occur some time in your lifetime.
	Unlikely	<b>Unlikely</b> - less than 1% annual probability. Or unlikely but possible to occur in your lifetime.

## IMPACT RATING

In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs? The impact could be in terms of one hazard event (flooding from a culvert failure) or a large-scale event (multiple rivers flooding) in the same jurisdictional boundary.

IMPACT			
Minor	Limited	Critical	Catastrophic

- Minor** - very few injuries, if any. Only minor property damage & minimal disruption on quality of life. Temporary shutdown of critical facilities.
- Limited** - minor injuries only. Approx. 10% or less of property in disaster footprint damaged or destroyed. Complete shutdown of critical facilities for more than one day.
- Critical** - multiple deaths/injuries possible. Between 25% and 50% of property in disaster footprint is damaged or destroyed. Complete shutdown of critical facilities for more than one week.
- Catastrophic** - high number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.

To concentrate resources, the jurisdictional planning team will focus on "High" and "Extreme" risk hazards. These hazards have the higher probability and greater impact as it relates to the jurisdictions planning area.

Hazard definitions are included in Vol. 1 of this plan. Some hazards are discussed as subset hazards— e.g., "Dam Failure" within the "Flood" hazard profile. If a hazard is not present on the risk matrix or are grey in color, the jurisdictional planning team felt the hazard had a minimal footprint within their planning area and was not ranked.

### Hazard Information / Legend:

- Climate change may change the frequency, duration and intensity of hazards within each planning area. If applicable Climate Change impacts are described at the end of each section.
- Alluvial Fan deposits and issues in Kern County. This hazard is profiled and defined under "Slope Failure" in Vol. 1 of this plan.
- Soil Stability in Kern County includes Land Subsidence and Wind Erosion. Definitions for each are described in Vol. 1 of this plan.
- If hazard symbol is grey or not present, the jurisdictional planning team did not develop hazard vulnerability information related to the planning areas due to perceived probability and impact described above.

### Arvin Csd Risk Matrix

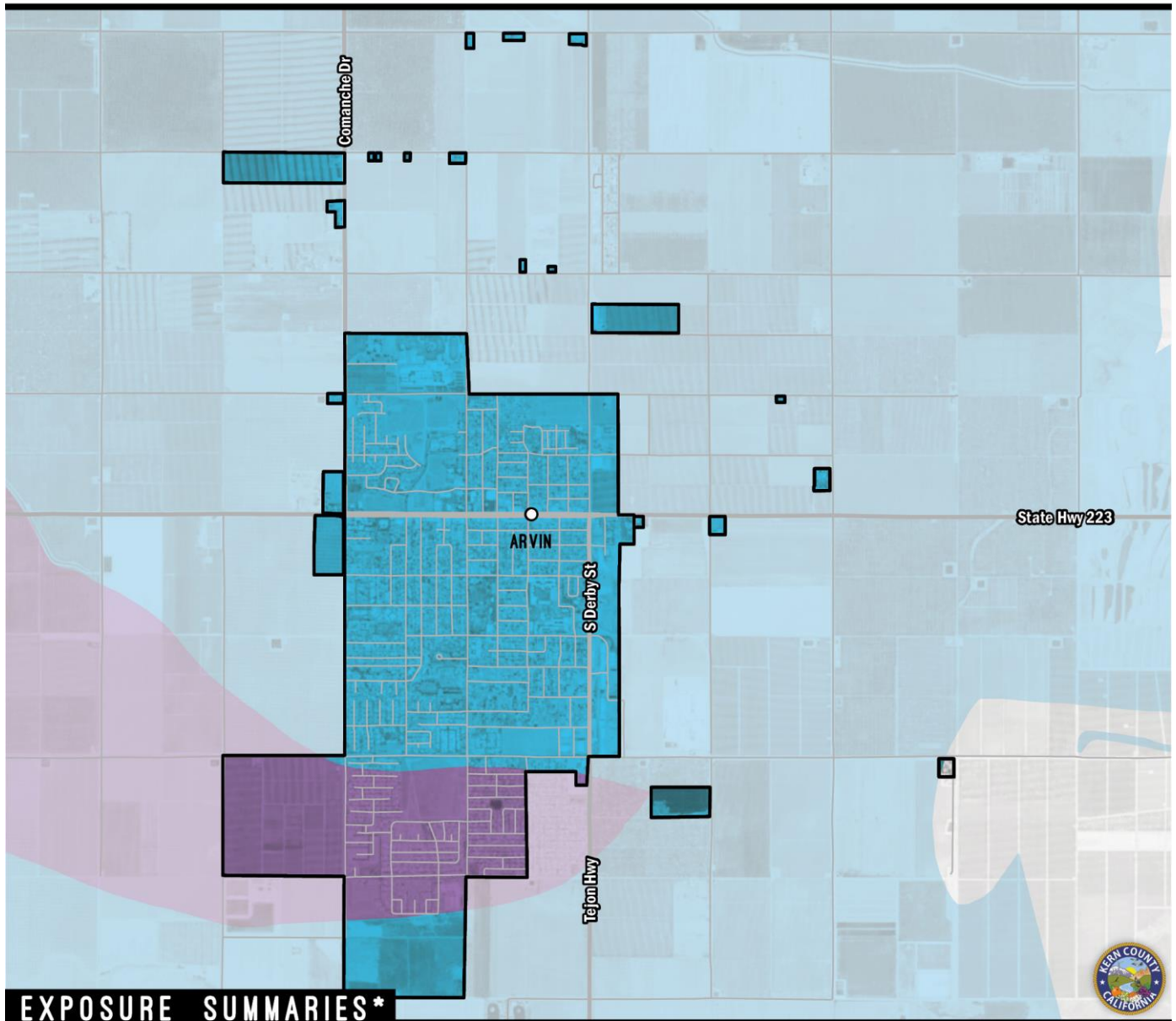
		IMPACT			
		Minor	Limited	Critical	Catastrophic
PROBABILITY	Highly Likely	Medium	High	Extreme	EARTHQUAKE
	Likely	Medium	High	DROUGHT	Extreme
	Possible	DAM FAILURE	EXTREME WEATHER SOIL STABILITY	FLOOD	High
	Unlikely	WILDFIRE SLOPE FAILURE	Low	Medium	Medium

