Harold Snyder
P.O. Box 926
Nipomo, CA 93444
(805) 929-2455 H

December 21, 2007

Nipomo Community Services District
148 Wilson Street
P.O. Box 326
Nipomo, CA 93444

(805) 929-1133 Phone
(805) 929-1932 Fax

Dear Bruce Buel:

It is my understanding from the past board meetings that the WATER AND SEWR MASTER PLAN UPDATE 2007 that was posted on the web and given to the board has had some corrections and updates that have been made (or will be made) and distribuited to the board memebers to update there Older version binders.

I am requesting a copy of any pages with corrections or updates made after the initial posting on the NCSD website.

If the corrections or updates are posted on a website identification of the web address is acceptable and no paper copy is needed.

Thank You

Harold Snyder

Hand Delivered.

RECEIVED
DEC 21 2007
NIPOMO COMMUNITY SERVICES DISTRICT

NIPOMO COMMUNITY SERVICES DISTRICT

BOARD MEMBERS
MICHAEL WINN, **PRESIDENT**
LARRY VIERHEILIG, **VICE PRESIDENT**
CLIFFORD TROTTER, **DIRECTOR**
ED EBY, **DIRECTOR**
JAMES HARRISON, **DIRECTOR**

STAFF
BRUCE BUEL, **GENERAL MANAGER**
LISA BOGNUDA, **ASSISTANT ADMINISTRATOR**
JON SEITZ, **GENERAL COUNSEL**

148 SOUTH WILSON STREET POST OFFICE BOX 326 NIPOMO, CA 93444 - 0326
(805) 929-1133 FAX (805) 929-1932 Website address: NCSD.CA.GOV

January 2, 2008

Mr. Harold Snyder
P. O. Box 926
Nipomo, CA 93444

SUBJECT: DECEMBER 21, 2007 PUBLIC RECORDS REQUEST RE W&S MASTER PLAN

Dear Mr. Snyder,

Attached is a copy of the materials that were deleted from the draft Water and Sewer Master Plan for replacement with revised text.

If you have any questions, please don't hesitate to call me.

Sincerely,

NIPOMO COMMUNITY SERVICES DISTRICT

Bruce Buel
General Manager

CC: Public Records Request File
Chronological File

T:\DOCUMENTS\STAFF FOLDERS\BRUCE\LETTERS\080102Snyder.DOC

Unscanned color map
pages

Cannon ASSOCIATES

ENGINEERS
PLANNERS
SURVEYORS

November 12, 2007

Nipomo Community Services District
148 South Wilson Street
Nipomo, CA 93444

To: Michael Winn, BOD President;
Larry Vierheilig, BOD Vice President;
Cliff Trotter, Director
Ed Eby, Director;
Jim Harrison, Director;
Bruce Buel, NCSD General Manager

Subject: Water and Sewer Master Plan Update, Administrative Draft

Enclosed is the Administrative Draft of the Water and Sewer Master Plan Update for the Nipomo Community Services District.

The primary goals of this Update were to develop estimates of water flow rates and sewer demand rates from now through the year 2030; develop computer models for predicting system response to growth and various demand scenarios, and identify projects necessary to address system deficiencies and improve system performance.

This Administrative Draft presents the analysis performed on both the water and sewer systems, and identifies distribution/collection system improvement projects. These improvement projects were developed to respond to system deficiencies identified through system modeling, as well as independent study on specific topics identified by the Board. Total estimated cost for proposed projects is estimated at $20,920,000 for the water system and $21,880,000 for the sewer system. These budgets are broken down and prioritized herein.

Periodically throughout development of this Update, proposed projects have been presented to the Board for review and discussion. This Administrative Draft reflects comments received during previous Board meetings and in discussions with Bruce Buel and NCSD Operations Staff. This Draft is presented for purposes of additional review and comment prior to publication of the final Master Plan Update.

Cannon Associates appreciates the opportunity to work with the Board on preparation of this Update. If there are questions or if we can provide any further assistance, feel free to contact us.

Sincerely,

Larry Kraemer, RCE 44813
Sr. Civil Engineer

364 Pacific Street
San Luis Obispo, CA 93401
Tel: 805-544-7407
Fax: 805-544-3863

WATER AND SEWER
MASTER PLAN UPDATE

Administrative Draft

Prepared for

Nipomo Community Services District

Board of Directors	**Michael Winn, President** **Larry Vierheilig, Vice President** **Ed Eby** **Jim Harrison** **Cliff Trotter**
General Manager	**Bruce Buel**

Prepared by

Cannon Associates
364 Pacific Street
San Luis Obispo, CA 93401

Garing, Taylor & Associates
141 S Elm St.
Arroyo Grande CA 93420

November 12, 2007

As a cross-check, water demand was then calculated based on properties currently being served and the duty factors shown in Table 2-1. This calculation yielded similar results and was used as the basis for calibrating the computer model of the water system under existing conditions (discussed further below). Figure 2-1, Existing Water Service Area, shows the properties that are currently being served along with their designated land use type.

Future water demand projections were based on the UWMP methodology and updated to reflect the water duty factors listed in Table 2-1. Results are summarized in Table 2-3. Figure 2-2, Future Water Service Area, shows all of the properties within the proposed future District boundary and their designated land use.

Table 2-3: Future Annual Water Demand by Land Use, Buildout and 2030

Land Use	Water Duty Factor[(2)]	2005 Water Service Area [(1)]	SOI-1	SOI-2	SOI-3	SOI-4	SOI-7	SOI-8	Total Area served	Estimated Water Use at Buildout	Estimated Water Use in Year 2030 [4]
(units)	afy/ac	ac	ac	ac	ac	ac	ac	ac	ac	afy	afy
Residential Land Uses											
REC	0.98	631							631	618	
RR	0.20	1,404	662				1,264	181	3,511	688	
RSF	2.10	686			91				777	1,632	
RS	0.98	905			84	245	28		1,262	1,237	
RL	0.10	4				1,073			1,077	106	
Blacklake [(1)]	1.04	510							510	530	
Southland Specific Plan	0.98					100			100	98	4,300
RMF	3.75	160							160	600	600
Non-Residential Land Uses											
AG	0	12	420	132	58		83		705	0	0
OP	0.26	33							33	9	
CR	1.42	160							160	227	
CS	0.35	94				104			198	69	289
IND	0.67	0							0	0	0
OS	1.18	11							11	13	13
PF	0.59	38			5				43	25	24
MUC									0	0	
Total Use		4,648	1,082	132	238	1,522	1,375	181	9,178	5,852	5,226
In-Lieu NMMA Groundwater Recharge [(3)]											600
Unaccounted System Losses (8%)											420
Total Demand											6,246

1: UWMP 2005 Update Appendix E

2: Residential Rates Observed FY05-06, Non-residential rates UWMP Table 15

3: UWMP 2005 Update Appendix Table 35. Amount of groundwater NCSD pumps in excess of safe yield on NMMA and therefore must recharge with Supplemental water.

4: Limited by 2.3% Growth Rate

The values shown in Table 2-4 below are used throughout the remainder of this MPU to simplify discussions of the Existing and Future conditions. The Existing Condition water demand projection is rounded to 3,000 acre-feet per year and the Future Condition (Year 2030) to 6,200 acre-feet per year. Refer to Technical Memorandum 1 (Appendix A) for additional information.

Table 2-6: Assumed Annual Water Supply (AF) from Sources

Source\Condition	Current	Near-Term	Interim	Future
NCSD Wells	3,000	1,000	1,000	1,000
CCWA	-	2,500	1,500	0
Desalination	-	0	2,000	5,200
Total	3,000	3,500	4,500	6,200

Note that these scenarios all show a dramatic reduction in District well usage from current levels. Wells will primarily be used to offset seasonal peak demand, once the supplemental water sources are on line.

Tie-in locations for supplemental water sources to the existing system were assumed to be near the intersection of Thompson and Tefft for CCWA and at Highway 101/Willow Road for the desalinated water.

The analysis for CCWA supplemental water assumed a fixed-flow condition; that is, a constant volume of supplemental water would be supplied at a rate equivalent to no more than the average daily demand of the system. In regard to Desalination, it was assumed that desalinated water can be provided on an as-needed basis, much as the District's wells are operated currently, to meet the future maximum daily demand requirements.

2.3.3 Analysis and Recommendations

The District is required by State law (Title 22 Requirements) to have sufficient water delivery capacity equal to or greater than the maximum daily demand (MDD) on the system in a 24 hour period. At present, the pumping capacity of the existing active wells is approximately 3,920 gpm, which is slightly greater than the maximum day demand of 3,152 gpm. Many jurisdictions require total system capacity to be quantified assuming the largest producing well out of service. It is recommended that the District strive to meet this criterion by not only developing new supplemental water supply sources (as discussed above) but also by upgrading its existing standby wells to consistently meet water quality and pumping capacity objectives. We recommend the District undertake a feasibility study to upgrade Church Well to bring it up to active status. Alternatives for Church Well include (1) well-head treatment or (2) a dedicated line, blending tank, and booster pump. Recommended pumping capacities are shown on the table below for both existing and future conditions.

Source/Condition	Current Available Capacity, gpm	Existing Recommended Capacity, gpm	Future Recommended Capacity, gpm
Wells	3,920	3,920	3,920
CCWA	-	1,550	-
Desalination	-	-	6,575
Total Capacity	3,920	5,470	10,495

MDD Required	3,152	3,152+	6,575

Operational storage to accommodate for delivery of CCWA water is estimated by approximating the potential difference between actual water delivered vs. actual daily demand. The worst case scenario would be the over-ordering of water, whereby a portion of the water delivered from CCWA would need to be stored due to low demand in the system. Assuming that water will be delivered daily and ordered on a monthly basis, the worst case would occur during the low demand period of the year. If the District were to order an average day delivery (2,500 ac-ft/yr = 2.3 MG/day) and actual demand was at its lowest value (say 1.3 MG/day), then approximately 1.0 MG of storage would be needed to handle the over-order.

The following table illustrates the District's storage requirements based on the master-plan water supply scenarios and storage calculations described above for both existing and future conditions.

Water System Storage Capacity

Storage Requirements	Existing Condition (gallons)	Future Condition (gallons)
Fire	540,000	540,000
Equalization	1,320,000	2,760,000
Emergency	1,800,000	3,180,000
Operational (CCWA)	1,000,000	
Total Needs:	4,660,000	6,480,000
Elevated Storage Available:	3,280,000	4,280,000
Gross Surplus/(Deficiency):	(1,380,000)	(2,200,000)
Credit for Sundale Well*	1,800,000	3,180,000
Net Surplus/(Deficiency)	420,000	980,000
Proposed Additional Storage	1,000,000	1,000,000
Net Surplus/(Deficiency)	1,420,000	1,980,000

* Assumes Sundale Well can reliably produce 1,000-gpm of emergency water supply for three day period, which is equivalent to 3,710,000 gallons.

As shown, the District's existing tank storage is adequate to meet current and future needs given the four major storage requirement components discussed above. However, this is based on the assumption that Sundale Well has reliable backup emergency power and that the well itself will be available during an emergency.

From an operational perspective, we recommend the District construct approximately 2.0 MG of additional storage, 1 MG in the near-term and another 1 MG in the future. This will serve several purposes including, (1) meeting the District's desire to have a larger component of its Emergency Storage in above-ground, elevated storage tanks, and (2) providing sufficient tank capacity to handle differences between CCWA ordered deliveries and actual demand.

- Technical Memorandum 6: *County Drainage Projects, Impacts to NCSD Water System* (Appendix F):

  This memorandum reviews the potential impact of planned County drainage system improvement projects to District water lines in the vicinity of the planned projects, and addresses costs for proposed system modifications.

  San Luis Obispo County intends to complete six drainage system improvement projects within the next three years. Some of these projects will affect the NCSD water system by requiring either permanent pipeline relocation or a temporary system modification during construction. The following potential impacts were identified.

  Water System Impacts

Drainage Project	Water System Impact
1. Tefft St. Box Culvert Improvements	Existing 10" and 12" water mains to be relocated
2. Thompson Ave. Arch Culvert Improvements	Existing 6" water main to be relocated, currently hanging within planned culvert structure
3. Mallagh St. Arch Culvert Improvements	Existing water line in project area; will need to be relocated to accommodate new arch culvert
4. Mallagh St. Box Culvert Improvements	Existing 6" water line in project area will need to be relocated to accommodate new box culvert. No impacts anticipated for pipe culvert replacement.
5. Burton St. Box Culvert Improvements	Existing 6" water line in project area; will need to be relocated to accommodate new box culvert.

  Working with NCSD staff, likely alternate permanent locations or temporary modifications for each project were identified and have been designed. The technical memorandum includes a cost estimate for each project.

- Technical Memorandum 7: *Conoco Phillips Water Supply Feasibility Study* (Appendix G):

  This memorandum reviews the potential for developing a desalination facility at the existing Conoco Phillips plant and develops a scope for a Feasibility Study for further review.

  Conoco Phillips currently processes almost 1.3 MGD of ground water extracted from four groundwater wells. They are permitted to discharge up to 575,000 GPD of treated plant effluent and brine from their reverse osmosis (RO) facility, via an ocean outfall pipeline (Outfall). NCSD would like to explore the possibility of utilizing slant drilling technologies to draw seawater or brackish groundwater, treating this water in a separate RO desalination (desal) plant to provide supplemental potable water for the NCSD system, and discharging brine waste from the desal process to the ocean via the Outfall.

  Conoco Phillips currently utilizes all of the permitted capacity in the Outfall, so there is no excess capacity for brine discharge from a NCSD desal plant. However, NCSD could potentially generate Outfall capacity by providing alternate disposal of Conoco Phillips' treated plant effluent, such as groundwater recharge, direct injection, or landscape irrigation. Financial viability for this project concept depends on two assumptions: that sufficient capacity can be generated is the Outfall, and that sufficient recovery can be achieved through RO.

For purposes of this technical memorandum, it was assumed that up to 430,000 GPD of capacity would be available made in the Outfall by handling Conoco Phillips wastewater through alternate means of disposal or reuse. With 430,000 GPD of capacity for brine and assuming an 80% recovery form the desal plant, approximately 2.2 MGD of potable water could be processed, providing up to 1,900 AFY of desalinated water to the NCSD potable water system.

Based on discussions with other water agencies utilizing desal technologies, construction costs could range between $5 million and $9 million, and operating cost are estimated between $2,000 to $4,000/AF. Assuming up to 1,900 AFY water produced, this project would cost NCSD between $3,800,000 and $7,600,000 per year for water treatment.

This technical memorandum recommends that NCSD conduct a Feasibility Study to determine if this is truly a technically and economically viable project. A recommended Scope of Work for this Feasibility Study is included in the technical memorandum.

- Technical Memorandum 16: *CCWA Disinfection and Regulatory Compliance* (Appendix P):

CCWA water uses chloramines for disinfection, a method which is incompatible with the chlorine-based disinfection method currently used by the District. Use of CCWA supplemental water may necessitate additional compliance requirements or operational modifications to accommodate this alternate disinfection method. This technical memorandum reviews compliance challenges and operational choices available to meet the regulatory requirements for use of CCWA water.

Compliance challenges may include additional disinfection profiling and benchmarking to comply with LT2 and additional system monitoring for compliance with DBPR2.

Disinfection system alternatives include uncontrolled blending of chloraminated CCWA water with chlorinated District water either in the system or at a single location prior to entry in the system. This alternative may result in water quality problems due to the incompatibility of the two disinfection methods.

A second disinfection alternative involves removing the chloramines from the CCWA water and disinfecting with chlorine prior to entry to the District system. However, CCWA water is more likely to form DBPs that District water, so DBP monitoring and treatment may be required.

A third disinfection alternative involves conversion of the District system from chlorine to chloramines. This alternative presents the lowest potential for water quality problems, the lowest maintenance cost, and a comparable capital cost to the second alternative.

This technical memorandum recommends conversion of the District system to a chloramines disinfection method as part of the CCWA water tie-in projects.

