FLOW PROJECTION STUDY
FOR THE

VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY

PREPARED BY:

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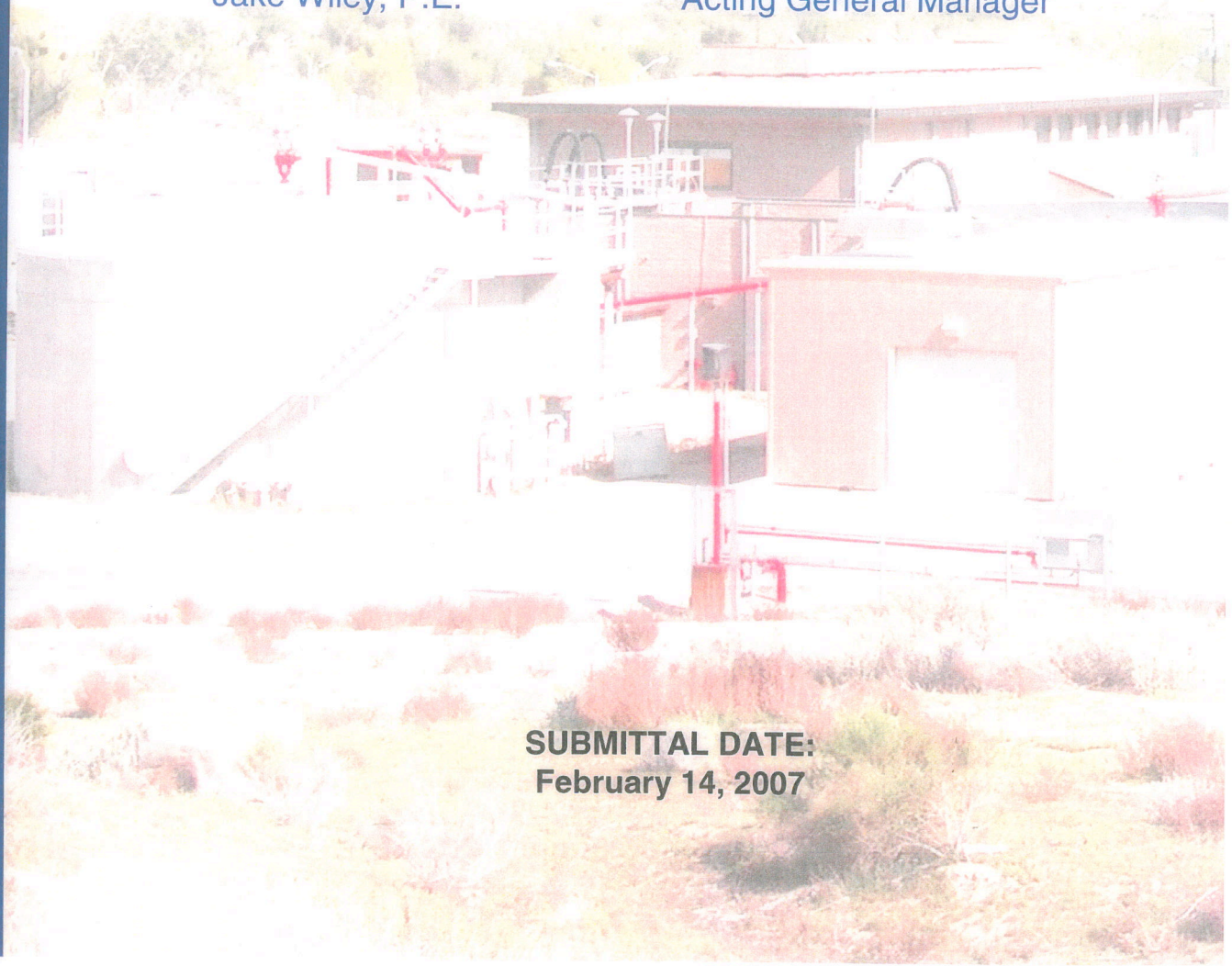

SUBMITTAL DATE:
February 14, 2007

RBF CONSULTING

February 14, 2007 JN 10-104667.001-.014

Mr. Logan Olds
Acting General Manager
Victor Valley Wastewater Reclamation Authority
20111 Shay Road
Victorville, CA 92394-8539

Subject: Updated Service Area Flow Projection

Dear Mr. Olds:

In accordance with our proposal to you, dated July 7, 2008, and your Purchase Order 1937, we are submitting herein the updated flow projection for the VVWRA Service Area. We developed a method for this projection that allowed us to quickly construct a flow model that integrates current data with flexible assumptions to give the JPA meaningful results. Our method sought to create a living document that can be readily updated as conditions in the high desert change.

