Meadowbrook Water System Intertie Feasibility Study

Technical Memorandum

Prepared for
Merced Irrigation District

Prepared by
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AECOM Project Number 60612644

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1. Background

Merced Irrigation District (MID) has obtained a grant from the State of California Department of Water Resources (DWR) (Agreement No. 4600012719) under the 2017 Proposition 1, Sustainable Groundwater Planning (SGWP) Grant Program on behalf of the three Merced Subbasin Groundwater Sustainability Agencies (GSAs) (Merced Irrigation-Urban Groundwater Sustainability Agency, Merced Subbasin Groundwater Sustainability Agency, and Turner Island Water District GSA-1). The purpose of the grant is to provide funding from the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Prop. 1) to assist the GSAs in financing and planning and/or selecting project activities that will improve sustainable groundwater management pursuant to Water Code Section 79700 et. seq. One component of the overall grant is the Meadowbrook Water System Intertie Feasibility Study. This project is to evaluate the needs and feasibility of connecting the water system to nearby water systems in the cities of Atwater of Merced as discussed in this Technical Memorandum.

The California American Water Company Meadowbrook Water System (Meadowbrook) is located along State Route 99 between the cities of Atwater and Merced. This formerly private water system, which was formed in the mid-1950s, was purchased by California American Water in 2017. California American Water is a division of American Water, an investor-owned utility. The Meadowbrook system operates under Water Supply Permit No. 03-11-19P-023 granted by the California State Water Resources Control Board, Division of Drinking Water (DDW) on September 3, 2019. A copy of this permit, along with the associated engineering report, is included in Appendix A.

The geographic area of the Meadowbrook system is roughly 3.5 square miles and is currently an unincorporated area of Merced County. The Meadowbrook system supplies water to approximately 5,640 people through 1,670 metered service connections. There are 57 commercial connections and one landscape irrigation connection included in the Meadowbrook system. The nonresidential connections include service to two elementary schools, three mobile home parks, one migrant housing facility, a meat-packing company, small retail businesses, and three cement-mixing plants. There are three active groundwater wells ranging between 371 feet and 528 feet in depth. The pumping capacities of the active wells are shown in Table 1. Wells 1, 2, and 3 have been destroyed due to low capacities or nitrate contamination concerns.

Table 1 Meadowbrook Active Well Pumping Capacity (gpm)

Well 4	Well 5	Well 6	Total
1,800	630	1,160	3,590

There is only minimal water storage in the system consisting of ground-level hydropneumatic tanks at the well sites. Well 4 formerly had three pressure tanks ranging in size from 22,000 gallons to 33,000 gallons, and Meadowbrook is currently replacing them all at Well 4 with one 20,000-gallon tank. The pressure tanks previously were not equipped with air compressors and therefore provided no effective storage volume to the system.

Well 5 formerly had two pressure tanks with an effective volume of 24,750 gallons and is being replaced with one 10,000-gallon pressure tank. Well 6 formerly had two pressure tanks ranging in size from 16,000 to 45,000 gallons and are being replaced with one 15,000-gallon pressure tank. Currently, there is an ongoing project to replace the existing tanks with new one that are pressure vessel code rated and have compressors and controls to provide proper operational function in the system. A summary of the wells and pumping equipment is shown in Table 2.

Table 2 Well Pumping Equipment

	Well Depth (ft)	Date Drilled	Annular Seal Depth (in.)	Motor HP	Variable-Frequency Drive	Emergency Power*
Well 4	371	1992	200	125	Yes	No
Well 5	528	2001	275	60	Yes	No
Well 6	376	2007	210	75	Yes	No

*The Meadowbrook system has the ability to rent and install temporary generators at the wells in the event of a power outage. It is also in the process of installing a permanent emergency generator at Well 4.

The wells pump into one pressure zone throughout the Meadowbrook system, which also includes interconnections to two adjoining small subdivisions known as Trinidad and Gurr. Approximately 14 miles of distribution mains exist ranging in size from 4 to 12 inches in diameter. The Meadowbrook distribution system and well locations are shown in Figure 1.

The normal system pressures range from 40 to 60 psi throughout most of the distribution system with an average pressure of 55 psi. Most of the pipe in the system is polyvinyl chloride (PVC) AWWA C-900, but there is approximately 2 to 3 miles of 4-, 6-, and 8-inch-diameter asbestos cement pipes with a few thousand feet of 10- and 12-inch ductile iron pipe. Each well is equipped with sodium hypochlorite injection that provides a chlorine residual throughout the system. This is the only treatment provided in the system.

The entire service area is sewered and treated at the nearby Franklin County Water District facility. A few individual septic tank systems serve residences at the outside edges of the service area.

2. System Demands

The Meadowbrook water demands taken from the 2018 DDW Electronic Annual Report are reflected in Table 3.

Table 3 Meadowbrook Water Demand (2018)

Year	Yearly Total (MG)	ADD in Max Month (gpm)	MDD (gpm)	MDD (gallons)	PHD (gpm)
2018	317.266	871	1,305	1,881,000	1,958

ADD = average day demand
MDD = maximum day demand
PHD = peak hour demand

The ADD, MDD, and PHD shown in Table 3 for Meadowbrook were estimated by DDW in their September 2019 Engineering Report based on peaking factors used for similar small San Joaquin Valley water systems as shown below.

$$Average\ Day\ Demand\ During\ Max\ Month\ (gpm) = \frac{10yr\ Highest\ Monthly\ Production}{(days\ per\ month)(24hrs)(60min)}$$

$$Maximum\ Day\ Demand\ (gpm) = \frac{1.5\ Peaking\ Factor\ x\ ADD\ during\ Max\ Month}{(24hrs)(60min)}$$

$$Peak\ Hour\ Demand\ (gpm) = (MDD)(1.5\ PeakingFactor)$$

Potential Atwater
Tie-In Points

Potential Merced
Tie-In Points

Well # 5

Well # 4

Well # 6

1

2

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), NGCC, © OpenStreetMap contributors, and the GIS User Community

Legend

Sampling Locations

- Sampling Locations

Well

- Well

Street Valve

- Street Valve

Pipe Size

- 4 INCH
- 6 INCH
- 8 INCH
- 10 INCH
- 12 INCH

STAGE 2 DBPR MONITORING LOCATIONS

No	Street
1	2425 San Joaquin CT
2	3156 Sahota Ave

CALIFORNIA AMERICAN WATER

MEADOWBROOK
DISTRIBUTION SYSTEM

N

0 0.2 0.4 0.8 Miles

POTENTIAL CONNECTION POINTS

PROJECT NUMBER: 60612644

FIGURE 1

According to the California Water Works Standards Section 64554(a), at all times, a public water system's source(s) shall have the capacity to meet the system's maximum day demand. Also according to DDW criteria and other American Water Works recommendations, a water system should be able to meet maximum day demand or peak hour demand with the largest water source out of service. For systems with 1,000 or more service connections, the system shall be able to meet four hours of peak hour demand with source capacity, storage capacity, and/or emergency source connections.

Meadowbrook's total source capacity is 3,590 gpm and 1,790 gpm with the largest well (Well 4) out of service. In addition, a reliable water system should have sufficient water supply capacity to meet peak demand as well as water requirements during emergencies such as fires, power outages, and natural or manmade disasters. Typical evaluation criteria for the water systems include the following:

- The well supply must be adequate to meet maximum day demand with the largest well out of service.
- If storage is not adequate to provide total emergency, fire, and operational storage combined, the well supply must be available to meet the differences.
- If adequate gravity-supplied storage or storage equipped with booster pumps with auxiliary power is not available to meet maximum day demand when there is a power outage, supply wells required to meet the difference must be equipped with auxiliary power.
- If supply from storage in conjunction with wells is not available to meet peak hour demand, the deficit in water supply must be met from the well supply.
- Storage and/or well supply must be adequate to supply fire flows during maximum day demand.

If supply storage in conjunction with wells is not available to meet PDD during a power outage, the deficit in water supply must be met from wells equipped with auxiliary power. Should this occur, loss of power alone would reduce the peak hour demand due to closure of businesses, schools, etc. Therefore, meeting peak hour demand solely with wells equipped with auxiliary power is not considered necessary.

It is recommended that this small water system strive to have a sufficient capacity to meet maximum day demand concurrent with one fire flow demand. This water demand should be met with the largest well out of service to achieve reliable firm capacity. Typically, a fire flow of 1,500 gpm would be required for nonsprinklered residential, commercial, and small businesses in this small water system. These criteria were used for evaluation of the Meadowbrook water system and determination of the advantages to providing an intertie to an adjacent water system as shown in Table 4.

Based on this evaluation for the relatively critical conditions shown above, the water system could benefit by having an additional 1,000-gpm supply such as from an intertie to a nearby water system. If an additional 25 percent is added to this shortage to allow for possible growth (250 gpm), a total of at least 1,250 gpm is estimated as an intertie capacity that would benefit the Meadowbrook system. Design and operation of this type of intertie emergency supply is discussed in the following sections.

Table 4 Criteria for Meadowbrook Water System Evaluation

Criteria	Meadowbrook System Flow Rate (gpm)	Comments
Average day demand in maximum month	871	--
Maximum day demand	1,305	--
Peak hour demand	1,958	--
Fire flow demand	1,500	--
Maximum day demand plus 1,500-gpm fire flow	2,805	--
Total well supply capacity	3,590 available	Meets all required demands
Total well supply capacity with largest well offline	1,790 available	168 gpm short of meeting peak hour demand 1,015 gpm short of meeting maximum day demand plus fire flow
Storage capacity	0 available	No storage available
Power loss, well supply with auxiliary power	1,800 available*	158-gpm capacity short of meeting peak hour demand 1,005 gpm short of meeting maximum day demand plus fire flow
Emergency supply required to meet ADD in maximum month with all wells off during a disaster scenario	871 required 0 available	871 gpm short

*Assuming Well 4 is equipped with permanent generator, rented generator may supply additional water from Wells 5 and 6 (1,790 gpm).

3. Benefits/Purpose of Intertie

- **Emergency Supply**: In the case of a disaster (earthquake, fire, terrorist action) that disables all wells, an intertie of 1,250 gpm would satisfy average daily demands for a maximum month for life safety uses.
- **Peak Day/Hour Supply**: An intertie would provide the shortage of approximately 170 gpm during peak hour demands plus some capacity for growth.
- **System Redundancy**: An intertie to an entirely separate larger water system with excess capacity is advantageous for a small water system with only three wells that could be vulnerable to mechanical or structural failures.
- **Fire Flow**: An intertie of 1,250 gpm plus existing Wells 5 and 6 (total 3,040 gpm) will provide fire flow capacity of 1,500 gpm during maximum day demands (total 3,805 gpm) with the largest well out of service.
- **Supply Future Connections**: An intertie of 1,250 gpm would provide an additional 250 gpm for growth and would accommodate approximately 200 additional service connections at 1.17 gpm each during peak hour conditions.
- **Pressure Increase**: An intertie connection of 1,250 gpm would maintain system pressures to customers during critical maximum day demands with a 1,500-gpm fire flow with the largest well out of service. A minimum of 20 psi is required by fire codes.

- **Water Quality**: Should one or more of the three existing wells be impacted by a groundwater contaminant (nitrates, TCP, PCE, DBCP, arsenic, etc.) requiring it to be shut down for an extended period and/or treated, an intertie that can be readily opened would be important.

4. City of Atwater Intertie Scenarios

The city of Atwater is located along State Route 99 roughly 6 miles west of Meadowbrook. Currently, the City of Atwater provides water to approximately 31,235 people through 8,323 mostly unmetered service connections. The 2017 DDW Electronic Annual Report discloses that 5,463 service connections are unmetered, and 2,860 connections are metered. The City of Atwater has eight active wells, one inactive well in the process of being equipped, three storage tanks, one GAC treatment facility, and the distribution system comprised of approximately 97 miles of 4-inch- through 14-inch-diameter pipelines. An inventory of the City of Atwater's wells is shown in Table 5 as taken from the City of Atwater 2019 Water Master Plan Update prepared by AECOM. The distribution system consists of one pressure zone that operates generally between 45 and 65 psi throughout the system. The nominal combined source capacity of active wells in the Atwater system per the DDW permit is 15,500 gpm.

Table 5 Inventory for Atwater's Groundwater Wells

							Perforations					
Well No.	Date Drilled	Current Status	Nominal Rated Capacity per DDW Permit (gpm)	Motor Size (hp)	Motor Mfr.	Casing Diameter (in.)	Depth to top (ft)	Depth to bottom (ft)	Length (ft)	Annular Seal Depth (ft)	Auxiliary Power	Well Rehab
1	-	Destroyed	-	-	-	-	-	-	-	-	-	-
2	-	Destroyed	-	-	-	-	-	-	-	-	-	-
3	-	Destroyed	-	-	-	-	-	-	-	-	-	-
4	-	Abandoned	-	-	-	-	-	-	-	-	-	-
5	-	Destroyed	-	-	-	-	-	-	-	-	-	-
6	-	Destroyed										
7	-	Destroyed	-	-	-	-	-	-	-	-	-	-
8	-	Abandoned	-	-	-	-	-	-	-	-	-	-
9	-	Destroyed										-
10	-	Destroyed	-	-	-	-	-	-	-	-	-	-
11	-	Destroyed	-	-	-	-	-	-	-	-	-	-
12	-	Destroyed	-	-	-	-	-	-	-	-	-	-
13	1976	Active[1]	1,500	200	Submersible	16	120	265	145	65	No	2003
14	1976	Active[1]	2,100	200	Submersible	16	110	273	163	50	Yes	-
15	1976	Active[1]	2,000	200	Allis Chambers	16	120	306	186	50	Yes	-
16	1988	Active[1]	2,000	200	US Electric	18	330	600	270	300	Yes	-

							Perforations					
Well No.	Date Drilled	Current Status	Nominal Rated Capacity per DDW Permit (gpm)	Motor Size (hp)	Motor Mfr.	Casing Diameter (in.)	Depth to top (ft)	Depth to bottom (ft)	Length (ft)	Annular Seal Depth (ft)	Auxiliary Power	Well Rehab
17	1990	Active[1]	2,500	200	US Electric	18	305	515	210	305	Yes	2003
18	1992	Active[1]	2,200[4]	200	US Electric	18	380	600	220	360	Yes	-
19	1992	Active[1]	2,000	200	US Electric	18	485	660	175	460	Yes	2003
20		Inactive[3]	0								Yes	-
21	2000	Active[2]	1,700	100	Peerless	16	360	670	360	320	Yes	-
Total			15,500									

[1]Water disinfection treatment is gaseous chlorination.

[2]Water disinfection treatment is on-site hypochlorite generation.

[3]Redrilled new Well 20 on site; not yet equipped.

[4]Based on City meter readings.

Figure 2 (also taken from the Master Plan Update prepared by AECOM) shows the locations of the water system facilities as well as proposed future pipelines, wells, and storage reservoirs. Figure 3 (also taken from the Master Plan Update) shows proposed future developments as of 2018. One of these proposed developments (the Ferrari Ranch located in southeast Atwater in the vicinity of the Meadowbrook water system) is shown in Figure 4 with a conceptual water system layout and proposed future well. This development, which is just west of Meadowbrook, has been approved by is not under way at this time.

An evaluation of the City of Atwater's water facilities, as taken from the 2019 Water Master Plan Update is shown in Table 6.

Table 6 Atwater's Existing and Projected Water Demand

Demand Type	2018	Midterm (Figure 2)	Buildout (Figure 2)
Average Day (gpm)	6,060	11,846	14,443
Maximum Day[1] (gpm)	10,910	21,323	25,997
Peak Hour[2] (gpm)	17,570	34,354	41,885

[1] Based on 1.8 peaking factor.
[2] Based on 2.9 peaking factor.