RECOMMENDED WATER SYSTEM IMPROVEMENTS

Improvements to meet NEAR-TERM needs

DISTRIBUTION SYSTEM		Diam. (in)	Unit	Quantity	Unit Cost[1]	Total Cost[2]
PRIORITY 1 - ELIMINATING EXISTING BOTTLENECKS						
1	Camino Caballo - Blue Gum west to existing 16" main	16	LF	1,325	$200	$265,000
2	Willow Road - Pomeroy west to Misty Glen Place	14	LF	1,500	$180	$270,000
3	Grande from Cyclone to Orchard	8	LF	660	$140	$92,400
4	Frontage from Story to Banyon	12	LF	290	$170	$49,300
5	Frontage from Hill to Grande	12	LF	1,180	$170	$201,000
					Subtotal	*$878,000*
PRIORITY 1 - UPGRADING STANDBY WELLS TO ACTIVE WELLS						
6	Church Well - Wellhead Treatment Feasibility Study		LS	1	$25,000	$25,000
					Subtotal	*$25,000*
PRIORITY 1 - ELIMINATING EXISTING BOTTLENECKS - BLACKLAKE						
7	Misty Glen Place - Willow Road north to existing 8" main	8	LF	85	$140	$11,900
					Subtotal:	*$11,900*
PRIORITY 1 - SLO COUNTY DRAINAGE PROJECT - RELOCATING WATER MAINS						
8	Tefft Street Box Culvert Improvements	10	LF	150	$160	$24,000
9	Thompson Avenue Arch Culvert Improvements	8	LF	150	$140	$21,000
10	Mallagh Arch Culvert Improvements	8	LF	150	$140	$21,000
11	Mallagh Box Culvert Improvements	8	LF	150	$140	$21,000
12	Burton Street Box Culvert Improvements	8	LF	150	$140	$21,000
					Subtotal	*$108,000*
PRIORITY 1 - BACKBONE IMPROVEMENTS TO ACCOMMODATE NEW SUPPLY AT THOMPSON & MEHLSCHAU						
13	North Dana Foothill Road - Quad Tanks to Mehlschau	24	LF	4,900	$260	$1,280,000
14	Mehlschau - North Dana Foothill Road to Thompson	24	LF	5,650	$260	$1,470,000
15	Thompson - Mehlschau to High School	14	LF	900	$180	$162,000
16	Disinfection: conversion for chloramination at each well.		LS	1	$960,000	$960,000
17	Pressure reducing station at CCWA tie-in.		LS	1	$75,000	$75,000
18	Land Acquisition / Lease Entitlements for Water Storage Tank				TBD	TBD
19	Water Storage Tank (1MG) above Mehlschau/N.Dana Foothill Rd.		MG	1	$1,000,000	$1,000,000
20	Mehlschau Extension - Intersection N.Dana Rd. to New Tank	24	LF	2,100	$260	$546,000
					Subtotal	*$5,500,000*
PRIORITY 1 - WILLOW ROAD EXTENSION IMPROVEMENTS						
21	Mehlschau (Future Extension) - Thompson to Oakglen	18	LF	2,900	$250	$725,000
22	Hwy 101 Crossing - Oakglen/Mehlschau(Future) Intersection to N.Frontage Rd.	18	LF	250	$1,500	$375,000
23	N. Frontage Rd - along Hwy 101 to Sandydale	16	LF	600	$200	$120,000
24	N. Frontage Rd - along Hwy 101 to Willow Road Extension	12	LF	3,650	$170	$621,000
25	Willow Rd. (Future Extension) - N. Frontage Rd to Hetrick	12	LF	4,600	$170	$782,000
26	Willow Rd. (Future Extension) - Hetrick to Pomeroy	12	LF	3,700	$170	$629,000
					Subtotal	*$3,252,000*
PRIORITY 2 - OPERATIONAL IMPROVEMENTS						
27	Standpipe Mixing		LS	1	$150,000	$150,000
28	Security System		LS	1	$121,000	$121,000
					Subtotal	*$271,000*
PRIORITY 2 - LOOPING DEAD-END MAINS						
29	Brytec Ct - extend 8" dead-end to Division	8	LF	20	$140	$2,800
30	N. Blume - extend 8" dead-end to Grande	8	LF	370	$140	$51,800
31	N. Crosby - extend 8" dead-end to Camino Caballo	8	LF	90	$140	$12,600
32	Eve Street - from Burton to Thompson	8	LF	440	$140	$61,600
33	Colt Lane from Glory to Amado	8	LF	1,800	$140	$252,000
34	Grove from Oakglen to Colt	8	LF	650	$140	$91,000
35	Branch from Wilson to Carrillo	8	LF	730	$140	$103,000
36	Camino Caballo from Lindon to Frontage	8	LF	500	$140	$70,000
					Subtotal	*$645,000*
			Total cost to meet NEAR-TERM needs:			***$10,700,000***
PRIORITY 1 - ANNUAL PIPE REPLACEMENT PROGRAM[3]						
37	Replace 5% of Valves per year (1840 total)		EA	92	$2,000	$184,000
38	Replace 5% of Fire Hydrants per year (660 total)		EA	33	$2,200	$72,600
39	Replace 5% of Air/Vac's per year (205 total)		EA	11	$1,500	$16,500
40	Replace 10% of Water Meters per year (3000 total)		EA	300	$500	$150,000
					Subtotal:	*$424,000*
PRIORITY 3 - SUMMIT STATION PRESSURE/FIRE PROTECTION UPGRADES[4]						
41	Hydro-pneumatic Tanks, Booster Pump Station, & Valving		LS	1	$500,000	$500,000
					Subtotal:	*$500,000*

NOTES:

1. Cost Estimate derived from adjusting 2001 Master Plan Estimate April 2001 cost to May 2007 ENR CCI.
2. Costs rounded to 3-significant figures.
3. Costs are expressed in approximate annual present worth values to be funded from District's maintenance reserves.
4. Facilities required to bring fire flow capacity to 1,000 gpm at 20 psi. Improvements to be funded by properties receiving benefit.

RECOMMENDED WATER SYSTEM IMPROVEMENTS						
Improvements to meet INTERIM-TERM needs						
DISTRIBUTION SYSTEM		**Diam. (in)**	**Unit**	**Quantity**	**Unit Cost[1]**	**Total Cost[2]**
PRIORITY 1 - BACKBONE IMPROVEMENTS TO ACCOMMODATE NEW SUPPLY AT WILLOW & HWY 1						
1	Willow Road from Hwy 1 to Bevington Well (parallel)	24	LF	6,800	$260	$1,770,000
						$1,770,000
PRIORITY 1 - BACKBONE IMPROVEMENTS TO MEET INTERIM NEEDS						
2	S. Oakglen - Tefft to Amado	14	LF	3,050	$180	$549,000
3	Amado - S. Oakglen to Highway 101	14	LF	650	$180	$117,000
4	Freeway Crossing - Oakglen to Frontage at Amado	14	LF	250	$1,400	$350,000
5	N. Frontage - Sandydale to Lindon	16	LF	650	$200	$130,000
6	N. Frontage - Lindon to Juniper	14	LF	1,600	$180	$288,000
7	Calle Fresa - Pomeroy to Camino Caballo	10	LF	1,200	$160	$192,000
8	S. Frontage - Tefft to Hill Street	12	LF	900	$170	$153,000
9	S. Frontage - Grande to Banyon	12	LF	2,250	$170	$383,000
10	S. Frontage - Story to Southland	12	LF	1,850	$170	$315,000
					Subtotal	*$2,480,000*
			Total cost to meet INTERIM-TERM needs:			***$4,250,000***

NOTES:
1. Cost Estimate derived from adjusting 2001 Master Plan Estimate April 2001 cost to May 2007 ENR CCI.
2. Costs rounded to 3-significant figures.

RECOMMENDED WATER SYSTEM IMPROVEMENTS							
Improvements to meet FUTURE-TERM needs							
DISTRIBUTION SYSTEM		**Diam. (in)**	**Unit**	**Quantity**	**Unit Cost[1]**	**Total Cost[2]**
PRIORITY 1 - BACKBONE IMPROVEMENTS TO ACCOMMODATE FUTURE NEEDS						
1	Future Road - Hetrick to Pomeroy	12	LF	2,500	$170	$425,000
2	Pomeroy - Willow to Future Road	12	LF	3,600	$170	$612,000
3	Pomeroy - Future Road to Summit Station	10	LF	2,050	$160	$328,000
4	Willow Road from Bevington Well to Misty Glen Place	18	LF	5,000	$250	$1,250,000
5	Mesa - Charro to Evergreen	10	LF	2,200	$160	$352,000
6	Evergreen - extend to Mesa	8	LF	1,400	$140	$196,000
7	Southland - Frontage to Orchard	10	LF	3,900	$160	$624,000
8	Addtnl. Water Storage Tank (1MG) above Mehlschau/N.Dana Foothill Rd.		MG	1	$1,000,000	$1,000,000
					Subtotal	*$4,790,000*
PRIORITY 1 - ELIMINATING BOTTLENECKS - BLACKLAKE						
9	Augusta Drive - extend 8" to future line in Pomeroy	8	LF	20	$140	$2,800
					Subtotal:	*$2,800*
PRIORITY 2 - PROPOSED LOOPS						
10	Widow Lane / Twilight - extend 8" to loop dead-ends	8	LF	1300	$140	$182,000
11	Tanis - extend 6" dead-end to Nellie	8	LF	900	$140	$126,000
12	Spruce - extend 6" dead-end to Nellie	8	LF	250	$140	$35,000
13	Bristlecone - extend 6" dead-end to Nellie	8	LF	200	$140	$28,000
14	Terrace - extend 6" dead-end to Souza	8	LF	1850	$140	$259,000
15	Souza - Terrace to Oakglen	8	LF	300	$140	$42,000
16	Glenhaven - San Ysidro to Amber	8	LF	800	$140	$112,000
17	Hunter Ridge - Pomeroy to Glenhaven	8	LF	1050	$140	$147,000
18	Future Road - Glenhaven to Pomeroy (between Jennie and Ten Oaks)	8	LF	1050	$140	$147,000
19	Future Road - Honey Grove to Drumm	8	LF	650	$140	$91,000
					Subtotal	*$1,170,000*
			Total cost to meet FUTURE-TERM needs:			***$5,970,000***

NOTES:
1. Cost Estimate derived from adjusting 2001 Master Plan Estimate April 2001 cost to May 2007 ENR CCI.
2. Costs rounded to 3-significant figures.

The technical memorandum recommends a Feasibility Study be conducted to investigate this option further, and recommends a scope for such a Study.

- Technical Memorandum 10: *Relocation and Groundwater Recharge of Southland WWTP Effluent* (Appendix J):

  This memorandum reviews locations, piping alternatives, and costs for discharge of effluent from the Southland WWTP as a possible source of groundwater recharge.

  NCSD wanted to identify potential upgradient locations to recharge treated wastewater from the Southland WWTP. Based on guidance from District staff, initial screening was performed to identify potential areas for groundwater recharge. Three sites were selected as possible discharge locations.

  Costs were calculated for conceptual alignments to each of the three potential discharge locations. Detailed cost analyses are included in the technical memorandum. As would be expected, the costs for disposal of effluent increases with the distance to the disposal site as well as the flow rate desired for pumping to that area.

  The District should determine if the value of groundwater recharge in upgradient locations merits the additional costs associated with transporting the effluent. This technical memorandum recommends a Feasibility Study be conducted to investigate this option further, and recommends a scope for such a Study.

- Technical Memorandum 11: *Southland Wastewater Treatment Plant Facility Master Plan* (Appendix K):

  This memorandum reviews current status and associated costs for projects originally presented in the Southland Wastewater Treatment Plant Facility Master Plan.

  Of the Current System Improvements noted, the majority are already proposed to be accomplished by the year 2009. The technical memorandum recommends that installation of appropriately sized and rated variable frequency drives is the most economical method to forestall the periodic influent pump station pump failures. Additionally, the oxidation ditch (Biolac Wave Oxidation System) is recommended as the most cost effective future treatment option. Although not part of the Capital Improvement Plan presented in the Master Plan, the technical memorandum further recommends that sludge removal through the use of rental dredge equipment should be explored in the near term.

- Technical Memorandum 12: *Southland Shop Upgrades* (Appendix L):

  This memorandum reviews costs associated with potential upgrades to the Southland Shop and reviews the viability of installing solar panels to meet the Shop electric needs.

  The proposed upgrade will enlarge the existing office and storage space, provide shower facilities, expand garage space, improve security features such as lighting and fencing, and provide paved access to some interior areas. Estimated costs for this upgrade are approximately $400,000.

  One possible additional aspect of the shop upgrade may be installation of solar panels to offset electrical usage. Currently, the Shop uses an average of approximately 775 kwh per month. With the planned upgrade, this usage may double. Costs and savings for installation of solar panels to offset current usage are estimated on the table below.

Item	Approximate Cost
Installation	$24,000
Currently Average Monthly Electrical Costs	$127.00
Anticipated Average Monthly Electric Costs	$38.00
Anticipated Monthly Savings	$89.00
Estimated Payback Period	12 years

This technical memorandum does not recommend inclusion of the solar system installation as part of the Southland Shop Upgrade.

- Technical Memorandum 13: *County Drainage Projects, Impacts to NCSD Sewer System* (Appendix M):

  This memorandum reviews the potential impact of planned County drainage system improvement projects to District sewer lines in the vicinity of the planned projects.

  San Luis Obispo County intends to complete six drainage system improvement projects within the next three years. The majority of projects have sewer lines within the immediate vicinity of the construction. Proposed projects were reviewed with San Luis Obispo County staff and NCSD Operations staff and it was determined that no permanent or temporary relocations for NCSD sewer lines seem to be required.

RECOMMENDED SEWER SYSTEM IMPROVEMENTS

No.	Item	Diam. (in)	Unit	Quantity	Unit Cost[2]	Total Costs[3]
	IMPROVEMENTS TO MEET EXISTING NEEDS					
	COLLECTION SYSTEM					
	Town					
	PRIORITY 1 - FRONTAGE TRUNK LINE					
1	Upsize Frontage Trunk Line - Southland to WWTP	21	LF	1,160	$375	$435,000
2	Upsize Frontage Trunk Line - Story to Southland	18	LF	1,780	$330	$587,400
3	Upsize Frontage Trunk Line - Division to Story	18	LF	1,350	$330	$445,500
					Frontage Subtotal:	*$1,500,000*
	PRIORITY 2 - DIVISION RELIEF					
4	Upsize Division Gravity Collector - Beverly to Frontage	12	LF	1,415	$210	$297,150
					Division Subtotal:	*$297,150*
					Town Total:	*$1,800,000*
	Blacklake					
	PRIORITY 1 - GOLF COURSE TRUNK LINE					
5	Remove Sag/Belly from golf course mainline along 9th hole	10	LF	450	$200	$90,000
					Blacklake Total:	*$90,000*
					Total Collection System Costs:	***$1,900,000***
	WASTEWATER TREATMENT					
	Southland WWTP (Town Division)					
	PRIORITY 1 - WWTP IMPROVEMENTS					
5	Influent Pump Station and Flowmeter Improvements[1]		LS	1	$620,000	$620,000
6	Spiral Screening System[1]		LS	1	$468,000	$468,000
7	Grit Removal System[1]		LS	1	$560,000	$560,000
8	Phase I Wave Oxidation System[1]		LS	1	$4,060,000	$4,060,000
9	Solids Handling Proposals		LS	1	TBD	TBD
10	Shop Upgrade		LS	1	$400,000	$400,000
11	Hazard, Security, and Safety Upgrades		LS	1	$50,000	$50,000
					Subtotal:	*$6,200,000*
	PRIORITY 2 - WWTP IMPROVEMENTS					
12	Shop Solar Panels		LS	1	$30,000	$30,000
					Subtotal:	*$30,000*
					Southland WWTP Total:	*$6,230,000*
	Blacklake WWTP					
	PRIORITY 1 - WWTP IMPROVEMENTS					
13	Hazard, Security, and Safety Upgrades		LS	1	$25,000	$25,000
14	Liner Replacement (2007)		LS	1	$300,000	$300,000
					Blacklake WWTP Total:	*$325,000*
					Total WWTP Costs:	***$6,600,000***
	WATER RECLAMATION					
	Southland WWTP					
	PRIORITY 1 - WATER RECLAMATION					
15	Southland Effluent Recharge/Reuse Feasibility Study		LS	1	$75,000	$75,000
					Southland Reclamation Total:	*$75,000*
					Total Reclamation Cost:	***$75,000***
	TOTAL COST OF IMPROVEMENTS TO MEET EXISTING NEEDS					***$8,580,000***
	PRIORITY 1 - ANNUAL REHABILITATION / REPLACEMENT[4]					
16	Rehabilitate 7% of Lift Stations per year (1 per year with 14 total)		EA	1	$50,000	$50,000
17	Rehabilitate 5% of Manholes per year (600 total)		EA	30	$3,000	$90,000
					Rehab./Replacement Subtotal:	*$140,000*

NOTES:
1. Improvements and costs incorporated from Southland Wastewater Treatment Facility Master Plan 2007
2. Cost Estimate derived from adjusting Master Plan Estimate April 2001 cost to May 2007 ENR CCI.
3. Total Costs are rounded to 2-significant figures.
4. Costs are expressed in approximate annual present worth values to be funded from District's maintenance reserves.