The method is summarized as follows:

1) Develop a GIS database that uses a December 2005 aerial photograph of the service area and overlays San Bernardino County parcel data and member agency boundaries.

2) Develop shape files for the parcels that appear occupied (i.e., generating sewage) from inspection of the aerial photograph.

3) Develop shape files for the parcels that appear vacant on the aerial photograph.

4) Acquire current subdivision map activity from each member agency and create shape files with attributes for these parcels-in-process according to three specific land uses:

    a) Single family residential
    b) Multi-family residential
    c) Commercial/Industrial

5) Develop a flow projection model that:

    a) Identifies parcels in the mapping process and their land use category.
    b) Identifies vacant land in the VVWRA Service Area.
    c) Assumes a duration of development for those parcels in process.
    d) Establishes unit sewage generation factors for the vacant land and maps in process in each member agency.

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e) Establishes a duration of development for the vacant land.
f) Produces summary tables and graphs of the flow projection showing growth in mgd and EDUs.

Aerial Photograph Based GIS Database

The County of San Bernardino published an aerial photograph of the high desert that was flown in December 2005. The County also published an assessor parcel database in September 2005.

RBF reviewed these databases and attributed parcels with the following information:

- Member agency
- Vacant or built
- Land use of built parcels

Figure 1 shows the compiled databases. Please note that our review was limited to inspection of the aerial photograph. Our scope of work did not include field verification of parcels in question. The primary purpose of this step was to sort out occupied land from the vacant land for the estimate of future flow. Vacant versus occupied parcels are summarized in Table 1.

Table 1: Summary of Land Status

Member Agency	Occupied Land, acres	Vacant Land, acres	Percent Occupied	Total, acres
Victorville	16,447	29,672	36%	46,119
Hesperia	17,369	9,315	65%	26,684
Apple Valley	18,636	24,461	43%	43,097

Maps in Process Database

RBF coordinated with each member agency to determine which parcels are currently in the mapping process. The data consisted of: the April 30, 2006 List of Building Activity obtained from the Planning Department at the City of Victorville; the March 2006 Development Activity Report obtained from the web site of the City of Hesperia; and the Active Tract Maps furnished by the Town of Apple Valley. This data was sorted by three land use categories:

- Single family residential parcels
- Multi-family residential parcels
- Commercial/Industrial parcels

It should be noted that no maps in process data was obtained for the San Bernardino County Service Areas of Spring Valley Lake and Oro Grande. This decision was made for the sake of expediency and the fact that the CSAs represent a relatively minor portion of the flow in the VVWRA Service Area. For the CSAs, an average yearly flow increase of 40,000 gpd was assumed, in line with the 2005 estimate. This estimate assumes no flow increase for Oro Grande and a yearly increase of approximately 167 EDUs at Spring Valley Lake.

Each parcel falling in the Maps in Process category was attributed with the following when the data was available:

- APN
- Status
- Development Type
- Tentative Tract Number
- Acreage
- Building Area
- File Number
- Proposed Number of Lots

Table 2 summarizes key components of this data for each member agency.

Table 2: Summary of Maps in Process

Member Agency	Parcels in Process		
	SFDOs	MFDUs	Commerial/ Industrial, sf
Victorville	21,826	4,494	4,402,374
Hesperia	5,571	3,443	3,425,099
Apple Valley[1]	4,047	347	1256
TOTAL	31,444	8,284	7,828,729

[1] Commercial/Industrial reported in acres.

Unit flow factors were established for each of the land uses in the mapping parcels. These are summarized in Table 3.

Table 3: Unit Flow Factors Summary

Land Use	Unit Generation	Unit
SFDU	250 (1)	gpd/unit
MFDU	200 (2)	gpd/unit
Commercial/Industrial	0.25 (3)	gpd/sf
Commercial/Industrial	1400 (4)	gpd/acre

(1) Based upon VVWRA Standards.
(2) Based upon 2.5 persons per unit and 80 gpcd.
(3) Based upon City of Los Angeles Standards.
(4) Based upon IRWD and EMWD Standards.

Parcels in process are shown in Figure 2. Table 4 summarizes the resultant flow by volume and equivalent dwelling units.