LIVINGSTON CANAL
WINTON WAY
CAMELLIA DR
SANTA FE DR
ATWATER CANAL
ORCHARD PARK AVE
FRUITLAND DR
BELLEVUE RD
MITCHELL AVE
1ST ST
BUHACH RD
LIVINGSTON CANAL
E JUNIPER AVE
TRINDALE RD.
GURR RD.
BERT CRANE RD
STATE HIGHWAY 99
BELL DR
BLOSS LATERAL
SUNSET DR
APPLEGATE RD
ATWATER BLVD
GREEN SANDS RD.
BELCHER AVE.
ATWATER JORDAN RD
MULBERRY AVE
SWAN RD
WHITE CRANE RD
STATE HWY 99

TO FEDERAL PRISON WATER FACILITIES
21 (AT PRISON)

A 13
A 14
A 15
A 16
A 17
A 18
A 19
A 22
1 MG
20

FERRARI RANCH
PLANNED DEVELOPMENT

POTENTIAL TIE-IN

POTENTIAL CONNECTION POINT

LEGEND

CITY LIMITS

EXISTING PIPE
- 4"
- 6"
- 8"
- 10"
- 12"
- 14"

FUTURE PIPE
- 8"
- 10"
- 12"

1 MG — 1 MG RESERVOIR AND SIZE
16 — ACTIVE WELL AND NUMBER
20 — DRILLED BUT NOT EQUIPPED
22 — FUTURE WELL AND NUMBER
A — AUXILIARY POWER

SCALE: 1" = 2000'

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CITY OF ATWATER
WATER MASTER PLAN 2019

EXISTING TRANSMISSION AND DISTRIBUTION SYSTEM

AECOM PROJECT NO. 60612644

FIGURE 2

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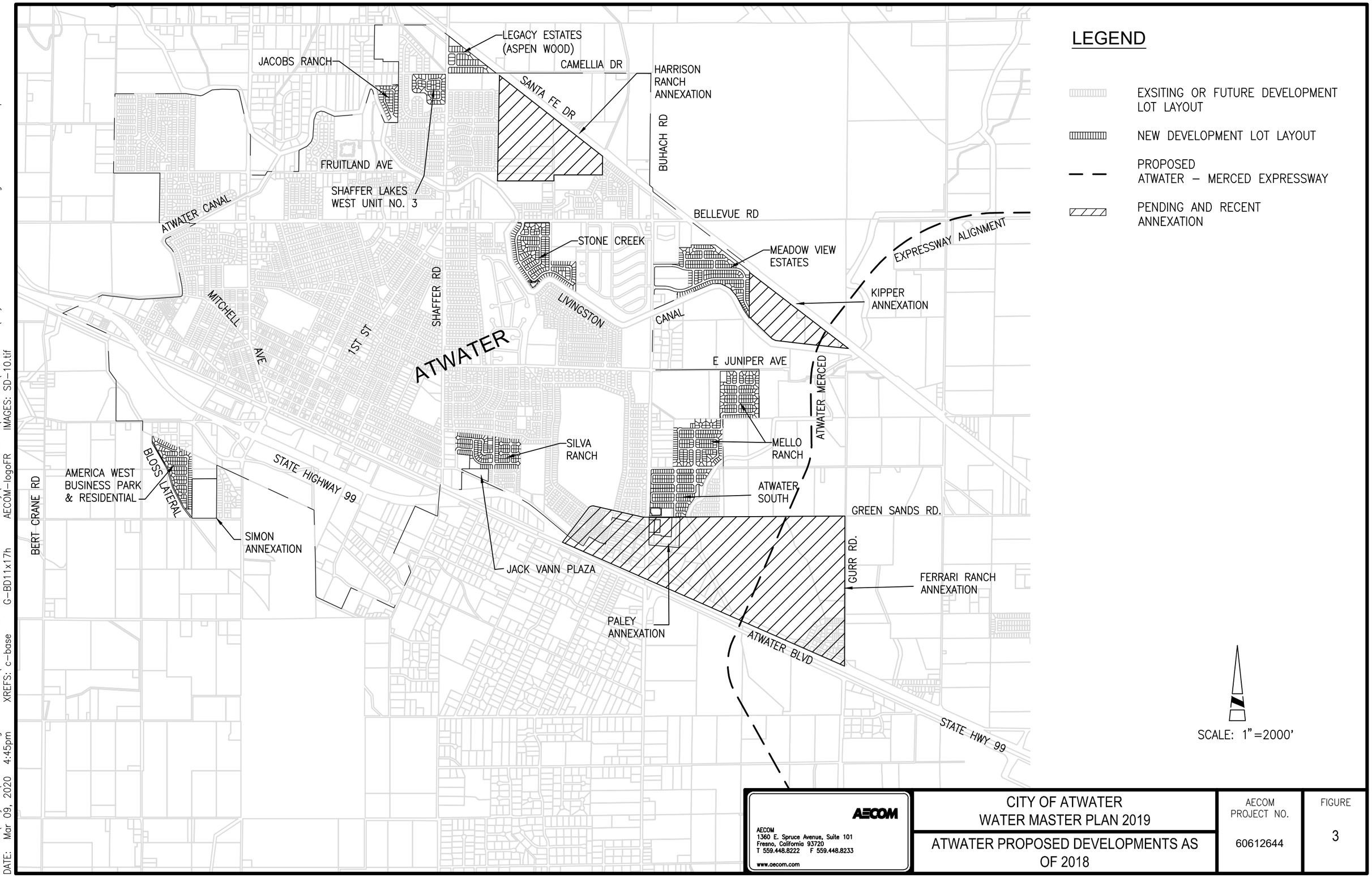

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DATE: Mar 09, 2020 4:45pm XREFS: c-base AECOM-logoFR IMAGES: SD-10.tif G-BD11x17h

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CITY OF ATWATER
WATER MASTER PLAN 2019

ATWATER PROPOSED DEVELOPMENTS AS OF 2018

AECOM PROJECT NO. 60612644

FIGURE 3

Well 20

Proposed Ferrari Tank

Proposed Ferrari Well

Green Sands Ave.

Gurr Road

Highway 99

LEGEND

Wells

- Proposed Well
- Existing Well

Tanks

- Proposed Ferrari Ranch Tank

DIAMETER

- Proposed 8-Inch
- Proposed 10-Inch
- Proposed 12-Inch
- Existing Pipes
- Project Boundary

N

W E

S

0 600 1,200 Feet

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AECOM Water

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CITY OF ATWATER
FERRARI RANCH UTILITY PLAN

CONCEPTUAL WATER PIPE LAYOUT

AECOM PROJECT NO.
60612644

FIGURE
4

4.1 Existing Supply and Storage in Atwater

Storage Reservoirs: Based on the municipal standards for minimum supply and water storage and the evaluation criteria detailed in the Master Plan Update, a minimum storage volume required for the City of Atwater is estimated at 2.3 million gallons (MG). Table 7 summarizes the results obtained from applying the requirements of the evaluation criteria to the City's current water demand.

Table 7 Water Storage Requirements for Current (2018) Demand

Demand Type	Period (hr)	% of Average Day Demand	Demand (gpm)	Volume (gal)
Operational Storage (difference in peak hour and max day demand)[1]	4	-	6,660	1,598,400
Emergency Storage[2]	24	25	1,515	2,181,600
Fire Storage	3	-	3,000	540,000
Total Storage Required				4,320,000
Less Atwater Available Storage Volume[3]				1,500,000
Less Atwater Available Excess Well Supply Volume Over 24-hour Period[4,5]				561,600
Net Storage Volume Deficit				**(-)2,258,400**

[1] Based on PHD of 17,570 gpm and MDD of 10,910 gpm.

[2] Based on ADD of 6,060 gpm.

[3] Includes 1-MG elevated tank plus one of the two 0.5-MG reservoirs at prison. Assumes one 0.5-MG reservoir would be dedicated to the federal prison.

[4] Based on a 390-gpm well supply in excess of MDD. (Firm supply 11,300 gpm – MDD (10,910 gpm). DDW permitted capacity of 15,500 gpm used for well supply.

[5] Firm well supplies include active wells minus Well 21 and largest active Well 17 out of service.

It should be noted that the existing booster station, Well 21, and the two 0.5-MG storage reservoirs at the federal prison are interconnected to the City's system via a 12-inch main. In case of emergency, one of the redundant 0.5-MG reservoirs could be used to supply the City.

Well Supply: Results indicate that the City does not have sufficient firm well capacity to meet the City's current peak hour demand (17,570 gpm) with the largest well (Well 17 at 2,500 gpm) out of service. Table 8 summarizes the results for water required versus total available for a peak hour demand scenario. The assumed limitations in supply from the elevated storage tank and the ground-level tanks at the federal prison are also shown in Table 8. The deficit of approximately 3,270 gpm can be met by just getting existing Well 20 online (2,000 gpm) and supplying more water from the 12-inch main connected to the federal prison water system (1,270 gpm) or drilling a combination of new wells and storage tanks.

Table 8 Water Supply Requirements for Current (2018) Peak Hour Demand (gpm)

City's Existing Peak Hour Demand	17,570
Firm Available Well Supply[1]	11,300
Available Storage Supply[2]	3,000
City's Deficit Supply Capacity	**(-)3,270**

[1] Well supply does not include Well 21 and Well 17 (largest active well).

[2] Includes 1-MG elevated tank supplying 2,500 gpm plus one of the two 0.5-MG reservoirs at prison supplying 500 gpm. Assumes one 0.5-MG MG reservoir would be dedicated to the federal prison.

For the maximum day demand scenario with the largest well out of service and during a power outage, the City's supply capacity appears to be more than enough to meet this water supply requirement.

Table 9 summarizes the results for water volume required versus total volume available for a maximum day demand scenario during a power outage.

Table 9 Supply Requirements for Current (2018) Demand (Maximum Day Without Largest Well) During Power Outage (gpm)

City's Existing Maximum Day Demand	10,910
Approximate Available Well Supply (10,100 gpm)[1]	10,100
Approximate Available Storage Supply[2]	3,000
City's Excess Supply Capacity	**2,190**

[1] Well supply does not include the supply from Well 21 and the largest well (Well 17) and the wells without auxiliary generators (Well 13).

[2] Includes 1-MG elevated tank plus one of the two 0.5-MG reservoirs at the prison. Assumes one 0.5-MG reservoir would be dedicated to the federal prison.

The system should also be able to meet the water supply requirements for a maximum day demand with a 3,000-gpm fire flow requirement. The total demand is approximately 13,910 gpm, and the total available firm well supply (11,300 gpm) and storage supply (3,000 gpm) is approximately 14,300 gpm. This indicates sufficient water for maximum day demand and fire flow.

4.2 Summary of Atwater Capacity for Intertie

Based on this evaluation of Atwater's water system, Atwater would have excess supply capacity of approximately 2,190 gpm during maximum day demands with their largest well out of service. Details of operation, capacity, and timing of an intertie would have to be worked out to the satisfaction of the City of Atwater prior to committing to allowing an intertie of this type.

4.3 Atwater Intertie Locations

The three potential tie-in points to the Meadowbrook water system, along with the closest tie-in point to Atwater's 12-inch water main on Green Sands Road east of Buhach Road, is shown in Figure 5. The three optional alignments (A-1, A-2, and A-3) to connect these tie-in points are shown in Figure 5. A 12-inch-diameter pipeline would be capable of supplying the 1,250-gpm maximum flow rate at a velocity of approximately 3.5 feet per second with a friction headloss of approximately 0.15 psi per 100 feet of pipeline plus approximately 5 psi for backflow prevention and metering. The three options are summarized in Table 10.

Table 10 Parameters for Intertie to City of Atwater

Option	Size (in.)	Length (ft)	Pressure Loss at 1,250 gpm (psi)	Pipe Size at Connection
A-1	12	8,310	18	One 8-in. dia.
A-2	12	7,176	16	Two 6-in. dia.
A-3	12	9,413	19	One 8-in. dia.

PROPOSED WATER MAIN LENGTHS

OPTION	DISTANCE (FT.)
A-1	8310.0
A-2	7176.0
A-3	9413.0

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

REV	DATE	DESCRIPTION	APPR
7			
6			
5			
4			
3			
2			
1			

DESIGNED BY --
DRAWN BY --
CHECKED BY --
DATE 00/00/00

PROJECT ENGINEER
REG NUMBER
EXP DATE
PROJECT NUMBER 60612644
CADD STANDARDS AECOM

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MEADOWBROOK

ATWATER/MEADOWBROOK POTENTIAL CONNECTION POINTS

FIG. 5

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The intertie would likely need to contain the following items at the connection point in order to satisfy the City of Atwater and Meadowbrook:

- Flowmeter
- Backflow prevention
- Valving with SCADA connection
- SCADA connection to City for monitoring
- Security fencing and lighting
- Possibly a booster pump

5. City of Merced Intertie Scenarios

The city of Merced is located along State Route 99 roughly 3.4 miles east of Meadowbrook. The system serves a population of approximately 86,750 people through 21,523 metered connections (Note: all of Merced's service connections are metered). There are 20 active wells, two storage tanks with a combined capacity of approximately 1 MG, and a GAC treatment facility. All of Merced's wells are equipped with auxiliary diesel generators to provide significant water supply during long-term power outages or public emergencies. The combined source capacity of the active wells in the Merced system is 54,400 gpm. Two additional wells are now under construction, which will bring the total source capacity to approximately 59,400 gpm when completed. The water demand for Merced is shown in Table 11.

Table 11 City of Merced Historical Water Demand

Year	ADD (gpm)	MDD Date	MDD (gpm)	MDD (gal)	PHD (gpm)
2018	12,082	7/18/2018	19,146	27,571,000	28,719
2017	11,588	7/10/2017	19,763	28,460,000	29,645
2016*	11,043	7/29/2016	18,347	26,421,000	27,521
2015*	11,068	6/30/2015	16,583	23,880,000	24,875
2014*	15,644	8/3/2014	28,312	40,770,000	42,468
2013*	17,029	7/26/2013	29,165	41,998,000	43,747
2012	16,057	--	30,508	43,932,000	44,960

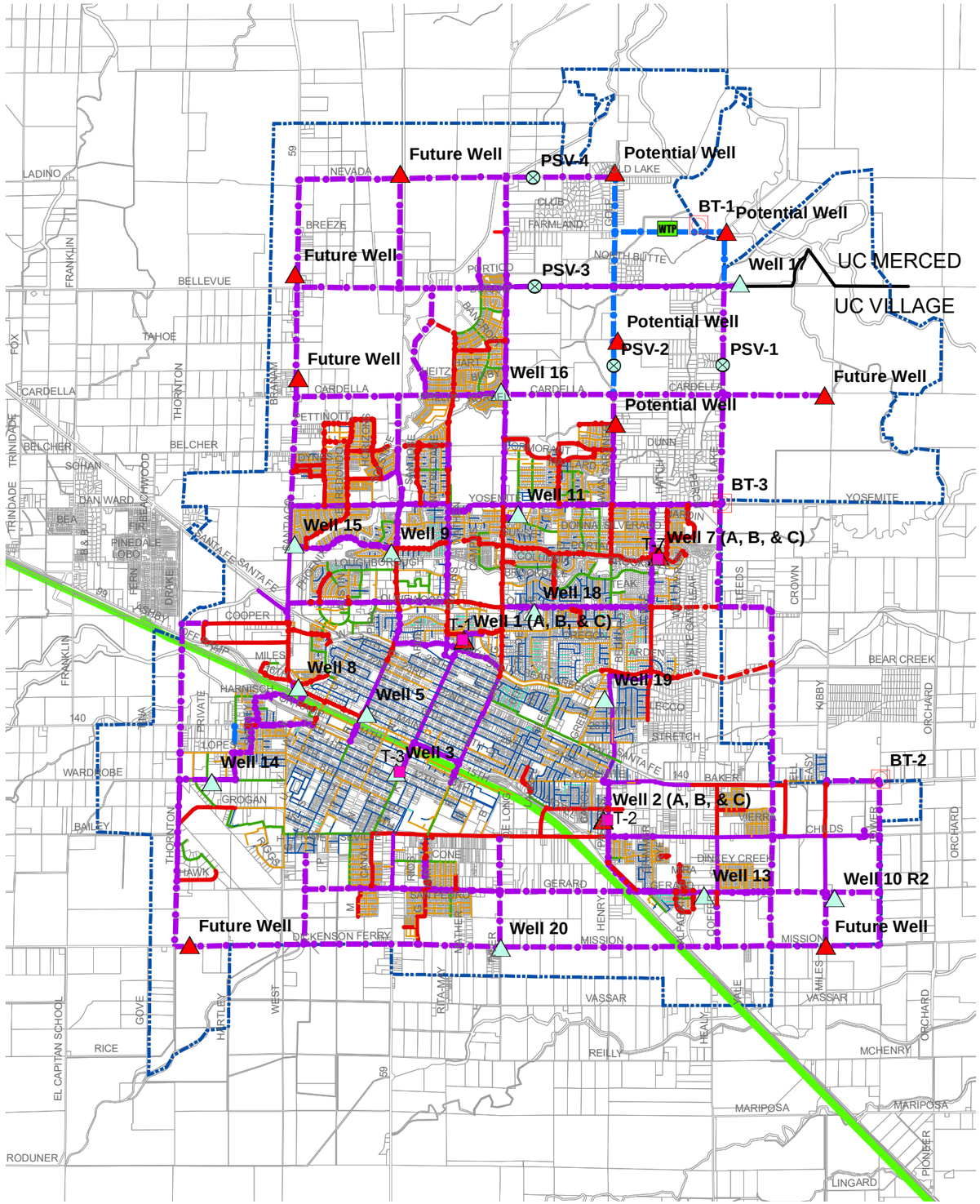
*Drought period.

Figure 6, as taken from the 2015 City of Merced Water Master Plan prepared by AECOM, shows the locations of the water system facilities as well as proposed future pipelines, wells, and storage reservoirs.

An evaluation of the City of Merced's water facilities, as taken from the 2015 Water Master Plan, follows.