RECOMMENDED SEWER SYSTEM IMPROVEMENTS

IMPROVEMENTS TO MEET FUTURE NEEDS

COLLECTION SYSTEM		Diam (in)	Unit	Quantity	Unit Cost[2]	Total Costs[4]
Town						
	PRIORITY 1 - OAKGLENN TRUNK LINE[3]					
1	Upsize Oakglen Trunk Line - Amado to Freeway Crossing	15	LF	2,300	$240	$552,000
2	Upsize Oakglen Trunk Line - Glory to Amado	15	LF	1,830	$240	$439,200
3	Upsize Oakglen Trunk Line - Mads Place to Glory	12	LF	965	$210	$202,650
4	Upsize Oakglen Trunk Line - Oakglen at Tefft	10	LF	330	$180	$59,400
					Subtotal	*$1,253,250*
	PRIORITY 2 - FRONTAGE TRUNK LINE					
5	Upsize Frontage Trunk Line - Grande to Division	15	LF	1,150	$240	$276,000
6	Upsize Frontage Trunk Line - Juniper to Grande	12	LF	3,515	$210	$738,150
					Subtotal	*$1,014,150*
	PRIORITY 3 - UPGRADES					
7	Branch Bypass Gravity Collector - Mallagh to Wilson	8	LF	480	$155	$74,400
8	Tejas Lift Station Upgrade to 150 gpm		LS	1	$150,000	$150,000
					Subtotal	*$224,400*
	PRIORITY 4 - ORPHAN AREA IMPROVEMENTS[5]					
9	Project 1 - Upgrade Gravity Collector - Story from Peacock to Meredith	8	LF	875	$155	$135,625
	Monarch Lift Station - 50 gpm		LS	1	$150,000	$150,000
	Monarch Force Main	4	LF	800	$140	$112,000
10	Project 2 - Gravity Collector - Story from Orchard to Peacock	8	LF	1,970	$155	$305,350
	Gravity Collector - Orchard from Soares to Story	8	LF	700	$155	$108,500
	Gravity Collector - Orchard from Primavera to Story	8	LF	700	$155	$108,500
11	Project 3 - Frontage Trunk Line - Camino Caballo to Juniper	8	LF	1,300	$155	$201,500
	Gravity Collector - Camino Caballo to Frontage	8	LF	2,685	$155	$416,175
12	Project 4 - Widow Lift Station - 200 gpm		LS	1	$150,000	$150,000
	Widow Force Main	4	LF	325	$140	$45,500
	Gravity Collector - Southland from Honey Grove to Frontage	12	LF	2,840	$210	$596,400
13	Project 5 - Gravity Collector - Orchard and Southland to Drumm Lane	8	LF	915	$155	$141,825
14	Project 6 - Gravity Collector - Hill Street to Frontage	8	LF	1,475	$155	$228,625
					Orphan Area Subtotal	*$2,700,000*
	PRIORITY 5 - AMADO LIFT STATION & FORCEMAIN[5]					
15	Amado Lift Station - 350 gpm		LS	1	$300,000	$300,000
	Amado Force Main	6	LF	920	$155	$142,600
	Gravity Collector - Sparks Bypass extension to Amado LS	8	LF	3,000	$155	$465,000
					Subtotal	*$907,600*
					Town Total:	*$6,099,400*
					Total Collection System Costs:	***$6,100,000***
WASTEWATER TREATMENT[1]						
Southland WWTP						
	PRIORITY 1 - WWTP IMPROVEMENTS					
16	Phase II Wave Oxidation System		LS	1	$198,000	$198,000
					Southland WWTP Total:	*$198,000*
					Total WWTP Costs:	***$200,000***
WATER RECLAMATION						
Southland WWTP						
	PRIORITY 1 - WATER RECLAMATION					
17	Tertiary Filtration		LS	1	$1,898,000	$1,898,000
18	Chlorination System		LS	1	$1,546,000	$1,546,000
19	Southland Effluent Discharge and Percolation Basin		LS	1	TBD	TBD
20	Lift Station		LS	1	$300,000	$300,000
21	New Effluent Force Main		LF	28,260	$115	$3,249,900
					Southland Reclamation Total:	*$6,993,900*
					Total Reclamation Cost:	***$7,000,000***
	TOTAL COST OF IMPROVEMENTS TO MEET FUTURE NEEDS:					***$13,300,000***

NOTES:

1. Improvements and costs incorporated from Southland Wastewater Treatment Facility Master Plan 2007
2. Cost Estimate derived from adjusting Master Plan Estimate April 2001 cost to May 2007 ENR CCI.
3. Tefft Street Lift Station has major affect on this line, reducing flow rate or VFD may alleviate issues.
4. Total Costs are rounded to 2-significant figures.
5. Improvements to be funded by properties receiving benefit.

Unscanned color map
pages

6. References

American Water Work Association. *Computer Modeling of Water Distribution Systems.* AWWA Manual M32. 2005.

American Water Works Association security planning service http://www.awwa.org/science/wise/

Anderson, James. Superintendent Health and Safety, Conoco Phillips Refinery. Personal Correspondence and Discussions. March - June, 2007.

ASCE/AWWA/WEF. Guidelines for the Physical Security of Water Utilities. December 2006.

Bergman, Klara, 2006, personal communication regarding Crystal Oaks Ranch - Specific Plan, 10/26/2006.

Boyle Engineering Corporation, 2002, Nipomo Community Services District Water and Sewer System Master Plan 2001 Update, March 2002.

Boyle Engineering Corporation, *DRAFT Nipomo Waterline Intertie Project - - Preliminary Engineering Memorandum.* November, 2006.

Boyle Engineering Corporation. *Southland Wastewater Treatment Facility Master Plan.* Prepared February 9, 2007

California Data Exchange Center, 2006, hourly rainfall data for station ARG, California Department of Water resources, Division of Flood Management, *http://cdec.water.ca.gov/*

California, State of. *California Safe Drinking Water Act & Related Laws and Regulations.* Title 22, California Code of Regulations. 2007.

California, State of, Department of Health Services, 2004. Draft Waterworks Standards Revisions, November 12, 2004.

Designing Water & Hydrant Systems website: *www.firehydrant.org*

DWR, 2002, Water Resources of the Arroyo Grande - Nipomo Mesa, California Department of Water Resources, Division of Planning and Local Assistance, Southern District, *http://www.dpla.water.ca.gov/sd/water_quality/arroyo_grande/arroyo_grande-nipomo_mesa.html*

Environmental Protection Agency Biosolids Information Site: *http://www.epa.gov/owm/mtb/biosolids/genqa.htm*

FEMA Earthquake Preparedness website: *http://www.fema.gov/plan/prevent/earthquake/index.shtm*

Kennedy/Jenks Consultants. *Evaluation of Water Supply Alternatives, Nipomo Community Services District.* October, 2001.

McKenzie, John, 2006, San Luis Obispo County Department of Planning and Building, personal communication regarding various land development projects.

MetroScan, 2006, San Luis Obispo County Assessor's Data accessed through MetroScan (computer application), Version 3.7.0, First American Real Estate Solutions, L.P.

Nall, John, 2006, San Luis Obispo County Department of Planning and Building, personal communication regarding Nipomo Oaks development project.

Unscanned color map
pages

ADMINISTRATIVE REVIEW DRAFT

Technical Memorandum
Phase I

Water Demand and Sewer Load Projections

Prepared for

Nipomo Community Services District

Prepared by

Garing, Taylor & Associates
141 S Elm St.
Arroyo Grande CA 93420

Cannon Associates
364 Pacific Street
San Luis Obispo, CA 93401

January 5, 2007

Table of Contents

Executive Summary

Purpose of Technical Memorandum, Phase I

The purpose of this technical memorandum is to develop water demand and sewer flow projections for use in the master planning process. These projections will be used in subsequent steps in the analysis to appropriately plan for the expansion and upgrade of the Nipomo Community Services District's water distribution and sewer collection systems. The study area includes: Town, Blacklake, "Orphan areas", and the un-annexed Sphere of Influence areas.

Water and sewer projections were derived primarily from two main sources: District-provided operational data and records, and the recently completed Urban Water Management Plan (UWMP) completed in 2005. The UWMP was used as the basis for land use designations and associated water duty factors for each land use category. (Duty factors are estimates of water demand or sewer flow load per acre by land use category.) Sewer duty factors were based on duty factors developed as part of the 2001 Water and Sewer System Master Plan Update, but were adjusted so that predicted wastewater flows matched observed wastewater flows under existing land use.

Per-unit water use rates are a key element used in estimating per-acre water duty factors. Initially, water and sewer duty factors were estimated using the per-unit water use rates contained in the UWMP. Subsequently, the District requested that a second set of estimates be created, using observed per-unit water use values for FY05-06. Both sets of per-unit water use rates are shown below:

Table ES-1: Water Use Rates

Land Use Code in this Report	Use Group Reported by District	UWMP Per unit Use Rate (af/du/yr)	FY05-06 Observed per unit Use Rate (af/du/yr)
RMF	Multi-Family	0.146	0.25
(not used)	Duplex		0.32
(not used)	SF (<4,500sf Lot)	0.473	0.42
RSF	SF (4,500 to 10,000sf)	0.473	0.6
RS	SF (>10,000sf)	0.619	0.98

Both sets of Use Rates were used in this analysis, as specified below.

The resulting duty factor estimates are shown below.

Table ES-2: Summary of Water Demand and Sewer Flow Duty Factors

Land Use Code	Assumed Water Duty Factor (af/yr-acre)	Assumed Sewer Flow Duty Factor (MGD/acre)	Observed(1) Water Duty Factor (af/yr-acre)	Observed(1) Sewer Flow Duty Factor (MGD/acre)
RMF	2.19	0.001758	3.75	0.002634
RSF	1.60	0.001125	2.10	0.000924
RS	0.62	0.000411	0.98	0.000330
RR	0.21	*	0.20	*
RL	0.11	*	0.101	*
AG	0.00	*	0.00	*
PF	0.59	0.000484	0.59	0.000442
OP	0.26	0.000213	0.26	0.000195
CR	1.42	0.001165	1.42	0.001064
CS	0.35	0.000287	0.35	0.000262
OS	1.18	*	1.18	*
REC	0.62	*	0.62	*
IND	0.67	*	0.67	*
Blacklake	1.04	*	1.04	*
Canada Ranch	1.18		1.96	
Southland	0.59		0.98	

* Not Applicable for this type of land use.

1: Based on observed per-unit water use rates, FY05-06

Three planning scenarios for sizing the future water and sewer systems were chosen from the UWMP: Existing Land Use Designations and a 2.3% Growth Rate; Existing Land Use Designations with Pending Land Use Amendments and a 2.3% Growth Rate; and, High Density Land Use and a 2.3% Growth Rate.

The 2.3% Growth Rate was selected based on an emergency growth ordinance for the Nipomo Mesa adopted January 2000 by the SLO County Board of Supervisors. It should be noted that the "2.3% growth rate" demand projections in the UWMP do not appear to follow a simple 2.3% annual growth rate. The UWMP 2005 Update is unclear as to the method by which residential development and its associated water demand were allocated over time. The UWMP projections for demand were used to estimate "percent built-out" in 2030, which formed part of the assumptions used to estimate water duty factors. The resulting estimated water demand and sewer flow projections in 2030 for the three scenarios are shown below.

Water

Table ES-3A: Summary of Water Demand Projections & Peaking Factors (Based on Assumed Water Use Rates)

	Annual Demand	Average Daily Demand	Maximum Daily Demand	Peak Hourly Demand
units	af/yr	MGD	MGD	MGD
Peaking Factor		*(1 MGD = 1121 AFY)*	*1.70*	*3.78*
2005 Conditions	2,989	2.67	4.50	10.08
2030 Scenario 1	4,960	4.42	7.51	16.71
2030 Scenario 2	5,170	4.61	7.84	17.43
2030 Scenario 3	5,970	5.33	9.06	20.15

Table ES-3B: Summary of Water Demand Projections & Peaking Factors (Based on Observed FY05-06 Water Use Rates)

	Annual Demand	Average Daily Demand	Maximum Daily Demand	Peak Hourly Demand
units	af/yr	MGD	MGD	MGD
Peaking Factor		*(1 MGD = 1121 AFY)*	*1.7*	*3.78*
2005 Conditions	2,989	2.67	4.53	10.09
2030 Scenario 1	6,246	5.57	9.47	21.05
2030 Scenario 2	6,542	5.84	9.92	22.08
2030 Scenario 3	7,878	7.03	11.95	26.57

Sewer

Table ES-4A: Summary of Sewer Flow Projections & Peaking Factors (Based on Assumed Water Use Rates)

Southland WWTP	Est. Average Annual Flow (AAF)	Est. Peak Dry Weather Flow (PDWF)	Est. Peak Wet Weather Flow (PWWF)
units	MGD	MGD	MGD
Peaking Factor		*1.73*	*2.17*
2005 Conditions	0.63	1.09	1.37
2030 Scenario 1	1.39	2.40	3.02
2030 Scenario 2	1.58	2.73	3.43
2030 Scenario 3	1.79	3.10	3.88

Table ES-4B: Summary of Sewer Flow Projections & Peaking Factors (Based on Observed FY05-06 Water Use Rates)

Southland WWTP	Est. Average Annual Flow (AAF)	Est. Peak Dry Weather Flow (PDWF)	Est. Peak Wet Weather Flow (PWWF)
units	MGD	MGD	MGD
Peaking Factor		*1.73*	*2.17*
2005 Conditions	0.63	1.09	1.37
2030 Scenario 1	1.28	2.21	2.78
2030 Scenario 2	1.49	2.58	3.23
2030 Scenario 3	1.67	2.89	3.62

1. Introduction

The Nipomo Community Services District (District) intends to update its 2002 Water and Sewer Master Plan to acknowledge capital improvement projects completed, to add new projects, to estimate the cost of all projects, to re-prioritize all projects, and to evaluate the District's current and future Utility Department staffing complement and organization.

The purpose of this Technical Memorandum is to develop population projections, duty factors, water demands and sewer flow and load projections for both the existing Blacklake and Town Water and Sewer service areas and for the un-annexed areas within the District's Sphere of Influence (SOI).

The information prepared in this Technical Memorandum will be used in water and sewer modeling efforts for subsequent Memoranda.

2. Background

This Section presents a discussion of population projection calculations and the three long-term land use scenarios under consideration.

Population

The 2001 Update of the Water and Sewer Master Plan estimated the population inside the District's service boundary at 10,790 people in the year 2000. Existing Nipomo-area growth management policies are assumed to restrict construction of new residential dwelling units to an annual cap of 2.3%. Based on this growth cap, this memo assumes a 2.3% population growth rate between now and the year 2030. Anticipated population projections within District's service area are shown in Table 2-1.

Table 2-1: Population Projections

Year	Population Served by District
2000	10,790
2005	12,000
2010	13,440
2015	15,060
2020	18,910
2025	18,910
2030	21,190

Land Use Scenarios

Following the approach of the Urban Water Management Plan (WMPU) 2005 Update, future water demands and wastewater flow rates are estimated under three different land use scenarios. All scenarios assume that the District will annex the areas identified for annexation in the SOI study. All scenarios also assume a "2.3% growth rate" as further clarified below.

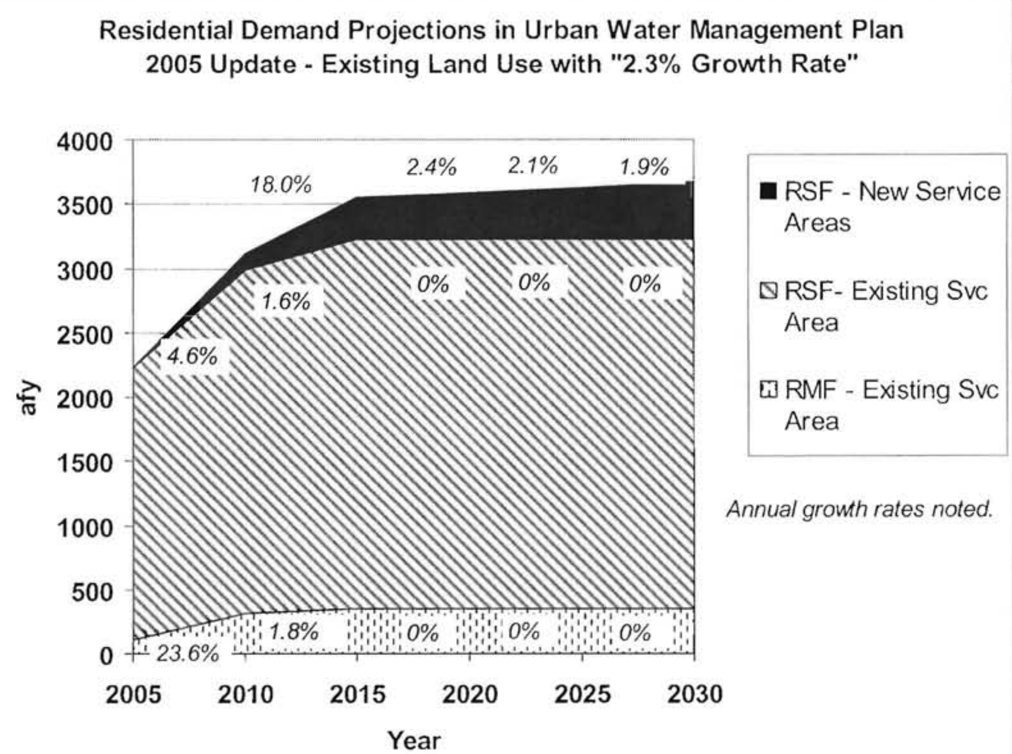
The first land use scenario, Existing Use, assumes no changes in the existing land use designations. Figure 2-1 shows the anticipated services area and land use designation in the year 2030 under the Existing Use scenario.

The second scenario, Amended Use, assumes all current proposed land-use amendments are approved. Figure 2-2 shows the anticipated services area in the year 2030 under the Amended Use scenario. (See Tables 14 and 19, UWMP 2005 Update.)

