REPORT TO THE BOARD OF DIRECTORS
BOARD MEETING OF MAY 10, 2022
AGENDA ITEM 8.A.

AGENDA SECTION: **OLD BUSINESS**

SUBJECT: **RECEIVE AN UPDATE ON THE WATER TRANSFER REFILL**

PREPARED BY: Adam Brown, Operations Manager

APPROVED BY: Adam Coyan, General Manager

BACKGROUND

On May 12, 2020, the Board of Directors approved Resolution 2020-25, to execute agreements associated with temporary water transfer of up to 2,000 acre-feet (ac-ft) (Attachment 1). Specific agreements included:

- Water Purchase and Sale Agreement between Westlands Water District and the District;
- Refill Agreement between California Department of Resources (DWR), United States Bureau of Reclamation (USBR) and the District; and
- Professional Services Agreement with Western Hydrologics Consulting.

The transfer resulted in gross revenue of $700,000 with a consulting cost of $63,800 and associated legal counsel fees, the District's net revenue was estimated at $600,000 applied to the District Capital Improvement Program.

From May 12, 2020, to current, hydrologic conditions within the Pilot Creek Watershed and District demand resulted in Stumpy Meadows Reservoir storage level ranging between 10,992 and 20,000 acre-feet. As of February 28, 2022, the reservoir is at full capacity.

DISCUSSION

Upon completion of the temporary water transfer the District and Western Hydrologics have been engaged with DWR and USBR for the tracking of refill criteria. This tracking process is submitted monthly to DWR and USBR. Based on criteria outlined in the *Refill Agreement for Stumpy Meadows*[1], as of May 1, 2022, the District has satisfied 455 ac-ft of the 2,000 ac-ft. Refill tracking spreadsheets for December 2021 through March 2022 are included as Attachment 2.

FISCAL IMPACT

No fiscal impact.

[1]https://www.gd-pud.org/files/5ded511b1/Final_20741_Georgetown_Refill_20200814.pdf

CEQA ASSESSMENT

This is not a CEQA project.

RECOMMENDED ACTIONS

The District Staff recommends that the Board of Directors receive the update on the Water Transfer Refill Agreement and provide Staff direction, if necessary.

ATTACHMENTS

1. Resolution 2020-25 Authorizing Temporary Water Transfer Agreements
2. Re-Fill Tracking Spreadsheets

RESOLUTION NO. 2020-25

OF THE BOARD OF DIRECTORS OF THE GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT AUTHORIZING THE INTERIM GENERAL MANAGER TO EXECUTE AGREEMENTS RELATED A TEMPORARY TRANSFER OF UP TO 2,000 ACRE-FEET OF WATER

WHEREAS, the Georgetown Divide Public Utility District ("District"), has negotiated the terms of agreements that provide for a temporary water transfer with Westlands Water District ("WWD") to allow WWD to supplement its water supply; and

WHEREAS, beginning on July 1, 2020, the District will make available a total of up to 2,000 acre-feet of water to WWD on a schedule mutually agreeable to the District and WWD; and

WHEREAS, the District will operate Stumpy Meadows Reservoir to allow for releases of water that will be delivered to Folsom Reservoir; and

WHEREAS, the transferred water will be conveyed though the State Water Project by the Department of Water Resources under a Conveyance Agreement to WWD; and

WHEREAS, WWD, under the Water Purchase and Sale Agreement By and Between Westlands Water District and Georgetown Divide Public Utility District for 2020 Temporary Water Purchase will purchase water from the District at Three Hundred Fifty Dollars ($350.00) per acre foot of water received and reimburse the District for its costs associated with the transfer;

WHEREAS, Revenue generated from the temporary water transfer will be exclusively appropriate to fund capitol improvement projects;

WHEREAS, Conduct public education outreach; and

WHEREAS, the Board of Directors finds that the agreement is in the best interest of the District, and is therefore willing to sell and temporarily transfer WWD, District water as provided in the temporary water sale agreement.

NOW, THEREFORE, BE IT RESOLVED THAT THE BOARD OF DIRECTORS OF THE GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT as follows:

1. The Interim General Manager is authorized to execute the agreements between: a) the Water Purchase and Sale Agreement by and between Westlands Water District and Georgetown Divide Public Utility District for 2020 Temporary Water Purchase; b.) a Refill Agreement between the United States Bureau of Reclamation and the District; c) a Conveyance Agreement with the Department of Water Resources; and d) a professional services agreement with Western Hydrologics Consulting.

2. The Interim General Manager or his or her designee is authorized to enter into minor amendments to the aforementioned agreements subject to approval as to form by the District General Counsel.

3. The Board of Directors hereby authorizes the Interim General Manager to submit a petition to the State Water Resources Control Board for the temporary transfer of water, and the Interim General Manager is authorized to take such other administrative actions as may be necessary to effectuate the transfer and sale of the water. This includes any minor administrative actions necessary to provide fair administration of the District's reimbursable administrative expenses.

4. The Board of Directors find that the temporary water transfer from the District to WWD is exempt from CEQA under California Water Code sections 1725 and 1729, the general exemption provided under the CEQA Guidelines section 15061, 15301 (class 1), 15304 (class 4), and the statutory exemption set forth in section 15282(u), and is not barred by any exceptions to CEQA exemptions. The transfer involves the operation of existing facilities involving negligible or no expansion of use beyond that existing at the time of the proposed action, which is categorically exempt from CEQA. The Board of Directors authorizes the Interim General Manager to sign and file a Notice of Exemption if deemed appropriate or desirable, in his discretion.

PASSED AND ADOPTED by the Board of Directors of the Georgetown Divide Public Utility District at a meeting of said Board held on the Twelfth day of May, 2020, by the following vote:

AYES: SOUZA, SAUNDERS, WADLE, HALPIN

NOES: GARCIA

ABSENT/ABSTAIN:

Dave Souza, President, Board of Directors
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

Attest:

Jeff Nelson, Clerk and Ex officio
Secretary, Board of Directors
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

CERTIFICATION

I hereby certify that the foregoing is a full, true and correct copy of Resolution 2020-25 duly and regularly adopted by the Board of Directors of the Georgetown Divide Public Utility District, County of El Dorado, State of California, on this Twelfth day of May 2020.

Jeff Nelson, Clerk and Ex officio
Secretary, Board of Directors
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

Records for December 2021

Georgetown Divide Public Utility District

2020 Water Transfer: Stumpy Meadows Reservoir

Tabulation of Reservoir Refill

Submitted on: 1/12/2022

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Date	Actual Storage, end of day	Transfer Account Balance, beginning of day	Transfer Account Balance, end of day	Theoretical Storage, end of day (without Daily Refill Volume)	Theoretical Storage, end of day (with Daily Refill Volume)	Allowable Storage, end of day	Daily Refill Volume	Cumulative Refill Volume, end of day	Delta Condition[1]	Excess American Release[2]	Daily Refill Impact	Release to Eliminate Refill Impact	Cumulative Refill Impact, end of day
	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)			(AF)	(AF)	(AF)
11/30/21			2,000					0					0
12/1/21	13,037	2,000	2,000	15,037	15,037	20,000	0	0	B	N	0	0.0	0
12/2/21	13,037	2,000	2,000	15,037	15,037	20,000	0	0	B	N	0	0.0	0
12/3/21	13,065	2,000	2,000	15,065	15,065	20,000	0	0	B	N	0	0.0	0
12/4/21	13,065	2,000	2,000	15,065	15,065	20,000	0	0	B	N	0	0.0	0
12/5/21	13,093	2,000	2,000	15,093	15,093	20,000	0	0	B	N	0	0.0	0
12/6/21	13,121	2,000	2,000	15,121	15,121	20,000	0	0	B	N	0	0.0	0
12/7/21	13,121	2,000	2,000	15,121	15,121	20,000	0	0	B	N	0	0.0	0
12/8/21	13,148	2,000	2,000	15,148	15,148	20,000	0	0	B	N	0	0.0	0
12/9/21	13,176	2,000	2,000	15,176	15,176	20,000	0	0	B	N	0	0.0	0
12/10/21	13,204	2,000	2,000	15,204	15,204	20,000	0	0	B	N	0	0.0	0
12/11/21	13,204	2,000	2,000	15,204	15,204	20,000	0	0	B	N	0	0.0	0
12/12/21	13,260	2,000	2,000	15,260	15,260	20,000	0	0	B	N	0	0.0	0
12/13/21	13,400	2,000	2,000	15,400	15,400	20,000	0	0	B	N	0	0.0	0
12/14/21	13,652	2,000	2,000	15,652	15,652	20,000	0	0	E	N	0	0.0	0
12/15/21	13,793	2,000	2,000	15,793	15,793	20,000	0	0	E	N	0	0.0	0
12/16/21	13,933	2,000	2,000	15,933	15,933	20,000	0	0	E	N	0	0.0	0
12/17/21	13,989	2,000	2,000	15,989	15,989	20,000	0	0	E	N	0	0.0	0
12/18/21	14,073	2,000	2,000	16,073	16,073	20,000	0	0	E	N	0	0.0	0
12/19/21	14,129	2,000	2,000	16,129	16,129	20,000	0	0	E	N	0	0.0	0
12/20/21	14,185	2,000	2,000	16,185	16,185	20,000	0	0	E	N	0	0.0	0
12/21/21	14,241	2,000	2,000	16,241	16,241	20,000	0	0	E	N	0	0.0	0
12/22/21	14,325	2,000	2,000	16,325	16,325	20,000	0	0	E	N	0	0.0	0
12/23/21	14,828	2,000	2,000	16,828	16,828	20,000	0	0	E	N	0	0.0	0
12/24/21	15,389	2,000	2,000	17,389	17,389	20,000	0	0	E	N	0	0.0	0
12/25/21	15,752	2,000	2,000	17,752	17,752	20,000	0	0	E	N	0	0.0	0
12/26/21	16,032	2,000	2,000	18,032	18,032	20,000	0	0	E	N	0	0.0	0
12/27/21	16,262	2,000	2,000	18,262	18,262	20,000	0	0	E	N	0	0.0	0
12/28/21	16,416	2,000	2,000	18,416	18,416	20,000	0	0	E	Y	0	0.0	0
12/29/21	16,571	2,000	2,000	18,571	18,571	20,000	0	0	E	Y	0	0.0	0
12/30/21	16,695	2,000	2,000	18,695	18,695	20,000	0	0	E	Y	0	0.0	0
12/31/21	16,757	2,000	2,000	18,757	18,757	20,000	0	0	E	Y	0	0.0	0

Notes

Enter value in the cell

[1] B = Delta in Balanced Conditions
E = Delta in Excess Conditions

[2] Y = Excess American Release in effect
N = Excess American Release not in effect

Records for January 2022

Georgetown Divide Public Utility District

2020 Water Transfer: Stumpy Meadows Reservoir

Tabulation of Reservoir Refill

Submitted on: 3/1/2022

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Date	Actual Storage, end of day	Transfer Account Balance, beginning of day	Transfer Account Balance, end of day	Theoretical Storage, end of day (without Daily Refill Volume)	Theoretical Storage, end of day (with Daily Refill Volume)	Allowable Storage, end of day	Daily Refill Volume	Cumulative Refill Volume, end of day	Delta Condition[1]	Excess American Release[2]	Daily Refill Impact	Release to Eliminate Refill Impact	Cumulative Refill Impact, end of day
	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)			(AF)	(AF)	(AF)
12/31/21			2,000					0					0
1/1/22	16,850	2,000	2,000	18,850	18,850	20,000	0	0	E	Y	0	0.0	0
1/2/22	16,943	2,000	2,000	18,943	18,943	20,000	0	0	E	Y	0	0.0	0
1/3/22	17,005	2,000	2,000	19,005	19,005	20,000	0	0	E	Y	0	0.0	0
1/4/22	17,098	2,000	2,000	19,098	19,098	20,000	0	0	E	Y	0	0.0	0
1/5/22	17,160	2,000	2,000	19,160	19,160	20,000	0	0	E	Y	0	0.0	0
1/6/22	17,253	2,000	2,000	19,253	19,253	20,000	0	0	E	Y	0	0.0	0
1/7/22	17,346	2,000	2,000	19,346	19,346	20,000	0	0	E	Y	0	0.0	0
1/8/22	17,408	2,000	2,000	19,408	19,408	20,000	0	0	E	Y	0	0.0	0
1/9/22	17,470	2,000	2,000	19,470	19,470	20,000	0	0	E	Y	0	0.0	0
1/10/22	17,564	2,000	2,000	19,564	19,564	20,000	0	0	E	Y	0	0.0	0
1/11/22	17,626	2,000	2,000	19,626	19,626	20,000	0	0	E	Y	0	0.0	0
1/12/22	17,688	2,000	2,000	19,688	19,688	20,000	0	0	E	Y	0	0.0	0
1/13/22	17,750	2,000	2,000	19,750	19,750	20,000	0	0	E	Y	0	0.0	0
1/14/22	17,814	2,000	2,000	19,814	19,814	20,000	0	0	E	Y	0	0.0	0
1/15/22	17,878	2,000	2,000	19,878	19,878	20,000	0	0	E	Y	0	0.0	0
1/16/22	17,974	2,000	2,000	19,974	19,974	20,000	0	0	E	Y	0	0.0	0
1/17/22	18,038	2,000	1,962	20,038	20,000	20,000	38	38	E	Y	0	0.0	0
1/18/22	18,102	1,962	1,898	20,064	20,000	20,000	64	102	E	Y	0	0.0	0
1/19/22	18,134	1,898	1,866	20,032	20,000	20,000	32	134	E	Y	0	0.0	0
1/20/22	18,198	1,866	1,802	20,064	20,000	20,000	64	198	E	Y	0	0.0	0
1/21/22	18,262	1,802	1,738	20,064	20,000	20,000	64	262	E	Y	0	0.0	0
1/22/22	18,294	1,738	1,706	20,032	20,000	20,000	32	294	E	Y	0	0.0	0
1/23/22	18,358	1,706	1,642	20,064	20,000	20,000	64	358	E	Y	0	0.0	0
1/24/22	18,423	1,642	1,577	20,065	20,000	20,000	65	423	E	Y	0	0.0	0
1/25/22	18,455	1,577	1,545	20,032	20,000	20,000	32	455	E	Y	0	0.0	0
1/26/22	18,487	1,545	1,513	20,032	20,000	20,000	32	487	E	N	32	0.0	32
1/27/22	18,551	1,513	1,449	20,064	20,000	20,000	64	551	E	N	64	0.0	96
1/28/22	18,615	1,449	1,385	20,064	20,000	20,000	64	615	E	N	64	0.0	160
1/29/22	18,647	1,385	1,353	20,032	20,000	20,000	32	647	E	N	32	0.0	192
1/30/22	18,712	1,353	1,288	20,065	20,000	20,000	65	712	E	N	65	0.0	257
1/31/22	18,744	1,288	1,256	20,032	20,000	20,000	32	744	E	N	32	0.0	289

Notes

Enter value in the cell

[1] B = Delta in Balanced Conditions
E = Delta in Excess Conditions

[2] Y = Excess American Release in effect
N = Excess American Release not in effect

Records for February 2022

Georgetown Divide Public Utility District
2020 Water Transfer: Stumpy Meadows Reservoir
Tabulation of Reservoir Refill

Submitted on: 3/16/2022

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Date	Actual Storage, end of day	Transfer Account Balance, beginning of day	Transfer Account Balance, end of day	Theoretical Storage, end of day (without Daily Refill Volume)	Theoretical Storage, end of day (with Daily Refill Volume)	Allowable Storage, end of day	Daily Refill Volume	Cumulative Refill Volume, end of day	Delta Condition[1]	Excess American Release[2]	Daily Refill Impact	Release to Eliminate Refill Impact	Cumulative Refill Impact, end of day
	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)			(AF)	(AF)	(AF)
1/31/22			1,242					758					0
2/1/22	18,776	1,242	1,224	20,018	20,000	20,000	18	776	B	N	18	0.0	18
2/2/22	18,808	1,224	1,192	20,032	20,000	20,000	32	808	B	N	32	0.0	50
2/3/22	18,872	1,192	1,128	20,064	20,000	20,000	64	872	B	N	64	0.0	114
2/4/22	18,904	1,128	1,096	20,032	20,000	20,000	32	904	B	N	32	0.0	146
2/5/22	18,969	1,096	1,031	20,065	20,000	20,000	65	969	B	N	65	0.0	211
2/6/22	19,001	1,031	999	20,032	20,000	20,000	32	1,001	B	N	32	0.0	243
2/7/22	19,033	999	967	20,032	20,000	20,000	32	1,033	B	N	32	0.0	275
2/8/22	19,065	967	935	20,032	20,000	20,000	32	1,065	B	N	32	0.0	307
2/9/22	19,097	935	903	20,032	20,000	20,000	32	1,097	B	N	32	0.0	339
2/10/22	19,162	903	838	20,065	20,000	20,000	65	1,162	B	N	65	0.0	404
2/11/22	19,194	838	806	20,032	20,000	20,000	32	1,194	B	N	32	0.0	436
2/12/22	19,226	806	774	20,032	20,000	20,000	32	1,226	B	N	32	0.0	468
2/13/22	19,291	774	709	20,065	20,000	20,000	65	1,291	B	N	65	0.0	533
2/14/22	19,355	709	645	20,064	20,000	20,000	64	1,355	B	N	64	0.0	597
2/15/22	19,387	645	613	20,032	20,000	20,000	32	1,387	B	N	32	0.0	629
2/16/22	19,483	613	517	20,096	20,000	20,000	96	1,483	B	N	96	0.0	725
2/17/22	19,515	517	485	20,032	20,000	20,000	32	1,515	B	N	32	0.0	757
2/18/22	19,548	485	452	20,033	20,000	20,000	33	1,548	B	N	33	0.0	790
2/19/22	19,580	452	420	20,032	20,000	20,000	32	1,580	B	N	32	0.0	822
2/20/22	19,612	420	388	20,032	20,000	20,000	32	1,612	B	N	32	0.0	854
2/21/22	19,676	388	324	20,064	20,000	20,000	64	1,676	B	N	64	0.0	918
2/22/22	19,773	324	227	20,097	20,000	20,000	97	1,773	B	N	97	0.0	1,015
2/23/22	19,806	227	194	20,033	20,000	20,000	33	1,806	B	N	33	0.0	1,048
2/24/22	19,870	194	130	20,064	20,000	20,000	64	1,870	B	N	64	0.0	1,112
2/25/22	19,870	130	130	20,000	20,000	20,000	0	1,870	B	N	0	0.0	1,112
2/26/22	19,903	130	97	20,033	20,000	20,000	33	1,903	B	N	33	0.0	1,145
2/27/22	19,968	97	32	20,065	20,000	20,000	65	1,968	B	N	65	0.0	1,210
2/28/22	20,000	32	0	20,032	20,000	20,000	32	2,000	B	N	32	0.0	1,242

Notes

Enter value in the cell

[1] B = Delta in Balanced Conditions
E = Delta in Excess Conditions

[2] Y = Excess American Release in effect
N = Excess American Release not in effect

Records for March 2022

Georgetown Divide Public Utility District
2020 Water Transfer: Stumpy Meadows Reservoir
Tabulation of Reservoir Refill

Submitted on: 4/15/2022

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Date	**Actual Storage, end of day**	**Transfer Account Balance, beginning of day**	**Transfer Account Balance, end of day**	**Theoretical Storage, end of day (without Daily Refill Volume)**	**Theoretical Storage, end of day (with Daily Refill Volume)**	**Allowable Storage, end of day**	**Daily Refill Volume**	**Cumulative Refill Volume, end of day**	**Delta Condition[1]**	**Excess American Release[2]**	**Daily Refill Impact**	**Release to Eliminate Refill Impact**	**Cumulative Refill Impact, end of day**
	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)			(AF)	(AF)	(AF)
2/28/22			0					2,000					1,242
3/1/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/2/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/3/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/4/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/5/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/6/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/7/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/8/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/9/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/10/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/11/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/12/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/13/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/14/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/15/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/16/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/17/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/18/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/19/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/20/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/21/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/22/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/23/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/24/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/25/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/26/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/27/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/28/22	20,000	0	0	20,000	20,000	20,000	0	2,000	B	N	0	0.0	1,242
3/29/22	20,000												
3/30/22	20,000												
3/31/22	20,000												

Notes

Enter value in the cell

[1] B = Delta in Balanced Conditions
E = Delta in Excess Conditions

[2] Y = Excess American Release in effect
N = Excess American Release not in effect

REPORT TO THE BOARD OF DIRECTORS
BOARD MEETING OF MAY 10, 2022
AGENDA ITEM NO. 8.B.

AGENDA SECTION:	**OLD BUSINESS**
SUBJECT:	**IRRIGATION APPLIICATION FOR 2022**
PREPARED BY:	Adam Brown, Operations Manager
APPROVED BY:	Adam Coyan, General Manager

BACKGROUND

On the April 12, 2022, Board meeting District staff presented irrigation applications. All applications were approved with the exception of application located on Route 092 due to specific easement restrictions.

DISCUSSION

Easement restriction has been resolved and with the approval of the application total demand on irrigation Route 092 will be 26 of the available 27 miners-inches.

FISCAL IMPACT

Projected revenue of $397,836 presented in the April 12, 2022, staff report has not changed.

CEQA ASSESSMENT

This is not a CEQA Project.

RECOMMENDED ACTION

Staff recommends the Board of Directors of the District amend resolution 2022-XX by authorizing the irrigation connection on Route 092.

ATTACHMENTS

Attachment 1 – Resolution 2022-25

RESOLUTION NO. 2022-25

OF THE BOARD OF DIRECTORS OF THE GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT APPROVING IRRIGATION APPLICATIONS FOR THE 2022 IRRIGATION SEASON

WHEREAS, Ordinance 2005-01, An Ordinance Establishing Rules and Regulations for Irrigation Service in the Georgetown Divide Public Utility District, dictates the method of approving the irrigation applications received by the District; and

WHEREAS, the Irrigation Applications are part of an annual process by which existing irrigation service accounts renew or modify their contracts with the Georgetown Divide Public Utility District, and new applications are considered for service on routes where available; and

WHEREAS, applications are accepted every year between January 1 and March 1 for that calendar year's irrigation season; and

WHEREAS, Ordinance 2005-01 states that applications will be considered for approval using the following priority system:

Priority 1 – Parcels that received irrigation service during the immediately past irrigation season

Priority 2 – Parcels with most recent active irrigation service during the previous ten (10) irrigation seasons

Priority 3 – Applications for new irrigation service;

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT THAT:

1. All applications to reduce a contracted amount that are consistent with Ordinance 2005-01 are approved, with one exception to be considered separately after additional review of public easement. This action results in flows reduced from the 2003 Safe and Reliable Demand threshold, established by the Board.
2. The Board further approves all Priority 1 (P1) irrigation service accounts. This will assure that the flow in an established route will not exceed the Board established safe and reliable maximum flow.
3. The Board denies all Priority 2 (P2) and all Priority 3 (P3) requests that result in an increased flow for a specific route or are inconsistent with GDPUD Ordinance 2005-01.
4. These actions are summarized in the attached table (**Exhibit A**).

PASSED AND ADOPTED by the Board of Directors of the Georgetown Divide Public Utility District at a meeting of said Board held on the twelfth day of April 2022, by the following vote:

AYES: THORNBROUGH, MACDONALD, STEWART, SEAMAN, SAUNDERS

NOES:

ABSENT/ABSTAIN:

Michael Saunders, President, Board of Directors
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

Attest:

Adam Coyan, Clerk and Ex officio
Secretary, Board of Directors
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

CERTIFICATION

I hereby certify that the foregoing is a full, true, and correct copy of Resolution 2022-24 duly and regularly adopted by the Board of Directors of the Georgetown Divide Public Utility District, County of El Dorado, State of California, on this twelfth day of April 2022.

Adam Coyan, Clerk and Ex officio
Secretary, Board of Directors
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

2022 IRRIGATION SEASON REQUEST SUMMARY

Routes	2003 Demand MI	2021 Active Accounts	2021 Demand MI	Requested Changes and Priority	2022 Demand MI	Staff Recommendation
Route 080: Upper-Lower Conduit						
Priority 1 (P1)	**43.5**	28	31.5		29	Approve all P1 requests at 2003 flow.
Service Change Requests:						
080-0025-001				-0.5" (P1)		Approve request to reduce from 1" to 0.5"
080-0035-001				-2" (P1)		Did not apply in 2022
Route 081: Cool-Cherry Acres Ditch						
Priority 1 (P1)	**45**	25	40.5		40.5	Approve all P1 requests at 2003 flow.
Service Change Requests :	None					
Route 082: C-CA / Croft Pipeline---*Ext. #144*						
Priority 1 (P1)	**19.5**	11	16.5		16.5	Approve all P1 requests at 2003 flow.
Service Change Requests:	None					
Route 083: Cunningham Pipeline						
Priority 1 (P1)	**8**	9	7.5		7.5	Approve all P1 requests at 2003 flow.
Service Change Requests:	None					
Route 084: Garden Valley Pipeline						
Priority 1 (P1)	**58.5**	29	40		39.5	Approve all P1 requests at 2003 flow.
Service Change Requests :						
084-0095-001				+1" (P3)		Approve request to increase from 2" to 3" (first applied in (2022)
084-0120-001				-2" (P1)		Did not apply in 2022
084-0140-002				+0.5" (P3)		Approve request to increase from 0.5" to 1" (first applied in 2022)
Route 085: G.V. / Greenwood Road Pipeline						
Priority 1 (P1)	**24**	23	19		19	Approve all P1 requests at 2003 flow.
Service Change Requests :						
085-0070-001			+0.5" (P3)			Approve request to increase from 0.5" to 1" (first applied in 2022)
085-0110-001			-0.5" (P1)			Approve request to reduce from 0.5 to 0".
Route 086: Hocket Hollow Pipeline---*Ext. #179*						
Priority 1 (P1)	**21**	15	15		16.5	Approve all P1 requests at 2003 flow.
Service Change Requests :						
086-0035-001				-1" (P1)		Approve request to decrease from 2" to 1"
				+2" (P3)		Approve request to move service from 089-0145-001
				0.5" (P3)		Approve APN 061-530-027-000 application for new service (first applied 2022)

2022 IRRIGATION SEASON REQUEST SUMMARY

Routes	2003 Demand MI	2021 Active Accounts	2021 Demand MI	Requested Changes and Priority	2022 Demand MI	Staff Recommendation
Route 087: Kelsey Ditch						
Priority 1 (P1)	**84.5**	58	82.5		82.5	Approve all P1 requests at 2003 flow.
Service Change Requests :						
087-0040-002				-1" (P1)		Did not apply in 2022
087-0360-002				+1" (P2)		Approve AB request to increase from 0" to 1" (first applied 2022)
Route 088: Kelsey Pipeline						
Priority 1 (P1)	**7**	7	6.0		6.0	Approve all P1 requests at 2003 flow.
Service Change Requests :	None					
Route 089: Main Ditch #1						
Priority 1 (P1)	**66.5**	30	65.5		66.5	Approve all P1 requests at 2003 flow.
Service Change Requests :						
089-0023-001				+1" (P2)		Approve AB request to increase from 0 to 1". Activate account. (first applied 2022)
089-0040-001				+1" (P2)		Approve AB request to increase from 0 to 1". Activate account. (first applied 2022)
089-0145-001				-2" (P1)		Approve to receive 2" irrigation service from 086 Hockets Hollow Pipeline
				+1" (P3)		Deny APN 061-540-047-000 application for new service. (first applied 2022)
Route 090: Main Ditch #2						
Priority 1 (P1)	**113**	47	60.5		61.5	Approve all P1 requests at 2003 flow.
Service Change Requests :						
090/0295				+1" (P2)		Approve AB request to increase from 0 to 1". Activate account. (first applied 2022)
Route 091: Pedro Hill Pipeline						
Priority 1 (P1)	**8.5**	7	6.5		6.5	Approve all P1 requests at 2003 flow.
Service Change Requests :	None					

2022 IRRIGATION SEASON REQUEST SUMMARY

Routes	2003 Demand MI	2021 Active Accounts	2021 Demand MI	Requested Changes and Priority	2022 Demand MI	Staff Recommendation
Route 092: Pilot Hill Ditch						
Priority 1 (P1)	**27**	16	26		26	Approve all P1 requests at 2003 flow.
Service Change Requests :						
092-0010-001				-1" (P1)		Did not apply in 2022
092-0085-001				+1" (P2)		Approve AB request to increase from 0 to 1". Activate account. (first applied 2022)
092-0110-001				-1" (P1)		Approve request to decrease from 2" to 1"
				+1" (P3)		Pending Board Approval APN 061-530-027-000 application for new service (first applie
Route 093: Pilot Hill Pipeline						
Priority 1 (P1)	**15.5**	16	13.5		14.5	Approve all P1 requests at 2003 flow.
Service Change Requests :						
093-0070-001				+1"(P2)		Approve AB request to increase from 0" to 1". Activate account. (first applied 2022)
093-0080-001				+0.5" (P2)		Approve AB request to increase from 0" to 0.5". Activate account. (first applied 2022)
093-0105-001				-1" (P1)		Did not apply in 2022
Route 094: Pilot Hill Estates Pipeline--*Max 1 1/2"*						
Priority 1 (P1)	**20**	15	19.5		17.5	Approve all P1 requests at 2003 flow.
Service Change Requests :						
094-0015-001				+0.5" (P3)		Approve request to increase from 1.5" to 2".
094-0040-002				-1.5" (P1)		Did not apply in 2022
094-0045-001				-1.0" (P1)		Did not apply in 2022
095: Rattlesnake Bar Rd. Pipelines						
Priority 1 (P1)	**9.5**	10	10.5		9.5	Approve all P1 requests at 2003 flow.
Service Change Requests :	None					
096: Spanish Dry Diggins Ditch						
Priority 1 (P1)	**29**	15	29		29	Approve all P1 requests at 2003 flow.
Service Change Requests :						
096-0040-001				+1" (P3)		Deny AB request. Results in increased flow. (first applied 2021)
097: Taylor Mine Ditch						
Priority 1 (P1)	**32**	24	26		24	Approve all P1 requests at 2003 flow.
Service Change Requests :						
097-0125-001				-1"(P1)		Approve request. Irrigation service revoked.
097-0135-002				-1"(P1)		Approve request. Irrigation service revoked.
TOTALS	**632.0**	**385**	**515.5**		**512.0**	

Water is available in the following routes prior to the start of the 2022 season:

Route 80	**14.5**		
Route 81	**4.5**	**Route 88**	**1**
Route 82	**3**	**Route 90**	**51.5**
Route 83	**0.5**	**Route 91**	**2**
Route 84	**19**	**Route 92**	**1**
Route 85	**5**	**Route 93**	**1**
Route 86	**4.5**	**Route 94**	**2.5**
Route 87	**2**	**Route 97**	**8**

REPORT TO THE BOARD OF DIRECTORS
BOARD MEETING OF MAY 10, 2022
AGENDA ITEM NO. 8.C.

AGENDA SECTION: **OLD BUSINESS**

SUBJECT: **CONSIDER CLARIFICATION ON RESOLUTION 2022-26 – APPROVING THE AUBURN LAKE TRAILS PAVING PROJECT REQUEST FOR PROPOSALS**

PREPARED BY: Adam Brown, Operations Manager

APPROVED BY: Adam Coyan, General Manager

BACKGROUND

District staff presented the Request for Proposal (RFP) for the Auburn Lake Trails Paving Project for approval by the Board of Directors during the April 12, 2022, Board meeting. Historical staff report is included as Attachment 1.

DISCUSSION

The staff report omitted appropriate California Environmental Quality Act (CEQA) information that is generally included in District staff reports. Therefore, during the April 12, 2022, Board meeting information was requested to be added to the RFP and subsequent resolution that was not applicable to the project.

FISCAL IMPACT

Refer to Attachment 1.

CEQA ASSESMENT

This project is categorically exempt pursuant to CEQA Guidelines Section 15301, Existing Facilities, and Section 15061, No Possibility of Significant Effect on the Environment. The project is limited to maintenance of existing facilities and does not involve an expansion of use.

RECOMMENDED ACTION

It is Staff's recommendation that the Board approve the issuance of the Request for Proposals for the ALT Paving project and amend Resolution 2022-26.

ATTACHMENTS

1. April 12, 2022, Staff Report
2. Resolution 2022-26 approving the issuance of an RFP

REPORT TO THE BOARD OF DIRECTORS
BOARD MEETING OF APRIL 12, 2022
AGENDA ITEM NO. 10.E.

AGENDA SECTION: **NEW BUSINESS**

SUBJECT: **CONSIDER APPROVING THE ISSUANCE OF A REQUEST FOR PROPOSAL (RFP) FOR THE AUBURN LAKE TRAILS PAVING PROJECT**

PREPARED BY: Adam Brown, Operations Manager

APPROVED BY: Adam Coyan, General Manager

BACKGROUND

Auburn Lake Trails Subdivision (ALT) consists of a well-established housing development located north of Highway 193, beginning approximately two miles east of Cool in El Dorado County, California, and encompasses an area of approximately 2,500 acres created by Trans-Land Company in 1972. Approximately 1,000 of the District's 3,800 customers are located within ALT along with significant infrastructure demand.

DISCUSSION

In 2021 the District repaired a total of 26-line breaks. Line breaks can often lead to scouring of road base and compromising the integrity of paved surfaces. A total of three areas with these conditions were identified by ALT staff and reported to the District. Areas are located along Big Strike Trail, Kit Fox Court, and Chimney Flat Court.

A Request for Proposal (RFP) has been drafted to be advertised through ebidboard.com for approximately 30 days and qualified bidders will be notified of project opportunity. The RFP is included as Attachment 1.

FISCAL IMPACT

The 2021/2022 Capital Improvement Plan (CIP) included $100,000 to complete the paving projects. It is anticipated all funds will be expended for this project.

RECOMMENDED ACTION

It is Staff's recommendation that the Board approve the issuance of the Request for Proposals for the ALT Paving project.

ATTACHMENTS

1. Request for Proposal | ALT Paving Projects
2. Resolution 2022-XX approving the issuance of an RFP

RESOLUTION NO. 2022-26

OF THE BOARD OF DIRECTORS OF THE GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT APPROVING THE ISSUANCE OF A REQUEST FOR PROPOSALS FOR THE AUBURN LAKE TRAILS PAVING PROJECT

WHEREAS, the Auburn Lake Trails Subdivision (ALT) encompasses an area of approximately 2,500 acres and approximately 1,000 of the District's 3,800 customers reside in ALT with significant infrastructure demand; and

WHEREAS, in 2021, the District repaired a total of 26 line breaks, which often cause the scouring of road base and the compromising of the integrity of paved surfaces; and

WHEREAS, three (3) areas were identified by the ALT management staff and reported to the District as needing pavement repairs due to the line break repairs; and

WHEREAS, the FY 2021/2022 Capital Improvement Plan (CIP) included $100,000 to complete these paving projects; and

WHEREAS, all projects being considered for award funding will require compliance with the National Environmental Policy Act (NEPA) before any ground-disturbing activity may begin. Compliance with all applicable state, Federal and local environmental, cultural, and paleontological resource protection laws and regulations is also required. Recipients shall adhere to Federal, State, territorial, Tribal, and local laws, regulations, and codes, as applicable, and shall obtain all required approvals and permits. Recipients shall also coordinate and obtain approvals from site owners and operators. Staff has provided a Request for Proposals (RFP) to complete this project for the Board's review and approval.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT THAT the issuance of the RFP for the ALT Paving Project the project is hereby approved.

PASSED AND ADOPTED by the Board of Directors of the Georgetown Divide Public Utility District at a meeting of said Board held on the twelfth day of April 2022, by the following vote:

AYES: THORNBOROUGH, MACDONALD, STEWART, SEAMAN, SAUNDERS

NOES:

ABSENT/ABSTAIN:

Michael Saunders, President, Board of Directors
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

Attest:

Adam Coyan, Clerk and Ex officio
Secretary, Board of Directors
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

CERTIFICATION

I hereby certify that the foregoing is a full, true, and correct copy of Resolution 2022-26 duly and regularly adopted by the Board of Directors of the Georgetown Divide Public Utility District, County of El Dorado, State of California, on this twelfth day of April 2022.

Adam Coyan, Clerk and Ex officio
Secretary, Board of Directors
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

REPORT TO THE BOARD OF DIRECTORS
BOARD MEETING OF May 10, 2022
AGENDA ITEM NO. 8.D.1.

AGENDA SECTION: **OLD BUSINESS**

SUBJECT: **PRESENTATION OF PROPOSED FY 2022-2023 OPERATING BUDGET**

PREPARED BY: Adam Coyan, General Manager

APPROVED BY: Adam Coyan, General Manager

BACKGROUND

On March 24, 2022, I presented the working draft of the FY 2022-2023 Operating Budget, prepared in corroboration with my staff, to the Finance Committee for review and input. Participating in the monthly meetings of the Committee has also provided me with some guidance and direction for developing the working draft.

During the regular Board meeting of April 12, 2022, I presented the draft of the FY 2022-2023 Operating Budget and CIP to the Board.

At the joint Budget Workshop of the Board and Finance Committee of April 26, 2022, I presented the draft of the FY 2022-2023 Operating Budget and CIP.

DISCUSSION

Through these initial stages of the process established by the Board for the review and adoption of the budget, the working draft evolved to this proposed FY 2022-2023 Operating Budget for the ratepayers review. (Attachment 1).

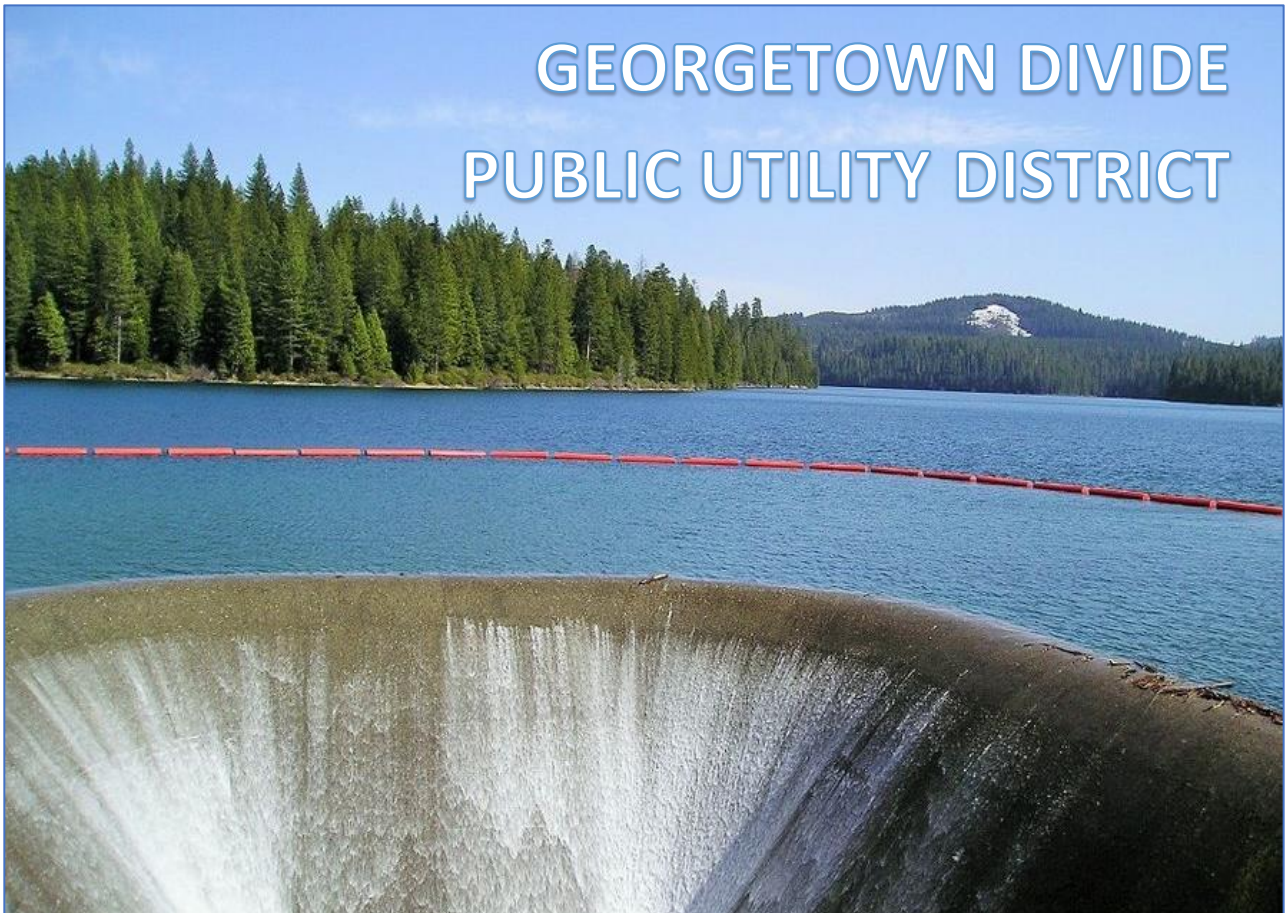
This proposed budget includes a total estimated revenue of $7,213,628 when including the supplemental charge. This compares to a projected total revenue of $6,659,130 for FY 2021-2022. Total operating expenses are estimated to be $5,198,106, a 12% increase from FY 2021-2022 ($4,543,801).

RECOMMENDED ACTION

Staff recommends that the Board receive and review the Draft FY 2022-2023 budget prior to the regular board meeting scheduled for June 14, 2022.

ATTACHMENT

(1) Proposed FY 2022-2023 Operating Budget



PROPOSED

FISCAL YEAR 2022-2023

OPERATING BUDGET

Presented to the Board of Directors

May 10, 2022

Georgetown Divide Public Utility District ♦ 6425 Main Street, Georgetown, CA 95634
(530) 333-4356 ♦ www.gd-pud.org

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GEORGETOWN DIVIDE
PUBLIC UTILITY DISTRICT
P.O. Box 4240
Georgetown, CA 95634-4240
Phone: (530) 333-4356
FAX: (530) 333-9442

April26, 2022

Board of Directors, Finance Committee and Customers,

I am submitting this proposed FY 2022-23 Operating Budget to the community of the Georgetown Divide Public Utility District.

The Board established the process for reviewing and adopting the FY 2022-23 Operating Budget. On March 24, 2022, the Finance Committee reviewed and provided feedback on the working draft of the budget. The Board reviewed the draft budget at the April 12th, 2022, regular board meeting and provided feedback and staff direction. During this workshop, the ratepayers will receive this draft budget and provide input. With input from the public, the Board will review an updated proposed budget on May 10, 2022, Board meeting, with final adoption scheduled for the Board meeting of June 14, 2022.

During the FY 2021-2022 budget planning process, the District was in the midst of transitioning from an antiquated accounting software to the Tyler system. Along with the rest of the State, the District was dealing with the impacts of the COVID-19 pandemic and facing the potential of an extreme drought and calling for voluntary conservation. Staff vacancies and management changes added to the challenges. I began as the new General Manager in August of 2021, and immediately tasked with finalizing the interim budget adopted by the Board on June 24, 2021. The final FY 2021-22 budget was adopted on September 14, 2021.

The FY 2022-2023 budget review process with the following changes, planning tools, and improvements:

- As of March 21, 2022, the District is finally fully staffed.
- The Board approved a PSA with LSL CPAs to provide CPA services beginning April 1, 2022.
- The 2020-2021 annual audit was completed and received by the Board on January 11, 2022.
- COVID-prevention requirements lifted and opportunities for recouping COVID-related expenses is being pursued through grants and other funding opportunities.
- The Board adopted the 2021-2022 Strategic Plan – Goals and Objectives as a planning tool in November 2021.
- The Finance Committee was reestablished and currently has six public members appointed to bring valuable knowledge and experience to advice the Board during this process.
- On December 14, 2021, the Board adopted Resolution 2021-56 to freeze the treated water rates at the 2019 level until June 30, 2022. The rates for irrigation service were frozen to December 31, 2022, to line up with the 2022 irrigation season. This budget reflects the increase for treated water service set to apply on July 1, 2022. The rate for irrigation water service is set to increase for the 2023 irrigation season.

This budget includes a total estimated revenue of $7,213,628 when including the supplemental charge. This compares to a projected total revenue of $6,659,130 for fiscal year 2021-2022. Total operating expenses is estimated to be $5,198,106, a 12% increase from FY 2021-2022 ($4,543,801).

An update to the Five-year Capital Improvement Plan (CIP) is adopted each year by the Board separately from the operating budget. The draft CIP is also presented to the ratepayers for review. The total cost of CIP projects proposed for FY 2022-23 is $1,800,808.

I appreciate the corroboration with my dedicated staff and input from the Finance Committee and board. I look forward to the input provided by the ratepayers.

Sincerely,

Adam Coyan, General Manager

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GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

Proposed Fiscal Year 2022-2023 Budget

TABLE OF CONTENTS

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I. GDPUD Overview

The Georgetown Divide Public Utility District (District) serves communities located in western El Dorado County among the foothills of the Sierra Nevada Mountain Range, situated in the heart of the Mother Lode. The Georgetown Divide is located between the Middle and South Forks of the American River, nestled in the heart of the Sierra Nevada Foothills and Northern California's Gold Country. Access is through Highway 50 and Interstate 80, making it in close proximity to either metropolitan cities or recreational activities of Lake Tahoe. The cornerstone of the District's water supply system is the Stumpy Meadows Reservoir with a storage capacity of 20,000 acre-feet.

- Location — 72,000 acres serving unincorporated areas of western El Dorado County
- Services — Irrigation and domestic water supplies, on-site wastewater disposal
- Population of area served — 15,000
- Formation Date — June 4, 1946
- Type of District (Act) — California Public Utility District Act
- Source of Water — Pilot Creek and other tributary water rights
- Amount of Water Served — Approximately 12,000 acre-feet per year
- Predecessor Agencies — A series of private water companies dating back to 1852 and the El Dorado, Pilot and Rock Creek Canal Companies

GDPUD History

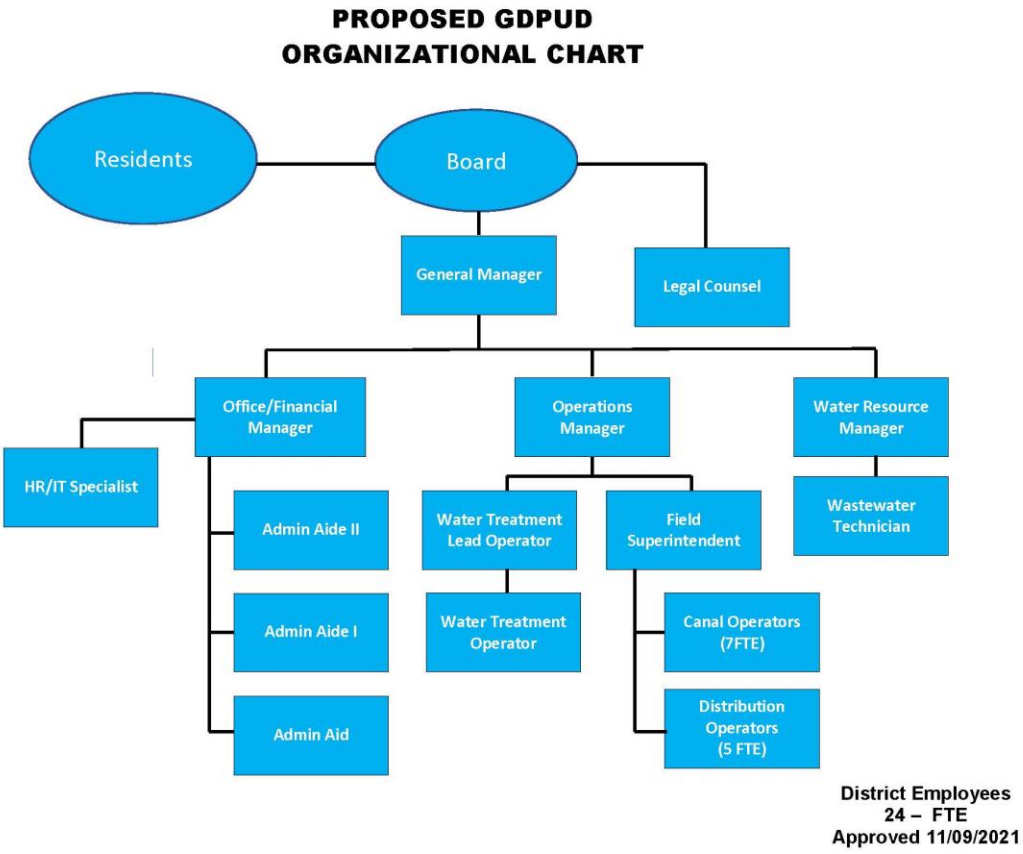
The origins of District facilities can be directly traced back to 1852 and the El Dorado, Pilot and Rock Creek Canal Companies, one of the first established water purveyors in the State of California; resulting from James Marshall's discovery of gold in nearby Coloma. Following the decline in gold production, agriculture and lumbering became the staple industries on the Divide for many years.

The focus of the District water supply system is the Stumpy Meadows Reservoir, a 20,000 acre-foot impoundment on Pilot Creek, at the eastern edge of the District. Water from this source of supply traverses through approximately 75 miles of ditch and pipeline to provide both agricultural water for customers, and raw water supplies for the District's water treatment plants.

II. GDPUD Organizational Chart

The current organizational chart is depicted in Figure 1.