Adjustment for Areas Not Tributary to VVWRA

The potential development areas (maps in process and vacant land) were adjusted for areas that will not drain to the VVWRA Interceptor. Areas that will not drain to VVWRA fall into two categories: land that is and will continue to be serviced via septic tanks and leach fields; and land that cannot drain to VVWRA because of a physical restriction. The process for this determination is summarized below:

- For the City of Victorville, land within the San Bernardino County areas was exempted.
- For the City of Hesperia, land currently serviced by septic tanks and a portion of the City south of the Aqueduct was exempted.
- For the Town of Apple Valley, a map of sewer service areas was reviewed with Town staff. Maps in process were reviewed individually. An estimate of vacant land within the ultimate sewer service area was made.

Table 5 summarizes the revised flow and EDUs from the maps in process, taking into account the land that will not drain to VVWRA. Table 6 summarizes the vacant land status.

Flow Projection

The VVWRA Service Area flow projection was estimated using by assigning a duration of occupancy for maps in process and adding sustainable growth for vacant parcels. The parcels in progress were adjusted to subtract the land that will not drain to VVWRA. The duration for occupancy of maps in process was set at 10 years. Sustainable growth estimates were assigned to vacant land in each member agency: 1,800 EDUs/year for Victorville; 1,500 EDUs/year for Hesperia; and 600 EDUs/year for Apple Valley. The growth for Spring Valley Lake was estimated at 167 EDUs/year. Table 7 shows the year-by-year service area growth based on these assumptions. Figure 3 graphs this growth. Also shown on Figure 3 is a graph of historical flow from the VVWRA RWWRF Influent Flow Meter (from 2002 to 2006). Figure 3 also depicts the previous VVWRA flow projection completed in 2005 and utilized for planning of the 18 mgd RWWRF expansion and VVWRA Interceptor Expansion projects. Finally, Figure 3 includes a straight line drawn on the graph for comparison that is an extension of historical plant flow increases from 2002 to 2006.