Figure 1-4: Arvin Community Services District Risk Assessment



FEMA FLOOD ZONE VULNERABILITY & EXPOSURE SNAPSHOT

ARVIN CSD



**EXPOSURE SUMMARIES\***

POPULATION		PARCEL		PARCEL VALUE		CRITICAL INFRASTRUCTURE		
COUNT		COUNT		IMPROVEMENT		COUNT		
<b>11,663</b>	<b>100%</b>	<b>3,350</b>	<b>100%</b>	<b>\$287,539,757</b>	<b>100%</b>	Essential Facilities	<b>1</b>	<b>100%</b>
				CONTENT		High Potential Loss	<b>63</b>	<b>100%</b>
				<b>\$143,805,879</b>	<b>100%</b>	Transportation & Lifeline	<b>0</b>	<b>0%</b>
							<b>49</b>	<b>100%</b>
								<small>LINEAR MILEAGE</small>

MAP LEGEND	
<b>100-YR</b>	<b>100-YR FLOODWAY</b>
<b>500-YR</b>	<b>PROTECTED BY LEVEE</b>

\*Exposure summaries include 100-year and 500-year flood zone areas. Hazard data source: FEMA.  
(%) - Percent of respective category totals for jurisdiction.

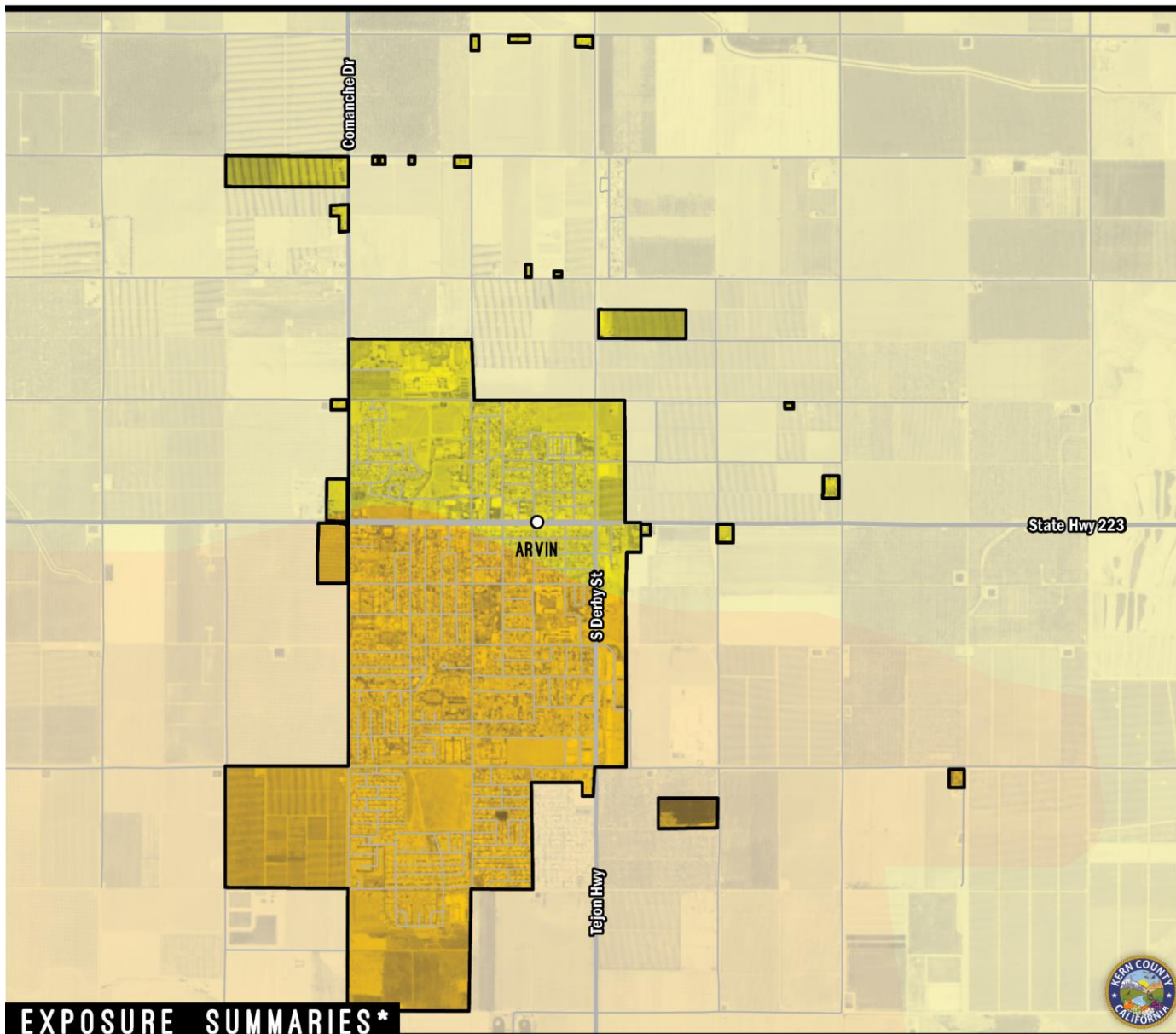
Dynamic Planning + Science for Kern County, 2019

Figure 1-5: Arvin CSD – FEMA Flood Zone Vulnerability & Exposure Snapshot



EQ - S. SAN ANDREAS MOJAVE N. VULNERABILITY & EXPOSURE SNAPSHOT

ARVIN CSD



**EXPOSURE SUMMARIES\***

POPULATION		PARCEL		PARCEL VALUE		CRITICAL INFRASTRUCTURE	
COUNT		COUNT		IMPROVEMENT		COUNT	
<b>11,663</b>	<b>100%</b>	<b>3,353</b>	<b>100%</b>	<b>\$287,737,380</b>	<b>100%</b>	Essential Facilities	<b>1 100%</b>
				CONTENT		High Potential Loss	<b>63 100%</b>
				<b>\$143,904,690</b>	<b>100%</b>	Transportation & Lifeline	<b>0 0%</b> <small>LINEAR MILEAGE</small> <b>49 100%</b>



\*Exposure summaries include strong, very strong, and severe MMI classes. Hazard data source: USGS.  
(%) - Percent of respective category totals for jurisdiction.