Figure 1 - Current GDPUD Organizational Chart



III. Revenue Summary

GDPUD REVENUE BUDGET

Description	FY 17-18 Actual	FY 18-19 Actual	FY 19-20 Actual	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed
WATER OPERATING REVENUE							
Water Sales							
Residential Sales	$1,244,193	$1,862,227	$2,411,551	$2,745,822	$2,969,850	$2,981,068	$3,200,000
Commercial Sales	$177,031	$260,936	$315,497				
Irrigation Sales	$135,218	$317,330	$416,369	$407,856	$424,346	$543,404	$560,000
Penalties	$39,885	$46,739	$50,625				$45,400
Other (2)	$15,705	$10,951	$59,679				
Sub-Total	**$1,612,032**	**$2,498,183**	**$3,253,721**	**$3,153,678**	**$3,394,196**	**$3,524,472**	**$3,805,400**
NON OPERATING REVENUE							
Property Taxes	$1,447,381	$1,577,792	$1,657,978	$1,710,211	$1,687,194	$1,845,242	$1,900,850
SMUD	$108,515	$108,515	$108,515	$108,769	$163,000	$86,207	$109,300
Tax Revenue - Debt Service							
Restricted Benefit Charges	$19,103						
Interest Income	$5,386	$18,884	$75,443	$92,402	$76,700	$5,747	$2,500
Water Agency Cost Share (3)			$45,000		$0	$0	$0
Leases	$67,893	$73,023	$70,000			$86,207	$88,200
Hydro	$43,259	$43,259	$60,000			$50,038	$54,212
Grants (3)							$169,514
Other (3)		$291,035		$54,006	$3,866	$185,125	$196,232
Sub-total Non-Operating	**$1,691,537**	**$2,112,508**	**$2,016,936**	**$1,965,388**	**$1,930,760**	**$2,258,566**	**$2,520,808**
Supplemental Charge (1)	$0	$657,545	$549,529			$666,069	$667,000
Total Water Revenue	***$3,303,569***	***$5,268,236***	***$5,820,186***	***$5,119,066***	***$5,324,956***	***$6,449,107***	***$6,993,208***
WASTEWATER OPERATING REVENUE							
Zone Charges	$311,629	$311,547	$313,372	$165,143	$188,317	$176,985	$188,400
Escrow Fees	$33,600	$33,600	$28,000	$39,880	$45,000	$22,980	$30,000
Septic Design Fees	$1,200	$1,200	$3,000	$10,040	$1,500	$7,380	$1,500
Restricted Benefits Charges							
Soil Evaluations/Loans/Repairs							
Interest Income	$3,175	$3,175	$16,894	$18,483	$9,000	$2,678	$520
Other				$4,100	$3,000		
Total Wastewater Revenue	***$349,604***	***$349,522***	***$361,266***	***$237,646***	***$246,817***	***$210,023***	***$220,420***
TOTAL REVENUE	***$3,653,173***	***$5,617,758***	***$6,181,452***	***$5,356,712***	***$5,571,773***	***$6,659,130***	***$7,213,628***

Notes:
(1) - Supplemental Charge revenue can only be used to fund State Revoloving Fund Loan
(2) - Other revenue are connection fees
(3) -Grant Revenue and other revenues restricted to capital projects are shown in the Restricted Funds

IV. Revenue Sources

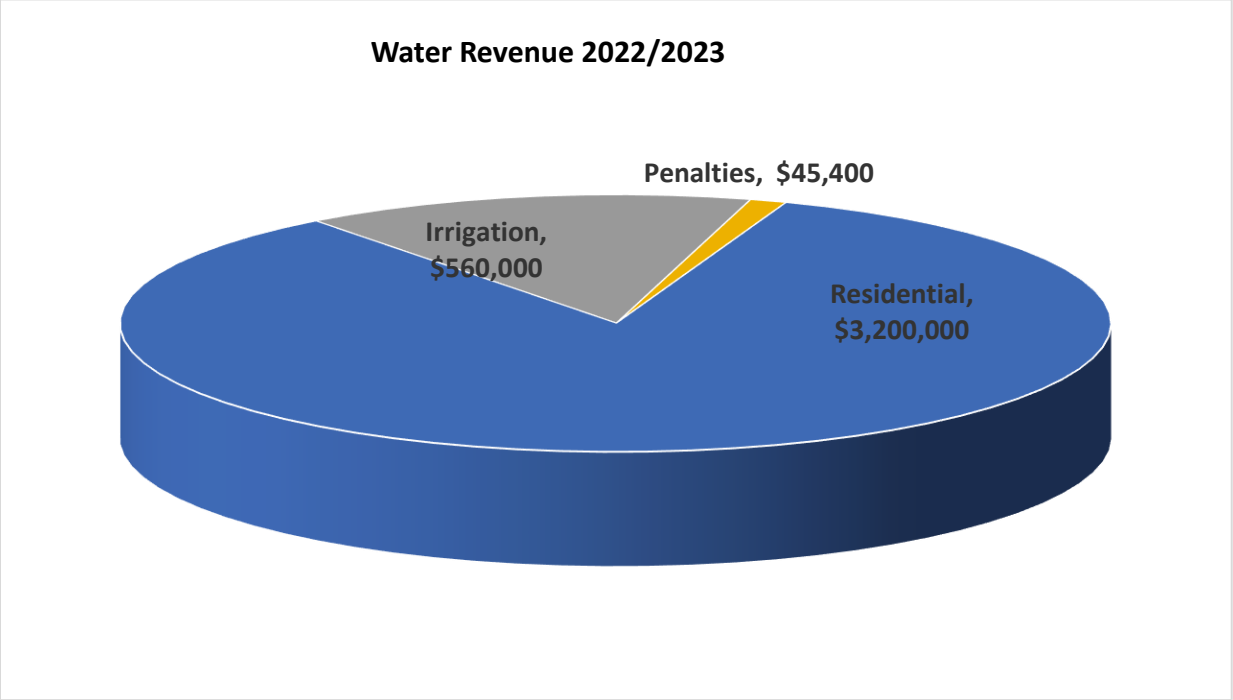
District revenues are divided into three broad categories: Water Operating Revenue, Wastewater Operating Revenue, and Non-Operating Revenue.

A. Operating Revenue

Water Sales

Water Operating Revenue includes all revenue generated by the sale of water and associated penalties. The District sells both treated water and untreated water. The largest source of operating revenue is the sale of treated water. In FY 21-22, treated water sales are estimated to total $2,981,068, which is approximately 84% of water operating revenues and approximately 45% of total revenue. Since the population of the District is not growing and water rates are not increasing, FY 22-23 residential water sales are projected to be substantially similar to the FY 21-22 estimates, with a projected total of $3,200,000 representing 87% of water operating revenue and 46% of total revenue. For FY 22-23 the supplementary charge will be separated for greater transparency and better tracking.

Untreated (irrigation) water sales are estimated to total approximately $543,404 for FY 21-22, which is 15% of water operating revenues and 8% of total revenue. Since the population of the District is not growing and water rates are not increasing, the projected revenue from irrigation water sales in FY 22-23 is anticipated to be substantially the same as FY 21-22, with a projected revenue of $560,000, representing 15% of water operating revenue and 8% of total revenue.



B. Non-Operating Revenue

Non-operating revenues include grant revenue, interest income, restricted benefit charges, hydroelectric payments, lease payments and general property tax revenues. Non-operating revenues are projected to total $2,258,566 in FY 21-22 and with a proposed revenue of $2,351,294 for FY 22-23

Property Tax

The largest non-operating revenue source is property tax revenue. The District receives a portion of the ad valorem property tax from El Dorado County based on the assessed value of the properties within the District. The actual amount varies based on the tax rate that was established when each individual property annexed into the district. On average, the District receives about $0.12 per $100 of assessed property value within the District. Property tax revenue for FY 21-22 is estimated to be $1,845,242 which is 81% of non-operating revenues, and 28% of total revenue. It is anticipated that property tax revenue will increase modestly for FY 21-22 to $1,900,850.

Sacramento Municipal Utility District (SMUD)

The District receives payments each year from SMUD in accordance with the 2005 cooperation agreement between El Dorado Water and Power Authority and SMUD. That agreement was reached as a requirement of SMUD's relicensing of the Upper American River Project through the Federal Energy Regulatory Commission (FERC). The estimated payment to the District for FY 20-21 is estimated to be $108,515, which is roughly 5% of non-operating revenues, and 2% of total revenue. The annual payment is adjusted each year to account for inflation, and the revenue projected for FY 21-22 is $109,300.

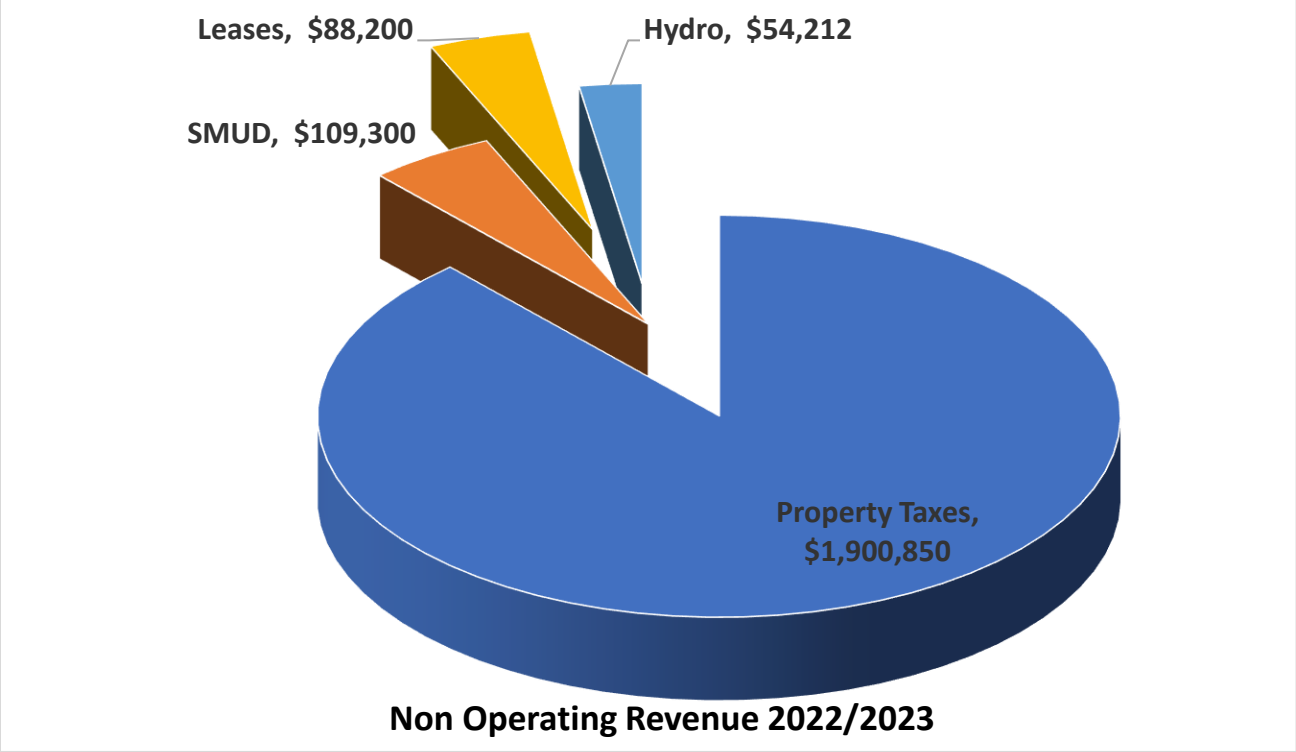
Interest, Leases, Hydroelectric

Interest income is earned on all general, restricted and designated funds. Interest income will be minimal due to lower interest rates this year.

The district has leases with several companies that pay to place their communications equipment on district facilities. For FY 19-20 and FY 20-21 Leases and hydro were not tracked separately. Lease revenue is estimated to be $88,200 for FY 22-23, which is roughly 4% of non-operating revenues and 1% of total revenue.

The district also receives hydroelectric royalty payments for the Buckeye and Tunnel Hill facilities. During FY 22-23, the hydroelectric royalty payments are estimated to be $54,212, which is approximately 2% of non-operating revenues and less than 1% of total revenue.

The following charts summarize non-operating

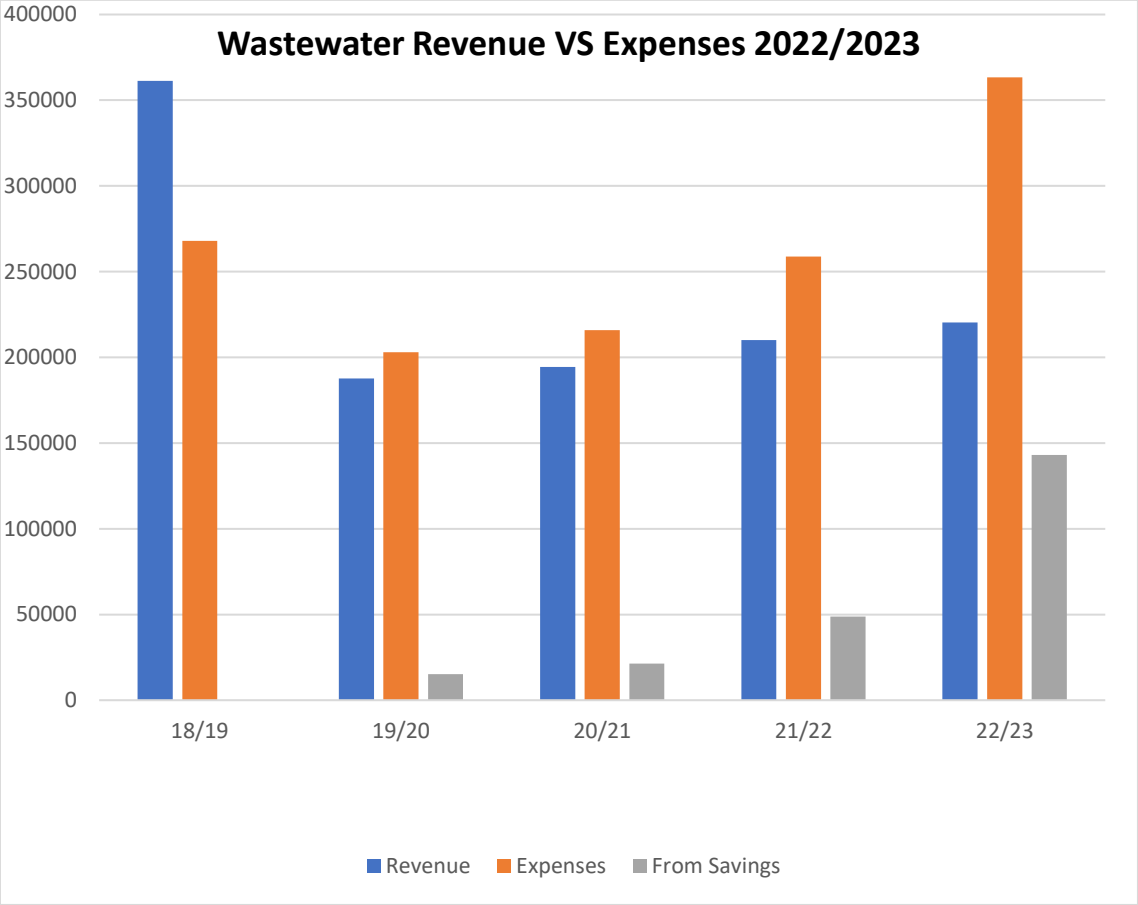


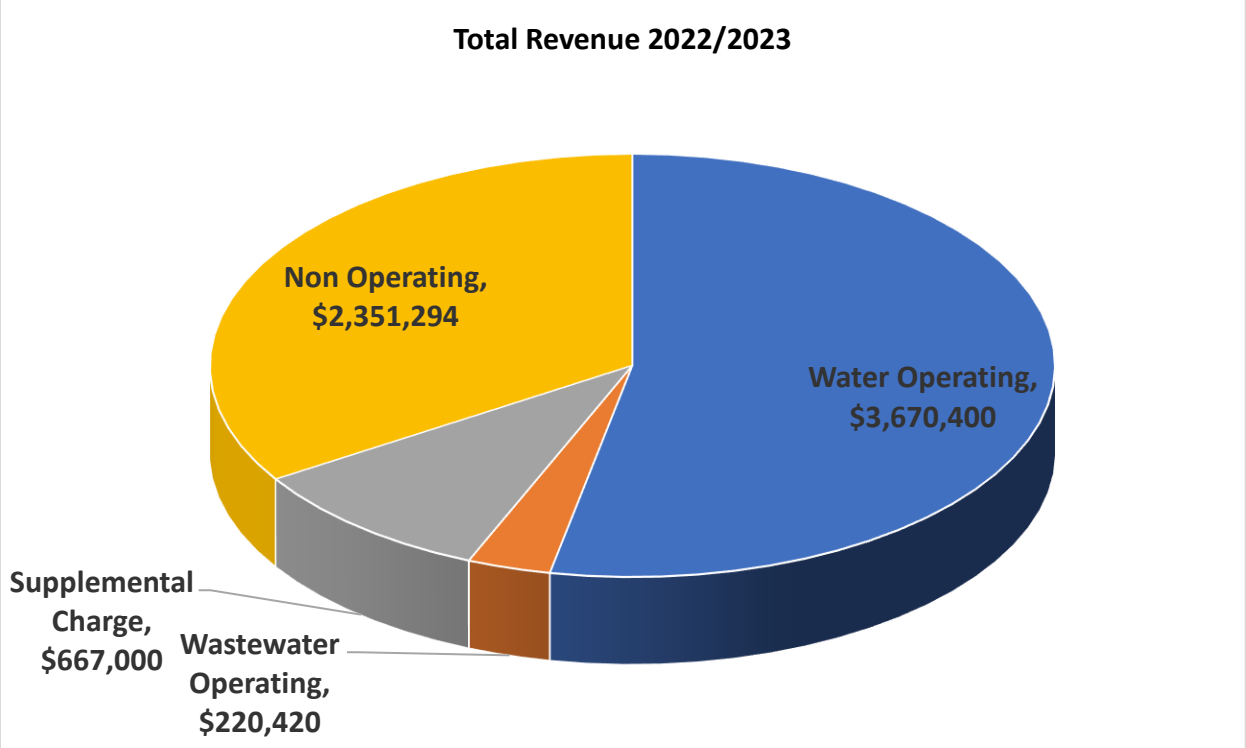
C. Supplemental Charge

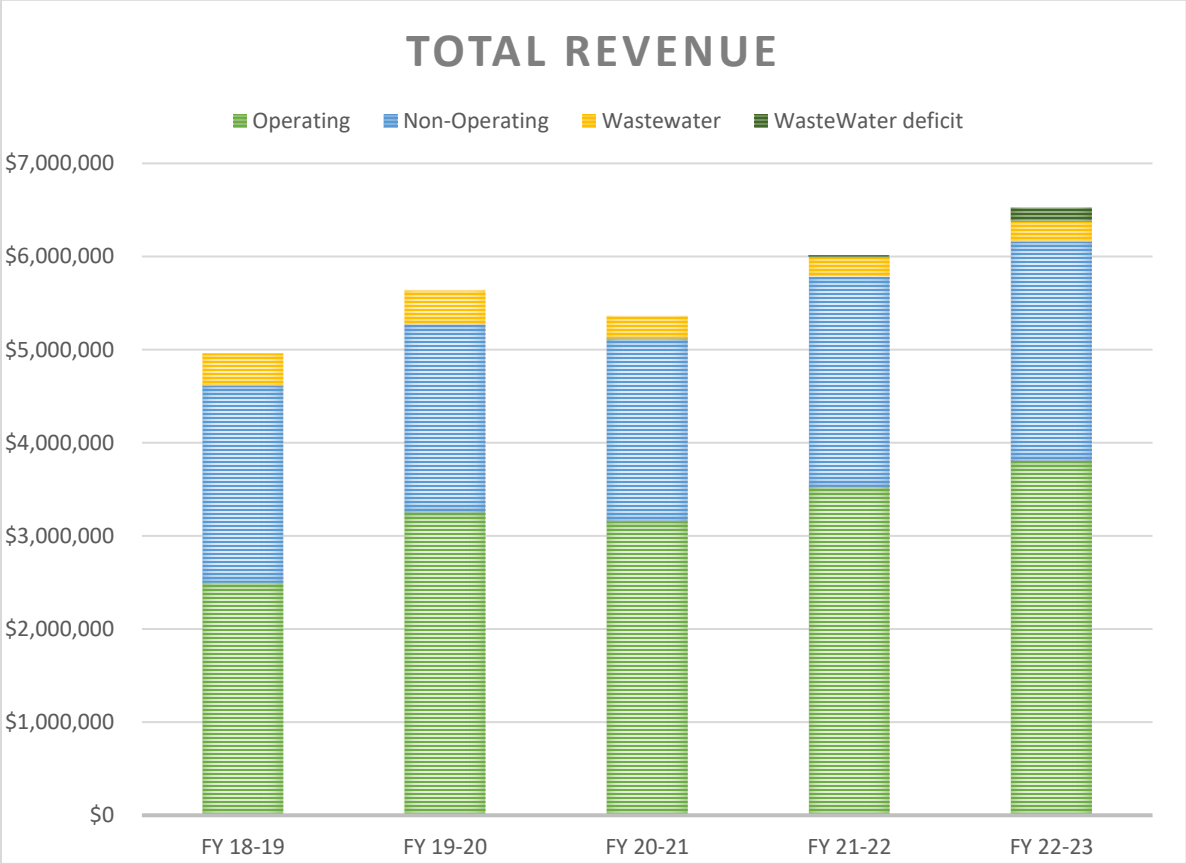
In 2015 the District conducted Proposition 218 proceedings and adopted a supplemental monthly charge in the amount of $15.08 per month on treated water accounts. The Supplemental Charge is for the specific purpose of paying off a loan from the State Revolving Fund that is being used to finance construction of a new water treatment plant to replace the aging plant located in Cool near the Auburn Lake Trails subdivision. The District Board of Directors adopted a resolution stating that the Supplemental Charge "will be held in separate, restricted account, used solely for servicing SWRCB low-interest loan and reserve account." For this reason, the charge is listed separately in the budget and cannot be used to fund operating expenses. The Supplemental Charge was approved in September 2015 and first began appearing on customers' bills in February 2017. For FY 22-23, the revenue is estimated to be $667,000, which is roughly 9% of total revenue.

D. Wastewater Charges/Fees

Revenue collected and used for oversight of the Auburn Lake Trails On-Site Wastewater Disposal Zone is projected to total $210,023 for FY 21-22, which is roughly 3% of the total revenues. This revenue expected to stay about the same for FY 22-23 and the projected revenue is $220,420. The revenue represents homeowners' bimonthly fees collected separate from residential water costs for the State mandated oversight of wastewater activities in the Auburn Lake Trails subdivision. The amount also includes a minor amount for additional fees related to homeowner requested activities. Wastewater operating revenues for FY 22-23 and the last four years are summarized below.




Total Revenue 2022/2023
Non Operating, $2,351,294
Water Operating, $3,670,400
Supplemental Charge, $667,000
Wastewater Operating, $220,420


TOTAL REVENUE
Operating
Non-Operating
Wastewater
WasteWater deficit
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$0
FY 18-19
FY 19-20
FY 20-21
FY 21-22
FY 22-23

V. Expenses

A. Operating

Operating expenses are divided into seven departments: 5100 – Source of Supply, 5200 – Transmission & Distribution of Raw Water, 5300 – Water Treatment, 5400 – Transmission & Distribution of Treated Water, 5500 – Customer Service, 5600 – General & Administration, and 6100 – Wastewater (Zone).

5100 – Source of Supply

Activities related to the maintenance and operation of the upper canal system from Stumpy Meadows Reservoir to Tunnel Hill. In addition to physical maintenance of the reservoir and canal system, this also includes water rights monitoring and reporting, dam surveying and monitoring, and dam safety compliance.

SOURCE OF SUPPLY
(FUNDS 10,12 DEPARTMENT 5100)
BUDGET

Account	Description	FY 17-18 Actual	FY 19-20 Actual	FY 19-20 Actual	Account	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed	% Increase 22-23
5010	Labor	$ 135,151	$ 114,161	$ 102,911	50100	$ 105,076	$ 163,354	$ 111,827	$ 157,169	-4%
5019	Overtime	9,404	12,524	14,226	50102	11,715	13,642	10,138	13,642	0%
5017	Standby	6,250	10,740	8,210	50103	7,110	11,867	17,091	11,867	0%
5011	Temporary Labor (not on payroll)	-	2,554	-	50101	-		-		
5013	PERS Unfunded Accrued Liability	83,821	19,190	10,855	50401	9,984	11,926	9,756	10,683	-10%
5014	PERS	12,689	12,206	11,010	50400	12,317	14,223	13,441	13,469	-5%
5015	Deferred Compensation	-	-		50403		740	-	680	-8%
5016	Payroll Taxes	11,248	10,464	9,816	50200	9,526	14,865	9,858	14,302	-4%
5018/71	Insurance: Health, Life, etc	39,195	49,757	32,763	50300	35,849	51,860	30,720	51,860	0%
5020	Insurance: Worker's Comp.	5,905	4,232	6,431	50302	4,460	6,857	4,524	6,804	-1%
5024	Insurance: D/O	-	-		50402			-		
	Subtotal Personnel Related	*$ 303,663*	*$ 235,828*	*$ 196,222*		*$ 196,037*	*$ 289,334*	$ 207,355	$ 280,476	-3%
5027	Audit	-			51303			-		
5028	Engineering Studies		-		*Unassigned*			-	-	
5030	Building Maintenance	-	-		51202			-		
5034	Insurance: General	6,658			51301			-	-	
5036	Legal--General				51302			-	-	
5038	Materials and Supplies	10,508	6,781	6,081	51100	9,483	10,765	10,188	11,410	6%
	Uniforms									
	Hand Tools									
	Concrete									
	Lumber									
	Safety (PPE)									
	Welding									
	Electrical									
	Electronics									
	Plumbing									
	Miscellaneous									
5039	Rental/Durable	2,050	6,314	2,284	51101	300	344	1,800	3,200	830%
5040	Office Supplies	567			51102	259	297	272	304	
	Computers									
	Electronics									
	Miscellaneous Office									
5041	Staff Development and Safety Train	-			52100		-	-	750	
5042	Travel--Conference				52101		-	-	-	
5044	Utilities	3,995	4,230	4,755	52102	4,755	10,715	18,177	19,267	80%
5046	Vehicle & Equipment Maintenance	3,595	4,517	9,128	51200	5,186	4,632	5,273	5,589	21%
5048	Vehicle Fuel	6,236	6,839	6,509	51201	5,352	5,683	7,906	8,380	47%
5060	Bank Fees & Payroll Services				52103		-	-	-	
12-5068	Retiree Health Premium				50104		-	-	-	
5070	Director Stipends				50105		-	-	-	
5076	Building Maintenance				51202		-	-	-	
5080	Outside Service/Consultants	87,406	32,713	10,350	51300	32,615	37,359	79,468	84,236	125%
5084	Govt. Reg./Lab Fees	36,453	55,246	60,762	52105	122,742	60,000	79,434	80,000	33%
5090	Other: Cost of recruitment etc.				51101		-	-	-	
5090	Other: County Tax Admin. Fees	17,900			52104		-	-	-	
5089	Other: Memberships	310		775	52108	341	391	341	415	6%
5091	Other: Elections				52106		$ -	-	$ -	
	Subtotal Services	*$ 175,678*	*$ 116,640*	*$ 100,644*		*$ 181,033*	$ 130,186	$ 202,859	$ 213,551	64%
	Grand Total 10-5100	**$ 479,341**	**$ 352,468**	**$ 296,866**		**$ 377,070**	**$ 419,520**	**$ 410,214**	**$ 494,027**	18%

5200 - Transmission & Distribution of Raw Water

Activities related to the conveyance of untreated water, including the transmission of untreated water to the water treatment plants.

TRANSMISSION & DISTRIBUTION RAW WATER
(FUNDS 10,12 DEPARTMENT 5200)
BUDGET

Account	Description	FY 17-18 Actual	FY 18-19 Actual	FY 19-20 Actual	Account	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed	% Increase 22-23
5010	Labor	$ 254,422	$ 275,371	$ 273,837	50100	$ 282,984	$ 322,851	$ 222,859	$308,538	-4%
5019	Overtime	22,228	22,906	28,996	50102	27,179	20,648	30,552	20,252	-2%
5017	Standby	11,680	13,780	15,110	50103	14,280	13,260	14,460	13,260	0%
5011	Temporary Labor (not on payroll)	19,334	3,580	1,656	50101	952	1,065	952	976	
5013	PERS Unfunded Accrued Liability	167,911	155,583	211,683	50401	179,550	214,481	190,251	208,325	-3%
5014	PERS	24,165	26,952	28,846	50400	27,810	30,867	25,895	29,450	-5%
5015	Deferred Compensation	-	-		50403		1,460	-	1,330	-9%
5016	Payroll Taxes	22,202	22,937	25,398	50200	15,379	29,379	25,793	28,077	-4%
5018/71	Insurance: Health, Life, etc	85,146	106,715	90,420	50300	91,296	115,737	69,483	115,737	0%
5020	Insurance: Worker's Comp.	16,784	13,140	13,508	50302	8,034	15,689	6,672	15,285	-3%
5024	Insurance: D/O	-	-		*Unassigned*			-		
	Subtotal Personnel Related	*$ 623,872*	*$ 640,964*	*$ 689,454*		*$ 647,464*	***$ 765,437***	$ 586,917	$ 741,229	-3%
5027	Audit	-	-		51303			$ -		
5028	Engineering Studies	-	-		*Unassigned*			-		
5030	Building Maintenance	-	-		51202			-		
5034	Insurance: General	16,139			51301			-	-	
5036	Legal--General				51302			-	-	
5038	Materials and Supplies	22,561	17,084	17,380	51100	73,632	18,000	31,790	25,000	39%
	Uniforms									
	Hand Tools									
	Concrete									
	Lumber									
	Safety (PPE)									
	Welding									
	Electrical									
	Electronics									
	Plumbing									
	Miscellaneous									
5039	Rental/Durable	3,859	2,161	657	51101	24,714	2,000	2,200	2,000	0%
5040	Office Supplies	722	-		51102		-	-	-	
	Computers									
	Electronics									
	Miscellaneous									
5041	Staff Development and Safety Traini	50	-		52100	128	147	80	750	410%
5042	Travel--Conference	-	-		52101		-	-	-	
5044	Utilities	1,417	1,175	1,284	52102	1,270	1,337	1,185	1,420	6%
5046	Vehicle & Equipment Maintenance	9,277	10,246	8,415	51200	5,705	6,152	9,635	10,213	66%
5048	Vehicle Fuel	15,117	17,521	14,622	51201	11,490	12,070	17,180	18,210	51%
5060	Bank Fees & Payroll Services	-	-		52103		-	-	-	
12-5068	Retiree Health Premium	-	-		50104		-	-	-	
5070	Director Stipends	-	-		50105		-	-	-	
5076	Building Maintenance	-	-		51202		-	-	-	
5080	Outside Service/Consultants	1,159		2,500	51300	2,055	2,354	5,464	5,984	154%
5084	Govt. Reg./Lab Fees	118		148	52105	104	119	54	57	
5090	Other: Cost of recruitment etc.	-			51101		-	-	-	
5090	Other: County Tax Admin. Fees	240	-		52104		-	-	-	
5089	Other: Memberships	-	-	108	52108	341	391	341	358	-8%
5091	Other: Elections	-	-		52106		-	-	-	
	Subtotal Services	*$ 70,659*	*$ 48,187*	*$ 45,114*		*$ 119,439*	$ 42,570	$ 67,929	$ 63,992	50%
	Grand Total 10-5200	**$ 694,531**	**$ 689,151**	**$ 734,568**		**$ 766,903**	**$808,007**	**$654,846**	**$805,221**	0%

5300 – Water Treatment

Activities related to the treatment plants and treating water for domestic use. This includes water quality monitoring, and compliance with State regulations related to water treatment plant operation.

WATER TREATMENT
(FUNDS 10,12 DEPARTMENT 5300)
BUDGET

Account	Description	FY 17-18 Actual	FY 18-19 Actual	FY 19-20 Actual	Account	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed	% Increase 22-23
5010	Labor	$ 138,048	$ 166,600	$ 204,928	50,100	$ 200,776	$ 250,264	$ 179,652	$ 244,058	-2%
5019	Overtime	16,735	23,397	35,001	50102	33,216	25,118	30,471	25,097	0%
5017	Standby	15,470	15,710	15,960	50103	16,330	9,688	14,531	9,688	0%
5011	Temporary Labor (not on payroll)	-	-		50101			-	-	
5013	PERS Unfunded Accrued Liability	17,105	28,508	54,277	50401	47,133	20,466	18,691	20,466	0%
5014	PERS	14,280	19,924	21,897	50400	23,952	32,592	20,948	31,790	-2%
5015	Deferred Compensation	-	-		50403		1,130	-	1,050	-7%
5016	Payroll Taxes	14,922	17,861	18,776	50200	18,600	22,774	16,936	22,209	-2%
5018/71	Insurance: Health, Life, etc	54,245	74,719	65,096	50300	69,925	64,914	70,320	64,914	0%
5020	Insurance: Worker's Comp.	5,461	5,059	5,670	50302	4,617	9,488	5,037	9,426	-1%
5024	Insurance: D/O	-	-		*Unassigned*			-		
	Subtotal Personnel Related	*$ 276,266*	*$ 351,778*	*$ 421,605*		*$ 414,549*	***$ 436,434***	$ 356,585	$ 428,698	-2%
5027	Audit	-	-		51303			-		
5028	Engineering Studies	-	-		*Unassigned*			-		
5030	Building Maintenance	-	-		51202			289		
5034	Insurance: General	8,844			51301			-	-	
5036	Legal–General	-	-		51302			-	-	
5038	Materials and Supplies	62,536	72,613	73,291	51100	73,692	72,000	80,591	85,426	19%
	Uniforms									
	Hand Tools									
	Concrete									
	Lumber									
	Safety (PPE)									
	Welding									
	Electrical									
	Electronics									
	Plumbing									
	Miscellaneous									
5039	Rental/Durable		5,640	5,161	51101	1,087	1,245	1,186	13,300	
5040	Office Supplies				51102		-	-	-	
	Computers									
	Electronics									
	Miscellaneous									
5041	Staff Development and Safety Train	250	250	912	52100	2,131	2,441	2,325	2,587	6%
5042	Travel–Conference	-	-		52101		-	-	-	
5044	Utilities	160,724	199,026	205,552	52102	188,647	214,327	204,121	227,186	6%
5046	Vehicle & Equipment Maintenance	1,244	4,278	7,664	51200	5,486	6,284	5,985	17,134	173%
5048	Vehicle Fuel	5,457	6,740	11,802	51201	7,505	8,484	8,080	8,993	6%
5060	Bank Fees & Payroll Services	-	-		52103		-	-	-	
12-5068	Retiree Health Premium	-	-		50104		-	-	-	
5070	Director Stipends	-	-		50105		-	-	-	
5076	Building Maintenance	-			51202		-	-	-	
5080	Outside Service/Consultants	60,577		8,519	51300	7,523	8,617	8,207	24,135	180%
5084	Govt. Reg./Lab Fees	27,547	32,388	52,540	52105	22,957	26,311	25,058	26,311	0%
5090	Other: Cost of recruitment etc.	-	-		51101		-	-	-	
5090	Other: County Tax Admin. Fees		-		52104		-	-	-	
5089	Other: Memberships	310	-	775	52108	341	391	372	391	0%
5091	Other: Elections	-	-		52106		-	-	-	
	Adjustments	-	-					12,869		
	Subtotal Services	*$ 327,489*	*$ 320,935*	*$ 366,216*		*$ 309,369*	$ 340,100	$ 349,083	$ 405,463	19%
	Grand Total 10-5300	**$ 603,755**	**$ 672,713**	**$ 787,821**		**$ 723,918**	**$ 776,534**	**$ 705,668**	**$ 834,160**	7%

5400 – Transmission & Distribution of Treated Water

Activities related to operation and maintenance of treated water pipelines and associated facilities. Also includes activities such as backflow testing compliance program, laboratory testing, and water quality sampling and reporting.

TRANSMISSION & DISTRIBUTION TREATED WATER
(FUNDS 10,12 DEPARTMENT 5400)
BUDGET

Account	Description	FY 17-18 Actual	FY 18-19 Actual	FY 19-20 Actual	Account	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed	% Increase 22-23
5010	Labor	$ 306,325	$ 311,409	$ 360,215	50100	$ 401,651	$ 416,998	$ 405,729	$ 417,609	0%
5019	Overtime	30,565	24,057	25,147	50102	39,563	39,846	31,214	40,329	1%
5017	Standby	16,230	15,710	16,660	50103	16,330	20,030	15,710	20,030	0%
5011	Temporary Labor (not on payroll)	-	-	-	50101	-		-	-	
5013	PERS Unfunded Accrued Liability	102,677	168,729	37,994	50401	77,580	90,000	34,147	90,000	0%
5014	PERS	28,131	29,833	35,329	50400	41,061	47,899	44,249	48,008	0%
5015	Deferred Compensation	-	-		50403		1,880	-	1,790	-5%
5016	Payroll Taxes	29,946	26,216	31,120	50200	35,122	37,947	35,401	38,002	0%
5018/71	Insurance: Health, Life, etc	11,562	116,862	109,344	50300	129,484	101,964	111,728	101,964	0%
5020	Insurance: Worker's Comp.	12,650	9,378	9,199	50302	6,429	17,175	6,405	17,342	1%
5024	Insurance: D/O	-	-		*Unassigned*			-	-	
	Subtotal Personnel Related	*$ 538,086*	*$ 702,194*	*$ 625,008*		*$ 747,220*	*$ 773,739*	$684,583	$ 775,075	0%
5027	Audit	-	-		51303			-		
5028	Engineering Studies	-	-		*Unassigned*			-		
5030	Building Maintenance		-		51202			-		
5034	Insurance: General	16,496			51301			-	-	
5036	Legal--General	-			51302			-	-	
5038	Materials and Supplies	96,488	69,825	89,710	51100	118,626	75,000	136,254	135,000	80%
	Uniforms									
	Hand Tools									
	Concrete									
	Lumbar									
	Safety (PPE)									
	Welding									
	Electrical									
	Electronics									
	Plumbing									
	Miscellaneous									
5039	Rental/Durable	932	2,161	1,000	51101	10,366	2,000	2,049	2,171	
5040	Office Supplies	758			51102	31	36	31	33	-10%
	Computers									
	Electronics									
	Miscellaneous									
5041	Staff Development and Safety Train	348	125	797	52100	167	191	205	750	293%
5042	Travel–Conference				52101		-	-	-	
5044	Utilities	11,846	13,332	12,045	52102	15,280	17,267	18,392	19,495	13%
5046	Vehicle & Equipment Maintenance	9,538	11,325	10,231	51200	11,875	13,233	17,353	23,500	78%
5048	Vehicle Fuel	21,860	21,153	20,834	51201	18,097	19,535	26,903	28,517	46%
5060	Bank Fees & Payroll Services				52103		-	-	-	
12-5068	Retiree Health Premium				50104		-	-	-	
5070	Director Stipends				50105		-	-	-	
5076	Building Maintenance				51202		-	-	-	
5080	Outside Service/Consultants	197			51300	495	5,000	7,130	7,529	
5084	Govt. Reg./Lab Fees	6,296	6,915	9,333	52105	31,005	31,802	16,305	17,120	-46%
5090	Other: Cost of recruitment etc.				51101		-	-	-	
5090	Other: County Tax Admin. Fees				52104	283		-	-	
5089	Other: Memberships	919		1,123	52108		-	-	-	
5091	Other: Elections				52106		-	-	-	
	Subtotal Services	*$ 165,678*	*$ 124,836*	*$ 145,073*		*$ 206,225*	$ 164,064	$ 224,622	$ 234,115	
	Grand Total 10-5400	**$ 703,764**	**$ 827,030**	**$ 770,081**		**$ 953,445**	**$ 937,803**	**$ 909,205**	**$ 1,009,190**	8%

5500 – Customer Service

Activities directly related to assisting customers, reading meters, and preparing and processing water billing.

CUSTOMER SERVICE
(FUNDS 10,12 DEPARTMENT 5500)
BUDGET

Account	Description	FY 17-18 Actual	FY 18-19 Actual	FY 19-20 Actual	Account	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed	% Increase 22-23
5010	Labor	$ 93,538	$ 90,713	$ 82,800	50100	$ 106,874	$ 139,282	$ 114,697	$ 153,231	10%
5019	Overtime	1,627	273	45	50102	851				
5017	Standby	-	-	-	50103	-			-	
5011	Temporary Labor (not on payroll)	29,510	26,773	21,117	50101	19,275	21,553	19,461	19,948	
5013	PERS Unfunded Accrued Liability	7,587	12,843	10,855	50401	8,556	10,221	8,756	9,588	-6%
5014	PERS	8,044	9,025	6,736	50400	9,762	11,102	11,749	12,154	9%
5015	Deferred Compensation	-	-		50403		630	-	660	
5016	Payroll Taxes	7,498	8,147	5,330	50200	8,223	12,675	8,882	13,944	10%
5018/71	Insurance: Health, Life, etc	32,725	36,464	22,652	50300	34,926	42,356	39,757	42,356	0%
5020	Insurance: Worker's Comp.	1,350	1,460	1,530	50302	1,049	1,598	1,053	1,711	7%
5024	Insurance: D/O	-	-		*Unassigned*			-	-	
	Subtotal Personnel Related	*$ 181,879*	*$ 185,698*	*$ 151,065*		*$ 189,516*	*$ 239,417*	$204,355	**$ 253,591**	6%
5027	Audit	-	-		51303			-		
5028	Engineering Studies				*Unassigned*			264		
5030	Building Maintenance	-	-		51202			-		
5034	Insurance: General	5,707			51301			-	-	
5036	Legal–General				51302			-	-	
5038	Materials and Supplies	-			51100			-	-	
	Uniforms									
	Hand Tools									
	Concrete									
	Lumbar									
	Safety (PPE)									
	Welding									
	Electrical									
	Electronics									
	Plumbing									
	Miscellaneous									
5039	Rental/Durable				51101			-	-	
5040	Office Supplies	23,471	21,429	19,583	51102	22,364	22,000	30,120	31,927	45%
	Computers									
	Electronics									
	Miscellaneous									
5041	Staff Development and Safety Training		450		52100		-	-	-	
5042	Travel–Conference				52101		-	-	-	
5044	Utilities	4,441	6,558	7,959	52102	9,106	5,860	14,079	14,923	155%
5046	Vehicle & Equipment Maintenance				51200		21	20	21	
5048	Vehicle Fuel				51201		-	-	-	
5060	Bank Fees & Payroll Services	1,905	20		52103		-	-	-	
12-5068	Retiree Health Premium				50104		-	-	-	
5070	Director Stipends				50105		-	-	-	
5076	Building Maintenance				51202		-	-	-	
5080	Outside Service/Consultants	464	1,278	995	51300	15,674	35,000	3,051	5,000	-86%
5084	Govt. Reg./Lab Fees				52105		-	-	-	
5090	Other: Cost of recruitment etc.	10			51101		-	-	-	
5090	Other: County Tax Admin. Fees			170	52104	60		-	-	
5089	Other: Memberships			34,637	52108		-	-	-	
5091	Other: Elections				52106		-	-	-	
	Subtotal Services	*$ 35,998*	*$ 29,735*	*$ 63,344*		*$ 47,204*	$ 62,881	$ 47,534	$ 51,871	-18%
	Grand Total 10-5500	**$ 217,877**	**$ 215,433**	**$ 214,409**		**$ 236,720**	**$ 302,298**	**$ 251,889**	**$ 305,461**	1%

5600 – General & Administration

Activities not directly attributed to any one other department but supporting all District activities, except wastewater. Examples include financial planning and management, accounting, information technology, records management, website hosting and management, Board of Directors support, payroll, and human resources.

ADMINISTRATION
(FUNDS 10,12 DEPARTMENT 5600)
BUDGET

Account	Description	FY 17-18 Actual	FY 18-19 Actual	FY 19-20 Actual	Account	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed	% Increase 22-23
5010	Labor	$ 286,259	$ 385,829	$ 276,343	*50100*	$ 328,755	$ 347,744	$ 352,487	$ 394,543	13%
5019	Overtime	563	124	14,602	*50102*	16,166	2,624	3,700	2,734	4%
5017	Standby	-	-	-	*50103*	-	1,702	-	1,702	
5011	Temporary Labor (not on payroll)	25,872	33,021	17,690	*50101*		1,129	8,392		-100%
5013	PERS Unfunded Accrued Liability	55,851	94,891	200,827	*50401*	128,583	153,598	180,494	197,641	29%
5014	PERS	26,467	36,200	37,091	*50400*	33,342	35,679	37,609	35,102	-2%
5015	Deferred Compensation	7,750	7,452	5,701	*50403*		1,570	3,027	1,690	8%
5016	Payroll Taxes	24,317	31,099	32,418	*50200*	28,670	31,645	32,184	35,903	13%
5018/71	Insurance: Health, Life, etc	51,650	86,670	83,095	*50300*	76,532	69,772	64,567	69,772	0%
5020	Insurance: Worker's Comp.	1,261	1,802	2,229	*50302*	1,149	4,670	1,067	4,672	0%
5024	Insurance: D/O	-	-	270,648	*50402*			-	-	
	Subtotal Personnel Related	*$ 479,990*	*$ 677,088*	*$ 940,644*		*$ 613,197*	*$ 650,133*	**$ 683,527**	**$ 743,759**	14%
5027	Audit	16,773	24,510	21,950	*51,303*	12,610	14,444	20,725	21,968	52%
5028	Engineering Studies			3,534	*52107*	36,086		36,076.00		
5030	Building Maintenance	-	-	11,605	*51202*	6,308		7,334.00		
5034	Insurance: General	5,178	76,605	79,001	*51301*	84,407	96,684	80,520.00	84,546	-13%
5036	Legal–General	200,384	191,998	124,947	*51302*	84,225	96,476	75,676.00	96,476	0%
5038	Materials and Supplies	-		3,840	*51100*	5,116	5,691	9,002.00	9,540	68%
	Uniforms									
	Hand Tools									
	Concrete									
	Lumbar									
	Safety (PPE)									
	Welding									
	Electrical									
	Electronics									
	Plumbing									
	Miscellaneous									
5039	Rental/Durable	2,437	2,536	2,366	*51101*	7,481	8,569	14,609.00	15,485	
5040	Office Supplies	37,969	41,260	29,805	*51102*	33,745	37,815	25,468.00	32,000	-15%
	Computers									
	Electronics									
	Miscellaneous									
5041	Staff Development and Safety Train	5,726	4,080	1,881	*52100*	520	596	1,982.00	2,100	252%
5042	Travel--Conference	3,715	6,037	7,425	*52101*	1,866	2,137	3,871.00	4,103	92%
5044	Utilities	24,983	25,225	26,412	*52102*	32,198	35,236	30,731.00	37,350	6%
5046	Vehicle & Equipment Maintenance	103	406	115	*51200*	224	235		-	
5048	Vehicle Fuel	50	920	297	*51201*		-	-	-	
5060	Bank Fees & Payroll Services	3,294	134,309	44	*52103*	275	344	405.00	425	24%
12-5068	Retiree Health Premium	76,048	102,248		*50104*	641	22,827	9,498.00	9,973	-56%
5070	Director Stipends	24,031	23,600	23,234	*50105*	23,200	21,993	23,200.00	24,360	11%
5076	Building Maintenance	4,599	7,907		*51202*	6,308			-	
5080	Outside Service/Consultants	165,199	124,860	145,868	*51300*	360,863	100,000	217,981.00	200,000	100%
5084	Govt. Reg./Lab Fees	6,722	413	4,727	*52105*	10,214	5,919	10,800.00	11,340	92%
5090	Other: Cost of recruitment etc.				*51101*		-	-	-	
5090	Other: County Tax Admin. Fees	2,427	35,242	24,647	*52104*	23,854		24,637.00	25,869	
5089	Other: Memberships	27,704	33,102		*52108*	29,690	33,972	55,182.00	57,941	71%
5091	Other: Elections		6,782		*52106*	8,951	10,253	8,951.00	9,399	-8%
	Subtotal Services	*$ 590,569*	*$ 817,530*	*$ 489,748*		*$ 756,172*	$ 493,191	$ 656,648	$ 642,875	30%
	Grand Total 10-5600	**$1,087,332**	**$1,519,128**	**$1,452,342**		**$1,381,979**	**$ 1,143,324**	**$ 1,340,175**	**$ 1,386,633**	21%

6700 – Wastewater (Zone)

Activities related to overseeing wastewater collection and disposal. Includes compliance with State regulations including the waste discharge requirements adopted by the Water Quality Control Board.