5.1 Existing Water Supply and Pumping Capacity Evaluation in Merced

The water supply and pumping capacity criteria for the City of Merced require the existing water system to have sufficient firm pumping capacity to meet maximum day demand plus fire flow or peak hour demand, whichever is greater. Firm pumping capacity should account for pumps that are out of service at any given time due to mechanical breakdowns, maintenance, water quality, or other operational issues. For this analysis, it was assumed that the largest well pump will be out of service to calculate firm pumping capacity. The results of the pumping capacity evaluation are summarized in Table 12.



LEGEND

- Existing Tank
- Existing Wells
- Future Wells
- 2030 Booster Pump
- 2030 Pressure Sustaining Valve
- Water Treatment Plant

Existing Pipelines

- 4 in.
- 6 in.
- 8 in.
- 10 in.
- 12 in.
- 16 in.
- 18 in.

2030 Pipelines

- 12 in.
- 16 in.
- 18 in.
- 12
- 16
- Future High Speed Rail Alignment
- Merced Vision 2030 Boundary

N

0 6,000 12,000

Feet

V:\Merced_City\MODEL\GIS\FIGURES\2012 WMP Figures\2030 Figures

AECOM Water
AECOM
1360 E. Spruce Avenue, Suite 101
Fresno, California 93720
T 559.448.8222 F 559.448.8233
www.aecom.com

CITY OF MERCED WATER MASTER PLAN 2015

RECOMMENDED WATER SYSTEM IMPROVEMENTS

AECOM PROJECT NO. 60612644

FIGURE 6

As shown in Table 12, the City's existing pumping capacity exceeds the pumping capacity criteria for the existing service area. It should be noted that wells at Pump Stations 1, 2, 3, and 7 that supply the water distribution system through onsite elevated tanks were counted among the reliable pumping capacity because they can be reconfigured to bypass the elevated tanks to pump directly into the water distribution system.

5.2 Existing Water Storage Capacity Evaluation for Merced

To comply with the design and operational criteria, three storage components should be met by the existing water system:

- Operational Storage: 30 percent of maximum day demand
- Emergency Storage: 100 percent of average day demand
- Fire flow Storage: The required maximum fire flow times the fire flow duration period

As presented in Table 13, the existing storage capacity in the City is approximately 45 MG. This is entirely ground storage in wells. This storage volume assumes that all wells have standby power and accounts for 80 percent of the wells operating minus average day demand. The existing storage in wells is adequate to meet the existing operational, emergency and fire flow storage as shown in Table 13.

5.3 Existing Water Distribution System Evaluation

The City's existing water distribution system was evaluated using a hydraulic model. The evaluation focused on the ability of the existing water distribution system to supply existing customer demands at adequate pressures and within allowable pipeline velocities as specified in the planning criteria.

Steady-state hydraulic conditions of the water system for average day, maximum day, maximum day plus fire flow, and peak hour demand were simulated. Areas within the existing water service area that did not meet the pressure and velocity criteria were identified. Additional model simulations were conducted to evaluate potential water system improvements to correct existing deficiencies. The results of the model simulations are discussed as follows.

5.3.1 Average Day Demand Analysis

The City's 2012 average day demand allocated in the model was used for this simulation. It was assumed that the existing average day demand would be met from some of the existing wells. The service area has pressures above the required minimum pressure of 40 psi. Pipeline velocities are below the 5-fps maximum velocity criterion for all areas.

5.3.2 Maximum Day Demand Analysis

The City's 2012 maximum day demand was simulated in the model by applying the peaking factor of 1.9 to the allocated average day demand. It was assumed that the existing maximum day demand would be met from the existing elevated tanks and City wells.

The southeastern portion of the existing water distribution system has pressures at approximately 40 psi, close to the minimum pressure criterion of 40 psi. All pipeline velocities were below the 5-fps maximum criterion. Even though the southeastern portion falling slightly below 40 psi is close to Well 10R2, the VFD of this well is operated at a lower pressure because of Tank 2. A higher pressure would increase water system pressures, thus preventing water in Tank 2 from flowing via gravity into the distribution system.

Table 12 Existing City of Merced Water Supply and Pumping Capacity

Well No.	Existing Pumping Capacity, gpm	Existing Maximum Day Demand Plus Fire Flow, gpm[1]	Existing Peak Hour Demand, gpm
1A	2,200		
1C	2,200		
2A	2,200		
2B	2,200		
2C	2,500		
3C	3,000		
5B	3,000		
7C	2,800		
8	2,000		
9	1,800		
10R2	3,000		
11	3,000		
13	3,000		
14	4,000		
15	3,500		
16	3,500		
17	2,500		
18	3,000		
19	2,500		
20 (under construction)	(2.500)		
21	2,500		
22 (under construction)	(2,500)		
Total Capacity	**54,400[3]**		
Total Firm Capacity[2]	**50,400**	**34,508**	**44,960**

[1] Based on a maximum day demand of 30,508 gpm and a fire flow of 4,000 gpm in 2012.

[2] Defined as the total capacity of the individual wells with the largest well pump out of service. For this case Well 14 is the largest well and so was not considered in calculating firm pumping capacity.

[3] 59,400-gpm total capacity when construction is completed.

Table 13 Comparison of Existing Available and Required Storage Capacity for Merced

Available Storage Capacity, MG	Required Storage Capacity, MG				Excess Capacity[3] (MG)
	Operational	Fire Flow	Emergency	Total	
44.96[1]	13.35	0.96[2]	23.40	37.71	7.25

[1] Available storage from groundwater wells. Based on the production of 80% of City wells minus Average Day Demand. 20% of City wells assumed out of service.

[2] Based on required institutional fire flow of 4,000 gpm flowing for four hours.

[3] Calculated as required storage minus available storage.

5.3.3 Maximum Day Demand plus Fire Flow Analysis

The 2012 maximum day demand was simulated concurrently with fire flows within the existing water service area. Fire flows were simulated at all fire hydrants within the distribution system. A fire flow of 1,500 gpm was simulated for residential land uses. Simulations of 2,500 gpm and 3,000 gpm, respectively, were used for commercial and industrial land uses. It is assumed that commercial and industrial facilities would be sprinklered. For many of the locations, the required fire flows could be satisfied by using one or two hydrants. Pipeline improvements to improve fire flows, where feasible, were recommended.

5.3.4 Peak Hour Demand Analysis

The 2012 peak hour demand was simulated by applying a demand peaking factor of 2.8 to the existing average day demands allocated in the model. This peak hour demand is expected to be met from all existing water supply sources including the elevated storage tanks.

The peak hour demand pressure distribution shows that only one portion of the distribution system to the east is slightly below the 40-psi minimum pressure criterion. Pipelines are adequately sized with pipeline velocities well below the maximum 7 fps as required by the City's design and performance criterion.

5.4 Summary of Merced Capacity for Intertie

Based on the evaluation of Merced's water system, Merced would have excess firm supply capacity of (50,400 gpm – 34,508 gpm) 15,892 gpm (20,892 gpm when Wells 20 and 22 are completed) during maximum day demand plus fire flow with the largest well out of service. They would also have an excess firm supply capacity of (50,400 gpm – 44,960 gpm) 5,440 gpm (10,440 gpm when Wells 20 and 22 are completed) during peak hour demands.

As can be seen in Table 10, the maximum day demand for Merced has been dropping significantly since 2013 due to water conservation. Details of the operation, capacity, and timing of an intertie would have to be worked out to the satisfaction of the City of Merced prior to committing to allowing an intertie of this type.

5.5 Merced Intertie Locations

The two potential tie-in points to the Meadowbrook water system, along with the two closest tie-in points the Merced water system on Santa Fe Drive and on Copper Avenue, are shown in Figure 7. The two optional alignments (M-1 and M-2) to connect to these tie-in points are shown in Figure 7. A 12-inch-diameter pipeline would be capable of supplying the 1,250-gpm maximum flow rate at a velocity of approximately 3.5 feet per second with a friction headloss of approximately 0.15 psi per 100 feet of pipeline plus approximately 5 psi for backflow prevention and metering. The two options are summarized in Table 14.

Table 14 Parameters for Intertie to City of Atwater

Option	Size (in.)	Length (ft)	Pressure Loss at 1,250 gpm (psi)	Pipe Sizes at Connection
M-1	12	3,612	10	One 10-in. dia
M-2	12	1,511	7	Two 6-in. dia

The intertie would likely need to contain the following items at the connection point in order to satisfy the City of Merced and Meadowbrook:

- Flowmeter
- Backflow prevention
- Valving with SCADA connection
- SCADA connection to City for monitoring
- Security fencing and lighting

6. Estimate of Probable Construction Cost for Interties

The detailed estimates of probable construction cost for the intertie connections to Atwater and Merced can be found in Appendix B. A summary of these estimates is as follows:

Atwater

Option A-1	$2,257,400
Option A-2	$1,994,500
Option A-3	$2,601,500

Merced

Option M-1	$1,185,800
Option M-2	$ 764,300

Based on these estimated costs and the apparent larger water supply surplus of Merced compared to Atwater, an intertie to the City of Merced appears to be more advantageous to Meadowbrook. Option M-1 is somewhat more expensive than M-2 due to pipe length; however, it does connect to a larger City of Merced water main (16 inches) as well as to a larger Meadowbrook water main (10 inches). From an operational standpoint for Merced and Meadowbrook, a water main extension along Santa Fe Drive may also be more advantageous for future growth and access for maintenance.

PROPOSED WATER MAIN LENGTHS	
OPTION	DISTANCE (FT.)
M-1	3612.0
M-2	1511.0

REV	DATE	DESCRIPTION	APPR
7			
6			
5			
4			
3			
2			
1			

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DESIGNED BY	--
DRAWN BY	--
CHECKED BY	--
DATE	00/00/00
PROJECT ENGINEER	
REG NUMBER	EXP DATE
PROJECT NUMBER	60612644
CADD STANDARDS	AECOM

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MEADOWBROOK

MERCED/MEADOWBROOK
POTENTIAL CONNECTION POINTS

FIG. 7

DWG: K:\Projects\Merced Irrigation District\60612644_Meadowbrook Interfie Study\900_CAD_GIS\910_CAD\02-Sheets\Overview.dwg USER: Phillip.Boren
DATE: Mar 10, 2020 2:37pm AECOM-RegAR IMAGES:
SHEETS: 00000000-REF-C-BD MERCED

Appendix A
Water Supply Permit No. 03-11-19P-023
and Engineering Report

CALIFORNIA
Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board
Division of Drinking Water

September 3, 2019

System No.: 2410008

Mr. Tim Mullins, Operations Superintendent
Cal American Water Company – Meadowbrook
2272 Meadowbrook Avenue
Merced, CA 95348

Dear Mr. Mullins:

RE: Water Supply Permit No. 03-11-19P-023

The purpose of this letter is to inform you that the State Water Resources Control Board – Division of Drinking Water (Division) has issued a New Domestic Water Supply Permit for the Cal American Water Company – Meadowbrook (Company) Water System. This permit is required because the of the change of ownership of the Meadowbrook Water Company. The Domestic Water Supply Permit and an Engineering Report are attached to this letter. Please review the engineering report and provide any comments or corrections to the Division in writing.

The Company needs to complete the following action items and submit the required documents to the Division by the date specified.

1. The total capacity of the system is 3,630 gpm. The System should be able to meet their MDD and PHD conditions with the highest producing well offline. With Well No. 4 offline, the combined capacity is 1,830 gpm, which is slightly greater than the MDD but slightly less than the PHD for the system. It appears the System has adequate capacity to meet the System's demands with the existing source capacity. There have been no reports of low pressure events or water outages. The Company should continue to evaluate the source capacity and it's ability to meet MDD and PHD conditions.

2. The Company completed the initial monitoring for 123-TCP for Well No. 5 based on grandfathered data. Three of the four quarters of monitoring for 123-TCP from Wells Nos. 4 and 6 were completed but data for one additional quarter is missing. A review of the data in WQI shows 123-TCP sample results from March, August

and November 2018. If monitoring was completed in second quarter of 2018, the Company needs to contact the analytical laboratory and have the results submitted via EDT. If the monitoring was not completed, Wells Nos. 4 and 6 must be monitored for 123-TCP by October 31, 2019, and submit the results electronically via EDT to the Division.

3. The Company last monitored for lead and copper in August 2016 with a 90th percentile value for lead of <0.005 mg/L and a 90th percentile for copper of 0.260 mg/L. The Company can continue on the reduced triennial monitoring frequency. The next round of lead and copper tap monitoring must be completed in 2019 between the months of June and September. The results must be submitted to the Division by October 10, 2019.

4. As part of the 2017 EAR, the Company was required to submit an inventory of lead service lines in the distribution system. The Company submitted the Lead Service Line Inventory Form and stated there are 1,723 service lines and all are of unknown material. Additionally, there are 121 fittings of unknown material. Given the recent change in ownership, the Company did not have access to historical records showing the pipe materials. The Company must identify the unknown materials or submit a plan and time schedule for replacement of the unknown materials by July 1, 2020. DDW will review and approve the proposed schedule and timeline and post on the Division's website. The Company will be required to report annually progress being made towards replacing the service lines of unknown material.

Please acknowledge in writing by September 30, 2019, receipt of this water supply permit, your willingness to comply with the permit provisions and any comments or corrections to the engineering report. This permit supersedes previous domestic water supply permit issued by our office to the Meadowbrook Water Company and contains an all-inclusive list of applicable special permit provisions. If you have any questions regarding this matter, please contact Orlando Gonzalez at (559) 447-3306.

Sincerely,

Kassy D. Chauhan

Kassy D. Chauhan, P.E.
Senior Sanitary Engineer
Merced District
Central California Section
SOUTHERN CALIFORNIA BRANCH
DRINKING WATER FIELD OPERATIONS

Enclosures

cc: Merced County Environmental Health Department

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF DRINKING WATER

Certificate of Issuance

OF A

WATER SUPPLY PERMIT

TO

Cal American Water Company

For The Operation of The

Cal AM - Meadowbrook Water System

System No. 2410008

This is to certify that a water supply permit **03-11-19P-023** has been issued to the **Cal American Water Company** on **September 3, 2019** for the operation of the **Cal AM - Meadowbrook Water Company** Water System to supply water for domestic purposes to **Cal AM - Meadowbrook Water Company** Water System. The permit was issued by the State Water Resources Control Board, pursuant to the provisions of Division 104, Part 12, Chapter 4, Article 7, of the California Health and Safety Code. The permit is subject to the requirements of Title 22, California Code of Regulations, and to the conditions provided in the water supply permit.

A copy of the water supply permit is on file with the **Cal AM - Meadowbrook Water Company** Water System or may be obtained by contacting the Fresno District Office of the State Water Resources Control Board, Division of Drinking Water 265 W. Bullard Avenue, Suite 101, Fresno, CA 93704.

Kassy D. Chauhan

Kassy D. Chauhan, P.E., Merced District Engineer

STATE OF CALIFORNIA

DOMESTIC WATER SUPPLY PERMIT ISSUED TO CAL AMERICAN WATER COMPANY FOR THE OPERATION OF THE CAL AM – MEADOWBROOK WATER SYSTEM Water System No. 2410008

PERMIT NO. *03-11-19P-023* EFFECTIVE DATE: *September 3, 2019*

WHEREAS:

1. The public water system is known as the Cal AM - Meadowbrook Water System (District) whose physical address is located in the City of Merced.

2. Cal American Water Company submitted a permit application dated March 14, 2017, to take ownership of the Meadowbrook Water Company.

3. The public water system is described briefly below:

   The Cal AM- Meadowbrook water system is located in an unincorporated area of Merced County and was formed in the mid 1950's to serve a small subdivision located near the City of Merced. The system serves the Meadowbrook community including residential and commercial customers. The System supplies water to about 5,640 people through 1,670 metered service connections. Of the 1,670 service connections, there are 57 commercial connections and one landscape irrigation connection. The non-residential service connections include service to two elementary schools, three mobile home parks, one migrant housing facility, a meat packaging company, small retail businesses and three cement mixing plants. The geographic area of the Cal AM– Meadowbrook system includes approximately 3.5 square miles.

   The water system includes three active groundwater wells, chlorination facilities, and the associated distribution system. There is no storage other than the small amount provided by the pressure tanks at the well sites. The wells pump water into a single pressure zone, which includes interconnections to two

adjoining small subdivisions, known as Trinidad and Gurr. The only treatment provided is continuous chlorination.

The entire area is sewered and the raw sewage is treated at the Franklin County Water District. Sewage disposal of some residential properties located in the outer limits of the service area is provided by individual septic systems with leach lines.

And WHEREAS:

1. The Company has submitted all of the required information relating to the operation of the water system.

2. The State Water Resources Control Board, Division of Drinking Water has evaluated all of the information submitted by the City and has conducted a physical investigation of the water system.

