

Fair Oaks Water District

2017 Water Management Flexibility and Preparedness Evaluation:

As Requested By

FOWD Board of Directors



Prepared by:
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2017 Water Management Flexibility and Preparedness Evaluation

Intended Outcome and Background

The intended outcome of this report is to provide an assessment of Fair Oaks Water District (FOWD) water demands, supplies, infrastructure and management options needed to provide long-term reliability to the FOWD service area.

The recent unprecedented drought has led to a “new normal” for balancing customer water needs and available water supply throughout California. While FOWD was successful in meeting its customer needs during this extended dry period, we recognize lasting changes to both customer demand behavior and reliability of surface water supplies. FOWD’s long-term water management plans require updating to incorporate this “new normal.”

Reliability is a measure of a water system’s expected success in managing water shortages. The combination of demand management and supply augmentation options help to reduce the frequency and severity of water shortages. FOWD and the regional water agencies have implemented a variety of programs to ensure reliability through diversity of supply. Such programs in the region include the implementation of the American River Basin Conjunctive Use Program; development of the Integrated Regional Water Management Plan; implementation of the Water Forum Agreement; implementation of the Central Valley Regional Water Quality Control Board Basin Plan; enhancement of conservation programs; and the development of additional local supplies such as groundwater and remediated groundwater to optimize the beneficial uses of ground and surface waters.

While FOWD has historically provided highly reliable, high quality water supplies to its customers, it needs to evaluate the functionality and flexibility of its existing and planned supply sources and infrastructure to continue to meet this objective in the most economically practical manner. To understand options, the FOWD Board requested staff to prepare a summary of existing and planned water demands, supplies, and infrastructure management - along with an abbreviated assessment of options that would allow FOWD to continue meeting water supply reliability objectives in the future. In response to the Board’s request, FOWD staff prepared this document, organized as follows:

1. Historic and Forecast Customer Demands
2. Cost of water
3. Water Supply Overview
4. Options for Assuring Reliability
5. Infrastructure Flexibility Evaluation 2017

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1.0 Historic and Forecast Customer Water Demand

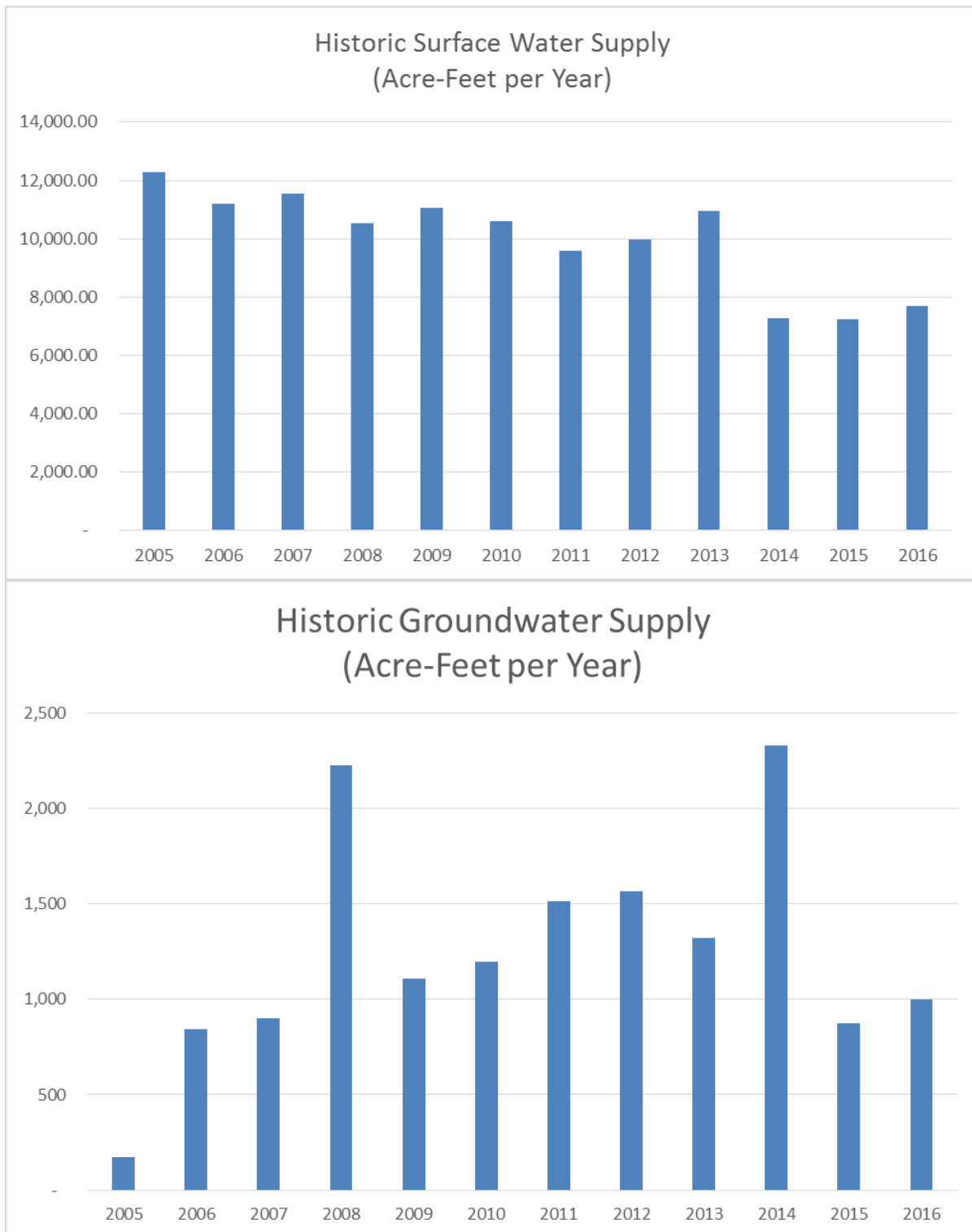
The focus of the FOWD mission statement is meeting customer water demands with high quality and affordable water – this includes under all conditions both in the near-term and into the future. Current demand and trends in water use are helpful predictors of future customers’ demands. However, as represented on Table 1, recent water use went down significantly in 2015 due primarily to state-mandated conservation targets. As the region’s supplies recover from the drought and customer use is returning to higher levels – FOWD staff anticipates demand reductions will be long lasting and representative of the “new normal” – never returning to the water use of 2013 and before.