ALT WASTEWATER ZONE
(FUND 40, DEPARTMENT 6700)
BUDGET

Account	Description	FY 17-18 Actual	FY 18-19 Actual	FY 19-20 Actual	Account	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed	% Increase 22-23
5010	Labor	$ 91,197	$ 84,330	$ 67,020	50100	$ 86,991	$ 101,660	$76,200	$80,789	-21%
5019	Overtime	757	331	1,810	50102	1,104	5,689	764	1,047	-82%
5017	Standby	-			50103			-	-	
5011	Temporary Labor (not on payroll)	-	-		50101			-	-	
5013	PERS Unfunded Accrued Liability	14,007	23,924	16,283	50401	11,356	11,788	12,388	14,634	24%
5014	PERS	7,715	7,541		50400	8,082	9,658	7,070	7,944	-18%
5015	Deferred Compensation	-	-		50403		250	-		-100%
5016	Payroll Taxes	6,951	6,432	5,619	50200	6,806	10,166	5,979	6,326	-38%
5018/71	Insurance: Health, Life, etc	27,261	28,670	20,880	50300	25,325	33,518	25,304	20,981	-37%
5020	Insurance: Worker's Comp.	2,534	1,666	1,116	50302	1,086	3,404	1,185	1,088	-68%
5024	Insurance: D/O	-	-	15,272	50402			-	-	
	Subtotal Personnel Related	*$ 150,422*	*$ 152,894*	*$ 128,000*		*$ 140,750*	*$ 176,133*	$ 128,890	$ 132,809	-25%
5027	Audit		2,000		51303			-	-	
5028	Engineering Studies				*Unassigned*			-	-	
5030	Building Maintenance	-	-		51202			-		
5034	Insurance: General	3,633	5,002	4,647	51301	4,750	5,441	4,373	4,592	-16%
5036	Legal--General				51302		-	-	-	
5038	Materials and Supplies	9,503	5,432	4,350	51100	6,672	7,632	5,497	8,089	6%
	Uniforms									
	Hand Tools									
	Concrete									
	Lumbar									
	Safety (PPE)									
	Welding									
	Electrical									
	Electronics									
	Plumbing									
	Miscellaneous									
5039	Rental/Durable	573	1,192	2,016	51101	2,560	2,932	390	3,107	6%
5040	Office Supplies	1,772	1,797	2,174	51102	1,932	2,213	1,185	2,213	0%
	Computers									
	Electronics									
	Miscellaneous									
5041	Staff Development and Safety Traini	225	1,038		52100		315	275	333	6%
5042	Travel--Conference	-			52101		-	-	-	
5044	Utilities	11,495	14,795	13,367	52102	14,622	14,000	15,559	16,492	18%
5046	Vehicle & Equipment Maintenance	1,112	211	2,077	51200	2,235	2,220	2,442	4,788	116%
5048	Vehicle Fuel	2,491	3,775	4,273	51201	5,918	6,387	6,139	6,770	6%
5060	Bank Fees & Payroll Services				52103		-	-	-	
12-5068	Retiree Health Premium				50104		-	-	-	
5070	Director Stipends				50105		-	-	-	
5076	Building Maintenance				51202		-	-	-	
5080	Outside Service/Consultants	93,345	41,921	8,027	51300	9,732	11,012	11,414	150,000	1262%
5084	Govt. Reg./Lab Fees	32,359	37,952	33,988	52105	32,154	36,831	32,591	34,221	-7%
5090	Other: Cost of recruitment etc.				51101		-	-	-	
5090	Other: County Tax Admin. Fees				52104		-	-	-	
5089	Other: Memberships				52108	341		-	-	
5091	Other: Elections						-	-	-	
	Adjustments							20,000		
	Subtotal Services	*$ 156,508*	*$ 115,115*	*$ 74,919*		*$ 80,916*	$ 88,983	$ 99,865	$ 230,604	159%
	Grand Total 40-6700	**$ 306,930**	**$ 268,009**	**$ 202,919**		**$ 221,666**	**$ 265,116**	**$ 228,755**	**$ 363,413**	37%

Consolidated Expenses

In some departments the amounts appear much higher from previous years. On the consolidated expense sheet, the bottom line is only 15% difference from the FY 21-22 budget. This in part is due to increase expenses because of inflation and it also represents a more accurate budget because of my familiarity with the different accounts. This year we will be tracking material and supplies with more categories.

GDPUD OPERATING BUDGET EXPENSE
(FUNDS 10, 12, 40)

Account	Description	FY 17-18 Actual	FY 18-19 Actual	FY 19-20 Actual	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed	Amount Change	Percent Change
5010	Labor	1,304,940	1,428,413	1,368,054	1,513,107	1,742,153	1,463,451	1,755,937	$13,784	1%
5019	Overtime	81,879	83,612	119,827	129,794	107,567	106,839	103,101	($4,466)	-4%
5017	Standby	49,630	55,940	55,940	54,050	56,547	61,792	56,547	($0)	0%
5011	Temporary Labor (not on payroll)	74,716	65,928	40,463	20,227	23,747	28,805	20,923	($2,824)	-12%
5013	PERS Unfunded Accrued Liability	448,959	503,668	542,774	462,742	512,480	454,483	551,337	$38,857	8%
5014	PERS	121,491	141,681	140,909	156,326	182,020	160,961	177,916	($4,104)	-2%
5015	Deferred Compensation	7,750	7,452	5,701	-	7,660	3,027	7,200	($460)	-6%
5016	Payroll Taxes	117,084	123,156	128,477	122,326	159,451	135,034	158,764	($687)	0%
5018/71	Insurance: Health, Life, etc	301,784	499,857	424,250	463,337	480,121	411,879	467,584	($12,537)	-3%
5020	Insurance: Worker's Comp.	45,945	36,737	39,683	26,824	58,881	25,942	56,327	($2,554)	-4%
5024	Insurance: D/O	-	-	285,920	-	-	-	-	-	
	Subtotal Personnel Related	*$2,554,178*	*$2,946,444*	*$3,151,998*	*$2,948,733*	*$3,330,627*	*$2,852,213*	*$3,355,636*	$25,009	1%
5027	Audit	$ 16,773	$ 26,510	$ 21,950	$ 12,610	$ 14,444	$ 20,725	$ 21,968	$7,524	52%
5028	Engineering Studies	0	0	3,534	36,086	0	36,340	0	$0	
5030	Water Fund Equip Maint T&D Treated Wtr	-	-	11,605	6,308	-	7,623	-	$0	
5034	Insurance: General	62,655	81,607	83,648	89,157	102,125	84,893	89,138	($12,987)	-13%
5036	Legal--General	200,384	191,998	124,947	84,225	96,476	75,676	96,476	$0	0%
5038	Materials and Supplies	201,596	171,735	194,652	287,221	189,088	273,322	274,465	$85,377	45%
5039	Rental/Durable	9,851	20,004	13,484	46,508	17,090	22,234	39,263	$22,173	130%
5040	Office Supplies	64,692	64,486	51,562	58,072	62,064	56,804	66,477	$4,413	7%
5041	Staff Development and Safety Trainin	6,599	5,943	3,590	2,946	3,690	4,867	7,270	$3,580	97%
5042	Travel--Conference	3,715	6,037	7,425	1,866	2,137	3,871	4,103	$1,966	92%
5044	Utilities	218,901	264,341	271,374	265,878	298,742	302,244	336,133	$37,391	13%
5046	Vehicle & Equipment Maintenance	24,869	30,983	37,630	30,711	32,777	40,707	61,245	$28,467	87%
5048	Vehicle Fuel	51,211	56,948	58,337	48,362	52,159	66,208	70,870	$18,711	36%
5060	Bank Fees & Payroll Services	5,199	134,329	44	275	344	405	425	$81	24%
12-5068	Retiree Health Premium	76,048	102,248	0	641	22,827	9,498	9,973	($12,854)	-56%
5070	Director Stipends	24,031	23,600	23,234	23,200	21,993	23,200	24,360	$2,367	11%
5076	Building Maintenance	4,599	7,907	0	6,308	0	0	0	$0	
5080	Outside Service/Consultants	408,347	200,772	176,259	428,957	199,342	332,715	476,884	$277,542	139%
5084	Govt. Reg./Lab Fees	109,495	132,914	161,498	219,176	160,982	164,242	169,049	$8,067	5%
5090	Other: Cost of recruitment etc.	10	0	0	0	0	0	0	$0	
5090	Other: County Tax Admin. Fees	20,567	35,242	24,817	24,197	0	24,637	25,869	$25,869	
5089	Other: Memberships	29,243	33,102	37,418	31,054	35,145	56,236	59,105	$23,960	68%
5091	Other: Elections	-	6,782	-	8,951	10,253	8,951	9,399	($854)	-8%
		-	-	-	-	-	-	-	-	
	Subtotal Services	*$ 1,538,785*	*$ 1,597,488*	*$ 1,307,008*	*1,712,709*	*$503,045*	***$ 1,615,398***	$1,842,470	$520,792	
	Total Operating Expense	**$ 4,092,963**	**$ 4,543,932**	**$ 4,459,006**	**$ 4,661,442**	$ 4,652,305	**$4,467,611**	**$5,198,106**	$545,800	12%

DRAFT Fiscal Year 2022-2023 Budget								
Description	FY 17-18 Actual	FY 18-19 Actual	FY 19-20 Actual	FY 20-21 Actual	FY 21-22 Budget	FY 21-22 Projected	FY 22-23 Proposed	% Increase 22-23
Operating Expenses:								
Source of Supply (5100)	$ 479,341	$ 352,468	$ 296,866	$ 377,070	$ 419,520	$ 410,214	$ 494,027	18%
Trans & Dist Raw Water (5200)	$ 694,531	$ 689,151	$ 734,568	$ 766,903	$ 808,007	$ 654,846	$ 805,221	0%
Water Treatment (5300)	$ 603,755	$ 672,713	$ 787,821	$ 723,918	$ 776,534	$ 705,668	$ 834,160	7%
Trans & Dist Treated Water (5400)	$ 703,764	$ 827,030	$ 770,081	$ 953,445	$ 937,803	$ 909,205	$ 1,009,190	8%
Customer Service (5500)	$ 217,877	$ 215,433	$ 214,409	$ 236,720	$ 302,298	$ 251,889	$ 305,461	1%
Admin & General (5600 & 5900)	$ 1,087,332	$ 1,519,128	$ 1,452,342	$ 1,381,979	$ 1,143,324	$ 1,340,175	$ 1,386,633	21%
On-Site Wastewater Disposal Zone (670(	$ 306,930	$ 268,009	$ 202,919	$ 221,666	$ 265,116	$ 228,755	$ 363,413	37%
Total Operating Expenses	**$4,093,530**	**$4,543,932**	**$4,459,006**	**$4,661,701**	**$4,652,602**	**$ 4,500,752**	**$5,198,106**	12%
Capital Improvement Plan	$11,682,810	$7,816,272	$3,084,123	$3,190,400	$1,151,000		$1,800,808	56%

VI. Capital Improvement Projects

The five-year capital improvement plan (CIP) is adopted each year by the Board separately from the budget. The expenditures in the CIP for the current fiscal year are incorporated into this budget and shown as expenses within the Fund Summary.

5 Year CIP Budget						
Project	FY 22/23	FY 23/24	FY 24/25	FY 25/26	FY 26/27	TOTAL 2022-2027
Pump Station Retrofit	$50,000	$12,000	$12,000	$12,000	$12,000	$98,000
ALT 2,000,000 Water Tank	--	--	--	$3,000,000		$3,000,000
Tunnel Inspection and Lining	$65,000					$65,000
Infrastructure Repalcement	$225,000	$10,000	$10,000	$10,000	$10,000	$265,000
Angel Camp Tank Recoating	--	$366,800			--	$366,800
Repair Safety Walkways	$75,000	$2,000	$2,000	$2,000	$2,000	$83,000
Treated Water Line Replacement	$300,000	$50,000	$50,000	$50,000	$50,000	$500,000
Pressure Regulating Valves	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
North Fork American River Pumping Plant I	--	--	--	--	--	$0
Meter Replacement	$97,458	$97,458	$97,458	$97,458	$97,458	$487,290
Annual Canal Lining/ Canal Improvements	$150,000	$100,000	$100,000	$100,000	$100,000	$550,000
Develop Alternate Water Source	--	--	--	--	--	$0
Paving	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000
Water System Condition Assessment		--	--	--	--	$0
Replace Air Release Valves	$20,000	$10,000	$10,000	$10,000	$10,000	$60,000
Asset Management Program	$48,350	$16,350	$16,350	$16,350	$16,350	$113,750
Lift Station Upgrade (CDS Reserve)	$150,000		--	--	--	$150,000
Master Meters	$100,000					$100,000
AMI Meter Infrastructure	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
Solar on Walton & Sweetwater	$50,000	$1,000,000				$1,050,000
Water Wheel for Ditch	$150,000					$150,000
Parshall Flume	$20,000					$20,000
Plant Preasure Relief Valves	$80,000					$80,000
	$1,800,808	$1,884,608	$517,808	$3,517,808	$517,808	$8,238,840

GDPUD FUND SUMMARY
Fiscal Year 2022-2023

FUND		BUDGET REVENUE 2022-2023	BUDGET EXPENSES 2022-2023	PROJECTED Surplus 2022/2023
10 - GENERAL FUND				
REVENUE				
Water Operating Revenue		$ 3,805,400		
Non-Operating Revenue		$ 2,520,808		
Supplemental Charge		$ 667,000		
Total Revenue		*$ 6,993,208*		
EXPENSES				
5100			$ 494,027	
5200			805,221	
5300			834,160	
5400			1,009,190	
5500			305,461	
5600			1,386,633	
Total Expenses			*4,834,692*	
TRANSFERS				
Transfer Supplemental Charge to SRF Fund 29			667,000	
Transfer from SMUD Fund		-		
Total Transfers		-	*667,000*	
Subtotal General Fund		**$ 6,993,208**	**$ 5,501,692**	
40 - ALT ZONE FUND				
REVENUE				
Wastewater Operating		$ 220,420		
Total Revenue		*$ 220,420*		
EXPENSES				
6700			363,413	
Total Expenses			*363,413*	
Subtotal ALT Zone Fund(200)	**931,415**	**220,420**	**363,413**	**788,422**
Grand Total Revenues & Expenses		***7,213,628***	***5,501,692***	***1,711,936***

CIP Budget 2022/2023

Project	Cost	
Pump Station Retrofit	$50,000	
ALT 2,000,000 Water Tank	–	
Tunnel Inspection and Lining	$65,000	
Infrastructure Repalcement	$225,000	
Angel Camp Tank Recoating	–	
Repair Safety Walkways	$75,000	
Treated Water Line Replacement	$300,000	
Pressure Regulating Valves	$100,000	
North Fork American River Pumping Plant Eval	–	
Meter Replacement	$97,458	
Annual Canal Lining/ Canal Improvements	$150,000	
Develop Alternate Water Source	–	
Paving	$20,000	
Water System Condition Assessment		
Replace Air Release Valves	$20,000	
Asset Management Program	$48,350	
Lift Station Upgrade (CDS Reserve)	$150,000	
Master Meters	$100,000	
AMI Meter Infrastructure	$100,000	
Solar on Walton & Sweetwater	$50,000	
Water Wheel for Ditch	$150,000	
Parshall Flume	$20,000	
Plant Preasure Relief Valves	$80,000	
Total CIP 2022/2023	***$ 1,800,808***	***$ (88,872)***

REPORT TO THE BOARD OF DIRECTORS
BOARD MEETING OF MAY 10, 2022
Agenda Item No. 8.D.2

AGENDA SECTION: **OLD BUSINESS**

SUBJECT: **REVIEW PROPOSED FY 2022-2023 – FY 2026-27 CAPITAL IMPROVEMENT PLAN**

PREPARED BY: Adam Coyan, General Manager

BACKGROUND

The draft Capital Improvement Plan (CIP) identifies anticipated capital improvement projects and funding sources for a five-year period beginning with Fiscal year 2022-2023 through FY 2026-2027 (Attachment 1) and is submitted for the ratepayer's review.

The CIP is a multi-year instrument to guide the construction of new facilities/ infrastructure, as well as the expansion, rehabilitation, or replacement of existing District assets. This Plan is presented as the guiding document for the prioritization of projects.

The CIP does not appropriate funds, but rather, it functions as a budgeting and planning tool which supports actual appropriations that are made through adoption of the budget. The subsequent four years are subject to change due to more detailed engineering analysis, Board direction of project priorities, updates to revenues, and changes in project costs. Therefore, the five-year CIP is updated annually.

DISCUSSION

Upon adoption of the CIP, Staff will continue project planning to identify components of the work plan and initiate project management to track the project through completion. Attachment 2 is a sample project management form that describes the project, funding sources, and tracks expenses. It is expected that project data will be compiled through Tyler as well as the Asset Management software. Project updates can be provided to the Board and posted on the website for the public.

Further, a 5 to 10-year CIP project list with attached documents has been added.

RECOMMENDED ACTION

Staff recommends that the ratepayers receive the draft CIP and review.

ATTACHMENTS

(1) Draft FY 2022/2023 to FY 2026/2027 Capital Improvement Plan

DRAFT

CAPITAL IMPROVEMENT PLAN

FY 2022/23 – FY 2026/27

Presented to the Board of Directors

May 10, 2022

Adam Coyan, General Manager

Georgetown Divide Public Utility Distict

Proposed Capital Improvement Plan FY 2022/23 – FY 2026/27

Table of Contents

I. Introduction

The Georgetown Divide Public Utility District's (District) Five-year Capital Improvement Plan (CIP) is a multi-year planning instrument to guide the construction of new facilities/infrastructure and the expansion, rehabilitation, or replacement of existing District assets. The Five-Year CIP is developed by Staff and adopted by the Board of Directors as the guiding document for the prioritization of projects.

The information included in the CIP is based on the current information available and updated regularly to reflect changing priorities, funding availability, and project completion. A new five-year CIP is submitted to the Board annually with recommended adjustments to project budgets, funding sources, descriptions, and/or schedules. Inclusion of a project in the CIP does not commit the District to specific expenditures or appropriations for any particular project.

Approximately $1,808,823 in CIP programs and projects over the next five years have been identified.

II. GDPUD Infrastructure

District infrastructure includes the water and wastewater physical structures, systems, and facilities needed to provide services to customers and for the functioning of a company and its economy. Infrastructure impacts public health, safety, and the quality of life for District customers and residents. Decisions made regarding infrastructure projects are very important because they are generally large and expensive, and the assets created will require decades of public use.

The District is responsible for maintaining the following infrastructure:

- Over 70 miles of canal
- Over 200 miles of water pipeline
- Two (2) water treatment plants
- Ten (10) water storage tanks
- Five (5) pumping stations
- Three (3) reservoirs
- Two (2) State regulated dams
- Two (2) miles of sewer pipelines
- Five (5) community wastewater disposal fields
- Corporation yard and office building

III. Description of Funding Sources

The Five-Year CIP is funded by various unrestricted and restricted funds. Unrestricted funds are free from external restrictions and can be used for any purpose, as directed by the Board. For example, the District's General Fund is an unrestricted fund. The General Fund is primarily made up of funding from water sales, and property tax revenue. Restricted funds are legally required to be used for a specific purpose. For example, ALT Zone Funds can only be used to fund activities within the wastewater zone. Other examples of restricted funding sources include local, state, and federal grants and loans; and capital facility charges. The following chart provides a description of the various funding sources:

FUNDING SOURCES	DESCRIPTION AND RESTRICTIONS
Capital Reserve	These are funds set aside at the Board's direction to fund capital improvements to the water system. The original source of these funds is water sales, property tax, and other General Fund revenues. Capital Reserve funds are not legally restricted however, they have been designated by the Board to be used to fund capital improvements to the water system.
Capital Facility Charge	In 2005, the District retained Stantec to prepare a Capital Facility Charge Study, analyzing the impact of the development on certain capital facilities and to calculate impact fees based on that analysis. The methods used to calculate impact fees in the study were intended to satisfy all legal requirements. By law, impact fees can only be collected to cover the impact of new development on existing infrastructure. Impact fees cannot be used to correct "existing deficiencies." This fund is used to accumulate funds from new or proposed development to pay for Water System Capital Improvements needed to support new development.
Water Development Funds	The Water Development Fund is a sub-fund account for the receipt and the development portion of the Capital Facilities Charge. It is a restricted account.
ALT CDS Reserve	These funds are collected from properties within the wastewater zone at Auburn Lake trails subdivision that are connected to the community disposal system (CDS). Funds collected in this fund can only be used to inspect, monitor, operate, and maintain the wastewater collection and disposal system.
Grant and Loan Funding	Some projects are entirely or partially funded by grants, reimbursements, or loans from the State and federal government, as well as other agencies. Funding restrictions related to grant and loan funding can vary greatly, and each grant will have specific project restrictions related to the funding source.

IV. CIP Project List and Expenditures

The CIP includes projects that support the treatment and delivery of water throughout the District, upgrading infrastructure and improvements to existing water system; as well as collection and disposal of wastewater within the auburn Lake Trails subdivision. The District complies with all applicable local, state, and federal regulations related to water and wastewater. Funding for water projects is from water rates, property taxes bonds, grants, and development impact fees. Funding for wastewater projects is from fees collected from properties within the wastewater zone at Auburn Lake trails subdivision. The table below summarizes the funding source for projects by fiscal year.

The CIP consists of 23 projects, totaling approximately $8.2 million and constrained against $10.2 million of available funding over the next five years. All expenditures and revenues identified beyond Fiscal Year 2022/2023 have no direct fiscal impact at this time because the CIP is not a financial commitment by the Board, but rather a planning and forecasting tool.

Table 1 summarizes the CIP projects and expenditures by fiscal year. It includes values for loan repayment and does not represent total exposure. For example, the meter replacement loan amount is estimated to be $1.7 million. The monthly payment is listed under meter replacement. The total project cost is not listed in Table 1.

TABLE 1 – Project List

PROJECT	FY 22/23	FY 23/24	FY 24/25	FY 25/26	FY 26/27	TOTAL
Alternate Water Source Development	--	--	--	--	--	--
AMI Meter Infrastructure	100,000	100,000	100,000	100,000	100,000	500,000
Angel Camp Tank Recoating	--	366,800	--	--	--	366,800
Annual Canal Lining/ Canal Improvements	150,000	100,000	100,000	100,000	100,000	550,000
Asset Management Plan	48,350	16,350	16,350	16,350	16,350	113,750
CDS Wastewater Lift Station Upgrade	150,000	--	--	--	--	150,000
Infrastructure Replacement	225,000	10,000	10,000	10,000	10,000	265,000
Master Meters	100,000	--	--	--	--	100,000
Meter Replacement Project	97,458	97,458	97,458	97,458	97,458	487,290
North Fork American River Pumping Station Evaluation	--	--	--	--	--	--
Parshall Flume	20,000	--	--	--	--	20,000
Paving Repairs	20,000	20,000	20,000	20,000	20,000	100,000
Pressure Regulating Valves	100,000	100,000	100,000	100,000	100,000	500,000
Pressure Regulating Valves at SWTP	80,000					80,000
Pump Station Retrofit/Generator	50,000	12,000	12,000	12,000	12,000	98,000
Repair Safety Walkways	75,000	2,000	2,000	2,000	2,000	83,000
Replace Air Release Valves	20,000	10,000	10,000	10,000	10,000	60,000
Solar on Walton and Sweetwater	50,000	1,000,000	--	--	--	1,050,000
Sweet Water Treatment Plant 2-Million Gallon Water Tank	--	--	--	3,000,000	--	3,000,000
Treated Water Line Replacement	300,000	50,000	50,000	50,000	50,000	500,000
Tunnel Inspection and Lining	65,000	--	--	--	--	65,000
Water System Condition Assessment	--	--	--	--	--	--
Water Wheel for Ditch	150,000	--	--	--	--	150,000
Stumpy Meadows Hydroelectric	1,992,601	1,992,601				
TOTALS	1,800,808	1,884,608	517,808	3,517,808	517,808	8,238,840

Table 2 summarizes the funding by fiscal year.

TABLE 2 – Funding Source

Fund	FY 22/23	FY 22/23	FY 23/24	FY24/25	FY25/26	TOTAL
Capital Reserve	3,132,622	1,350,000	1,350,000	1,350,000	1,350,000	8,532,622
Capital Facility Charge Restricted	433,073					433,073
Water Development Fund	412,283					412,283
TOTAL	3,977,978	1,350,000	1,350,000	1,350,000	1,350,000	10,282,849
Grant Funds						
SRF Loans						

Table 3 provides a brief description of the projects, the total estimated cost, the estimated completion fiscal year, and the status.

TABLE 3 – Project Descriptions

PROJECT	DESCRIPTION	EST. COST	EST. COMPLETION	STATUS
Alternate Water Source Development	This would tie into the North Fork of the American River Pumping Plant. If that plan proves unfeasible then develop an alternate source.	--	--	Planned
AMI Meter Infrastructure	AMI (Advanced Metering Infrastructure) is a two-way communication system to collect detailed metering information throughout a utility's service industry. AMI is typically automated and allows real time, on-demand interrogations with metering endpoints.	500,000	FY 26/27	Proposed
Angel Camp Tank Recoating	Project will clean and recoat Angel Camp Storage Tank to maintain high water quality. It is necessary to recoat the tanks as needed to keep them from degrading and then needing to be replaced.	366,800	FY 23/24	Planned
Annual Canal Lining	Prioritized repair and lining of water conveyance canals and ditches. An additional $100,000 is allocated each fiscal year until 2025/2026. Canal lining is the cheapest options. If we piped the ditches, it would be more expensive initially but would save money in the long term due to maintenance costs. We would lose the natural fire break that the ditch provides either way.	550,000	FY 26/27	In Progress
Asset Management Plan	The purpose of the Asset Management Plan is to track, maintain and depreciate infrastructure for planned replacement.	113,750	FY 26/27	Proposed

Table 3 is continued on the following pages.

PROJECT	DESCRIPTION	EST. COST	EST. COMPLETION	STATUS
CDS Wastewater Lift Station Upgrade	Projects will include development of Water System Condition Assessment estimated at $250,000 and Asset Management Plan estimated at $80,000. This is the basis of a rate study and to be able to predict what future costs the district will need to pay.	150,000	FY 22/23	Planned
Infrastructure Replacement	Miscellaneous repairs/replacement projects.	65,000	FY 26/27	Proposed
Master Meters	The master meters are installed on the mains at the entrance to each subdivision to allow for the comparison of readings to the cumulative readings of all rate payer's meters in that area, as an indicator of lost water either through leaks or theft for that particular line.	100,000	FY 22/23	Proposed
Meter Replacement Project	The Automated Water Meter Replacement Project provides for the technology of automatically collecting consumption, diagnostic, and status data from devices with the ability to store and transfer data to a central database for billing purposes.	487,290	FY 26/27	In Progress
North Fork American River Pumping Station Evaluation	First phase of project would include water rights analysis, conceptual engineering design and evaluation of capital and operating costs. It is imperative to get another source of water. Having a single source puts the district in a very precarious position as we progress into drought conditions.	--	--	Planned
Parshall Flume Installation	Installation of a parshall flume, a fixed hydraulic structure n open channel flow metering device to measure the flow of surface waters and irrigation flows.			
Paving Repairs	Miscellaneous paving repairs as needed.	100,000	FY 26/27	In Progress
Pressure Regulating Valves	Projects will include replacement of pressure regulating valves. An additional $100,000 is allocated each fiscal year until 2025/2026. The valves regulate the pressure in the system and protect the system from events that could damage lines and rate payer's houses.	500,000	FY 26/27	In Progress
Pressure Regulating Valve Installation at SWTP	Installation of Pressure Regulating Valve at the Sweet Water Treatment Plant.	80,000	FY 22/23	Proposed
Pump Station Retrofit/Generator	Pump stations in the system pump water to a tank that supplies pressure to the rate payers. Many of these stations do not have generators and if the power is off the tanks will drain and the people on that will run dry. For fire resiliency it is imperative to ensure that the tanks can maintain pressure.	$98,000	FY 26/27	In Progress

PROJECT	DESCRIPTION	EST. COST	EST. COMPLETION	STATUS
Repair Safety Walkways	Install employee safety barriers at distribution, monitoring, and adjustment locations. Currently the walkways at some of the diversions and clean out locations are unsafe by OSHA standards and need to be fixed for insurance purposes and safety concerns with our crew.	83,000	FY 26/27	In Progress
Replace Air Release Valves	Projects will include replacement of air release valves. An additional $10,000 is allocated each fiscal year until 2025/2026.	60,000	FY 26/27	In Progress
Solar on Walton and Sweetwater	Install solar panels at the two water treatment plants.	1,050,000	N/A	Proposed
Sweet Water Treatment Plant 2-Million Gallon Water Tank	Install a two-million-gallon storage tank adjacent to Sweetwater Treatment Plant. This is primarily for fire protection and to provide back up for the Angel Camp tank that is there. Currently in the summer the Angel camp turns over multiple times a day and only has one pipe into it so cannot get recoated unless another tank is in place. We would bring this project as close as possible to shovel ready and seek grants.	3,000,000	FY 25/26	Planned
Treated Water Line Replacement	Replace/upgrade treated water pipeline segments which have experienced a high rate of failures and repairs in recent years. Two segments include Kit Fox Court and Angel Camp Court in Cool, totaling approximately 1,350 linear feet.	500,000	FY 26/27	In Progress
Tunnel Inspection and Lining	Inspect and line Tunnel Hill raw water conveyance tunnel. An additional $150,000 is allocated each fiscal year until 2025/2026. The last tunnel inspection was done over twenty years ago. All of the water that is used for residential and irrigation is conveyed through the tunnel. I am currently working with JPIA to get some insurance on the tunnel and to get the tunnel inspected for liability reasons. The lining would be dependent upon the report from the mining engineer that completed the inspection.	65,000	FY 22/23	Planned
Water System Condition Assessment	Projects will include development of Water System Condition Assessment estimated at $250,000 and Asset Management Plan estimated at $80,000. This is the basis of a rate study and to be able to predict what future costs the district will need to pay.	--		Planned
Water Wheel for Ditch Study	Conduct a study on the generation of energy through the installation of a water wheel in the ditches.	150,000	FY 22/23	Proposed

PROJECT MAP

The 2022/2023 CIP Map shows the location of the following projects:

A – Pump Station Retrofit

B – Infrastructure Replacement

C – Repair Safety Walkways

D – Treated Water Line Replacement

E – Lift Station Upgrade

F – Master Meters

G – Solar on Walton & Sweetwater Treatment Plants

H – Plant Pressure Relief Valves

Table 4 lists the projected five to ten-year CIP projects. The supporting documents, listed below, are provided to explain how the numbers in the table were calculated. The supporting documents include the following:

(1) El Dorado County Hydro Development Options Study, Section 7, July 2009
(2) Stumpy Meadows Hydroelectric Permit
(3) Georgetown Small Hydro Feasibility Report, December 2, 1981
(4) GDPUD Options to Increase Water Support Report, April 2009

TABLE 4 - Projected 5-to-10-year CIP

Projects	2027/2028	2028/2029	2029/2030	2030/2031	2031/2032	Total Cost
Kaiser Siphon Hydroelectric Average Income: $448,331/year	$7,000,000					$7,000,000
Sand Trap Siphon Hydroelectric Average Income: $140,752/year	$1,800,000					$1,800,00
Buffalo Hill Siphon Hydroelectric Average Income: $106,777/year	$1,600,000					$1,600,000
Stumpy Meadows Hydroelectric Average Income: $204,724/year	$3,985,203					$3,985203
Canyon Creek Reservoir	$28,800,000	$28,800,000	$28,800,000	$28,800,000	$28,800,000	$144,000,000
Treated Water Line Replacement	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$15,000,000
Enlarge Stumpy Meadows Reservoir	Further Investigation					
American River Pump Station and Tank and piping	$9,000,000	$9,000,000	$3,000,000	$5,000,000		$26,000,000
Line ditches	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$25,000,000
Construct Rubicon River Diversion Conveyance System from South Fork of the Rubicon to Pilot Creek upstream of Stumpy. 59 million with tunnel 28 million without.	$7,400,000	$7,400,000	$7,400,000	$7,400,000	$7,400,000	$37,000,000
TOTAL						$261,385,203

7.4.4 Sandtrap Siphon

PRIORITY:
Recommended for immediate implementation

PURVEYOR LEAD: GDPUD

Project Category: Feed-In Tariff

Design Head (ft): 137

Design Flow (cfs): 24

Nameplate capacity (kW): 230

Estimated Annual MWh/year: 1,130

Capital Cost to Construct (Estimated): $1,456,000

Photo 4 – Aerial of Walton Reservoir at the Outlet of Sandtrap Siphon

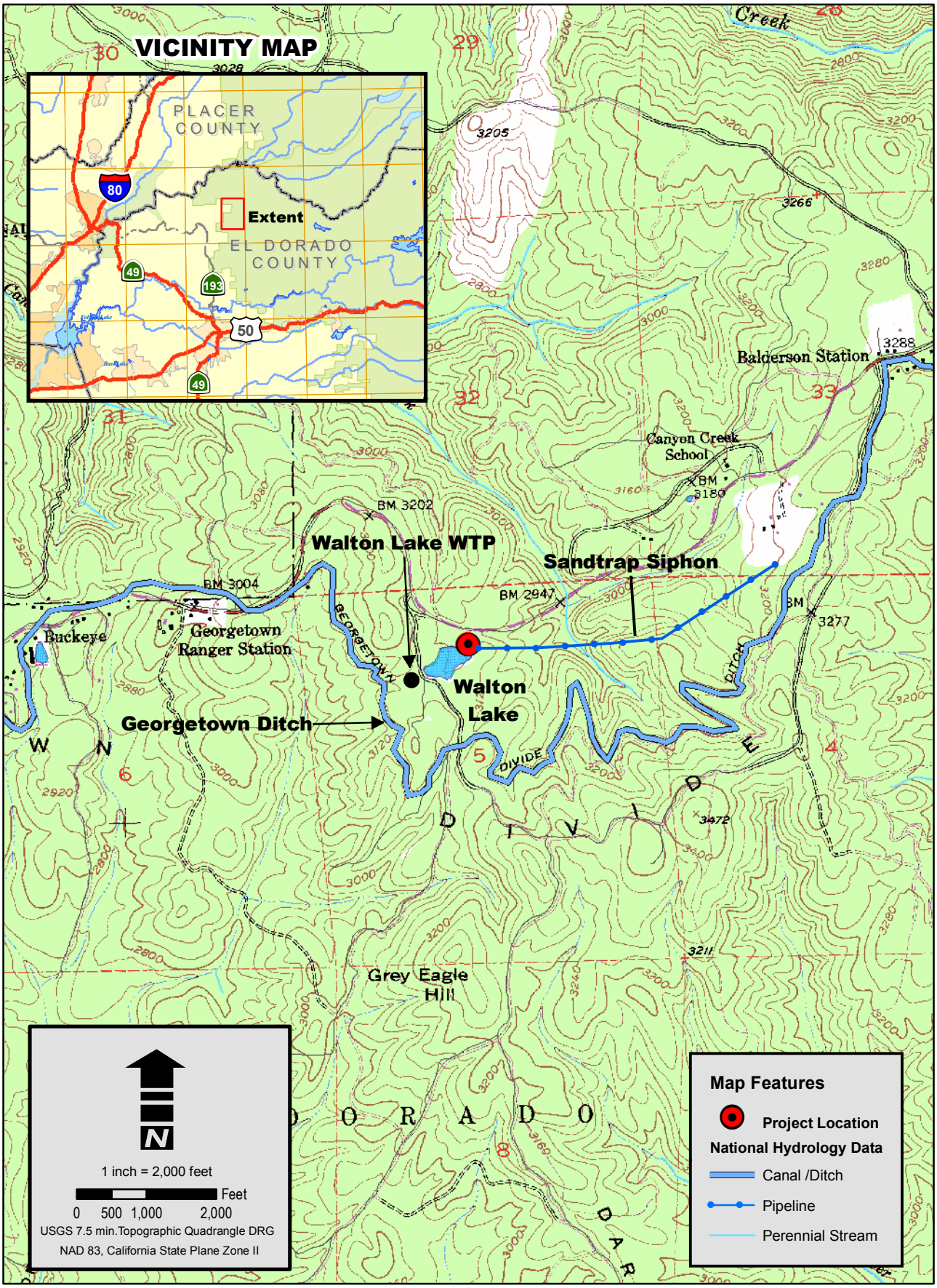
Annual Income: $140,752 (assumes 20-year FIT agreement with PG&E; annual revenues cannot be reasonably projected beyond the 20-year analysis period)

EXISTING FEATURES:

Avg. annual flow (cfs)	Distance to 3-phase Power (ft)	Pipeline (in.)	Access Road	Downstream Storage	Land Ownership
17	**500**	**36**	**Y**	**Y**	**GDPUD**

PROJECT DESCRIPTION:

As part of the Stumpy Meadows Project, the GDPUD diverts water at the Pilot Creek Diversion Dam and conveys it in the Georgetown Ditch. The Georgetown Ditch conveyance system includes the inverted Sandtrap Siphon located east of the town of Georgetown. The site is located adjacent to Walton Lake and the Walton Lake Water Treatment Plant, and is within land zoned as commercial. Access to the project is very good. The elevation at the site is approximately 3,100 feet. The project would likely occur within the existing GDPUD easement area, but may require adjacent landowner right-of-way. The Sandtrap hydro option would be located where the Sandtrap Siphon pipeline enters Walton Lake and would include a new 230 kW hydroelectric generating facility, consisting of three units – two fixed and one variable pumps operated as turbines that would collectively have a design flow of 24 cfs. A small powerhouse would be constructed near the Walton Lake shoreline to house the generating equipment. The average annual generation would be approximately 1,130 MWh.



Created By: Ethan Koenigs
Date: 07/22/09

Figure 7-4: Sandtrap Siphon Project Location and Vicinity

El Dorado County Hydroelectric Development Options

A. Existing Facilities

The siphon is a 36-inch diameter ductile iron pipeline. The pipe discharges into an energy dissipating structure to Walton Lake. Walton Lake is adjacent to the Walton Lake Water Treatment Plant. The total difference in elevation between the water surface at the entry to the siphon and at the exit from the siphon is about 140 feet. The existing water supply, Georgetown Ditch conveyance system, Sandtrap Siphon and energy dissipater would all be utilized with the Sandtrap option.

B. Project Facilities and Operation

The Sandtrap Siphon hydro option would be located where the Sandtrap Siphon pipeline enters Walton Lake and would include a new 230 kW hydroelectric generating facility, consisting of 3 units – two fixed and one variable pumps operated as turbines. The Sandtrap option is sized at 24 cfs capacity to capture most flows at this location that occur during the irrigation season. The maximum static head will be about 140 feet. The operating head is variable dependent on flow rate, but is expected to average about 120 feet.

The project would utilize the existing Sandtrap Siphon and therefore would not require construction of a new pipeline. A "Y" would be installed immediately upstream of the existing energy dissipating structure to divert water to the units. The pipe to the power plant would be about 24 inches in diameter with a 24-inch shut-off valve. A small powerhouse would be constructed near the Walton Lake shoreline to house the generating equipment. Release from the energy dissipater would flow through the powerhouse foundation structure. The 24-inch segment of the "Y" would discharge through the turbine with the outlet discharging directly into Walton Lake.

The Engineer's Preliminary Estimate of Probable Costs in Appendix A identifies the project components, costs, and related assumptions. A typical layout has been developed for this station and is presented in Appendix A.

C. Estimated Generation

The maximum flow expected to occur is during the irrigation season, from about May 1 through October 1 of each year, at about 30 cfs. Flows during the winter months will vary between about 3 and 10 cfs depending on water demands, availability and operational requirements.

Flow records were examined to determine typical flow releases that would be available for hydropower generation. Average power generation is estimated based on available water, head, efficiency, loss estimates and typical operation. Appendix B provides a detailed breakdown of the flow and generation estimates for this hydro option.

Table 7-8: Sandtrap Siphon Powerhouse Flow and Generation

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Projected Average Flow Through Sandtrap Siphon Powerhouse													
CFS	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**30**	**30**	**30**	**30**	**30**	**17**
AF	400	400	400	400	300	400	400	1,800	1,800	1,800	1,800	1,800	11,800
Projected Average Power Generation of Sandtrap Siphon													
MWh	45	44	45	45	41	45	44	167	162	167	167	162	1,130

D. Anticipated Regulatory Approvals and Permits

The table below summarizes the anticipated environmental approvals and permits. A detailed discussion of environmental, regulatory, and other permitting requirements is provided in Appendix C.

Table 7-9: Sandtrap Siphon Anticipated Regulatory Approvals

Agency	Permit/Approval	Expected Agency Review Time (months)
GDPUD	CEQA LEAD AGENCY	
	CEQA Exemption	2 to 4
FERC	FPA/NEPA LEAD AGENCY	
	In-conduit exemption	18
	Small Generator Interconnection Agreement	6
El Dorado County	Air Quality/Emergency Response/ Building	2 to 4
SWRCB	Clean Water Act (CWA) Section 401	4 to 6
RWQCB	CWA Section 402	4 to 6
CEC	RPS FIT Pre-certification and Certification	2 to 3 for each certification

E. Project Economics

Appendix A provides a detailed cost breakdown for project planning, design, permitting, and construction and operation. The construction costs were escalated to 2011, and include a 5 percent/year factor for interest during construction.

Project costs are expected to consist of the annual debt service paid (principal and interest) to finance the project and incremental O&M and replacement costs attributable to the power generation portion of the broader water project. Based on the financing parameters identified earlier – 30-year term, 6.0 percent annual interest, $1,456,000 total capital cost – the annual debt service is estimated at $107,363. The annual cost of generation is the sum of the annual debt service and the annual O&M and replacement cost ($16,066) and is estimated at $123,429.

Based on the project characteristics, it is eligible to enter into a FIT contract with PG&E. For this analysis, it is assumed that the project enters into a 20-year contract that initiates delivery in 2011 and receives energy payments based on PG&E’s TOD factors. Under these conditions, the project would receive an annual average of $124.56 per MWh delivered. The project is expected to deliver 1,130 MWh per year. Applying TOD multipliers result in gross revenues of $140,752.

F. Conclusion/Recommendation

Table 7-1 provides a summary and Appendix B provides a detailed breakdown of the annual cash flow and economic analysis for this project. The economic analyses show this project to be viable, even without potential reoperation and other considerations that are expected to improve the economic characteristics of this project; therefore, this hydro option is recommended for immediate implementation.

7.4.5 Buffalo Hill Siphon

PRIORITY:
Recommended for reoperation study

PURVEYOR LEAD: GDPUD

Project Category: Feed-In Tariff

Design Head (ft): 141

Design Flow (cfs): 20

Nameplate capacity (kW): 170

Estimated Annual MWh/year: 860

Capital Cost to Construct (Estimated): $1,284,000

Photo 5 – Outlet Structure at Buffalo Hill

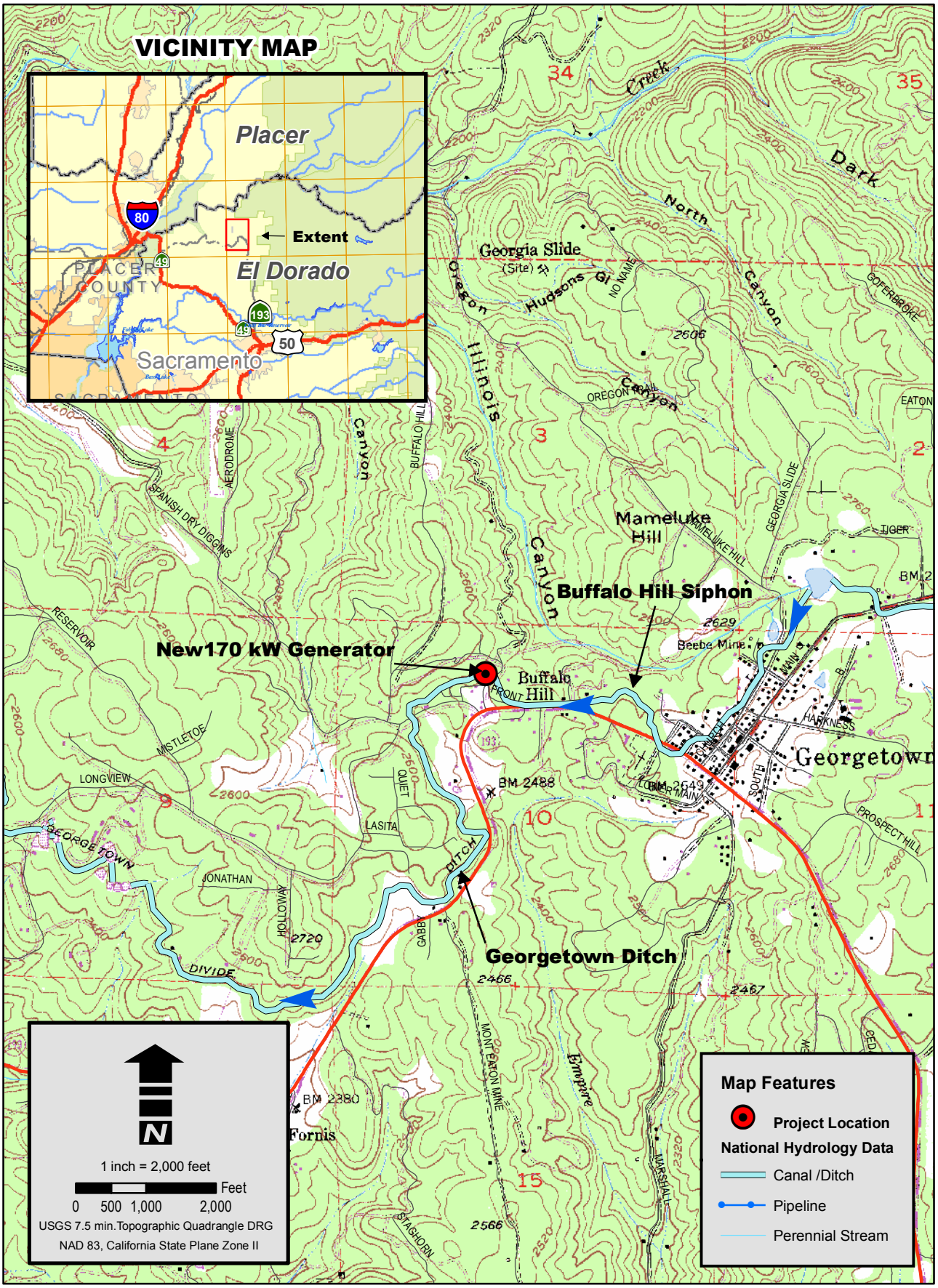
Annual Income: $106,777 (assumes 20-year FIT agreement with PG&E; annual revenues cannot be reasonably projected beyond the 20-year analysis period)

EXISTING FEATURES:

Avg. annual flow (cfs)	Distance to 3-phase Power (ft)	Pipeline (in.)	Access Road	Downstream Storage	Land Ownership
15	**300**	**24**	**Y**	**N**	**GDPUD**

PROJECT DESCRIPTION:

The Buffalo Hill inverted siphon is located on the Georgetown Ditch conveyance system just north of the town of Georgetown, near Highway 193. The Buffalo Hill Siphon hydro option would capture the energy available at the existing 24-inch Buffalo Hill Siphon with a 170 kW hydroelectric generating facility located near the energy dissipating structure at the terminus of the siphon. The project would be sized for a maximum flow of 20 cfs, which approximates the peak flows between May and October. Annual flows are expected to average 12 cfs due to lower demand in the winter. The operating head would be variable, depending on flow rate, but is expected to average about 115 feet (141 feet max.). The project would operate using existing and future water supplies required by the GDPUD distribution system. No reoperation of the Stumpy Meadows Project or the Georgetown Ditch is expected. The average annual generation expected from the Buffalo Hill Siphon option is about 860 MWh.



Created By: Ethan Koenigs
Date: 06/29/09

Figure 7-5: Buffalo Hill Siphon Project Location and Vicinity

A. Existing Facilities

The siphon is a 24-inch diameter ductile iron pipeline that is buried with concrete thrust blocks and rated at 350 psi. The fittings are rated at 250 psi. The pipe is about 5,400 feet (1 mile) long and terminates with a 14-inch diameter butterfly valve shut-off which discharges into an energy dissipating structure near Buffalo Hill. The total difference in elevation between the water surface at the entry to the siphon and at the exit from the siphon is about 145 feet. The existing water supply, Georgetown Ditch conveyance system, Buffalo Hill Siphon and energy dissipater would all be utilized with the Buffalo Hill Siphon hydro option.

B. Project Facilities and Operation

The Buffalo Hill hydro option would be located immediately adjacent to and downstream from the existing energy dissipating structure and would include a new 170 kW hydroelectric generating facility, consisting of three units – two fixed and one variable PAT. The maximum static head of the Buffalo Hill unit will be about 145 feet. The operating head is variable dependent on flow rate, but is expected to average about 115 feet.

The project would utilize the existing Buffalo Hill Siphon and therefore would not require construction of a new pipeline. A "Y" would be installed immediately upstream of the exiting butterfly valve to divert water to the hydro unit. The segment to the power plant would be 16 inches in diameter with a 16-inch shut-off valve. A small powerhouse would be constructed to house the generating equipment. The powerhouse turbines would discharge flows through the foundation structure, with the outlet discharging directly into the ditch.

The Engineer's Preliminary Estimate of Probable Costs in Appendix A identifies the project components, costs, and related assumptions. A typical layout has been developed for this station and is presented in Appendix A.

C. Estimated Generation

The maximum flow is expected during the irrigation season, from about May 1 through October 1 of each year, at about 20 cfs. Flows during the winter months will vary between about 3 and 10 cfs depending on water demands, availability and operational requirements.

Average power generation at the Buffalo Hill powerhouse is estimated based on available water, head, efficiency, loss estimates and typical operation. The average monthly and annual powerhouse flow and generation expected to be available is shown below. Appendix B provides a detailed breakdown of the flow and generation estimates for this hydro option.