3. The State Water Resources Control Board, Division of Drinking Water has the authority to issue domestic water supply permits pursuant to Health and Safety Code Section 116540.

THEREFORE:

1. The Company meets the criteria for and is hereby classified as a community water system.

2. The applicant has demonstrated that the Company has adequate technical, managerial, and financial capacity to operate the water system.

3. Provided the following conditions are complied with, the Company should be capable of providing water to consumers that is pure, wholesome, and potable and in compliance with statutory and regulatory drinking water requirements at all times.

THE CAL AMERICAN WATER COMPANY IS HEREBY ISSUED THIS DOMESTIC WATER SUPPLY PERMIT TO OPERATE THE CAL AM – MEADOWBROOK WATER SYSTEM.

The Company shall comply with the following permit conditions:

1. The only approved sources of supply are listed in the table below.

Source Name	Operating Status	Primary Station Code
Well 04	Active – Raw	2410008-004
Well 05	Active – Raw	2410008-005
Well 06	Active – Raw	2410008-010

2. The only approved treatment for the Cal AM – Meadowbrook water system is continuous chlorination using sodium hypochlorite. The Company shall not provide any other treatment without first submitting a permit amendment application to the State Water Resources Control

Board – Division of Drinking Water and receiving written approval from the Division. The continuous chlorination system must be operated in accordance with the approve operations plan.

3. The Company shall not use any source or treatment other than those specified in this permit without approval form the Division of Drinking Water. No changes, additions, or modifications shall be made to the approved sources or treatment without approval from the Division of Drinking Water.

4. The Company shall collect raw well water samples on at least a monthly frequency from each active well for analysis of total coliform and E.coli bacteria. The coliform tests shall be performed using a density analytical method and the results reported in units of MPN/100 mL. The results shall be submitted to the Division's Merced District Office by the 10th day of the following month.

5. The water system is classified as a Class D2 distribution system in accordance with Title 22 of the California Code of Regulations since continuous chlorination is provided. The minimum certification levels of the chief and shift operator are D2 and D1, respectively. The water system must employ adequately qualified operators at all times.

6. The Company shall submit plans and specifications for all proposed sources of supply, water treatment projects, storage tanks, and significant distribution system improvements to the Division of Drinking Water's Merced District Office, for review and approval prior to construction.

7. The Company shall maintain a cross-connection control program. All cross-connections shall be abated after being identified. Backflow prevention devices shall be tested as least once a year by a certified tester of backflow prevention devices. In the EAR, the Company shall submit information outlining the cross-connection control program for the previous year, including the name and certification of the person assigned to coordinate the program, number of inspections made, number of backflow prevention devices installed in the distribution system and the number of devices tested and repaired. The Company shall conduct cross-connection control surveys of the distribution system at least every five years.

8. The Company shall notify the State Board – Division of Drinking Water within 24 hours of any water outages, low pressure events, E.coli-positive sample results, primary drinking water standards violations or any other water system emergencies.

The special provisions contained in this permit supersedes all previous provisions in the previous permit. This permit is non-transferable. Should the Cal AM – Meadowbrook water system undergo a change of ownership, the new owner must apply for and receive a new domestic water supply permit.

Any change in the source of water for the water system, any modification of the method of treatment as described in the Permit Report, or any addition of distribution system storage reservoirs shall not be made unless an application for such change is submitted to the State Water Resources Control Board, Division of Drinking Water.

This permit shall be effective as of the date shown below.

FOR THE STATE WATER RESOURCES CONTROL BOARD, DIVISION OF DRINKING WATER

9-3-19

Kassy D. Chauhan

Kassy D. Chauhan, P.E.
Senior Sanitary Engineer
Merced District
Central California Section
SOUTHERN CALIFORNIA BRANCH
DRINKING WATER FIELD OPERATIONS

Engineering Report
For Consideration of a New Domestic Water Supply Permit to the
California American Water Company
For the Operation of The

Cal AM- Meadowbrook Water System
System No. 2410008
Merced County
September 2019

State of California Water Resources Control board
Division of Drinking Water
Kassy D. Chauhan, P.E., Senior Sanitary Engineer

I. INTRODUCTION

1.1 PURPOSE OF REPORT

The purpose of this new water supply permit is to allow California American Water Company (Company) to continue the operations of the Cal AM– Meadowbrook Water System as the new owners of the public water system. The Company submitted a permit application dated March 14, 2017, to change the ownership of the Meadowbrook Water Company to California American Water and change the system name to Cal AM – Meadowbrook. The Company resumed ownership of the former Meadowbrook Water Company on April 1, 2017, and has been operating the system since that time. The Division granted approval to operate via a conditional approval letter on March 28, 2017.

This report will document all aspects of the water system as witnessed during the sanitary survey/inspection of the water system on December 12, 2017.

1.2 BRIEF DESCRIPTION OF SYSTEM

The Cal AM- Meadowbrook water system is located in an unincorporated area of Merced County and was formed in the mid 1950's to serve a small subdivision located near the City of Merced. The system serves the Meadowbrook community including residential and commercial customers. According to the 2018 Electronic Annual Report (EAR) to the Drinking Water Program, the System supplies water to about 5,640 people through 1,670 metered service connections. Of the 1,670 service connections, there are 57 commercial connections and one landscape irrigation connection. The non-residential service connections include service to two elementary schools, three mobile home parks, one migrant housing facility, a meat packaging company, small retail businesses and three cement mixing plants. The geographic area of the Cal AM– Meadowbrook system includes approximately 3.5 square miles.

The water system includes three active groundwater wells, chlorination facilities, and the associated distribution system. The wells range in depth from 371 feet to 528 feet. There is no storage other than the small amount provided by the pressure tanks at the well sites. Currently, there are six hydropnuematic tanks installed in the system at the well sites. By the end of 2019, the number will be reduced to three with one new hydropneumatic tank being installed at each well site. The wells pump water into a single pressure zone, which includes interconnections to two adjoining small subdivisions, known as Trinidad and Gurr.

The only treatment provided is continuous chlorination. Hypochlorinators are installed at each well and inject sodium hypochlorite into the well discharge when in operation. The chlorination was installed to address bacteriological water quality problems in the distribution system.

The entire area is sewered and the raw sewage is treated at the Franklin County Water District. Sewage disposal of some residential properties located in the outer limits of the service area is provided by individual septic systems with leach lines.

1.3 ADEQUACY OF SUPPLY

The 2018 Electronic Annual Report (EAR) shows the Company's water system produced a total of 317.266 million gallons (MG) of water during 2018. The maximum day demand was not reported on the 2018 EAR but can be estimated using the maximum month of production which occurred in July 2018. During the maximum month of production, the wells produced 38.870 MG of water. The average day demand during the maximum month of production was 1.254 MG (871 gpm). The maximum day demand can be estimated by applying a peaking factor of 1.5 to the average day demand during the maximum month. Accordingly, the maximum day demand is estimated to be 1.881 MG (1,305 gpm). Similarly, the peak hour demand is estimated by applying a peaking factor of 1.5 to the maximum day demand. The peak hour demand is estimated to be 2.82 MG (1,958 gpm). During peak hour demand conditions, the customer usage rate is 1.17 gpm per service connection.

The combined capacity of the three active wells is shown in the table below:

Well Name	**Maximum Capacity, gpm**
Well No. 4	1,800
Well No. 5	630
Well No. 6	1,200
Total Capacity	**3,630 gpm**

The total capacity of the system is 3,630 gpm. The System should be able to meet their MDD and PHD conditions with the highest producing well offline. With Well No. 4 offline, the combined capacity is 1,830 gpm, which is slightly greater than the MDD but slightly less than the PHD for the system. It appears the System has adequate capacity to meet the System's demands with the existing source capacity. There have been no reports of low pressure events or water outages.

The Company should continue to evaluate the source capacity and it's ability to meet MDD and PHD conditions.

II. INVESTIGATION AND FINDINGS

2.1 SOURCES OF INFORMATION

Information for the preparation of this report was obtained from California American Water Company; files from the Merced District of the State Water Resources Control Board – Division of Drinking Water; and a file inspection/sanitary survey of the water system and facilities conducted on December 12, 2017.

The investigation, analyses, and preparation of this report were undertaken primarily by Kassy D. Chauhan, P.E., Senior Sanitary Engineer, with the Merced District Office of the Division.

2.2 SOURCES OF SUPPLY

Drinking water is obtained from three active groundwater wells drilled within the System's service area. The County has destroyed three wells (Wells Nos. 1, 2, and 3) due to low capacities or nitrate contamination concerns. Well Destruction Logs are on file with the Division for these destroyed wells. The only approved sources of supply are listed in the table below. The primary station codes for use are listed in the table.

Source Name	Operating Status	Primary Station Code
Well 04	Active - Raw	2410008-004
Well 05	Active - Raw	2410008-005
Well 06	Active – Raw	2410008-010

The active wells are all equipped with a housed chlorination system that continuously treats the water with a solution of sodium hypochlorite prior to entering the pressure tanks. The chlorination system is comprised of disinfectant storage tanks ranging in size between 100 and 125 gallons and chemical injection pumps, at each site. The water produced by the System's wells is continuously disinfected prior to entering the distribution system.

Each of the wells is described below.

Well No. 4 (Active Raw)

Well No. 4 (PS Code 2410008-004) was drilled in 1992 to a depth of 371 feet by the reverse rotary method. The well has a 24-inch diameter steel conductor casing from 0 to 18 feet and a 16-inch diameter steel casing from 0 to 371 feet. The steel casing is screened from 210 to 235 feet and 295 to 371 feet. The well has a cement annular seal to a depth of 200 feet and a gravel pack from 200 to 371 feet. The Well Driller's Report is on file. The 5 feet by 5 feet by 12 inch concrete pedestal contains a sounding tube, gravel chute and casing vent that is properly screened and downturned. The well site is equipped with a transfer switch ready to accept auxiliary power when needed.

Well No. 4 is equipped with a 125-HP electric motor and a water-lubricated vertical turbine pump capable of producing 1,800 gpm. The electric motor is controlled by a variable-frequency drive (VFD). The discharge piping includes an air-release valve, check valve, water lubrication source piping, a flow meter, an injection port for chlorination, hose bib, a non-threaded sample tap and three pressure tanks with an effective storage volume of 39,000-gallons. The well discharges directly to a 33,000-gallon hydropnuematic tank that then discharges water to the distribution system as the system pressure drops. Well No. 4 is located about 1,000 feet from the Franklin County Water District's aeration ponds.

There are currently three hydropnuematic tanks installed at Well No. 4 but two have been isolated from the distribution system. The Company plans to replace the three hydropnuematic tanks ranging in size from 22,000 gallons to 33,000 gallons with a single 20,000-gallon hydropnuematic tank. The new 20,000-gallon hydropnuematic tank will be installed by the end of 2019 and the other existing tanks will be removed from the site.

Well No. 5 (Active Raw)

Well No. 5 (PS Code 2410008-005) was drilled to a depth of 528 feet in 2001 using the reverse rotary drilling method. The Well Driller's Report is on file. The well has a 16-inch diameter steel casing from 0 to 528 feet. The steel casing is screened from intervals 307 to 325 feet, 355 to 365 feet, 400 to 410, 455 to 470 and 480 to 490 feet below the surface. The well has a cement annular seal to a depth of 275 feet. No mention of a gravel pack below the annular seal on the Well Driller's Report. The 2.5 feet by 2.5 feet by 12 inch concrete pedestal contains casing vent that is properly screened and downturned.

Well No. 5 is equipped with a 60-HP electric motor and a water-lubricated vertical turbine pump capable of producing 630 gpm. The electric motor is controlled by a variable-frequency drive (VFD). The discharge piping includes an air-release valve, check valve, water lubrication source piping fitted with a non-threaded sample tap and a hose bib, pump to waste piping with a gate valve, a flow meter, an injection port for chlorination and two pressure tanks with an effective volume of 24,750-gallons. The well discharges directly to a 10,000-gallon hydropneumatic tank that then discharge water to the distribution system as the system pressure drops. This well was drilled as a replacement of Well No. 3, which was destroyed in 2001. The well is about 100 feet away from a sewer line and about 35 feet from the destroyed Well No. 3.

The new 10,000-gallon hydropneumatic tank was installed in 2019 to replace the two existing tanks ranging in capacity from 16,000 to 33,000 gallons. The old hydropneumatic tanks have been removed from the site.

Well No. 6 (Active Raw)

Well No. 6 (PS Code 2410008-010) was drilled in 2007 to a depth of 376 feet by the reverse rotary method. The well contains a 24-inch diameter galvanized steel conductor casing to a depth of 20 feet and a 16-inch diameter steel casing from 0 to 376 feet. The casing is screened from intervals 222 to 226, 254 to 256, 266 to 270, 282 to 284 and 356 to 370 feet below the surface. The well has a cement annular seal to a depth of 210 feet. No mention of a gravel pack below the annular seal on the Well Driller's Report. The 4 feet by 4 feet by 12 inch concrete pedestal contains a sounding tube and casing vent that is properly screened and downturned.

The well is equipped with a 75-HP electric motor and a water-lubricated vertical turbine pump. The motor has a variable frequency drive (VFD) and is capable of producing up to 1,200 gpm. The well discharge piping includes an air release valve, a non-threaded sample tap, a check valve, flow meter, disinfectant injection point and one pressure tank. The well discharges directly to two hydropnuematic tanks ranging in size from 16,000 to 45,000 gallons. The Company is in the process of replacing the two hydropneumatic tanks with a single 15,000-gallon hydropneumatic tank. The project is in progress and will be completed before the end of 2019. The nearest sewer line is about 100 feet away from the wellhead.

Emergency Power

The Company currently has not installed emergency power generators at any of the well sites. However, the Company is in the process of building a generator to be installed at Well No. 4. The Company indicated that they will rent generators in the event of a power outage prior to having a generator on site. When the

generator is installed, it will be operated under load for at least 15 minutes every month to ensure proper working order.

Source Water Assessment (SWA) Report

The Division completed the SWA reports in August 2001 using the Turbo SWAP program. The Water Company supplied completed well data sheets and the possible contaminating activities (PCA) checklists for Wells Nos. 1, 2, 4 and 5. The Division obtained latitude and longitude readings for each well and plotted the protection zones calculated for each well on a map for the Water Company to complete the PCA checklists. Copies of the completed SWA reports were sent to the Water Company advising them that the Vulnerability Summaries must be included in the Water Company's annual Consumer Confidence Report.

The SWA for Well No. 6 has not been completed by the Water Company. The SWA for destroyed Well No. 1 can be replaced by using the updated well construction data from completed Well No. 6 due to their proximity. The Water Company will be required to complete PCA checklist for the revised protection zones calculated based on the well construction features and production capacity of the Well No. 6. These informational requirements are included as provisions of the revised permit.

The PCA checklists submitted were detailed and contain one hazardous waste site cleanup project from BAC Pritchard, a wood treatment facility that used chromated copper arsenate. The facility has a ground water treatment facility and monitoring wells off-site and is located in Protection Zone A of Well No. 4. The California Regional Water Quality Control Board's Sacramento office is overseeing the ongoing clean up of the facility by the responsible party's contractor, Arcadis. The ground water plume is being tracked by a network of monitoring wells. The plume is closest to destroyed Well No. 2. Well No. 4 is monitored through well head sampling by the responsible party on a regular frequency based on directives from the Regional Water Quality Control Board.

2.3 TREATMENT

The Company has chlorination stations that continuously chlorinate the water pumped from Wells Nos. 4, 5 and 6. These chlorination stations, located at their respective well sites, consist of an injection pump (Prominent Gamma) and disinfectant storage tank inside a permanent housing enclosure. Each chlorination station uses NSF/ANSI standard 60-certified 12.5 % sodium hypochlorite solution which is fed neat at full strength. The Company typically maintains a chlorine residual ranging from 0.80 to 1.0 mg/L with a target does of 0.95 mg/L. The Company submitted the Chlorination Operations Plan as required as part of the operations plan with the change of ownership documents. The Operations Plan is dated July 2017. The Division hereby approves the

operations plan containing the chlorination operations plan and the Company is required to operate the continuous chlorination treatment in accordance with this plan. If the Company makes any changes to the chlorination treatment system, a revised operations plan is required prior to implementing the changes.

2.3 STORAGE AND DISTRIBUTION SYSTEM

2.3.1 STORAGE

System water storage is not provided. The Company does have hydropneumatic tanks at each well site to maintain system pressure. As mentioned, the Company is in the process of removing all of the old hydropneumatic tanks and replacing them with new hydropnuematic tanks. The tanks will be equipped with access manholes, waste drains, pressure gauges, and air release valves. Each tank is inspected visually at least once a month.