Figure 3
VVWRA Service Area Flow Projection

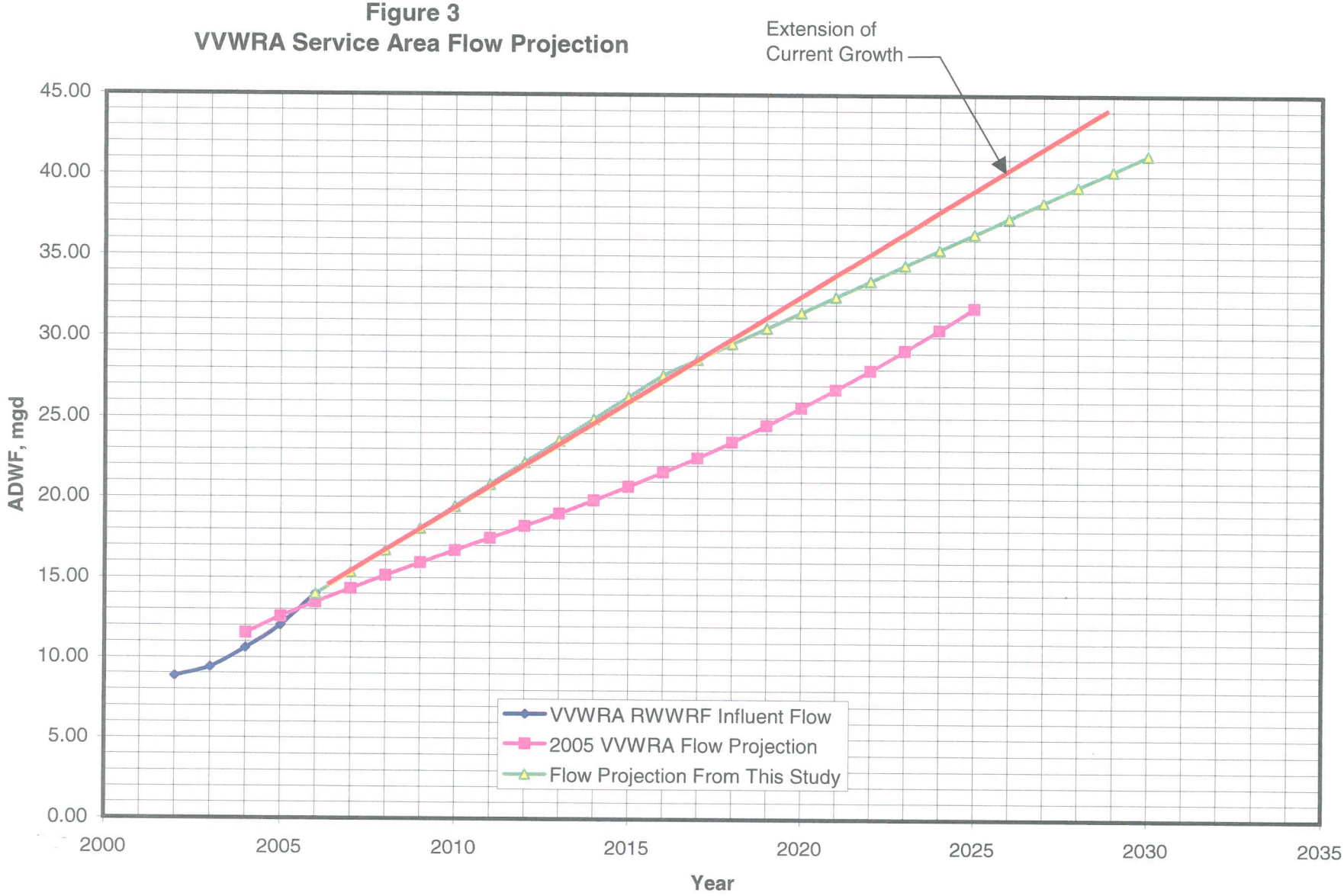

Table 4: Summary of Sewage Generation from Maps in Process

Land Use	Member Agency			Average Dry Weather Flow, mgd			Equivalent Dwelling Units			TOTAL	
	Victorville	Hesperia	Apple Valley	Victorville	Hesperia	Apple Valley	Victorville	Hesperia	Apple Valley	Flow, mgd	EDUs
Single Family	21,826	6,341	4,047	5.46	1.59	1.01	22,735	6,605	4,216	8.05	33,556
Multi-Family	4,494	3,470	347	0.90	0.69	0.07	3,745	2,892	289	1.66	6,926
Comm/Ind, sf	4,402,374	3,805,666	NA	1.10	0.95		4,586	3,964		3.81	15,877
Comm/Ind, acres	NA	NA	1,256			1.76			7,327		
TOTAL				7.46	3.23	2.84	31,066	13,461	11,831	13.53	56,359

Table 5: Revised Flow Summary

Land Use	Member Agency			Average Dry Weather Flow, mgd			Equivalent Dwelling Units			TOTAL	
	Victorville	Hesperia	Apple Valley	Victorville	Hesperia	Apple Valley	Victorville	Hesperia	Apple Valley	Flow, mgd	EDUs
Single Family	21,826	5,571	4,047	5.46	1.39	1.01	22,735	5,803	4,216	7.86	32,754
Multi-Family	4,494	3,443	347	0.90	0.69	0.07	3,745	2,869	289	1.66	6,903
Comm/Ind, sf	4,402,374	3,425,099	NA	1.10	0.86		4,586	3,568		3.72	15,480
Comm/Ind, acres	NA	NA	1,256			1.76			7,327		
TOTAL				7.46	2.94	2.84	31,066	12,240	11,831	13.23	55,138

Table 6: Vacant Land Status Summary

Member Agency	Land, acres						
	Total Area	Tributary to VVWRA	Sewered to VVWRA	On Septic	Occupied/ Sewered to VVWRA	In Mapping/ Sewered to VVWRA	Vacant Sewered to VVWRA
Victorville	46,119	46,119	44,952	1,167	16,447	6,541	21,964
Hesperia	26,684	20,013	14,009	6,004	4,203	3,518	6,288
Apple Valley	43,097	43,097	15,084	28,013	5,591	2,518	6,975