The third scenario, High Density, assumes that all proposed land-use amendments are approved and that any agricultural acreage or rural land acreage remaining would convert to a higher-density use. In SOI areas 1, 2, and 3, the use will convert to SRF. In SOI areas 4 and 8, the use will convert to RS. (See page 35 and Table 22, UWMP 2005 Update.) Figure 2-3 shows the anticipated services are in the year 2030 under the High Density scenario.

Demands Associated with "2.3% Growth Rate"

The water demand projections contained in the UWMP 2005 Update form the basis of the water and sewer demand projections contained in this memo. It should be noted that the "2.3% growth rate" demand projections in the UWMP do not appear to follow a simple 2.3% annual growth rate, as shown in the graph below.



The UWMP 2005 Update is unclear as to the method by which residential development and its associated water demand were allocated over time. Perhaps the high growth rates in residential demands shown prior to 2015 are the result of exemptions from the SLO County Growth Management Ordinance and were included in the UWMP projections. These exemptions included subdivisions exempt from growth cap limitations, "pipeline projects" (i.e., projects accepted for development between 11/14/99 and 4/4/2000), exemptions for affordable housing, and exemptions for antiquated subdivisions with Certificates of Compliance.

Regardless of the underlying assumptions, for the remainder of this memo, the phrase "2.3% growth rate" shall be used as a label for a particular set of water demand and land use projections taken from the UWMP 2005 Update.

3. Water System Demand Projections

This section describes the method of analysis and assumptions used in determining water system demand projections. It presents current information regarding the water system and the analysis used to project water demand in the year 2030 under the three land use scenarios. Figures 3-8 through 3-11 at the end of this section show the existing water service area and the future water service areas for the three land use scenarios.

Estimation Method

Water demand at "build-out" and in 2030 under the three land use scenarios was estimated as follows:

1. District operating records were examined to determine annual average water demand separately for the Town Division and Blacklake Division.
2. Existing land use information and assumed water demand rates were used to predict existing annual average demand for both Divisions.
    a. One set of water and sewer duty factors was estimated using the assumed water demand rates contained in the Urban Water Management Plan 2005 Update.
    b. A second set of water and sewer duty factors was estimated using the observed FY2005-06 water use rates supplied by the District.
3. An assumed level of development was chosen so that predicted water demand closely matched existing use.
4. The assumed water demand rates were then applied to future land use scenarios, assuming 100% buildout, to estimate "build-out" demand.
5. The land development projections generated as part of the UWMP 2005 Update according to the "2.3% growth rate" were used to estimate the demand in 2030 for each scenario.

Existing Water Production

Current water production rates were examined, as shown below.

Figure 3-1: Town Production Rates – 12 month running average

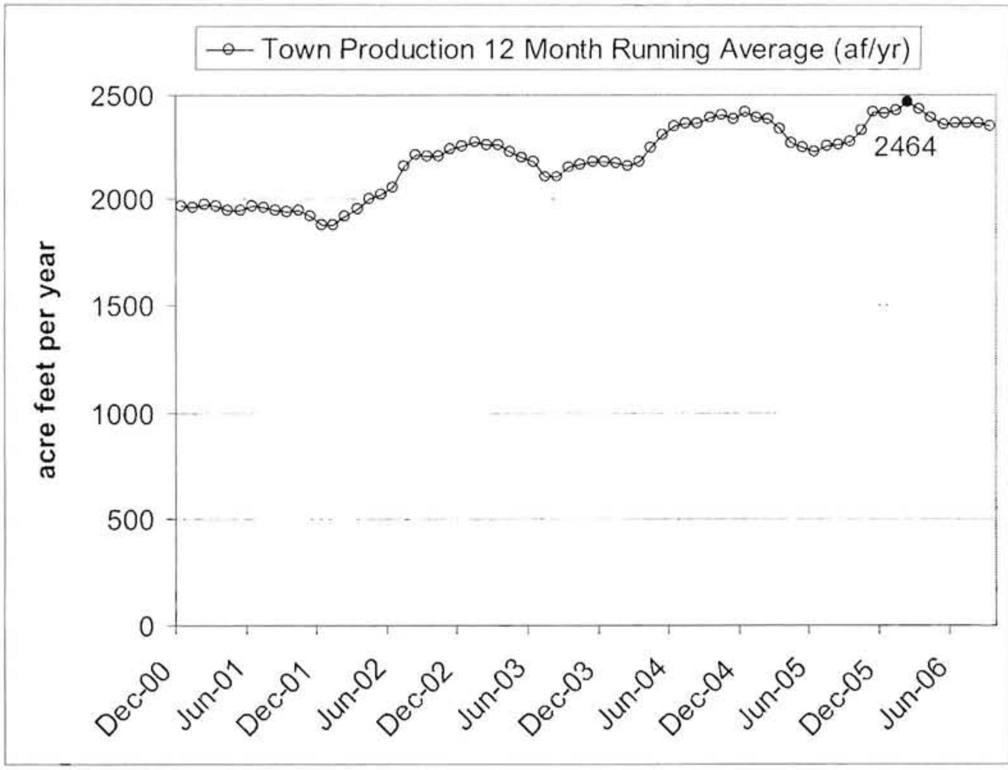


Figure 3-2: Blacklake Production Rates - 12 month running average

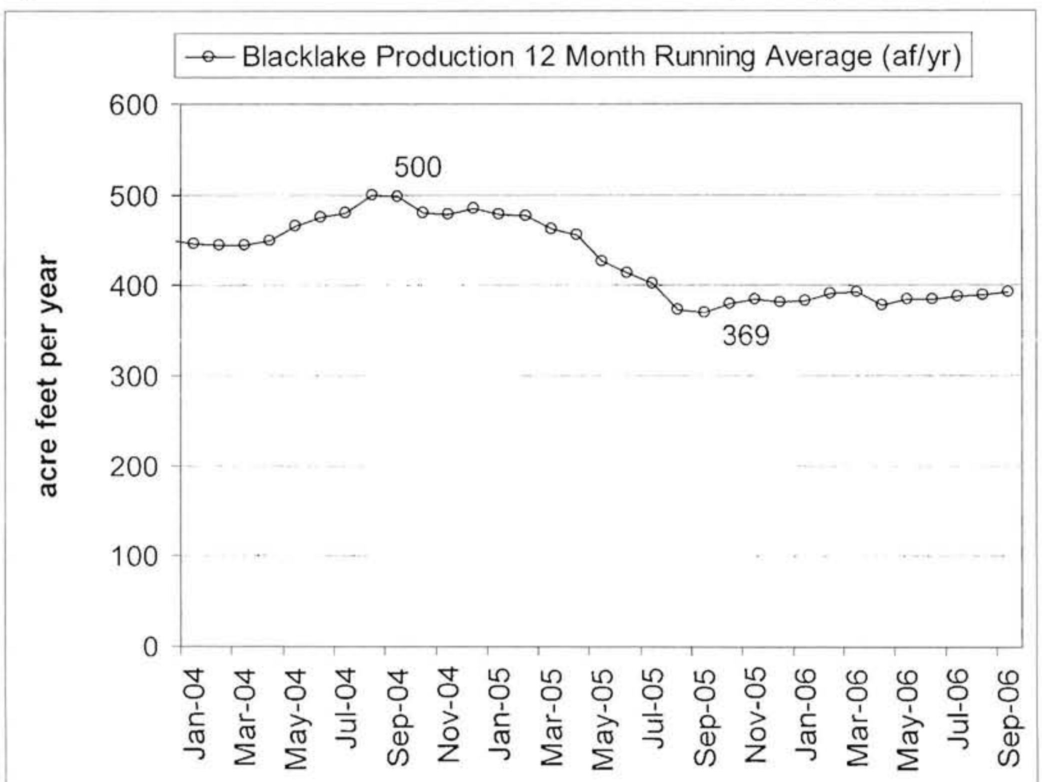
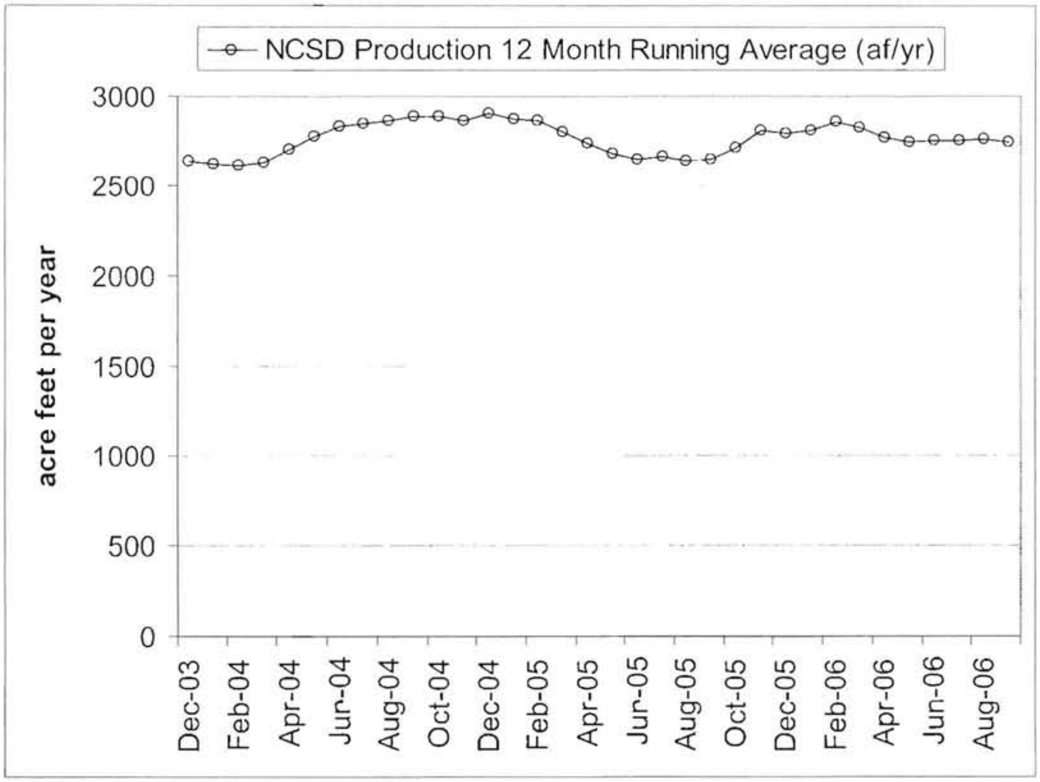


Figure 3-3: District Production Rates - 12 month running average



The current latest 12-month running average shown is 2775 acre-feet per year.

Water System Losses

The 2001 Water Master Plan Update reported system losses, or water that was produced but never metered at an end user. This unaccounted-for water (UAW) was estimated as 11% of production between 1995 and 2000. However, recent data suggest that District-wide system losses are more accurately estimated between 2% and 6%. The following figures show data from District monthly production reports.

Figure 3-4: Production vs Delivery, Town Division

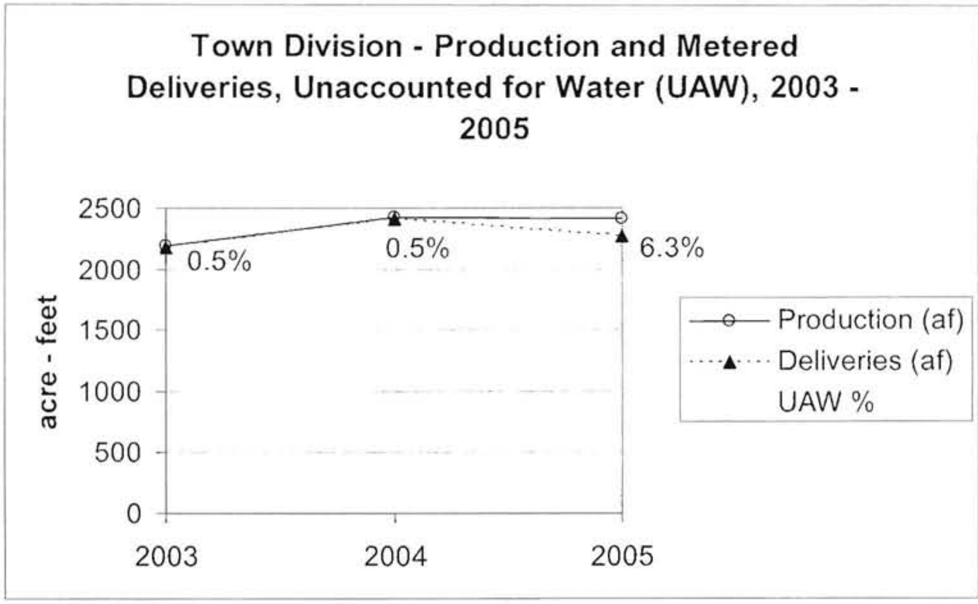


Figure 3-5: Production vs Delivery, Blacklake Division

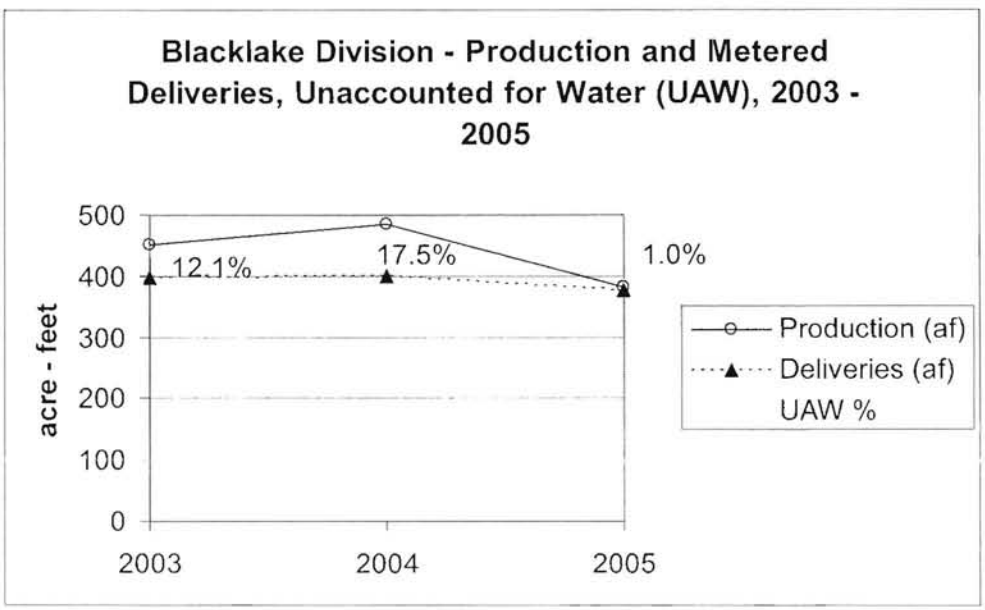
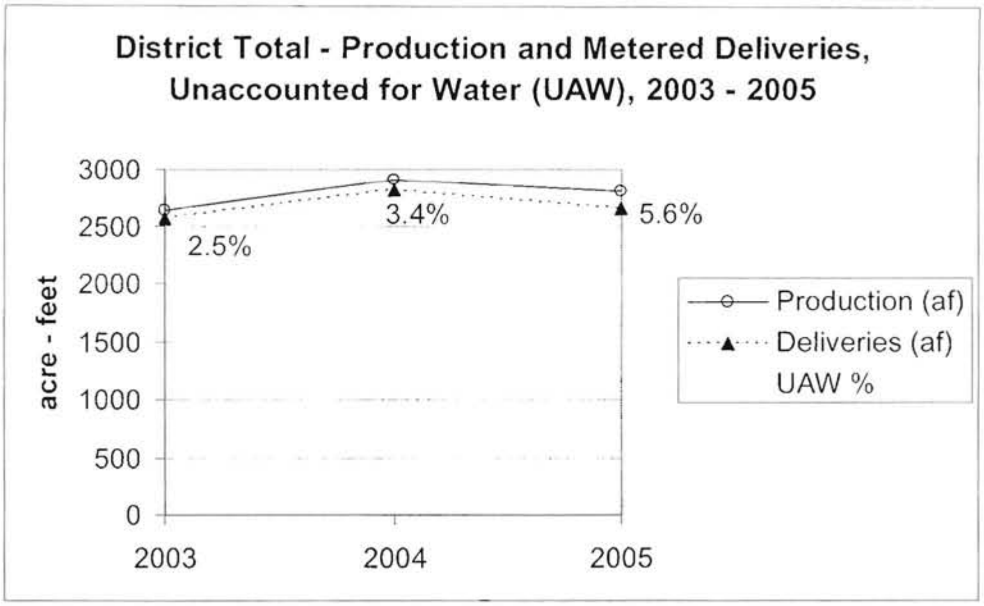


Figure 3-6: Production vs Delivery, District Total



For the purposes of this Master Plan Update, District's future system losses are conservatively assumed to be 8% of total production (UWMP 2005 Update). Using the average production value noted previously, and the system losses noted, the 12-month running average demand would be 2553 acre-feet per year.

Existing Water Duty Factors

The following water duty factors (i.e., water use rates per acre by land use) were assumed to apply to existing land use patterns within the District.

