From: Jim Anderson <JA@malagacwd.org>
Sent: Monday, November 03, 2014 10:01 AM
To: CentralValleyFresno
Cc: Ortiz, Aide@Waterboards
Subject: Engineer's Water Balance Report; Aide Ortiz
Attachments: P&P.Water Balance Report.24Oct2014.pdf

Attached is the stamped and signed engineer's report.

James D. Anderson
General Manager
Malaga County Water District
3580 S Frank Street
Fresno, Ca 93725
559-485-7353 Office
559-485-2341 Direct
559-647-2733 Mobile
ja@malagacwd.org
www.malagacwd.org

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

Engineering
Surveying
Planning
Environmental
GIS
Construction Services
Hydrogeology
Consulting

286 W. Cromwell Avenue
Fresno, CA 93711-6162
Tel: (559) 449-2700 • Fax: (559) 449-2715
www.ppeng.com

FRESNO • CLOVIS • VISALIA • BAKERSFIELD • MODESTO • LOS BANOS • CHICO

MEMORANDUM

To: Malaga County Water District, Jim Anderson

From: Michael Taylor

Subject: WWTP Water Balance

Date: October 24, 2014

REGISTERED PROFESSIONAL ENGINEER
MICHAEL J. TAYLOR
NO. 39961
CIVIL ENGINEER
STATE OF CALIFORNIA
Exp. 12-31-15

Based on the recent monitoring of actual water level changes in Ponds 5, 6, and 7, which were isolated during portions of the months of July through October, 2014, the estimated percolation rate in the wastewater disposal ponds is 1.66 inches per day. It is noted that the previous estimated percolation rate (from 2008) was 0.60 inches per day. This updated percolation rate demonstrates a significant improvement in pond percolation rates. This improvement is a direct result of Malaga County Water District commitment during the previous six (6) years to scrape and rip the disposal ponds at the WWTP.

When the percolation rate of 1.66 inches per day is applied to a 100 Year Rainfall Water Balance, the existing ponds at the WWTP may be able to dispose of approximately 1.085 mgd (see attached water balance).

It is noted that the percolation rate of the ponds will decrease with use as dust and other particulates will settle on the pond bottom. When a factor of 75 percent is applied to the measured percolation rate, a resulting conservative value is 1.24 inches per day. When the percolation rate of 1.24 inches per day is applied to the 100 Year Rainfall Water Balance, the existing ponds at the WWTP may be able to dispose of approximately 0.821 mgd (see attached water balance).

It is recommended that this information is reviewed and forwarded to the RWQCB for consideration in establishing discharge limits for the new Waste Discharge Requirements to be adopted for the facilities. The efforts taken by the District over the past six (6) years has had significant impact in improving the on-site disposal capacity at the site, as evidenced by the recent pond percolation tests.

Also attached with this memorandum is a spreadsheet that allows the District to readily check that the necessary Available Capacity in the disposal ponds is available prior to each winter. For example, information regarding freeboard in the disposal ponds as of October 22, 2014 have been entered into the table. The ponds presently have approximately 34,825,885 gallons of capacity available. The 100 Year Rainfall Water

Balance indicates that the District must have at least 13,700,000 gallons of available capacity. The actual available capacity greatly exceeds the minimum requirement.

In addition, please refer to the attached Table 1 that includes monthly influent flowrates. Based on the current influent flowrates, and an estimated annual growth rate of 2 percent, the Malaga County Water District would not rely upon discharge to the Central Canal for approximately 23 years. It is recommended that the flowrate projection is updated each calendar year.

It is recommended that the District continue the annual rotation of scraping and ripping the existing ponds. In addition, it is recommended that the District isolate a pond every two years and monitor the actual change of water level so as to be able to update the estimated pond percolation rate.

Based on the information associated with current pond percolation rates, it is recommended that the present discharge flowrate limitation of 0.85 mgd to the disposal ponds is still viable for the Malaga County Water District.

Please contact me if you need additional information or if you have any questions.

Thank you.