When inspecting the data presented in Table 1, a few important facts become apparent:

1. During the driest period in recent history, FOWD’s water demands were met with surface water purchased from the San Juan Water District, while groundwater production was limited. Although capacity exists to serve more groundwater, FOWD maintained a heavy reliance on strained regional surface water resources.
2. Customer water use only increased slightly in 2016 when state-mandated conservation targets were replaced with District-initiated objectives. This demonstrates FOWD customer recognition of conservation as a way of life. In 2017, FOWD customer water use has continued to show an increase - while not likely to return to pre-drought conditions.

Surface Water Supply from SJWD	Source	Capacity	AF Delivered into Distribution System by Year					
			2011	2012	2013	2014	2015	2016
	FO-40	25 MGD	2,802	1,240	4,199	1,206	367	0
	CTP	20 MGD	6,795	8,747	6,740	6,056	6,890	7,703
	Total SW	45 MGD	9,597	9,987	10,939	7,262	7,257	7,703
Groundwater	Town	2,700 gpm	515	623	601	1,141	391	457
	Heather	2,000 gpm	470	487	555	898	306	321
	Northridge	1,000 gpm	531	453	164	291	176	220
	Madison	1,100 gpm	<i>Permitted in 2017</i>					
	Total GW	6,800 gpm	1,516	1,563	1,320	2,330	873	998
Total Water Delivered			11,113	11,550	12,259	9,592	8,130	8,701

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Table 2 provides future FOWD demands from our 2015 Urban Water Management Plan (UWMP) as submitted to the California Department of Water Resources, along with currently available water supply.

When inspecting the data presented in Table 2, a few important facts become apparent:

1. Though it is not practical to assume that the design capacity of the 2017 water supply of 61,393 AF would ever be available on an annual basis - this number does indicate is that FOWD currently has access to more than enough water supply to meet the projected 2035 annual demand of 12,726 AF.
2. Given FOWD actual water use in 2015, 2016, and the first six months of 2017, along with our prediction that FOWD customers have adopted a “new normal” for water use, it can be assumed that the future water demands from our 2015 UWMP are high.

	2020	2025	2030	2035
Annual Demand (AF)	12,259	11,768	12,080	12,726
2017 SW Supply (AF Design Cap)	50,425 AF			
2017 GW Supply (AF Design Cap)	10,968 AF			
Total Water Supply (AF Design Cap)	61,393 AF			

2.0 Cost of Water

	Actual 2016 GW Pumping @ 998 AF	Estimated GW @ 2,500 AF	Estimated GW @ 5,000 AF	Estimated GW @ 10,000 AF	
Total \$/AF^(a)	\$124.69	\$122.69	\$132.10	\$140.30	
(a) Please note that all costs provided for FOWD groundwater production the operational cost only and <i>do not</i> include a capital, administrative or labor cost component.					

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	2017	2018	2019	2020	2021
Commodity \$/AF ^(a)	\$81.14	\$81.14	\$81.14	\$81.14	\$81.14
Fixed \$/AF ^(a)	\$140.55	\$153.30	\$167.48	\$182.09	\$194.75
Total \$/AF^(a)	\$221.69	234.44	\$248.62	\$263.23	\$275.89
(a) Source: SJWD approved five year rate study – based on FOWD purchasing 9,244 AF in 2017, 9,702 AF in 2018, 10,146 AF in 2019, 10,591 AF in 2020, and 10,647 AF in 2021					

3.0 Water Supply Overview

FOWD has made significant investments to ensure that the current and future water supply needs of our customers and the local region are met during normal operations and if regional water supplies are again threatened during a future drought condition. FOWD must now determine how to use our water supply to ensure economic viability of the water supply investments for the future.

Please note the following for use in understanding this section of the report:

Average Day Demand = Actual annual demand recorded ÷ 365

Maximum Day Demand = Actual recorded maximum water use day in the year

Peak Hour Demand = Actual recorded maximum hour, non-emergency, use in the year

Emergency Demand = Peak hour demand plus maximum fire flow requirement

Surface Water Supply

A significant portion of the Fair Oaks Water District's (FOWD) available water supply comes from surface water purchased from the San Juan Water District (SJWD). SJWD diverts surface water from Folsom Reservoir. Surface water is then treated at the Sydney N. Peterson Water Treatment Plant (WTP), which is owned and operated by SJWD. The capacity of the Peterson WTP is 150 million gallons per day (MGD). After being treated at the Peterson WTP, water is conveyed to the 62 million gallon, or 190 acre-feet, Hinkle Reservoir. Hinkle Reservoir provides water storage to meet fluctuations in demand and to provide emergency supply if the WTP is taken out of service. From the Hinkle Reservoir,



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water is distributed via pipelines to the wholesale customers of SJWD. Two transmission pipelines provide treated surface water to the FOWD.