Table 3-1: Annual Water Duty Factors by Land Use

Land Use Code	Estimated Water Use per year per acre (af/yr-ac) (1)
RMF	2.19
RSF	1.60
RS	0.62
RR	0.21
RL	0.11
AG	0.00
PF	0.59
OP	0.26
CR	1.42
CS	0.35
OS	1.18
REC	0.62
IND	0.67
Blacklake	1.04

1: UWMPU (2005) Table 15 and Appendix E

The total amount of annual water use was estimated by multiplying the use rates by the areas under each land use type. The resulting total water use rate was then adjusted downward by applying an "occupancy rate" factor to account for the fact that not all areas within the District have been fully developed. This factor was selected so that estimated total water use matched reported values, as shown below.

Table 3-2: Estimated Average Annual Water Use under Existing Land Uses (Assumed water use rates.)

Land Use	Acres	Water Duty Factor af/yr/acre (1)	Occupancy Rate in 2005	Estimated Water Use, af/yr	Unaccounted for Water (as percent of production)	Estimated Water Production (af/yr)
Town Division						
RMF	150	2.19	79%	260	8%	282
RSF	700	1.6	79%	885	8%	962
RS	900	0.62	79%	441	8%	479
RR	1380	0.21	79%	229	8%	249
RL	3	0.11	79%	0.26	8%	0.28
AG	110	0	79%	0	8%	0
PF	37	0.59	79%	17	8%	19
OP	34	0.26	79%	7	8%	8
CR	160	1.42	79%	179	8%	195
CS	80	0.35	79%	22	8%	26
OS	11	1.18	79%	10	8%	11
REC	116	0.62	79%	57	8%	62
Subtotal	**3681**			2107		2290
Black Lake Division						
VRL	510	1.04	87%	461	8%	501
District Total						
	4191			**2568**		**2792**

1: UWMP 2005 Update, Table 15, page 36

Tables 3-3, 3-4, and 3-5 below show estimated annual water demand in the year 2030 for the three land use scenarios.

Demand at "build-out" is calculated so that water transmission facilities can be adequately sized. Demand in 2030 is calculated so that adequacy of supply and storage can be assessed, and so that the performance of the distribution system under critical demands can be evaluated.

Note also that "build-out" for the District as a whole may not occur by the year 2030 because population growth is assumed to be limited to the "2.3% growth rate" described in the UWMP. The water demand results presented below show that in 2030 water demand will be equivalent to 88%, 84%, and 76% of "build-out" demand under Scenarios 1, 2, and 3 respectively.

Table 3-3: Estimated Average Annual Water Use in Year 2030 under Existing Land Uses

			Scenario 1 - Existing Land Use [1]								
Land Use	Water Use Rate[1]	2005 Water Service Area [1]	SOI-1	SOI-2	SOI-3	SOI-4	SOI-7	SOI-8	Total Area served	Estimated Water Use at Buildout	Estimated Water Use in Year 2030 - Limited by 2.3% Growth Rate [2]
(units)	af/yr/ac	ac	ac	ac	ac	ac	ac	ac	ac	af/yr	af/yr
Residential Land Uses											
REC	0.62	631							631	391	
RR	0.21	1,404	662				1,264	181	3,511	737	
RSF	1.6	686			91				777	1,243	
RS	0.62	905			84	245	28		1,262	782	
RL	0.11	4				1,073			1,077	118	
Blacklake [1]	1.04	510							510	530	
Southland Specific Plan	0.59					100			100	59	3,320
RMF	2.19	160							160	350	350
Non-Residential Land Uses											
AG	0	12	420	132	58		83		705	0	0
OP	0.26	33							33	9	
CR	1.42	160							160	227	
CS	0.35	94				104			198	69	290
IND	0.67	0							0	0	0
OS	1.18	11							11	13	10
PF	0.59	38			5				43	25	20
MUC									0	0	
Total Use		4,648	1,082	132	238	1,522	1,375	181	9,178	4,555	3,990
In-Lieu NMMA Groundwater Recharge [3]											600
Unaccounted System Losses [3]											370
Total Demand											4,960

1: UWMP 2005 Update Appendix E
2: UWMP 2005 Update Appendix Table 16
3: UWMP 2005 Update Appendix Table 35

Table 3-4: Estimated Average Annual Water Use in Year 2030 under Pending Land Uses

			Scenario 2 - Existing Land Uses with Pending Land Use Amendments [1]								
Land Use	Water Use Rate [1]	2005 Water Service Area [1]	SOI-1	SOI-2	SOI-3	SOI-4	SOI-7	SOI-8	Total Area served	Estimated Water Use at Buildout	Estimated Water Use in Year 2030 - Limited by 2.3% Growth Rate [2]
(units)	af/yr/ac	ac	ac	ac	ac	ac	ac	ac	ac	af/yr	af/yr
Residential Land Uses											
REC	0.62	631					16		647	401	
RR	0.21	1,404	484				1,262	181	3,331	700	
RSF	1.6	686			129				815	1,304	
RS	0.62	905	14		84	277	28		1,308	811	
RL	0.11	4				1,073			1,077	118	
Blacklake [1]	1.04	510							510	530	
Canada Ranch Specific Plan	1.18		288						288	340	
Southland Specific Plan	0.59								0	0	3,480
RMF	2.19	160							160	350	350
Non-Residential Land Uses											
AG	0	12	256	132	58	28	45		531	0	0
OP	0.26	33							33	9	
CR	1.42	160	40						200	284	
CS	0.35	94				136			230	81	320
IND	0.67	0							0	0	0
OS	1.18	11			10	8			29	34	20
PF	0.59	38			5		24		67	40	20
MUC									0	0	
Total Use		4,648	1,082	132	286	1,522	1,375	181	9,226	5,001	4,190
In-Lieu NMMA Groundwater Recharge [3]											600
Unaccounted System Losses [3]											380
Total Demand											5,170

1: UWMP 2005 Update Appendix E

2: UWMP 2005 Update Appendix Table 16

3: UWMP 2005 Update Appendix Table 38

Table 3-5: Estimated Average Annual Water Use in Year 2030 under High Density Land Use

			Scenario 3 - High Density Land Use Assumption [1]								
Land Use	Water Duty Factor [1]	2005 Water Service Area [1]	SOI-1	SOI-2	SOI-3	SOI-4	SOI-7	SOI-8	Total Area served	Estimated Water Use at Buildout	Estimated Water Use in Year 2030 - Limited by 2.3% Growth Rate [2]
(units)	af/yr/ac	ac	ac	ac	ac	ac	ac	ac	ac	af/yr	af/yr
Residential Land Uses											
REC	0.62	631					16		647	401	
RR	0.21	702	572				1,262	181	2,717	571	
RSF	1.6	698	256	132	187				1,273	2,037	
RS	0.62	1,611	14		84	1,378	28		3,115	1,931	
RL	0.11	0							0	0	
Blacklake [1]	1.04	510							510	530	
Canada Ranch SP	1.18		200						200	236	
Southland SP	0.59								0	0	4,220
RMF	2.19	160							160	350	350
Non-Residential Land Uses											
AG	0	0					45		45	0	0
OP	0.26	33							33	9	
CR	1.42	160	40						200	284	
CS	0.35	94				136			230	81	320
IND	0.67	0							0	0	0
OS	1.18	11			10	8			29	34	20
PF	0.59	38			5		24		67	40	20
MUC									0	0	
Total Use		4,648	1,082	132	286	1,522	1,375	181	9,226	6,503	4,930
In-Lieu NMMA Groundwater Recharge [3]											600
Unaccounted System Losses [3]											440
Total Demand											5,970

1: UWMP 2005 Update Appendix E
2: UWMP 2005 Update Appendix Table 16
3: UWMP 2005 Update Appendix Table 41

FY05-06 Water Use Rates

Subsequent to the initial analysis presented above, the District requested that the water duty factors be re-calculated using the following information:

Table 3-6: FY05-06 Water Use Observations

Use Group	FY05-06 Observed Average Use (af/DU/yr)	Single Family Meters in Town Division
Multi-Family	0.25	
Duplex	0.32	
Single Family (<4,500 sf lot)	0.42	321
Single Family (4,500 sf < lot < 10,000 sf)	0.6	2534
Single Family (> 20,000 sf lot)	0.98	533

Based on this information, the Water Duty Factors were revised as follows:

Table 3-7: Annual Water Duty Factors by Land Use

Land Use	Units per Acre	Demand per unit (af/DU/yr)	Water Duty Factor (af/acre/yr)
Residential			
REC	1	0.980	0.98
RMF	15	0.250	3.75
RR	0.2	0.980	0.20
RSF	3.5	0.600	2.10
RS	1	0.980	0.98
RL	0.1	0.980	0.10
Canada Ranch	2	0.980	1.96
Southland	1	0.980	0.98
Blacklake			1.04
Non-Residential			
AG			0
CR			1.42
CS			0.35
IND			0.67
OP			0.26
OS			1.18
PF			0.59

Note that the 0.6 af/du/yr value was applied to all RSF uses. This value was chosen because it is the more conservative value (versus 0.42 af/du/yr), and also because it represents a larger sample size. The value 0.98 af/du/yr was applied to all residential uses with 1-acre or larger lots.

These revised water duty factors are used in the table shown below, as described above in reference to Table 3-2. Note the difference in the "occupancy rate" column for the Town Division.

Table 3-8: Estimated Average Annual Water Use under Existing Land Uses (Observed FY05-06 Water Use Rates)

Land Use	Acres	Water Duty Factor af/yr/acre[1]	Occupancy Rate in 2005	Estimated Water Use (af/yr)	Unaccounted for Water (as percent of production)	Estimated Water Production (af/yr)
Town Division						
RMF	150	3.75	59%	332	8%	361
RSF	700	2.1	59%	867	8%	943
RS	900	0.98	59%	520	8%	566
RR	1380	0.2	59%	163	8%	177
RL	3	0.1	59%	0.18	8%	0.19
AG	110	0	59%	0	8%	0
PF	37	0.59	59%	13	8%	14
OP	34	0.26	59%	5	8%	6
CR	160	1.42	59%	134	8%	146
CS	80	0.35	59%	17	8%	18
OS	11	1.18	59%	8	8%	8
REC	116	0.98	59%	67	8%	73
Subtotal	3681			2126		2312
Black Lake Division						
VRL	510	1.04	87%	461	8%	501.2
NCSD Total	4191			2587		2,813

1: Based on observed water use rates FY05-06

Total system demand under these assumptions was calculated as follows:

1. The entire study area (i.e., the existing service area plus SOIs 1-5, 7, and 8) was assumed to be completely developed. "Build Out" water demand was estimated by multiplying each area under a particular land use by the water duty factor shown above.
2. Demand in 2030 was estimated by utilizing the UWMP 2005 Update calculations to determine "occupancy rate", i.e., the percentage of each land use type predicted to be developed by 2030. (For example, under the "existing land use" scenario, the UWMP calculated that 927 acre-feet would be used by new single family housing in the SOI areas at "build-out". That report also predicted that in 2030 only 440 acre-feet would be used in these areas, implying that 47% of the area in question (440/927 = 47%) had been developed.)
3. These "occupancy rate" values were then applied to the demand associated with each land use type, and totaled. The results are shown below.

Table 3-9: Estimated Average Annual Water Use in Year 2030 under Existing Land Uses

			Scenario 1 - Existing Land Use [1]								
Land Use	**Water Duty Factor[2]**	**2005 Water Service Area [1]**	**SOI-1**	**SOI-2**	**SOI-3**	**SOI-4**	**SOI-7**	**SOI-8**	**Total Area served**	**Estimated Water Use at Buildout**	**Estimated Water Use in Year 2030 - Limited by 2.3% Growth Rate**
(units)	**af/yr/ac**	**ac**	**ac**	**ac**	**ac**	**ac**	**ac**	**ac**	**ac**	**af/yr**	**af/yr**
Residential Land Uses											
REC	0.98	631							631	618	
RR	0.20	1,404	662				1,264	181	3,511	688	
RSF	2.10	686			91				777	1,632	
RS	0.98	905			84	245	28		1,262	1,237	
RL	0.10	4				1,073			1,077	106	
Blacklake [1]	1.04	510							510	530	
Southland Specific Plan	0.98					100			100	98	4,300
RMF	3.75	160							160	600	600
Non-Residential Land Uses											
AG	0	12	420	132	58		83		705	0	0
OP	0.26	33							33	9	
CR	1.42	160							160	227	
CS	0.35	94				104			198	69	289
IND	0.67	0							0	0	0
OS	1.18	11							11	13	13
PF	0.59	38			5				43	25	24
MUC									0	0	
Total Use		4,648	1,082	132	238	1,522	1,375	181	9,178	5,852	5,226
In-Lieu NMMA Groundwater Recharge [3]											600
Unaccounted System Losses (8%)											420
Total Demand											6,246

1: UWMP 2005 Update Appendix E

2: Residential Rates Observed FY05-06, Non-residential rates UWMP Table 15

3: UWMP 2005 Update Appendix Table 35

Table 3-10: Estimated Average Annual Water Use in Year 2030 under Pending Land Uses

			Scenario 2 - Existing Land Uses with Pending Land Use Amendments [(1)]								
Land Use	Water Duty Factor [(2)]	2005 Water Service Area [(1)]	SOI-1	SOI-2	SOI-3	SOI-4	SOI-7	SOI-8	Total Area served	Estimated Water Use at Buildout	Estimated Water Use in Year 2030 - Limited by 2.3% Growth Rate
(units)	af/yr/ac	ac	ac	ac	ac	ac	ac	ac	ac	af/yr	af/yr
Residential Land Uses											
REC	0.98	631					16		647	634	
RR	0.20	1,404	484				1,262	181	3,331	653	
RSF	2.10	686			129				815	1,712	
RS	0.98	905	14		84	277	28		1,308	1,282	
RL	0.10	4				1,073			1,077	106	
Blacklake [(1)]	1.04	510							510	530	
Canada Ranch Specific Plan	1.96		288						288	564	
Southland Specific Plan	0.98								0	0	4,530
RMF	3.75	160							160	600	600
Non-Residential Land Uses											
AG	0	12	256	132	58	28	45		531	0	0
OP	0.26	33							33	9	
CR	1.42	160	40						200	284	
CS	0.35	94				136			230	81	319
IND	0.67	0							0	0	0
OS	1.18	11			10	8			29	34	23
PF	0.59	38			5		24		67	40	30
MUC									0	0	
Total Use		4,648	1,082	132	286	1,522	1,375	181	9,226	6,527	5,502
In-Lieu NMMA Groundwater Recharge [(3)]											600
Unaccounted System Losses (8%)											440
Total Demand											6,542

1: UWMP 2005 Update Appendix E

2: Residential Rates Observed FY05-06, Non-residential rates UWMP Table 15

3: UWMP 2005 Update Appendix Table 38

Table 3-11: Estimated Average Annual Water Use in Year 2030 under High Density Land Use

			Scenario 3 - High Density Land Use Assumption [1]								
Land Use	Water Duty Factor [1]	2005 Water Service Area [1]	SOI-1	SOI-2	SOI-3	SOI-4	SOI-7	SOI-8	Total Area served	Estimated Water Use at Buildout	Estimated Water Use in Year 2030 - Limited by 2.3% Growth Rate [2]
(units)	af/yr/ac	ac	ac	ac	ac	ac	ac	ac	ac	af/yr	af/yr
Residential Land Uses											
REC	0.98	631					16		647	634	
RR	0.20	702	572				1,262	181	2,717	533	
RSF	2.10	698	256	132	187				1,273	2,673	
RS	0.98	1,611	14		84	1,378	28		3,115	3,053	
RL	0.10	0							0	0	
Blacklake [1]	1.04	510							510	530	
Canada Ranch SP	1.96		200						200	392	
Southland SP	0.98								0	0	5,766
RMF	3.75	160							160	600	600
Non-Residential Land Uses											
AG	0	0					45		45	0	0
OP	0.26	33							33	9	
CR	1.42	160	40						200	284	
CS	0.35	94				136			230	81	319
IND	0.67	0							0	0	0
OS	1.18	11			10	8			29	34	23
PF	0.59	38			5		24		67	40	30
MUC									0	0	
Total Use		4,648	1,082	132	286	1,522	1,375	181	9,226	8,861	6,738
In-Lieu NMMA Groundwater Recharge [3]											600
Unaccounted System Losses (8%)											540
Total Demand											7,878

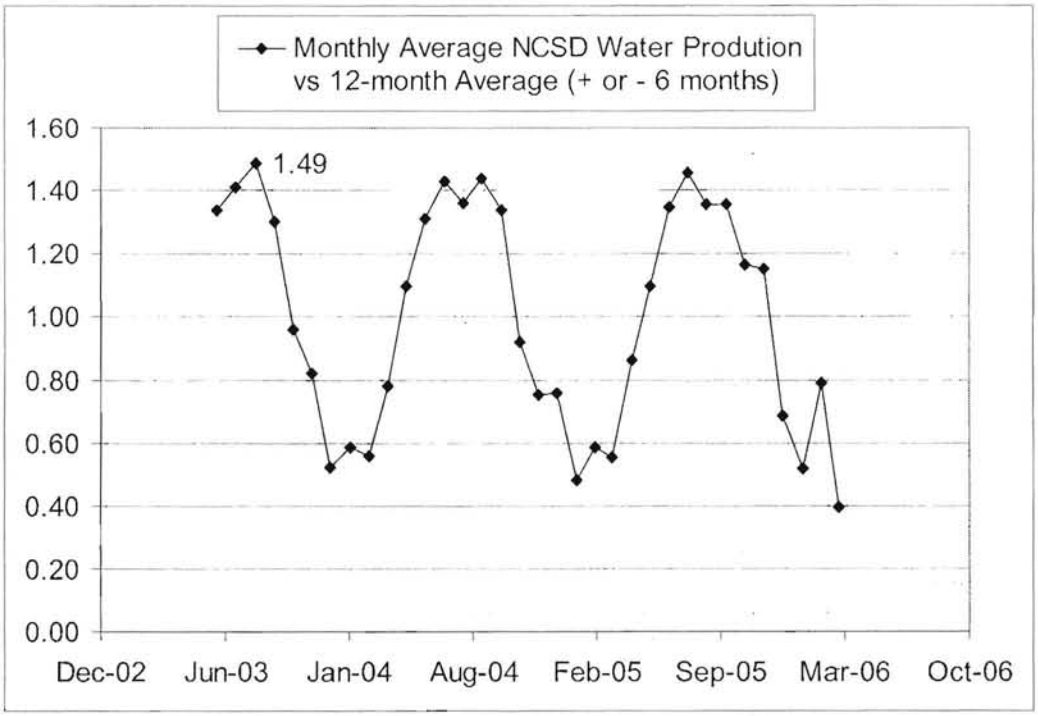
1: UWMP 2005 Update Appendix E
2: Residential Rates Observed FY05-06, Non-residential rates UWMP Table 15
3: UWMP 2005 Update Appendix Table 41

Peaking Factor Analysis

Peaking factors can be used to estimate peak water demands of particular durations (such as peak daily demand, or peak hourly demand) based on longer-term use rates (such as annual demand or daily demand).