Table 7-10: Buffalo Hill Siphon Powerhouse Flow and Generation

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Projected Average Flow Through Buffalo Hill Siphon Powerhouse													
CFS	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**20**	**20**	**20**	**20**	**20**	**12**
AF	400	400	400	400	300	400	400	1,200	1,200	1,200	1,200	1,200	8,700
Projected Average Power Generation of Buffalo Hill Siphon													
MWh	37	36	37	37	34	37	36	121	117	121	121	117	850

D. Anticipated Regulatory Approvals and Permits

The table below summarizes the anticipated environmental approvals and permits. A detailed discussion of environmental, regulatory, and other permitting requirements is provided in Appendix C.

Table 7-11: Buffalo Hill Siphon Anticipated Regulatory Approvals

Agency	Permit/Approval	Expected Agency Review Time (months)
GDPUD	CEQA LEAD AGENCY	
	CEQA Exemption	2 to 4
FERC	FPA/NEPA LEAD AGENCY	
	In-conduit Exemption	18
	Small Generator Interconnection Agreement	6
El Dorado County	Air Quality/Emergency Response/Building	2 to 4
CEC	RPS FIT Pre-certification and Certification	2 to 3 for each Certification

E. Project Economics

Appendix A provides a detailed cost breakdown for project planning, design, permitting, and construction and operation. The construction costs were escalated to 2011, and include a 5 percent factor/year for interest during construction.

Project costs are expected to consist of the annual debt service paid (principal and interest) to finance the project and incremental O&M and replacement costs attributable to the power generation portion of the broader water project. Based on the financing parameters identified earlier - 30-year term, 6.0 percent annual interest, $1,284,000 total capital cost – the annual debt service is estimated at $94,680. The annual cost of generation is the sum of the annual debt service and the annual O&M and replacement costs ($14,888) and is estimated at $109,568.

Based on the project characteristics, it is eligible to enter into a FIT contract with PG&E. For this preliminary analysis, it is assumed that the project enters into a 20-year contract that initiates delivery in 2011 and receives energy payments based on PG&E’s TOD factors. Under these conditions, the project would receive an annual average of $124.16 per MWh delivered. The project is expected to deliver 860 MWh per year. Applying TOD multipliers result in gross revenues of $106,777.

F. Conclusion/Recommendation

Table 7-1 provides a summary and Appendix B provides a detailed breakdown of the annual cash flow and economic analysis for this project. The Buffalo Hill Siphon hydro option shows a negative cash flow under 20-year financing, and has a slightly negative cash flow under 30-year financing. Reoperation of flows through this site with new water system storage could concentrate generation during peak periods when FIT energy values increase from about 10 to 100 percent. Estimated deficits could be outweighed by the corresponding increases in revenues; therefore, this hydro option is recommended for a reoperation study.

7.4.6 Kaiser Siphon

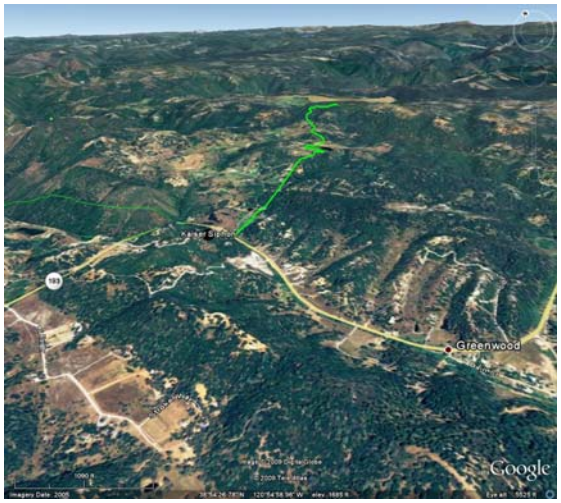


Photo 6 – Aerial of Approximate Pipeline Alignment (shown in green)

PRIORITY:
Recommended for immediate implementation

PURVEYOR LEAD: GDPUD

Project Category: FIT (to be confirmed)

Design Head (ft): 668

Design Flow (cfs): 15

Nameplate capacity (kW): 580

Estimated Annual MWh/year: 3,638

Capital Cost to Construct (Estimated): $5,172,000 (includes 8,000-foot pipeline)

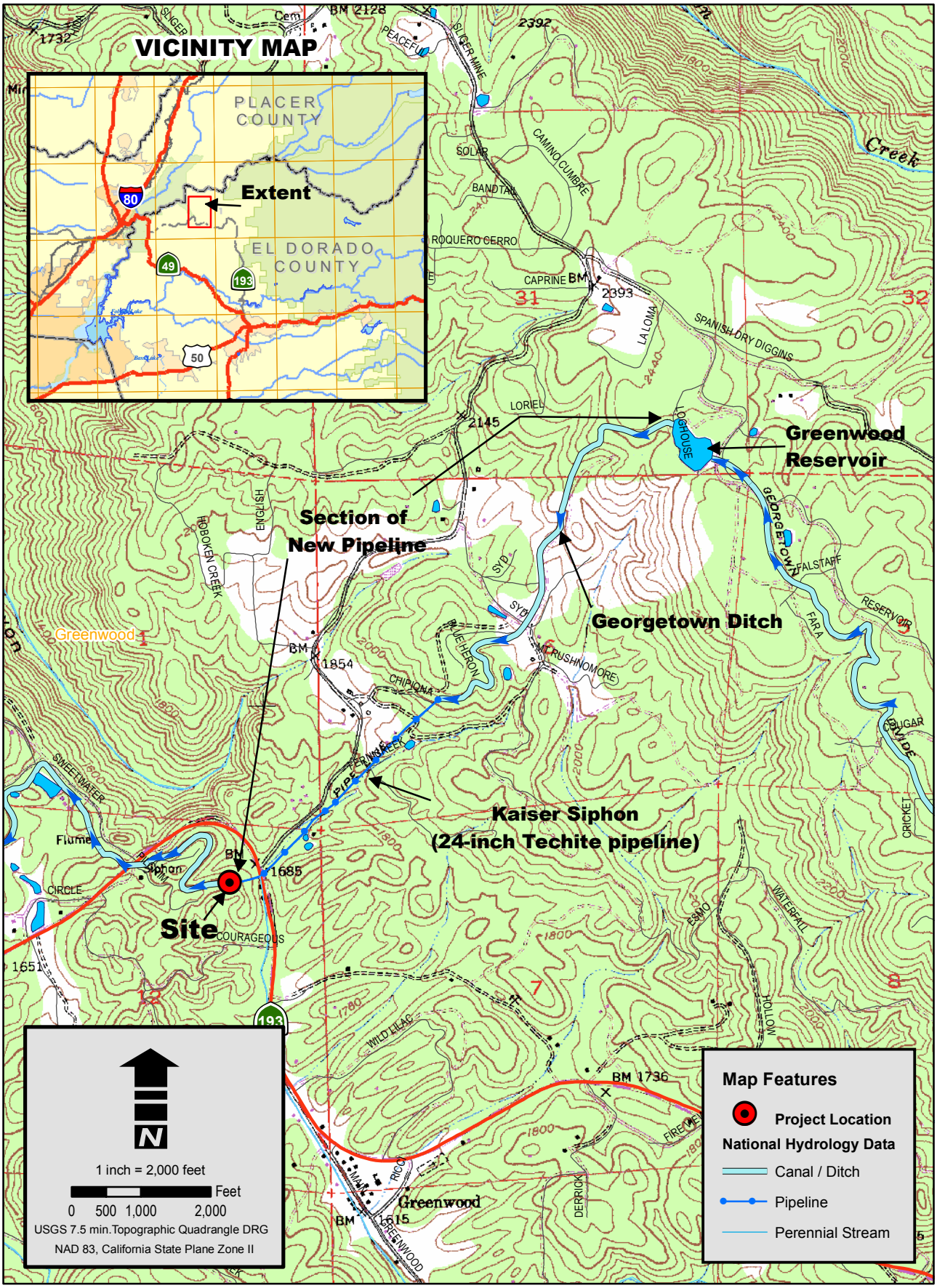
Annual Income: $448,331 (assumes 20-year FIT agreement with PG&E; annual revenues cannot be reasonably projected beyond the 20-year analysis period)

EXISTING FEATURES:

Avg. annual flow (cfs)	Distance to 3-phase Power (ft)	Pipeline (in.)	Access Road	Downstream Storage	Land Ownership
10	**1,200**	**24**	**Y**	**N**	**GDPUD/Priv.**

PROJECT DESCRIPTION:

The Kaiser inverted siphon is located on the Georgetown Ditch conveyance system near Highway 193 just north of Greenwood, near the Auburn Lake Trails Water Treatment Plant. The existing siphon is a 24-inch diameter buried pipeline that flows to an energy dissipater at its terminus. This project option includes replacing an existing reinforced plastic mortar (Techite) pipe and an open channel section upstream of the siphon with new, 24-inch diameter pipe, for a total distance of 8,000 feet. The extended pipe provides for a significant increase in available head and resulting project benefit. The proposed 580 kW generating facility would be located immediately adjacent to and downstream from the existing energy dissipating structure. The project is sized for an estimated maximum flow of 15 cfs, which would occur between May and October. Annual flows are expected to average 10 cfs due to lower demand in the winter. The operating head would be variable, depending on flow rate, but is expected to average about 540 feet. The proposed project would operate using existing and future water supplies required by the GDPUD distribution system. No reoperation of the Stumpy Meadows Project or the Georgetown Ditch is expected. The average annual generation expected from the Kaiser Siphon hydroelectric project is about 3,600 MWh.



Created By: Ethan Koenigs
Date: 06/29/09

Figure 7-6: Kaiser Siphon Project Location and Vicinity

El Dorado County Hydroelectric Development Options

A. Existing Facilities

The existing water supply, Pilot Creek Diversion Dam, Georgetown Ditch conveyance system, Kaiser Siphon and energy dissipater would all be utilized with the Kaiser Siphon hydro option. Three-phase distribution voltage level power lines are within about 1,200 feet of the site for project interconnection. The Kaiser Siphon is primarily a steel 24-inch diameter pipe. A section of the existing pipeline is reinforced plastic mortar (Techite) pipeline. This pipe material is prone to failure and would be replaced with high pressure rated pipeline to accommodate the Kaiser Siphon hydro project.

B. Project Facilities and Operation

Currently, the Georgetown Ditch flows as an open channel from Greenwood Reservoir to the Kaiser Siphon. This project option would include piping this section plus the section of Techite pipe, about 8,000 feet (1.5 miles) total distance. This would significantly increase head and resulting project generation. A pipe size of about 24 inches would be necessary to maintain capacity of the ditch in this section. The total difference in elevation between the water surface at the entry to the proposed new pipeline and the exit from the existing Kaiser Siphon is about 675 feet.

The project would include a 580 kW generating facility, which is sized for an estimated maximum flow of 15 cfs. The operating head is variable dependent on flow rate but will be expected to average about 540 feet.

There would be a water reliability benefit by replacing the Techite pipe as well as a possible water conservation component of this project for losses in this section of the Georgetown Ditch conveyance system.

The Engineer's Preliminary Estimate of Probable Costs in Appendix A identifies the project components, costs, and related assumptions. A typical layout has been developed for this station and is presented in Appendix A.

C. Estimated Generation

The maximum flow expected to occur is during the irrigation season, from about May 1 through October 1 of each year, at about 15 cfs. Flows during the winter months will vary between about 3 and 10 cfs depending on water demands, availability and operational requirements.

Flow records were examined to determine typical flow releases that would be available for hydropower generation at the Kaiser Siphon. Average power generation at the Kaiser Siphon powerhouse is estimated based on available water, head, efficiency, loss estimates and typical operation. The average monthly and annual powerhouse flows and generation expected to be available is estimated in Table 7-12 below. Appendix B provides a detailed breakdown of the flow and generation estimates for this hydro option.

Table 7-12: Kaiser Siphon Powerhouse Flow and Generation

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Projected Average Flow Through Kaiser Siphon Powerhouse													
CFS	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**15**	**15**	**15**	**15**	**15**	**10**
AF	400	400	400	400	300	400	400	900	900	900	900	900	7,200
Projected Average Power Generation of Kaiser Siphon Powerhouse													
MWh	196	190	196	196	177	196	190	466	451	466	466	451	3,600

D. Anticipated Regulatory Approvals and Permits

The table below summarizes the anticipated environmental approvals and permits. A detailed discussion of environmental, regulatory, and other permitting requirements is provided in Appendix C.

Table 7-13: Kaiser Siphon Anticipated Regulatory Approvals

Agency	Permit/Approval	Expected Agency Review Time (months)
GDPUD	CEQA LEAD AGENCY	
	Mitigated Negative Declaration Process	10 to 14
FERC	FPA/NEPA LEAD AGENCY	
	Small Hydro Exemption/ Environmental Assessment (EA) Processes	18 to 20
	Small Generator Interconnection Agreement	6
U.S. Army Corps of Engineers (USACE)	CWA Section 404	4 to 6
USFWS	Federal Endangered Species Act (ESA)	2 to 4
SWRCB	CWA Section 401	4 to 6
RWQCB	CWA Section 402	4 to 6
CDFG	Section 1600 et seq.; CA ESA	4 to 6
State Historic Preservation Officer (SHPO)	National Historic Preservation Act (NHPA) Section 106	4 to 6
California Department of Transportation (Caltrans)	Hwy 193 Encroachment	2 to 4
El Dorado County	Air Quality/Emergency Response/Building	4 to 6
CEC	RPS FIT Pre-certification and Certification	2 to 3 for each certification

E. Project Economics

Appendix A provides a detailed cost breakdown for project planning, design, permitting, and construction and operation. The construction costs were escalated to 2011, and include a 5 percent/year factor for interest during construction.

Project costs are expected to consist of the annual debt service paid (principal and interest) to finance the project and incremental O&M and replacement costs attributable to the power generation portion of the broader water project. Based on the financing parameters identified earlier - 30-year term, 6.0 percent annual interest, $5,172,000 total capital cost – the annual debt service is estimated at $381,376. The annual cost of generation is the sum of the annual debt service and the annual O&M and replacement costs ($30,082) and is estimated at $411,458.

The above cost estimate and debt service assume that all identified costs are attributable to the hydro project. However, GDPUD has identified a prior need to replace sections of existing pipe for reliability purposes. It could be argued that the pipeline replacement and certain other costs therefore should not be part of the hydro project option economic analyses. Further information is needed on what costs should be assigned to the hydro option. This information could affect the hydro option's permitting requirements, potential financing with CREBs, and eligibility for a FIT from PG&E.

In addition to the above, if the pipeline is deemed part of the hydro option, then additional investigation is required to confirm that the project does not alter the amount, timing, or quality of stream flows that could be affected by the hydro option. If it does, then the project would not qualify for the FIT contract and GDPUD should reconsider the Kaiser Siphon minor pipeline hydro option as it is expected to meet FIT conditions.

For this analysis, it is assumed that the project entered into a 20-year FIT contract that initiates delivery in 2011 and receives energy payments based on PG&E's TOD factors. Under these conditions, the project would receive an annual average of $123.23 per MWh delivered. The project is expected to deliver 3,638 MWh per year. Applying TOD multipliers result in gross revenues of $448,331.

F. Conclusion/Recommendation

Table 7-1 provides a summary and Appendix B provides a detailed breakdown of the annual cash flow and economic analysis for this project. Of the top 10 hydro options, this project has the greatest estimated generation potential with a significant revenue stream. The multiple benefits with a substantial net present value support the immediate implementation of this project, especially considering the project's ability to carry the added cost burden of the 8,000-foot pipeline.

STATE OF CALIFORNIA
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
STATE WATER RESOURCES CONTROL BOARD

ORDER WR 2013-0059-EXEC

In the Matter of Permit 18593 (Application 27174)
Georgetown Divide Public Utility District

ORDER APPROVING PETITION FOR EXTENSION OF TIME

SOURCE: Pilot Creek

COUNTY: El Dorado

BY THE BOARD:

1. The State Water Resources Control Board (State Water Board), Division of Water Rights (Division) issued Permit 18593 to Georgetown Divide Public Utility District (Permittee) on September 24, 1982, pursuant to Application 27174.

2. The permit requires that construction work be completed by December 1, 1985, and that the water be applied to the authorized use by December 1, 1986.

3. Permittee requested, and has received two prior time extensions. On December 17, 1985 and on March 24, 2000, the Division granted extensions of time to commence or complete construction work or apply the water to full beneficial use. The 2000 time extension order required that water be fully used by December 31, 2010.

4. On December 23, 2010, Permittee filed a petition for an extension of time within which to commence or complete construction work or apply water to beneficial use. The required fee was submitted.

5. Permittee constructed the Stumpy Meadows Dam and Reservoir Project in the early 1960's. The Permittee's project is a multi-purpose facility currently used for consumptive purposes of use under other appropriative water rights issued by the State Water Board. Permittee has constructed the penstock necessary to convey water to a hydroelectric generator.

   Other than the hydroelectric generation plant itself, Permittee has constructed the necessary facilities, but could not transmit electricity before Pacific Gas & Electric (PG&E) or another electrical company constructs a transmission line to or near Stumpy Meadows Dam.

6. State policy (Executive Order S-21-09) favors increasing the amount of electricity generated from renewable resources.

7. The petition was not noticed. (tit. 23, CCR § 843).

8. The State Water Board may grant an extension of time within which to commence or complete construction work or apply water to beneficial use upon a showing of good cause. (Wat. Code, § 1398.) Permittee must show that (1) due diligence has been exercised; (2) failure to comply with previous time requirements has been occasioned by obstacles which could not be reasonably avoided; and (3) satisfactory progress will be made if an extension of time is granted. Lack of finances, occupation with other work, physical disability, and other conditions incident to the person and not to the enterprise will not generally be accepted as good cause for delay.

9. Permittee has shown that due diligence has been exercised. The multi-purpose reservoir project and penstock have been built.

10. Permittee has shown that failure to comply with previous time requirements has been occasioned by obstacles that could not be reasonably avoided. Permittee is waiting for PG&E to construct electrical transmission lines to, or near, Stumpy Meadows Dam.

11. Permittee has shown that satisfactory progress will be made if a time extension is granted. Permittee has indicated that it will timely install the hydroelectric generator once an electrical transmission line is available to convey the power. All other facilities are existing, including the penstock.

12. Permittee has shown good cause for the time extension.

13. Pursuant to Resolution No. 2002-0104, the State Water Board has delegated authority to the Executive Director to conduct and supervise the activities of the State Water Board.

14. Pursuant to Resolution No. 2012-0029, the State Water Board has delegated authority to the Deputy Director to administer the duties required under the California Environmental Quality Act (CEQA). (Resolution No. 2012-0029, section 4.10.) Resolution No. 2012-0029 authorizes the Deputy Director to redelegate this authority to the Assistant Deputy Director for Water Rights. This authority has been so redelegated.

15. The project does not involve the expansion of the amount of water that Permittee may divert and use at the Stumpy Meadows Dam. The water currently used for consumptive purposes will be routed through the existing penstock for power generation. There will be no expansion in an existing use. Accordingly, the project is exempt from CEQA under California Code of Regulations, title 14, section 15061, subdivision (b). The Division will file a Notice of Exemption in accordance with the California Code of Regulations, title 14, section 15062 after issuance of this order.

16. A term has been added to require measurement of water diverted under the permit to comply with Water Code section 1605.

17. In addition to any obligation the State Water Board may have under CEQA, the State Water Board has an independent obligation to consider the effect of the proposed project on public trust resources and to protect those resources where feasible. (*National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419 [189 Cal.Rptr. 346, 658 P.2d 709].) There is no evidence that the time extension will have any adverse impacts on public trust resources.

NOW, THEREFORE, IT IS ORDERED THAT THE STATE WATER BOARD HEREBY APPROVES THE PETITION FOR EXTENSION OF TIME. THE ATTACHED AMENDED PERMIT, WHICH INCORPORATES THE TIME EXTENSION, IS ISSUED.

STATE WATER RESOURCES CONTROL BOARD

Thomas Howard

Thomas Howard
Executive Director

Dated: 11/12/13

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board

In Reply Refer to:
KDM:A027174

Mr. Henry White
Georgetown Divide Public Utility District
P.O. Box 4240
Georgetown, CA 95634

Dear Mr. White:

AMENDED WATER RIGHT PERMIT 18593 (APPLICATION 27174), PILOT CREEK IN EL DORADO COUNTY

Your petition has been approved and the requested extension of time has been incorporated in the enclosed water right. All previous versions of the water right have been superseded by the present version of the water right. The amended water right may be viewed at: http://www.waterboards.ca.gov/water_issues/programs/ewrims/license_search.shtml

The amended water right includes conditions based on any of the following which are applicable to this project: (1) protest resolution; (2) mitigation measures based on any California Environmental Quality Act document and/or public trust evaluation prepared for the petition; (3) standard terms related to (a) continuing authority and water quality (Cal. Code Regs., tit. 23, § 780 (a), (b)), (b) threatened and endangered species, and (c) archeology; and (4) previous water rights or orders of the State Water Resources Control Board. Due to changes in format, the amended water right may have different term numbering than the original water right. Please make sure that you have reviewed the amended water right and understand your obligations.

If you require further assistance, I can be reached at (916) 341-5363 or Kathy.mrowka@waterboards.ca.gov. Written correspondence or inquiries should be addressed as follows: State Water Resources Control Board, Division of Water Rights, Attn: Katherine Mrowka, P.O. Box 2000, Sacramento, CA, 95812-2000.

Sincerely,

for Katherine Mrowka, Senior
Inland Streams Unit
Division of Water Rights

Enclosures: (1) Amended Permit; (2) Order

STATE OF CALIFORNIA
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
STATE WATER RESOURCES CONTROL BOARD

DIVISION OF WATER RIGHTS

RIGHT TO DIVERT AND USE WATER

APPLICATION 27174 PERMIT 18593

Right Holder: Georgetown Divide Public Utility District
P.O. Box 4240
Georgetown, CA 95634

The State Water Resources Control Board (State Water Board) authorizes the diversion and use of water by the right holder in accordance with the limitations and conditions herein SUBJECT TO PRIOR RIGHTS. The priority of this right dates from **September 24, 1982**. This right is issued in accordance with the State Water Board delegation of authority to the Deputy Director for Water Rights (Resolution 2012-0029) and the Deputy Director for Water Rights redelegation of authority dated July 6, 2012. This right supercedes any previously issued right on **Application 27174**.

Right holder is hereby granted a right to divert and use water as follows:

1. Source of water: **Pilot Creek**

tributary to: **Rubicon River thence Middle Fork American River thence American River**

within the County of **El Dorado**

2. Location of point of diversion

By California Coordinate System of 1983 in Zone 2	40-acre subdivision of public land survey or projection thereof	Section	Township	Range	Base and Meridian
Stumpy Meadows Dam **North 2,094,086 feet and East 6,958,561 feet**	**SE ¼ of NW ¼**	**11**	**12N**	**12E**	**MD**

3. Purpose of use	4. Place of use					
	40-acre subdivision of public land survey or projection thereof	Section (Projected)*	Township	Range	Base and Meridian	Acres
Power	**SE ¼ of NW ¼**	**11**	**12N**	**12E**	**MD**	

The place of use is shown on map filed with the State Water Board.

5. The water appropriated under this right shall be limited to the quantity which can be beneficially used and shall not exceed **50 cubic feet per second** by direct diversion to be diverted from November 1 of each year to August 1 of the succeeding year. The maximum amount diverted under this right shall not exceed **27,174 acre-feet per year.**

(0000005A)

6. Construction work and complete application of the water to the authorized use shall be prosecuted with reasonable diligence and completed by December 31, 2023.

(0000009)

7. Water diverted under this right is for nonconsumptive use and is to be released to Pilot Creek within SE ¼ of NW ¼ of Section 11, T12N, R12E, MDB&M.

(0000111)

8. The total quantity diverted under this permit, together with that diverted under permit or license issued pursuant to Application 12421, shall not exceed 50 cubic feet per second.

(0000114)

9. All rights and privileges to appropriate water for power purposes under this right are subject to depletions resulting from future upstream appropriation for domestic and stockwatering uses within the watershed. Such rights and privileges under this water right may also be subject to future upstream appropriations for uses within the watershed other than domestic and stockwatering if and to the extent that the Board determines, pursuant to Water Code Sections 100 and 275, that the continued exercise of the appropriation for power purposes is unreasonable in light of such proposed uses. Any such determination shall be made only after notice to right holder of an application for any such future upstream appropriation and the opportunity to be heard; provided, that a hearing, if requested, may be consolidated with the hearing on such applications.

(000000I)

10. During the season specified in this permit, the total quantity and rate of water diverted and used under this right and under right holder's existing right for the place of use specified in this right shall not exceed the quantity and rate of diversion and use specified in this right. If the right holder's claimed existing right is quantified at some later date as a result of an adjudication or other legally binding proceeding, the quantity and rate of diversion and use allowed under this right shall be the net of the face value of this right less the amounts of water available under the existing right.

Right holder shall forfeit all rights under this permit or license if right holder transfers all or any part of the claimed existing right for the place of use covered by this permit or license to another place of use without the prior approval of the State Water Board.

Right holder shall take and use water under the existing right claimed by right holder only in accordance with law.

(0000021)

THIS RIGHT IS ALSO SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS:

A. Right holder is on notice that: (1) failure to timely commence or complete construction work or beneficial use of water with due diligence, (2) cessation or partial cessation of beneficial use of water, or (3) failure to observe any of the terms or conditions of this right, may be cause for the State Water Board to consider revocation (including partial revocation) of this right. (Cal. Code Regs., tit. 23, § 850.)

(0000016)

B. Right holder is on notice that when the State Water Board determines that any person is violating, or threatening to violate, any term or condition of a right, the State Water Board may issue an order to that person to cease and desist from that violation. (Wat. Code, § 1831.)

(0000017)

C. Right holder is not authorized to make any modifications to the location of diversion facilities, place of use or purposes of use, or make other changes to the project that do not conform with the terms and conditions of this right, prior to submitting a change petition and obtaining approval of the State Water Board.

(0000018)

D. Once the time to develop beneficial use of water ends under this permit, right holder is not authorized to increase diversions beyond the maximum annual amount diverted or used during the authorized development schedule prior to submitting a time extension petition and obtaining approval of the State Water Board.

(0000019)

E. Only the amount of water applied to beneficial use during the authorized diversion season, as determined by the State Water Board, shall be considered when issuing a license. (Wat. Code, § 1610.)

(0000006)

F. Right holder shall maintain records of the amount of water diverted and used under this right to enable the State Water Board to determine the amount of water that has been applied to beneficial use.

(0000015)

G. Right holder shall promptly submit any reports, data, or other information that may reasonably be required by the State Water Board, including but not limited to documentation of water diversion and use under this right and documentation of compliance with the terms and conditions of this right.

(0000010)

H. No water shall be diverted under this right unless right holder is operating in accordance with a compliance plan, satisfactory to the Deputy Director for Water Rights. Said compliance plan shall specify how right holder will comply with the terms and conditions of this right. Right holder shall comply with all reporting requirements in accordance with the schedule contained in the compliance plan.

(0000070)

I. Right holder shall grant, or secure authorization through right holder's right of access to property owned by another party, the staff of the State Water Board, and any other authorized representatives of the State Water Board the following:

1. Entry upon property where water is being diverted, stored or used under a right issued by the State Water Board or where monitoring, samples and/or records must be collected under the conditions of this right;

2. Access to copy any records at reasonable times that are kept under the terms and conditions of a right or other order issued by State Water Board;

3. Access to inspect at reasonable times any project covered by a right issued by the State Water Board, equipment (including monitoring and control equipment), practices, or operations regulated by or required under this right; and,

4. Access to photograph, sample, measure, and monitor at reasonable times for the purpose of ensuring compliance with a right or other order issued by State Water Board, or as otherwise authorized by the Water Code.

(0000011)

J. This right shall not be construed as conferring right of access to any lands or facilities not owned by right holder.

(0000022)

K. All rights are issued subject to available flows. Inasmuch as the source contains treated wastewater, imported water from another stream system, or return flow from other projects, there is no guarantee that such supply will continue.

(0000025)

L. This right does not authorize diversion of water dedicated by other right holders under a senior right for purposes of preserving or enhancing wetlands, habitat, fish and wildlife resources, or recreation in, or on, the water. (Wat. Code, § 1707.) The Division of Water Rights maintains information about these dedications. It is right holders' responsibility to be aware of any dedications that may preclude diversion under this right.

(0000212)

M. No water shall be diverted or used under this right, and no construction related to such diversion shall commence, unless right holder has obtained and is in compliance with all necessary permits or other approvals required by other agencies. If an amended right is issued, no new facilities shall be utilized, nor shall the amount of water diverted or used increase beyond the maximum amount diverted or used during the previously authorized development schedule, unless right holder has obtained and is in compliance with all necessary requirements, including but not limited to the permits and approvals listed in this term.

Within 90 days of the issuance of this right or any subsequent amendment, right holder shall prepare and submit to the Division of Water Rights a list of, or provide information that shows proof of attempts to solicit information regarding the need for, permits or approvals that may be required for the project. At a minimum, right holder shall provide a list or other information pertaining to whether any of the following permits or approvals are required: (1) lake or streambed alteration agreement with the Department of Fish and Wildlife (Fish & G. Code, § 1600 et seq.); (2) Department of Water Resources, Division of Safety of Dams approval (Wat. Code, § 6002); (3) Regional Water Quality Control Board Waste Discharge Requirements (Wat. Code, § 13260 et seq.); (4) U.S. Army Corps of Engineers Clean Water Act section 404 permit (33 U.S.C. § 1344); and (5) local grading permits.

Right holder shall, within 30 days of issuance of any permits, approvals or waivers, transmit copies to the Division of Water Rights.

(0000203)

N. Urban water suppliers must comply with the Urban Water Management Planning Act (Wat. Code, § 10610 et seq.). An "urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually.

Agricultural water users and suppliers must comply with the Agricultural Water Management Planning Act (Act) (Water Code, § 10800 et seq.). Agricultural water users applying for a permit from the State Water Board are required to develop and implement water conservation plans in accordance with the Act. An "agricultural water supplier" means a supplier, either publicly or privately owned, supplying more than 50,000 acre-feet of water annually for agricultural purposes. An agricultural water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers.

(0000029D)

O. Pursuant to Water Code sections 100 and 275 and the common law public trust doctrine, all rights and privileges under this right, including method of diversion, method of use, and quantity of water diverted, are subject to the continuing authority of the State Water Board in accordance with law and in the interest of the public welfare to protect public trust uses and to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of said water.

The continuing authority of the State Water Board may be exercised by imposing specific requirements over and above those contained in this right with a view to eliminating waste of water and to meeting the reasonable water requirements of right holder without unreasonable draft on the source. Right holder may be required to implement a water conservation plan, features of which may include but not necessarily be limited to (1) reusing or reclaiming the water allocated; (2) using water reclaimed by another entity instead of all or part of the water allocated; (3) restricting diversions so as to eliminate agricultural tailwater or to reduce return flow; (4) suppressing evaporation losses from water surfaces; (5) controlling phreatophytic growth; and (6) installing, maintaining, and operating efficient water measuring devices to assure compliance with the quantity limitations of this right and to determine accurately water use as against reasonable water requirements for the authorized project. No action will be taken pursuant to this paragraph unless the State Water Board determines, after notice to affected parties and opportunity for hearing, that such specific requirements are physically and financially feasible and are appropriate to the particular situation.

The continuing authority of the State Water Board also may be exercised by imposing further limitations on the diversion and use of water by right holder in order to protect public trust uses. No action will be taken pursuant to this paragraph unless the State Water Board determines, after notice to affected parties and opportunity for hearing, that such action is consistent with California Constitution, article X, section 2; is consistent with the public interest; and is necessary to preserve or restore the uses protected by the public trust.

(0000012)

P. The quantity of water diverted under this right is subject to modification by the State Water Board if, after notice to right holder and an opportunity for hearing, the State Water Board finds that such modification is necessary to meet water quality objectives in water quality control plans which have been or hereafter may be established or modified pursuant to Division 7 of the Water Code. No action will be taken pursuant to this paragraph unless the State Water Board finds that (1) adequate waste discharge requirements have been prescribed and are in effect with respect to all waste discharges which have any substantial effect upon water quality in the area involved, and (2) the water quality objectives cannot be achieved solely through the control of waste discharges.

(0000013)

Q. This right does not authorize any act which results in the taking of a candidate, threatened or endangered species or any act which is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish & G. Code, § 2050 et seq.) or the federal Endangered Species Act (16 U.S.C. § 1531 et seq.). If a "take" will result from any act authorized under this right, right holder shall obtain any required authorization for an incidental take prior to construction or operation of the project. Right holder shall be responsible for meeting all requirements of the applicable Endangered Species Act for the project authorized under this right.

(0000014)

This right is issued and right holder takes it subject to the following provisions of the Water Code:

Section 1390. A permit shall be effective for such time as the water actually appropriated under it is used for a useful and beneficial purpose in conformity with this division (of the Water Code), but no longer .

Section 1392. Every permittee, if he accepts a permit, does so under the conditions precedent that no value whatsoever in excess of the actual amount paid to the State therefor shall at any time be assigned to or claimed for any permit granted or issued under the provisions of this division (of the Water Code), or for any rights granted or acquired under the provisions of this division (of the Water Code), in respect to the regulation by any competent public authority of the services or the price of the services to be rendered by any permittee or by the holder of any rights granted or acquired under the provisions of this division (of the Water Code) or in respect to any valuation for purposes of sale to or purchase, whether through condemnation proceedings or otherwise, by the State or any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the State, of the rights and property of any permittee, or the possessor of any rights granted, issued, or acquired under the provisions of this division (of the Water Code).

STATE WATER RESOURCES CONTROL BOARD

for James W. Kassel

Barbara Evoy, Deputy Director
Division of Water Rights

Dated:

Notice of Exemption

Form D

To: Office of Planning and Research
P.O. Box 3044, Room 212
Sacramento, CA 95812-3044

County Clerk
County of _____

_____

_____

From: (Public Agency) Division of Water Rights
State Water Resources Control Board, P.O. Box 2000
Sacramento, CA 95814
(Address)

Project Title: Petition for Extension of Time for Water Right Permit 18593

Project Location - Specific:

Georgetown Divide Public Utility District (GDPUD) service area; Stumpy Meadows Dam

Project Location – City: Georgetown Project Location – County: El Dorado

Description of Nature, Purpose and Beneficiaries of Project:

Petition for extension of time for water right Permit 18593 of GDPUD. The permit is for power generation at the multi-purpose Stumpy Meadows Dam and Reservoir Project. The project was built in the early 1960's, including the penstock. During the extension, a generator will be installed in the existing facilities. The water currently used solely for consumptive use will also generate power.

Name of Public Agency Approving Project: State Water Resources Control Board

Name of Person or Agency Carrying Out Project: GDPUD

Exempt Status: **(check one)**

- ☐ Ministerial (Sec. 21080(b)(1): 15268);
- ☐ Declared Emergency (Sec. 21080(b)(3); 15269(a));
- ☐ Emergency Project (Sec. 21080(b)(4); 15269(b)(c));
- ☒ Categorical Exemption. State type and section number: Existing facilities (CEQA Guideline 15301); minor alterations to land (CEQA Guideline 15304)
- ☐ Statutory Exemptions. State code number: _____

Reasons why project is exempt:

The project was built in the 1960's. The project is a multi-purpose facility currently used for consumptive purposes. Other than the power generation plant itself, all facilities are existing, including the penstock. Water currently used for consumptive purposes will also generate power. There is no expansion of an existing use or expansion in water use.

Lead Agency
Contact Person: Hank White Area Code/Telephone/Extension: 530-333-4356

If filed by applicant:

1. Attach certified document of exemption finding.
2. Has a Notice of Exemption been filed by the public agency approving the project? ☐ Yes ☐ No

Signature: _____ Date: _____ Title: _____

☒ Signed by Lead Agency

☐ Signed by Applicant

Date received for filing at OPR: _____

Revised 2005

Sierra Hydrotech

ENGINEERING CONSULTANTS

1024 SIMON DRIVE
POST OFFICE BOX 169
PLACERVILLE, CALIFORNIA 95667
TELEPHONE (916) 622-7155

JACK F. HANNAFORD
CALIFORNIA CE 11536
OREGON CE 5469

RODERICK L. HALL
CALIFORNIA CE 13040

December 2, 1981

Charles F. Gierau
Georgetown Divide Public Utility District
P.O. Box 338
Georgetown, California 95634

Subject: Small Hydroelectric Feasibility Report

Dear Chuck:

Transmitted herewith is the "Feasibility Report, Georgetown Divide Public Utility District, Small Hydroelectric Project", December 1981. This report has been prepared in accordance with the requirements and suggested outline of the U.S. Department of Energy for Small Hydroelectric Projects as provided for in the DOE contract. Note that this report actually covers five projects rather than just a single project as envisioned in the DOE outline, so the report contains more sections needed to describe the separate units in detail. Although this is the final report, it does not include the drawings of individual sites, the USBR report on Stumpy Meadows Dam, or the summary for the Department of Energy. These items will be included in your final copy and copy sent to DOE.

You and I have discussed results of this study at some length, including assumptions used in analysis. The assumptions appear to me to be fairly conservative, in keeping with the District's mode of operation and primary obligations to the community.

A "Summary of Financial Evaluation" appears on Page XIII-4, describing the results for each site. A summary table also appears on Page XV-2 under Section XV, "Conclusions and Recommendations".

Buckeye is clearly the most attractive unit, with Tunnel Hill also being very attractive for District development. Buffalo Hill is relatively attractive, utilizing the small predesigned turbine-generator-control package units which are becoming available. Stumpy Meadows carries

the burden of construction and ownership of extensive transmission line, which has made that unit relatively unattractive at this point. Kaiser does not appear very practical for District development, unless less expensive equipment can be found to develop the site.

It should be remembered that under marginal conditions, financial analysis becomes very dependent upon the assumptions used. Substantial requirements for reserve, higher interest rates, higher cost of bond sales and reduced escalation of power value might make marginal units less attractive or infeasible, while more rapid rise in the value of energy, lower cost of financing, or less discount of generation would all tend to make the units more attractive. In spite of the fact that interest rates are currently dropping to levels which might even be lower than those used in this report, the value of escalation of payments for power might be affected by decreased inflation rates possibly associated with falling interest rates. It is fairly easy to reanalyse specific sites in view of changing conditions to permit reconsideration of the more marginal sites, and this should be done as conditions change.

The District must consider means of financing project construction and the preparatory and design work and the time-frame pertinent to such financing. The District has already had several proposals for financing and constructing some of these units through private funding. Information on costs, cash-flow and other items appearing in this report should be useful in assisting you to evaluate proposals by private interests with respect to short term and long term benefits to the District.

Best regards,

Jack F. Hannaford

JFH:jm

FEASIBILITY REPORT

GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

SMALL HYDROELECTRIC PROJECT

DECEMBER 1981

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FEASIBILITY REPORT
GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT
SMALL HYDROELECTRIC PROJECT

I. INTRODUCTION

A. Purpose of the Project

Georgetown Divide Public Utility District is located in northwestern El Dorado County, California, and provides water for municipal, domestic, and agricultural use to a population of about 4500 inhabitants located within the District's 62,000 acre area. The major source of water supply is Stumpy Meadows Reservoir, located about 15 miles east of Georgetown on Pilot Creek, a tributary of the Middle Fork of the American River. The District has about 35 miles of major conveyance system to take water from the reservoir and enroute diversion points to local distribution facilities in the service area.

The District has five sites in the conveyance system which appear to have some potential for power development. The purpose of this investigation is to determine the feasibility for construction and operation of power plants at each or any of the five sites within the conveyance system.

B. Authority

On September 3, 1980, the Board of Directors of the Georgetown Divide Public Utility District passed Resolution 80-28 authorizing the District Manager to file an application for a Federal Assistance Loan for a Feasibility Study of five potential hydroelectric sites in the District conveyance system. The District received approval from the U.S. Department of Energy to proceed with the feasibility study in February 1981. In addition, the District Board has authorized the Manager to file the appropriate applications and petitions for water rights with

the State Water Resources Control Board and applications with the Federal Energy Regulatory Commission.

C. Scope of Study

This feasibility report describes the analysis and resulting technical and financial feasibility of each of the five proposed hydroelectric sites individually, representing the specific units proposed under the applications for Federal Energy Regulatory Commission Projects 4302 and 4303. Filings for these projects were made pursuant to the results of the preliminary feasibility analysis developed during the early phases of this study.

D. Sub-Contractors

This feasibility report has been prepared by:

Sierra Hydrotech
Engineering Consultants
1024 Simon Drive
P.O. Box 169
Placerville, California 95667
Telephone: 916-622-7155

Additional work was done by the Manager and staff of the Georgetown Divide Public Utility District.

II. DESCRIPTION OF DISTRICT AND EXISTING FACILITIES

A. General Description of District

The Georgetown Divide Public Utility District is situated in the Sierra Nevada foothills approximately 45 miles northeast of Sacramento, California. The District occupies the region forming the drainage boundary between the Middle and South Forks of the American River. Although the area has been largely agricultural and lumbering in the past, there is continual growth in residential and retirement living.

Georgetown Divide Public Utility District provides domestic, municipal, and irrigation water to some 4500 inhabitants of the Georgetown Divide. The District currently encompasses 61,656 acres in northern El Dorado County, and is the sole agency supplying water for domestic use and fire protection for the communities of Georgetown, Kelsey, Greenwood, Garden Valley, Cool, and Auburn Lake Trails, as well as other population centers in the area.

Pursuant to the California Public Utility District Act and in accordance with Ordinance No. 137 of the El Dorado County Board of Supervisors, formation of the Georgetown Divide Public Utility District was submitted to and approved by the qualified electors within the District boundary on June 4, 1946. The statutory authority enabling the Georgetown Divide Public Utility District to construct, finance, maintain, and operate a water system is set forth in Section 16461 of the Public Utilities Code of California.

B. Existing Water Supply and Distribution Facilities

The major features of the water supply, conveyance and distribution system of Georgetown Divide Public Utility District are delineated on Figure 1. The main

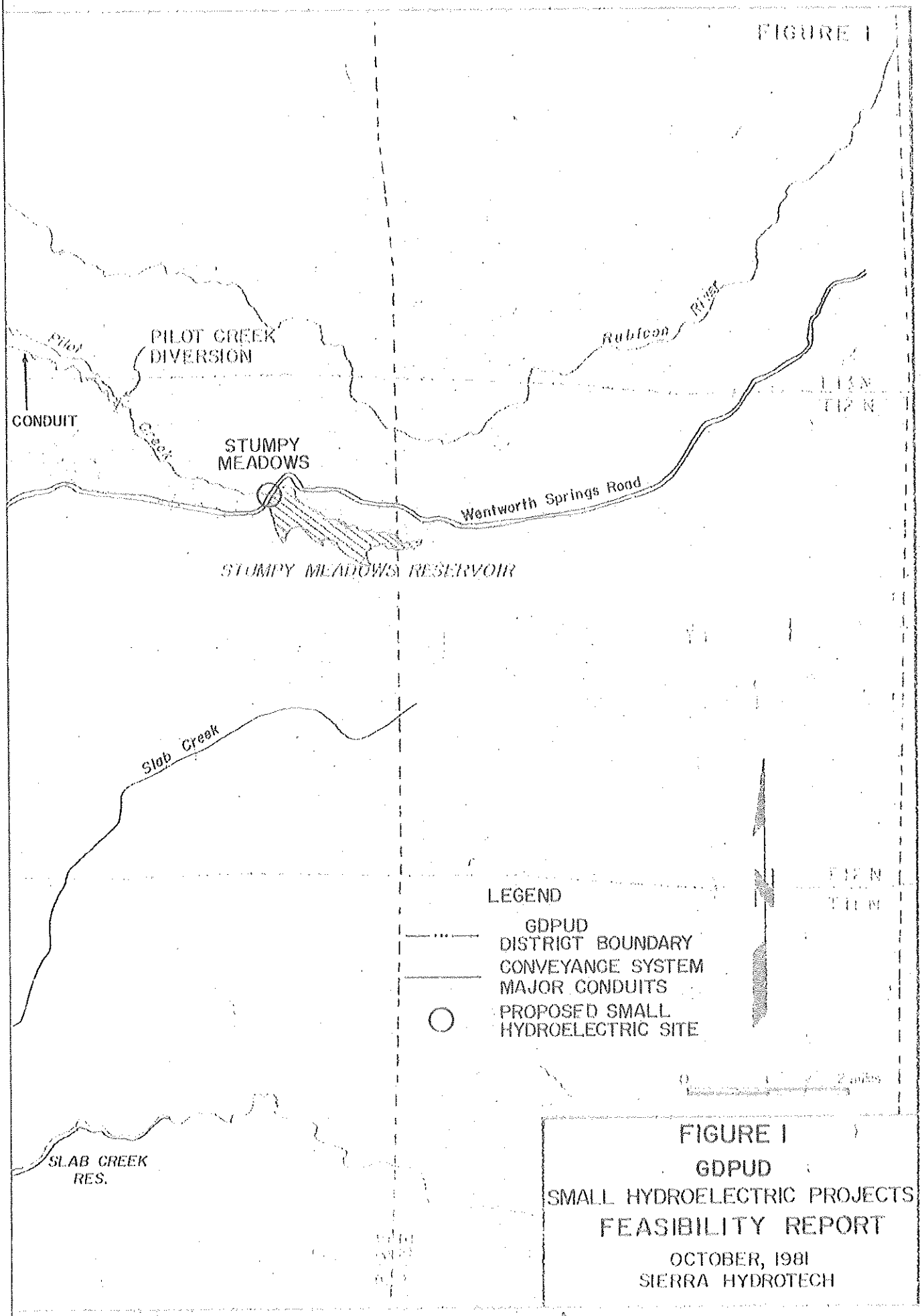

FIGURE 1

GDPUD

SMALL HYDROELECTRIC PROJECTS

FEASIBILITY REPORT

OCTOBER, 1981

SIERRA HYDROTECH

and almost sole source of water supply to GDPUD is Stumpy Meadows Reservoir located on Pilot Creek about 15 miles east of Georgetown at an elevation of approximately 4260 feet. Water to meet demands within the service area is released from Stumpy Meadows Reservoir into Pilot Creek, and rediverted from Pilot Creek through the El Dorado Conduit to the vicinity of Tunnel Hill where it is released into the Georgetown Divide Ditch for conveyance and distribution.

Stumpy Meadows Reservoir and the conveyance system as far as Tunnel Hill were constructed as part of the Stumpy Meadows Project, completed in 1962 (Stumpy Meadows Dam was completed in November 1961). The project was financed through a PL 984 loan administered by the Mid-Pacific Region of the Bureau of Reclamation of the U. S. Department of Interior.

It is anticipated that water available from the Stumpy Meadows Project is sufficient to provide an adequate water supply for the service area for the next 15 years or more. Probable decreases in the demand for agricultural water and decrease in conveyance losses by upgrading the conveyance and distribution systems tend to extend the life of this water source. Estimated increase in water usage will be attributable primarily to domestic, municipal, and industrial demands. This change of usage will tend to make demands more consistent over the year than they are at present with the present relatively heavy agricultural usage in the summer months.

Georgetown Divide Public Utility District distributes water to customers in the service area by both open ditch and pipeline. There are some 70 miles of ditches throughout the District, approximately 35 of which are included in the main conveyance system. Several pipelines and siphons in the main conveyance

system are used to convey water from one level to another following the topography of the Divide. Some of these pipelines presently have energy dissipators to protect the conveyance system from excessive velocities and errosion.

III. SITE CHARACTERISTICS

A. General

The District has five sites which have potential for small hydroelectric power development and have been studied in detail in this investigation. The first is located at the existing Stumpy Meadows Dam, while the remaining four sites are located along the District's major conveyance system. Proposed sites appear on Figure 1, and are described individually in the following text.

1. Stumpy Meadows Reservoir (energy dissipating valve)
2. Tunnel Hill
3. Buckeye Pipeline (energy dissipator)
4. Buffalo Hill Siphon (energy dissipator)
5. Kaiser Pipeline (energy dissipator)

As a result of the early stages of this investigation, GDPUD has taken steps to apply for the necessary changes in the existing water rights, and made application to the Federal Energy Regulatory Commission. Although all sites are covered in this report, the overall project has been broken down into two projects for water right and permit application.

1. Stumpy Meadows Hydroelectric Project
2. Conduit Hydroelectric Project

It must be emphasized that Georgetown Divide Public Utility District operates to meet the water supply needs of the area. No other activity, including power production, can interfere with or compromise water operations. This assumption is implicit in all analyses associated with this project.

B. Water Rights

The California State Water Resources Control Board handles water rights matter in California through the staff of the Division of Water Rights, Department of Water Resources. GDPUD has three applications and permits associated with the Stumpy Meadows Project and water supply for the Georgetown Divide. The applications and permits are as follows:

Application	Permit
5644A	12817
16213	11304
12421	11305

These applications apply to the waters of Pilot Creek and its tributaries, a tributary of the Rubicon River, and to Otter Creek, a tributary of the Middle Fork of the American River. All of these applications and permits were for consumptive use of the waters within the District's service area and for the waters necessary for carriage and maintenance of the conveyance system.