Malaga County Water District
Wastewater Treatment & Disposal Facilities
Estimated Capacity Wastewater Disposal - 100 Year Rainfall Water Balance, Discharge and Storage

DATA:

Month	Number of Days per Month	100 Yr. Rainfall 1/ (in/month)	100 Yr. Evaporation 3/ (in/month)
January	31	5.14	0.90
February	28	3.70	1.46
March	31	4.53	2.09
April	30	2.76	3.71
May	31	0.01	6.21
June	30	0.31	6.85
July	31	0.00	8.14
August	31	0.00	6.99
September	30	1.10	4.68
October	31	1.58	3.09
November	30	3.16	1.20
December	31	1.59	0.85
Total	365	23.88	46.17

Discharge to canal		0	MGD	
Daily Effluent Production 5/	=	1,085,000	gpd	
Pond Wet Area 7	=	23.24	acres	
Pond Storage	=	185.9	ac-ft	8 ft deep
Pond Percolation Rate	=	1.66	in/day	
Additional Pond Wet Area	=		acres	
Additional Pond Storage	=	0.0	ac-ft	6 ft deep
Estimated Pond Percolation Rate	=	1.00	in/day	
Total Storage =		185.9	ac-ft	
Total Storage =		60,582,302	gal	
Total Area =		23.2	acres	

WWTF POND CALCULATIONS:

	Effluent Produced (gal/month)	Effluent To Canal (gal/month)	Effluent to Ponds (gal/month)	Surface Rainfall 19/ (gal/month)	Surface Evaporation 20/ (gal/month)	Pond Percolation 21/ (gal/month)	Monthly Change in Storage (gal/month)	Required Storage Capacity 23/ (gal)
January	33,635,000	0	33,635,000	3,243,677	567,959	32,474,638	3,836,080	8,030,702
February	30,380,000	0	30,380,000	2,334,943	921,356	29,331,931	2,461,656	10,492,358
March	33,635,000	0	33,635,000	2,858,727	1,318,927	32,474,638	2,700,162	13,192,520
April	32,550,000	0	32,550,000	1,741,741	2,341,254	31,427,069	523,418	13,715,938
May	33,635,000	0	33,635,000	6,311	3,918,918	32,474,638	(2,752,245)	10,963,693
June	32,550,000	0	32,550,000	195,630	4,322,800	31,427,069	(3,004,239)	7,959,454
July	33,635,000	0	33,635,000	0	5,136,874	32,474,638	(3,976,512)	3,982,942
August	33,635,000	0	33,635,000	0	4,411,149	32,474,638	(3,250,787)	732,155
September	32,550,000	0	32,550,000	694,172	2,953,387	31,427,069	(1,136,284)	0 *
October	33,635,000	0	33,635,000	997,084	1,949,993	32,474,638	207,453	207,453
November	32,550,000	0	32,550,000	1,994,167	757,279	31,427,069	2,359,819	2,567,272
December	33,635,000	0	33,635,000	1,003,394	536,406	32,474,638	1,627,350	4,194,622
Total (gal)	396,025,000	0	396,025,000	15,069,846	29,136,302	382,362,673	-404,129	* Start at 0 Stored
Total (ac-ft)	1,215.4	0.0	1,215.4	46.2	89.4	1,173.4	-1.2	September 1st
							-404,129	

1/ Rainfall Data per the Western Regional Climate Center.
3/ Evaporation data per WRCC X 0.75
5/ Design Capacity Effluent Production
7/ Total existing wet area of the existing lagoons.
19/ Surface Rainfall = Volume of 100 Year rainfall on the existing WWTF treatment and storage ponds and proposed storage ponds.
20/ Surface Evaporation = Volume of effluent and rain water evaporating from the existing WWTF treatment and disposal ponds.
21/ Pond Percolation = Volume of effluent and rain water percolating into the ground for existing ponds 1 through 8.
23/ Required Storage = Theoretical starting point Sept. 1st where pond storage starts at zero with monthly contributions.

36/ Maximum Storage Needed = Peak end of month pond storage volume needed (gallons & ac-ft).
37/ Storage Available from all ponds = Total volume of available storage.
39/ Check Balance = Comparison of this value with total wastewater processed.

Maximum Required storage	13,715,938	
Total Storage Available 37/:	60,582,302	gal
Extra Storage:	46,866,364	gal
	144	ac-ft
Total Effluent Production:	396,025,000	gal
Total Effluent Exported:	0	gal
Total Surface Rainfall 19/:	15,069,846	gal
Total Evaporation 20/:	29,136,302	gal
Total Percolation 21/:	382,362,673	gal
Effluent Applied to Crop:	0	gal
Check Balance 39/:	396,429,129	gal

Updated: 10/24/14
Print Date: *10/24/14*

PROVOST & PRITCHARD

Malaga County Water District
Wastewater Treatment & Disposal Facilities
Estimated Capacity Wastewater Disposal - 100 Year Rainfall Water Balance, Discharge and Storage

DATA:

Month	Number of Days per Month	100 Yr. Rainfall 1/ (in/month)	100 Yr. Evaporation 3/ (in/month)
January	31	5.14	0.90
February	28	3.70	1.46
March	31	4.53	2.09
April	30	2.76	3.71
May	31	0.01	6.21
June	30	0.31	6.85
July	31	0.00	8.14
August	31	0.00	6.99
September	30	1.10	4.68
October	31	1.58	3.09
November	30	3.16	1.20
December	31	1.59	0.85
Total	365	23.88	46.17

Discharge to canal		0	MGD	
Daily Effluent Production 5/	=	821,000	gpd	
Pond Wet Area 7	=	23.24	acres	
Pond Storage	=	185.9	ac-ft	8 ft deep
Pond Percolation Rate	=	1.24	in/day	
Additional Pond Wet Area	=		acres	
Additional Pond Storage	=	0.0	ac-ft	6 ft deep
Estimated Pond Percolation Rate	=	1.00	in/day	
Total Storage	=	185.9	ac-ft	
Total Storage	=	60,582,302	gal	
Total Area	=	*23.2*	*acres*	

WWTF POND CALCULATIONS:

	Effluent Produced (gal/month)	Effluent To Canal (gal/month)	Effluent to Ponds (gal/month)	Surface Rainfall 19/ (gal/month)	Surface Evaporation 20/ (gal/month)	Pond Percolation 21/ (gal/month)	Monthly Change in Storage (gal/month)	Required Storage Capacity 23/ (gal)
January	25,451,000	0	25,451,000	3,243,677	567,959	24,258,163	3,868,555	8,159,554
February	22,988,000	0	22,988,000	2,334,943	921,356	21,910,599	2,490,988	10,650,542
March	25,451,000	0	25,451,000	2,858,727	1,318,927	24,258,163	2,732,637	13,383,179
April	24,630,000	0	24,630,000	1,741,741	2,341,254	23,475,642	554,845	13,938,024
May	25,451,000	0	25,451,000	6,311	3,918,918	24,258,163	(2,719,770)	11,218,254
June	24,630,000	0	24,630,000	195,630	4,322,800	23,475,642	(2,972,812)	8,245,442
July	25,451,000	0	25,451,000	0	5,136,874	24,258,163	(3,944,037)	4,301,405
August	25,451,000	0	25,451,000	0	4,411,149	24,258,163	(3,218,312)	1,083,093
September	24,630,000	0	24,630,000	694,172	2,953,387	23,475,642	(1,104,857)	0 *
October	25,451,000	0	25,451,000	997,084	1,949,993	24,258,163	239,928	239,928
November	24,630,000	0	24,630,000	1,994,167	757,279	23,475,642	2,391,246	2,631,174
December	25,451,000	0	25,451,000	1,003,394	536,406	24,258,163	1,659,825	4,290,999
Total (gal)	299,665,000	0	299,665,000	15,069,846	29,136,302	285,620,308	-21,764	* *Start at 0 Stored September 1st*
Total (ac-ft)	919.6	0.0	919.6	46.2	89.4	876.5	-0.1	
							-21,764	

1/ Rainfall Data per the Western Regional Climate Center.
3/ Evaporation data per WRCC X 0.75
5/ Design Capacity Effluent Production
7/ Total existing wet area of the existing lagoons.
19/ Surface Rainfall = Volume of 100 Year rainfall on the existing WWTF treatment and storage ponds and proposed storage ponds.
20/ Surface Evaporation = Volume of effluent and rain water evaporating from the existing WWTF treatment and disposal ponds.
21/ Pond Percolation = Volume of effluent and rain water percolating into the ground for existing ponds 1 through 8.
23/ Required Storage = Theoretical starting point Sept. 1st where pond storage starts at zero with monthly contributions.

36/ Maximum Storage Needed = Peak end of month pond storage volume needed (gallons & ac-ft).
37/ Storage Available from all ponds = Total volume of available storage.
39/ Check Balance = Comparison of this value with total wastewater processed.

Maximum Required storage	13,938,024	
Total Storage Available 37/:	60,582,302	gal
Extra Storage:	46,644,278	gal
	143	ac-ft
Total Effluent Production:	299,665,000	gal
Total Effluent Exported:	0	gal
Total Surface Rainfall 19/:	15,069,846	gal
Total Evaporation 20/:	29,136,302	gal
Total Percolation 21/:	285,620,308	gal
Effluent Applied to Crop:	0	gal
Check Balance 39/:	299,686,764	gal