Dynamic Planning + Science  
for Kern County, 2019

**Figure 1-6: Arvin CSD – EQ S. San Andreas Mojave N. Vulnerability & Exposure Snapshot**



DROUGHT SEVERITY TIMELINE

MIDDLE KERN-UPPER TEHACHAPI-GRAPEVINE

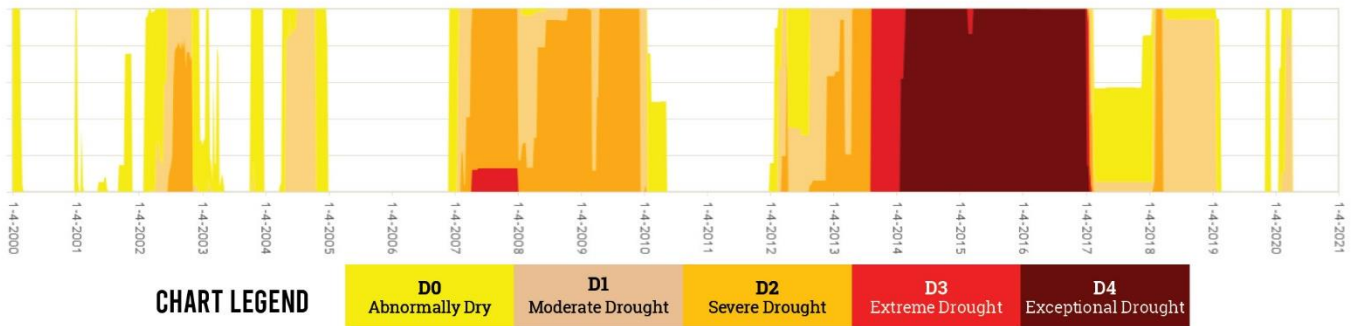
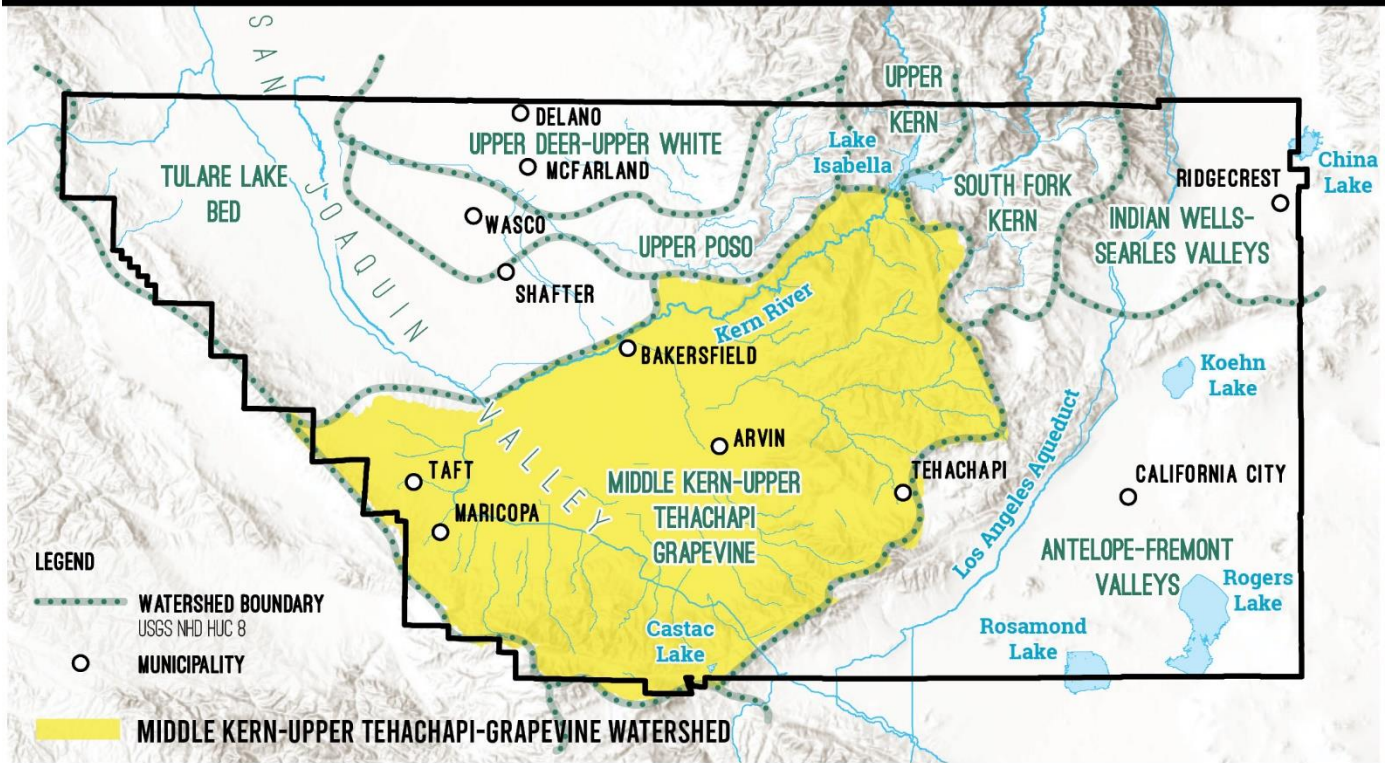