The District has a current wholesale water supply agreement that will expire in 2045. It is the intention of FOWD to renegotiate and extend this agreement.

Groundwater Supply

The District currently pumps groundwater to meet its peaking demands, emergency water demands and a minimum baseline to maintain groundwater reliability. Historically, groundwater was produced by seven wells with individual design capacities varying from 700 gallons per minute (gpm) to 2,500 gpm. The wells are located primarily in the central portion of the District’s water system.

Over the past few years, some of the wells were no longer worthy of additional investment and were destroyed; with the Madison Well completed and permitted in 2017. Table 5 lists active District wells and the latest production test information.

Well No.	Well Name	Design Capacity (GPM)	Latest Capacity Test, (GPM)	Reliable Pumping Capacity, (GPM)	Proposed Actions
9	Northridge Well	1,000	1,000	1,000	Completed in 1991; Routine well maintenance
10	Town Well	2,700	2,800	2,700	Completed in 2007; Routine well maintenance
11	Heather Well	2,000	2,000	2,000	Completed in 2007; Routine well maintenance
12	Madison Well	1,100	1,100	1,100	Completed in 2017; Routine well maintenance
Total Existing Capacity		6,800	6,900	6,800	As of June 2017

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Future Groundwater Projects

Future well construction projects, along with anticipated well production rates, are identified in the Table 6. The location of each future well was reviewed and analyzed based on: availability of adequate land, location relative to existing transmission mains, and future system demands.

These future well construction projects only make financial sense if developed for regional water reliability and water transfers or for the option of serving 100% of FOWD customer demand with groundwater.

Table 6 Future Well Projects			
Well No.	Well Name	Design Capacity Upon Completion of Improvements (GPM)	Proposed Actions
-	New York (Existing Well)	2,000	Re-drilled required; could be completed in 18-months
-	Fair Oaks Park (Existing Well)	1,000	Expand property to re-drill; negotiations w/ FORPD required; could be completed in 18-months
-	Miller Park Well (future)	1,000	Estimated yield; Negotiate property with FORPD or SJSD; timing TBD
-	Skyway Well (future)	750	Estimated yield; could be completed in 18-months
Total Future Well Capacity		4,750	
Total 2017 Capacity (Table 5)		6,800	
Total Planned GW Supply		11,550	

Interconnections with Adjacent Water Districts

The Fair Oaks Water District currently has four interconnections with adjacent water agencies. The interconnections are considered as water supply for emergency conditions and

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are depended on the status of other agency at the time of the emergency. Currently no agreements exist between the agencies for formal exchange of water. Two of the three agencies depend on the same source of the primary water supply. None of the interconnections are equipped for formal water transfers due to lack of necessary mechanical and telemetry equipment to operate automatically or remotely.

Moving forward in 2017, FOWD is working on a formal Mutual Aid Agreement with the Carmichael Water District that will include the development of infrastructure required for formal water transfers between the two agencies - FOWD will attempt to develop a similar agreement with the Citrus Heights Water District.

Table 7 indicates descriptions and hydraulic capacity of the current interconnections; it is unlikely that adjacent agencies can provide the total supply listed.

Table 7 Interconnections with Adjacent Agencies					
Agency	Location	Connection Size	Capacity ¹ GPM	Metered	Possible Actions
Carmichael WD	Winding Way west of Zelinda Way	8-inch	Up to 1,000	Metered: One Way due to psi differential	Distribution improvements; Add booster station
Citrus Heights WD	McKay Street	8-inch	Up to 1,000	No Meter; Gate valve only	Upgrade W/ Gum Ranch Phase 2
Citrus Heights WD	Manana Way at Aqueduct Way	8-inch	Up to 1,000	No Meter; Gate valve only	Upgrade W/ Gum Ranch Phase 2
Orange Vale Water Company	Pershing Ave. @ Beech Ave.	8-inch	Up to 1,000	No Meter; Butterfly valve only	Distribution and telemetry improvements
Total capacity			4,000		
^[1] Connection capacities are estimated based on size of pipe and maximum velocity of 10 ft/sec.					