Updated: 10/24/14
Print Date: *10/24/14*

PROVOST & PRITCHARD

Malaga County Water District

Available Disposal Pond Capacity as of October 22, 2014

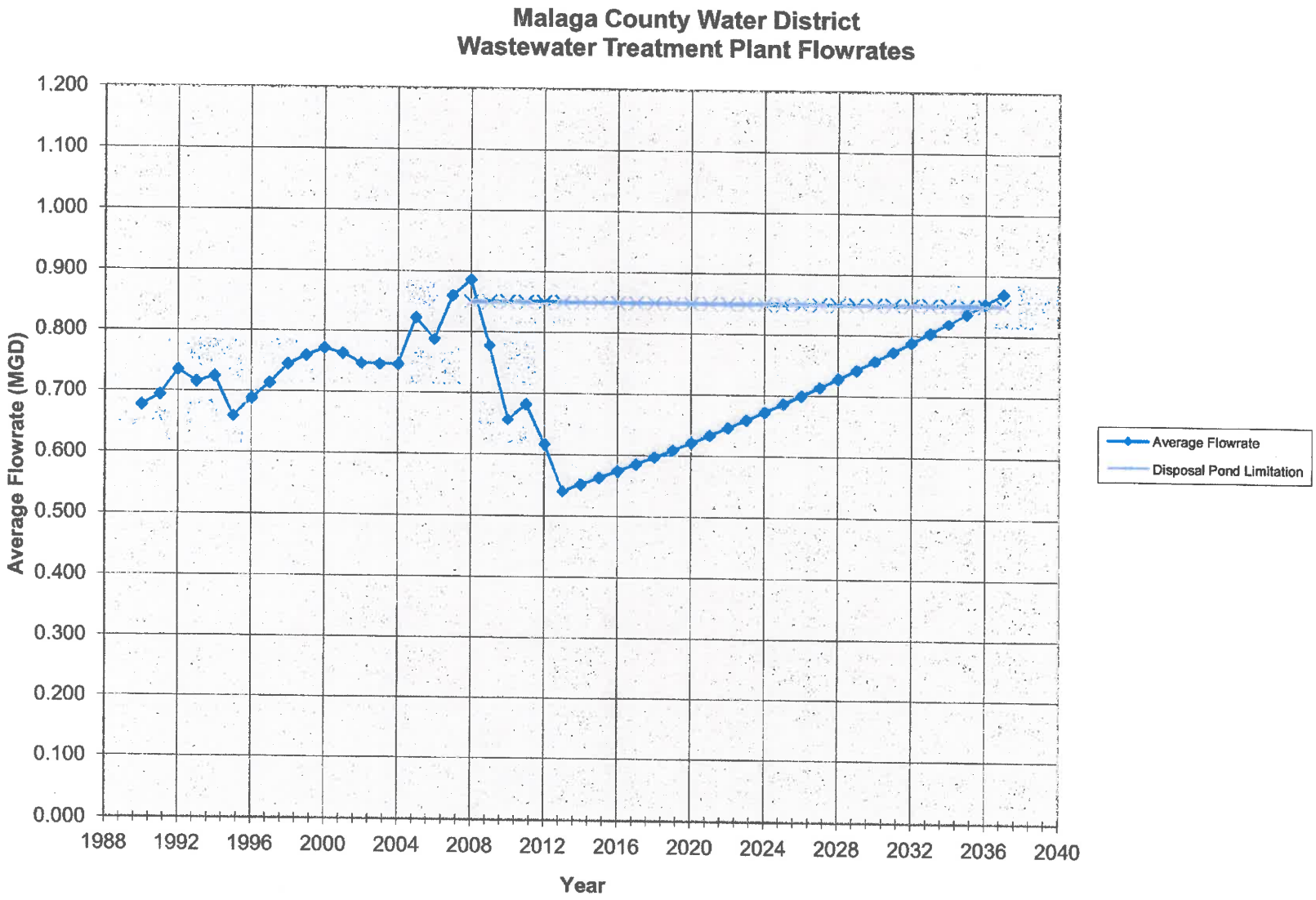
Pond	Freeboard (ft)	Available Depth (ft)	Acreage (acres)	Available Capacity (acre-ft)	Available Capacity (gal)	Total Depth (ft)
1	2.5	0.5	1.29	0.645	210,160	8
2	8	6	0.76	4.56	1,485,779	8
3	8	6	2.59	15.54	5,063,380	8
4	8	6	2.5	15	4,887,432	8
5	3.2	1.2	3.07	3.684	1,200,353	8
6	5.5	3.5	4.29	15.015	4,892,319	8
7	8	6	4.79	28.74	9,364,320	8
8	8	6	3.95	23.7	7,722,143	8
		Total	23.24	106.884	34,825,885	

Note: A minimum of 2 ft. of freeboard is required. 2 ft. freeboard equates to O AF available capacity.