Figure 1-7: Arvin CSD Drought Severity Timeline - Middle Kern-Upper Tehachapi-Grapevine



### 1.4.3.3 Past & Future Development

Special districts, including the Arvin Community Services District, do not approve development within their established boundaries; instead, they provide essential, focused water services. The Arvin Community Services District provides drinking water to residents in and around the City of Arvin.

#### Development since Previous HMP

The District completed several central mitigation actions that substantially decreased its vulnerability to hazards. The District constructed six new wells and took all old wells offline. The new wells have seismic and flood reinforcement that increase resiliency, and the water quality improvements address drought impacts. Importantly, while the District has added approximately 450 new connections in the planning period, the District is still providing the same amount of water, demonstrating public water conservation commitments and District sustainability into the future.

#### Future Development

Future development is overseen and regulated by Kern County. That jurisdiction's General Plan (GP) establishes long-range development policies. The GP provides a basis for private development proposals and public projects to remain consistent with existing city, regional, and state policies. The County's municipal codes includes regulations to mitigate the impact of hazards on new and existing development, including:

- Drainage and stormwater retention requirements, floodplain management regulations,
- Steep slope restrictions for new development,
- Zoning that prevents development in hazardous areas of the community such as floodplains, landslide areas, the wildland-urban interface (WUI), or other known hazard areas, and
- Building codes including fire and seismic standards and many other provisions crafted to protect new construction from hazard events.

See Vol. 1, Section 4.3.5, for additional information on past and future development in Kern County.



### 1.4.3.4 Identify Hazard Problem Statements

As part of the mitigation action identification process, the Planning Committee for each jurisdiction identified areas of concern (aka problem statements) for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping and static snapshot maps. Problem statements focused on the impact, victim, or threat that the hazard could create in the jurisdiction, as described in Figure 1-8. Identifying common issues and weaknesses through these problem statements assisted the Planning Committee in understanding the realm of resources needed for mitigation. Jurisdiction problem statements are listed in Table 1-5.

The goal is to have at least one mitigation action for every problem statement. Projects or actions have been developed to mitigate each problem identified. See Table 1-10 for a full list of mitigation actions and corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 1-5 and Table 1-10.



#### **IMPACT**

- Casualties**
- Property Damage**
- Business Interruption**
- Financial Loss**
- Environmental Contamination**



#### **VICTIM**

- School Children in Hazard High Hazard Areas**
- Care Facilities in High Hazard Area**
- Vulnerable Population Exposed to hazards**



#### **THREAT**

- Increased Fuels due to drought**
- Hotter, drier climates**
- More Intense Storms**
- Impervious surfaces = greater runoff**
- Increases of Invasive Species**

**Figure 1-8: Guidance for Problem Statements**





**Table 1-5: Arvin Community Services District Problem Statements**

<b>Problem No.</b>	<b>Hazard</b>	<b>Area of Concern</b>	<b>Mitigation Alternatives</b>	<b>Primary Agency</b>	<b>Problem Description</b>	<b>Related MA</b>
<b>ps-DR-ACSD-618</b>	Drought	Impact	PE&A - Public Education & Awareness	<b>Arvin CSD</b>	Water levels in aquifer may be reduced to point where not able to supply water, water quality declines	ma-DR-ACSD-591
<b>ps-DR-ACSD-619</b>	Drought	Threat	PE&A - Public Education & Awareness	<b>Arvin CSD</b>	Drought is occurring more frequently and for longer periods of time	ma-DR-ACSD-591
<b>ps-EQ-ACSD-615</b>	Earthquake	Impact	PPRO - Property Protection , ES - Emergency Services	<b>Arvin CSD</b>	Loss of power in earthquake event (and PSPS or other power outage) means District unable to pump water	ma-EQ-ACSD-592
<b>ps-EQ-ACSD-616</b>	Earthquake	Impact	ES - Emergency Services	<b>Arvin CSD</b>	Loss of power for District main office can reduce ability to detect and respond to problems within the system.	ma-EQ-ACSD-592
<b>ps-EQ-ACSD-617</b>	Earthquake	Impact	PPRO - Property Protection	<b>Arvin CSD</b>	Breaks in water lines could result in significant loss of water supplies	ma-EQ-ACSD-593
<b>ps-FL-ACSD-620</b>	Flood	Impact	PPRO - Property Protection	<b>Arvin CSD</b>	Access to wells and facilities may be limited or unavailable during flood event.	ma-FL-ACSD-590