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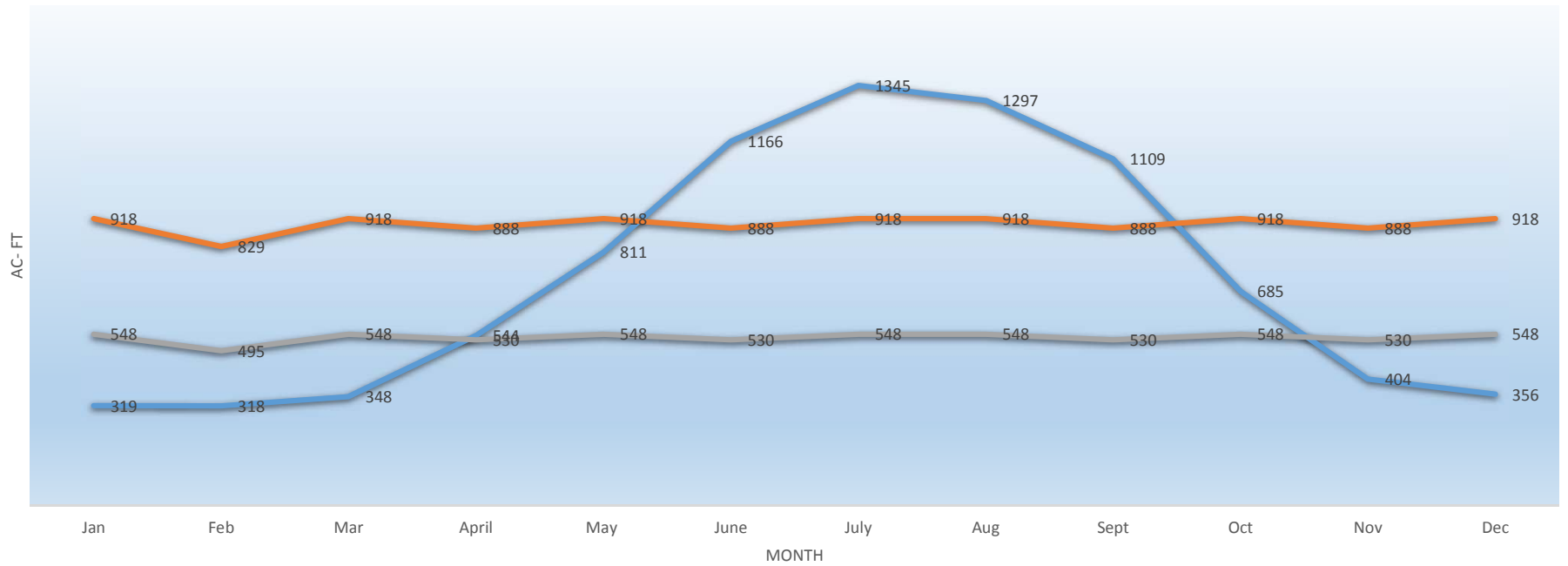
Sample Year 2016

The following two graphs provide actual data on water demands and groundwater production for 2016; with peak water demand recorded on July 26, 2016 with an ambient temperature of 104 degrees Fahrenheit.

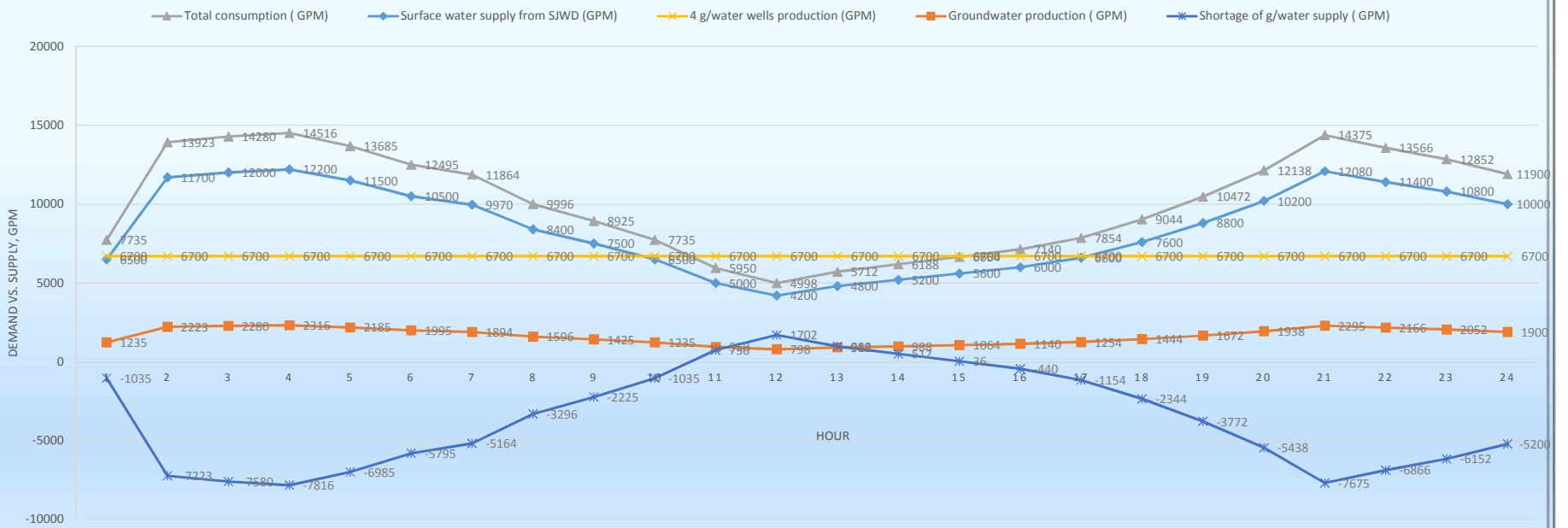
FOWD

2016 Total system demand vs. available groundwater production, AC-FT

— 2016 total system demand — Available groundwater production (all wells) — Available groundwater production (3 wells - Town Well out)



FOWD MAXIMUM DAY DEMAND VS. AVAILABLE SUPPLY ON JULY 26, 2016 (GPM)



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Normal Water Supply Operation

Under the normal operating conditions, District's water supply sources can provide maximum day demand and required normal operating pressures of not less than 40 P.S.I. at the customers service connection. During peak hour demands, the required minimum pressure may not be less than 30 P.S.I. at the service connection. As shown below, the system sources can also meet peak hour demands for each pressure zone in the water system.

The following tables provide summaries of the available water supply and water demands for each of the three pressure zones in the FOWD.