The following figure shows that water use within District is highly seasonal, with monthly peaking factors approaching 1.5.

Figure 3-7: Ratio of Monthly Average Production vs Annual Average Production



To calculate peak demand, well production and tank level data were collected from the District telemetry system. Daily pumping records were provided by the District for the Olympic well. Monthly summaries of well production and bypass flows to Blacklake were also provided.

Well production, net tank flow, and bypass flows were calculated on an hourly basis from the available data. These values were used to estimate average daily, peak daily, and peak hourly demands between August 1, 2005 and July 31, 2006 for the Town Division and the Blacklake Division separately.

Town Division

Total well production delivered to the town division between August 1, 2005 and July 31, 2006 was 770,034,389 gallons, equal to 2,363 acre-feet per year, 2.11 MGD, or 1,465 gpm.

Peak 24-hour average flow occurred on 7/28/2006 at a rate of 2,497 gpm. Peak hourly flow in Town Division occurred on 7/17/2006 at a rate of 5,542 gpm. Using these values, the following peaking factors are calculated:

Town Division Peaking Factors:

Period	Flow (gpm)	Peaking Factor
ADD	1465	1.00
MDD	2497	1.70
PHD	5542	3.78

Blacklake Division

The total of well production and bypass flows delivered to Blacklake division between August 1, 2005 and July 31, 2006 was reported as 126,440,691 gallons, equal to 388 acre-feet per year, 0.35 MGD, or 241 gpm.

Peak 24-hour average flow occurred on 6/7/2006 at a rate of 451 gpm. Peak hourly flow in Blacklake Division was recorded on 6/9/2006 at a rate of 1435 gpm. Using these values, the following peaking factors are calculated:

Blacklake Division Peaking Factors:

Period	Flow (gpm)	Peaking Factor
ADD	241	1.00
MDD	451	1.87
PHD	1435	5.95

Because of the larger area involved, the peaking factors determined for the Town Division are more representative of the water distribution system as a whole, and are therefore used below.

Based on the average daily demand (ADD) values noted above, maximum daily demand (MDD) and peak hourly demands (PHD) under the three land use scenarios examined can be projected as shown below.

Table 3-12: Estimated Peak Water Demands – Assumed Water Use Rates

	Annual Demand	Average Daily Demand	Maximum Daily Demand	Peak Hourly Demand
units	af/yr	MGD	MGD	MGD
Peaking Factor		*(1 MGD = 1121 AFY)*	*1.70*	*3.78*
2005 Conditions	2,989	2.67	4.53	10.08
2030 Scenario 1	4,960	4.42	7.51	16.71
2030 Scenario 2	5,170	4.61	7.84	17.43
2030 Scenario 3	5,970	5.33	9.06	20.15

Using the FY2005-06 observed water use rates, peak water demand projections are as shown below.

Table 3-13: Estimated Peak Water Demands – Observed Water Use Rates

	Annual Demand	Average Daily Demand	Maximum Daily Demand	Peak Hourly Demand
	af/yr	MGD	MGD	MGD
Peaking Factor		*(1 MGD = 1121 AFY)*	*1.7*	*3.78*
2005 Conditions	2,989	2.67	4.53	10.09
2030 Scenario 1	6,246	5.57	9.47	21.05
2030 Scenario 2	6,542	5.84	9.92	22.08
2030 Scenario 3	7,878	7.03	11.95	26.57

Water Demand for Fire Suppression Analysis

Another factor which must be considered in determination of appropriate figures for use in system modeling is water demand for fire suppression. While fire suppression demand does not enter into usage projections, it must be accounted for in system pressure and sizing requirements. For each land use in the District's SOI, the following water use rates for fire suppression are applied:

Table 3-14: Recommended Fire Suppression Water Demand by Land Use

Land Use Code	Minimum Flow rate (gpm) (1)	Recommended Flow rate (gpm) (2)	Duration (hours) (1)
RMF	1,000	1,500	2
RSF	1,000	1,500	2
RS	1,000	1,500	2
RR	1,000	1,500	2
RL	1,000	1,500	2
AG	1,000	1,500	2
PF	1,500	2,500 (3)	3
OP	1,500	2,500 (3)	3
CR	1,500	2,500 (3)	3
CS	1,500	2,500 (3)	3
OS	1,000	1,500	2
REC	1,000	1,500	2
Summit Station	500 (4)	1,500	2

1: Minimum acceptable flow rate in developed areas, and minimum flow rates when buildings are sprinklered.
2: Recommended flow rates for Master Planning purposes.
3: Increased flows and durations may be required, depending on building size, building materials and use of sprinklers.
4: Minimal fire flows were allowed in the development of the Summit Station area. Improvement of available fire flows to this area is one of the goals of this master planning effort.

4. Sewer System Load Projections

This section describes the method of analysis and assumptions used in determining sewer system load projections. It presents current information regarding the sewer system and the analysis of projected annual average sewer load in the year 2030 under the three land use scenarios. Figures 4-1 through 4-4 at the end of this section show the existing sewer service area and the future sewer service areas for the three land use scenarios.

The sewer system consists of a network of gravity mains, lift stations, and force mains. The Blacklake Division is served independently of the remainder of the District and has its own wastewater treatment plant. Approximately 1100 acres within the Town Division receive sewer service, the remainder operating on private septic systems. Town Division wastewater is conveyed to the Southland Wastewater Treatment Plant (WWTP). In addition, wastewater discharging from the Galaxy Park lift station is carried in District sewers to the Southland WWTP.

Methodology and Assumptions

Wastewater duty factors (i.e., wastewater production rates by land use) were estimated as follows:

1. Land use within the existing sewer service area was quantified (e.g., 126 acres within the existing sewer service area is zoned Residential Multi-Family).
2. The District GIS data was used to estimate the fraction of each land use area that is connected to the wastewater collection system in 2005 (e.g., 58 acres of Residential Multi-Family area appears to be connected to the collection system).
3. Both water use analyses presented above (i.e., based on assumed use rates and based on observed rates) were used to estimate water use within the areas connected to the collection system.
4. For each type of land use, a fraction of the delivered water was assumed to flow to the sewer. The fractions used were taken from the 2001 Water and Sewer Master Plan Update, adjusted so that the total wastewater flow matched the reported average flow rate in 2005 (0.626 MGD).
5. A wastewater duty factor was calculated for each land use by dividing the wastewater flow by the contributing area connected to the collection system.

The results of this analysis are presented below:

Table 4.1A: Wastewater Duty Factors for Existing Wastewater Production under Existing Land Use – Assumed Water Duty Factors

Land Use	Acres with Sewer Service	Water Duty Factor from UWMP assump-tions (af/yr/acre)	Estimated percent of area connected to sewer in 2005	Estimated Water Use, af/yr	Fraction of Delivered Water going to Sewer (1)	Estimated Sewage Production (MGD)	Wastewater Production Rate (MGD/acre)
Town Division							
RMF	126	2.19	46%	126	90%	0.101	0.001758
RSF	604	1.60	51%	491	79%	0.345	0.001125
RS	139	0.62	4%	3	74%	0.002	0.000411
RR	0	0.21	0%	0	0%		
RL	0	0.11	0%	0	0%		
AG	11	0.00	0%	0	0%		
PF	19	0.59	81%	9	92%	0.007	0.000484
OP	31	0.26	28%	2	92%	0.002	0.000213
CR	121	1.42	38%	65	92%	0.053	0.001165
CS	47	0.35	51%	8	92%	0.007	0.000287
OS	11	1.18	0%	0	0%		
REC	5	0.62	100%	3	0%		
Subtotal	1116			708		0.518	
Galaxy Park and People's Self-Help Housing							
RSF	85	1.60	100%	136	90%	0.109	0.001285
High School							
PF	76	0.59	100%	45	90%	0.036	0.000474
Southland WWTP							
Total	1277			889		0.627	

1: Boyle 2002, Table 2 estimates, adjusted upward by 60% of the difference between the Boyle estimate and 100%. (e.g., Boyle estimate of 75% for RMF becomes 90% (75% + (0.60)(25%) = 75% + 15% = 90%)

Table 4.1B: Wastewater Duty Factors for Existing Wastewater Production under Existing Land Use – Observed FY05-06 Water Duty Factors

Land Use	Acres with Sewer Service	Water Duty Factor, Observed FY05-06 Uses (af/yr/acre)	Estimated percent of area connected to sewer in 2005	Estimated Water Use (af/yr)	Fraction of Delivered Water going to Sewer (1)	Estimated Sewage Production (MGD)	Wastewater Production Rate (MGD/acre)
Town Division							
RMF	126	3.75	46%	216	79%	0.152	0.002634
RSF	604	2.10	51%	644	49%	0.283	0.000924
RS	139	0.98	4%	5	38%	0.002	0.000330
RR	0	0.20	0%	0	0%		
RL	0	0.10	0%	0	0%		
AG	11	0.00	0%	0	0%		
PF	19	0.59	81%	9	84%	0.007	0.000442
OP	31	0.26	28%	2	84%	0.002	0.000195
CR	121	1.42	38%	65	84%	0.049	0.001064
CS	47	0.35	51%	8	84%	0.006	0.000262
OS	11	1.18	0%	0	0%		
REC	5	0.62	100%	3	0%		
Subtotal	1116					0.500	
Galaxy Park and People's Self-Help Housing							
RSF	85	2.10	100%	179	79%	0.125	0.001475
High School (2)							
PF	76	0.12	100%	9	79%	0.006	0.000083
Southland WWTP							
Total	1277			188		0.626	

1: Boyle 2002, Table 2 estimates, adjusted by 5%
2: Domestic water use as reported by NCSD

Average annual wastewater flow rates to the Southland WWTP under the three land use scenarios were estimated as follows:

1. Land use within the future sewer service area was quantified.
2. The wastewater production rates noted above were used to estimate average flow rates under full build-out conditions. Note that some land uses are assumed to generate no wastewater.
3. The water demand analysis presented above showed that in 2030 water demand will be equivalent to 88%, 84%, and 76% of "build out" demand under Scenarios 1, 2, and 3, respectively. These fractions were used to estimate wastewater production in 2030 as a fraction of "build out" wastewater production.

The results are shown below:

Table 4.2: Scenario 1 - Future Wastewater Production under Existing Land Use (based on Assumed Water Use Rates)

Land Use	Total Area Served	Wastewater Production Rate	Estimated Wastewater Produced at Buildout	percent built-out	Estimated Wastewater Production in Year 2030 -
(units)	ac	MGD/ac	MGD		MGD
Residential Land Uses					
REC	5	0	0.000	86%	0.000
RR	0	0	0.000	86%	0.000
RSF	888	0.001125	0.999	86%	0.859
RS	270	0.000411	0.111	86%	0.095
RL	0	0	0.000	86%	0.000
RMF	126	0.001758	0.222	100%	0.222
Non-Residential Land Uses					
AG	0	0	0.000	100%	0.000
OP	31	0.000213	0.007	95%	0.006
CR	128	0.001165	0.149	95%	0.142
CS	67	0.000287	0.019	95%	0.018
IND (1)	4	0.000484	0.002	95%	0.002
OS	0	0	0.000	100%	0.000
PF	22	0.000484	0.011	95%	0.010
High School	76	0.000474	0.036	100%	0.036
Total Use	1,617		1.555		1.390

1: Wastewater production rate assumed equal to PF

Table 4.3: Scenario 2 - Future Wastewater Production under Proposed Land Use Amendments (based on Assumed Water Use Rates)

Land Use	Total Area Served	Wastewater Production Rate	Estimated Wastewater Produced at Buildout	percent built-out	Estimated Wastewater Production in Year 2030 -
(units)	ac	MGD/ac	MGD		MGD
Residential Land Uses					
REC	5	0	0.000	81%	0.000
RR	0	0	0.000	81%	0.000
RSF	914	0.001125	1.028	81%	0.833
RS	455	0.000411	0.187	81%	0.151
RL	0	0	0.000	81%	0.000
RMF	166	0.001758	0.292	100%	0.292
Non-Residential Land Uses					
AG	0	0	0.000	100%	0.000
OP	31	0.000213	0.007	86%	0.006
CR	212	0.001165	0.247	86%	0.212
CS	141	0.000287	0.040	86%	0.035
IND (1)	12	0.000484	0.006	76%	0.004
OS	61	0	0.000	100%	0.000
PF	22	0.000484	0.011	76%	0.008
High School	76	0.000474	0.036	100%	0.036
Total Use	2,095		1.854		1.578

1: Wastewater production rate assumed equal to PF

Table 4.4: Scenario 3 - Future Wastewater Production under High Density Land Use Assumption (based on Assumed Water Use Rates)

Land Use	Total Area Served	Wastewater Production Rate	Estimated Wastewater Produced at Buildout	percent built-out	Estimated Wastewater Production in Year 2030 -
(units)	ac	MGD/ac	MGD		MGD
Residential Land Uses					
REC	5	0	0.000	72%	0.000
RR	0	0	0.000	72%	0.000
RSF	1,310	0.001125	1.474	72%	1.061
RS	455	0.000411	0.187	72%	0.135
RL	0	0	0.000	72%	0.000
RMF	166	0.001758	0.292	100%	0.292
Non-Residential Land Uses					
AG	0	0	0.000	100%	0.000
OP	31	0.000213	0.007	86%	0.006
CR	212	0.001165	0.247	86%	0.212
CS	141	0.000287	0.040	86%	0.035
IND (1)	12	0.000484	0.006	76%	0.004
OS	61	0	0.000	100%	0.000
PF	22	0.000484	0.011	76%	0.008
High School	76	0.000474	0.036	100%	0.036
Total Use	2,491		2.299		1.789

1: Wastewater production rate assumed equal to PF

Table 4.5: Scenario 1 - Future Wastewater Production under Existing Land Use (based on Observed FY05-06 Water Use Rates)

Land Use	Total Area Served	Wastewater Duty Factor	Estimated Wastewater Produced at Buildout	percent built-out	Estimated Wastewater Production in Year 2030 -
(units)	ac	MGD/ac	MGD		MGD
Residential Land Uses					
REC	5	0	0.000	86%	0.000
RR	0	0	0.000	86%	0.000
RSF	888	0.000924	0.821	86%	0.706
RS	270	0.00033	0.089	86%	0.077
RL	0	0	0.000	86%	0.000
RMF	126	0.002634	0.332	100%	0.332
Non-Residential Land Uses					
AG	0	0	0.000	100%	0.000
OP	31	0.000195	0.006	95%	0.006
CR	128	0.001064	0.136	95%	0.129
CS	67	0.000262	0.018	95%	0.017
IND (1)	4	0.000442	0.002	95%	0.002
OS	0	0	0.000	100%	0.000
PF	22	0.000442	0.010	95%	0.009
High School	76	0.000083	0.006	100%	0.006
Total Use	1,617		1.419		1.283

1: Wastewater production rate assumed equal to PF

Table 4.6: Scenario 2 - Future Wastewater Production under Proposed Land Use Amendments (based on Observed FY05-06 Water Use Rates)