#### 1.4.3.5 Mitigation Action Support Tool (MAST)

As a living document, hazard problem statements and mitigation activities will be updated through a web interface application developed specifically for participating jurisdictions. The Mitigation Action Support Tool (MAST) is accessible through <http://mitigatehazards.com/county-of-kern/>.

MAST is a web-based interactive tool that enables multiple users to search, view, enter, and update mitigation actions, ideas or projects, and other information. MAST provides participating jurisdictions and plan reviewers (Cal OES/FEMA) access to valuable mitigation information that can be leveraged by future planning or other risk reduction efforts within the County. Participating jurisdictions can update the status of their mitigation projects throughout the planning lifecycle, and this web-based tool will improve participating jurisdiction's ability to apply for FEMA's Hazard Mitigation Assistance (HMA) grant programs including initial grant application processes through Cal OES.



## 1.5 Mitigation Strategy

The mitigation strategy is the guidebook to future hazard mitigation administration, capturing the key outcomes of the MJHMP planning process. The mitigation strategy is intended to reduce vulnerabilities outlined in the previous section (a.k.a. problem statements) with a prescription of policies and physical projects. These mitigation actions should be compatible with existing planning mechanisms and should outline specific roles and resources for implementation success.

### 1.5.1 Capabilities Assessment

This section examines the planning and regulatory, administrative, technical, financial, educational, and outreach capabilities to augment known issues and weaknesses from identified natural hazards.

The tables in this section explore various local planning mechanisms, administrative capacity, financial capabilities, and education and outreach initiatives. The columns in each table represent deeper dives into the following questions:

- Is the existing planning or regulatory mechanism used currently? (Column 1, Status)
- Has the HMP been integrated into the planning mechanism currently so that the named mechanism is currently used in HMP planning? (Column 2, Current Mitigation Use)
- Is there a future opportunity to expand, improve upon, and incorporate this 2020 HMP Update into the planning or regulatory mechanism? (Column 3, Future Opportunity)

The capabilities assessment is easily-digestible and based on color coding to indicate which policies and plans are adequate, need improvement or in which the HMP could be integrated. Each table includes a legend that explain how each one of these questions are being answered according to the color indicated: green, yellow, and orange.

As a special district, the District is not eligible for the National Flood Insurance Program (NFIP), nor does it have repetitive loss properties; no statistics on NFIP participation are included in this annex.

For more information on the regulatory environment surrounding each hazard, see hazard-specific sections of Volume 1. Volume 1, Section 5.3.5 includes an extensive list of federal and state funding opportunities as well.



1.5.1.1 Planning and Regulatory Capabilities

Table 1-6: Planning and Regulatory Capabilities Summary

CAPABILITY ASSESSMENT LEGEND		
Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

Resource	HMP Integration			Notes / Additional Detail
	Status	Current Mitigation Use	Future Opportunity	
<b>Planning and Regulatory Capabilities</b>				
<b>Hazard Reduction Programs (Annually Conducted)</b>				
Capital Improvements Program (CIP) or Plan				
Annual Fire Prevention Plan				
Seismic Safety Program (Non-structural)				
Earthquake Modernization Plan (Building Safety)				
Stormwater Management Program (Annual Inspections)	N/A	N/A	N/A	
<b>Hazard Plans and Programs</b>				
Floodplain Response Plan	N/A	N/A		
Community Wildfire Protection Plan (CWPP)				Countywide CWPP expected 2021.
Ground Water Management Planning / Plans				Through Kern Groundwater Authority
Climate Action Plan				
Drought Mgmt/ Contingency Plan				During 205-2017 drought
FireWise Communities within District				
Hazard-Related Public Outreach Program				