Table 8 Water Supply by Zone Reduced Pressure Zone HGL 320' Highest Service Connection – 189' Lowest Service Connection – 84'		
672 Existing Services – 680 Projected in 2025		
Facility	Location	Supply to Zone, (GPM)
Pressure Regulating Valve	Minnesota Road	3,500
Pressure Regulating Valve	Lemon Street	3,500
Pressure Regulating Valve	Crestridge Rd.	3,500
Pressure Regulating Valve	Fair Oaks Blvd.	3,500
Total		14,000
Current Max Day Demand		670
Ultimate Max Day Demand		680
Current Peak Hour Demand		1,000
Ultimate Peak Hour Demand		1,020
Peak Hour Demand plus Fire Flow		2,520

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<p>Table 9 Water Supply by Zone Upper Pressure Zone HGL 378' - 404' Highest service connection – 283' Lowest service connection – 180'</p>		
<p>3,100 Existing Services – 3,120 Projected in 2025</p>		
Facility	Location	Supply to Zone (GPM)
30-inch transmission main		10,000 ^[1]
Booster A	Skyway Tank site	3,500
Booster B	Skyway Tank site	3,500
Booster C	Skyway Tank site	3,500
Total		20,500
Current Max Day Demand		3,100
Ultimate Max Day Demand		3,120
Current Peak Hour Demand		4,650
Ultimate Peak Hour Demand		4,680
Peak Hour Demand plus Fire Flow		6,680
<p>^[1] Estimated capacity of 30-inch transmission main at maximum velocity of 5 ft/sec.</p>		

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Table 10 Water Supply by Zone Main Pressure Zone HGL 370' - 385' Highest service connection – 250' Lowest service connection – 100'		
10,10 Existing Services – 10,700 Projected in 2025		
Facility	Location	Supply to Zone (GPM)
36-inch Inter-tie	Main Avenue @ Madison	17,350
30-inch Inter-tie	Filbert Avenue	17,350
Northridge Well No.9	8261 Kaula Drive	1,000
Town Well No.10	7995 Park Drive	2,700
Heather Well No.11	7601 Heather Drive	2,000
Madison Well No.12	Madison West of Kenneth	1,100
Total		41,500
Current Max Day Demand		10,100
Ultimate Max Day Demand		10,700
Current Peak Hour Demand		15,150
Ultimate Peak Hour Demand		16,050
Peak Hour Demand plus Fire Flow		19,550
Ultimate Supply to Upper and Reduced Pressure Zones		5,700
Ultimate Demand for Main Pressure Zone		25,250

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Emergency Operations

For purpose of this analysis, emergency operation is defined as the worst-case scenario; operation of the system without any surface water available from the SJWD. The District plans on meeting this scenario by developing groundwater supply capability to meet the average day demand of the entire system.

The District reviewed system water supply capabilities to meet average day demand with groundwater supply only. Table 11 below summarizes results of this analysis.

Table 11 Average Day Demand and Groundwater			
Current Conditions			
Average Day Demand (GPM)		Reliable GW Supply	
		Well	GPM
		Northridge No. 9	1,000
		Town No. 10	2,700
		Heather No. 11	2,000
		Madison No. 12	1,100
Total	7,500	Total	6,800
Projected 2025 Ultimate Demands			
Average Day Demand (GPM)		Reliable GW Supply	
		Well	GPM
		Northridge No. 9	1,000
		Town No. 10	2,700
		Heather No. 11	2,000
		Madison No. 12	1,100
		New York (re-drill)	2,000
		Park Well (re-drill)	1,000
		Miller (new)	1,000
		Skyway (new)	750
Total	7,750 - 7,800	Total	11,550
Note: Currently the reliable groundwater sources will not meet the average day demand of the system. Upon completion of several groundwater supply projects, the available groundwater supply will meet average day demands for the entire system.			

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Groundwater Supply Summary

Table 12 FOWD Demand and Groundwater			
Current Conditions			
Average Day Demand (GPM)		Reliable GW Supply	
		Well	GPM
		Northridge No. 9	1,000
		Town No. 10	2,700
		Heather No. 11	2,000
		Madison No. 12	1,100
Total	7,500	Total	6,800
2025 Max Day Demand		14,500 GPM	
2025 Peak Hour Demand		21,750 GPM	
2025 Peak Hour + Fire Flow ^(a)		24,750 GPM	
(a) Maximum fire flow requirement within the FOWD service area is 3,000 GPM; as determined by local fire code			

4.0 Options for Assuring Water Supply Reliability

Any options for assuring water supply reliability for FOWD customers must also provide economic sustainability for the District. The goal is to determine the optimal operations and economic use of available water supplies and the delivery system infrastructure during normal conditions to assure reliability during future droughts. The following are items for consideration as a means for FOWD to meet all of its water demands over the next 25 years for normal, single-dry, and multiple-dry years.

- Under normal operations, FOWD will seek to utilize all available water supplies to ensure economic viability of keeping the water supply developed available for the future, while maintaining water reliability and water quality.
- Develop groundwater supply capable of meeting average day demand for entire system - this groundwater supply will provide the ability to serve the entire FOWD service area under emergency and drought conditions.
- Renegotiate and extend our existing wholesale water supply agreement with SJWD, which will expire in 2045, to reflect 2017 water supply conditions and the “new normal” as mandated by State regulations.

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- Execute a formal Mutual Aid Agreement with the Carmichael Water District that includes the development of infrastructure required for formal water transfers between the two agencies.
- Execute a formal Mutual Aid Agreement with the Citrus Heights Water District that includes the development of infrastructure required for formal water transfers between the two agencies.
- Pursue potential water exchange agreements with the other water purveyors.
- Actively support the development of a regional water bank that is recognized by the State of California.
- Actively monitor and provide input on the development of a regional groundwater management plan as required by the State of California.
- Maintain our memorandum of understanding with Aerojet, securing water supply equal to all groundwater pumped from the FOWD service area for groundwater contamination containment and cleanup.
- Develop and implement a preventive maintenance program for groundwater production facilities. Replace or rehabilitate wells as required.
- Continue the District's plan for water conservation and conduct a variety of water conservation activities.
- Investigate groundwater throughout the FOWD service area and identify areas of highest water quality and quantity.
- Maintain and calibrate a hydraulic model of the FOWD water system.
- The following is a list of proposed water supply projects based the water supply analysis completed in this report.