Until recently, State Water Resources Control Board required separate applications for consumptive use and for non-consumptive use, such as power. In December, 1980, a new regulation was approved and established permitting power as an additional incidental use of consumptive use water, in cases where the power was developed from water enroute to beneficial consumptive use. On December 29, 1980, GDPUD filled petitions for power as an additional purpose of use under Applications 5644a and 16212. These petitions applied specifically to the four conduit sites. Although the petitions are in the process of approval by the Board, the file has not yet been closed. However, the District has been assured that the petitions will be granted in the very near future.

As soon as the file has been closed, the District will submit a petition for an additional purpose of use for water which is released through the Stumpy Meadows outlet works for fish release and consumptive use. At the same time, an application will be submitted to utilize for the purpose of power generation water which is released through the Stumpy Meadows outlet works to reduce winter and spring spill. The use of spill water through the Stumpy Meadows power plant would have no effect on the total volume of spill, but there would be a minor effect on the time-distribution of spill, primarily during the late winter and spring.

The petitions and applications have been discussed with the California Department of Fish and Game and the Federal Fish and Wildlife Service, and no problems are contemplated by either agency with regard to proposed operation of the power plants

C. FERC Filings

As a result of favorable analysis in the preliminary stages of this investigation, GDPUD filed two applications with the Federal Energy Regulatory Commission covering the proposed power plants. The first was "Application for Exemption -- Small Hydroelectric Power Project, Docket No. RM80-65, for the Stumpy Meadows Hydroelectric Project". FERC assigned Project No. 4302, and on June 30, 1981, issued an order granting exemption for this project.

The second was "Application for Exemption -- Small Conduit Hydroelectric Facility, Docket No. RM79-35, for the Conduit Hydroelectric Project", including all four power plants located along the conduit system. FERC assigned Project No. 4303, and on June 30, 1981, issued an order granting the exemption for this

project.

D. Legal Access

GDPUD owns the land upon which Stumpy Meadows Dam and Reservoir are located. The project is surrounded by Eldorado National Forest but there is a substantial amount of property in private ownership around the dam.

From the standpoint of construction, the most attractive site for the Kaiser Power Plant is on Federal lands under the jurisdiction of Bureau of Land Management. However, it is possible to move the power plant upstream on the Kaiser pipeline to place it on private land, with the power plant tail water discharge back into the pipeline. The site on private land appears to be most practical from a regulatory standpoint.

The remaining three sites, Tunnel Hill, Buckeye and Buffalo Hill, are all located on private land. The District has right of access to the sites by virtue of the right-of-way for the existing conduits. However, in each case, additional land will be required at the power plant locations for construction and operation. In each case where private property is involved, the District anticipates no problem in acquiring the necessary right-of-access and right-of-way. However, in the event that it is impossible to acquire such rights, the District has the right of condemnation as a public agency. Legal cost for acquisition of right-of-way has been included in estimates for the various units.

E. Geology

All of the intended power plants are extremely small, and foundation conditions associated with each site are more than adequate to support the required powerhouse, equipment, thrust blocks, etc. In some cases, the proposed power

plant will be located adjacent to the enclosures housing the energy dissipating units. At the Stumpy Meadows site, the power plant will be adjacent to the existing outlet works (Plate 1B). At Buckeye and Buffalo Hill, the power plants will also be constructed adjacent to the existing structures housing the energy dissipators. There is adequate foundation for thrust blocks and the relatively light structures required.

At the Kaiser site, the existing energy dissipator is located upstream from the intended powerhouse site. The dissipator will be removed and the powerhouse constructed near the location where the Kaiser pipeline enters the Shroeder Siphon. The Shroeder Siphon is much older than the Kaiser pipeline, and its condition is unknown, but it appears to be adequately serving its purpose at the present time. The proposed power plant site is in an area of cut in the Mariposa formation and there appears to be adequate foundation for the structure required.

At Tunnel Hill, a pipeline must be constructed from the existing tunnel down to the existing Georgetown Divide Ditch, paralleling the present channel. Foundation material is metamorphosed Mariposa formation and is more than adequate to support pipeline, anchor blocks, thrust blocks and the small power plant structure required at the intersection with the Georgetown Divide Ditch. Geologic reports on, and the construction experience with the existing tunnel, support competency of the materials.

F. Individual Site Descriptions

Detailed descriptions of each of the five sites appear in the next five sections of this report (Sections IV through VIII). Table 1 summarizes the characteristics of each of the units described in the following sections.

Table 1
Georgetown Divide Public Utility District
Proposed Hydroelectric Units

Unit	Section	Flow Rate 1984 Flows mo/yr	Q cfs	Design Q cfs	Conduit Pipe Diameter In.	Conduit Length ft.	Heads Static ft.	Heads Net 1/ ft.	Heads Net 2/ ft.	Ratings Approx. Values Only 2/ hp	Ratings Approx. Values Only 2/ kw	Comments
Stumpy Meadows	IV	6 2 4	32 25 4	55	30 36	300 450	150.0	146.6	140.1	700	485	Outlet works, Stumpy Mdws. Dam, existing energy dissipator. Requires transmission construction
Tunnel Hill	V	6 6	27 5-15	35	30	3475	274.0	254.2	244.4	785	545	Requires construction of penstock.
Buckeye	VI	6 6	25 5-10	33	30	11350	262.5	216.9	185.6	565	390	Existing pipeline and energy dissipator.
Buffalo Hill	VII	6 6	19 5-10	25	24	5400	143.0	114.6	95.2	216	150	Existing pipeline and energy dissipator.
Kaiser Alternate A	VIII	6 6	15 3-10	18	24	1258	169.0	161.0	158.8	260	180	Existing pipeline, must be partially replaced.
Kaiser Alternate B	VIII	6 6	15 3-10	15	24	432	118.0	110.3	110.3	150	100	At existing dissipator

1/ At maximum 1984 flows
2/ At Design Q

IV. STUMPY MEADOWS UNIT

A. Description of Dam and Appurtenances

Stumpy Meadows Reservoir is formed by Stumpy Meadows Dam which is a rock fill structure with an earth core located in Section 11, T12N, R12E, MDBM (lat. 38°43'30", long. 120°36'00"), about 15 miles east of Georgetown. The dam has a volume of 897,000 cubic yards. Height is 162 feet above the streambed and crest length is 1230 feet. Capacity at spillway level is 20,000 acre-feet and surface area is 330 acres. The usable capacity is 19,000 acre-feet. The dam has an uncontrolled overflow spillway cut through the right abutment with a capacity of about 6900 cfs. The spillway channel is mostly on granite and is partially concrete lined.

The outlet works consist of a pipeline through the dam with a trash rack at the entry in the reservoir, a butterfly valve for complete closure, and a gatehouse with an energy dissipating valve for operational releases to the channel of Pilot Creek below the dam. The pipeline consists of 450 feet of 36-inch concrete pipeline, 300 feet of 30-inch steel pipe, and terminates with a 30-inch Howell-Bunger valve in the concrete gatehouse.

The District has purchased and holds title to the lands on which the dam and reservoir were constructed. The power plant site is on District land, and the site is accessible from a paved county road.

Stumpy Meadows Dam falls within jurisdiction of the California Division of Safety of Dams and is subject to periodic inspection by both that agency and the U.S. Bureau of Reclamation which services the PL984 loan. Copies of the most recent inspections appear in Appendix A. No modification or reconstruction of the existing Stumpy Meadows Dam is contemplated. Only the downstream end of

the outlet works would be modified to accept the unit.

B. Hydrology and Hydraulics

Stumpy Meadows Reservoir is located on the Pilot Creek watershed with a drainage area of 15.1 square miles and an average annual runoff of approximately 21,100 acre-feet, which is about 1400 acre-feet per square mile. Runoff is extremely variable from season to season with the maximum year of record (1952) being about 207 percent of average, and the minimum year of record (1977) being about 13 percent of average. Stumpy Meadows Reservoir is operated with multi-year carryover to provide for the water use requirements in the District's service area.

A U.S. Geological Survey gage, Pilot Creek above Stumpy Meadows Lake (USGS 11431800) is located upstream from the reservoir with a drainage area of 11.7 square miles. This gage has been operated continuously since the 1961 water year. Records from this gage have been used to estimate a total inflow to Stumpy Meadows Reservoir and to provide other data required for operational analysis of the reservoir, Stumpy Meadows power plant, and the conduit power plant sites. A second gage, Pilot Creek below Mutton Canyon, near Georgetown (USGS 11433040) is located about 2.5 miles downstream from Stumpy Meadows Dam with a drainage area of 21.1 square miles. This gage is used to measure the fish release made to Pilot Creek below the Pilot Creek Diversion Dam. It is located about 400 feet below the confluence of Pilot Creek and Mutton Canyon.

Although there is adequate hydrologic data available to develop flow duration curves for Pilot Creek at the location of the Stumpy Meadows unit, sizing of the unit was based upon operational considerations. Operational analysis

related to determination of generation of all five sites was based on the historic record and operational considerations.

The Stumpy Meadows power plant will obtain its operating head from water stored behind the existing dam. Maximum static head at the site of the proposed unit is 150 feet. The average static head during the season with reservoir drawdown is about 135 feet. The head at minimum pool is only about 64 feet. The unit was sized on its ability to produce adequate flow to meet District demands, even at reduced heads, and the ability to optimize power production from spills which might otherwise go unused.

Capacity of the existing outlet works at Stumpy Meadows Dam is about 200 cfs through the energy dissipating valve in the gatehouse. However, the maximum operational releases at the present time during the summer irrigation season are about 30 to 35 cfs. After the irrigation season, releases through the outlet works are reduced to the minimum fish release which is 4 cfs in a normal year and 2 cfs under dry year criteria. The irrigation season is normally from May 1 through October 31. Irrigation releases may start as early as April 15 in a dry year. Releases from the dam during the irrigation period vary from about 15 to 35 cfs, depending upon demand and contribution from the enroute drainages, with the greatest releases in June, July, and August. However, during the snowmelt period (and in many years, during a substantial portion of the winter) spills of various magnitudes occur after the reservoir has reached maximum capacity. Portions of these spills are available for power generation. Analysis of power generation with releases to meet demands and releases of water which might otherwise have been spilled, is described under Section IX, "Project Power Production".

Four unit hydraulic capacities were analysed to optimize power production from spills. The sizes were 45 cfs, 55 cfs, 60 cfs and 80 cfs. The larger units captured more spill, while resulting in increased head loss at those higher flows and loss of some efficiency at the lower flow rates. Optimum hydraulic capacity appears to fall between 55 and 60 cfs. The 55 cfs unit was selected for final analysis.

C. Recommended Project

C.1. Power Plant Selection

As with all power plants in this study, the Stumpy Meadows unit will be expected to operate under a widely varying range of flow conditions. However, unlike the conduit sites, the Stumpy Meadows unit must also operate under a wide range of heads as the water surface in the reservoir rises and falls during the season. The unit will be required to operate at a maximum static head of 150 feet and a maximum flow rate of 55 cfs. This would result in an operating head of about 140.1 feet when head loss in the outlet works is considered. Smaller flow rates would result in corresponding smaller head loss.

Several possible alternatives for turbines have been analysed. The cross flow turbine appears to have ability to meet the wide range of operating conditions encountered, producing about 20 percent more power during the average season than a reaction turbine. Assuming an 80 percent efficiency at maximum flow rate (83 percent maximum efficiency) and a generator efficiency of 93 percent, the following unit sizing would apply.

Item	Type	Rating	Hydraulic Capacity
Turbine	Cross flow	700 hp	55 cfs
Generator	Asynchronous	485 kw, 440 volt	

The unit will have an average annual generation under 1984 conditions of 1,651,000 kWh, ranging from 2,727,000 kWh in the maximum year to 741,000 kWh in the minimum year. The range of annual generation at this site is far greater than that at any other site in this analysis.

C.2 Description of Proposed Installation

A 16'x20' concrete block powerhouse with concrete foundation will be constructed immediately adjacent to the Stumpy Meadows gatehouse as delineated on Plate 1B. The powerhouse will house the 700 hp cross flow turbine, speed increaser, 485 kw asynchronous generator, and the required electrical, hydraulic, and mechanical controls.

A 24-inch Tee connection will be installed just above the existing gatehouse and be directed to the power plant as indicated in the drawing. A 30-inch butterfly valve will be installed just upstream from the energy dissipating valve to close off the flow to that valve. The floor of the powerhouse will be about 5 feet lower than the floor in thegate house in order to utilize some additional head available.

The turbine will discharge into a draft tube which will in turn discharge into the stream channel through side ports in the powerhouse foundation. The pipeline from the Tee in the 30-inch steel outlet pipe to the power plant will be 24 inches in diameter with a 24-inch butterfly valve installed between the Tee and the turbine for complete manual closure for maintenance or automatic closure in the event of electrical failure or separation from the electrical distribution system. Under automatic closure conditions, the 30-inch butterfly valve ahead of the Howell-Bunger valve will open simultanteously with closure of the valve to the power plant. Maximum releases equivalent to those possible at the present time may still be made through the Howell-Bunger valve.

There is no PG&E distribution line in the immediate vicinity of the proposed power plant. The project will require construction of five miles of three phase distribution type line from Stumpy Meadows to the area of Blodgett Forest and Quintette. In addition, four miles of single phase distribution line from Chiquita Lake to Blodgett Forest must be converted to three phase by addition of the third line to the existing wood poles. It is anticipated that the new three phase line between Stumpy Meadows and Blodgett Forest will be constructed on wood poles along the right-of-way of the County road (Wentworth Springs Road). To date, no agency or group has voiced opposition to construction of this pole line. The proposed transmission line is very long with respect to the small unit size and amount of generation available. The cost of construction and maintenance of this transmission line has a very large impact on project feasibility.

The transformer would be mounted on a pad beside the powerhouse and a pole line run from below the toe of the Stumpy Meadows Dam to the right-of-way of the County road.

C.3 Operation and Controls

Releases through the proposed Stumpy Meadows power plant will be made and adjusted manually in a fashion very similar to releases made through the existing outlet works to Stumpy Meadows Reservoir. The objective of releases is to meet water system demands. Releases are made at Stumpy Meadows Reservoir in order to:

1. Meet fish release requirements (4 cfs, except 2 cfs under dry year criteria).
2. Provide for enough flow in addition to the natural flow of the stream

tributary to the Pilot Creek Diversion Dam to meet demands served through the District's conduit system and to meet fish release requirements at Pilot Creek Diversion Dam.

At the present time, the Howell-Bunger valve is hand operated to meet the required release schedule. The operator makes adjustment to the valves twice a week, or more often if necessary during periods of varying flow and varying requirements. There is a small valve by-passing the main valve to make the fish release during periods when little or no water is required to be released from Stumpy Meadows Reservoir to meet service area demands. In addition, uncontrolled releases may occur over the ungated spillway when Stumpy Meadows Reservoir reaches maximum capacity. There is no operation at the present time to vary the magnitude or time-distribution of spills from the reservoir.

It is anticipated that the releases through the proposed Stumpy Meadows power plant will be made in much the same fashion and magnitude as releases currently made for fish releases and to meet District demands. However, since Pilot Creek is a snowmelt stream, the District has some opportunity to predict if and when the reservoir will fill and spill. It is anticipated that if the reservoir is full and spilling, or predicted to fill and spill, releases may then be made through the Stumpy Meadows power plant rather than over the spillway. There would be no modification of the quantity of water flowing down Pilot Creek below Stumpy Meadows Dam. However, the ability to anticipate spill conditions may make it possible to distribute flows which would have otherwise occurred as uncontrolled spill over a longer period of time as controlled release through the power plant. This does not mean that uncontrolled spill would be eliminated from

Stumpy Meadows Reservoir, but only that anticipated spill, particularly during the period of major snowmelt, would be reduced in magnitude but extended over a longer period of time as a power plant release.

C.4 Transmission Line

The length of transmission line from Quintette to Stumpy Meadows is 5 miles (plus 4 miles of single to three phase conversion) which is about the practical limit for a unit of the small size proposed for Stumpy Meadows site. However, certain costs of line ownership must enter into the analysis of the Stumpy Meadows transmission line.

C.5 Intangibles

Stumpy Meadows Reservoir has a substantial amount of regulation, a portion of which can be used for regulation of flows for power generation. At the present time, studies have been made to optimize releases through the Stumpy Meadows power plant for increased power production during periods when spill is projected to occur. The object is to refine forecasting procedures for the Pilot Creek watershed tributary to Stumpy Meadows Reservoir to enable GDPUD to draw the reservoir down prior to the period of substantial snowmelt without jeopardizing water supply. The techniques used in this analysis have been relatively conservative with regard to predicting future runoff. Actual operation might permit small additional generation from flows which might eventually spill. Total increase in theoretical generation attributable to refinement of operation might range from 2 to 5 percent. Generation at all units in this study has been discounted by 5 percent to allow for outages, or failure of estimated flows and operations to meet actual conditions.

A final item included under intangibles is the type of generator, which could be either synchronous or asynchronous (induction). The Stumpy Meadows unit will be at the end of a transmission line virtually 15 miles long from the vicinity of Georgetown to Stumpy Meadows Reservoir. It may be advisable to consider a synchronous generator for this site for improvement of power factor and increased efficiency. The synchronous generator is more expensive to buy and may require more sophisticated controls which are also more expensive than those required for induction equipment. In the event that this unit should go to design, these factors must be considered in project design.

V. TUNNEL HILL UNIT

A. Site Description

The El Dorado Conduit passes through Tunnel Hill in an unlined tunnel approximately 4000 feet long. At the present time, flow discharges into a normally dry tributary of Otter Creek. Flow is rediverted about 1200 feet downstream from the Tunnel and crosses a drainage divide into the Rock Creek drainage. Flow continues down a normally dry tributary of Rock Creek to the intersection with the old Georgetown Divide Ditch, and continues along the Georgetown Divide Ditch about 1200 feet to the intersection of Georgetown Divide Ditch and the Otter Creek Ditch. Total drop is 270 feet.

The proposed power plant site is on the existing Georgetown Divide Ditch, about 60 feet upstream from the confluence with the Otter Creek Ditch.($SW\frac{1}{4}$, $SW\frac{1}{4}$, Sec. 26, T13N, R11E, MDB&M). Although the District has right of access and easements for the Georgetown Divide Ditch, new easement will be required for the power plant site and for construction access for the proposed pipeline connecting the tunnel to the power plant. The power plant site is within 125 feet of the Wentworth Springs Road, a paved County road.

It is proposed to construct 3475 feet of pipeline from the tunnel outlet to the power plant site. This construction is along the existing conduit route and generally within existing easements.

B. Flows and Hydraulics

Flows for the Tunnel Hill unit and all downstream units would be those flows in the conduit system required to meet water demands within the District's distribution system and to maintain system operation. The District has records of past

operation, and estimates of operational flows for the year 1984 have been made on the basis of these records. Operational flows and studies are described under "Project Power Production", Section IX.

The 1984 maximum flows at the Tunnel Hill unit are estimated to be 27 cfs during the summer months. Flows during winter months vary between 5 and 15 cfs depending upon water availability and demands. The Tunnel Hill unit, including pipeline and other facilities, is sized for 130 percent of the estimated 1984 flows, or 35 cfs.

C. Recommended Project

C.1 Power Plant Selection

As with all power plants in this study, the Tunnel Hill unit will be expected to operate under a widely varying range of flow conditions. The maximum static head will be 274 feet, which at a maximum flow rate of 35 cfs would result in an operating head of about 244.4 feet. At the 1984 flow of 27 cfs, the operating head would be 254.2 feet. Smaller flow rates would have correspondingly greater operating heads as pipeline friction losses are reduced.

The cross flow turbine appears to have the ability to produce more than 25 percent more power during the average year than a reaction type machine as a result of higher efficiency at partial load. A turbine efficiency of 80 percent at maximum flow rate and 83 percent at maximum efficiency was assumed, with a generator efficiency of 93 percent. Following is unit sizing.

Item	Type	Rating	Hydraulic Capacity
Turbine	Cross flow	785 hp	35 cfs
Generator	Asynchronous	545 kw, 440 volt	

Average annual generation under 1984 water demands and optimum operational conditions would be 2,273,000 kWh at the Tunnel Hill unit with a minimum year generation of 1,924,000 kWh. Calculation of generation is described in Section IX.

C.2 Description of Proposed Installation

The Tunnel Hill unit is the only unit which will require extensive construction of new pipeline to develop head at the power plant. A small diversion structure will be constructed at the outlet to the Tunnel with a turnout or spillway to discharge excess flow into the Otter Creek tributary. A pressure pipeline, 3475 feet in length will convey water from the Tunnel to the power plant site. The first 400 feet of the pipeline will be steel pipe, surface mounted with straps on concrete saddle blocks. The pipeline will follow the right bank of the Otter Creek tributary. The remaining 3075 feet will be buried 30-inch diameter concrete cylinder pipe with joints designed to operate at the required head along the pipeline route. The pipeline will follow the right bank of the Otter Creek tributary to a point near the present rediversion structure and then turn south along existing conveyance route to the Wentworth Springs Road. It will cross under the Wentworth Springs Road in an existing 42-inch culvert and run approximately 1000 feet to a point 60 feet upstream from the confluence of the Otter Creek Ditch and Georgetown Divide Ditch.

A 16x20 foot concrete block powerhouse with concrete foundation will be constructed immediately adjacent to the Georgetown Divide Ditch, as delineated on Plate 2B. The powerhouse will house the cross flow turbine, speed increaser, asynchronous generator, and the required electrical, hydraulic, and mechanical controls in addition to the synchronous bypass. The transformer will be mounted

on a concrete pad next to the powerhouse. A cyclone fence will be constructed around the powerhouse site, enclosing an area about 100x100 feet.

A "Y" will be installed above the unit with a 12-inch diameter pipeline and butterfly valve operating as a synchronous bypass in the event of unit failure. The bypass pipeline will discharge into a concrete wall, faced with a steel plate, to dissipate energy. The bypass is adequately sized for maximum water demand.

The turbine will discharge into a draft tube which in turn will discharge into the Georgetown Divide Ditch.

A PG&E power pole is located 150 feet north of the proposed power plant site. However the line is single phase. The project will require upgrading of 0.65 miles of single phase distribution type line to three phase by the addition of the third line to the existing wood poles. This is a portion of the same single phase line described under the Stumpy Meadows unit.

C.3 Operation and Controls

Releases through the proposed Tunnel Hill power plant will be continued in a fashion very similar to releases and rediversions to the Georgetown Divide Ditch from the El Dorado Conduit.

The unit could be either hand controlled or operated to respond to water stage at the outlet to the tunnel. If the unit is operated manually, any excess flow would spill into the Otter Creek tributary until manual adjustment could be made. However, it would be desirable to have an automatically regulated turbine control which would increase or decrease water flow through the unit within selected limits, based on water elevation at the diversion structure, in order to keep the pipeline full and maintain maximum head on the unit. A turnout or spillway at

the tunnel would still be required.

The synchronous bypass valve would be a 12-inch diameter butterfly valve, with maximum opening to be set manually, consistent with current system demands to provide flow control when the unit is either shut down automatically or manually, with a synchronous valve controller to open the valve in the event that the unit is separated from the electrical sytem or some other failure occurs. A second control valve could be placed in series with the butterfly valve to regulate flow rate through the bypass. The bypass facilities are sized to make the maximum release required to meet future water demands.

VI. BUCKEYE UNIT

A. Site Description

Georgetown Divide Ditch flows into Walton Lake, which is located about 200 feet south of the Wentworth Springs Road and about 4 miles east of Georgetown. Walton Lake has a capacity of about 50 acre-feet and is used for regulation of ditch flows as well as providing water to the Georgetown Water Treatment Plant which is located at Walton Lake. Walton Lake has a spillway to discharge excess flow into a tributary of Canyon Creek. That portion of water being treated for municipal and domestic use in the Georgetown area goes through the treatment plant and is carried by pipeline to the area of use.

A 24-inch diameter pipeline passes through the Walton Lake Dam as a means of releasing non-treated irrigation water into the distribution system. Control is effected by a 24-inch slide gate valve in the reservoir. Immediately after leaving the 24-inch pipe, water passes into the 30-inch diameter Buckeye Conduit. This conduit is 11,350 feet long. It was originally constructed to bypass an extensive portion of the open ditch system. Pipeline is 30-inch diameter concrete cylinder pipe in classes consistent with head on the system. At the end of the Buckeye Conduit, the flow passes through a 30-inch to 18-inch diameter transition. There is an 18-inch butterfly valve for control and closure. The engery dissipator consists of another transition and a 12-inch hollow cone valve discharging into a concrete chamber. Flow exits the chamber in a 42-inch reinforced concrete pipe which discharges back into the Georgetown Divide Ditch.

Total difference in elevation between normal water surface of Walton Lake and the Georgetown Divide Ditch is 268 feet. A gross head of 262.5 feet has been

used in this analysis to adjust for headwater and tail water conditions.

The proposed power plant site is on the existing Georgetown Divide Ditch immediately to the south and adjacent to the existing energy dissipating valve and valve house as delineated on Plate 3B (NE$\frac{1}{4}$, NW$\frac{1}{4}$, Sec. 1, T12N, R10E, MDB&M). Although the District has right of access and easements for the Georgetown Divide Ditch and the Buckeye Conduit, additional easements will be required for the power plant site. The power plant site is located immediately adjacent to a private dirt road which has been used for many years as access to the Georgetown Divide Ditch and Buckeye Conduit.

B. Flow and Hydraulics

Flows for the Buckeye unit will be those flows in the conduit system required to meet water demands in the District's distribution system and maintain system operation. Operational flows and studies are described under "Project Power Production", Section IX.

The 1984 maximum flows at the Buckeye Unit are estimated to be 25 cfs during the summer months. Flows during the winter months will vary between 5 and 15 cfs depending upon water availability and demands. The Buckeye unit is sized for 130 percent of the estimated 1984 flows, or 33 cfs.

C. Recommended Project

C.1 Power Plant Selection

The Buckeye unit will be expected to operate under a widely varying range of flow conditions. The maximum static head will be 262.5 feet, which at maximum flow rate of 33 cfs would result in an operating head of approximately 185.6 feet. At the 1984 flow of 25 cfs, the operating head would be 216.9 feet. Reduction

in flow rate would result in substantial increases in head at this site which has an extremely long pipeline with relatively high pipeline losses at higher flow rates.

A cross flow turbine at this site would produce more than 25 percent more power during the average year than the reaction type machine. The cross flow unit is recommended for installation. A turbine efficiency of 80 percent at maximum flow rate and 83 percent at maximum efficiency was assumed, with a generator efficiency of 93 percent. Following is a summary unit sizing.

Item	Type	Rating	Hydraulic Capacity
Turbine	Cross flow	565 hp	33 cfs
Generator	Asynchronous	390 kw, 440 volt	

Average annual generation under 1984 water demands would be 1,979,000 kWh at the Buckeye unit, with a minimum year generation of 1,521,000 kWh.

C.2 Description of Proposed Installation

The Buckeye unit will require no new construction of pipeline. Some new construction may be required at the Walton Lake outlet gate valve in order to fully utilize the maximum head at the water surface of Walton Lake. The 24-inch slide valve will be left in place and a trash rack will be installed around the intake. The existing transition structure to match the 24-inch outlet works to the 30-inch Buckeye Conduit may possibly require some modification.

A 16 x20 foot concrete block powerhouse with concrete foundation will be constructed adjacent to the existing energy dissipating valve house. The unit will discharge into a draft tube which in turn will discharge into the dissipator chamber or directly into the 42-inch RCP line leading back to the ditch. The power plant is delineated on Plate 3B. The powerhouse will house the cross flow turbine, speed increaser, asynchronous generator, and the required

electrical, hydraulic, and mechanical controls. The transformer will be mounted on a concrete pad next to the powerhouse. A cyclone fence will be constructed around the powerhouse site, enclosing an area about 100 feet by 100 feet which will include the energy dissipating valve house.

A Tee will be installed in the Buckeye Conduit immediately above the existing 30-inch to 18-inch transition and energy dissipator, with an 24-inch diameter line to the power plant. A 24-inch diameter butterfly valve will be installed in the line to the power plant to permit flows to be closed off during maintenance or to operate in conjunction with the valve to the energy dissipator as a synchronous bypass.

A PG&E power pole is located about 60 feet from the proposed power plant site. The line is three phase and of adequate capacity to handle the Buckeye unit.

C.3 Operation and Controls

Releases through the proposed Buckeye power plant will continue in a fashion very similar to present releases to the Georgetown Divide Ditch from the Buckeye Conduit. The unit will be hand controlled by the Ditch Tender in order to provide sufficient flow through the Buckeye Conduit from Walton Lake to meet District demands. Automatic hydraulic controls do not appear to be justified for this unit. Any excess flow which could not be stored at Walton Lake would be spilled.

The synchronous bypass will consist of the two butterfly valves with controls which will shut off flow to the turbine and bypass it through the energy dissipator in the event of a failure of the unit or separation from the electrical grid system. The maximum opening of the existing 12-inch cone valve would be preset by the Ditch Tender so that flow would remain relatively uninterrupted in the event of an electrical failure. It would not be anticipated to run the Buckeye pipeline

for long periods of time with the discharge through the energy dissipator. The unit would have to be restarted manually in the event of a failure. The bypass facilities are capable to releasing flow rates as great as those possible through the existing dissipator.

VII. BUFFALO HILL UNIT

A. Site Description

The Georgetown Ditch continues in open conduit from the Buckeye unit site to the north side of the City of Georgetown. At this point ($SW\frac{1}{4}$, $SW\frac{1}{4}$, Sec. 2, T12N, R10E, MDB&M), the flows enter the existing Buffalo Hill Siphon. The siphon is 24-inch diameter reinforced plastic mortar pipe, buried with concrete thrust blocks. The pipe is 5400 feet in length and terminates with a 14-inch diameter butterfly valve shut-off which discharges into an energy dissipating device near Buffalo Hill ($NE\frac{1}{4}$, $NW\frac{1}{4}$, Sec. 10, T12N, R10E, MDB&M). Total difference in elevation between the water surface at the entry to the siphon and at the exit from the siphon is 145.0 feet.

Over the years, there has been some problem with the reinforced plastic mortar pipe (Techite) which was installed in 1971. Several breaks in the pipeline have occurred. The class of pipeline appears to be more than adequate for the pressures encountered and for conditions to be encountered with the proposed power plant. Failures observed to date have apparently been attributable to either (1) deficiencies in the manufacture of individual pieces of pipe, or (2) poor construction techniques in pipe placement and thrust block construction. In the event that it is decided to build a power plant at the Buffalo Hill site, it is essential that the loads on the pipeline must be no greater than loads being currently experienced in order to avoid any further premature failure.

The proposed power plant site is immediately adjacent to and downstream from the existing energy dissipator site. The District has right of access and easement for the Georgetown Divide Ditch and Buffalo Hill siphon, but new easements will be required for the power plant site. Recent land splitting and

residential construction in the immediate vicinity of the power plant site must be considered as intangible items in any decision to install this unit. The power plant site is located immediately adjacent to a private dirt road which has been used as access to the energy dissipator and Georgetown Divide Ditch.

B. Flow and Hydraulics

Flows for the Buffalo Hill unit will be those flows in the conduit system required to meet water demands in the District's distribution system and maintain system operation. Operational flows and studies are described under "Project Power Production", Section IX.

The maximum flows for 1984 at the Buffalo Hill unit are estimated to be 19 cfs during the summer months. Flows during the winter months will vary between 3 and 10 cfs depending upon water availability and demands. The Buffalo Hill unit is sized for 130 percent of the estimated 1984 maximum flows, or 25 cfs. Potential growth patterns might justify a slightly smaller unit hydraulic capacity at this location.

C. Recommended Project

C.1 Power Plant Selection

The Buffalo Hill unit will be expected to operate under widely varying range flow conditions. The maximum static head will be 143.0 feet, which at the design flow rate of 25 cfs would result in an operating head of approximately 95.2 feet. At the 1984 flow of 19 cfs, the operating head would be 114.6 feet. As with the Buckeye Conduit, the extremely long pipeline results in relatively high pipeline losses at higher flow rates.

Although a cross flow turbine at this site would produce the greatest generation

during the average year, a predesigned package unit of the conventtional impulse type appears to have the edge from an economic standpoint due to the lower initial cost and ease of installation. The small impulse machine is near its lower limt of head, especially at the maximum flow rate when pipeline losses are high. The predesigned package unit of conventional impulse type is recommended for installation at Buffalo Hill. A turbine efficiency of 80 percent at maximum flow rate was assumed, with somewhat less efficiency at low flows than the cross flow unit. Generator efficiency was assumed to be 93 percent. Following is a summary of unit sizing.

Item	Type	Rating	Hydraulic Capacity
Turbine	Impulse	216 hp	25 cfs
Generator	Asynchronous	150 kw, 440 volt	

Average annual generation under 1984 water demands would be about 811,000 kilowatt hours at the Buffalo Hill Unit, with a minimum year generation of 615,000 kilowatt hours. The smaller Buffalo Hill and Kaiser units may be more difficult to operate to maximize potential generation, especially during the period outside the irrigation season, than would be the larger plants. This is a factor which must be considered in analysis of economic feasibility.

C.2 Description of Proposed Installation

The Buffalo Hill unit will require no new construction of pipeline, A "Y" will be installed immediately upstream of the existing butterfly valve. The leg to the power plant will be 16-inch diameter with a 16-inch butterfly shut-off valve. The butterfly valve might possibly be eliminated if the turbine control system can completely shut off flows to the turbine.

A 16x20' steel or concrete block powerhouse will be constructed in the Georgetown Divide Ditch immediately downstream from the existing energy dissipator structure. Releases from the energy dissipator will flow through the powerhouse foundation

structure. The 16-inch leg of the "Y" will discharge through the turbine with the draft tube discharging directly into the Georgetown Divide Ditch. The powerhouse will house the turbine, speed increaser, asynchronous generator, and the required electrical, hydraulic, and mechanical controls. The transformer will be mounted on a wood pole next to the powerhouse. A cyclone fence will be constructed around the powerhouse site enclosing an area of about 100 feet by 60 feet which will include the energy dissipating structure and valve box.

A PG&E power pole is located about 100 feet from the proposed plant site. The line must be upgraded to three phase, but distance and cost must be small. PG&E has not yet decided on the best procedure for upgrading this line.

C.3 Operation and Controls

Releases through the proposed Buffalo Hill power plant will continue in a fashion very similar to releases to the Georgetown Divide Ditch from the Buffalo Hill siphon. The unit may either be hand-controlled by the Ditch Tender or operated with a control sensitive to water surface elevation at the inlet to the Buffalo Hill siphon in order to minimize air intake to the pipeline and maintain maximum head on the unit. A turnout will be required above the siphon inlet to spill any flow in excess of unit capacity or surplus flow during changing of valve settings.

The synchronous by-pass valve will be the existing 14-inch butterfly valve, which will fully open in the event of a failure of the unit or separation from the electrical system. The unit will have to be restarted manually in the event of a failure. Bypass capacity is adequate to more than meet all future demands.

C.4 Intangibles

There are two items which must be considered as intagibiles in the development

of the Buffalo Hill site. These are (1) integrity of the pipe in the existing Buffalo Hill siphon and (2) encroaching residential development at the site.

It is virtually impossible to determine whether all points which might be subject to premature failure in the Buffalo Hill siphon have already failed and been corrected. Under normal operation, the pipeline as designed should be more than adequate to take loads created by the proposed power plant, which are no more than present loads imposed by the existing energy dissipator. However, there is always the possibility that some electrical or mechanical device may fail, resulting in rapid closure of turbine controls or butterfly valve to the turbine without simultaneous opening of the valve to the bypass. This might create momentary high pressure, and if portions of the pipe are actually near the point of premature failure, damage could result. A 1984 repair and replacement cost of $5000 was included in the operation and maintenance cost of the Buffalo Hill unit in order to allow for possible failure. However, a fairly substantial failure could be potentially very costly. By the same token, failure might occur even if no power plant were installed. The District must consider the value of potential power generation as weighed against the possibility of potential pipeline failure at this site, weighing the fact that under normal operating conditions the stress on the pipe would be no more than at the present time.

Apparently, parcels surrounding the existing energy dissipator structure for the Buffalo Hill siphon have been recently split, and some residential construction is taking place within 75 feet of the existing structure. The existing energy dissipator is relatively noisy. Although there would be some noise generated by a power plant at this site, the overall amount of noise would probably be at a much

lower level than the existing energy dissipator. However, the type of noise would be different. The District must consider the impact of the potential change in noise and noise level as well as other impacts related to the proximity of residential development.

Depending upon the type of unit installed, the emergency by-pass operations might be accomplished by deflecting the jets away from the turbine runner. This might eliminate the cost of a sychronous by-pass control on the by-pass line with some small reduction in cost. The standard by-pass would still be required for long term by-passing of flows and maintenance purposes.

VIII. KAISER UNIT

A. Site Description

The Georgetown Divide Ditch continues in a westerly direction beyond Georgetown. About four miles west of Georgetown, the conveyance system drops about 175 feet in the Kaiser pipeline to the point where it enters the existing Schroeder Siphon. The Schroeder Siphon is 24-inch in diameter and approximately 2500 feet long and conveys the water across a tributary of Greenwood Creek and State Highway 193. The Schroeder Siphon is mostly a steel pipe of unknown condition. Although it would be possible to recapture some head in the Schroeder Siphon at low flow conditions (when head loss due to pipe friction would be small), the probable condition of the Schroeder Siphon is such that it would be inadviseable to consider that pipeline as part of a proposed power project.

In 1972, GDPUD built the Kaiser pipeline to convey water from the Georgetown Ditch through the 175 foot drop to the Schroeder Siphon inlet. The Kaiser pipeline paralleled and replaced a former existing pipeline and ditch section. The total length of the pipeline is approximately 1400 feet. It is constructed of 24-inch diameter reinforced plastic mortar pipe (RPM 100) with 100 foot design working pressure and corresponding connections and details. There is an energy dissipator installed 432 feet from the upstream end of the Kaiser pipeline, approximately 118 feet below the intake elevation. The energy dissipator reduces pressure head in the pipe at that point, which permitted construction of the remainder of the pipeline with pipe having a working pressure of 100 feet.

Several alternative sites and types of equipment were analysed for the Kaiser pipeline unit. Two of the alternative sites are described in this report. The first alternative (Alternative A) had the greatest head, 166 feet (total drop in the pipeline

to this point is 169 feet), utilizing a major portion of the drop between the inlet to the pipeline and the Schroeder Siphon. From a practical standpoint, it was desirable to locate the unit on private, rather than Federal (BLM) land. The unit is located at Station 12+58 on the Kaiser pipeline. Since the existing pipeline working pressure is only 100 feet (even though the test pressure of the pipe is 225 feet) it was concluded that it would be unwise to remove the existing dissipator and pressurize the entire existing line. Consequently, it would be necessary to either (1) replace the entire line from the dissipator to the power plant (826 feet) with line of suitable working pressure, or to (2) encase the existing pipe in concrete. Replacement appears to be the most attractive. A predesigned package unit of approximately 180 kw capacity could be used. A unit of this capacity would require delivery of 3-phase power to the PG&E system.

The second alternative (Alternatave B) would be to install the unit at the existing energy dissipator near Station 4+32. Static head would be 118 feet. Although generation would be reduced to about 65 percent of that at the lower site, this alternative would permit the following.

1. Eliminate the need for replacement of 826 feet of existing pipe with new pipe capable of withstanding the higher working pressures.
2. Permit the use of a small predesigned package unit of turbine, generator, and controls. The unit would be approximately 100 kw with the corresponding lower first cost and simplified controls to meet PG&E requirements. The turbine would be a conventional impulse type.
3. Permit generation of three-phase current but with possible delivery of single phase current to the existing PG&E distribution system, eliminating the need for construction or upgrading of transmission facilities.

Both proposed power plant sites are located on private property. The higher head unit (Alternative A) is located about 20 feet upstream from the point where Kaiser pipeline enters Bureau of Land Management property (SW$\frac{1}{4}$, SW$\frac{1}{4}$, Sect. 6, T12N, R10E, MDB&M). Length of pipeline to this point is 1258 feet. The lower head unit (Alternative B) is also in Section 6 with 432 feet of pipeline. The District has right of access and easement for the Kaiser Pipeline, but new easements will be required to extend the existing easement around either of the power plant sites. The power plant sites are located within 450 feet of an existing medium duty County road and are approximately 0.3 mile from State Highway 193. A short access road will be constructed from the County road to either power plant site, with Alternative B requiring the longer road. Most of the access road will be within the easement of the existing Kaiser pipeline.

B. Flow and Hydraulics

Flows for the Kaiser unit located at either site will be those flows in the conduit system required to meet water demands in the District's distribution system and maintain system operation. This portion of the ditch system supplies the Cool area with irrigation water and supplies are described under "Project Power Production", Section IX.

The 1984 maximum flows at either Kaiser unit are estimated to be 15 cfs during the summer months. Flows during the winter months will vary between 3 and 10 cfs, depending upon water availability and demands. Alternative A is sized for 120 percent of the estimated 1984 flows or 18 cfs. This would give about 260 hp or 180 kw capacity. Note, however, that the power production study in Section IX shows a drop in generation by 1998 as a result of a greater proportion

of the flow being carried in the pipelines of the treated water system. The lower head unit, Alternative B, was sized for 15 cfs which would give a capacity of about 100 kw. This unit could be possibly operated under 100 kw to meet PG&E requirements.

C. Recommended Project

In spite of the high cost of replacing pipeline, Alternative A has a 1984 cost of generation about 0.7 cents/kWh higher than Alternative B. Since the two sites are so close in cost, small changes in cost or financial assumptions could make either one or the other the most attractive. Both alternatives are described below.

C.1.a Power Plant Selection, Alternative A

The Kaiser unit will be expected to operate under a widely varying range of flows. Maximum static head will be 166 feet, which at maximum flow rate of 18 cfs would result in a operating head of approximately 158.8 feet. At the 1984 flows of 15 cfs, the operating head would be 161.0 feet.

A predesigned package unit with a conventional impulse turbine is recommended at this site. The unit would produce about 260 hp at 18 cfs, driving a 180 kw asynchronous generator. Although a cross-flow unit appears to produce more power, particularly during period of low flow, the additional cost does not appear to be justified. A turbine efficiency of 80 percent at maximum flow rate and 83 percent at maximum efficiency was assumed (see Figure 3), with a generator efficiency of 93 percent.

The average annual generation under 1984 water demands would be 820,000 kWh at the Kaiser unit, with a minimum year generation of 539,000 kWh. It is anticipated that average annual generation would drop to 784,000 kWh by 1998.

C.2.a Description of Proposed Installation, Alternative A

The Kaiser unit will require new construction of 826 feet of 24-inch pipeline with safe working pressure up to about 200 feet. It will be necessary to eliminate the existing energy dissipator and replace it with concrete encased pipe.

A 16x20 foot prefabricated steel building with concrete foundation will be constructed adjacent to the Kaiser Pipeline alignment about 20 feet before entry of the pipeline onto Bureau of Land Management land. A "tee" with a 10-inch diameter outlet will be constructed in the 24-inch pipe immediately upstream from the proposed powerhouse. A transition to 16-inch diameter pipe will be installed immediately downstream from the "tee". The 16-inch pipe will use the powerhouse foundation as a thrust block and bend upward, discharging through the turbine. A 16-inch butterfly valve will be mounted in the pipeline ahead of the turbine for maintenance purposes and to act as part of a synchronous bypass system. The unit will discharge into a chamber in the foundation of the powerhouse. Flow will exit the chamber through the existing 24-inch Kaiser pipeline downstream from the power plant.

The 10-inch extension from the "tee" will be controlled with a 10-inch butterfly valve which will act as the second valve of the synchronous bypass. The 10-inch pipeline will discharge into the chamber below the draft tube against a steel faced concrete wall to dissipate energy while the unit is bypassing flow.

A PG&E power pole is located about 190 feet from the proposed power plant site. The line is single phase and would have to be upgraded to three-phase for the Kaiser unit. A PG&E three-phase line is located about 2500 feet to the west along State Highway 193.

C.1.b Power Plant Selection, Alternative B

Maximum static head at Alternative B, the unit located at the Kaiser energy dissipator, is 118 feet, which at a flow rate of 15 cfs would give an operating head of 110.3 feet. A small predesigned packaged unit with approximately 100 kw capacity would appear very practical at this site. A package unit investigated has a small multi-jet impulse turbine with about 150 hp at 15 cfs and a 100 kw asychronous generator. Maximum flow rate through the unit would be restricted to slightly over 15 cfs, but additional flows could be bypassed on occasion if necessary. Turbine efficiency was estimated as 80 percent at maximum flow rate and 83 percent at maximum efficiency. Generator efficiency has been assumed at 90 percent to compensate for losses attributable to single-phase delivery.

The average annual generation under 1984 water demands would be 533,000 kWh at the Kaiser unit with the minimum year generation of 350,000 kWh. Generation is 65 percent of that at Alternative A.

C.2.b Description of Proposed Installation, Alternative B

The Kaiser unit would be installed in a 16x20 foot prefabricated steel building located adjacent to the existing pipeline at the approximate location of the existing energy dissipator. A "tee" with a 12-inch diameter outlet would be constructed on the 24-inch existing pipeline immediately upstream from the existing energy dissipator, with the 12-inch line to be used as a bypass. A transition to 16-inch diameter pipe will be installed immediately downstream from the "tee". The 16-inch pipe will use the powerhouse foundation as a thrust block and then upward, discharging through the impulse turbine. The 16-inch butterfly valve will be mounted in a box outside of the power plant in the pipeline ahead of the turbine for maintenance purposes and will act as part of a synchronous bypass system.

The impulse unit will discharge into a chamber in the foundtion of the powerhouse and flow will exit the chamber through the existing 24-inch Kaiser pipeline downstream from the power plant.

The 12-inch extension from the "tee" will be controlled with a 12-inch butterfly valve which will act as the second valve of the synchronous bypass. The 12-inch pipeline will discharge into the chamber below the turbine against a steel faced concrete wall to dissipate energy while the unit is bypassing flow. A PG&E power pole is locate about 650 feet from the proposed power plant site. This line is single-phase and although the unit would operate on three-phase, power would be delivered to the PG&E system at single-phase.

C.3 Operation and Controls

Releases through either of the proposed Kaiser power plant alternatives will continue in a fashion very similar to releases through the existing ditch system and Kaiser pipeline. An automatic control sensitive to water stage at the inlet to Kaiser pipeline is recommended to maintain head on the unit with varying flow in the ditch system. Any excess flow which could not be handled by the unit would be spilled from a turnout into a tributary of Greenwood Creek.

The synchronous bypass valve of either unit will fully open in the event of a failure of the unit or separation from the electrical system so that flows remain relatively uninterrupted in the event of an electrical failure. Depending upon the type of unit selected, bypass resulting from electrical failure might be accomplished by jet deflectors, which could possibly result in a reduction in cost of the synchronous bypass. The unit would have to be restarted manually in the event of failure.

C.4 Intangibles

The Kaiser pipeline is constructed of reinforced plastic mortar pipe. GDPUD experience at the Buffalo Hill Siphon has created some skepticism as to reliability of this type of pipe if stressed to design limits. This matter should be considered in the decision to pursue the Kaiser unit.

IX. PROJECT POWER PRODUCTION

A. General

As a result of the fact that all power plants will be utilizing flows to be delivered for consumptive use in the service area of GDPUD, analysis was made simultaneously for all plants proposed under FERC Projects 4302 and 4303. A computer program was developed to model operation of the entire GDPUD system including the following:

1. Operation of Stumpy Meadows Reservoir.
2. Diversion and re-diversion from Pilot Creek, its enroute tributaries, and Otter Creek as available supply to the conduit system.
3. Enroute diversion from the conduit system to the service area.
4. Turbine type as represented by efficiency curves.
5. Fish and streamflow maintenance releases to Pilot Creek, both above and below Pilot Creek Diversion Dam.

A sketch outlining various features considered in the analysis appears in Figure 2.

B. Hydrology

Analysis was made for the twenty-year period including water years 1959-60 through 1978-79. The USGS gaging station, Pilot Creek above Stumpy Meadows Reservoir, adjusted for difference in area, was used to estimate inflow to Stumpy Meadows Reservoir. All operations were conducted on a monthly basis to meet (1) fish and streamflow maintenance requirements, and (2) demands for consumptive use within the GDPUD service area. Both the above station and Pilot Creek below Mutton Canyon were used to estimate other local inflow and enroute diversion.