### 1.5.1.2 Administrative and Technical Capabilities

**Table 1-7: Administrative and Technical Capabilities Summary**

CAPABILITY ASSESSMENT LEGEND		
Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

Resource	HMP Integration			Notes / Additional Detail
	Status	Current Mitigation Use	Future Opportunity	
<b>Administrative and Technical</b>				
<b>Staff Capacity</b>				
Emergency Manager				General Manager
Civil Engineer				On contract basis
Dedicated Public Outreach Personnel				General Manager
GIS Specialist and Capability				Chief Operator
Grant Manager, Writer, or Specialist				General Manager
Other	N/A	N/A	N/A	
<b>Warning Systems/Services</b>				
General				Plan for boil alert notice, other public health impacts to water system
Flood	N/A	N/A	N/A	
Wildfire	N/A	N/A	N/A	
Geological Hazards	N/A	N/A	N/A	



1.5.1.3 Financial Capabilities

Table 1-8: Financial Capabilities Summary

CAPABILITY ASSESSMENT LEGEND		
Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

Resource	HMP Integration			Notes / Additional Detail
	Status	Current Mitigation Use	Future Opportunity	
<b>Fiscal Capabilities</b>				
<b>Financial Resources for Hazard Mitigation</b>				
Levy for Specific Purposes with Voter Approval				Rate restructuring for arsenic mitigation project (Prop 218)
Utilities Fees				
System Development Fee				Application for "will serve" for all new development
General Obligation Bonds to Incur Debt				
Special Tax Bonds to Incur Debt				
Withheld Spending in Hazard-Prone Areas	N/A	N/A	N/A	
Stormwater Service Fees	N/A	N/A	N/A	
Capital Improvement Project Funding				



1.5.1.4 Education and Outreach

Table 1-9: Education and Outreach Capabilities Summary

CAPABILITY ASSESSMENT LEGEND		
Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

Resource	HMP Integration			Notes / Additional Detail
	Status	Current Mitigation Use	Future Opportunity	
<b>Education / Outreach Capabilities</b>				
<b>Education/Outreach Resources</b>				
Website Dedicated to Hazard Topics				New website in development currently (2020)
Dedicated Social Media				
Hazard Info. Avail. at Library/ Planning Desk				
Annual Public Safety Events				
Ability to Field Public Tech. Assistance Requests				
Public Safety Newsletters or Printed Outreach				As needed basis
Fire Safe Councils	N/A	N/A	N/A	
Resource Conservation Districts				
Other	N/A	N/A	N/A	



### 1.5.2 Mitigation Actions

Mitigation actions were developed based upon the jurisdiction’s priorities, risk assessment results, and mitigation alternatives. The mitigation action prioritization method used by all participating jurisdictions is described in Section 5.5.1 of Volume 1. Table 1-10 lists each priority mitigation action, responsible party, time frame, potential funding source, implementation steps, and resources need to implement based upon the Planning Committee consensus.

Each participating jurisdiction, including the Arvin Community Services District, considered ongoing relevancy of mitigation actions from the existing MJHMP and retained or removed such actions while adding new relevant actions as well. Mitigation actions were examined for relevancy and the potential for future implementation and then evaluated for potential follow-up. Some mitigation actions developed during the previous HMP effort were not included because they were an inherent part of the HMP update process or were not detailed enough for implementation at a local jurisdiction level. The Arvin Community Services District has made significant changes to other mitigation actions because of the updated risk assessment and implementation strategy, to include more detail, or to update based on current mitigation practices. Volume 1, Section 5.5.2 provides a record of County-wide mitigation actions, the status, and additional notes for each action.

Table 1-10 lists each mitigation action for the Arvin Community Services District. Each participating jurisdiction developed unique mitigation actions, targeted at their own unique priorities and vulnerabilities. Each mitigation action identifies the responsible party, time frame, potential funding source, implementation steps and resources needed to implement these priority mitigation actions. As a living document, hazard problem statements and mitigation activities will be updated through MAST. The detail in Table 1-10 meets the regulatory requirements of FEMA and DMA 2000.