Land Use	Total Area Served	Wastewater Production Rate	Estimated Wastewater Produced at Buildout	percent built-out	Estimated Wastewater Production in Year 2030 -
(units)	ac	MGD/ac	MGD		MGD
Residential Land Uses					
REC	5	0	0.000	81%	0.000
RR	0	0	0.000	81%	0.000
RSF	914	0.000924	0.845	81%	0.684
RS	455	0.00033	0.150	81%	0.122
RL	0	0	0.000	81%	0.000
RMF	166	0.002634	0.437	100%	0.437
Non-Residential Land Uses					
AG	0	0	0.000	100%	0.000
OP	31	0.000195	0.006	86%	0.005
CR	212	0.001064	0.226	86%	0.194
CS	141	0.000262	0.037	86%	0.032
IND (1)	12	0.000442	0.005	76%	0.004
OS	61	0	0.000	100%	0.000
PF	22	0.000442	0.010	76%	0.007
High School	76	0.000083	0.006	100%	0.006
Total Use	2,095		1.722		1.492

1: Wastewater production rate assumed equal to PF

Table 4.7: Scenario 3 - Future Wastewater Production under High Density Land Use Assumption (based on Observed FY05-06 Water Use Rates)

Land Use	Total Area Served	Wastewater Production Rate	Estimated Wastewater Produced at Buildout	percent built-out	Estimated Wastewater Production in Year 2030 -
(units)	ac	MGD/ac	MGD		MGD
Residential Land Uses					
REC	5	0	0.000	72%	0.000
RR	0	0	0.000	72%	0.000
RSF	1,310	0.000924	1.210	72%	0.872
RS	455	0.00033	0.150	72%	0.108
RL	0	0	0.000	72%	0.000
RMF	166	0.002634	0.437	100%	0.437
Non-Residential Land Uses					
AG	0	0	0.000	100%	0.000
OP	31	0.000195	0.006	86%	0.005
CR	212	0.001064	0.226	86%	0.194
CS	141	0.000262	0.037	86%	0.032
IND (1)	12	0.000442	0.005	76%	0.004
OS	61	0	0.000	100%	0.000
PF	22	0.000442	0.010	76%	0.007
High School	76	0.000083	0.006	100%	0.006
Total Use	2,491		2.088		1.666

1: Wastewater production rate assumed equal to PF

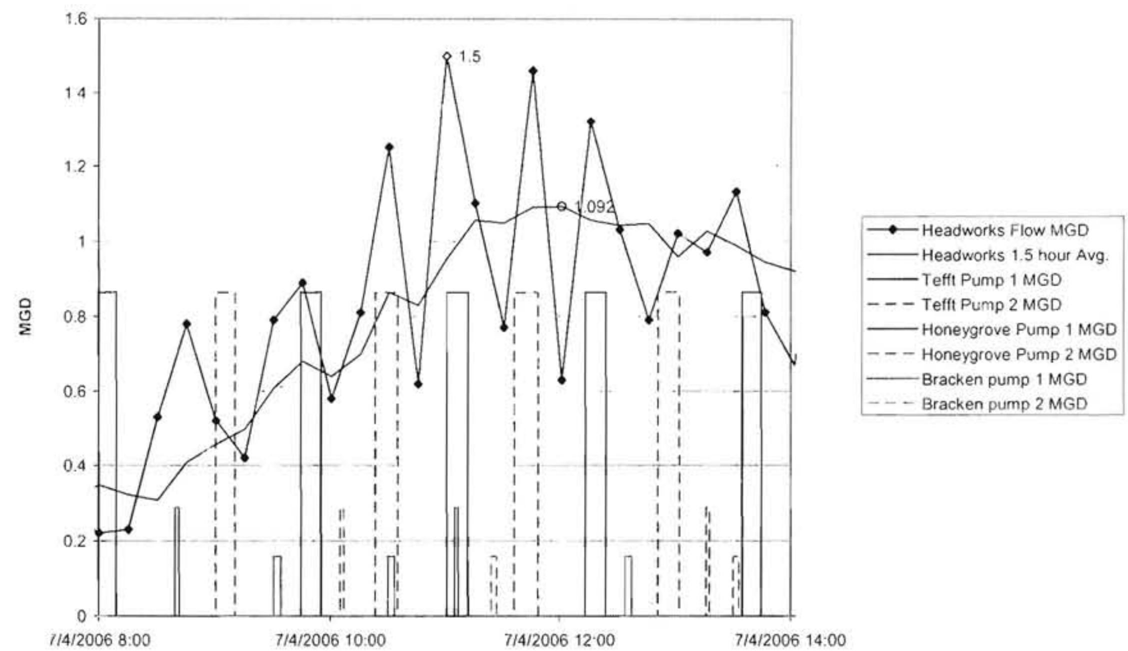
Lift Station Effects

The impacts of existing lift stations were examined by plotting Southland WWTP influent flow rates and lift station pumping rates during a day when peak influent flows were recorded.

Pumping rates for lift stations were taken from the previous Water and Sewer Master Plan (Boyle, 2001) or from as-built plans and specifications in cases where pump sizes had been changed since 2001. On/Off pumping records for the lift stations were collected from the District telemetry system.

The chart below shows that the Tefft Street Lift Station has a significant effect on the influent flow rate. While a peak flow rate of 1.5 MGD was reported at the influent meter, a more appropriate value would be 1.09 MGD, which corresponds to the 1.5-hour averaged influent flow rate.

July 4, 2006, 3AM - 3PM
Flow to Southland WWTP and Contributions of Selected Lift Stations

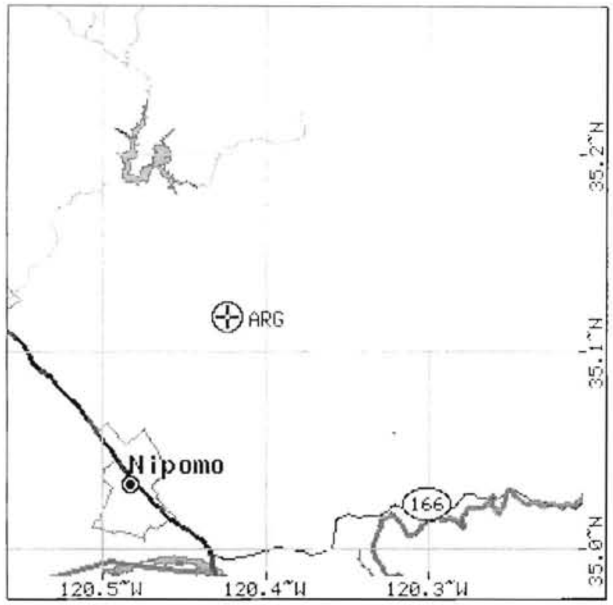


For the remainder of this sewer peaking factor analysis, an averaging period of 1.25 hours is used. This averaging period was found to be sufficient in most cases for estimating wastewater flow rates with lift station effects suppressed.

Inflow and Infiltration

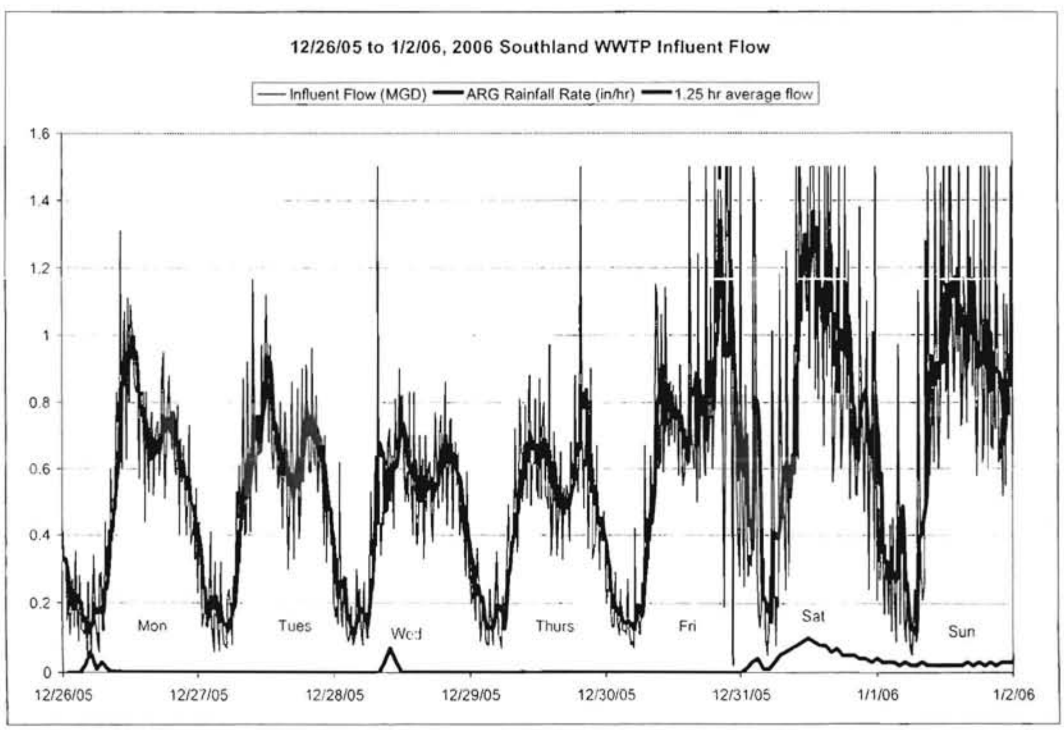
The impact of inflow and infiltration (I/I) on flow rates was examined by comparing flows to the Southland WWTP during dry weather and wet weather periods, as shown below. Influent flow data were collected from the District telemetry system. Also collected were "high level" alarm data which signal when elevated levels occur in the wet well.

Rainfall data from the ARG weather station was collected from California Department of Water Resources. This station is located at an elevation of 600 feet, approximately 7 miles northeast of Nipomo. The approximate location of the ARG rain gage is shown below.

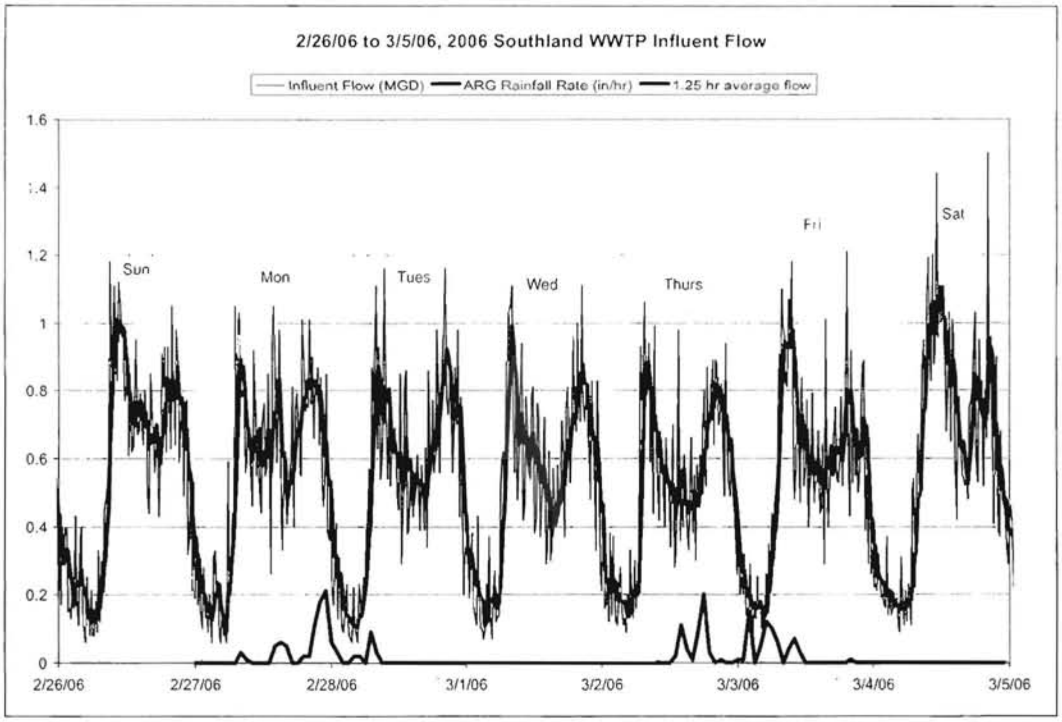


The following charts show reported influent flow rate, 1.25-hour average influent flow rate, and rainfall rate at the ARG gage. The following observations can be made:

Some data suggests that I/I may be a problem. A brief, fairly intense storm on 12/28/05, which dropped 0.13" at the ARG gage, coincided in a sharp peak in flow to the WWTP headworks. The large storm of 12/31/2005, which delivered 2.22" to the ARG gage during that 24-hour period, coincided with periods of peak flow, and greater than average flow rates at the WWTP.

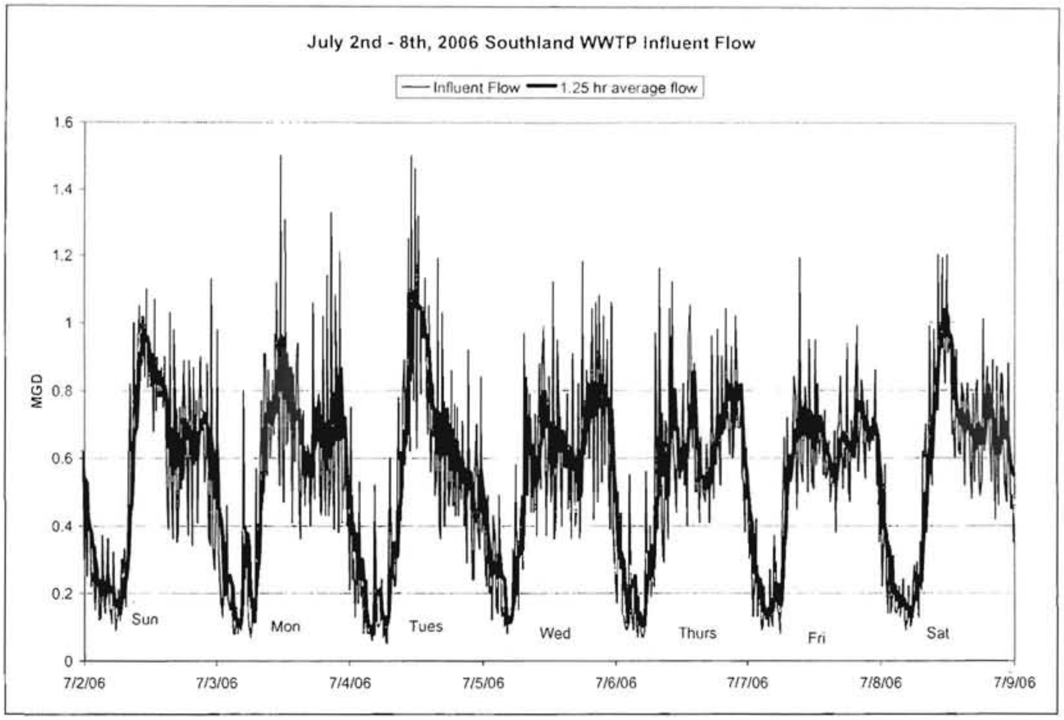


However, other data show that the collection system experiences very little I/I. The storms of 2/27-2/28/06 and 3/2-3/3/06, which dropped 0.99" and 1.16" respectively on the ARG gage, did not coincide with an increase in flow rates to the plant.



These results tend to indicate that the high flows experienced on 12/31/2005 and 1/1/2006 may be caused primarily by holiday usage patterns.

Observations recorded around the July 4th holiday support the conclusion that holiday usage may be the controlling factor in determining peak flow rates, as shown below. Peak flow rates and peak average flow rates are recorded on 7/4/06. Rates then return to more normalized patterns later in the week.



Estimated Peaking Factors

Average annual flows to the plant were reported in 2005 to be 0.63 MGD.

Average flows to the plant between 5/15/2006 and 9/15/2006 were 0.57 MGD.

A peak influent flow rate of 1.09 MGD was reported on July 4, 2006.

A peak 1.25-hour average flow rate of 1.37 MGD was reported on 12/31/2005 at a time when rainfall from a significant storm was peaking at the ARG rain gage.

Based on the values noted above, peaking factors for the Southland WWTP can be estimated as follows:

Table 4.8: Southland WWTP Peaking Factors

Period	Flow (MGD)	Factor
Annual Average Flow	0.63	1.00
Average Dry Weather Flow	0.57	0.90
Peak Dry Weather Flow	1.09	1.73
Peak Wet Weather Flow	1.37	2.17

Note that no influent flow data is available for the Blacklake Wastewater Treatment Plant. Therefore, no peaking analysis was performed.

Based on the values noted above, projected wastewater flows to the Southland WWTP can be estimated as follows:

Table 4.9: Projected Wastewater Flows to Southland WWTP (based on Assumed Water Use Rates)

Southland WWTP	Est. Average Annual Flow (AAF)	Est. Peak Dry Weather Flow (PDWF)	Est. Peak Wet Weather Flow (PWWF)
units	MGD	MGD	MGD
Peaking Factor		*1.73*	*2.17*
2005 Conditions	0.63	1.09	1.37
2030 Scenario 1	1.39	2.40	3.02
2030 Scenario 2	1.58	2.73	3.43
2030 Scenario 3	1.79	3.10	3.88

Table 4.10: Projected Wastewater Flows to Southland WWTP (based on Observed FY05-06 Water Use Rates)

Southland WWTP	Est. Average Annual Flow (AAF)	Est. Peak Dry Weather Flow (PDWF)	Est. Peak Wet Weather Flow (PWWF)
units	MGD	MGD	MGD
Peaking Factor		*1.73*	*2.17*
2005 Conditions	0.63	1.09	1.37
2030 Scenario 1	1.28	2.21	2.78
2030 Scenario 2	1.49	2.58	3.23
2030 Scenario 3	1.67	2.89	3.62

5. References

California, State of, Department of Health Services, 2004. Draft Waterworks Standards Revisions, November 12, 2004.