➤ **Groundwater Contamination Containment and Clean-Up**

The District will continue to enforce its agreement for groundwater protection with Aerojet.

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➤ **Inter-tie Upgrade with Carmichael Water District**

FOWD currently has an 8-inch interconnection with Carmichael Water District (CWD or District) which only allows one-way transmission of water from FOWD to CWD. Improving the interconnection would have regional and statewide benefits.

In 2001, CWD constructed a microfiltration water treatment plant that treats water pumped from the American River. In 2003, a groundwater contaminant plume of nitrosodimethylamine (NDMA) was detected in monitoring wells located in the CWD service area. Recently CWD constructed Groundwater Extraction and Treatment Facility to capture and treat groundwater that was contaminated with (NDMA). After being treated for NDMA removal, the water is discharged into the American River or used to irrigate Ancil Hoffman Golf Course. The CWD favors using the treated water on the golf course, because if it is released into the American River, the CWD currently receives no use of this valuable resource.

Although CWD has significant water supply capacity, it is currently limited in ability to participate in regional conjunctive use projects that can provide benefit statewide. The installation of an upgraded interconnection with FOWD and booster station would allow water transfers from CWD within the region.

Within FOWD's service area, Aerojet is planning to expand its groundwater remediation effort, resulting in additional groundwater discharge into the American River. This is groundwater, pumped from the FOWD service area, could conceptually be recovered by CWD's Bajamont Water Treatment Plant, and wheeled back to FOWD or conjunctively used by CWD.

This project would replace the existing one-way interconnection with CWD to allow two-way flow, allowing CWD to treat and send water to FOWD. The project would require linking of FOWDs and CWD distribution system models to design a booster station and modify the existing interconnection. Telemetry would also be necessary to allow operation of the intertie and boosters remotely.

The interconnection would provide regional benefits by fully utilizing groundwater pumped from beneath FOWD in place surface water in dry

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years - potentially allow future use of groundwater pumped and treated for NDMA from within CWD that is currently released to the river - increase FOWD water supply reliability - allow for the CWD to participate in conjunctive use programs by utilizing FOWD groundwater instead of surface water - and provide for emergency water supplies.

This project was included in the 2013 Regional Water Authority IRWMP update.

➤ **American River South Interconnection Pipeline**

During the recent unprecedented drought, the need for increased mutual aid interconnections within the region became apparent.

To assist the region in the development of water supplies in case of drought or an emergency, FOWD would like to create an interconnection that would allow for water transfers south of the American River. In 2010, FOWD, in association with the Hazel Avenue bridge widening project, secured an easement for the installation of a transmission pipeline across the Hazel Avenue bridge. Conceptually, FOWD could extend its distribution system pipelines approximately 1,000 feet beyond the south side of the existing Hazel Avenue Bridge and connect to American States Water Company existing pipelines. The ASWC distribution system already extends beneath Highway 50 and there is already an intertie with areas south.

The connection could provide mutual aid water to both FOWD and Golden State Water Company. In addition, the GSWC distribution system could wheel water from FOWD through their distribution system to areas south.

The interconnection would provide regional benefits by increasing water supply reliability, allow for increased participation in conjunctive use programs, and provide for emergency water supplies for multiple communities.

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➤ **New York Well Rehabilitation Project**

New York Well No. 6 was drilled in 1952 with design capacity of 1,500 GPM. Over the years, due to changing conditions, the specific yield of the well has declined, along with overall well efficiency.

FOWD proposes to drill a new well at the same location and equip it with deep turbine pump or submersible pump with design capacity of at least 2,000 GPM. The site, owned by the District, is sufficient to maintain a safe distance from existing well and provide room for drilling and operation of the new well. The water quality of aquifer underlying this site is excellent with no known contaminants. The project could be completed within 18-months of funding.

➤ **Miller Park Well**

Miller Park is located on the corner of Kenneth Avenue and Sunset Avenue; within Main Pressure Zone. The old Kenneth Well, located just to the north of the park, was abandoned in 1999 due to casing failure. Prior to the failure of the existing well, the quality and quantity of the water produced was high. The District plans to determine the feasibility of acquiring a well site from the FORPD on the Miller Park property, or from the SJSD on the Earl Leggett school property, for a replacement well. If feasible, the project would start construction at a date yet to be determined.

➤ **Skyway Well**

The Skyway reservoir and booster station site was originally master-planned to add a groundwater well at a later date. If constructed, a well at the Skyway tank site would provide emergency supply during surface water supply interruptions or reductions to the Upper Pressure Zone. The project could be completed within 18-months of funding.

The existing Skyway reservoir has a volume of 3 MG - which equals an operational water supply of 4,200 GPM for 8 hours or 1,400 GPM for 24 hours; assuming two thirds of the tank is available for operational water supply.

➤ **Kenneth Reservoir and Booster Station (Gum Ranch Subdivision)**

As a part of the development project known as Gum Ranch Phase 2, the District secured a site for a future water storage facility and a booster station. The District is considering the construction of a storage reservoir and booster station on this property at time yet to be determined. The purpose of this project would be to help meet peak and emergency demands of FOWD customers and possibly others. This project was included in the 2013 Regional Water Authority IRWMP update.