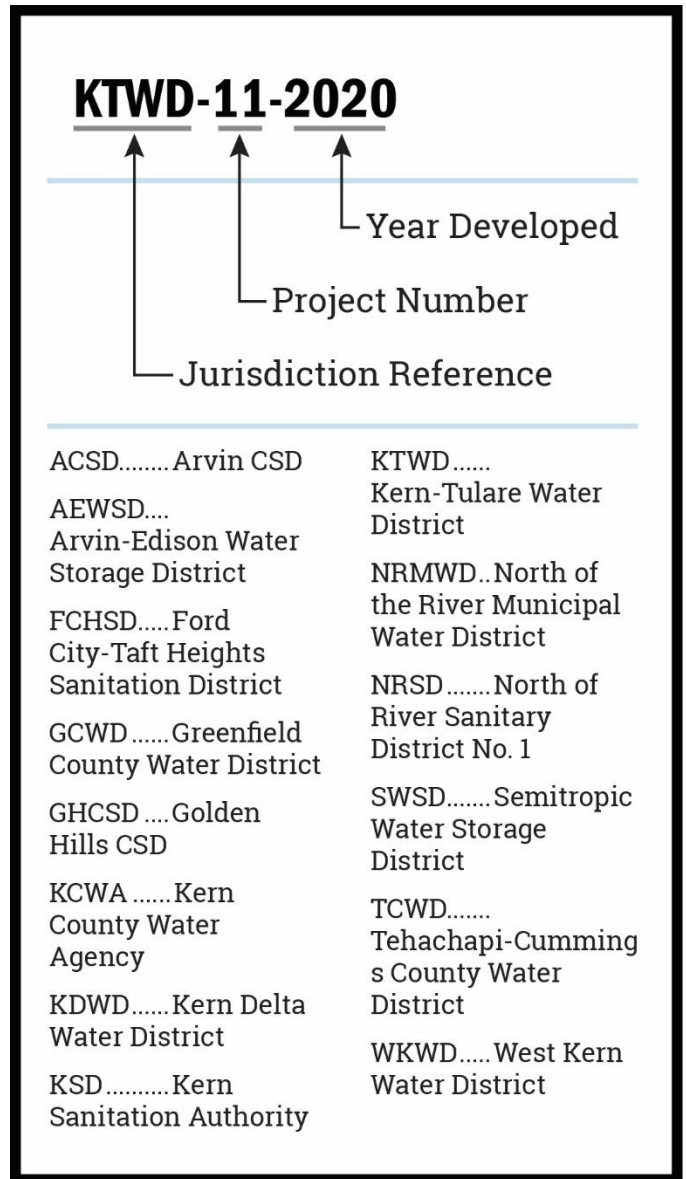


Figure 1-9: Mitigation Action Key





INTENTIONAL BLANK PAGE



Table 1-10: Arvin Community Services District Mitigation Actions

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Problem Statements
ma-DR-ACSD-591	Drought	PE&A - Public Education & Awareness	Pending	2020	Arvin CSD	Develop and implement a public education campaign around water conservation (in coordination with City of Arvin ma-DR-AR-563)	ACSD General Manager	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	Ongoing	5%	HMGP / BRIC , Internal Funding	High	ps-DR-ACSD-619, ps-DR-ACSD-618
ma-EQ-ACSD-592	Earthquake	ES - Emergency Services	Pending	2020	Arvin CSD	Acquire backup generators for District office, which contains SCADA system, and facilities that currently lack generators	General Manager/ Chief Operator	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	ps-EQ-ACSD-615, ps-EQ-ACSD-616
ma-EQ-ACSD-593	Earthquake	PPRO - Property Protection	Pending	2020	Arvin CSD	Install automatic shut off valves for water system in event of major seismic event	General Manager/ Chief Operator	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC	High	ps-EQ-ACSD-617
ma-FL-ACSD-590	Flood	PPRO - Property Protection	Ongoing	2020	Arvin CSD	Assess District ability to access facilities during key flood times, including whether District has proper vehicles in accessing facilities in times of flood	General Manager	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	1-3 Years	Project	HMGP / BRIC , Internal Funding	High	ps-FL-ACSD-620



INTENTIONAL BLANK PAGE

**BOARD RESOLUTION ADOPTING THE 2020 UWMP**

**BOARD RESOLUTION ADOPTING THE 2020 WATER SHORTAGE  
CONTINGENCY PLAN**