Table 7: Year-by-Year Service Area Growth

Year	Victorville		Hesperia		Apple Valley		SVL/Oro Grande		Total		EDU Growth[1]
	ADWF, mgd	EDUs	ADWF, mgd	EDUs	ADWF, mgd	EDUs	ADWF, mgd	EDUs	ADWF, mgd	EDUs	
2006	9.03	37,620	2.04	8,500	1.94	8,091	0.99	4,123	14.00	58,333	
2007	9.77	40,727	2.33	9,724	2.23	9,274	1.03	4,289	15.36	64,014	5,680
2008	10.52	43,834	2.63	10,948	2.51	10,457	1.07	4,456	16.73	69,694	5,680
2009	11.27	46,940	2.92	12,172	2.79	11,640	1.11	4,623	18.09	75,375	5,680
2010	12.01	50,047	3.21	13,396	3.08	12,823	1.15	4,789	19.45	81,055	5,680
2011	12.76	53,154	3.51	14,620	3.36	14,006	1.19	4,956	20.82	86,736	5,680
2012	13.50	56,260	3.80	15,844	3.65	15,190	1.23	5,123	22.18	92,416	5,680
2013	14.25	59,367	4.10	17,068	3.93	16,373	1.27	5,289	23.54	98,096	5,680
2014	14.99	62,473	4.39	18,292	4.21	17,556	1.31	5,456	24.91	103,777	5,680
2015	15.74	65,580	4.68	19,516	4.50	18,739	1.35	5,623	26.27	109,457	5,680
2016	16.48	68,687	4.98	20,740	4.78	19,922	1.39	5,789	27.63	115,138	5,680
2017	16.92	70,487	5.34	22,240	4.93	20,522	1.43	5,956	28.61	119,204	4,067
2018	17.35	72,287	5.70	23,740	5.07	21,122	1.47	6,123	29.59	123,271	4,067
2019	17.78	74,087	6.06	25,240	5.21	21,722	1.51	6,289	30.56	127,338	4,067
2020	18.21	75,887	6.42	26,740	5.36	22,322	1.55	6,456	31.54	131,404	4,067
2021	18.64	77,687	6.78	28,240	5.50	22,922	1.59	6,623	32.51	135,471	4,067
2022	19.08	79,487	7.14	29,740	5.65	23,522	1.63	6,789	33.49	139,538	4,067
2023	19.51	81,287	7.50	31,240	5.79	24,122	1.67	6,956	34.47	143,604	4,067
2024	19.94	83,087	7.86	32,740	5.93	24,722	1.71	7,123	35.44	147,671	4,067
2025	20.37	84,887	8.22	34,240	6.08	25,322	1.75	7,289	36.42	151,738	4,067
2026	20.80	86,687	8.58	35,740	6.22	25,922	1.79	7,456	37.39	155,804	4,067
2027	21.24	88,487	8.94	37,240	6.37	26,522	1.83	7,623	38.37	159,871	4,067
2028	21.67	90,287	9.30	38,740	6.51	27,122	1.87	7,789	39.35	163,938	4,067
2029	22.10	92,087	9.66	40,240	6.65	27,722	1.91	7,956	40.32	168,004	4,067
2030	22.53	93,887	10.02	41,740	6.80	28,322	1.95	8,123	41.30	172,071	4,067

[1] EDU growth from 2002 to 2006 has 5,168

Conclusions

The VVWRA Service Area has experienced rapid growth over the last 5 years. This growth is reflected in increases in sewage flow to the Regional Wastewater Reclamation Facility (RWWRF), which has averaged 11 percent per annum.

The VVWRA Service Area has experienced a flurry of subdivision activity in recent years. There are currently approximately 56,000 EDUs in process in Apple Valley, Hesperia and Victorville that will drain to the VVWRA Interceptor System. This activity gives the most reliable indication of flow increase since developers of these parcels have made a solid commitment through purchase of the land and payment of fees in the mapping process.

The duration of occupancy for theses parcels under process is a matter of projection. An assumption of 5 years would yield an astonishing growth rate, because of the large number of EDUs in process. An assumption of 10 years yields a more reasonable growth rate that more closely approximates plant flow growth from 2002 to 2006.

The basis of design for the current expansions to the VVWRA RWWRF and Interceptor was based on the 2005 Flow Projection furnished to RBF by VVWRA. This projection estimated an average flow of 18 mgd in the system by 2012 and assumes a decrease in building activity over the next 6 years. The projection in this letter report assumes the current rate of building activity is sustained over the immediate period ahead, which would bring the system to 18 mgd by the Year 2010.

The current RWWRF Expansion Projects will be complete by the first part of 2008 and will bring plant capacity to 18 mgd. The Phases 1 and 2 Interceptor Upgrades Project is part of a five-phase project that will bring Interceptor capacity up to plant capacity. The Phases 1 and 2 Project is not yet out to bid and will take approximately 1.5 years to build. The remaining phases will take approximately 2 years to design and build.

We hope that this analysis helps VVWRA in its planning for capital improvement projects. Please do not hesitate to contact me if you have any questions or comments regarding this analysis or require further assistance.

Sincerely,

Kevin Schmidt, P.E.
Senior Project Manager
Water Resources

cc: Paul Findley
Glenn Reiter

Attachments (3)

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