2.3.2 DISTRIBUTION SYSTEM

The distribution system is a single pressure zone system containing around 14 miles of distribution pipe ranging in size from 4 to 12 inches in diameter. System pressures range from 40 psi to 60 psi throughout most of the distribution system with an average system pressure of about 55 psi. Most of the pipe is polyvinyl chloride (PVC) C-900, but there is also around 2 to 3 miles of 4, 6, and 8-inch diameter transite or asbestos-cement pipe, and a few thousand feet of 10 and 12-inch ductile iron pipe. Asbestos monitoring was required due to the asbestos pipe material and the corrosivity of the water produced by the wells (see water quality section).

The Company performs its own repairs of minor leaks and breaks, but contracts out all new installations and major repair work. For repairing small cracks in asbestos-cement pipe, the section of pipe is valved off and a repair clamp is installed over the crack. Repairs of all PVC pipe and larger cracks and breaks in asbestos-cement pipe are accomplished by valving off the section of pipe to be repaired, removing the section and replacing it with a new section of pipe. The replacement section is rinsed with water and swabbed with chlorine before being installed. After installation, water is flushed through the section of pipe and discharged to a storm sewer. After flushing, bacteriological samples are collected upstream and downstream of the repair work and the repaired section is put back into service. Water Company personnel direct the disinfection of pipe repairs and replacements completed by their subcontractor and collect the upstream and downstream bacteriological samples. Chlorine residual levels are routinely elevated after any leak repair or new construction. The elevated level is maintained for a few days.

Flushing:

The Company flushes distribution system deadends and fire hydrants and deadends are eliminated when the distribution system is expanded. During the most recent extreme drought, Cal AM suspended all routine flushing activities to conserve water. Flushing is only performed as needed, in response to water quality concerns. In the 2018 EAR, the Company reported they have 30 deadends and only one was flushed. The Company should consider revising their operations to include routine flushing to help ensure the water distribution lines are free of debris and sediment.

Valve Exercising:

The Company exercises the valves located in the distribution system on a routine frequency. The small valves and hydrant inspections are completed every five years (approximately 20% each year). The large valves are exercised annually. In the 2018 EAR, the Company indicated they have 314 valves ranging in size from 2 inches to 12 inches in diameter. 76 of the 314 valves were exercised in 2018.

The Company keeps records of the valve exercising and flushing events. The Valve Exercising Plan and the Flushing Plan are included in the Operations Plan for the system dated July 2017.

2.4 OPERATION AND MAINTENANCE

2.4.1 ORGANIZATION AND PERSONNEL

The water system staffing requirements under the operator certification regulation is for a Class D2 distribution system since the system provides continuous chlorination of the distribution system. A Grade D2 operator is required for the chief operator and Grade D1 for the shift operator. The Company has a Grade D2 identified as the Chief Operator and a Grade D2 identified as the Shift Operator.

The two operators and other staff are responsible for the daily operations of the water system. The daily operations include daily inspections of the wells, hydropnuematic tanks and chemical feed systems. It also includes taking chlorine residuals in the distribution system at least three times per week, valve exercising and flushing activities. The Company has an extensive tracking system for keeping track of the daily activities and operations. A Hach Pocket Colorimeter is used to measure the chlorine residual levels.

The Division receives the following monthly reports:

- Distribution system bacteriological monitoring summary that contains the monthly presence/absence test results. The routine distribution samples include the field chlorine residuals obtained during sample collection.

- Raw water monitoring consists of total coliform (density analysis) and heterotrophic plate counts before chlorination. A monitoring summary form for the raw monitoring has been provided to the Water Company to submit with the analytical results.

- Monthly Chlorination Report that includes the following information: daily water production from each well (flow meter readings), daily chlorine usage (gallons per day) and chlorine residual readings are recorded at the well site.

2.4.2 CROSS-CONNECTION CONTROL PROGRAM

The Company has a cross connection control program and the program coordinator is Hector Torres (Certification No. 02916), who is a certified Cross-Connection Control Program Specialist. The 2018 EAR indicates that the system has 67 backflow prevention assemblies in its water system and 60 were tested during the year. Six new backflow prevention devices were installed in 2018 and aren't due to be tested until 2019. Each of the backflow prevention devices must be tested annually. If the backflow fails, it must be repaired or replaced and tested again.

The Company completed a cross-connection control survey of the distribution system in 2018 and a copy of the survey results is on file at the Division. The survey showed there were six areas which were not adequately protected against potential backflow or cross connections so six new devices were installed, as referenced above. The Division recommends that the cross-connection control surveys be completed every five years. As such, the next cross-connection control survey must be completed by 2023.

2.4.3 SYSTEM PROBLEMS AND COMPLAINTS

Customer complaints are reported directly to Cal American Water Company. In 2018, the Company received a total of eight complaints. There were single complaints for taste and odor, color, and turbidity and five other complaints. The Company properly investigated the complaints and made the necessary operational adjustments such as flushing, to alleviate the questionable water quality which resulted in the compliant. The customer complaints are logged into the tracking system and reported annually on the EAR.

2.4.4 CONSUMER CONFIDENCE REPORT

The Company typically completes and distributes its Consumer Confidence Report annually by July of each year. A certification form indicates the notice is distributed electronically. The 2018 CCR was distributed to the customers on May 23, 2019. A copy of the 2018 CCR and the certification form were provided electronically to the Division on June 19, 2019. The Company must continue to provide a CCR annually by July 1st to each customer of the water system. A copy of the CCR and the certification form must be provided to the Division annually by October 1st. A copy is also provided to the California Public Utilities Commission.

2.4.5 EMERGENCY NOTIFICATION PLAN

The plan is up-to-date and on file with the Division. The ENP contains contact information (day and evening) for three Cal American contacts as well as contact information for the Division of Drinking Water and the Merced County Environmental Health Department. The ENP is dated February 20, 2019, and must be updated if any of the water system contacts change. The ENP indicates notifications will be made using a number of methods including door-to-door notices, social media postings, reverse 911 callouts and news media. It is estimated that the notifications will be completed by Cal AM staff and will be done in one to eight hours.

2.4.6 ELECTRONIC ANNUAL REPORT

The California Health and Safety Code Section 116530 states that all public water systems shall submit a technical report as required by the Division on an annual basis. The Division requires all water systems to submit the Electronic Annual Report (EAR) to the Drinking Water Program annually for the previous year, detailing population served and the number of service connections, water produced and used, status of various monitoring requirements and operator certification, system improvements and other information. The Company submitted the 2018 EAR as required.

2.4.7 BUILDING RESILIENCY

The effects of extreme weather on community water system (CWS) facilities and operations is a concern and priority of the State Water Resources Control Board (SWRCB), which is documented by the SWRCB in its Comprehensive Climate Change Resolution No. 2017-12, adopted in March 2017. DDW is reviewing each water system's level of resiliency and preparedness for changing climate conditions and extreme weather increase awareness to the potential effects to facilities and operations, and encourage the use of EPA's Climate Resilience Evaluation and Awareness Tool (CREAT). The CREAT can be found on the following website:

http://www.epa.gov/crwu

As part of the 2017 and 2018 EARs, CWSs were asked to identify their vulnerabilities, and rank them as either high, medium or low sensitivity, and proposed or implemented projects to prepare for the impacts from climate change. The System provided responses to these questions. The System indicated that there are no climate-related impacts their facilities are vulnerable to.

The Company indicated they have an emergency response plan dated June 1, 2016 and a drought continency/water shortage plan dated February 1, 2016. The Company would pull resources from other Cal-Am water systems to ensure minimal impacts to the Meadowbrook service area. The Company is in the process of building a generator for the Meadowbrook service area but only has access to emergency power through rented generators at this point. Since Cal AM has owned and operated the Meadowbrook system, there have been no outages.

The Water System indicated that they were not aware of the CREAT tool developed by USEPA for identifying climate vulnerabilities. The Water System has not used CREAT to identify vulnerabilities to the water system sources and facilities. The SWRCB strongly encourages utilities to evaluate infrastructure and operational vulnerabilities to extreme weather and other emergency conditions using tools such as CREAT and engaging in a conversation both within your water system organization and with customers on how to plan and prepare for being resilient to provide clean and safe water reliably and adequately under all current and future conditions.

2.5 SOURCE WATER QUALITY MONITORING

The Company must submit all source monitoring results through electronic data transfer (EDT). The analyzing laboratory typically makes the actual submission. The primary station codes for all sources are provided in the Department's Water Quality Monitoring database. The source monitoring code classification for the Water Company's sources is CLGA, which stands for community, large (greater than 3,300 population), groundwater, agriculture.

2.5.1 COLIFORM MONITORING FROM WELLS

Since the Company continuously disinfects the water produced by the groundwater wells prior to deliver to the customers, the System is required to conduct bacteriological monitoring of the raw water on an monthly basis. The Company collects bacteriological samples from the active wells at a frequency of once a month. The samples are analyzed for total coliform and E. coli bacteria using the MMO-MUG media (density method). The raw water bacteriological samples are analyzed using a density method and reported as MPN per 100

mLs. A review of the raw water bacteriological monitoring results since Cal AM has been the owner/operator of the Meadowbrook system, there have been six positive total coliform bacteriological results from the wellheads. Two occurred in January 2017 at Well No. 4 and four occurred at Well No. 5 in April 2018. The Company appropriately investigated each total coliform positive result, performed the necessary maintenance and resampled for total coliform bacteria. Each of the issues was resolved prior to putting the sources back online. Well No. 5 was cleaned and repaired and remained offline from April 2018 through May 2019 to allow for repairs and the replacement of the hydropneumatic tanks at this site. There have not been any positive E.coli bacteria results. A summary of the source bacteriological monitoring results is included in Appendix B.

2.5.2 GENERAL MINERALS, GENERAL PHYSICALS AND INORGANIC CHEMICALS

The Last Sample/Next Due monitoring schedule can be found in Appendix A. With the exception of nitrate, general mineral, general physical and inorganic chemical monitoring is required to be completed once every three years for the active wells. General mineral, general physical and inorganic chemical monitoring was completed in 2017. The results showed that the water produced by the active wells complies with the primary and secondary drinking water standards for these constituents.

2.5.3 NITRATES/NITRITES

As of July 2015, the California inorganic chemical monitoring regulations were revised to require nitrate monitoring results be reported as nitrogen (nitrate as N). Nitrate monitoring must be completed at least annually and nitrite monitoring must be completed every three years. Nitrate monitoring for Wells Nos. 4, 5, and 6 was last completed in May and June 2019 and all of the results were below the maximum contaminant level for nitrate. The wells must be monitored for nitrate again in 2020.

The wells were last monitored for nitrite in May 2017 and all of the results were non-detectable. The next nitrite monitoring must be completed in 2020.

2.5.4 VOLATILE ORGANIC CHEMICALS (VOC)

Volatile organic chemical (VOC) monitoring is required once every three years for all active sources after initial monitoring is complete. The Company has completed the initial VOC monitoring for all active wells. A review of the data

shows that there have not been any volatile organic chemicals detected in the water produced by the wells. The wells were last monitored for VOCs in May 2017 and must complete the next round of monitoring in 2020.

2.5.5 SYNTHETIC ORGANIC CHEMICALS (SOC)

Based on the specific monitoring schedule, the Company is required to monitor its active wells for Atrazine, Dibromochloropropane (DBCP), Ethylene Dibromide (EDB), Alachlor and Simazine, every three years once initial monitoring is complete. The Company has completed the initial monitoring for all of the wells. The last round of SOC monitoring was completed in August 2017 and all results showed non-detectable levels of these constituents in the water produced by the wells. The next round of monitoring for SOCs is due in August 2020.

1,2,3-Trichloropropane (123-TCP)

123-TCP was previously an unregulated SOC. 123-TCP is a chlorinated hydrocarbon with high chemical stability. It is a manmade chemical found at industrial and hazardous waste sites. It has been used as a cleaning and degreasing solvent and is associated with pesticide products. In 1999, the Division established a 0.005 microgram per liter (ug/L) drinking water notification level for 123-TCP. This value is based on cancer risks derived from laboratory animal studies. On July 18, 2017, the State Water Resources Control Board voted to adopt a proposed 123-TCP regulation with an MCL of 0.005 ug/L (5 parts per trillion). Thus, beginning in January 2018, all community and nontransient-noncommunity water systems were required to begin quarterly monitoring for one year for the presence of 123-TCP in groundwater and surface water sources. The 123-TCP regulation allowed for grandfathering data from samples collected in 2016 and 2017.

The Company completed the initial monitoring for 123-TCP for Well No. 5 based on grandfathered data. **Three of the four quarters of monitoring for 123-TCP from Wells Nos. 4 and 6 were completed but data for one additional quarter is missing. A review of the data in WQI shows 123-TCP sample results from March, August and November 2018. If monitoring was completed in second quarter of 2018, the Company needs to contact the analytical laboratory and have the results submitted via EDT. If the monitoring was not completed, Wells Nos. 4 and 6 must be monitored for 123-TCP by October 31, 2019, and submit the results electronically via EDT to the Division.**

2.5.6 RADIOCHEMICALS

The California Radionuclide Rule became effective on June 11, 2006. The new regulation included initial monitoring requirements consisting of four quarters of

monitoring for gross alpha activity (GA) and radium-228. If the first two quarters showed levels of GA and radium-228 below the detection limits, the final two quarters of monitoring could be waived. GA results were used to determine whether or not monitoring for uranium and radium-226 was required.
The Company has completed the initial monitoring requirements for GA and Radium-228. The ongoing monitoring frequency was determined to be one sample every nine years for Wells Nos. 4 and 5 and one sample every three years for Well No. 6. The Company must ensure enough sample is collected to analyze for GA, uranium, radium-226 and radium-228, if required. If the GA + 0.84*CE is greater than 5, uranium monitoring is required. If the GA minus the uranium is greater than 5 pCi/L, radium-226 and radium-228 monitoring is required to determine compliance with the combined radium MCL.

2.6 DISTRIBUTION SYSTEM MONITORING

2.6.1 DISTRIBUTION SYSTEM BACTERIOLOGICAL MONITORING

The Company is required to collect a minimum of six routine samples every month from the distribution system per the Total Coliform Rule based on the population and service connections in the system. The Company submitted a bacteriological sample siting plan (BSSP) dated March 2017 indicating seven distribution system samples would be collected each month. The BSSP identifies the seven routine distribution system monitoring locations, as well as the upstream and downstream repeat monitoring locations.

In addition, the California Groundwater Rule requires the collection of a raw water bacteriological sample from the well(s) in operation whenever the Company is informed there is a routine distribution system positive sample result. The source sample must be analyzed for total coliform and E.coli bacteria using a density method that will report enumerated sample results. The BSSP indicates each groundwater source online at the time the distribution system total coliform positive sample occurred, will be tested as required by the California Groundwater Rule.

In the event of a distribution system total coliform positive sample result, repeat samples (per the approved BSSP) must be collected. In the event the water pressure in the distribution system is reduced below 5 psi, the Company must collect special bacteriological samples and analyze for total coliform bacteria. All monitoring must be completed in accordance with the BSSP.

2.6.2 LEAD AND COPPER TAP MONITORING

The Lead and Copper Rule requires community water systems to monitor for lead and copper levels at consumer's taps. If action levels are exceeded,

installation of corrosion control treatment is required. If the action level for lead is exceeded, lead public education is also required. The 90th percentile values for lead should be less than 0.015 mg/L and for copper should be less than 1.3 mg/L.
The Company is required to monitor 20 customer taps in the system for lead and copper every three years. The Company has completed the initial monitoring consisting of two rounds of samples collected six months apart followed by two annual rounds of monitoring. All of the 90th percentile values have been below the action levels for lead and copper. As such, the monitoring frequency was reduced to one round of monitoring every three years. Based on the Company's population served, each reduced round of monitoring must include at least 20 sample taps. All samples must be collected form the same sites during the summer months (June through September) and the results should be submitted to the Division via the Lab-to-State portal.

The Company last monitored for lead and copper in August 2016 with a 90th percentile value for lead of <0.005 mg/L and a 90th percentile for copper of 0.260 mg/L. The Company can continue on the reduced triennial monitoring frequency. The next round of lead and copper tap monitoring must be completed in 2019 between the months of June and September. The results must be submitted to the Division by October 10, 2019.

The Division recommends that the Company provide the following information on the Company's website or physically posting the information with other water quality notices such as the CCR:

- The latest 90th percentile values for the most recent lead and copper sampling event.
- The number of sites sampled, the number of sites that exceeded the action levels, and the number of samples that were invalidated (if applicable).
- Justification for invalidation of LCR samples (if applicable).
- Information on the locations of lead service lines in the distribution system, together with a map of the identified areas and an inventory of lead plumbing in the system.
- Additional health information on how to minimize lead in drinking water if lead was detected above the action levels in more than 5%, and up to and including 10%, of sites sampled. The health information language specified in Section 64482(c), Chapter 15, Title 22 of the California Code of Regulations may be used for this purpose.

Additionally, each resident that participated in the lead and copper sampling event should be provided a copy of the results for their home. The Company must continue to use the same sites or get approval to change a site from the Division.

A summary of the lead and copper tap monitoring results is provided in Appendix D.