The proposed Kenneth reservoir has a volume of 3 MG - which equals an operational water supply of 4,200 GPM for 8 hours or 1,400 GPM for 24 hours; assuming two thirds of the tank is available for operational water supply.

➤ **Park Well**

Existing Park Well No. 8 was completed in 1991 with design capacity of 1,500 GPM. Over the years, well production yield had decreased substantially to less than 1,000 GPM. In June of 2006, during performance of rehabilitation project, a portion of the perforated well casing split. The District performed an analysis of possible improvements to restore the original well capacity and recommend the following: Abandon existing well and re-drill at the same property. Anticipated cost is approximately \$1,500,000 for a 1,000 GPM. Life expectancy upon completion of these improvements is 40 to 50 years.

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Table 13 Estimated Cost of Proposed Water Supply Improvements			
Project ^{(a)(b)}	Type	Estimated Project Cost	Comments
Inter-tie Upgrade w/ CWD	New Booster Station & SCADA	\$1,000,000	
Hazel Avenue Inter-tie w/ ACWS	Pipeline and SCADA	\$2,000,000	
New York Well Construction	Re-drill Well at Present Location	\$1,700,000	
Miller Park Well Construction	Drill and Equip New Well	\$2,000,000	
Skyway Well	New Well at Skyway Tank Site	\$1,000,000	
Kenneth Tank and Booster Station	New 3.0 MG Tank and Booster Station	\$5,000,000	
Park Well Construction	Re-drill Well at Present Location	\$1,500,000	
TOTAL		\$14,200,000	
<p>(a) These future water supply construction projects only make financial sense if developed for regional water reliability and water transfers or for the option of serving 100% of FOWD customer demand with groundwater.</p> <p>(b) Projects are not listed in order of priority.</p>			

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The current water supply portfolio of FOWD is robust. The District currently purchases surface water from the San Juan Water District (SJWD) as treated water; with the balance of the District's water demand met by groundwater wells. The District overlies high capacity aquifers that contain good quality water. The District's historical water demand has been decreasing, making more water available for conjunctive use and assisting in regional water supply reliability. FOWD's 25-year demand forecast is similar to its current demand. FOWD currently has interconnections with Carmichael Water District, Citrus Heights Water District and Orange Vale Water Company that provide existing opportunities to share water supply. FOWD has recently participated with RWA in the construction of three new groundwater supply wells, and has participated in the environmental water account during dry years where FOWD used groundwater instead of taking surface water. In addition, the San Juan Family of water agencies directly depends on FOWD groundwater during surface water cutbacks and emergency water supply situations. The construction of new groundwater production and storage facilities would be a direct benefit to the regions water supply reliability - in addition to meeting the goals of the FOWD water supply planning.

5.0 Infrastructure Flexibility Evaluation 2017

To help the FOWD Board with future decisions relative to water supply, the District plans to expand groundwater production during the summer, and possibly into the fall, of this year. The goal is to evaluate the ability to meet customer water needs from both surface water and groundwater sources using the existing District distribution system, and to understand the practical limits of existing groundwater production facilities.

District staff anticipate the following benefits from increased production this year:

- a) Improve understanding of existing groundwater production facilities to meet customer demands during average day, max day and peak hour conditions
- b) Improve understanding of the groundwater basin's response to higher production
- c) Demonstrate flexibility to conjunctively manage surface water and groundwater resources to assure customer supply reliability
- d) Improve data for potential water transfers and regional groundwater management
- e) Determine the optimal operational and economic use of available water supplies during normal operations

During the evaluation, the District expects a balance of about 60% surface water and 40% groundwater during peak summer months, with the groundwater percentages potentially increasing into the fall months. SJWD's ability to also provide enough surface water during this time to fully meet the District's customer demands provides a valued backstop should the District's groundwater production capability not meet expectations. As discussed previously,



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the District's expected groundwater production capacity with all wells in operation is about 6,800 gpm (equivalent to about 30 acre-feet per day, or 900 acre-feet per month). However, the ability to manage overall flow rate into our three pressure zones in a manner consistent with each's wells production will dictate how much the District will actually be able to serve.

FOWD staff will monitor conditions throughout the evaluation period and prepare a detailed report for the Board late this year. In addition, staff will continue regular communication with our regional partners relative to the increased groundwater pumping plan and actual implementation of the plan.

- End -



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Miscellaneous Data Attached:

A. FOWD Water System Schematic

N:\AUTOCAD FILES\AUTOCAD MASTER DWGS\WORKING DWGS\FOWD system schematic 20170525.dwg, 08/16/17 12:28:13pm, teggar

FAIR OAKS WD INTERCONNECTIONS WITH SJWD

CONNECTION	SIZE	AVAILABLE FLOW, MGD	G.E., FT	PRESSURE, PSI
MAIN	40"	25.0	255	60
FILBERT	30"	20	226	80
TWIN LAKES	12"	5.0	265	60

FAIR OAKS WD WELLS

WELL NAME	WELL #	Q, GPM	TDH, FT.	HP	G.E. FT.	PL. FT.	PUMP TYPE
TOWN	#10	2714*	400'	350	190'	223'	DWT
MADISON	#12	1100	455	200	238	310	S/M
HEATHER	#11	1944*	420'	300	201'	212'	DWT
NEW YORK	#6	830	312'	150	166'	148'	DWT
CASABELLA	#7	850*	310'	150	188'	180'	DWT
PARK	#8	940	425'	150	223'	267'	DWT
NORTHRIDGE	#9	1088*	438'	150	170'	224'	S/M