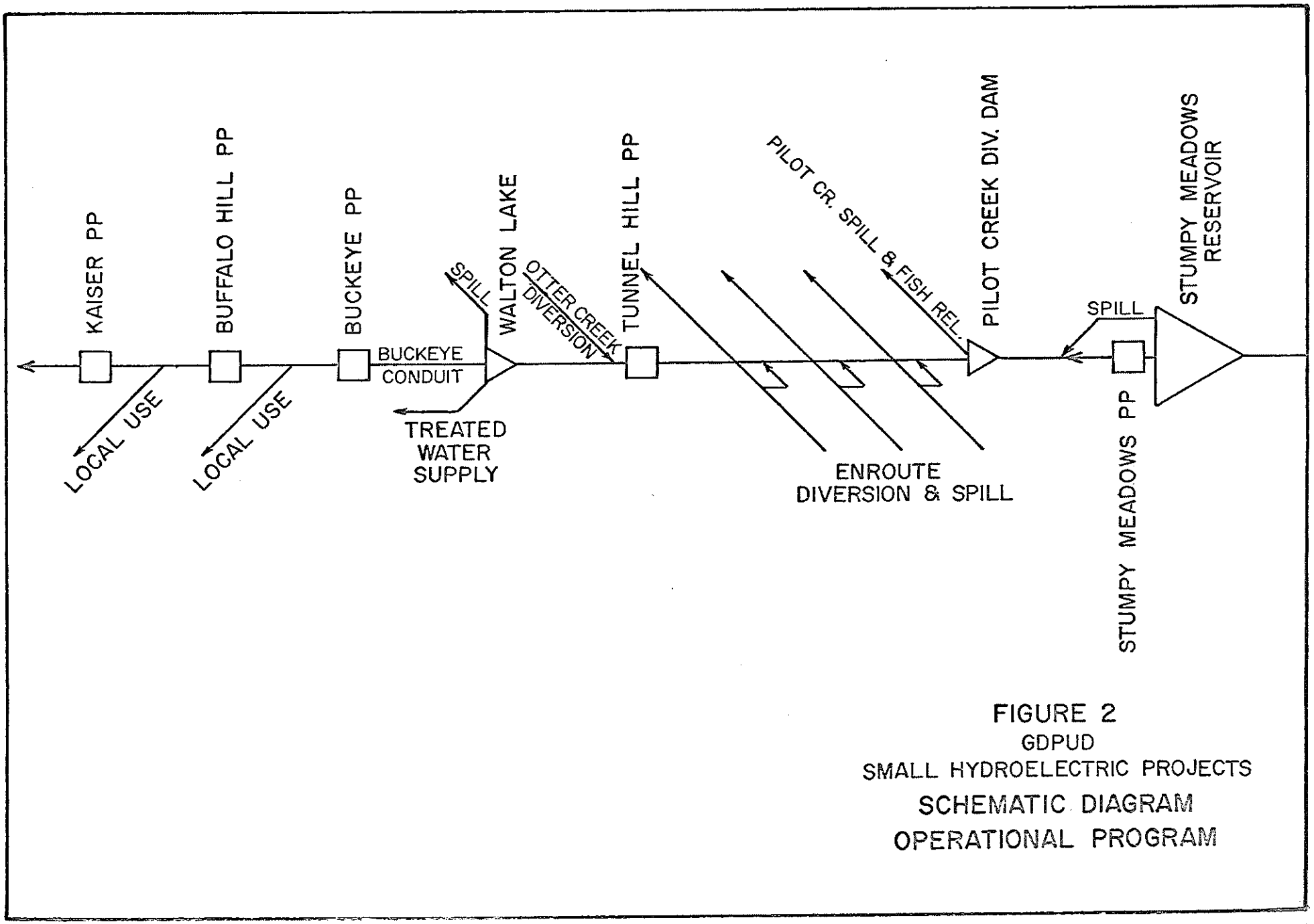

FIGURE 2
GDPUD
SMALL HYDROELECTRIC PROJECTS
SCHEMATIC DIAGRAM
OPERATIONAL PROGRAM

At the present time, diversions of up to approximately 15 cfs are made during winter months when such flows are available to meet water demands and to keep the ditch system operational, even though a portion of this water may return to natural stream channels through enroute turnouts. If local winter flows in the analysis were insufficient to meet demands, additional winter releases were made from Stumpy Meadows Reservoir.

When Stumpy Meadows Reservoir was either full and spilling, or projected to fill and spill in the program, release was made at the maximum rate through the Stumpy Meadows power plant, even though the downstream diversions were not necessarily increased beyond what they would have been without the Stumpy Meadows spills or releases.

C. Water Demands

Water demands in the GDPUD service area were estimated at two different levels of development. A beginning of project demand value was estimated at 9800 acre-feet annually (1984 conditions). A second set of studies was run with a value of 12,000 acre-feet annually which is the estimated demand in ten to fifteen years subsequent to 1984. The following table gives an estimate of the time-distribution of these demands.

Estimated Demand Schedule

Month	1984 Demand Acre-feet	Future Demand Acre-feet	Month	1984 Demand Acre-feet	Future Demand Acre-feet
Oct.	700	800	Apr.	500	700
Nov.	400	500	May	1200	1500
Dec.	300	400	June	1500	1800
Jan.	300	400	July	1500	1800
Feb.	300	400	Aug.	1500	1800
Mar.	400	500	Sep.	1200	1400
			Total	9800	12,000

D. Unit Type

Analysis was made for various types of turbines. The units in these projects are subject to extreme variation in flow during the year due to both change in demand and availability of water. Efficiency curves utilized for the cross flow and Francis turbine units studied appear in Figure 3. Although the cross flow unit is substantially less efficient at peak conditions than the Francis, the particular cross flow unit studied (Ossberger) had relatively high efficiency over a very wide range of flow. Generator units of the induction or asynchronous type were assumed to have an efficiency of 93 percent.

In general, the cross flow type turbine with lower maximum efficiency but a relatively high efficiency over a broad range of flow (and head in the case of Stumpy Meadows unit) produced about 25 percent more power than the Francis type unit which has a higher maximum efficiency, but a more limited range of flow. As a consequence, the cross flow unit was selected as the most appropriate turbine for Stumpy Meadows, Tunnel Hill and Buckeye sites to meet changing flow conditions in the system. Small predesigned package units of conventional impulse design were considered for Buffalo Hill and Kaiser.

E. Average Power Output

Power output was estimated for each unit in the system on a monthly basis for the twenty-year period of investigation. The average power output for 1984 conditions and future conditions appear in Table 2A (1984 conditions) and Table 2B (future conditions). Although future annual demand is estimated about 22 percent greater than 1984 demand, the overall increase in power production is only about 5 percent. This results primarily from two causes. First, higher flow rates result in greater head loss due to pipe friction, which reduces the

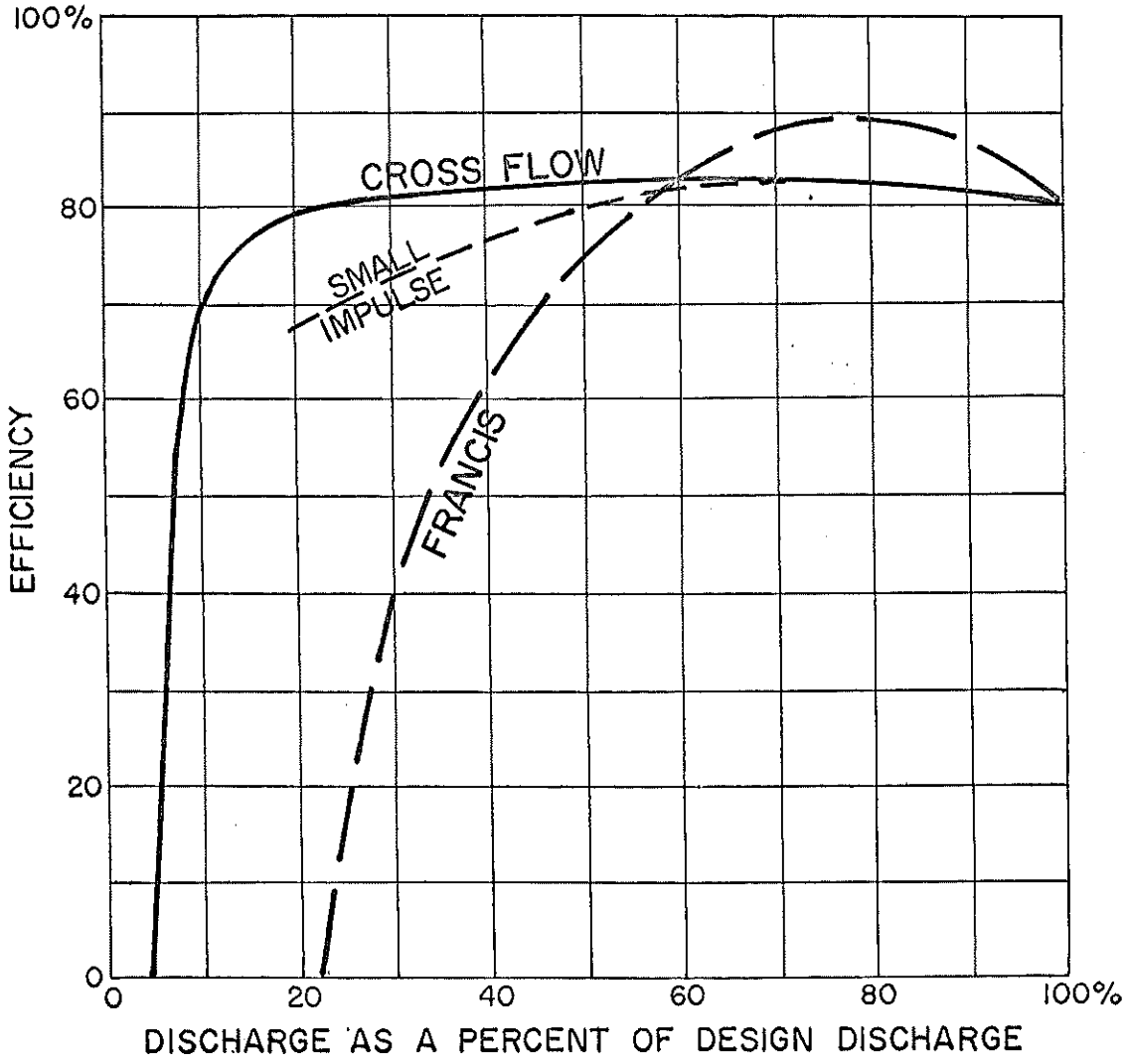

FIGURE 3
EFFICIENCY CURVES
FOR
TYPICAL SMALL TURBINES

gain in production. Second, reduction in future generation at the lower power plants, or at least lack of increased generation during winter months, results from the fact that certain domestic usage now served by ditches will be in pipeline from upstream water treatment facilities in the next fifteen or twenty years.

It may be more difficult to control the two smaller plants, Buffalo Hill and Kaiser, to meet varying flow conditions in the ditch due to changes in upstream flows and demands. This is particularly true of the winter months during storms when it may be more prudent to spill water at turnouts than to try to generate power. The November through March figures in Tables 2A and 2B for Buffalo Hill reflect a 15 percent reduction of winter generation for this reason, while the figure for Kaiser reflect a 20 percent reduction of winter generation.

Table 2A
Estimated
Average Annual Power Output

Million Kilowatt Hours
1984 Conditions

Month	Total of all Units		Average Year Generation				
	Average Year	Minimum Year	Stumpy Meadows	Tunnel Hill	Buckeye	Buffalo	Kaiser Alt. A 1/
Oct.	.451	.448	.067	.147	.124	.056	.057
Nov.	.207	.169	.019	.088	.057	.022	.021
Dec.	.277	.096	.031	.092	.085	.035	.034
Jan.	.408	.077	.084	.113	.115	.048	.048
Feb.	.533	.089	.129	.145	.140	.058	.061
Mar.	.647	.167	.211	.152	.152	.064	.068
Apr.	.710	.285	.268	.154	.154	.065	.069
May	.836	.728	.231	.232	.208	.084	.081
June	.905	.885	.162	.299	.246	.098	.100
July	.902	.876	.156	.302	.246	.098	.100
Aug.	.909	.865	.162	.303	.246	.098	.100
Sep.	.750	.708	.131	.246	.208	.084	.081 .462
Annual	7.535	5.394	1.651	2.273	1.979	.811	.820

1/ Kaiser Alternate B is 65 percent of values shown in table.

Table 2B
Estimated
Average Annual Power Output

Million Kilowatt Hours
Future Conditions

Month	Total of all Units		Average Year Generation				
	Average Year	Minimum Year	Stumpy Meadows	Tunnel Hill	Buckeye	Buffalo	Kaiser Alt. A[1/]
Oct.	.454	.470	.074	.158	.125	.053	.044
Nov.	.264	.240	.024	.110	.090	.022	.018
Dec.	.279	.149	.031	.108	.084	.030	.024
Jan.	.388	.137	.079	.120	.110	.042	.037
Feb.	.482	.146	.108	.145	.130	.051	.048
Mar.	.607	.234	.188	.154	.149	.059	.057
Apr.	.684	.413	.250	.159	.153	.062	.060
May	.954	.852	.228	.289	.242	.099	.096
June	1.018	.964	.183	.352	.269	.107	.107
July	1.020	.950	.182	.355	.269	.107	.107
Aug.	1.025	.930	.186	.356	.269	.107	.107
Sep.	.796	.000	.141	.270	.218	.088	.079
Annual	7.969	5.485	1.676	2.576	2.107	.828	.784

1/ Kaiser Alternate B is 65 percent of values shown in table.

X. PROJECT COSTS

A. General

Each power plant in this investigation was analysed as a separate unit, rather than as an entire single system. A few simplifying assumptions had to be made to permit the individual evaluation, but for the most part, net results would be conservative.

Construction costs of specific power plants and necessary appurtenant features are based on construction prices as of September 1981. Costs were then increased with a contingency, engineering and administration added, and the total was escalated to January 1984 prices, the date when the units were considered to go on line. The total cost, January 1984 prices, was then increased by other indirect costs and finally by reserves and financing fees to obtain the capital cost for each unit for January 1984.

Annual costs, including capital recovery, operation, maintenance, and other annual expenditures were then estimated so that cost of power production could be estimated (see Section XI, "Financial Alternatives and Energy Cost").

B. Capital Costs

B.1 Construction Cost as of September 1981

Construction costs were estimated as of September 1981. It should be recognized that there is a relatively wide range of costs for development of small hydro. Turbine-generator package units with controls, including switch gear and protective devices were based on manufacturers' and distributors' estimates. There seemed to be a substantial amount of variation between the highest and lowest estimates. The majority of the estimates were relatively close when the range

of services were also evaluated. The largest variations in costs were for the smaller units where the near pre-designed package type units were substantially less expensive than the units designed for the site. Although the cross flow units were not the lowest priced units, they were included in this estimate because of the larger potential generation. Studies indicated that incremental cost was more than justified by added generation with these units, especially at Stumpy Meadows, Tunnel Hill and Buckeye. The pre-designed package units were analysed for Buffalo Hill and Kaiser for comparison purposes where it was felt that the package unit might be particularly adaptable.

Costs of transformers, transmission lines, and other costs associated with metering and hookup were from estimates made by Pacific Gas and Electric Company. Costs of access roads, grading, excavation, and construction of powerhouses were based upon the present costs in the local area.

Estimates of costs of construction at 1981 prices for each of the five units appear in Tables 3A through 7A at the end of this section. Note that there is no contingency included in this construction cost.

B.2 Project Costs as of January 1984

Total construction costs as of September 1981 levels were used as a basis for estimating January 1984 project costs. The following steps were used in preparing the estimates.

1. September 1981 construction costs were taken from Tables 3A through 7A.
2. Contingency of 20 percent was added to all September 1981 construction costs, with the exception of construction of the power transmission lines to service the Stumpy Meadows power plant, where a 15 percent

contingency was used.

3. Engineering and administrative costs were set at 10 percent for projects in excess of $700,000 total construction cost plus contingency, and at 12 percent for projects less than that amount.

4. Escalation to January 1984 prices was based upon 2.25 years at 10 percent per year.

5. Total costs, January 1984 prices represents the total cost of construction at September prices increased for escalation.

6. Project costs as of January, 1984 for each of the five power plants and appurtenant facilities appear in Tables 3B through 7B.

B.3 Capital Costs

Tables 3B through 7B also contain estimates of total capital costs for each of the five units. Total capital cost represents project costs as of January 1984 with the addition of the following items:

1. Legal fees, miscellaneous right-of-way. In addition to other right-of-way costs included in the construction estimates were estimated at 2.5 percent of total costs, January 1984 prices.

2. Studies, licenses, permits were estimated for each unit. It should be noted that a substantial portion of the cost of this item has already been completed and included under the loan from Department of Energy.

3. Interest during construction was assumed to be at the bond rate. Since project construction will require about one year, and only a portion of the bond money would be required at the very beginning of construction, it has been assumed that the unused portion of the bond money is either

invested at a rate equivalent to the bond rate or not called for until required. Consequently, interest during construction was assumed to be at the bond rate for one-half year, or 6 percent of total cost, January 1984 prices.

4. Financing fees. District revenue bonds or industrial development bonds have been considered to finance this project. The cost to the District of selling such bonds has been included under capital cost, although analysis has been made on a strictly capital recovery basis. The District's bonding attorneys, Jones, Hall, Hill and White, estimated that at the present time a bond rate of 12 percent is reasonable to use for bonds sold by Georgetown Divide Public Utility District with the tax free municipal status. However, at the present time such bonds would be discounted approximately 6 percent. The cost of bond sales and legal fees would represent about 3 percent of the total issue. The discount rate and cost of sales may vary with the size of the issue. Each unit was analysed independently, but it was assumed that the size of the overall issue would be sufficient to obtain the above rates even if only three or four of the power plants should be built. The impact of initial financing fees can be calculated by multiplying the project cost by

$$\frac{1}{(1-.03)} \times \frac{1}{(1-.06)} = 1.0967$$

representing a 9.67 percent increase in capital cost.

5. Reserves. Reserves constitute an important feature in financing a public project. There are three types of reserves which have been considered in this analysis.

- General Reserves. The District's bonding attorneys recommend a 15 percent reserve on all sites to assure repayment of bonded indebtedness. This represents about one year's debt service. However, they point out that this reserve, if not required, may be invested at rates which would compensate for the repayment interest. Consequently, it was suggested that this general reserve on all sites be excluded from the calculation of capital cost in the analysis which has been prepared for this report. However, the 15 percent reserve must be included when determining the amount of funding required for project construction.

- Delayed Repayment Reserve. Some units do not have sufficient income from power sales to fully compensate for annual costs, including capital recovery, during the early years of project life, even if average water supply conditions are observed. Consequently, an additional reserve amount has been included in the analysis of those units with delayed repayment which will permit repayment according to the schedules appearing in the analysis. The amount of this reserve has been calculated as the funded interest necessary to permit delay of repayment during early years of project life. It has been included in the tables under Extra Reserve.

- Hydrologic Reserve. If the first few years of project operation should have reduced income as a result of exceptionally dry conditions, annual costs may have to be met from reserve. This is especially true of the Stumpy Meadows unit, where the minimum annual production is only about 45 percent of average. Minimum

annual production on the conduit sites is about 75 to 80 percent of average, and it has been assumed that several dry years could be handled satisfactory by the general reserves and replaced by succeeding years with above average flows. However, in the case of the Stumpy Meadows unit, additional reserve was included with the capital cost calculation to compensate for the additional impact of hydrologically deficient seasons on income from generation. The additional cost of funded interest added to the Extra Reserve was $32,000 based on estimated probability of sequential deficient years in early project life.

C. Annual Costs

C.1 Debt Service

A bond repayment period of 15 years was originally selected for all units in this investigation. Bonding attorneys felt that the shorter life bonds would be more attractive to bond purchasers, and the District concluded that time period for repayment should be held to a minimum under conditions of high interest rates which are now being experienced. Capital recovery factor for 12 percent interest for a 15-year repayment period was multiplied by capital cost in order to determine the amount of annual debt service.

The Stumpy Meadows unit which proved to be unattractive with a repayment period of 15 years was also studied with a 25-year repayment period. A 25 year repayment period was not considered justified for the Kaiser unit which appears unattractive with a 15 year repayment.

Although bond repayment was assumed to be uniform payments for all units for the 15-year reapyment period, in actual practice, bond repayment might be scheduled

to better match anticipated payments for power generated, or even repaid at the end of the repayment period with funding generated during the period assigned for repayment. Financial advisors can recommend the most appropriate method of financing applicable to the District, but comparative values in this study are still applicable to project feasibility with District financing.

C.2 Annual Operating Costs

Annual operating costs include the following items, all estimated at January 1984 prices. Annual operating costs appear in Tables 3B through 7.B.B.

1. Operation. This represents the cost of operating the unit, including minor maintenance items, by GDPUD personnel. Cost estimates are based on portions of a man year, including support items such as transportation. The cost has been based on .20 man years for the Stumpy Meadows plant which is most difficult to reach, particularly during winter months. Tunnel and Buckeye are estimated at .15 man years each, while the two smaller plants, Buffalo Hill and Kaiser, are estimated at .12 man years each.

2. Administration. GDPUD administration has been estimated at $2,000 per unit.

3. Repair, Interim Replacement, and Major Maintenance. Annual cost of major maintenance of the unit, including repairs and interim replacement has been estimated at 1 percent of the 1984 power plant construction costs. Major maintenance of mechanical and electrical devices would probably be carried out by contract.

4. Insurance. Power plant insurance has been estimated at 1 percent of the 1984 power plant construction cost. Insurance on most water facilities is currently carried under existing District policies. It is estimated that

the given estimates would provide a satisfactory coverage for liability and other additional coverage which would be desirable for the District.

5. PG&E Charges. Pacific Gas and Electric Company will install and maintain certain metering and other devices and transformers at District expense. The original cost of this equipment and installation has been included in the capital cost of the unit. However, PG&E requires annual payment of 12 percent of original equipment cost to cover cost of ownership of this equipment related to project operation. The annual cost of ownership of equipment associated with the power plant has been estimated as $1500 for the three larger units and $1000 for the two smaller units. In the analysis, this cost has been held constant rather than escalating as the other annual costs.

6. Transmission Lines. PG&E will make an annual ownership charge to a power seller for transmission lines constructed by the seller and taken over by PG&E. The charge is 12 percent of the construction cost of the transmission line. The Stumpy Meadows unit has a substantial construction cost for five miles of new three phase line plus four miles of upgrading existing PG&E single phase line to three phase. The District has no option in payment for the upgraded line. Annual cost is estimated at $5,000. This figure is not escalated with time in the analysis. The District could assume ownership of the five mile extension which might possibly cost less than PG&E ownership. A sureity bond would be required by PG&E in this case. The project was analysed with (1) a constant annual payment to PG&E of $25,400 and (2) district ownership with an estimated annual cost of 6 percent of cost, escalated with other

costs. The District ownership appears more attractive, at least during the first 15 years of project life, and this option was used in analysis. At Tunnel Hill site, an annual PG&E charge of $800 was assumed for the upgrading of the transmission line to the power plant. It was assumed that the other minor transmission lines in the system would be of use to PG&E and annual payments would not be required.

D. Cost of Power Generation

Based on the above costs and assumptions, the cost of power generation varies considerably from unit to unit. The following table compares the cost of generation as of 1984, assuming a 15-year repayment and no return calculated after the end of the repayment period. Tables 9 through 14 give costs for 15 years of analysis through the period of project repayment. (See Section XIII)

1984
Cost of Power Production
(All values in $1000 unless otherwise noted)

Unit	Capital Cost	Extra Reserve	Average Annual Generation[1] 10^6 kWh	Annual Debt Service	Annual Operating Cost	Total Annual Cost	Generation Cost cents/kWh
Stumpy Meadows[2]	1260.0	170.0	1.568	182.3	44.8	227.1	14.48
Tunnel Hill[3]	1454.0	20.0	2.159	216.4	26.4	242.8	11.25
Buckeye[3]	695.0	0	1.880	102.0	22.1	124.1	6.60
Buffalo Hill[3]	429.0	9.0	.770	64.3	22.3	86.6	11.24
Kaiser Alt. A[3]	596.0	124.0	.779	105.7	16.2	121.9	15.65
Kaiser Alt. B[3]	358.0	110.0	.514	68.7	15.5	84.2	16.34

1/ Generation discounted 5 percent from Table 2A at all sites.
2/ 25-year repayment period
3/ 15-year repayment period

Table 3A
Estimated Cost of Construction
Stumpy Meadows Power Plant
1981 Prices

Category and Item	Estimated Cost Item	Estimated Cost Category
Equipment - Hydro-Electric & Electric		
Turbine-generator package, controls	275,000	
Switch and protective gear, misc. controls, Metering	35,000	
Transformer, pad, barriers	8,000	
Installation, testing	25,000	
	343,000	343,000
Equipment-hydraulic		
By-pass butterfly valve, pipeline sections	15,000	
Fabricate and install hydraulic modifications	10,000	
	25,000	25,000
Powerhouse and Appurtenances		
Powerhouse	35,000	
Additional thrust block, ties	5,000	
Fence and other appurtenances	3,000	
	43,000	43,000
Access Roads - grade & fill	5,000	5,000
Total Power Plant Cost		416,000
Transmission Facilities		
Single-phase to 3-phase conversion 4 miles	34,000	
New 3-phase pole line 5 miles	171,000	
R/W, legal, misc.	20,000	
	225,000	225,000
Total Cost - Stumpy Meadows Site		$641,000

Table 3B
Estimated Project Costs
Stumpy Meadows Power Plant
1984 Prices

Item	Cost
Hydroelectric Plant & Facilities	
Direct Cost	416,000
Contingency (20%)	83,000
Total	499,000
Transmission Facilities	
Direct Cost	225,000
Contingency (15%)	36,000
Total	261,000
Total Construction Cost	760,000
Engineering and Administration (10%)	76,000
Total Cost - September 1981 prices	836,000
Escalation (2.25 yrs. at 10%)	200,000
Total Cost, January 1984 prices	$1,036,000
Legal Fees, Misc. R/W (2.5% total cost)	26,000
Studies, Licenses, Permits	25,000
Interest during construction (6% total cost)	62,000
Project Cost, January 1984 prices	$1,149,000
Financing Fees (9.67% project cost)	111,000
Capital Cost Stumpy Meadows Unit, January 1984 prices	$1,260,000

Table 3B (continued)
Estimated Project Costs
Stumpy Meadows Power Plant
1984 Prices

	Annual Costs	Annual Costs Based on Options for Ownership of Transmission Line	
		GDPUD	PG&E
Annual Operation Costs			
Power Plant			
Operation (.2 man years + support)	11,200		
Administration	2,000		
Repair, interim replacement, maintenance (1% PP cost)	6,200		
Insurance (1% PP cost)	6,200		
Total	$25,600		
Transmission line ownership and maintenance (6% constr. cost)	12,700		
		38,300	25,600
PG&E Charges	1,500		
Transmission line 4 miles upgrade	5,000 (6,500)		
Transmission line 5 miles new construction	25,400 (31,900)		
		6,500	31,900
		$44,800	$57,500

Table 4A
Estimated Cost of Construction
Tunnel Hill Power Plant
1981 Prices

Category and Item	Estimated Cost Item	Estimated Cost Category
Equipment - Hydroelectric and Electric		
Turbine generator package, controls	250,000	
Switch and protective gear, misc. controls, metering	35,000	
Transformer, pad, barriers	8,000	
Installation, testing	25,000	
	318,000	318,000
Equipment - Hydraulic		
Wye fabrication and installation	3,000	
Bypass valve to dissipator	3,000	
Dissipator (concrete work in powerhouse)	2,000	
Hydraulic control equipment	6,000	
	14,000	14,000
Penstock & Hydraulic Structures		
Diversion structure	6,000	
3475' 30" ϕ penstock	355,000	
Road crossing	2,000	
	363,000	363,000
Powerhouse and Appurtenances		
Powerhouse	30,000	
Fence and other appurtenances	3,000	
	33,000	33,000
Access Roads	1,000	1,000
Transmission Facilities	7,000	7,000
Total Cost - Tunnel Hill Site		$736,000

Table 4B
Estimated Project Costs
Tunnel Hill Power Plant
1984 Prices

Item	Cost
Hydroelectric Plant & Facilities (incl. transmission)	
Direct Cost	373,000
Contingency (20%)	75,000
Total	448,000
Penstock and Hydraulic Structures	
Direct Cost	363,000
Contingency (20%)	73,000
Total	436,000
Total Construction Cost	$ 884,000
Engineering and Administration (10%)	88,000
Total Cost - September 1981 prices	$ 972,000
Escalation (2.25 yrs. @ 10%)	232,000
Total Cost, January 1984 prices	$1,204,000
Legal Fees, Misc. r/w (2.5% total cost)	30,000
Studies, licenses, permits	20,000
Interest during construction (6% total cost)	72,000
Project Cost, January 1984 prices	$1,326,000
Financing Fees (9.67% Project cost)	128,000
Capital Cost Tunnel Hill Unit, January 1984 prices	$1,454,000
Annual Operation Costs:	
Power Plant	
Operation (.15 man years + support)	8,400
Administration	2,000
Repair, interim replacement, maintenance 1%(pp cost + .5 x penstock)	8,100
Insurance (1% pp cost)	5,500
Total	24,000
PG&E Charges	1,500
Transmission Line	900
	$26,400

Table 5A
Estimated Cost of Construction
Buckeye Power Plant
1981 Prices

Category and Item	Estimated Cost Item	Estimated Cost Category
Equipment - Hydroelectric and Electric		
Turbine-generator package, controls	217,000	
Switch and protective gear, misc. controls, metering	35,000	
Transformer, pad, barriers	8,000	
Installation, testing	25,000	
	285,000	285,000
Equipment - Hydraulic		
Bypass butterfly valve, installation (use existing valve with actuator)	1,000	
Wye fabricated and installed	3,000	
Connecting pipeline to ditch	5,000	
Thrust blocks	2,000	
	11,000	11,000
Powerhouse and Appurtenances		
Powerhouse	30,000	
Earth Work, Misc.	7,000	
Fences and other appurtenances	3,000	
	40,000	40,000
Access Road, Grading	3,000	3,000
Transmission hookup only	1,000	1,000
Total Cost - Buckeye Site		$340,000

Table 5B
Estimated Project Costs
Buckeye Power Plant
1984 Prices

Item	Cost
Hydroelectric Plant & Facilities	
Direct Cost	340,000
Contingency (20%)	68,000
Total Construction Cost	408,000
Engineering and Administration (12%)	49,000
Total Cost - September 1981 Prices	457,000
Escalation (2.25 yrs. @ 10%)	109,000
Total Cost, January 1984 prices	$566,000
Legal Fees, Misc. R/W (2.5% total cost)	14,000
Studies, Licenses, Permits	20,000
Interest during construction (6% total cost)	34,000
Project Cost, January 1984 prices	$634,000
Financing Fees (9.67% project cost)	61,000
Capital Cost Buckeye Unit, January 1984 prices	$695,000
Annual Operation Costs:	
Operation (.15 man years + support)	8,400
Administration	2,000
Repair, interim replacement, maintenance (1% pp cost)	5,100
Insurance (1% pp cost)	5,100
Total	$ 20,600
PG&E Charges	1,500
	$ 22,100

Table 6A
Estimated Cost of Construction
Buffalo Hill Power Plant
1981 Prices

Category and Item	Estimated Cost Item	Estimated Cost Category
Equipment - Hydroelectric and Electric		
Turbine-generator package, controls	120,000	
Switch and protective gear, misc. controls, metering	25,000	
Transformer, pole hung	6,000	
Installation and testing	15,000	
	166,000	166,000
Equipment - Hydraulic		
Fabricate and install wye	3,000	
Thrust blocks	1,000	
Modify pipe & existing valve	4,000	
Pipe - valve box to PP	3,000	
	11,000	11,000
Powerhouse and Appurtenances		
Powerhouse	23,000	
Energy dissipator bypass structure	2,000	
Fences	2,000	
	27,000	27,000
Access	0	0
Transmission Facilities		
800' new 3-phase, hookup	3,000	3,000
Total Cost - Buffalo Hill Site		$207,000

Table 6B
Estimated Project Costs
Buffalo Hill Power Plant
1984 Prices

Item	Cost
Hydroelectric Plant & Facilities	
Direct Cost	207,000
Contingency (20%)	41,000
Total Construction Cost	248,000
Engineering and Administration (12%)	30,000
Total Cost - September 1981 prices	278,000
Escalation (2.25 yrs. @ 10%)	66,000
Total Cost, January 1984 prices	$344,000
Legal Fees, Misc. R/W (2.5% total cost + 2000)	11,000
Studies, Licenses, Permits	15,000
Interest during construction (6% total cost)	21,000
Project Cost, January 1984 prices	$391,000
Financing Fees (9.67% project cost)	38,000
Capital Cost Buffalo Hill Unit, January 1984 prices	$429,000
Annual Operating Costs	
Operation (.12 man years + support)	6,700
Administration	2,000
Repair, interim replacement, maintenance (1% pp cost)	3,800
Allowance for pipeline repair	5,000
Insurance (1% pp cost)	3,800
Total	$ 21,300
PG&E Charges	1,000
	$ 22,300

Table 7A.A
Estimated Cost of Construction
Kaiser Power Plant
Alternative A
1981 Prices

Category and Item	Estimated Cost Item	Estimated Cost Category
Equipment - Hydroelectric and Electric		
Turbine-generator package, controls	123,000	
Switch and protective gear, controls, metering	20,000	
Transformer, pole hung	6,000	
Installation, testing	20,000	
	169,000	169,000
Equipment-Hydraulic		
Thrust blocks	1,000	
Fabricate and install wye, pipeline	5,000	
By-pass butterfly valve, control, and installation	5,000	
Eliminate existing energy dissipator	1,000	
826 feet pipeline replaced	77,000	
	89,000	89,000
Powerhouse and Appurtenances		
Powerhouse	19,000	
Energy dissipator by-pass structure	2,000	
Fences, other appurtenances	2,000	
	23,000	23,000
Access - grading, gravel	2,000	2,000
Transmission	6,000	6,000
Total Cost - Kaiser Site		$289,000

Table 7B.A
Estimated Project Costs
Kaiser Power Plant
Alternative A
1984 Prices

Item	Cost
Hydroelectric Plant & Facilities	
Direct Cost	289,000
Contingency (20%)	58,000
Total Construction Cost	347,000
Engineering and Administration (12%)	42,000
Total Cost - September 1981 prices	389,000
Escalation (2.25 yrs. @ 10%)	93,000
Total Cost - January 1984 prices	$482,000
Legal Fees, Misc. R/W (2.5% total cost)	12,000
Studies, Licenses, Permits	20,000
Interest during construction (6% total cost)	29,000
Project Cost, January 1984 prices	$543,000
Financing Fees (9.67% project cost)	53,000
Capital Cost Kaiser Unit, January 1984 prices	$596,000
Annual Operating Costs	
Operation (.12 man years + support)	6,700
Administration	2,000
Repair, interim replacement, maintenance (1% pp cost)	3,300
Insurance (1% pp cost)	3,300
Total	$ 15,300
PG&E Charges	1,000
	$ 16,300

Table 7A.B.
Estimated Cost of Construction
Kaiser Power Plant
Alternative B
1981 Prices

Category and Item	Estimated Cost Item	Estimated Cost Category
Equipment - Hydroelectric and Electric		
Turbine-Generator package, controls	92,000	
Switch and protective gear, controls, metering	20,000	
Transformer, pole hung	6,000	
Installation, testing	17,000	
	135,000	135,000
Equipment - Hydraulic		
Thrust blocks	1,000	
Fabricate and install wye, pipeline	5,000	
By-pass butterfly valve, control, and installation	5,000	
	11,000	11,000
Powerhouse and Appurtenances		
Powerhouse	18,000	
Energy dissipator by-pass structure	2,000	
Fences, other appurtenances	2,000	
	22,000	22,000
Access - grading, gravel	3,000	3,000
Transmission	1,000	1,000
Total Cost - Kaiser Site		$172,000

Table 7B.B
Estimated Project Costs
Kaiser Power Plant
Alternative B
1984 Prices

Item	Cost
Hydroelectric Plant & Facilities	
Direct Cost	172,000
Contingency (20%)	34,000
Total Construction Cost	206,000
Engineering and Administration (12%)	25,000
Total Cost - September 1981 prices	231,000
Escalation (2.25 yrs. @ 10%)	55,000
Total Cost - January 1984 prices	$286,000
Legal Fees, Misc. R/W (2.5% total cost + 1000)	8,000
Studies, Licenses, Permits	15,000
Interest during construction (6% total cost)	17,000
Project Cost, January 1984 prices	$326,000
Financing Fees (9.67% project cost)	32,000
Capital Cost Kaiser Unit, January 1984 prices	$358,000
Annual Operating Costs	
Operation (.12 man years + support)	6,700
Administration	2,000
Repair, interim replacement, maintenance (1% pp cost)	2,900
Insurance (1% pp cost)	2,900
Total	$ 14,500
PG&E Charges	1,000
	$ 15,500

XI. FINANCIAL ALTERNATIVES AND ENERGY COSTS

A. General

As of the time of preparation of this final report, the specific method of financing has not been determined, pending disucssion with Bond Counsel, Jones, Hall, Hill and White. The costs of producing energy are directly related to the method of financing employed, which can have significant impact upon project cost, development, and feasibility. There has been some discussion to date with the Bond Counsel, and tentative assumptions have been made regarding the approach to financing on the basis of their preliminary recommendations.

- o Type of Financing. Probably the most attractive financing method would be through tax-exempt revenue bonds or tax-exempt industrial development bonds. The District could qualify for either of these alternatives.
- o Bond Interest Rate. Bond Counsel estimates that the present interest rate on the type of tax-exempt bonds which the District might be using would be about 12 percent on the total bond issue. The 12 percent figure was used in this analysis.
- o Cost of Bonding. Bond Counsel estimates that under present conditions it would be necessary to discount the tax exempt bonds by 6 percent. In addition, there would be a cost of bond sales of about 3 percent. These values may vary with the size of the issue. In addition, there may be some substantial change in both the interest rate and cost of bonding before the proposed projects go to construction.
- o Reserves. Three types of reserves have been considered in this analysis for assurance of bond repayment as recommended by bond counsel. Reserves are discussed in Section X, Project Costs, Page X-4.

B. Energy Production Cost

The energy production cost is the annual cost of power production by the District, including both the annual operation costs and payments to retire bonds, divided by the average annual energy production. This information is presented in Tables 9 through 13, under Section XII "Benefit Cost and Financial Evaluation". Description of the analysis is included in that Section. Note that all generation has been discounted by 5 percent in this analysis.

XII. PROJECT POWER VALUE AND MARKETING

A. General

Pacific Gas and Electric Company owns and maintains the electrical distribution system and provides electrical service in the Georgetown Divide area. There are no transmission lines owned by other entities with voltages compatible with purchase of power in the immediate vicinity. Certain problems and costs associated with the wheeling of power through the PG&E system to other possible purchasers seem to preclude sale of power generated by GDPUD to entities other than PG&E.

The Public Utility Regulatory Policies Act of 1978 (PURPA) has set forth requirements for utilities regarding the purchase of power from small generation facilities. PURPA has changed the method for determining the value of energy generated by small power plants and the requirements for electrical interconnection. Section 210 defines the rates at which a qualifying small project can sell energy to a utility. California has implemented some of the policies established by PURPA through the California Public Utilities Commision which regulates electric utilities in California. CPUC instituted proceeding (OIR-2) to implement PURPA, establishing standards governing the prices, terms, and conditions of purchase of electric power by utilities.

According to Section 210 of PURPA and the standards set forth by CPUC Decision 91109, the alternative generation from a small hydroelectric project must be valued at the value of incremental energy a utility would have to generate itself or purchase from another source (the avoided-cost principle).

The District has met on several occasions with representatives of PG&E

from both the local Auburn Office (Drum Division) and the main office in San Francisco. The District has obtained a substantial amount of information from PG&E with regard to the potential sale of power to that company under the provisions of PURPA and CPUC. The information includes but is not limited to the following:

1. Sample contracts related to purchase of energy from small hydro power generation.
2. Estimated value of avoided cost of power under present conditions and under future conditions.
3. Sample calculation of discounted value of power to PG&E in the local area.
4. Methods for determining value of capacity.
5. Guidelines for interconnection with PG&E system.
6. Determination that no upgrading of the present distribution system will be required (with the exceptions noted under descriptions of specific units) in order to accept power from the proposed plants.
7. Estimated cost for transformer facilities, metering, and connection to 12KV distribution system at each site.

B. Projected Energy Costs

Payment by PG&E to Georgetown Divide Public Utility District is broken down into two categories in the sample contract. The basic and major source of revenue to the District would be from sale of energy. However, as a result of the District's major use of water during summer months, which is PG&E's period of maximum electrical demand, GDPUD generation would have substantial

capacity value. The following sections describe methods which have been used in this analysis to estimate the energy and capacity payment rates to GDPUD for purposes of determining economic feasibility of the project.

B.1 Energy Rate

Pacific Gas and Electric Company publishes quarterly the value of energy purchased from small power producers calculated on the basis of the avoided-cost principle. For the quarter ending October, 1981, the weighted value of energy is 7.104 cents per kWh.

At the present time, the cost of alternative generation is related to the cost of oil burned to produce electricity at steam power plants. Because of the rapidly rising price of oil, the cost of energy has escalated at a very rapid rate in the past few years. In order to determine feasibility of a small hydroelectric project, the value of energy generated, particularly during the early years of the project's operation, must be estimated within reasonable, but conservative limits. The economic benefits achieved during the first year or few years of operation will probably increase in subsequent years due to increasing energy prices and inflation, although projections of future escalation and inflation are difficult to make.

Table 8 gives estimates of projected energy rates for the sale of energy from small hydroelectric generation to PG&E from 1981 through 2000 in cents per kWh. The first column represents value of energy as estimated by the California Department of Water Resources in Bulletin 211, Table 8. The figures are based upon California Energy Commission's median estimates of escalation of crude oil prices and estimates of the inflation rate by DWR. The

second column represents an estimate of value of energy based upon projections by PG&E used for planning purposes during 1981. The PG&E representative providing information which appears in the second column could not provide information as to the factor in the increase reated to (1) oil costs vs (2) inflation, but these estimates appear very conservatively low.

The third column represents the value of energy used in this Feasibility Report which was estimated using the following assumptions related to total escalation resulting from increased oil cost and inflation. Values in this column were calculated using the following assumptions.

1. Value of energy for the quarter ending October 1981 assumed at 7.104 cents per kWh. The GDPUD project will produce power on a 24-hour per day basis, so the weighted value was used. This value reflects adjustment for hours of peak, partial peak and off-peak energy.
2. Escalation assumed at 15 percent for 2.75 years to estimate value of power in mid-1984 (assumed to be the average rate at which power would be sold during the 1984 calendar year).
3. Escalation, including inflation, assumed at 10.0 percent from 1984 to 1990 (6 years).
4. Escalation, including inflation, assumed at 7.0 percent after 1991 to 1999.
5. Escalation, including inflation, assumed at 3.5 percent after 1999.

The rate of escalation of energy values used in analysis of the GDPUD projects is considerably more conservative than estimates prepared by Department of

Water Resources. It is relatively close to estimates prepared by PG&E. PG&E has two factors which must be applied to the value of energy based on project location, delivery voltage, and variation of energy as determined from theoretical studies. F_1 is a value based on comparison of energy production during 28 percent of the driest years as compared to the long term average energy. F_1 as determined for the entire Georgetown project is .96 as computed from PG&E contract documents, Appendix H. F_2 is a factor to compensate for transmission losses of energy to PG&E load centers. Drum Division has a value of .96 which must in addition be reduced by about 3 percent to allow for an adjustment for the delivery of voltage to the system. The overall value of F_2 is .93. In this analysis, the estimated value of energy was multiplied by the product of F_1 times F_2 to determine value of energy sold to PG&E.

$$F_1 \times F_2 = .893$$

B.2 Capacity Rate

The time-distribution of potential generation by GDPUD is very attractive as far as load on the PG&E system is concerned. GDPUD is delivering maximum flow for consumptive use within the District during the summer months when irrigation water is required. PG&E has maximum load requirement in June, July and August. The District should elect to take a payment option which includes payment for capacity.

PG&E estimates of capacity payments appear on Table 1, Page C5 of the sample contract document. The estimated value of capacity payments for a 15-year contract period, based upon the proposed GDPUD time-distribution of generation, would represent 1.016 cents per kWh, based upon data from

the historical operational study and 1984 generation. This value must be multiplied by PG&E factor F_3 to compensate for transmission losses for capacity to PG&E load centers and for reduction due to low voltage of delivery. Drum Division has an F_3 of .98 which must be reduced by about 3 percent for transformation losses, giving an overall F_3 of .95. The estimated value of capacity for the 15-year repayment period was estimated at 1.016 cents per kWh times .95 equals 0.965 cents per kWh. The value of capacity payment was added directly to the escalated value for energy payment to represent total value of power sold by PG&E.

C. Discount of Generation

Note that the calculation of generation in this feasibility analysis has been discounted at some sites to represent outages and possible failure of the system to make full utilization of the estimated water supply available. Estimated generation at all sites has been discounted by 5 percent in the financial analysis.

Table 8
Estimates of Energy Costs
Based on
Avoided Cost Principle

Year	DWR[1/]	PG&E[2/]	Feasibility Study[3/]
1981	6.2	--	7.104[4/]
1982	7.5	7.45	7.88
1983	9.1	8.16	9.07
1984	11.1	8.89	10.43
1985	13.4	9.74	11.47
1986	15.0	10.74	12.62
1987	16.6	11.87	13.88
1988	18.5	13.29	15.27
1989	20.6	14.62	16.80
1990	22.9	16.03	18.48
1991	24.6	17.51	19.77
1992	26.5	18.97	21.15
1993	28.6	20.62	22.64
1994	30.8	22.51	24.22
1995	33.1	22.87	25.92
1996	35.7	25.92	27.73
1997	38.4	25.45	29.68
1998	41.4	28.84	31.76
1999	44.6	32.73	33.98
2000	48.0	34.15	35.16

1/ "Small Hydroelectric Potential at Existing Hydraulic Structures in California", Department of Water Resources, Bulletin 211, April 1981, Table 8.

2/ "Estimate of Marginal Energy Costs", PG&E, January 26, 1981, Exhibit J.

3/ See text for assumptions used in calculation, Section XII.

4/ Quarter ending October 1981.

XIII. BENEFIT/COST AND FINANCIAL EVALUATION

A. General

Benefit/cost evaluation is a comparison of the project benefits versus cost over the life of the project. Each power plant was evaluated separately in this analysis. Some work has also been done in evaluating combinations of power plants. All units were compared on the basis of present worth of cost and benefits for (1) the period of debt amortization and (2) estimated physical life of the project. All benefits and costs are calculated as of January 1984.

B. Project Life

Analysis was based upon a period of debt amortization of 15 years. It is estimated that the physical life of the facility, as well as the period over which the facilities can be operated economically in the GDPUD water supply system, will be substantially more. It is anticipated that the physical and economic life of facilities should be in the order of 25 to 30 years. The Stumpy Meadows unit has been analysed with a period of debt amortization of 25 years for comparison.

C. Cost and Benefit Streams

The estimated rate for power sales associated with the proposed project is described under Section XII, "Project Power Value and Marketing". Estimated values included the value for energy, decreased by PG&E factors F_1 and F_2, and escalated according to the following schedule:

Years	Percentage Increase/year
1984 thru 1990	10%
1991 thru 1999	7%
after 1999	3.5%

The capacity value was assumed at 0.9653 cents per kilowatt hour for the entire period of analysis, based on a 15-year agreement with PG&E initiated in 1984.

Costs, primarily the cost of operation, maintenance, and other annual costs involving labor, were subject to the same schedule of escalation as shown for energy costs above.

D. Present Worth Costs and Benefits

Present worth of costs and benefits were calculated using a discount rate of 12 percent, which is the rate estimated by Bond Counsel as the bond interest rate. Both the benefit and cost streams used 12 percent.

E. Benefit/Cost Ratio

The benefit/cost ratio of each project was computed by dividing the sum of the present worth of the stream of differences between revenue and operating expenses by the capital cost of the project, including cost of bonding and reserve. The present worth of benefits and costs were computed using the 12 percent discount rate. Note that estimated power generation has been discounted in this calculation as described previously. The following table lists benefit/cost ratios for each unit in the project.

Present Worth as of 1984
(All values in $1000 except ratio)

Name of Unit	Capital Costs	Extra Reserve	Present Worth of Benefits		Benefit Cost Ratio	
			15 years	25 years	15 yrs.	25 yrs.
Stumpy Meadows 1/	$1260.0	$170.0	--	$1803.2	-	1.26
Tunnel Hill 2/	1454.0	20.0	$2369.0	3216.9	1.61	2.18
Buckeye 2/	695.0	0	2007.0	2697.1	2.89	3.88
Buffalo Hill 2/	429.0	9.0	651.1	868.5	1.49	1.98
Kaiser Alt. A 2/	596.0	124.0	708.5	934.4	.98	1.30
Kaiser Alt. B 2/	358.0	110.0	396.6	514.9	.85	1.10

1/ 25-year repayment period
2/ 15-year repayment period

F. Cash Flow Statement

Annual cash flow for each unit is included in Tables 9 through 14. Following is an explanation of the material contained in these tables.

1. YR -- All projects are assumed to go on line at the beginning of the 1984 Calendar year. Analysis is carried for 25 years. The repayment period is 15 years ending in 1998. Subsequent to 1998, debt service drops to zero, as reflected in the sharp drop in the cost of producing power.
2. GENRATN MKWH -- This column represents average annual generation expressed in millions of kilowatt hours. This value has been discounted ten percent at all conduit site units (but not at Stumpy Meadows) from the values appearing in Tables 2A and 2B.
3. PWR RATE C/KWH -- This column represents the rate of payment for both energy and capacity for project power expressed in cents per kilowatt hour. The initial year, 1984, represents 9.315 cents/kWh energy payment plus 0.965 cents per kWh capacity payment. The energy payment is escalated as described above.
4. POWER REVENUE -- This column represents total payment in thousand dollars for power based upon the power rate times generation.
5. ANNUAL OPERATN -- This column represents the annual operating costs (with the exception of debt service) in thousand dollars. It has been escalated at the same rate as energy rates.
6. SURPLUS -- This column represents power revenue minus annual operation in thousand dollars.
7. PRESWRTH SURPLUS -- This column represents the present worth at an interest or discount rate of 12 percent of all surplus revenue from power (expressed in thousand dollars).