Lead Service Line Inventory

As part of the 2017 EAR, the Company was required to submit an inventory of the lead service lines in the distribution system. The Company submitted the Lead Service Line Inventory Form and stated there are 1,723 service lines all of unknown material. Additionally, there are 121 fittings of unknown material. Given the recent change of ownership, the Company did not have access to historical records showing the piper materials. **The Company must identify the unknown materials or submit a plan and time schedule for replacement of the unknown materials by July 1, 2020. DDW will review and approve the proposed schedule and timeline and post on the Division's website. The Company will be required to report annually progress being made towards replacing the service lines of unknown material.**

Lead Sampling in Schools

On January 17, 2017, Permit Amendment No. 2017PA – Schools was issued to the Meadowbrook water system requiring the Company to monitor for lead at any school served by the Company upon request. Additionally, Assembly Bill 746 was passed in California requiring lead monitoring at public schools and charter schools that are provided water by the system. The lead sampling in schools required by AB746 needed to be completed by July 1, 2019. The Company has completed the required lead sampling in schools.

2.6.3 DISINFECTION BYPRODUCTS MONITORING – STAGE 2 DBPR (ST2DBPR) MONITORING

The required compliance monitoring established for the Company's ST2DBPR is to monitor at one site every twelve months. The next set of samples including total trihalomethanes and haloacetic acids (TTHM and HAA5) must be collected in June 2020. All ST2DBPR monitoring results must be submitted electronically via EDT using primary station code 2410008-900. The ST2DBPR monitoring location is established at 2425 San Joaquin Avenue located within the distribution system. All TTHM and HAA5 monitoring results have been below the MCLs for these constituents.

2.6.4 ASBESTOS MONITORING

The Company's distribution system contains asbestos-cement (AC) pipe. The water's potential for asbestos contamination from leaching of the cement binder in the AC pipe is determined from the Aggressive Index (AI) from the well sources. Water with an AI over 12 is considered relatively non-aggressive, whereas water with an AI under 10 is considered very aggressive. Water with an AI between 10 and 12 is considered moderately aggressive. The Division developed a criteria of an AI of less than or equal to 11.5 to determine when asbestos monitoring is required. The AI is determined as:

$$AI = pH + \log (AH)$$

where

A = total alkalinity as $CaCO_3$ in mg/L
H = calcium hardness as $CaCO_3$ in mg/L*

* Equal to Ca in mg/L multiplied by 2.5

A review of the water produced by Wells Nos. 4 and 5 was determined to be moderately aggressive and Well No. 6 is relatively non-aggressive to AC pipe. As such, asbestos monitoring is required to be completed at least once every nine years fin the distribution system. The last asbestos monitoring was completed in May 2017 and showed nondetectable levels of asbestos. The next round of monitoring for asbestos in the distribution system is due by May 2026. All distribution system asbestos monitoring must be completed at Hudson sample site and submitted electronically via EDT using primary station code 2410008-901.

III. APPRAISAL OF SANITARY HAZARDS & PUBLIC HEALTH SAFEGUARDS

The Cal American – Meadowbrook water supply system was found to be in good operating condition. The system has adequate source capacity to meet maximum day demand and peak hour demand conditions. The water produced by the wells meets all primary and secondary drinking water standards.

IV. CONCLUSIONS AND RECOMMENDATIONS

It is the finding of the State Water Resources Control Board – Division of Drinking Water that the Cal AM- Meadowbrook water system is capable of supplying safe, wholesome, and potable water with competent operation the existing water system. It is recommended that a revised domestic water supply permit be granted to Cal American Water Company to continue operation of the Cal AM–Meadowbrook Water System subject to the following conditions:

1. The only approved sources of supply are listed in the table below.

Source Name	Operating Status	Primary Station Code
Well 04	Active – Raw	2410008-004
Well 05	Active – Raw	2410008-005
Well 06	Active – Raw	2410008-010

2. The only approved treatment for the Cal AM – Meadowbrook water system is continuous chlorination using sodium hypochlorite. The Company shall not provide any other treatment without first submitting a permit amendment application to the State Water Resources Control Board – Division of Drinking Water and receiving written approval from the Division. The continuous chlorination system must be operated in accordance with the approve operations plan.

3. The Company shall not use any source or treatment other than those specified in this permit without approval form the Division of Drinking Water. No changes, additions, or modifications shall be made to the approved sources or treatment without approval from the Division of Drinking Water.

4. The Company shall collect raw well water samples on at least a monthly frequency from each active well for analysis of total coliform and E.coli bacteria. The coliform tests shall be performed using a density analytical method and the results reported in units of MPN/100 mL. The results shall be submitted to the Division's Merced District Office by the 10th day of the following month.

5. The water system is classified as a Class D2 distribution system in accordance with Title 22 of the California Code of Regulations since continuous chlorination is provided. The minimum certification levels of the chief and shift operator are D2 and D1, respectively. The water system must employ adequately qualified operators at all times.

6. The Company shall submit plans and specifications for all proposed sources of supply, water treatment projects, storage tanks, and significant distribution system improvements to the Division of Drinking Water's Merced District Office, for review and approval prior to construction.

7. The Company shall maintain a cross-connection control program. All cross-connections shall be abated after being identified. Backflow prevention devices shall be tested as least once a year by a certified tester of backflow prevention devices. In the EAR, the Company shall submit information outlining the cross-connection control program for the previous year, including the name and certification of the person assigned to coordinate the program, number of inspections made, number of

backflow prevention devices installed in the distribution system and the number of devices tested and repaired. The Company shall conduct cross-connection control surveys of the distribution system at least every five years.

8. The Company shall notify the State Board – Division of Drinking Water within 24 hours of any water outages, low pressure events, E.coli-positive sample results, primary drinking water standards violations or any other water system emergencies.

APPENDICES

A. Last Sample/Next Due Monitoring Schedule
B. Summary of Bacteriological Monitoring from Sources
C. Summary of Bacteriological Monitoring from Distribution System
D. Lead and Copper Tap Monitoring Summary of Results

APPENDIX A:
Last Sample/Next Due Monitoring Schedule

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: 004 NAME: WELL 04 CLASS: CLGA STATUS: Active

PSCODE		GROUP/CONSTITUENT IDENTIFICATION		LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 004		**MEADOWBROOK WC**		**004**	**WELL 04**								
	GP	**SECONDARY/GP**											
	00440	BICARBONATE ALKALINITY		290	MG/L	--------	--------	2017/06/13	9	36		2020/06	
	00916	CALCIUM		47	MG/L	--------	--------	2017/06/13	10	36		2020/06	
	00445	CARBONATE ALKALINITY	<	ND	MG/L	--------	--------	2017/06/13	9	36		2020/06	
	00940	CHLORIDE		00000004.7	MG/L	500	--------	2017/05/25	8	36		2020/05	
	00081	COLOR	<	ND	UNITS	15	--------	2017/06/13	8	36		2020/06	
	01042	COPPER	<	0000000050	UG/L	1000	50	2017/05/25	8	36		2020/05	
	38260	FOAMING AGENTS (MBAS)	<	ND	MG/L	.5	--------	2017/06/13	8	36		2020/06	
	00900	HARDNESS (TOTAL) AS CACO3		190	MG/L	--------	--------	2017/06/13	9	36		2020/06	
	71830	HYDROXIDE ALKALINITY	<	ND	MG/L	--------	--------	2017/06/13	9	36		2020/06	
	01045	IRON		0000000230	UG/L	300	100	2017/05/25	8	36		2020/05	
	00927	MAGNESIUM		17	MG/L	--------	--------	2017/06/13	10	36		2020/06	
	01055	MANGANESE	<	0000000020	UG/L	50	20	2017/05/25	8	36		2020/05	
	00086	ODOR THRESHOLD @ 60 C	<	ND	TON	3	1	2017/06/13	8	36		2020/06	
	00403	PH, LABORATORY		7.7		--------	--------	2017/06/13	9	36		2020/06	
	01077	SILVER	<	0000000010	UG/L	100	10	2017/05/25	8	36		2020/05	
	00929	SODIUM		00000031.9	MG/L	--------	--------	2017/05/25	8	36		2020/05	
	00095	SPECIFIC CONDUCTANCE		480	US	1600	--------	2017/06/13	13	36		2020/06	
	00945	SULFATE		00000009.0	MG/L	500	.5	2017/05/25	8	36		2020/05	
	70300	TOTAL DISSOLVED SOLIDS		300	MG/L	1000	--------	2017/06/13	8	36		2020/06	
	82079	TURBIDITY, LABORATORY		0.45	NTU	5	.1	2017/06/13	8	36		2020/06	
	01092	ZINC	<	0000000050	UG/L	5000	50	2017/05/25	8	36		2020/05	
	IO	**INORGANIC**											
	01105	ALUMINUM	<	0000000050	UG/L	1000	50	2017/05/25	8	36		2020/05	
	01097	ANTIMONY	<	00000006.0	UG/L	6	6	2017/05/25	8	36		2020/05	
	01002	ARSENIC	<	0000000002	UG/L	10	2	2017/05/25	13	36		2020/05	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: NAME: WELL 04 CLASS: CLGA STATUS: Active

PSCODE		GROUP/CONSTITUENT IDENTIFICATION			LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 004	**IO**	**INORGANIC**												
		01007	BARIUM		0000000300	UG/L	1000	100	2017/05/25	8	36		2020/05	
		01012	BERYLLIUM	<	00000001.0	UG/L	4	1	2017/05/25	8	36		2020/05	
		01027	CADMIUM	<	00000000 1	UG/L	5	1	2017/05/25	8	36		2020/05	
		01034	CHROMIUM (TOTAL)	<	0000000010	UG/L	50	10	2017/05/25	21	36		2020/05	
		00951	FLUORIDE (F) (NATURAL-SOURCE)		0000000.10	MG/L	2	.1	2017/05/25	9	36		2020/05	
		71900	MERCURY	<	00000001.0	UG/L	2	1	2017/05/25	8	36		2020/05	
		01067	NICKEL	<	0000000010	UG/L	100	10	2017/05/25	8	36		2020/05	
		A-031	PERCHLORATE	<	00000004.0	UG/L	6	4	2017/05/25	6	36		2020/05	
		01147	SELENIUM	<	0000000005	UG/L	50	5	2017/05/25	8	36		2020/05	
		01059	THALLIUM	<	00000001.0	UG/L	2	1	2017/05/25	8	36		2020/05	
	NI	**NITRATE/NITRITE**												
		00618	NITRATE (AS N)		0000003.24	mg/L	10	.4	2019/05/13	33	12		2020/05	
		00620	NITRITE (AS N)	<	00000000.1	mg/L	1	.4	2017/05/25	12	36		2020/05	
	RA	**RADIOLOGICAL**												
		01501	GROSS ALPHA	<	ND	PCI/L	15	3	2017/08/10	23	108	M	2026/08	
	S1	**REGULATED VOC**												
		34506	1,1,1-TRICHLOROETHANE	<	00000000.5	UG/L	200	.5	2017/05/25	8	36		2020/05	
		34516	1,1,2,2-TETRACHLOROETHANE	<	00000000.5	UG/L	1	.5	2017/05/25	8	36		2020/05	
		34511	1,1,2-TRICHLOROETHANE	<	00000000.5	UG/L	5	.5	2017/05/25	8	36		2020/05	
		34496	1,1-DICHLOROETHANE	<	00000000.5	UG/L	5	.5	2017/05/25	8	36		2020/05	
		34501	1,1-DICHLOROETHYLENE	<	00000000.5	UG/L	6	.5	2017/05/25	8	36		2020/05	
		34551	1,2,4-TRICHLOROBENZENE	<	00000000.5	UG/L	5	.5	2017/05/25	8	36		2020/05	
		34536	1,2-DICHLOROBENZENE	<	00000000.5	UG/L	600	.5	2017/05/25	8	36		2020/05	
		34531	1,2-DICHLOROETHANE	<	00000000.5	UG/L	.5	.5	2017/05/25	8	36		2020/05	
		34541	1,2-DICHLOROPROPANE	<	00000000.5	UG/L	5	.5	2017/05/25	8	36		2020/05	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: NAME: WELL 04 CLASS: CLGA STATUS: Active

PSCODE		GROUP/CONSTITUENT IDENTIFICATION			LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 004	**S1**	34561	1,3-DICHLOROPROPENE (TOTAL)	<	00000000.5	UG/L	.5	.5	2017/05/25	8	36		2020/05	
		34571	1,4-DICHLOROBENZENE	<	00000000.5	UG/L	5	.5	2017/05/25	8	36		2020/05	
		34030	BENZENE	<	00000000.5	UG/L	1	.5	2017/05/25	8	36		2020/05	
		32102	CARBON TETRACHLORIDE	<	00000000.5	UG/L	.5	.5	2017/05/25	8	36		2020/05	
		77093	CIS-1,2-DICHLOROETHYLENE	<	00000000.5	UG/L	6	.5	2017/05/25	8	36		2020/05	
		34423	DICHLOROMETHANE	<	00000000.5	UG/L	5	.5	2017/05/25	8	36		2020/05	
		34371	ETHYL BENZENE	<	00000000.5	UG/L	300	.5	2017/05/25	8	36		2020/05	
		46491	METHYL-TERT-BUTYL-ETHER (MTBE)	<	00000003.0	UG/L	13	3	2017/05/25	11	36		2020/05	
		34301	MONOCHLOROBENZENE	<	00000000.5	UG/L	70	.5	2017/05/25	8	36		2020/05	
		77128	STYRENE	<	00000000.5	UG/L	100	.5	2017/05/25	8	36		2020/05	
		34475	TETRACHLOROETHYLENE	<	00000000.5	UG/L	5	.5	2017/05/25	8	36		2020/05	
		34010	TOLUENE	<	00000000.5	UG/L	150	.5	2017/05/25	8	36		2020/05	
		34546	TRANS-1,2-DICHLOROETHYLENE	<	00000000.5	UG/L	10	.5	2017/05/25	8	36		2020/05	
		39180	TRICHLOROETHYLENE	<	00000000.5	UG/L	5	.5	2017/05/25	8	36		2020/05	
		34488	TRICHLOROFLUOROMETHANE FREON 11	<	00000005.0	UG/L	150	5	2017/05/25	8	36		2020/05	
		81611	TRICHLOROTRIFLUOROETHANE (FREON 113)	<	00000010.0	UG/L	1200	10	2017/05/25	8	36		2020/05	
		39175	VINYL CHLORIDE	<	00000000.5	UG/L	.5	.5	2017/05/25	8	36		2020/05	
		81551	XYLENES (TOTAL)	<	00000000.5	UG/L	1750	0.5	2017/05/25	8	36		2020/05	
	S2	**REGULATED SOC**												
		77443	1,2,3-TRICHLOROPROPANE (1,2,3-TCP)	<	ND	UG/L	0.005	0.005	2018/11/15	3	3		2019/02	**DUE NOW**
		77825	ALACHLOR	<	00000001.0	UG/L	2	1	2017/08/10	10	36		2020/08	
		39033	ATRAZINE	<	00000000.5	UG/L	1	.5	2017/08/10	10	36		2020/08	
		38761	DIBROMOCHLOROPROPANE (DBCP)	<	0000000.01	UG/L	.2	.01	2017/08/10	9	36		2020/08	
		77651	ETHYLENE DIBROMIDE (EDB)	<	0000000.02	UG/L	.05	.02	2017/08/10	9	36		2020/08	
		39055	SIMAZINE	<	0000001.00	UG/L	4	1	2017/08/10	10	36		2020/08	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: 005 NAME: WELL 05 CLASS: CLGA STATUS: Active