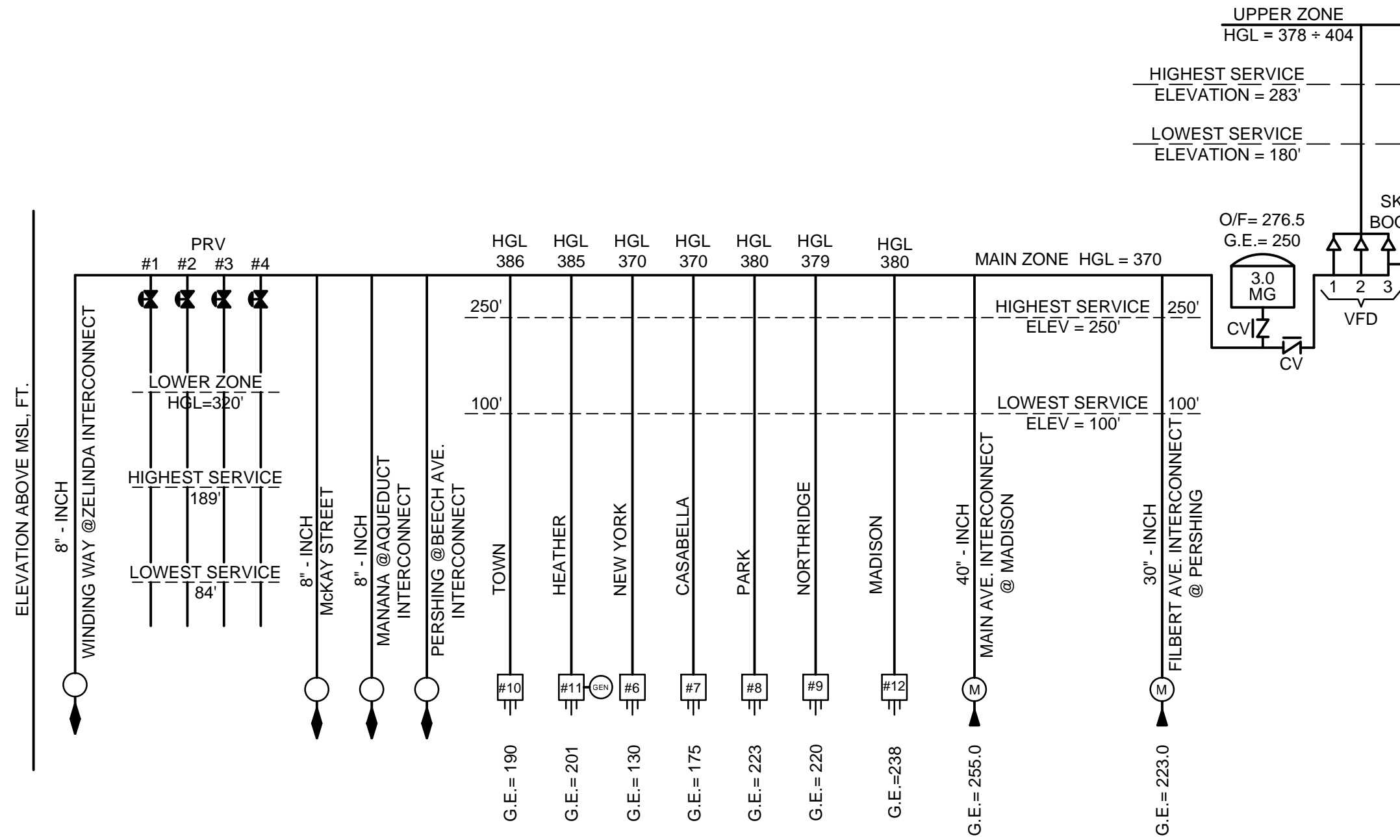
* MOST RECENT TEST ON 12/18/2008

SKYWAY BOOSTER PUMP STATION

WELL NAME	PUMP	Q, GPM	TDH, FT.	HP	G.E., FT.	PUMP TYPE
1 - SKYWAY	MKL	3500	128	150	250	WT/1 STAGE
2 - SKYWAY	MKL	3500	128	150	250	WT/1 STAGE
3 - SKYWAY	MKL	3500	128	150	250	WT/1 STAGE

SYSTEM INTERCONNECTION

AGENCY	AGENCY	SIZE IN.	CAPACITY, GPM
CARMICHAEL WD	WINDING WAY @ ZELINDA	8	1000
CITRUS HEIGHTS WD	McKAY STREET	8	1000
CITRUS HEIGHTS WD	MANANA @AQUEDUCT WAY	8	1000
ORANGEVALE WC	PERSHING @ BEECH AVE.	8	1000



LEGEND

- BOOSTER PUMP
- CHECK VALVE
- GENERATOR FOR BACK UP POWER
- HYDRAULIC GRADE LINE (2/3 FULL ELEV. CONTROLLING RESERVOIR OR PRV SETTING OR CONTROLLING BOOSTER SETTING)
- PURCHASED WATER SUPPLY & INTERCONNECTION
- RESERVOIR
- VALVE, ALTITUDE
- VALVE, GATE OR BUTTERFLY (NORMALLY CLOSED)
- VALVE, PRESSURE REGULATING
- VALVE, PRESSURE RELIEF
- VARIABLE FREQUENCY DRIVE
- WELL

PROJECT#	N/A	APPROVED BY:	M. NISENBOYM
DRAWN BY:	T. EGGAR	REV:	MAY-25-2017

**FAIR OAKS WATER DISTRICT
SYSTEM SCHEMATIC**

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FAIR OAKS
WATER DISTRICT



1917 - 2017

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