8. ANN COST GENRATN -- This column represents the annual cost of generation, including debt service, in thousand dollars. The figure represents the cost to the District of operating the plant, regardless of income.

9. CASH FLOW -- This column represents cash flow which is power revenue minus annual operation and debt service, expressed in thousand dollars. Negative values indicate that revenues are insufficient to offset annual operation costs and debt service.

10. PWR COST C/KWH -- This column represents the cost of producing power, expressed in cents per kWh. This is the annual cost of generation divided by generation. The sharp drop in power cost in year 16 represents the completion of payments for debt service.

G. Summary of Financial Evaluation

Buckeye is clearly the most attractive unit, with a 1984 cost of power production of 6.60 cents/kWh and a benefit cost ratio of 2.89 by the end of the 15-year repayment period. Initial costs are comparatively low, since only the installation of the power plant is required. There are no high transmission or pipeline costs such as those associated with Stumpy Meadows and Tunnel Hill. The Buckeye unit would fully pay all annual costs beginning with the first year of operation, and with the assumptions used in the analysis would have a surplus of $69,000.

Tunnel Hill is the next most attractive unit, in spite of the relatively high cost of pipeline installation. Tunnel Hill has a 1984 power production cost of 11.25 cents/kWh and a benefit cost ratio of 1.61 by the end of the 15-year repayment period. Based on assumptions used in this analysis, Tunnel Hill would pay all

costs after the second year of operation. If Tunnel Hill were to pay only interest during the first year of operation (as might be planned in a bond repayment schedule), it would become self sustaining in the first year of operation. Also, if Buckeye and Tunnel Hill were developed simultaneously by the District, Buckeye surplus during the first years of operation could be utilized to offset the Tunnel Hill deficit, making the two units self sustaining from the first year of operation.

The Buffalo Hill site was first studied using turbine-generator units similar in design to those at the larger sites. Under those conditions, Buffalo Hill seemed to have no return to the District until near the end of the repayment period, with the 1984 power production costs over 14 cents/kWh. Utilizing one of the small pre-designed packaged turbine-generator-control units which are currently on the market, the Buffalo Hill unit appeared to be much more attractive. The efficiency of such units might be relatively low, but on a site such as Buffalo Hill with the assumptions used in analysis, this type of unit appears to be much more attractive. The 1984 cost of power production would be reduced to 11.24 cents/kWh, with a benefit cost ratio of 1.49 by the end of the 15-year repayment period. Under the assumptions used in analysis, the plant would not become self sustaining until after the second year of operation. The Buffalo Hill unit does have a relatively good rate of return, but certain intangibles regarding the adequacy of the existing pipline (even though a figure of $5000 per year has been included for added maintenance reserve on this line) and the encroachment of development of residential and commercial property near the site must be considered before proceeding with development of this unit.

Stumpy Meadows unit carries the burden of the expensive transmission line

construction, as well as the continuing cost of ownership of that transmission line during project operation. Using a 15-year repayment period, the unit was clearly not feasible. However, extending the repayment period to 25 years seems to improve the financial feasibility of the project to some extent. The 1984 power production cost would be 14.8 cents/kWh, so that the unit would not become self-sustaining until after the fifth year of operation under the estimates of escalation of rates paid for power used in this study. The benefit cost ratio at the end of the 25-year repayment period is only 1.26. At best, the Stumpy Meadows unit must be considered as marginal at the present time under the relatively conservative assumptions used in analysis. Changing conditions, such as reduced interest rate, position of PG&E as to which portion of the transmission line would still fall under GDPUD ownership, changes in construction costs, or changes in the rate of escalation of payments for power and inflation might possibly make this unit more attractive. It is also possible that certain forms of private financing with associated tax incentives might make this unit attractive for private investment, but the transmission line problem will probably remain the critical issue as far as the feasibility of the Stumpy Meadows unit.

Development of the Kaiser site under conditions assumed in this analysis does not appear to be very attractive. The cost of 1984 energy production for Alternate B at the energy dissipator is 0.74 cents/kWh more than that at Alternate A, appearing to justify the expenditure of replacing over 800 feet of pipeline in order to gain the additional head for power generation. The 1984 cost of power production is 15.65 cents/kWh at Alternate A, while the benefit cost ratio is near unity (0.98) at the end of the 15-year repayment period. It does not appear to be justified to extend the repayment period beyond 15 years. Financing by means

other than direct District financing could make this site attractive, but from the District's standpoint, the site must be considered infeasible under the assumptions used in this analysis.

It should be remembered that under marginal conditions, economic and financial analyses become very dependent upon the assumptions used. Substantial requirements for reserve, high interest rates, the cost of bond sales, and other factors may make more marginal units less attractive or infeasible for District construction and financing. Assumptions used in this investigation have been relatively conservative with respect to the position of GDPUD to protech the District's interest and obligations as purveyor of water on the Georgetown Divide. The more marginal units might be more attractive to other investors, but Buckeye, Tunnel Hill, and possibly Buffalo Hill appear to be most attractive sites for development directly by Georgetown Divide Public Utility District.

Table 9

GDPUD POWERPLANT ANALYSIS -- FINAL REPORT 11-30-81

STUMPY MEADOWS POWER PLANT
1260.0 CAPITAL COST 170.0 EXTRA RESERVE 38.3 ANNUAL O&M 6.5 PG&E CHARGES
9.315 C/KWH ENRGYPMT
.965 C/KWH CAP PMT 0 .050 DISCNT GENRATN
12.000 REPYMT INTERST 25 YRS
182.325 DEBT SERVICE

	YR	GENRATN MKWH	PWR RATE C/KWH	POWER REVENUE	ANNUAL OPERATN	SURPLUS	PRESWRTH SURPLUS	ANN COST GENRATN	CASH FLOW	PWR COST C/KWH	YR
1	1984	1.568	10.280	161.241	44.800	116.441	110.027	227.125	-65.884	14.481	1984
2	1985	1.570	11.212	176.029	48.630	127.399	217.510	230.955	-54.926	14.710	1985
3	1986	1.572	12.236	192.310	52.843	139.467	322.567	235.168	-42.858	14.963	1986
4	1987	1.573	13.364	210.236	57.477	152.758	425.307	239.802	-29.567	15.243	1987
5	1988	1.575	14.603	229.972	62.575	167.397	525.830	244.900	-14.928	15.551	1988
6	1989	1.576	15.967	251.702	68.183	183.519	624.227	250.507	1.194	15.891	1989
7	1990	1.578	17.467	275.627	74.351	201.276	720.582	256.676	18.951	16.266	1990
8	1991	1.580	18.623	294.149	79.100	215.049	812.500	261.425	32.724	16.551	1991
9	1992	1.581	19.859	313.987	84.182	229.804	900.201	266.507	47.479	16.856	1992
10	1993	1.583	21.181	335.233	89.620	245.613	983.892	271.945	63.288	17.182	1993
11	1994	1.584	22.596	357.987	95.438	262.549	1063.769	277.763	80.224	17.532	1994
12	1995	1.586	24.110	382.358	101.664	280.693	1140.016	283.989	98.368	17.907	1995
13	1996	1.587	25.730	408.458	108.326	300.133	1212.808	290.651	117.808	18.309	1996
14	1997	1.589	27.464	436.413	115.453	320.959	1282.311	297.778	138.634	18.740	1997
15	1998	1.591	29.319	466.352	123.080	343.272	1348.682	305.405	160.947	19.200	1998
16	1999	1.592	31.304	498.417	131.241	367.177	1412.068	313.566	184.852	19.694	1999
17	2000	1.592	32.366	515.324	135.607	379.717	1470.596	317.932	197.392	19.968	2000
18	2001	1.592	33.465	532.823	140.125	392.697	1524.639	322.450	210.372	20.252	2001
19	2002	1.592	34.602	550.933	144.802	406.131	1574.543	327.127	223.806	20.546	2002
20	2003	1.592	35.779	569.678	149.643	420.035	1620.625	331.968	237.710	20.850	2003
21	2004	1.592	36.998	589.079	154.653	434.426	1663.179	336.978	252.101	21.164	2004
22	2005	1.592	38.259	609.159	159.838	449.320	1702.476	342.163	266.995	21.490	2005
23	2006	1.592	39.564	629.942	165.205	464.736	1738.768	347.530	282.411	21.827	2006
24	2007	1.592	40.915	651.452	170.760	480.692	1772.283	353.085	298.367	22.176	2007
25	2008	1.592	42.313	673.715	176.509	497.206	1803.235	358.834	314.881	22.537	2008

ALL VALUES IN $1000 EXCEPT AS NOTED

Table 10

GDPUD POWERPLANT ANALYSIS -- FINAL REPORT 11-30-81

TUNNEL HILL POWER PLANT
1454.0 CAPITAL COST 20.0 EXTRA RESERVE 24.0 ANNUAL O&M 2.4 PG&E CHARGES
9.315 C/KWH ENRGYPMT
.965 C/KWH CAP PMT 0 .050 DISCNT GENRATN
12.000 REPYMT INTERST 15 YRS
216.419 DEBT SERVICE

	YR	GENRATN MKWH	PWR RATE C/KWH	POWER REVENUE	ANNUAL OPERATN	SURPLUS	PRESWRTH SURPLUS	ANN COST GENRATN	CASH FLOW	PWR COST C/KWH	YR
1	1984	2.159	10.280	221.988	26.400	195.588	184.813	242.819	-20.831	11.245	1984
2	1985	2.179	11.212	244.254	28.800	215.454	366.585	245.219	-.965	11.256	1985
3	1986	2.198	12.236	268.924	31.440	237.484	545.476	247.859	21.065	11.278	1986
4	1987	2.217	13.364	296.260	34.344	261.916	721.632	250.763	45.497	11.311	1987
5	1988	2.236	14.603	326.548	37.538	289.009	895.185	253.957	72.591	11.357	1988
6	1989	2.255	15.967	360.108	41.052	319.056	1066.252	257.471	102.637	11.416	1989
7	1990	2.274	17.467	397.294	44.917	352.377	1234.942	261.336	135.958	11.490	1990
8	1991	2.294	18.623	427.141	47.894	379.248	1397.044	264.313	162.829	11.524	1991
9	1992	2.313	19.859	459.302	51.078	408.224	1552.835	267.497	191.805	11.566	1992
10	1993	2.332	21.181	493.955	54.486	439.469	1702.582	270.905	223.051	11.617	1993
11	1994	2.351	22.596	531.292	58.132	473.161	1846.534	274.551	256.742	11.677	1994
12	1995	2.370	24.110	571.521	62.033	509.488	1984.931	278.452	293.069	11.747	1995
13	1996	2.390	25.730	614.863	66.207	548.656	2117.999	282.626	332.237	11.827	1996
14	1997	2.409	27.464	661.559	70.674	590.885	2245.954	287.093	374.466	11.918	1997
15	1998	2.428	29.319	711.867	75.453	636.414	2369.003	291.872	419.995	12.021	1998
16	1999	2.447	31.304	766.064	80.567	685.497	2487.341	80.567	685.497	3.292	1999
17	2000	2.447	32.366	792.049	83.302	708.747	2596.583	83.302	708.747	3.404	2000
18	2001	2.447	33.465	818.944	86.134	732.810	2697.433	86.134	732.810	3.520	2001
19	2002	2.447	34.602	846.781	89.065	757.716	2790.538	89.065	757.716	3.639	2002
20	2003	2.447	35.779	875.591	92.098	783.493	2876.495	92.098	783.493	3.763	2003
21	2004	2.447	36.998	905.410	95.237	810.173	2955.855	95.237	810.173	3.892	2004
22	2005	2.447	38.259	936.273	98.487	837.786	3029.128	98.487	837.786	4.024	2005
23	2006	2.447	39.564	968.216	101.850	866.366	3096.782	101.850	866.366	4.162	2006
24	2007	2.447	40.915	1001.276	105.330	895.946	3159.250	105.330	895.946	4.304	2007
25	2008	2.447	42.313	1035.494	108.933	926.561	3216.931	108.933	926.561	4.451	2008

ALL VALUES IN $1000 EXCEPT AS NOTED

Table 11

GDPUD POWERPLANT ANALYSIS -- FINAL REPORT 11-30-81

BUCKEYE POWER PLANT
695.0 CAPITAL COST .0 EXTRA RESERVE 20.6 ANNUAL O&M 1.5 PG&E CHARGES
9.315 C/KWH ENRGYPMT
.965 C/KWH CAP PMT 0 .050 DISCNT GENRATN
12.000 REPYMT INTERST 15 YRS
102.043 DEBT SERVICE

	YR	GENRATN MKWH	PWR RATE C/KWH	POWER REVENUE	ANNUAL OPERATN	SURPLUS	PRESWRTH SURPLUS	ANN COST GENRATN	CASH FLOW	PWR COST C/KWH	YR
1	1984	1.880	10.280	193.275	22.100	171.175	161.745	124.143	69.132	6.603	1984
2	1985	1.888	11.212	211.696	24.160	187.536	319.964	126.203	85.494	6.684	1985
3	1986	1.896	12.236	232.035	26.426	205.609	474.845	128.469	103.566	6.775	1986
4	1987	1.904	13.364	254.492	28.919	225.573	626.558	130.961	123.530	6.877	1987
5	1988	1.912	14.603	279.286	31.660	247.626	775.259	133.703	145.583	6.991	1988
6	1989	1.921	15.967	306.663	34.676	271.987	921.090	136.719	169.944	7.119	1989
7	1990	1.929	17.467	336.892	37.994	298.898	1064.178	140.037	196.855	7.261	1990
8	1991	1.937	18.623	360.680	40.549	320.132	1201.012	142.592	218.089	7.362	1991
9	1992	1.945	19.859	386.229	43.282	342.947	1331.892	145.325	240.904	7.472	1992
10	1993	1.953	21.181	413.668	46.207	367.461	1457.102	148.250	265.419	7.591	1993
11	1994	1.961	22.596	443.137	49.336	393.801	1576.910	151.379	291.758	7.719	1994
12	1995	1.969	24.110	474.786	52.685	422.101	1691.569	154.728	320.058	7.857	1995
13	1996	1.977	25.730	508.776	56.268	452.508	1801.318	158.311	350.466	8.006	1996
14	1997	1.985	27.464	545.281	60.102	485.179	1906.383	162.144	383.136	8.167	1997
15	1998	1.994	29.319	584.486	64.204	520.282	2006.977	166.247	418.239	8.339	1998
16	1999	2.002	31.304	626.590	68.593	557.997	2103.306	68.593	557.997	3.427	1999
17	2000	2.002	32.366	647.845	70.941	576.904	2192.226	70.941	576.904	3.544	2000
18	2001	2.002	33.465	669.843	73.372	596.471	2274.313	73.372	596.471	3.666	2001
19	2002	2.002	34.602	692.611	75.887	616.724	2350.093	75.887	616.724	3.791	2002
20	2003	2.002	35.779	716.177	78.491	637.686	2420.053	78.491	637.686	3.921	2003
21	2004	2.002	36.998	740.566	81.185	659.381	2484.643	81.185	659.381	4.056	2004
22	2005	2.002	38.259	765.810	83.974	681.836	2544.277	83.974	681.836	4.195	2005
23	2006	2.002	39.564	791.937	86.861	705.076	2599.336	86.861	705.076	4.339	2006
24	2007	2.002	40.915	818.979	89.849	729.130	2650.173	89.849	729.130	4.489	2007
25	2008	2.002	42.313	846.967	92.941	754.026	2697.113	92.941	754.026	4.643	2008

ALL VALUES IN $1000 EXCEPT AS NOTED

Table 12

GDPUD POWERPLANT ANALYSIS -- FINAL REPORT 11-30-81

BUFFALO HILL POWER PLANT
429.0 CAPITAL COST 9.0 EXTRA RESERVE 21.3 ANNUAL O&M 1.0 PGEE CHARGES
9.315 C/KWH ENRGYPMT
.965 C/KWH CAP PMT 0 .050 DISCNT GENRATN
12.000 REPYMT INTERST 15 YRS
64.309 DEBT SERVICE

	YR	GENRATN MKWH	PWR RATE C/KWH	POWER REVENUE	ANNUAL OPERATN	SURPLUS	PRESWRTH SURPLUS	ANN COST GENRATN	CASH FLOW	PWR COST C/KWH	YR
1	1984	.770	10.280	79.205	22.300	56.905	53.770	86.609	-7.404	11.241	1984
2	1985	.772	11.212	86.502	24.430	62.072	106.138	88.739	-2.237	11.502	1985
3	1986	.773	12.236	94.539	26.773	67.766	157.185	91.082	3.457	11.789	1986
4	1987	.774	13.364	103.391	29.350	74.041	206.982	93.659	9.732	12.106	1987
5	1988	.775	14.603	113.141	32.185	80.955	255.597	96.494	16.646	12.455	1988
6	1989	.776	15.967	123.879	35.304	88.575	303.088	99.613	24.266	12.839	1989
7	1990	.777	17.467	135.706	38.734	96.972	349.510	103.043	32.663	13.263	1990
8	1991	.778	18.623	144.881	41.376	103.505	393.751	105.685	39.196	13.584	1991
9	1992	.779	19.859	154.711	44.202	110.509	435.925	108.511	46.200	13.928	1992
10	1993	.780	21.181	165.242	47.226	118.016	476.138	111.535	53.707	14.297	1993
11	1994	.781	22.596	176.525	50.462	126.063	514.491	114.771	61.754	14.691	1994
12	1995	.782	24.110	188.613	53.924	134.689	551.078	118.233	70.380	15.114	1995
13	1996	.783	25.730	201.565	57.629	143.936	585.987	121.938	79.627	15.566	1996
14	1997	.784	27.464	215.441	61.593	153.848	619.303	125.902	89.539	16.050	1997
15	1998	.786	29.319	230.307	65.834	164.473	651.103	130.143	100.164	16.568	1998
16	1999	.787	31.304	246.235	70.373	175.862	681.462	70.373	175.862	8.946	1999
17	2000	.787	32.366	254.587	72.801	181.786	709.482	72.801	181.786	9.255	2000
18	2001	.787	33.465	263.232	75.314	187.918	735.343	75.314	187.918	9.575	2001
19	2002	.787	34.602	272.179	77.915	194.265	759.213	77.915	194.265	9.905	2002
20	2003	.787	35.779	281.440	80.607	200.833	781.247	80.607	200.833	10.248	2003
21	2004	.787	36.998	291.025	83.393	207.631	801.586	83.393	207.631	10.602	2004
22	2005	.787	38.259	300.945	86.277	214.668	820.360	86.277	214.668	10.968	2005
23	2006	.787	39.564	311.212	89.262	221.950	837.692	89.262	221.950	11.348	2006
24	2007	.787	40.915	321.839	92.351	229.488	853.693	92.351	229.488	11.741	2007
25	2008	.787	42.313	332.837	95.548	237.289	868.465	95.548	237.289	12.147	2008

ALL VALUES IN $1000 EXCEPT AS NOTED

Table 13

GDPUD POWERPLANT ANALYSIS -- FINAL REPORT 11-30-81

KAISER POWER PLANT ALTERNATIVE A

596.0 CAPITAL COST 124.0 EXTRA RESERVE 15.2 ANNUAL O&M 1.0 PG&E CHARGES

9.315 C/KWH ENRGYPMT

.965 C/KWH CAP PMT 0 .050 DISCNT GENRATN

12.000 REPYMT INTERST 15 YRS

105.713 DEBT SERVICE

	YR	GENRATN MKWH	PWR RATE C/KWH	POWER REVENUE	ANNUAL OPERATN	SURPLUS	PRESWRTH SURPLUS	ANN COST GENRATN	CASH FLOW	PWR COST C/KWH	YR
1	1984	.779	10.280	80.084	16.200	63.884	60.364	121.913	-41.830	15.650	1984
2	1985	.777	11.212	87.084	17.720	69.364	118.885	123.433	-36.349	15.892	1985
3	1986	.774	12.236	94.764	19.392	75.372	175.661	125.105	-30.341	16.154	1986
4	1987	.772	13.364	103.188	21.231	81.957	230.782	126.945	-23.757	16.440	1987
5	1988	.770	14.603	112.429	23.254	89.174	284.332	128.968	-16.539	16.752	1988
6	1989	.768	15.967	122.564	25.480	97.084	336.386	131.193	-8.629	17.091	1989
7	1990	.765	17.467	133.681	27.928	105.754	387.012	133.641	.040	17.462	1990
8	1991	.763	18.623	142.097	29.813	112.285	435.006	135.526	6.571	17.761	1991
9	1992	.761	19.859	151.076	31.830	119.246	480.514	137.543	13.533	18.080	1992
10	1993	.758	21.181	160.654	33.988	126.667	523.675	139.701	20.953	18.419	1993
11	1994	.756	22.596	170.872	36.297	134.575	564.618	142.010	28.862	18.779	1994
12	1995	.754	24.110	181.773	38.767	143.005	603.464	144.481	37.292	19.164	1995
13	1996	.752	25.730	193.401	41.411	151.989	640.326	147.125	46.276	19.574	1996
14	1997	.749	27.464	205.804	44.240	161.564	675.313	149.953	55.851	20.011	1997
15	1998	.747	29.319	219.036	47.267	171.769	708.524	152.980	66.056	20.477	1998
16	1999	.745	31.304	233.150	50.505	182.644	740.054	50.505	182.644	6.781	1999
17	2000	.745	32.366	241.058	52.238	188.820	769.158	52.238	188.820	7.014	2000
18	2001	.745	33.465	249.244	54.032	195.212	796.023	54.032	195.212	7.254	2001
19	2002	.745	34.602	257.716	55.888	201.828	820.823	55.888	201.828	7.504	2002
20	2003	.745	35.779	266.484	57.809	208.676	843.716	57.809	208.676	7.762	2003
21	2004	.745	36.998	275.560	59.797	215.763	864.852	59.797	215.763	8.029	2004
22	2005	.745	38.259	284.953	61.855	223.098	884.364	61.855	223.098	8.305	2005
23	2006	.745	39.564	294.674	63.985	230.689	902.378	63.985	230.689	8.591	2006
24	2007	.745	40.915	304.736	66.189	238.547	919.010	66.189	238.547	8.887	2007
25	2008	.745	42.313	315.150	68.471	246.680	934.367	68.471	246.680	9.193	2008

ALL VALUES IN $1000 EXCEPT AS NOTED

Table 14

GDPUD POWERPLANT ANALYSIS -- FINAL REPORT 11-30-81

KAISER POWER PLANT ALTERNATIVE B
358.0 CAPITAL COST 110.0 EXTRA RESERVE 14.5 ANNUAL O&M 1.0 PG&E CHARGES
9.315 C/KWH ENRGYPMT
.965 C/KWH CAP PMT 0 .050 DISCNT GENRATN
12.000 REPYMT INTERST 15 YRS
68.714 DEBT SERVICE

	YR	GENRATN MKWH	PWR RATE C/KWH	POWER REVENUE	ANNUAL OPERATN	SURPLUS	PRESWRTH SURPLUS	ANN COST GENRATN	CASH FLOW	PWR COST C/KWH	YR
1	1984	.514	10.280	52.836	15.500	37.336	35.279	84.214	-31.378	16.386	1984
2	1985	.510	11.212	57.218	16.950	40.268	69.252	85.664	-28.445	16.786	1985
3	1986	.507	12.236	62.006	18.545	43.461	101.990	87.259	-25.253	17.220	1986
4	1987	.503	13.364	67.235	20.299	46.935	133.557	89.013	-21.778	17.692	1987
5	1988	.500	14.603	72.945	22.229	50.716	164.012	90.943	-17.998	18.206	1988
6	1989	.496	15.967	79.181	24.352	54.829	193.410	93.066	-13.885	18.767	1989
7	1990	.492	17.467	85.990	26.688	59.303	221.799	95.401	-9.411	19.379	1990
8	1991	.489	18.623	91.005	28.486	62.519	248.522	97.199	-6.195	19.890	1991
9	1992	.485	19.859	96.328	30.410	65.918	273.678	99.123	-2.796	20.435	1992
10	1993	.481	21.181	101.978	32.468	69.510	297.363	101.182	.796	21.016	1993
11	1994	.478	22.596	107.976	34.671	73.305	319.665	103.385	4.591	21.635	1994
12	1995	.474	24.110	114.341	37.028	77.313	340.666	105.742	8.599	22.297	1995
13	1996	.471	25.730	121.095	39.550	81.545	360.444	108.264	12.831	23.004	1996
14	1997	.467	27.464	128.263	42.249	86.014	379.070	110.962	17.300	23.760	1997
15	1998	.463	29.319	135.867	45.136	90.731	396.612	113.850	22.017	24.568	1998
16	1999	.460	31.304	143.934	48.226	95.709	413.135	48.226	95.709	10.488	1999
17	2000	.460	32.366	148.817	49.879	98.938	428.384	49.879	98.938	10.848	2000
18	2001	.460	33.465	153.870	51.589	102.281	442.460	51.589	102.281	11.220	2001
19	2002	.460	34.602	159.100	53.360	105.740	455.453	53.360	105.740	11.605	2002
20	2003	.460	35.779	164.513	55.192	109.321	467.447	55.192	109.321	12.004	2003
21	2004	.460	36.998	170.116	57.089	113.027	478.518	57.089	113.027	12.416	2004
22	2005	.460	38.259	175.915	59.052	116.862	488.739	59.052	116.862	12.843	2005
23	2006	.460	39.564	181.916	61.084	120.832	498.175	61.084	120.832	13.285	2006
24	2007	.460	40.915	188.128	63.187	124.941	506.886	63.187	124.941	13.742	2007
25	2008	.460	42.313	194.557	65.364	129.193	514.929	65.364	129.193	14.216	2008

ALL VALUES IN $1000 EXCEPT AS NOTED

XIV. ENVIRONMENTAL AND SAFETY ASPECTS

A. General

The projects described in this feasibility study include the Stumpy Meadows unit and the four conduit units. The environmental aspects of each of the projects is described below in subsections B and C. Safety aspects appear in subsection E.

B. Environmental Assessment -- Stumpy Meadows Site

B.1. Environmental Setting

The proposed Stumpy Meadows site is located on the existing outlet works of Stumpy Meadows Dam at an elevation of about 4100 feet on Pilot Creek in the lower mountain region of the Sierra Nevada on the Georgetown Divide. Vegetative cover is typical of the lower mountain area, consisting of forest cover, brushland, and grassland. Forest trees include ponderosa pine, cedar, black oak and white oak. Wildlife includes native and migratory birds, large mammals (predominately deer) and many small mammals including chipmunks, ground squirrels, tree squirrels, and other animals typical of this elevation zone and area. Stumpy Meadows Reservoir and Pilot Creek, the natural channel into which operational releases are made, contain several varieties of trout.

The reservoir, dam, and power plant site are all on land owned by the District. Campgrounds and boat launching facilities operated by the U.S. Forest Service serve recreational needs in the area.

B.2 Power Plant Operation

The existing intake to the outlet works is at elevation 4132. The outlet pipe passes through the dam and discharges through a 30 inch Howell-Bunger energy dissipating valve in the gate house. The proposed generating unit would parallel

the existing Howell-Bunger valve with a 485 kw hydroelectric unit with a maximum hydraulic capacity of about 55 cfs. This unit is adequately sized to take future system demands as well as to utilize certain spills and potential spills during the winter and spring snowmelt.

The maximum release at the present time during the summer irrigation period is about 30 to 35 cfs. This is presently sufficient to meet maximum water demand in the system as well as the required streamflow maintenance releases below the point of diversion. The capacity of the diversion works below Stumpy Meadows Dam on Pilot Creek is about 55 cfs. It is anticipated that District demands will continue to grow in the future. In addition, it is anticipated that the demand may become more uniform during the year as a result of the increase in domestic and municipal demands.

Under current demands, Stumpy Meadows Reservoir has some spill during the late winter and spring snowmelt season of almost every year. It is anticipated that when Stumpy Meadows Reservoir is full and spilling, or forecast to fill and spill, releases will be made through the generating unit rather than over the uncontrolled spillway. This will not eliminate uncontrolled spill from the reservoir, but it will tend to reduce the rate of spill and the amount of time during which spill occurs. This will also tend to decrease the amount of erosion occurring at the lower end of the spillway structure. The total annual volume of water in the stream below Stumpy Meadows Reservoir will remain unchanged, but operation of the hydroelectric generating unit will have some tendency to moderate flows below the dam during periods when the reservoir is projected to spill or is full and spilling.

B.3 Anticipated Environmental Impacts

No significant environmental impacts different from those of the existing

Stumpy Meadows Dam and Reservoir are anticipated as a result of the construction and operation of the proposed hydroelectric generating unit. The District has ownership of all property and facilities required for the project. Pacific Gas and Electric Company distributes power in the local area and maintains the distribution facilities into which the proposed hydroelectric unit will be tied. Construction of about five miles of new three phase power line on timber poles will be required along the right-of-way of the Wentworth Springs Road (a County road). Conversion of four miles of existing single phase powerline to three phase will also be required.

During most of the year, releases made from the outlet works at Stumpy Meadows Dam with the generating unit will be no different than they would have been without. The primary objective of such releases is to meet system water demands and existing fish and streamflow maintenance requirements. The system demands may increase with time, and there may be some effect upon time-distribution of flows as demands build.

During the winter and spring months, Stumpy Meadows Reservoir often fills and water is released over the spillway. Occassionally, releases of water which would have otherwise spilled are made through the energy dissipating valve to reduce spillway erosion. When the powerplant is installed, releases of water which would otherwise spill will be made through the power plant. Although flow over the spillway cannot be eliminated, there might be some reduction in peak uncontrolled spill. Total volume of release from the reservoir, including spill, power releases and release for water demand, would remain the same as at the present time.

The release through the existing outlet works is from a low level intake structure. The installation of the hydroelectric unit would not change this situation.

Water would simply be released through the unit rather than the existing energy dissipating valve. During the late winter and spring when release of spill is being made through the hydroelectric unit rather than over the spillway, there will be heavy inflow to the reservoir from rain and snowmelt with good mixing in the reservoir. No adverse effects are anticipated on the fish population, either in the reservoir or in Pilot Creek below the reservoir, resulting from operation of the hydroelectric unit.

The existing energy dissipating unit presently produces some noise. It is anticipated that the installed generating unit would result in less noise than the energy dissipator. However, if the energy dissipating valve to be installed in parallel with the generating unit is put into operation, the level of noise would be similar to that produced by the energy dissipating valve at the present time.

No additional hazard to wild life is anticipated as a result of construction or operation of the unit. Consequently, the District plans no measures to specifically change or mitigate any impacts of the project.

C. Conduit Sites

C.1 Environmental Setting

The proposed sites are all located along the existing GDPUD conveyance system between 1800 and 3700 feet elevation in the foothill and lower mountain region of the Sierra Nevada on the Georgetown Divide. Vegetative cover along the conveyance system is typical of the area, consisting of forest cover, brush-land, and grassland. Forest trees include ponderosa pine, cedar, black oak, white oak, and several varieties of "live oak". Brush cover includes manzanita, poison oak, and other brush types. Wild life includes native and migratory birds,

large mammals (predominately deer) and many small mammals including chipmunks, ground squirrels, tree squirrels, and other animals typical of this elevation zone and area. Pilot Creek, the source of water diverted to the District conveyance system contains several varieties of trout. These trout sometimes travel down into the conveyance system through pipelines and ditches.

All four sites are on private land so that the District has no control over use of the properties except for rights-of-way and easement for the conveyance system and appurtenant structures. Installation of the hydroelectric generating units may not be entirely within right-of-way of the existing conveyance alignment so additional easement may be required at the power plant sites. No archeological study of the sites is anticipated.

C.2 Power Plant Operation

The District operates the conveyance system to meet water demands in the service area. The District's primary responsibility is to meet water demands, and the production of electrical energy as a by-product cannot compromise the District's responsibilities in water supply. It is not anticipated that there will be any significant change in the operation of the District's conveyance system when the hydroelectric units are installed. Under present conditions, substantial flows are run through the conveyance system from April 15-May 1 through October 31, the irrigation season. Maximum flows in the upper end of the conveyance system are presently 25 to 30 cfs. During winter months, flows are maintained at somewhat lower rates (5 to 15 cfs) to meet municipal and domestic demands and to keep the conveyance system free of snow and ice. As domestic and municipal demands continue to grow, it is anticipated that total annual usage to water will increase and that the demand will become less seasonally oriented. Excess

water in the conveyance system would continue to be spilled through the waste gates as at the present time.

C.3 Anticipated Environmental Impacts

No significant environmental impacts different from those of the existing conveyance system are anticpated as a result of the construction and operation of the proposed hydroelectric generating units. All sites are located on private property. The District has ownership of all facilities and easements, right-of-way, and right of access to each proposed site. Some additional easement may be required at the power plant sites. Pacific Gas and Electric Company distributes power in the local area and maintains the distribution facilities into which the proposed hydroelectric units will be tied. No construction of major transmission facilities will be required.

Several of the existing energy dissipating lunits presently produce some noise. It is anticipated that the installed generating units would result in less noise than the energy dissipators. However, if the energy dissipating valves to be installed in parallel with the generating units are put into operation, the level of noise would be similar to that produced by the energy dissipating valves at the present time.

No additional hazard to wild life is anticipated as a result of construction or operation of the units. Consequently, the District plans no measures to specifically change or mitigate any impacts of the project.

D. Consultation with Federal, State, and Local Agencies

The District has consulted with the following state and local agencies during preparation of State and Federal applications and this Feasibility Report.

1. Federal Energy Regulatory Commission
   San Francisco, California
   (W. F. Kopfler)

2. State Clearing House
   Sacramento, California
   (Norma Wood)

3. California State Water Resources Control Board
   Sacramento, California
   (Paul Art and Glenn Mork)

4. California Department of Water Resources
   Energy Division
   Sacramento, California
   (Ron Delparte)

5. California Department of Fish and Game
   Region 2
   Sacramento, California
   (Jerry Mensch)

6. Office of Permit Assistance
   State of California
   Sacramento, California
   (Kent Fickett)

7. U.S. Fish and Wildlife Service
   U.S. Department of Interior
   Sacramento, California
   (Jim McKevitt)

8. U.S. Forest Service
   Eldorado National Forest
   Placerville, California
   (Mike Zelle)

9. El Dorado County Water Agency
   Placerville, California
   (Joe Flynn, member of County Board of Supervisors and Water Agency Board)

10. El Dorado County Planning Department
    Placerville, California
    (Arlan Nichols)

E. Safety Consideration

None of the proposed units will create a situation of increased hazard to persons or property as a result of installation and operation of hydroelectric equipment.

Under Part 12 of Subpart D of the Commission's Regulations in Title 18 of the Code of Federal Regulations (18CFR), Stumpy Meadows Dam may have to be evaluated periodically for safety. This dam also falls under jurisdiction of the California Division of Dam Safety and is inspected biennially for safety. The dam is also inspected biennially by the U.S. Bureau of Reclamation for safety as a result of the PL984 financing which is administered by USBR. Copies of the most recent DODS and USBR reports appear in Appendix A.

GDPUD is currently updating the District Emergency Plan, including the portions dealing with safety of Stumpy Meadows Reservoir. FERC, under Part 12, will require filing of a copy of the provisions in the District Emergency Plan with the FERC Regional Office by December 30, 1981.

XV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Georgetown Divide Public Utility District has several sites in the District's water conveyance system where it appears feasible to develop generation of hydroelectric power for sale to Pacific Gas and Electric Company, the local electrical utility. The District could develop generation facilities at several of these sites with substantial returns to the District on the basis of criteria and assumptions used in analysis. Tables 9 through 14 describe income, annual costs, and cash flow for each of the five units. The "Summary of Financial Evaluation" appears as item G, Page XIII-4, of Section XIII. The summary describes the evaluation of each unit individually.

Table 15 on Page XV-2 summarizes the results of analysis for each of the five potential hydroelectric sites studied in this investigation. The table summarizes annual generation, capital costs and reserves, annual costs, benefit/cost ratios, and 1984 generation costs for each of the five potential hydroelectric sites.

Review of the results of this investigation indicate that GDPUD has two, and possibly three sites which should be pursued immediately for construction. The remaining sites may be less attractive under current conditions, but might offer some potential at a future date under changing conditions or different types of financing.

B. Recommendations

The District may have several alternatives for financing and constructing the proposed power plants with different impacts on the District. Certain units could

Table 15
Summary of Analysis
Small Hydroelectric Sites
(All values in $1000 as of 1984 unless otherwise noted)

Unit	Average Annual Generation[1] 10^6 kWh	Capital Cost[2]	Extra Reserve[3]	Annual Debt Service	Annual Operating Cost	Total Annual Cost	Benefit/Cost Ratio[4] 15-yrs	25-yrs	1984 Generation Cost Costs/kWh
Stumpy Meadows[5]	1.568	1260.0	170.0	182.3	44.8	227.1	-	1.26	14.48
Tunnel Hill[6]	2.159	1454.0	20.0	216.4	26.4	242.8	1.61	2.18	11.25
Buckeye[6]	1.880	695.0	0	102.0	22.1	124.1	2.89	3.88	6.60
Buffalo Hill[6]	.770	429.0	9.0	64.3	22.3	86.6	1.49	1.98	11.24
Kaiser[6] (Alt. A)	.779	596.0	124.0	105.7	16.2	121.9	.98	1.30	15.65

1/ Average annual generation discounted 5 percent from figures in Table 2A. These values were used in analysis.

2/ Capital cost of project with the exception of reserves.

3/ Reserves for funded interest on delayed debt repayment and insurance against dry periods in first years of operation. Does not include 15 percent reserve for assurance of bond repayment.

4/ For all but Stumpy Meadows which has a 15-year repayment period, 15 years represents the repayment period while 25 years represents an estimate of economic life of the unit.

5/ Based upon 25-year repayment period, District financing.

6/ Based upon 15-year repayment period, District financing.

be constructed and financed by the District, probably through sale of bonds. However, certain tax incentives for private investors may make financing, or development and financing by private developers attractive. It is recommended that the results of this investigation be applied as a means of determining whether the District should finance, construct, and operate individual units, or whether other alternatives might be more attractive. Comparison may be made between proposals for private financing and the return to the District under District financing to determine whether the return to the District from private financing is adequate to reimburse the District for its recource of falling water.

B.1 Buckeye Unit

The Buckeye site with its low initial costs and relatively high generation is clearly the most attractive unit in the investigation. The estimated 1984 cost of generation at 6.60 cents/kWh is less than rates presently being paid by Pacific Gas and Electric Company under the Public Utilities Regulatory Power Act, which makes this unit very attractive when probable escalation of payments for energy is considered. It is recommended that the District proceed immediately with plans for District financing and development of the Buckeye unit.

B.2 Tunnel Hill Unit

The Tunnel Hill unit is also very attractive, in spite of the 3475 foot pipeline required for operation. It is recommended that the District proceed immediately with plans for financing and development of the Tunnel Hill site.

B.3 Buffalo Hill Unit

Although Buffalo Hill has the same 1984 generation costs as Tunnel Hill, its benefit/cost ratio at the end of the 15-year period of repayment is somewhat less than Tunnel Hill. The two intangible items regarding local development in the

vicinity of the proposed power plant and reliability of the existing pipeline must be considered. It is recommended that the District proceed with plans for District financing and development of the Buffalo Hill unit.

B.4 Stumpy Meadows Unit

On the basis of assumptions used in this analysis, the Stumpy Meadows unit does not appear very attractive for District construction, primarily as the result of the high cost of construction and operation of the transmission lines. However, it is recommended that the District complete the application for the water rights to use spill water from Stumpy Meadows Reservoir through the power plant. It is also recommended that the District proceed with investigation of and possible negotiation for other financing, possibly private financing, of the Stumpy Meadows unit.

B.5 Kaiser Unit

The Kaiser site is least attractive of all the sites investigated for potential financing and development by the District. It is recommended that the District continue investigation into the small predesigned package units to decrease first cost of the development of the site. In addition, the District should attempt to investigate and negotiate for private development and funding of this site, should the opportunity arise.

B.6 General Recommendations

It is recommended that the District investigate potential private development and funding for all sites with regard to level of return to the District and the addition or elimination of District responsibility in project development. In the event that any of the proposed sites should be considered by the District for private development, the District must develop a plan to request, review and evaluate

proposals. A plan for evaluation of proposals for private development of potential sites must consider the following items:

1. Overall return to District and comparison with District development.
2. District's responsibilities under District development and under private contract agreement.
3. District's responsibilities for operation, maintenance, electrical or mechanical failure, water system failure and other (? ? ?) during period of repayment.
4. Ownership of unit during repayment period.
5. Ownership of unit subsequent to repayment period.
6. Economic life of equipment intended for installation.
7. Possible impact of installation on reliability of the District's water supply and conveyance facilities.

The District must continue to view the development of these potential sites with regard to changing conditions, such as potential changing in the interest rate and changes in the rate of payment for energy, as they relate to particularly the more marginal sites. The District must remain aware of the impact of changing conditions which may influence the District's decision to proceed with development of the various sites.

GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

OPTIONS TO INCREASE WATER SUPPLY

April 2009

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GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

OPTIONS TO INCREASE WATER SUPPLY

April 2009

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Appendix

1.0 EXECUTIVE SUMMARY

A set of options selected to increase water supply has been identified and evaluated based on ability to meet future water supply demands of the Georgetown Divide Public Utility District (District). Supplemental water supply project options were identified during meetings with the District and by review of historical reports. Listing and potential water yield and cost information for each of the options to increase water supply to the District included in the evaluation is presented below in Table 1.

Georgetown Divide Public Utility District Ditch

Table 1 – Summary of Georgetown Divide Public Utility District Options to Increase Water Supply

Option Number	Option Name	Additional Water Yield (acre-feet)	Initial Cost ($mil)	Cost of Water ($/af/yr)
1	Conveyance canal loss reduction	670	11.5	1,200
2	Enlarging Stumpy Meadows Reservoir	250-1,000[1]	-[2]	-[2]
3	Upper Stumpy Meadows Reservoir	3,200	-[2]	-[2]
4	(a) Rubicon River Diversion – with tunnel	3,300-10,300[3]	59.0	470-1,100[3]
	(b) Rubicon River Diversion – without tunnel	3,300-10,300[3]	28.5	290-680[3]
5	North Fork American River Pumping Plant	10,300	14.2	230
6	Canyon Creek Reservoir	6,100	108.3	1,200
7	Mutton Canyon	100	0.140	130
8	Onion Creek	50-300[4]	2.2	500-3,000[4]
9	Modification to allowable demand deficiency	200-1,000[5]	0	0

[1]Range depends on size of dam raise (see Section 4.2).
[2]No known cost information and none developed in this analysis.
[3]Depending on diversion capacity of 15 or 50 cfs (see Section 4.4)
[4]Range depends on type of water right (see Section 4.8).
[5]Range depends on demand deficiency modification (see Section 4.9).

The *Initial Cost* shown in Table 1 represents the cost to bring the option on-line while the *Cost of Water* represents the unit cost of water per year.

2.0 INTRODUCTION AND BACKGROUND

The District is investigating options to increase its available water supply to help meet future increasing water demands. The El Dorado County Water Agency's *Water Resources Development and Management Plan,* December 2007 (Water Plan) reports that about 10,300 acre-feet (about 25% residential-commercial and 75 % agricultural) of additional water could be needed to meet District demands at year 2025 demand levels and up to 21,600 acre-feet per year to meet demands at buildout. In addition to these water needs, the Water Plan suggests that areas located near the District service area could possibly be annexed through service area expansion driving the water need even higher. This report summarizes an investigation of a set of options selected to increase the water supply availability to the District to help meet future water supply demands. The projected water need presented here does not include supplemental water that would be made available under the P.L. 101-514 (Fazio Water) project that is currently being developed by the District, El Dorado County Water Agency, and El Dorado Irrigation District. Water that would be made available under the P.L 101-514 project is included as OPTION 5 - North Fork American River Pumping Plant of this report.

The District provides water in the Georgetown Divide area of El Dorado County including the areas of Cool, Pilot Hill, Greenwood, Georgetown, Garden Valley, and Kelsey. The Stumpy Meadows Project, owned and operated by the District, is the District's primary water supply source. The main feature of the Stumpy Meadows Project is Stumpy Meadows Dam and Reservoir located on Pilot Creek. The reservoir has a total storage capacity of about 20,000 acre-feet and a usable capacity of about 18,800 acre-feet. The average annual inflow to Stumpy Meadows Reservoir is about 23,000 acre-feet (1923-1999 average). Water from Stumpy Meadows Reservoir is released to Pilot Creek and rediverted and conveyed to the District's service area through the El Dorado Conduit and Georgetown Divide Ditch. The *firm* and *safe* water yield of the Stumpy Meadows Project is calculated as 12,251 and 10,541 acre-feet, respectively. The evaluation summarized in this report uses the following definition of *firm* and *safe* yield which is consistent with traditional District definitions.

> *Firm yield* is defined as the maximum annual water supply that is expected to be available with the understanding that lower yields will occur in some dry

years in accordance with the Districts water deficiency policy.
Safe yield is defined as the maximum annual water supply that is expected to be available in all years even during the most critically dry years.

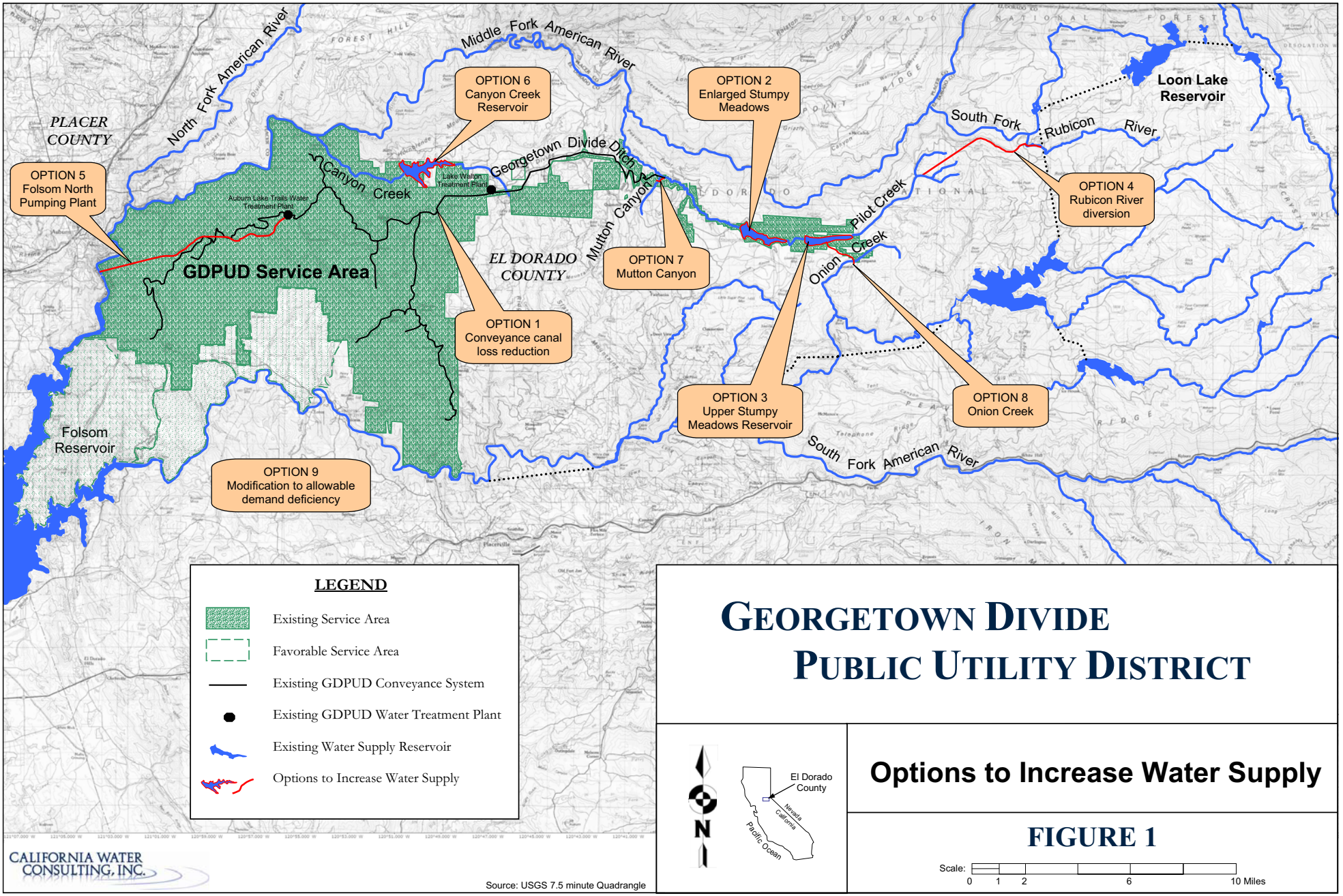
The evaluation presented here is intended to provide a general conceptual-level overview of some options available to the District to increase water supply. Based on this conceptual-level information, results of the evaluation are intended to present a description of each alternative, conceptual-level cost estimates where available, an evaluation of the ability of the option to provide supplemental water, discussion of water rights, and other contributing factors. Information presented in this report is intended to be used to evaluate selected options that best meet the needs of the District for consideration of implementation or further evaluation.