TABLE 1

MALAGA COUNTY WATER DISTRICT
WASTEWATER TREATMENT PLANT
MONITORING AND REPORTING PROGRAM NO. 2008-0033
NPDES NO. CA 0084239

YEAR	AVERAGE FLOWRATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
		31	28	31	30	31	30	31	31	30	31	30	31
		31	29	31	30	31	30	31	31	30	31	30	31
1990	0.677	0.660	0.667	0.694	0.610	0.688	0.709	0.652	0.664	0.679	0.726	0.741	0.632
1991	0.694	0.642	0.651	0.694	0.687	0.684	0.697	0.682	0.703	0.728	0.712	0.713	0.731
1992	0.735	0.727	0.741	0.735	0.681	0.679	0.740	0.753	0.768	0.743	0.768	0.756	0.729
1993	0.716	0.727	0.720	0.724	0.721	0.715	0.703	0.705	0.712	0.714	0.703	0.709	0.734
1994	0.724	0.748	0.739	0.743	0.743	0.745	0.740	0.739	0.737	0.731	0.722	0.669	0.636
1995	0.660	0.638	0.635	0.621	0.614	0.626	0.636	0.641	0.695	0.699	0.705	0.709	0.699
1996	0.688	0.671	0.680	0.676	0.690	0.690	0.689	0.692	0.691	0.686	0.694	0.696	0.705
1997	0.714	0.686	0.681	0.681	0.690	0.704	0.715	0.711	0.740	0.756	0.722	0.734	0.749
1998	0.745	0.744	0.743	0.737	0.772	0.755	0.756	0.738	0.775	0.740	0.739	0.706	0.738
1999	0.760	0.753	0.753	0.735	0.746	0.765	0.762	0.778	0.780	0.770	0.761	0.760	0.751
2000	0.772	0.723	0.744	0.738	0.754	0.783	0.767	0.772	0.808	0.770	0.795	0.797	0.810
2001	0.763	0.776	0.771	0.701	0.810	0.755	0.780	0.750	0.770	0.773	0.759	0.760	0.756
2002	0.748	0.742	0.750	0.737	0.748	0.745	0.737	0.746	0.740	0.755	0.754	0.753	0.763
2003	0.747	0.752	0.752	0.737	0.750	0.740	0.746	0.758	0.742	0.740	0.750	0.747	0.745
2004	0.746	0.760	0.737	0.722	0.717	0.734	0.760	0.750	0.750	0.770	0.750	0.750	0.750
2005	0.823	0.860	0.780	0.760	0.770	0.763	0.870	0.960	0.935	0.964	0.740	0.778	0.700
2006	0.788	0.740	0.740	0.760	0.744	0.757	0.806	0.849	0.882	0.803	0.820	0.798	0.752
2007	0.860	0.785	0.820	0.805	0.867	0.770	0.964	1.001	0.960	1.020	0.823	0.746	0.763
2008	0.887	0.990	0.840	0.760	0.760	0.909	0.970	0.955	0.949	0.909	0.829	0.900	0.870
2009	0.778	0.830	0.800	0.820	0.740	0.800	0.900	0.830	0.750	0.800	0.720	0.670	0.680
2010	0.658	0.512	0.431	0.650	0.580	0.640	0.720	0.740	0.750	0.740	0.710	0.710	0.710
2011	0.683	0.670	0.640	0.690	0.690	0.630	0.740	0.710	0.730	0.730	0.700	0.640	0.620
2012	0.618	0.630	0.600	0.630	0.690	0.620	0.680	0.660	0.640	0.610	0.590	0.520	0.540
2013	0.541	0.560	0.450	0.520	0.570	0.560	0.530	0.600	0.610	0.550	0.560	0.510	0.490
2014	0.552												
2015	0.563												
2016	0.574												
2017	0.585												
2018	0.597												
2019	0.609												
2020	0.621												
2021	0.634												
2022	0.646												
2023	0.659												
2024	0.673												
2025	0.686												
2026	0.700												
2027	0.714												
2028	0.728												
2029	0.743												
2030	0.757												
2031	0.773												
2032	0.788												
2033	0.804												
2034	0.820												
2035	0.836												
2036	0.853												
2037	0.870												


Malaga County Water District
Wastewater Treatment Plant Flowrates
Average Flowrate (MGD)
1.200
1.100
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1988
1992
1996
2000
2004
2008
2012
2016
2020
2024
2028
2032
2036
2040
Year
Average Flowrate
Disposal Pond Limitation