PSCODE		GROUP/CONSTITUENT IDENTIFICATION		LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 005		**MEADOWBROOK WC**		**005**	**WELL 05**								
	GP	**SECONDARY/GP**											
		00440 BICARBONATE ALKALINITY		130	MG/L	--------	--------	2017/05/09	6	36		2020/05	
		00916 CALCIUM		00000000023	MG/L	--------	--------	2017/05/09	7	36		2020/05	
		00445 CARBONATE ALKALINITY	<	ND	MG/L	--------	--------	2017/05/09	6	36		2020/05	
		00940 CHLORIDE		00000016.0	MG/L	500	--------	2017/05/09	6	36		2020/05	
		00081 COLOR	<	ND	UNITS	15	--------	2017/05/09	6	36		2020/05	
		01042 COPPER	<	00000000050	UG/L	1000	50	2017/05/09	6	36		2020/05	
		38260 FOAMING AGENTS (MBAS)	<	ND	MG/L	.5	--------	2017/05/09	6	36		2020/05	
		00900 HARDNESS (TOTAL) AS CACO3		75	MG/L	--------	--------	2017/05/09	6	36		2020/05	
		71830 HYDROXIDE ALKALINITY	<	ND	MG/L	--------	--------	2017/05/09	6	36		2020/05	
		01045 IRON	<	00000001000	UG/L	300	100	2017/05/09	6	36		2020/05	
		00927 MAGNESIUM		00000000005	MG/L	--------	--------	2017/05/09	7	36		2020/05	
		01055 MANGANESE	<	00000000020	UG/L	50	20	2017/05/09	6	36		2020/05	
		00086 ODOR THRESHOLD @ 60 C	<	ND	TON	3	1	2017/05/09	6	36		2020/05	
		00403 PH, LABORATORY		7.9		--------	--------	2017/05/09	6	36		2020/05	
		01077 SILVER	<	00000000010	UG/L	100	10	2017/05/09	6	36		2020/05	
		00929 SODIUM		00000029.1	MG/L	--------	--------	2017/05/09	6	36		2020/05	
		00095 SPECIFIC CONDUCTANCE		290	US	1600	--------	2017/05/09	10	36		2020/05	
		00945 SULFATE		00000008.1	MG/L	500	.5	2017/05/09	6	36		2020/05	
		70300 TOTAL DISSOLVED SOLIDS		200	MG/L	1000	--------	2017/05/09	6	36		2020/05	
		82079 TURBIDITY, LABORATORY		0.14	NTU	5	.1	2017/05/09	6	36		2020/05	
		01092 ZINC	<	00000000050	UG/L	5000	50	2017/05/09	6	36		2020/05	
	IO	**INORGANIC**											
		01105 ALUMINUM	<	00000000050	UG/L	1000	50	2017/05/09	6	36		2020/05	
		01097 ANTIMONY	<	00000006.0	UG/L	6	6	2017/05/09	6	36		2020/05	
		01002 ARSENIC		00000000003	UG/L	10	2	2017/05/09	6	36		2020/05	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: NAME: WELL 05 CLASS: CLGA STATUS: Active

PSCODE		GROUP/CONSTITUENT IDENTIFICATION		LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 005	**IO**	**INORGANIC**											
	01007	BARIUM		0000000100	UG/L	1000	100	2017/05/09	6	36		2020/05	
	01012	BERYLLIUM	<	00000001.0	UG/L	4	1	2017/05/09	6	36		2020/05	
	01027	CADMIUM	<	0000000001	UG/L	5	1	2017/05/09	6	36		2020/05	
	01034	CHROMIUM (TOTAL)	<	0000000010	UG/L	50	10	2017/05/09	6	36		2020/05	
	00951	FLUORIDE (F) (NATURAL-SOURCE)		0000000.14	MG/L	2	.1	2017/05/09	6	36		2020/05	
	71900	MERCURY	<	00000001.0	UG/L	2	1	2017/05/09	6	36		2020/05	
	01067	NICKEL	<	0000000010	UG/L	100	10	2017/05/09	6	36		2020/05	
	A-031	PERCHLORATE	<	00000004.0	UG/L	6	4	2017/05/09	5	36		2020/05	
	01147	SELENIUM	<	0000000005	UG/L	50	5	2017/05/09	6	36		2020/05	
	01059	THALLIUM	<	00000001.0	UG/L	2	1	2017/05/09	6	36		2020/05	
	NI	**NITRATE/NITRITE**											
	00618	NITRATE (AS N)		3.3	mg/L	10	.4	2019/06/12	24	12		2020/06	
	00620	NITRITE (AS N)	<	00000000.1	mg/L	1	.4	2017/05/09	6	36		2020/05	
	RA	**RADIOLOGICAL**											
	01501	GROSS ALPHA	<	ND	PCI/L	15	3	2016/09/08	11	108	M	2025/09	
	S1	**REGULATED VOC**											
	34506	1,1,1-TRICHLOROETHANE	<	00000000.5	UG/L	200	.5	2017/05/09	6	36		2020/05	
	34516	1,1,2,2-TETRACHLOROETHANE	<	00000000.5	UG/L	1	.5	2017/05/09	6	36		2020/05	
	34511	1,1,2-TRICHLOROETHANE	<	00000000.5	UG/L	5	.5	2017/05/09	6	36		2020/05	
	34496	1,1-DICHLOROETHANE	<	00000000.5	UG/L	5	.5	2017/05/09	6	36		2020/05	
	34501	1,1-DICHLOROETHYLENE	<	00000000.5	UG/L	6	.5	2017/05/09	6	36		2020/05	
	34551	1,2,4-TRICHLOROBENZENE	<	00000000.5	UG/L	5	.5	2017/05/09	6	36		2020/05	
	34536	1,2-DICHLOROBENZENE	<	00000000.5	UG/L	600	.5	2017/05/09	6	36		2020/05	
	34531	1,2-DICHLOROETHANE	<	00000000.5	UG/L	.5	.5	2017/05/09	6	36		2020/05	
	34541	1,2-DICHLOROPROPANE	<	00000000.5	UG/L	5	.5	2017/05/09	6	36		2020/05	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: NAME: WELL 05 CLASS: CLGA STATUS: Active

PSCODE		GROUP/CONSTITUENT IDENTIFICATION			LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 005	**S1**	34561	1,3-DICHLOROPROPENE (TOTAL)	<	00000000.5	UG/L	.5	.5	2017/05/09	6	36		2020/05	
		34571	1,4-DICHLOROBENZENE	<	00000000.5	UG/L	5	.5	2017/05/09	6	36		2020/05	
		34030	BENZENE	<	00000000.5	UG/L	1	.5	2017/05/09	6	36		2020/05	
		32102	CARBON TETRACHLORIDE	<	00000000.5	UG/L	.5	.5	2017/05/09	6	36		2020/05	
		77093	CIS-1,2-DICHLOROETHYLENE	<	00000000.5	UG/L	6	.5	2017/05/09	6	36		2020/05	
		34423	DICHLOROMETHANE	<	00000000.5	UG/L	5	.5	2017/05/09	6	36		2020/05	
		34371	ETHYL BENZENE	<	00000000.5	UG/L	300	.5	2017/05/09	6	36		2020/05	
		46491	METHYL-TERT-BUTYL-ETHER (MTBE)	<	00000003.0	UG/L	13	3	2017/05/09	6	36		2020/05	
		34301	MONOCHLOROBENZENE	<	00000000.5	UG/L	70	.5	2017/05/09	6	36		2020/05	
		77128	STYRENE	<	00000000.5	UG/L	100	.5	2017/05/09	6	36		2020/05	
		34475	TETRACHLOROETHYLENE	<	00000000.5	UG/L	5	.5	2017/05/09	6	36		2020/05	
		34010	TOLUENE	<	00000000.5	UG/L	150	.5	2017/05/09	6	36		2020/05	
		34546	TRANS-1,2-DICHLOROETHYLENE	<	00000000.5	UG/L	10	.5	2017/05/09	6	36		2020/05	
		39180	TRICHLOROETHYLENE	<	00000000.5	UG/L	5	.5	2017/05/09	6	36		2020/05	
		34488	TRICHLOROFLUOROMETHANE FREON 11	<	00000005.0	UG/L	150	5	2017/05/09	6	36		2020/05	
		81611	TRICHLOROTRIFLUOROETHANE (FREON 113)	<	00000010.0	UG/L	1200	10	2017/05/09	6	36		2020/05	
		39175	VINYL CHLORIDE	<	00000000.5	UG/L	.5	.5	2017/05/09	6	36		2020/05	
		81551	XYLENES (TOTAL)	<	00000000.5	UG/L	1750	0.5	2017/05/09	6	36		2020/05	
	S2	**REGULATED SOC**												
		77443	1,2,3-TRICHLOROPROPANE (1,2,3-TCP)		0	UG/L	0.005	0.005	2019/08/26	5	36		2022/08	
		77825	ALACHLOR	<	00000001.0	UG/L	2	1	2017/08/08	8	36		2020/08	
		39033	ATRAZINE	<	00000000.5	UG/L	1	.5	2017/08/08	8	36		2020/08	
		38761	DIBROMOCHLOROPROPANE (DBCP)	<	0000000.01	UG/L	.2	.01	2017/08/08	7	36		2020/08	
		77651	ETHYLENE DIBROMIDE (EDB)	<	0000000.02	UG/L	.05	.02	2017/08/08	7	36		2020/08	
		39055	SIMAZINE	<	0000001.00	UG/L	4	1	2017/08/08	8	36		2020/08	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: 010 NAME: WELL 06 CLASS: CLGA STATUS: Active

PSCODE	GROUP/CONSTITUENT IDENTIFICATION			LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 010	**MEADOWBROOK WC**			**010**	**WELL 06**								
	GP	**SECONDARY/GP**											
	00440	BICARBONATE ALKALINITY		360	MG/L	--------	--------	2017/05/04	4	36		2020/05	
	00916	CALCIUM		00000000 70	MG/L	--------	--------	2017/05/04	5	36		2020/05	
	00445	CARBONATE ALKALINITY	<	ND	MG/L	--------	--------	2017/05/04	4	36		2020/05	
	00940	CHLORIDE		00000029.0	MG/L	500	--------	2017/05/04	4	36		2020/05	
	00081	COLOR	<	ND	UNITS	15	--------	2017/05/04	4	36		2020/05	
	01042	COPPER	<	00000000 50	UG/L	1000	50	2017/05/04	4	36		2020/05	
	38260	FOAMING AGENTS (MBAS)	<	ND	MG/L	.5	--------	2017/05/04	4	36		2020/05	
	00900	HARDNESS (TOTAL) AS CACO3		290	MG/L	--------	--------	2017/05/04	4	36		2020/05	
	71830	HYDROXIDE ALKALINITY	<	ND	MG/L	--------	--------	2017/05/04	4	36		2020/05	
	01045	IRON	<	00000001 00	UG/L	300	100	2017/05/04	4	36		2020/05	
	00927	MAGNESIUM		00000000 29	MG/L	--------	--------	2017/05/04	5	36		2020/05	
	01055	MANGANESE	<	00000000 20	UG/L	50	20	2017/05/04	4	36		2020/05	
	00086	ODOR THRESHOLD @ 60 C	<	ND	TON	3	1	2017/05/04	4	36		2020/05	
	00403	PH, LABORATORY		7.7		--------	--------	2017/05/04	5	36		2020/05	
	01077	SILVER	<	00000000 10	UG/L	100	10	2017/05/04	4	36		2020/05	
	00929	SODIUM		00000029.7	MG/L	--------	--------	2017/05/04	4	36		2020/05	
	00095	SPECIFIC CONDUCTANCE		680	US	1600	--------	2017/05/04	8	36		2020/05	
	00945	SULFATE		00000019.0	MG/L	500	.5	2017/05/04	4	36		2020/05	
	70300	TOTAL DISSOLVED SOLIDS		430	MG/L	1000	--------	2017/05/04	4	36		2020/05	
	82079	TURBIDITY, LABORATORY		0.11	NTU	5	.1	2017/05/04	4	36		2020/05	
	01092	ZINC	<	00000000 50	UG/L	5000	50	2017/05/04	4	36		2020/05	
	IO	**INORGANIC**											
	01105	ALUMINUM	<	00000000 50	UG/L	1000	50	2017/05/04	4	36		2020/05	
	01097	ANTIMONY	<	00000006.0	UG/L	6	6	2017/05/04	4	36		2020/05	
	01002	ARSENIC	<	00000000 2	UG/L	10	2	2017/05/04	4	36		2020/05	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: NAME: WELL 06 CLASS: CLGA STATUS: Active

PSCODE	GROUP/CONSTITUENT IDENTIFICATION			LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 010	**IO**	**INORGANIC**											
	01007	BARIUM		0000000400	UG/L	1000	100	2017/05/04	4	36		2020/05	
	01012	BERYLLIUM	<	00000001.0	UG/L	4	1	2017/05/04	4	36		2020/05	
	01027	CADMIUM	<	00000000 1	UG/L	5	1	2017/05/04	4	36		2020/05	
	01034	CHROMIUM (TOTAL)	<	0000000010	UG/L	50	10	2017/05/04	4	36		2020/05	
	00951	FLUORIDE (F) (NATURAL-SOURCE)	<	0000000.10	MG/L	2	.1	2017/05/04	4	36		2020/05	
	71900	MERCURY	<	00000001.0	UG/L	2	1	2017/05/04	4	36		2020/05	
	01067	NICKEL	<	0000000010	UG/L	100	10	2017/05/04	4	36		2020/05	
	A-031	PERCHLORATE	<	00000004.0	UG/L	6	4	2017/05/04	5	36		2020/05	
	01147	SELENIUM	<	0000000005	UG/L	50	5	2017/05/04	4	36		2020/05	
	01059	THALLIUM	<	00000001.0	UG/L	2	1	2017/05/04	4	36		2020/05	
	NI	**NITRATE/NITRITE**											
	00618	NITRATE (AS N)		0000006.40	mg/L	10	.4	2019/05/13	24	12		2020/05	
	00620	NITRITE (AS N)	<	00000000.1	mg/L	1	.4	2017/05/04	4	36		2020/05	
	RA	**RADIOLOGICAL**											
	01501	GROSS ALPHA		10.6	PCI/L	15	3	2018/05/10	8	36	M	2021/05	
	S1	**REGULATED VOC**											
	34506	1,1,1-TRICHLOROETHANE	<	00000000.5	UG/L	200	.5	2017/05/04	5	36		2020/05	
	34516	1,1,2,2-TETRACHLOROETHANE	<	00000000.5	UG/L	1	.5	2017/05/04	5	36		2020/05	
	34511	1,1,2-TRICHLOROETHANE	<	00000000.5	UG/L	5	.5	2017/05/04	5	36		2020/05	
	34496	1,1-DICHLOROETHANE	<	00000000.5	UG/L	5	.5	2017/05/04	5	36		2020/05	
	34501	1,1-DICHLOROETHYLENE	<	00000000.5	UG/L	6	.5	2017/05/04	5	36		2020/05	
	34551	1,2,4-TRICHLOROBENZENE	<	00000000.5	UG/L	5	.5	2017/05/04	5	36		2020/05	
	34536	1,2-DICHLOROBENZENE	<	00000000.5	UG/L	600	.5	2017/05/04	5	36		2020/05	
	34531	1,2-DICHLOROETHANE	<	00000000.5	UG/L	.5	.5	2017/05/04	5	36		2020/05	
	34541	1,2-DICHLOROPROPANE	<	00000000.5	UG/L	5	.5	2017/05/04	5	36		2020/05	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: NAME: WELL 06 CLASS: CLGA STATUS: Active

PSCODE		GROUP/CONSTITUENT IDENTIFICATION			LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 010	**S1**	34561	1,3-DICHLOROPROPENE (TOTAL)	<	00000000.5	UG/L	.5	.5	2017/05/04	5	36		2020/05	
		34571	1,4-DICHLOROBENZENE	<	00000000.5	UG/L	5	.5	2017/05/04	5	36		2020/05	
		34030	BENZENE	<	00000000.5	UG/L	1	.5	2017/05/04	5	36		2020/05	
		32102	CARBON TETRACHLORIDE	<	00000000.5	UG/L	.5	.5	2017/05/04	5	36		2020/05	
		77093	CIS-1,2-DICHLOROETHYLENE	<	00000000.5	UG/L	6	.5	2017/05/04	5	36		2020/05	
		34423	DICHLOROMETHANE	<	00000000.5	UG/L	5	.5	2017/05/04	5	36		2020/05	
		34371	ETHYL BENZENE	<	00000000.5	UG/L	300	.5	2017/05/04	5	36		2020/05	
		46491	METHYL-TERT-BUTYL-ETHER (MTBE)	<	00000003.0	UG/L	13	3	2017/05/04	8	36		2020/05	
		34301	MONOCHLOROBENZENE	<	00000000.5	UG/L	70	.5	2017/05/04	5	36		2020/05	
		77128	STYRENE	<	00000000.5	UG/L	100	.5	2017/05/04	5	36		2020/05	
		34475	TETRACHLOROETHYLENE	<	00000000.5	UG/L	5	.5	2017/05/04	5	36		2020/05	
		34010	TOLUENE	<	00000000.5	UG/L	150	.5	2017/05/04	5	36		2020/05	
		34546	TRANS-1,2-DICHLOROETHYLENE	<	00000000.5	UG/L	10	.5	2017/05/04	5	36		2020/05	
		39180	TRICHLOROETHYLENE	<	00000000.5	UG/L	5	.5	2017/05/04	5	36		2020/05	
		34488	TRICHLOROFLUOROMETHANE FREON 11	<	00000005.0	UG/L	150	5	2017/05/04	5	36		2020/05	
		81611	TRICHLOROTRIFLUOROETHANE (FREON 113)	<	00000010.0	UG/L	1200	10	2017/05/04	5	36		2020/05	
		39175	VINYL CHLORIDE	<	00000000.5	UG/L	.5	.5	2017/05/04	5	36		2020/05	
		81551	XYLENES (TOTAL)	<	00000000.5	UG/L	1750	0.5	2017/05/04	5	36		2020/05	
	S2	**REGULATED SOC**												
		77443	1,2,3-TRICHLOROPROPANE (1,2,3-TCP)	<	ND	UG/L	0.005	0.005	2018/11/15	3	3		2019/02	**DUE NOW**
		77825	ALACHLOR	<	00000001.0	UG/L	2	1	2017/08/08	7	36		2020/08	
		39033	ATRAZINE	<	00000000.5	UG/L	1	.5	2019/05/13	14	36		2022/05	
		38761	DIBROMOCHLOROPROPANE (DBCP)	<	0000000.01	UG/L	.2	.01	2017/08/08	6	36		2020/08	
		77651	ETHYLENE DIBROMIDE (EDB)	<	0000000.02	UG/L	.05	.02	2017/08/08	6	36		2020/08	
		39055	SIMAZINE	<	0000001.00	UG/L	4	1	2017/08/08	7	36		2020/08	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: 900 NAME: ST2DBP - 2425 SAN JOAQUIN AVE CLASS: DBPA STATUS: Active