California Data Exchange Center, 2006, hourly rainfall data for station ARG, California Department of Water resources, Division of Flood Management, http://cdec.water.ca.gov/

San Luis Obispo Local Area Formation Commission (SLO LAFCO), 2004, Nipomo Community Services District Sphere of Influence Update Municipal Service Review, adopted May 20, 2004.

SAIC Engineering, Inc., 2006, Urban Water Management Plan 2005 Update, prepared for Nipomo Community Services District, Adopted January 25, 2006.

Boyle Engineering Corporation, 2002, Nipomo Community Services District Water and Sewer System Master Plan 2001 Update, March 2002.

SLO County Board of Supervisors, 2004, Agenda Item for General Plan Amendment G030011M (Nipomo Hills, LP), Meeting date November 9, 2004.

Bergman, Klara, 2006, personal communication regarding Crystal Oaks Ranch – Specific Plan, 10/26/2006.

SLO County, 1998, Black Lake Specific Plan, adopted 2/28/1983, revised May 1998.

SLO County, 2003, South County Area Plan -- Inland, Revised January 1, 2003.

McKenzie, John, 2006, San Luis Obispo County Department of Planning and Building, personal communication regarding various land development projects.

Nall, John, 2006, San Luis Obispo County Department of Planning and Building, personal communication regarding Nipomo Oaks development project.

San Luis Obispo Local Area Formation Commission (SLO LAFCO), 2006, File No. 1-R-06: Annexation No. 27 to the Nipomo Community Services District (Holloway/S. Oakglen), June 15, 2006.

SLO County, 2006, Land Use and Circulation Elements of the SLO County General Plan South County– Inland, Revised June 23, 2006.

Nipomo Community Services District, 2006, operating data provided from District telemetry system.

Nipomo Community Services District, 2006, Annual Production tables, January 2004 through September 2006.

Unscanned color map
pages

Appendix G: Technical Memorandum 7:

Conoco Phillips Water Supply Feasibility Study

ENGINEERS
PLANNERS
SURVEYORS

Technical Memorandum

August 8, 2007

To: Bruce Buel
Nipomo Community Services District

From: Larry Kraemer, RCE 44813
Rebekah Oulton, RME 30480

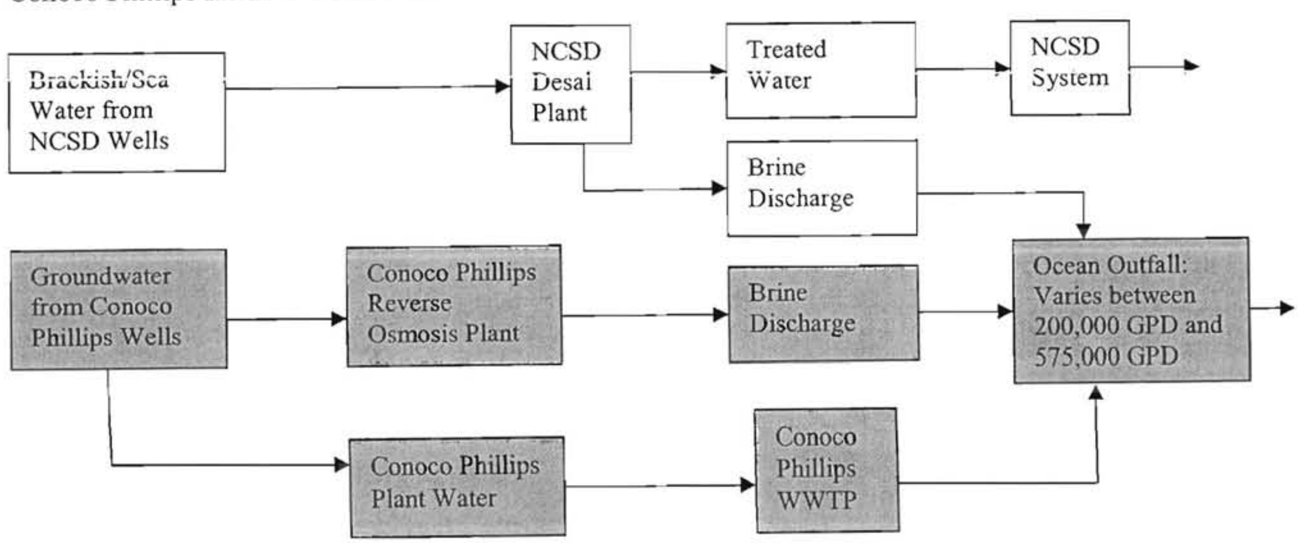
Subject: Technical Memorandum 7: Conoco Phillips Water Supply Feasibility Study

NCSD wishes to explore the possibility of supplementing its potable supplies with desalinated sea water or brackish groundwater, using the existing ocean outfall pipeline at the Conoco Phillips refinery for brine discharge. This Technical Memorandum examines the proposed project, explores the potential for such a project to cost effectively supplement potable water supply, and provides a scope of work for a feasibility study to consider this issue in detail should NCSD choose to pursue this alternative further.

1. Proposed Project Concept

Conoco Phillips currently processes almost 1.3 MGD of ground water extracted from four groundwater wells. This water is used in plant processes, cooling towers, and boilers. All plant process water is treated prior to release from the plant. Conoco Phillips is permitted to discharge up to 575,000 GPD of treated plant effluent and brine from their reverse osmosis (RO) facility, via an ocean outfall pipeline (Outfall). NCSD would like to explore the possibility of utilizing this existing Outfall for a desalination (desal) project to provide additional water for the NCSD system.

NCSD proposes utilizing slant drilling technologies to draw seawater or brackish groundwater, treating this water in a separate RO desal plant, and discharging brine waste from the desal process to the ocean via the Outfall. A diagram of the proposed project is shown below. Existing Conoco Phillips facilities are shaded.



364 Pacific Street
San Luis Obispo, CA 93401
Tel: 805-544-7407
Fax: 805-544-3863

2. Conoco Phillips Facilities and Operations

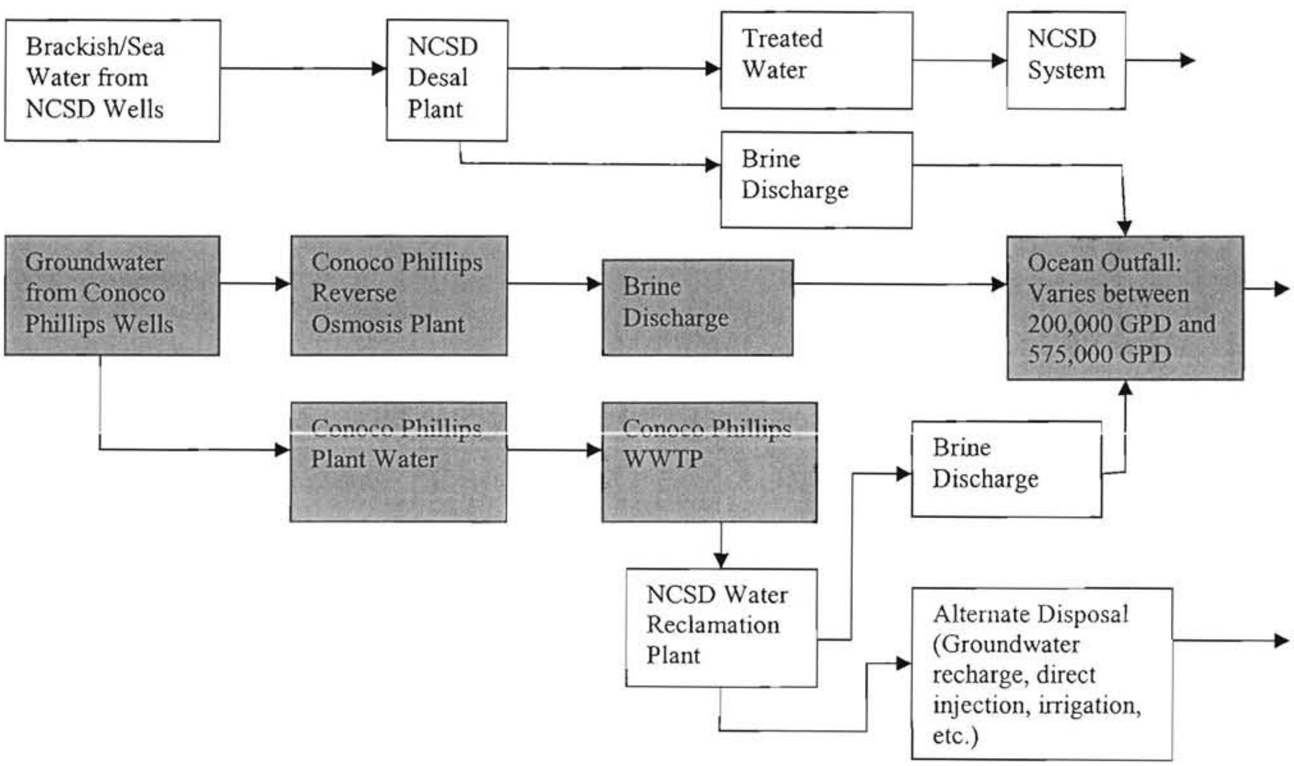
Conoco Phillips facilities include the existing RO plant and their ocean outfall pipe. They also operate four groundwater wells, which provide up to 1.3 MGD of groundwater for their operations. These wells would not be involved in the project, as plant operations cannot have the water source affected. Further, due to size limitations, use or expansion of their existing RO plant for the NCSD desal plant would not be feasible.

Conoco Phillips has indicated that they may be willing to negotiate for use or purchase of land for NCSD slant wells for brackish groundwater or ocean water as feed to the desal plant and for a separate NCSD desal plant site.

3. Potential Fatal Flaws

Conoco Phillips currently utilizes all of the permitted capacity in the Outfall, so there is no excess capacity for brine discharge from a NCSD desal plant. However, one possible way NCSD could potentially generate Outfall capacity would be by providing alternate disposal of Conoco Phillips' treated plant effluent, such as groundwater recharge, direct injection, or landscape irrigation.

According to Conoco Phillips staff, the treated plant water could potentially contain residual oil, water-treating chemicals, and process chemicals. It would likely require additional treatment prior to discharge to ground water. A diagram of the proposed revised project is shown below.



The feasibility of this proposal would need further review, including determination of Conoco Phillips' requirements regarding handling of their effluent, treatment requirements of that effluent prior to discharge, permitting requirements, additional costs related to effluent treatment, etc. Before pursuing this project further, NCSD should determine if Conoco Phillips will allow alternative treatment, disposal and/or reuse of their treated plant water for purposes of generating additional

Outfall capacity. If so, NCSD should determine how much capacity can be generated and if such effort is financially viable.

4. Potential Benefits

If this project is deemed feasible, it could potentially provide additional potable water for the NCSD system. However, financial viability for this project concept depends on two assumptions: that sufficient capacity can be generated is the Outfall, and that sufficient recovery can be achieved through RO.

Conoco Phillips currently uses the Outfall for discharge of both treated process water and waste brine from their own RO plant. The treated process water accounts for approximately 75% of the volume of discharge water. Assuming that all of this treated wastewater could be disposed of via alternate means (groundwater recharge, irrigation, etc.), then approximately 430,000 GPD of capacity would be available in the Outfall.

Depending on the source water used and the number of passes through the RO filters, a maximum recovery of between 70% and 90% can be expected. In general, the higher the salinity of the source water, the less recovery can be achieved. That is, seawater will generally show less recovery than brackish groundwater.

For purposes of this memo, a recovery of 80% is assumed. With 430,000 GPD of brine allowed to be discharged via the Outfall, approximately 2.2 MGD of potable water could be processed through the desal plant. This volume would provide up to 1.7 MGD or 1,900 AFY of desalinated water to the NCSD potable water system.

Actual achievable recovery of the RO system will need to be determined and potential Outfall capacity and will need to be reviewed and approved by Conoco Phillips in the development of the Feasibility Report for this project. Ultimately, the District plans to generate up to 5200 AFY of supplemental water through desalination. Generation of this volume may require an alternate discharge location or a modification to the existing facility and permit.

5. Cost Analysis

While there may be potential benefits for both NCSD and Conoco Phillips from pursuing this project, the question remains whether those benefits outweigh the potential costs. Based on discussions with other water agencies utilizing desal technologies, construction costs for an RO plant designed for treatment of 2.2 MGD could range between $5 million and $9 million. Previous cost estimates have placed the operating cost to treat brackish or seawater at $2,000 to $4,000/AF (Kennedy/Jenks, 2001). Assuming up to 1,900 AFY water produced, this project would cost NCSD between $3,800,000 and $7,600,000 per year for water treatment.

This estimate does not include cost of land. While land could potentially be available on Conoco Phillips' site for construction of the desal plant and drilling of the wells, lease or purchase arrangements with Conoco Phillips for use of that land have not been initiated.

This estimate also does not include cost for drilling, operating, and maintaining the brackish/seawater wells. Nor does this cost estimate address costs associated with infrastructure improvements necessary to tie in the desal plant to the existing NCSD water system. Such additional costs would need to be addressed in a detailed Feasibility Study should this project move forward.

6. Feasibility Study

Given the equally high costs of other supplemental water sources, we recommend that NCSD further investigate this alternative for supplementing their potable water system. A Feasibility Study should be developed to determine if this is truly a technically and economically viable project. A recommended Scope of Work for this Feasibility Study is outlined below.

The Feasibility Study should first review the project in more detail with Conoco Phillips to determine if pursuing the project further is viable for them. If so, it should then address the following key areas: technical feasibility, conceptual design, environmental impacts, regulatory requirements, economic analysis, and potential financing sources. Specific issues to address under each key area are identified below:

Technical Feasibility

- Determine Conoco Phillips treated plant effluent water quality prior to discharge.
- Determine the actual available capacity that could be discharged to the Outfall (as allowed by Conoco Phillips and by permit) and the corresponding rate of desal to be achieved.
- Develop proposed treatment and discharge alternatives in sufficient detail for agency review.
- Identify any "fatal flaws" associated with technical feasibility.

Conceptual Design

- Determine what modifications must be made to the existing NCSD system to tie into the desal plant.
- Confirm whether ocean water or brackish seawater will be drawn by the new NCSD wells.
- Determine what modifications must be made to the Conoco Phillips refinery site to accommodate the new wells and associated infrastructure.
- Confirm whether the desal plant can be located on Conoco Phillips property or whether an alternate site must be found. Determine what modifications must be made to the Conoco Phillips refinery site layout to accommodate the new desal plant and associated infrastructure. Or, identify potential alternative sites for the desal plant.
- Identify any "fatal flaws" associated with facility design.

Environmental Impacts

- Evaluate the Environmental Impacts of the Reclamation Plant.
- Evaluate the hydrogeologic impacts of brackish or ocean water wells on the environment.
- Identify any environmental impacts associated with the selected desal plant site.
- Identify any marine impacts associated with the brine discharge.
- Identify any "fatal flaws" associated with environmental impacts and review.

Regulatory Requirements

- Determine permitting and environmental review requirements for treatment and discharge/reclamation/reuse of Conoco Phillips' treated plant effluent.
- Determine if there are additional permit limitations on discharge, such as rate or concentration, which would limit feasibility of discharge of brine.
- Identify any "fatal flaws" associated with permitting or compliance.

Economic Analysis

- Confirm capital costs, construction costs, and operation and maintenance costs for the desal plant, wells, and associated facilities.
- Confirm impact of adding desal water to the NCSD system on NCSD customers' rates.
- Identify staffing requirements, compliance requirements, etc. associated with maintaining and operating the existing ocean outfall structure and the new desal plant.
- Identify costs associated with acquiring land or rights-of-use for the desal plant site and well sites.
- Determine the power requirements for the desal plant. Determine if it is possible to operate only during off-peak periods, and, if so, what the associated storage requirements are.
- Identify any "fatal flaws" associated with project economics.

Financing Sources

- Determine sources of financing (grants or loans) that may be available for assistance with this sort of project.
- Identify any "fatal flaws" associated with financing this sort of project.

7. References

Anderson, James. Superintendent Health and Safety, Conoco Phillips Refinery. Personal Correspondence and Discussions. March - June, 2007.

Kennedy/Jenks Consultants. *Evaluation of Water Supply Alternatives, Nipomo Community Services District*. October, 2001.

Veerapaneni, Srinivas et al. "Reducing Energy Consumption for Seawater Desalination."*American Water Works Association Journal*. Vol 99, No. 6, June 2007. pp 95-106.

Unscanned color map
pages