PSCODE		GROUP/CONSTITUENT IDENTIFICATION		LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 900		**MEADOWBROOK WC**		**900**	**ST2DBP - 2425 SAN JOAQUIN AVE**								
	DBP	**DISINFECTION BYPRODUCTS**											
	32101	BROMODICHLOROMETHANE (THM)	<	1.0	UG/L	--------	1	2019/06/12	5	12		2020/06	
	32104	BROMOFORM (THM)		1.7	UG/L	--------	1	2019/06/12	5	12		2020/06	
	32106	CHLOROFORM (THM)	<	1.0	UG/L	--------	1	2019/06/12	5	12		2020/06	
	82721	DIBROMOACETIC ACID (DBAA)		1.1	UG/L	--------	1	2019/06/12	5	12		2020/06	
	32105	DIBROMOCHLOROMETHANE (THM)		1.7	UG/L	--------	1	2019/06/12	5	12		2020/06	
	77288	DICHLOROACETIC ACID (DCAA)	<	1.0	UG/L	--------	1	2019/06/12	5	12		2020/06	
	A-049	HALOACETIC ACIDS (5) (HAA5)		1.1	UG/L	60	--------	2019/06/12	5	12		2020/06	
	A-041	MONOBROMOACETIC ACID (MBAA)	<	1.0	UG/L	--------	1	2019/06/12	5	12		2020/06	
	A-042	MONOCHLOROACETIC ACID (MCAA)	<	2.0	UG/L	--------	2	2019/06/12	5	12		2020/06	
	82080	TOTAL TRIHALOMETHANES		3.4	UG/L	80	--------	2019/06/12	5	12		2020/06	
	82723	TRICHLOROACETIC ACID (TCAA)	<	1.0	UG/L	--------	1	2019/06/12	5	12		2020/06	

LAST SAMPLE DATE AND MONITORING SCHEDULE

SYSTEM NO: 2410008 NAME: MEADOWBROOK WC COUNTY: MERCED

SOURCE NO: 901 NAME: ASB - HUDSON CLASS: OTHR STATUS: Active

PSCODE		GROUP/CONSTITUENT IDENTIFICATION		LAST RESULT	UNITS	MCL	DLR	LAST SAMPLE	COUNT	FREQ MONTHS	MOD	NEXT SAMPLE DUE	NOTES
2410008 - 901		**MEADOWBROOK WC**		**901**	**ASB - HUDSON**								
	IO	**INORGANIC**											
		81855	ASBESTOS	ND	MFL	7	.2	2017/05/01	1	108	M	2026/05	

APPENDIX B:
Summary of Bacteriological Monitoring Results – Sources

Meadowbrook WC

2410008 Source Monitoring Freq: 1/M

Sample Date	Time	Source	T Coli	E Coli	F Coli	HPC	Turbidity	Violation	Comment
1/12/2017		Well 4	2.0	<1.0					
1/12/2017		Wells: 5, 6	<1.0	<1.0					
1/14/2017		Well 4	2.0	<1.0					
1/16/2017		Well 4	<1.0	<1.0					
2/14/2017		Wells: 5, 6	<1.0	<1.0					
3/9/2017		Wells 5 and 6	<1	<1		<1--333.			
4/1/2017		Wells 5 and 6	A						
5/1/2017		Wells: 5, 6	A	A					
6/1/2017		Well 4	<1.1	<1.1					
6/13/2017		Wells: 4, 5, 6	<1.1	<1.1	<1.1				
7/13/2017		Wells: 4, 5, 6	<1.1	<1.1					
8/10/2017		Wells: 4, 5, 6	<1.1	<1.1					
9/7/2017		Wells: 4, 5, 6	<1.1	<1.1					
10/12/2017		Wells: 4, 5, 6	<1.1	<1.1					
11/16/2017		Wells: 4, 5, 6	<1.1	<1.1					
12/19/2017		Wells: 4, 5, 6	<1.1	<1.1					
1/18/2018		Wells: 4, 6	<1.1	<1.1					
2/8/2018		Wells: 4, 6	<1.1	<1.1					
3/13/2018		Wells: 4, 6	<1.1	<1.1					
4/5/2018		Well 5	>23	<1.1					
4/5/2018		Wells: 4, 6	<1.1	<1.1					
4/13/2018		Well 5	3.6	<1.1					
4/13/2018		Well 5	23	<1.1					
4/16/2018		Well 5	P	A					
5/10/2018		Wells: 4, 6	<1.1	<1.1					
6/12/2018		Wells: 4, 6	<1.1	<1.1					
7/12/2018		Wells: 4, 6	<1.1	<1.1					
8/14/2018		Wells: 4, 6	<1.1	<1.1					
9/13/2018		Wells; 4, 6	<1.1	<1.1					
10/16/2018		Wells: 4, 6	<1.1	<1.1					
11/15/2018		Wells: 4, 6	<1.1	<1.1					
12/4/2018		Wells: 4, 6	<1.1	<1.1					
1/11/2019		Well 4, 6	<1.1	<1.1					

Sample Date	Time	Source	T Coli	E Coli	F Coli	HPC	Turbidity	Violation	Comment
2/14/2019		Wells: 4, 6	<1.1	<1.1					
3/14/2019		Well 4, 6	<1.1	<1.1					
4/9/2019		Well 4	<1.1	<1.1					
4/16/2019		Well 6	<1.1	<1.1					
5/9/2019		Well 4	<1.1	<1.1					
5/15/2019		Well 6	<1.1	<1.1					
6/12/2019		Wells: 4, 5, 6	<1.1	<1.1					
7/18/2019		Wells: 4 & 5	<1.1	<1.1					

APPENDIX C:
Summary of Bacteriological Monitoring Results – Distribution System

Bacteriological Distribution Monitoring Report

2410008 Meadowbrook WC

Distribution System Freq: 5/M

Sample Date	Location	T Coli	E Coli	F Coli	HPC	Type	Cl2	Violation	Comment
1/12/2017	6 samples	<1.0	<1.0			Routine	0.18-0.28		
2/14/2017	6 samples	<1.0	<1.0			Routine	0.18-0.33		
3/9/2017	6 samples	<1	<1			Routine	.17-.22		
4/1/2017	7 samples	A	A			Routine	.16-.25		
5/11/2017	7 samples	A	A			Routine	.22-.52		
6/22/2017	7 samples	A	A			Routine	.36-.94		
7/13/2017	7 samples	A	A			Routine	.37-.53		
8/10/2017	7 samples	A	A			Routine	0.4-0.77		
9/7/2017	7 samples	A	A			Routine	0.2-0.79		
10/12/2017	7 samples	A	A			Routine	0.35-0.83		
11/16/2017	7 samples	A	A			Routine	0.42-0.81		
12/19/2017	7 samples	A	A			Routine	0.23-0.65		
1/18/2018	7 samples	A	A			Routine	0.4-0.82		
2/8/2018	7 samples	A	A			Routine	0.32-0.78		
3/15/2018	7 samples	A	A			Routine	0.42-1.08		
4/5/2018	7 samples	A	A			Routine	0.58-1.26		
5/10/2018	7 samples	A	A			Routine	0.42-0.81		
6/12/2018	7 samples	A	A			Routine	0.86-1.23		
7/12/2018	7 samples	A	A			Routine	0.64-1.23		
8/14/2018	7 samples	A	A			Routine	0.38-0.81		
9/13/2018	7 samples	A	A			Routine	0.48-0.83		
10/16/2018	7 samples	A	A			Routine	0.63-0.75		
11/15/2018	7 samples	A	A			Routine	0.58-0.72		
12/4/2018	7 samples	A	A			Routine	0.29-0.39		
1/11/2019	7 samples	A	A			Routine	0.41-0.67		
2/14/2019	7 samples	A	A			Routine	0.36-0.97		
3/1/2019	7 samples	A	A			Routine	0.42-0.63		
4/9/2019	7 samples	A	A			Routine	0.70-1.31		

Sample Date	Location	T Coli	E Coli	F Coli	HPC	Type	Cl2	Violation	Comment
5/9/2019	7 samples	A	A			Routine	0.97-1.23		
6/12/2019	7 samples	A	A			Routine	0.34-0.88		
7/18/2019	7 samples	A	A			Routine	0.48-0.67		

Violation Key

MCL	Exceeds the maximum contaminant level
MR1	No monthly sample for the report month
MR2	No quarterly sample for the report month
MR3	Incorrect number of routine samples for the report month
MR4	Did not collect 5 routine samples for previous month's positive sample
MR5	Incorrect number of repeat samples as follow-up to a positive sample
MR6	No source sample
MR7	No summary report submitted
MR8	Other comments and/or info.

APPENDIX D:
Lead and Copper Tap Monitoring Summary of Results

Individual System Lead and Copper Rule Tracking Report

2410008 **MEADOWBROOK WC** Pop: **4400** Eng: **SS** **Lead Action Level: 0.015 mg/L**

Copper Action Level: 1.3 mg/L

Sample Date Begin/(End)	Monitoring Period	Sample Set ID	Number Required	Number Sampled	Lead 90th % (mg/L)	Copper 90th % (mg/L)	Action Taken	Action Type	Next Due Date	Next Due Freq	Comments
(6/15/1993)	6M1ST-1993	1st 6	20	20	0.0025	0.136			12/15/1993	2nd 6	
(9/24/1993)	6M2ND-1993	2nd 6	20	21	0.0025	0.436			9/30/1994	A1	
(6/14/1995)	YR1995	A1	10	12	0.0093	0.364			9/30/1996	A2	
(8/12/1997)	YR1997	A2	10	10	0.0062	0.0616			9/30/2000	T1	
(10/23/1998)	3Y1996-1998	T1	10	10	0.005	0.328			9/30/2001	T2	
(9/13/2001)	3Y1999-2001	T2	10	10	<0.001	0.110			9/30/2004	T3	*akh on 3/12/03; pop >3300 so 20 sites reqd. akh 8/26/04*
(9/21/2004)	3Y2002-2004	T3	20	20	0.0025	0.22			9/30/2007	T4	*akh 10/15/04*
(7/25/2007)	3Y2005-2007	T4	20	22	0.005	0.271			9/30/2010	T5	*akh 11/6/07*
10/18/2010 (12/14/2010)	3Y2008-2010	T5	20	21	0.0	0.36			9/30/2013	T6	*samples collected out of range due to customer noncompliance. Entered by MRW 1-7-2011.*
6/25/2013 (9/19/2013)	3Y2011-2013	T6	20	20	0.0	0.255			9/30/2016	T7	*entered by MRW 10-16-13.*
(8/20/2014)	3Y2012-2014	T7	20	19	<0.005	0.280			9/30/2016	T8	*System collecting yearly.*
8/18/2016 (8/18/2016)	3Y2014-2016	T8	20	20	0	0.250			9/30/2019	T9	*entered by MLM 10/28/2016*

Legend:

Cit: Citation
EL: Enforcement letter

1st 6: 1st initial 6-mo. round of monitoring
2nd 6: 2nd initial 6-mo. round of monitoring

A1: 1st Annual monitoring
A2: 2nd Annual monitoring

T1: 1st Triennial (3 yr) monitoring
T2: 2nd Triennial (3 yr) monitoring
T3: 3rd Triennial (3 yr) monitoring

Appendix B
Opinion of Probable Construction Costs

Opinion of Probable Construction Cost
Atwater to Meadowbrook Intertie

Option A-1

Item	Description	Quantity	Unit	Unit Cost ($)	Amount ($)
1	Furnish and install 12" C-900 PVC pipeline	8,310	LF	130	1,080,300
2	Trench repaving	8,310	LF	30	249,300
3	Isolation valves	6	EA	4,000	24,000
4	Fire hydrants	16	EA	8,000	128,000
5	Air-release valves	2	EA	4,000	8,000
6	Metering station with backflow prevention and SCADA connection	1	LS	100,000	100,000
7	Security fencing and lighting with electrical service	1	LS	40,000	40,000
8	Property acquisition for metering station	1	LS	30,000	30,000
9	Miscellaneous permits	1	LS	25,000	25,000
			Subtotal		**1,684,600**
	Engineering and construction management/inspection			14%	235,900
	Legal and environmental			5%	84,200
	Contingencies			15%	252,700
			Total		**2,257,400**

Option A-2

Item	Description	Quantity	Unit	Unit Cost ($)	Amount ($)
1	Furnish and install 12" C-900 PVC pipeline	7,176	LF	130	932,880
2	Trench repaving	6,000	LF	30	180,000
3	Isolation valves	5	EA	4,000	20,000
4	Fire hydrants	14	EA	8,000	112,000
5	Air-release valves	2	EA	4,000	8,000
6	Metering station with backflow prevention and SCADA connection	1	LS	100,000	100,000
7	Security fencing and lighting with electrical service	1	LS	40,000	40,000
8	Canal crossing	1	LS	40,000	40,000
9	Property acquisition for metering station	1	LS	30,000	30,000
10	Miscellaneous permits	1	LS	25,000	25,000
			Subtotal		**1,487,880**
	Engineering and construction			14%	208,400
	Legal and environmental			5%	75,000
	Contingencies			15%	223,200
			Total		**1,994,500**

Option A-3

Item	Description	Quantity	Unit	Unit Cost ($)	Amount ($)
1	Furnish and install 12" C-900 PVC pipeline	9,413	LF	130	1,223,690
2	Trench repaving	8,200	LF	30	246,000
3	Isolation valves	8	EA	4,000	32,000
4	Fire hydrants	19	EA	8,000	152,000
5	Air-release valves	3	EA	4,000	12,000
6	Metering station with backflow prevention and SCADA connection	1	LS	100,000	100,000
7	Security fencing and lighting with electrical service	1	LS	40,000	40,000
8	Canal crossing	2	EA	40,000	80,000
9	Property acquisition for metering station	1	LS	30,000	30,000
10	Miscellaneous permits	1	LS	25,000	25,000
			Subtotal		**1,940,690**
	Engineering and construction			14%	271,700
	Legal and environmental			5%	98,000
	Contingencies			15%	291,100
			Total		**2,601,500**

Estimate of Probable Construction Cost
Merced to Meadowbrook Intertie

Option M-1

Item	Description	Quantity	Unit	Unit Cost ($)	Amount ($)
1	Furnish and install 12" C-900 PVC pipeline	3,612	LF	130	469,560
2	Trench repaving	3,612	LF	30	108,360
3	Isolation valves	3	EA	4,000	12,000
4	Fire hydrants	7	EA	8,000	56,000
5	Air-release valves	1	EA	4,000	4,000
6	Metering station with backflow prevention and SCADA connection	1	LS	100,000	100,000
7	Security fencing and lighting with electrical service	1	LS	40,000	40,000
8	Canal crossing	1	EA	40,000	40,000
9	Property acquisition for metering station	1	LS	30,000	30,000
10	Miscellaneous permits	1	LS	25,000	25,000
			Subtotal		**884,920**
	Engineering and construction management/inspection			14%	123,900
	Legal and environmental			5%	44,200
	Contingencies			15%	132,700
			Total		**1,185,800**

Option M-2

Item	Description	Quantity	Unit	Unit Cost ($)	Amount ($)
1	Furnish and install 12" C-900 PVC pipeline	1,511	LF	130	196,430
2	Trench repaving	550	LF	30	16,500
3	Isolation valves	2	EA	4,000	8,000
4	Fire hydrants	2	EA	8,000	16,000
5	Air-release valves	1	EA	4,000	4,000
6	Metering station with backflow prevention and SCADA connection	1	LS	100,000	100,000
7	Security fencing and lighting with electrical service	1	LS	40,000	40,000
8	Canal crossing	2	EA	40,000	80,000
9	Property acquisition for metering station	1	LS	60,000	60,000
10	Miscellaneous permits	1	LS	25,000	25,000
			Subtotal		**545,930**
	Engineering and construction management/inspection			20%	109,186
	Legal and environmental			5%	27,300
	Contingencies			15%	81,900
			Total		**764,300**