3.0 APPROACH TO EVALUATION

The District has previously investigated a number of options aimed at supplementing its water supply over the years. The investigation summarized in this report considers nine potential options many of which have been evaluated previously at varying levels of detail. These options were identified during meetings with the District and review of historical reports. The evaluation described here primarily relied on research and updating previously developed information. Some options were previously fully developed and some were modified to meet the needs of this study. *OPTION 9 – Modification to allowable demand deficiency* was fully developed as part of this evaluation as no previous studies evaluating this option are known.

4.0 OPTIONS TO INCREASE WATER SUPPLY

This section describes each of the nine options considered in this evaluation to increase water supply to the District. Figure 1 illustrates the location of each of the nine options.



GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

Options to Increase Water Supply

FIGURE 1

Scale: 0 1 2 6 10 Miles

4.1 OPTION 1 – Conveyance canal loss reduction

The District's ongoing management practices and conservation programs to reduce demands in its water conveyance system by lining ditches with gunite, replacing ditches with pipelines, and improving procedures to minimize operational water requirements has increased the reliability of its water delivery system as well as minimized water loss do to ditch seepage and leakage. The District estimates that operational water requirements and losses total about 3,600 acre-feet per year. Operational water requirements and loss reduction was evaluated in the Department of Water Resources (DWR) *Georgetown Divide Water Treatment Study*, 1992. That study was used as the basis for considering potential additional reduction of operational water requirements and losses in the Districts conveyance system in this evaluation as well as considering updated information related to system operation received from District personnel.

Even with the District's continuing program of system improvements to manage operational water requirements and reduce water losses, some losses still exists and are evaluated as to the feasibility of further reduction in this option. *OPTION 1 - Conveyance canal loss reduction* investigates the potential to reduce operational water requirements and losses thereby making additional water available to meet increasing water demands.

This option consists mainly of lining portions of unlined open ditch in the conveyance system with gunite. As the District has knowledge of the areas that are more susceptible to seepage and leakage losses, it is assumed that only those portions that experience significant loss would be lined and that continuing to line ditches will eventually reach a diminishing return by lining sections of ditch that currently experience little loss. It should be acknowledged that gunite lined open ditches do not always reduce water losses to zero and over time, losses can increase in lined ditches due to the formation of cracks in the lining requiring additional maintenance to continue to control losses.

Additionally, open ditches do gain water during some times of the year and at some locations due to direct inflow and groundwater intrusion. Additional evaluation of the existing ditch system is required to identify the locations that would most benefit from gunite lining.

Conveyance water requirement is associated with water transmission and delivery. In the treated and untreated water delivery system, this water may include seepage, leakage, and other losses associated with conveyance. The 1992 DWR study projected that conveyance

water requirements could be reduced to the order of about 13 percent by year 2000 by providing system improvements similar to those that the District performed in the past. A reduction to 13% might be a bit ambitious, but does represent a potential target and was used in this evaluation.

Carriage water requirement is the additional water that must be supplied due to the necessity to provide flows for regulation and diversion by users along the ditch system. The 1992 DWR study projected carriage water requirements for year 2000 of 2.3 cfs during the 5-month summer irrigation season and 1.4 cfs during the winter.

Distribution system water requirements result from the distribution of treated water and may include line flushing, fire fighting, casual sales (typically for construction and filling of swimming pools) and unauthorized water diversion. The 1992 DWR study projected distribution system losses could be reduced to 13 percent of the treated water production, or about 410 acre-feet per year. Process water requirement for the purpose of this study, refers to water uses including street cleaning and backwashing the water treatment plants. The District reports process water requirements in 2004 of approximately 150 acre-feet per year. The last major category of operational water requirements is water associated with watering-up of the canal system at the beginning of the irrigation season. The District reports water-up requirements in 2004 of approximately 450 acre-feet per year.

The District reports that the total system operational water requirement and losses were approximately 3,600 acre-feet in 2007. Of that amount, 600 acre-feet per year are accounted for in the process and water up losses described above. The other 3,000 acre-feet per year results from conveyance, carriage, and distribution requirements. As the split of these water requirements is unknown, year 2000 projected conveyance, carriage, and distribution losses from the 1992 DWR study were used to distribute the remaining 3,000 acre-feet of losses among the three categories by weighting the losses according to the weighted distribution from the 1992 study.

Potential measures to reduce operational water requirements and losses were considered based on the distribution of the source. No reduction in carriage, process, and distribution water requirements were considered in this option for the following reasons:

- The District monitors and operates to minimize the amount of carriage water required, and the water requirement is already below the projected 2000 levels indicated the 1992 DWR study.

- Process water requirements are considered to be necessary uses of water, for which reductions would only be minimal compared to the total operational requirements.
- Water-up requirements are necessary for operation of the conveyance system and can not be avoided.
- Although there may be opportunities for some further reductions in operational water requirements, they are minor compared to the overall requirements and, therefore, were not considered in the evaluation.

Excluding the above operational water requirements leaves conveyance and carriage requirements as opportunities for reducing water demands. Based on conversations with the District personnel, approximately 30% of the conveyance system is lined canal, tunnel, or pipeline. The remaining 70% of the District's 75 miles of conveyance is unlined ditch. It was assumed that an effort to line ditches in the areas that are more likely or known to have a higher degree of conveyance losses would result in the most efficient use of resources to achieve the highest degree of water savings. The cost for this savings was determined based on this assumption and an average cost per linear foot of canal lining.

This analysis estimates that a maximum of about 670 acre-feet could be saved through reduction in conveyance losses. To achieve this amount, costs are estimated at about $11.5 million. An advantage of this option is that ditch improvements can be incrementally staged over time as the need for supplemental water arises.

4.2 OPTION 2 – Enlarging Stumpy Meadows Reservoir

Stumpy Meadows Reservoir is located on Pilot Creek and has a capacity of 20,000 acre-feet. The existing Stumpy Meadows Dam has a crest length of 1,230 feet and width of 30 feet. The Pilot Creek drainage area tributary to the reservoir is about 15.6 square miles. *OPTION 2 - Enlarging Stumpy Meadows Reservoir* considers the increase in water supply made available by raising the Stumpy Meadows Dam and impounding additional water.

Stumpy Meadows Reservoir

There is a limit to how high the Stumpy Meadows Dam could be raised based on the physical aspects of the impoundment, dam stability, cost, as well as the reducing water

supply benefit afforded by increasing storage capacity. For this evaluation, Stumpy Meadows Dam raise of up to 9 feet was investigated. Additional information and study is needed to determine whether a simple dam raise of this magnitude would be supported by the existing dam foundation. If a simple dam raise is not feasible, costs would increase significantly.

The operation of an enlarged Stumpy Meadows Reservoir was evaluated using the District's *StumpSIM* computer model. Dam raises up to 9 feet, in one foot increments, were analyzed to determine the increase in project firm yield. Table 4 show the expected increase in water supply yield expected with additional storage capacity at Stumpy Meadows Reservoir made possible by increasing the dam height.

Table 2 – Stumpy Meadows Project Firm Yield With Increased Storage Capacity

Stumpy Meadows Dam Raise (feet)	Stumpy Meadows Reservoir Storage (acre-feet)	Stumpy Meadows Project Yield (acre-feet)	Water Supply Increase (acre-feet)
0	20,000	12,251	-existing project-
1	20,350	12,379	128
2	20,700	12,507	256
3	21,000	12,616	365
5	21,700	12,867	616
7	22,300	13,088	837
9	23,000	13,362	1,111

The evaluation indicates that raising Stumpy Meadows Dam 9 feet would increase the firm yield of the Stumpy Meadows Project by about 1,100 acre-feet. It might be possible to add a couple feet of flash boards to the Stumpy Meadows Project spillway to increase the storage capacity at a relative low cost. A two foot raise would provide an increase in firm yield of about 250 acre-feet. See Appendix 2 for additional information on this evaluation.

An advantage of this option is that the dam is already in place on Pilot Creek. Environmental impacts are relatively less compared to a new dam as fish and wildlife in the stream are already subject to regulated flow regime. Also, the incremental cost of adding

storage is typically much lower than for new dam projects. A disadvantage of this option might be that raising the existing Stumpy Meadows Dam might open the door for new requirements from regulatory agencies such as increase in minimum instream flow release requirements.

Cost information for this option has not been developed as it is unknown if a simple raise is feasible. Additional information and analysis is required to provide an estimate the cost of this option.

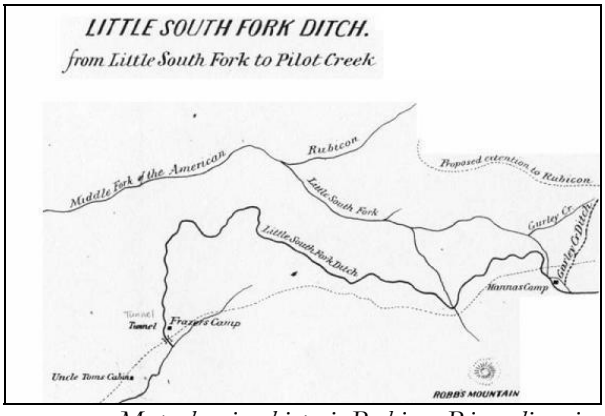
4.3 OPTION 3 – Upper Stumpy Meadows Reservoir

Upper Stumpy Meadows Reservoir is conceptualized to consist of building a new rockfill dam upstream of the existing Stumpy Meadows Dam and Reservoir on Pilot Creek. The dam would be 820 feet long and approximately 145 feet high with the crest elevation at 4,500 feet. The reservoir impounded by the dam would have a surface area of 194 acres with a storage volume of 10,820 acre-feet. The drainage area above the dam would be approximately 10 square miles. Preliminary evaluations estimated a safe yield of 3,200 acre-feet for the project. Upper Stumpy Meadows Reservoir would be operated in conjunction with Stumpy Meadows Reservoir to maximum water supply benefits.

A cost estimate was not prepared for this option. The dam will be similar in cost to *OPTION 6 - Canyon Creek Reservoir* (slightly less due to a smaller structure), but with a water yield of only one-half of that for Canyon Creek Reservoir. These two factors strongly indicate that the cost per acre-foot of water of this alternative will be significantly greater than the Canyon Creek Reservoir option. Due to the anticipated high cost and low water yield, no further evaluations were considered prudent for this option.

4.4 OPTION 4 – Rubicon River diversion

This option consists of constructing a gravity diversion conveyance system from the South Fork of the Rubicon River at or near Robbs Peak Forebay, or from Gerle Creek, to Pilot Creek upstream of the Stumpy Meadows Reservoir. There are two versions of this option being investigated, OPTION 4(a) and OPTION 4(b). OPTION 4(a) includes a pipeline and tunnel. Utilization of a tunnel



Map showing historic Rubicon River diversion

would provide for relatively minimal operation and maintenance costs and a reliable conveyance of water. However, construction of a tunnel does have a relatively high initial cost. OPTION 4(b) considers an all pipeline conveyance without use of a tunnel. Water conveyance would be achieved though a new pipeline following near the original historical flume alignment that once brought water from the Rubicon River to the Georgetown area.

OPTION 4(a) – Rubicon River diversion (with tunnel) consists of constructing a gravity diversion conveyance system from the South Fork of the Rubicon River at or near Robbs Peak Forebay, or from Gerle Creek, to Pilot Creek. Once diverted into Pilot Creek, water would flow down the natural channel for about 6 miles where it would enter Stumpy Meadows Reservoir. The diversion would include approximately 2.6 miles of pipeline along the historical diversion route followed by a new 2.6-mile tunnel to convey water to the headwaters of Pilot Creek. As considered in previous studies, a pipeline and tunnel configuration was investigated to provide a diversion capacity of 50 cfs. There is some concern whether Pilot Creek could support flows at this rate. A diversion capacity of 15 cfs was also investigated to evaluate how a more modest project could increase the District's water supply.

OPTION 4(b) – Rubicon River diversion (without tunnel) would include approximately 7.2 miles of pipeline located along the historical route to convey water to the headwaters of Pilot Creek. Diversion and conveyance capacities of 15 and 50 cfs were investigated. Once the water is diverted to Pilot Creek, it would flow down the natural channel for about 6 miles to Stumpy Meadows Reservoir augmenting its natural inflow.

Remnants of Rubicon River Diversion Flume

Proposed diversions from the South Fork Rubicon River, or Gerle Creek, would occur on an "as-needed" basis, and would increase the yield of the Stumpy Meadows Project by supplementing the natural runoff of Pilot Creek. Diversions from the Rubicon River, or Gerle Creek, would be made in dry years when Stumpy Meadows Reservoir is not expected to fill to capacity. For the 50 cfs diversion capacity scenario, on about April 1st of each year, if the storage in Stumpy

Meadows Reservoir in addition to the forecasted April through October inflow to the reservoir is less than 23,000 acre-feet, then diversions from the South Fork Rubicon would be made into Pilot Creek and Stumpy Meadows Reservoir. These diversions are expected to occur starting in April of the year when the need is identified and continuing at a rate of 50 cfs as long as needed to meet District demands for that year. The ability to make diversions from the South Fork Rubicon River, or Gerle Creek, will allow the District to rely on a greater portion of the water stored in Stumpy Meadows Reservoir than under current operating practice. This would allow for water diversions from the South Fork Rubicon River to only be required during drier water years. During wet years, there would be less need, or no need, to make diversions to meet water supply demands as the natural flow in Pilot Creek would be sufficient.

A maximum diversion rate of about 50 cfs is required to take a sufficient volume of water to meet the identified needs of 10,300 acre-feet. At this rate, about 3,000 acre-feet of water per month can be diverted into Stumpy Meadows Reservoir. Using the diversion criteria described above, the District's *StumpySIM* operational model was used to determine the required diversion volume. The results of the modeling effort are as follows:

Upper Pilot Creek

- Number of years analyzed = 77 (1923-1999)
- Number of years when diversion was required = 32 (42% of years)
- Average annual diversion volume = 2,700 acre-feet
- Maximum annual diversion volume = 18,200 acre-feet (occurred in 1977)
- Water supply yield increase = 10,300 acre-feet

A preliminary analysis was conducted to evaluate the water supply benefit of setting the diversion and conveyance capacity to a rate of 15 cfs. At this diversion rate, about 900 acre-feet of water per month can be diverted into Stumpy Meadows Reservoir which could result in an additional water supply of about 3,300 acre-feet per year. Diversions under this scenario were taken starting on March 1. This analysis is representative of the water supply benefits that could be developed with a 15 cfs diversion capacity. Additional project optimization studies should be conducted when additional information is known on the

diversion sizing criteria, more specific construction and water costs and potential SMUD power foregone costs. The District's operational model was used to estimate how this scenario could operate for representative purposes and results are as follows:

- Number of years analyzed = 77 (1923-1999)
- Number of years when diversion was required = 25 (32% of years)
- Average annual diversion volume = 1,100 acre-feet
- Maximum annual diversion volume = 7,200 acre-feet (occurred in 1977)
- Water supply yield increase = 3,300

Operational information for *OPTION 4 – Rubicon River diversion* is included in Appendix 4.

Development of this option would require additional water rights to allow new diversion and rediversion of water. This option will require the following new rights.

- Right to divert water from Rubicon River and Gerle Creek to storage in Stumpy Meadows Reservoir;
- Right to redivert water stored in Loon Lake at or near Robbs Peak Forebay if this water is desired;
- Right to redivert water from Pilot Creek released from Stumpy Meadows Reservoir storage to the place of use in the District service area.

Review of existing water rights, project facilities, operation, and hydrology of the Rubicon River indicate that unappropriated water is not available to fully meet the diversions required under *OPTION 4 – Rubicon River diversion.* Near the location of potential diversion from the Rubicon River, SMUD holds the rights to divert and store water for power generation and the City of Sacramento and US Bureau of Reclamation (USBR) hold similar consumptive rights. Water diverted under this option could impact SMUD's ability to utilize water under its rights for power production. Water diverted under this alternative could also impact the City of Sacramento and the USBR's ability to take consumptive water under their rights.

Costs associated with obtaining the right to use water for this option is assumed to be $75 per acre-foot which might be consistent with, for example, a transfer. If water were to be obtained for less that this value, then the cost of this option would decrease. For all options in this study, the cost of water is estimated only for the water actually taken. This assumes that the cost associated with water use will only have to be paid for the water actually used.

The cost of *OPTION 4 - Rubicon River diversion* alternative (a) and (b) is estimated at almost $59 million and $29 million, respectively (see Appendix 4). These costs are based on the diversion and conveyance capacity of 50 cfs. There would be some cost reduction to develop the option at a capacity of 15 cfs accounting for a reduction associated with a smaller diversion, pipeline and associated infrastructure. Cost for the 15 cfs diversion scenario is estimated at 85% of the 50 cfs diversion scenario cost.

4.5 OPTION 5 – North Fork American River Pumping Plant

North Fork American River

The North Fork American River Pumping Plant is a joint project with Placer County Water Agency (PCWA) located on the North Fork American River near the undeveloped Auburn Dam site. PCWA has completed a portion of the project and is now able to divert water at this location. The Pumping Plant shares a pump station site, including the intake structure and appurtenances. Two pumps to serve the District would be located on the north bank of the river. A casing has been constructed across the river to allow for a future pipe installation for water to be diverted and pumped to the District's service area. From this location, new conveyance infrastructure would be used to lift water about 800 to 900 feet along the first 3,000 feet of pipeline following a ridge line up to a small regulating reservoir with a total static lift of about 980 feet. Water would then be pumped from a new regulating reservoir and conveyed through a second pipeline to a proposed new treatment plant near the town of Cool or Greenwood Lake.

Based on preliminary estimates in previous studies, total pumping for the two pump stations of up to 4,600 hp would be required. As conceived, a 21 to 24-inch diameter pipeline about 16,000 to 17,000 feet (about 3 miles) in length would be required, with a capacity of about 22 cfs. The static lift from the North Fork American River to a treatment plant site near the town of Cool is approximately 1,080 feet. The project would require a regulating reservoir of approximately 100 acre-feet in size, water treatment plant and related piping to integrate with the existing water distribution system. The required 100 acre-foot regulating reservoir is included in the cost estimate of this options alternative, but not the water treatment plant and related piping.

This option is configured to allow the District to meet its projected water supply need (up to 10,300 acre-feet at year 2025 demand level) using water from the North Fork American River via the pumping plant. For this evaluation, the pumping plant operation was assumed to deliver water to meet demands ramped up starting in year 2009 to the full 10,300 acre-feet per year in 2025. With the North Fork American River Pumping Plant in service, additional water can be taken from the Stumpy Meadows Project minimizing the need to pump water at the North Fork American River Pumping Plant. This is especially the case in earlier years when the District demands have not substantially increased. A Sierra Hydrotech study showed that on average and at full demands, about 84% of the District's increased system water yield was required to be pumped from the North Fork American River Pumping plant with the remaining yield occurring through additional water being utilized from the Stumpy Meadows Project. This study assumes that 84% of the required additional safe yield based on updated water supply demand projections would be required to be pumped at the North Fork American River Pumping Plant. Pumping would occur to the regulating reservoir during off-peak hours to minimize operational energy costs. Water from the regulating reservoir will then be conveyed to the treatment plant as needed. The 100 acre-foot capacity regulating reservoir is sized to meet the storage requirements based on an anticipated delivery schedule.

Water for this option would be made available from the North Fork of the American River and be made up of water secured under a future EDCWA contract with the USBR (P.L. 101-514) and/or water made available under the Supplemental Water Rights Project, currently underway. Because water made available under both a USBR contract as well as the Supplemental Water Rights Project would be required to be taken directly from Folsom Reservoir, downstream of the North Fork American River Pumping Plant location, it is anticipated that water would be exchanged with other PCWA supplies allowing water to be taken directly at the North Fork American River Pumping Plant location. This would require agreement with PCWA and approval from the State Water Resources Control Board.

An advantage of this option is that the North Fork American River Pumping Plant would provide the District with a second major water supply project in addition to the existing Stumpy Meadows Project. Having two major sources of water available to serve the District would increase the dependability of water supply to the end customers. For example, if a catastrophic occurrence should occur on one project, such as conveyance failure, there would be a source of water available from the other project to partially meet demands. Another advantage is that this option locates water near where development is likely to take

place within the District's service area. The cost of the North Fork American River Pumping Plant is estimated at about $14 million (see Appendix 5).

4.6 OPTION 6 – Canyon Creek Reservoir

Canyon Creek Reservoir is a major storage project conceptualized on Canyon Creek below the confluence with Dark Canyon Creek located about 3 miles west of Lake Walton. The proposed dam would have a crest length of 980 feet and a height of 216 feet, providing storage capacity of 17,500 acre-feet. Water would be conveyed from Canyon Creek Reservoir to the existing District water system through 2.6 miles of pipeline and tunnel to a site north of Greenwood.

The Canyon Creek Project would provide gravity supply water to the western and southwestern portions of the District's service area below about 2,000 feet in elevation, while the Stumpy Meadows Project would continue to serve most of the eastern portions. Inflow to the Canyon Creek Reservoir could be augmented with surplus water from the Stumpy Meadows Project by conveying water in the existing District system to the Canyon Creek Reservoir. The Canyon Creek Dam would capture runoff from approximately 12.5 square miles of the Canyon Creek watershed. Operated in conjunction with the Stumpy Meadows Project, past reports have indicated that the safe yield of Canyon Creek Reservoir is about 6,100 acre-feet, with a firm yield of about 6,780 acre-feet.

A small hydroelectric power plant would probably be located at the Canyon Creek Dam to utilize head from the release of surplus water and stream maintenance flow. Releases made through the power plant would decrease over time as District demands continue to increase reducing available flow.

Previous studies of the Canyon Creek Reservoir site considered importing additional water from Otter Creek, thereby increasing the size of the watershed contributing to Canyon Creek Reservoir. The conclusion was that the relatively high cost of the diversion as related to the small increase in yield seemed to make the import from Otter Creek infeasible.

Development of the Canyon Creek Reservoir option would require rights to allow new diversion of water. *OPTION 6 – Canyon Creek Reservoir* would require the following new rights to divert water.

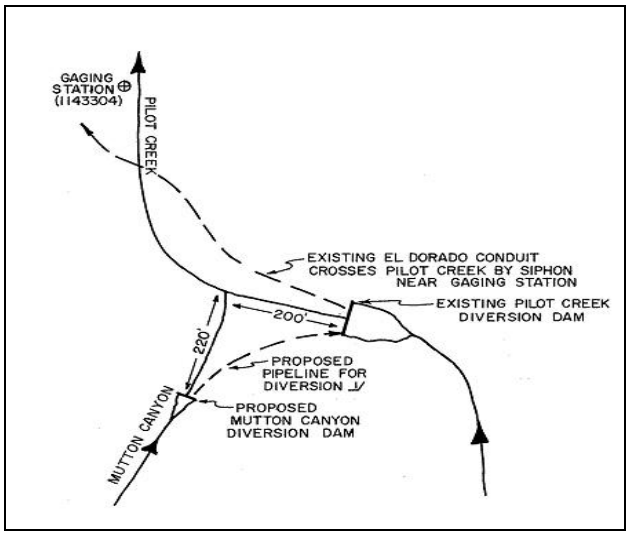
- Right to directly divert water from Canyon Creek, a tributary to the Middle Fork American River, for consumptive use;
- Right to divert water from Canyon Creek to storage in Canyon Creek Reservoir;
- Right to redivert water released from storage to the District's service area; and
- Right to store water from the Stumpy Meadows Project in Canyon Creek Reservoir (if this option were used).

An advantage of this option is that it would provide the District with a second major water supply project in addition to the existing Stumpy Meadows Project. Also, water from the Georgetown Divide Ditch at Walton Lake could be conveyed to Canyon Creek and stored in the reservoir augmenting inflow. A disadvantage is that construction of Canyon Creek Dam and Reservoir would likely have significant environmental opposition making it difficult to obtain project approvals.

The water supply provided by Canyon Creek Reservoir (firm yield of 6,780 acre-feet) is significant but would not meet the full identified 10,300 acre-feet identified as the water need by year 2025. The cost of Canyon Creek Project is estimated at about $108 million (see Appendix 6).

4.7 OPTION 7 – Mutton Canyon

The original vision of the Stumpy Meadows Project included water diverted from Mutton Canyon intended to augment water available from Stumpy Meadows Reservoir. As originally planned, the Pilot Creek Diversion Dam was to be located downstream from the Mutton Canyon confluence, which would have included the flows of Mutton Canyon. However, certain construction problems made it necessary to build the Pilot Creek Diversion Dam above the confluence. Consequently, the flow of Mutton Canyon was never diverted directly to the El Dorado Conduit and Georgetown Divide Ditch.



Mutton Canyon Option

This option would locate a new point of diversion on Mutton Canyon at a location just upstream from the confluence with Pilot Creek. From this new diversion location, water would be conveyed to either the existing Pilot Creek Diversion Dam on just upstream from its confluence with Mutton Canyon or conveyed directly into the El Dorado Conduit. Mutton Canyon diversions would be used to supplement Stumpy Meadows storage by reducing the need to make releases from storage when diversions from Mutton Canyon were available.

This option would include construction of a concrete diversion dam about six feet high and 40 feet long on Mutton Canyon, approximately 220 feet upstream from the confluence with Pilot Creek. The dam would have a crest height approximately 20 feet above the crest elevation of Pilot Creek Diversion Dam. A 15-inch pipeline approximately 400 feet long with a maximum capacity of 15 cfs would be constructed from the Mutton Canyon Diversion Dam and discharge into the pool behind Pilot Creek Diversion Dam or alternatively directly into the El Dorado Conduit.

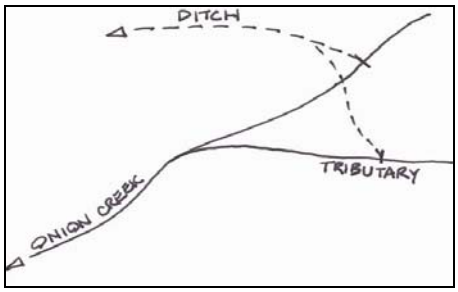
It is anticipated that a maximum diversion of 15 cfs would be made between November 1 and August 1 of each year. For this evaluation, it is assumed that the minimum streamflow release requirement below Mutton Canyon Diversion Dam would be 1 cfs or the natural flow, whichever is less. This stream release would flow down Mutton Canyon and then to Pilot Creek were it would be used to make partial compliance of the 4 cfs minimum release requirement (2 cfs in a dry year) at the compliance point located about 400 feet below the confluence.

When combined flow of Pilot Creek and Mutton Canyon exceeds the demand from the Georgetown Divide Ditch, spill will occur at Pilot Creek Diversion Dam as currently occurs and will occur at Mutton Canyon Diversion Dam when Mutton Canyon diversion capacity of 15 cfs is exceeded. Diversion would be made primarily during the spring runoff period of the drier years, permitting the District to maintain a higher project water yield without as great a degree of storage depletion at Stumpy Meadows Reservoir. It has been estimated that under the most favorable conditions during a moderately dry year, a diversion of 600 to 700 acre-feet could be made to meet District demands. The practical diversion of the flows of Mutton Canyon will likely be on the order of a couple of hundred acre-feet per season. During extremely dry years, it is unlikely that substantial diversion could be made from Mutton Canyon due to a lack of available natural flow. However, diversion that had occurred during previous seasons would assist by providing additional carryover storage at Stumpy Meadows Reservoir. For this evaluation, an increase in yield of 100 acre-feet is used.

The District claims the right to divert water from Mutton Canyon under existing water rights Application 5644A totaling up to about 690 afa at a rate of 15 cfs from Mutton Canyon as part of the Stumpy Meadows Project. Development of *OPTION 7 – Mutton Canyon* could require confirming these water rights will support this option. The Mutton Canyon pipeline would be located on U.S. Forest Service land requiring a special use permit or long-term easement.

The Cost of *OPTION 7 – Mutton Canyon* is estimated at about $190,000 (see Appendix 7).

4.8 OPTION 8 – Onion Creek



Onion Creek Option

The diversion from Onion Creek was originally constructed in the late 1800's as part of the Georgetown Divide Water Company system, diverting about 1.5 square miles of Onion Creek (a tributary to the South Fork American River) into Pilot Creek for enroute use and rediversion to the Georgetown Divide Ditch. The Water Company had pre-1914 water rights to the diversion of this water for mining and domestic purposes on the Georgetown Divide. Water was diverted from Onion Creek into a tributary of Pilot Creek and then rediverted from Pilot Creek to the Georgetown Divide Ditch for conveyance to the Georgetown area. Onion Creek Diversion was acquired by the District and utilized until the early 1970's. Diversion continued from Onion Creek until the early 1980's to serve cabins located along the ditch alignment. It is understood that logging operations in the 1980's destroyed much of the conveyance system from Onion Creek.

This option would include reconstructing the Onion Creek Diversion and conveyance System to allow water to once again be conveyed from Onion Creek to Pilot Creek. This diversion would increase the yield from the Stumpy Meadows project as the diverted water would augment project storage thereby increasing yield.

In order to provide the means of conveying water from Onion Creek to the Pilot Creek watershed, a new pipeline located along the old alignment would probably be the most practical approach. The length of the new pipeline would be about 1.7 miles.

It is not clear how much water could be made available from a restored Onion Creek Diversion as there is some question as to the type of water rights that could be utilized for this option; pre-1914 or permitted water rights. The District's *StumpySIM* computer model

was used to develop estimates of the potential additional Stumpy Meadows Project water supply firm yield that could be developed through diversions from Onion Creek. Project yield was estimated based on, 1) operation under pre-1914 water rights, and 2) operation under permitted water rights. It is assumed that the pre-1914 water rights allow diversion year around and the permitted water rights allow diversion from November 1 through August 1 with a minimum instream release requirement of 0.5 cfs. Results of the water supply yield analysis are shown below in Table 3.

Table 3 – Stumpy Meadows Project Firm Yield With Onion Creek Diversion

Onion Creek Water Right Type	Stumpy Meadows Project Yield (acre-feet)	Water Supply Increase (acre-feet)
-	12,251	-existing project-
Pre-1914 right	12,566	315
Permitted Right	12,305	54

The additional firm yield from *Option 8 – Onion Creek* operating under pre-1914 water rights is over 300 acre-feet. Under permitted rights, the additional firm yield is about 50 acre-feet. A first step in the potential reconstruction of the Onion Creek Diversion should be a water rights assessment to gain a better understanding of diversion constraints and potential water yield.

4.9 OPTION 9 – Modification to allowable demand deficiency

The annual safe yield of the Stumpy Meadows Project is 10,541 acre-feet estimated using the District's *StumpySIM* computer model. The project is operated to provide an estimated firm yield of 12,251 acre-feet per year by imposing dry year demand deficiency requirements. The District operates the Stumpy Meadows Project employing the demand deficiency criteria shown below in Table 4.

Table 4 – Georgetown Divide Public Utility District Maximum Dry Year Demand Deficiency Criteria

	Demand Deficiency	% of years Requiring Deficiency*
Treated water	10%	7%
Untreated water	50%	

*A year with required deficiency is defined as when modeling indicates a deficiency of over 5% is required for either treated or untreated water.

In most years, the District is able to supply the full firm yield of 12,251 acre-feet of water to its customers. In dry years, the District can impose up to 10% and 50% demand deficiency in treated and untreated water deliveries, respectively. Using this criterion, the District should expect to require some level of demand deficiency during about 7% of the years (less than 1 year out of ten) when water demands increase to equal the project firm yield.

OPTION 9 - Modification to allowable demand deficiency considers alternative dry year demand deficiency criteria designed to increase the firm yield of the Stumpy Meadows Project. Increasing the dry year demand deficiency criteria, allows for an increase in project firm yield by reducing the water used in dry years. Several different alternative dry year deficiency criteria have been examined to demonstrate how different criteria affect the Stumpy Meadows Project firm yield.

Table 5 lists the alternative dry year demand deficiency criteria considered in this evaluation along with the estimated Stumpy Meadows Project firm yield. Also shown is the percent of years that would require some level of demand deficiency. As shown in the table, the greater the deficiency criteria the more often demand deficiency would be required.

Table 5 – Stumpy Meadows Project Firm Yield
Alternative Water Demand Deficiency Criteria*

Demand Deficiency		% of years Requiring Deficiency	Stumpy Meadows Project Yield (acre-feet)	Water Supply Increase (acre-feet)
Treated	Untreated			
0%	0%	0%	10,541	-safe yield-
10%	50%	7%	12,251	-existing firm yield-
20%	50%	9%	12,493	242
30%	50%	9%	12,753	502
10%	60%	9%	12,616	365
20%	60%	12%	12,876	625
30%	60%	11%	13,161	910

*See Appendix 9 OPTION 9 - Modification to allowable demand deficiency for additional information on this option.

An increase in water supply firm yield is made available by increasing the demand deficiency criteria. For example, by increasing the treated water demand deficiency from 10% to 30%, a firm yield increase of about 500 acre-feet is realized (an increase of about 4%). By increasing the treated water demand deficiency from 10% to 30% and the untreated deficiency from 50% to 60% a firm yield increase of over 900 acre-feet is realized (an

increase of over 7%). Detailed results of this analysis including an evaluation of additional alternative demand deficiencies are included in Appendix 9.

The advantages of this option include its very low cost (for this analysis it is assumed cost is zero), no infrastructure requirements, and no outside approval requirements. The option could be realized through adoption of a new District dry year deficiency policy, operation of the Stumpy Meadows Project to implement the new policy, managing the associated water supply "cut backs" in dry years, and a perhaps a water rate schedule that encourages conservation, especially in dry years.

The main disadvantage of this option is that it would require more stringent dry year water supply deficiency to customers during dry years. However, the evaluation indicates that the increase in number of years that would require demand deficiencies would probably be minimal.

5.0 SUMMARY OF EVALUATION

Stumpy Meadows Reservoir

The options evaluated here are designed to increase the Districts available water supply yield to help meet future increasing demands. The potential water supply benefit and projected development cost for each evaluated option are summarized in Table 6 – Georgetown Divide Public Utility District Options to Increase Water Supply Summary of Findings. The water supply yield developed by each option ranges from under 100 acre-feet per year (Onion Creek) to 10,300 acre-feet (100% of projected future need) for several of the options. Initial costs range greatly from near zero for *OPTION 9 – Modification to Allowable Demand Deficiency* to $108 million to develop *OPTION 6 - Canyon Creek Reservoir*. Annual operating costs for the options range from near zero for *OPTION 9 – Modification to Allowable Demand Deficiency* to $1.4 million per year for the *OPTION 6 – North Fork American River Pumping Plant*. Unit cost of water per acre-foot per year ranges from near zero to over $1,000 for some options.

The information presented here is intended to provide a general conceptual-level overview of a series of options that could be available to the District to increase water supply. The intent of this study is to provide the District with information that can be used to help decide which options are most promising. The most promising options should be considered for detailed study to better understand their feasibility and ability to meet the Districts future water supply needs.

Table 6 - Georgetown Divide Public Utility District
Options to Increase Water Supply Summary of Findings

OPTION	Option Name	Initial Costs ($ mil) (Option 7, 8 and 9 in $1,000)						Annual Costs ($1,000/yr)					Total Cost ($ mil) (Option 7, 8 and 9 in $1,000)		Water Supply Safe yield (acre-feet)	Cost of Water ($/af/yr)
		Construction	Engineering[1]	Financing[2]	Land	Approvals	Total	Power Foregone[3]	Pumping Cost	Cost of Water[4]	O&M	Total	Present	Annual[5]		
1	Conveyance canal loss reduction	9.4	1.4	0.3	0	0.4	11.5	0	0	0	0	0	11.5	0.8	670	1,200
2	Enlarging Stumpy Meadows Reservoir	*Cost analysis not performed*						-	-	-	-	-	-	-	250 - 1,000	-
3	Upper Stumpy Meadows Reservoir	*Cost analysis not performed*						-	-	-	-	-	-	-	3,200	-
4	(a) Rubicon River Diversion-50 cfs (with tunnel)	48.6	7.3	1.5	0.5	1.2	59.0	540	0	203	25	768	70.3	4.8	10,300	470
	Rubicon River Diversion-15 cfs (with tunnel)	41.3	6.2	1.2	0.5	1.2	50.4	220	0	83	25	328	55.2	3.8	3,300	1,100
4	(b) Rubicon River Diversion-50 cfs (without tunnel)	22.9	3.4	0.7	0[6]	1.5	28.5	540	0	203	250	993	43.0	2.9	10,300	290
	Rubicon River Diversion-15 cfs (without tunnel)	19.5	2.9	0.6	0[6]	1.5	24.5	220	0	83	250	553	32.5	2.2	3,300	680
5	North Fork American River Pumping Plant	9.9	1.5	0.3	1.0	1.5	14.2	0	1,100	216	100	1,400	34.6	2.4	10,300	230
6	Canyon Creek Reservoir	85.0	12.8	2.6	3.0	5.0	108.3	0	0	0	200	200	111.2	7.6	6,100	1,200
7	Mutton Canyon	140	21	4	0	25	190	0	0	0	15	15	190	13	100	130
8	Onion Creek	1,800	270	54	0	50	2,200	0	0	0	20	20	2,200	150	50 - 300	500 - 3,000
9	Modification to allowable demand deficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	200 - 1,000	0

[1] Engineering costs estimated at 15% of construction costs.
[2] Financing costs estimated at 3% of construction costs.
[3] Based on an estimated cost of $200/acre-foot.
[4] Cost of water assumes full water demand for all years
[5] Annual costs determined using a discount rate of 3.2% and a project life of 20 years.
[6] Assumes land is available under the original land patent

6.0 REFERENCES

The following references were reviewed in carrying out the evaluation described in this report. Information from these references is incorporated throughout the report.

State of California, Department of Water Resources, Central District, *Georgetown Divide Water Management Study*, June 1992.

Sierra Hydrotech, Memorandum to Marie Davis, Subject: Preliminary Report – Folsom North Pumping Project, September 2, 1997.

Sierra Hydrotech, *Georgetown Divide Public Utility District's Water Rights and Water Supply and Sacramento Municipal Utility District's Relicensing Issues*, December 12, 2003.

Placer County Water Agency, US Army Corps of Engineers, *East Loomis Basin Canal Efficiency Study*, June 2008.

El Dorado County Water Agency, *Water Resources Development and Management Plan*, April 2007.

Mead & Hunt, Inc., Joint Benefit Investigation Plan, *Technical Analysis of Preliminary Alternatives*, July 2004.

Mead & Hunt, Inc., *Georgetown Divide Public Utility District Supplemental Water Supply Options Study, Technical Analysis of Preliminary Alternatives*, November 2004.

Website: (http://www.gerlecreek.com/documents/georgetowndividemaps.htm)

Brown & Caldwell, Georgetown Divide Public Utility District Drought Plan, October 2007.

APPENDIX 1

Conveyance canal loss reduction

OPTION 1 - Conveyance canal loss reduction

Losses estimated from 1992 DWR Georgetown Divide Water Management Study

Source	Projected 2000 Loss AF/yr	Losses Pro-Rated to 2009[2]	Percent of Total Water 10,300 AF
Process Water (wash streets, back flush treatment plant, etc) [1]	-	150	1%
System Water-up (annual) [1]	-	450	4%
Treated Water Distribution System Process Water (Casual sales, fire department, water theft, etc)	410	406	4%
Carriage Water (additional flow necessary for regulation and diversion by users) [1]	1,280	1,270	12%
Conveyance Losses (seepage, leakage and other losses associated with conveyance)	1,340	1,330	13%
	Total Process Water and Losses =	3,600	
	Total as Percent of Water Delivered =	35%	

Carriage Losses: (Assuming 10,300 acre-feet of delivery)

Season	Duration Months[1]	Rate cfs[1]	Total Loss (AF)
Summer	5	2.3	690
Winter	7	1.4	590
			1,280

Additional Water from Stumpy Meadows from Conservation:

Assumptions:
1. Carriage water requirements are already reduced to the projected 2000 levels from the 1992 DWR study.
2. A reduction in conveyance water requirements is considered for ditch lining only. Assume that by lining a percentage of the remaining unlined ditches at areas most susceptible to leakage and seepage, a 50% reduction in conveyance water requirement can be realized.
3. Water-up and process water requirements are necessary and can not be reduced.
4. Distribution system water requirement reductions are minor and not considered for reduction.

Conveyance:

Total Conveyance Length:		75	miles
Percent lined, tunnel, or pipeline: [1]		30%	
Percent of unlined canal to be lined:		40%	
Length of canal for lining:		21	miles
Cost per foot of ling:	$	85.00	per linear foot
Total cost for lining:	$	9,420,000	
Additional water:		670	AF/year

Total Cost (year 2009)	$	9,420,000				
Additional Water 2010 - 2029:		13,400	AF	Cost/AF	$	700

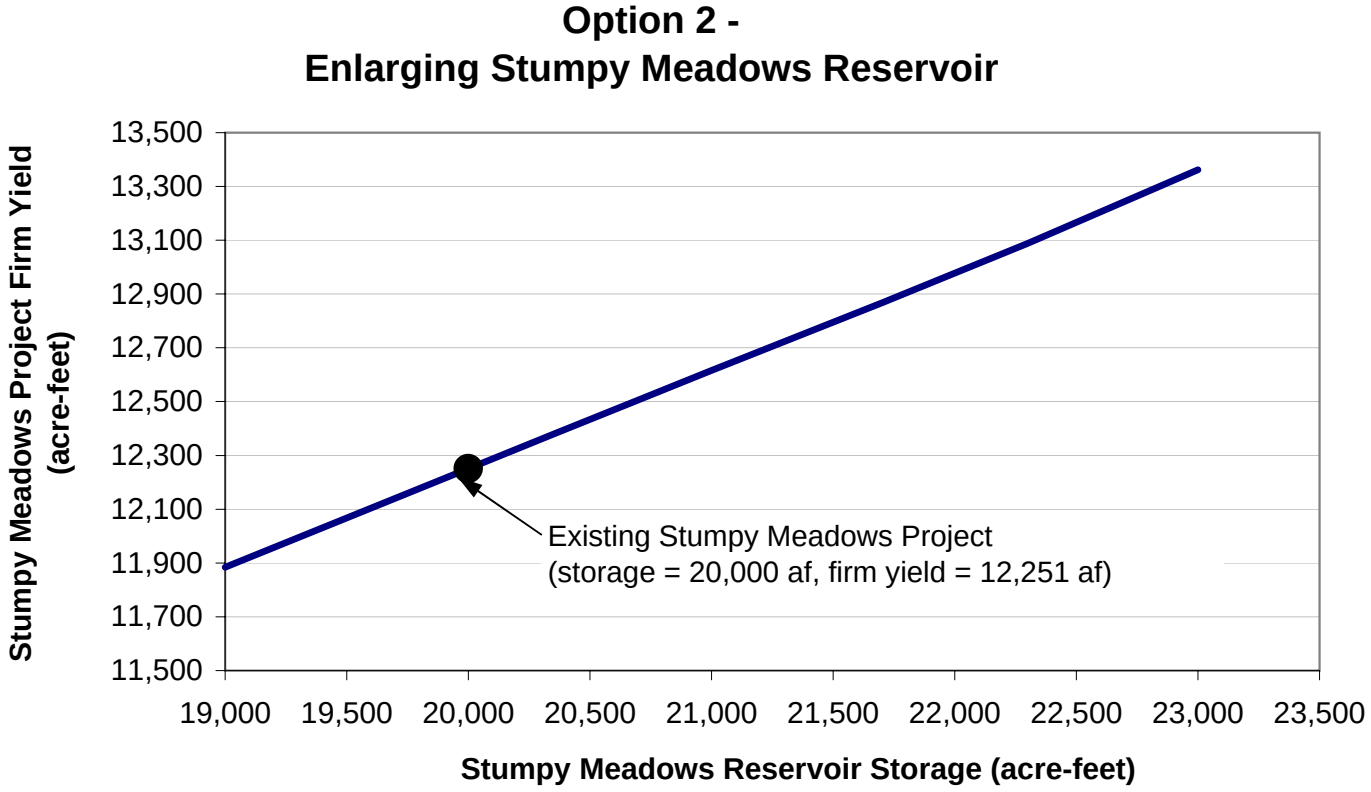
[1] *Estimates provided by GDPUD personnel.*

[2] *GDPUD reports total system losses of 3,600 acre-feet/year. Projected year 2000 losses from the 1992 study were pro-rated to match the remaining 3,000 acre-feet of losses reported by GDPUD after removing process and system water up demands.*

APPENDIX 2

Enlarging Stumpy Meadows Reservoir

Stumpy Storage (af)	Additional Storage (af)	Dam Height (feet)	Dam Raise (feet)	Project Yield	Delta from Existing Yield
19,000	-1,000	159	-3	11,884	-367
20,000	0	162	0	12,251	0
20,350	350	163	1	12,379	128
20,700	700	164	2	12,507	256
21,000	1,000	165	3	12,616	365
21,700	1,700	167	5	12,867	616
22,300	2,300	169	7	13,088	837
23,000	3,000	171	9	13,362	1,111



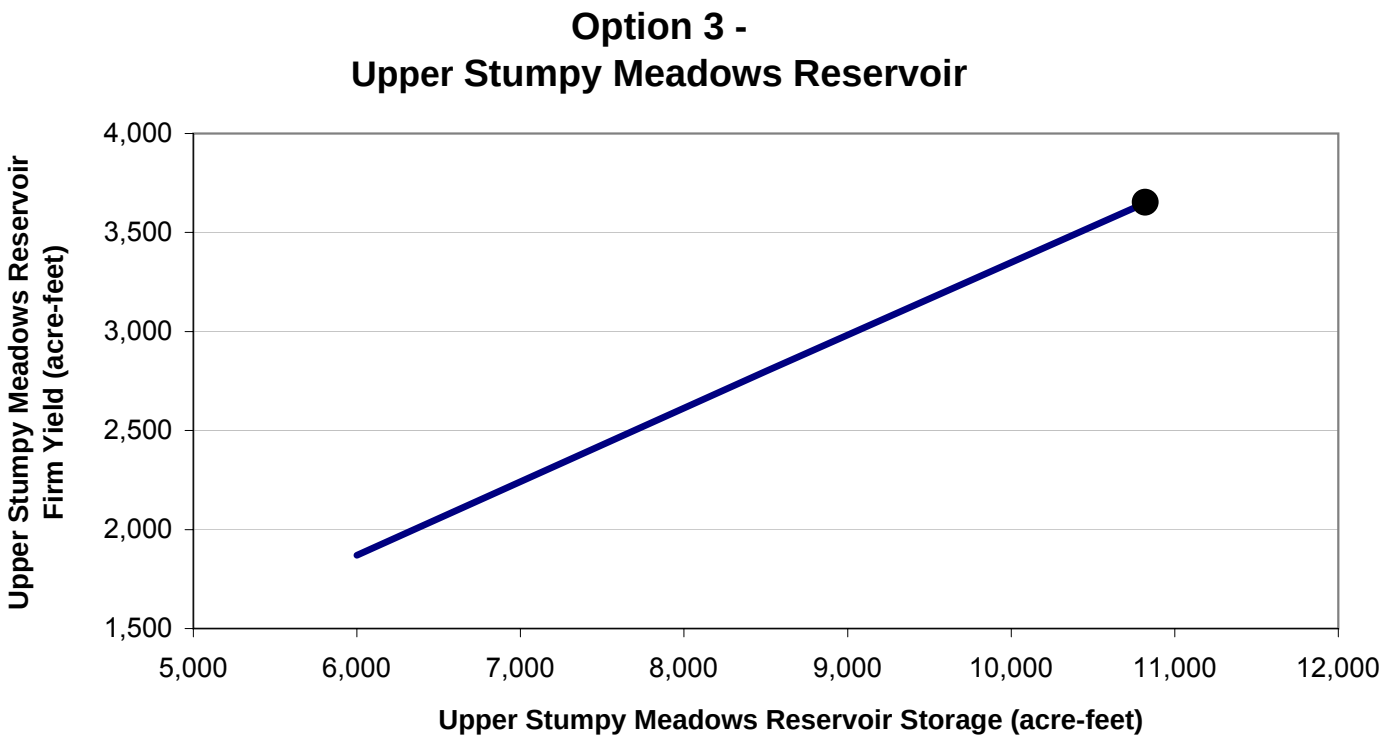
APPENDIX 3

Upper Stumpy Meadows Reservoir

Upper Stumpy Storage (af)	Usable Capacity (af)	Dam Height (feet)	Project Firm Yield w/Stumpy (af)	Upper Stumpy Project Firm Yield (af)
6,000	5,000	≈100	14,121	1,870
8,500	7,500	≈130	15,048	2,800
10,820	9,820	145	15,903	3,650

Upper Stumpy Meadows Dam and Reservoir
configuration used for cost development

Upper Stumpy Meadows Dam height = 142 feet
Dam crest elevation = 4,500 feet
Reservoir surface area = 194 acres
Storage capacity = 10,820 acre-feet
Assume dead pool = 1,000 acre-feet
Usable storage capacity = 9,820 acre-feet
Reservoir drainage area = 10 square miles



OPTION 3 - Upper Stumpy Meadows Reservoir

Project: Upper Stumpy Meadows Reservoir
Location: Pilot Creek, Upstream of existing Stumpy Meadows Reservoir

Comparison with Canyon Creek Dam:

	Upper Stumpy Meadows		Canyon Creek	
Dam:	Rockfill		Earthfill	
Top of Dam:	4500	feet	2256	feet
Base of Dam	4355	feet	2040	feet
Height:	145	feet	216	feet
Length:	850	feet	980	feet
Topwidth:	20	feet		feet
Reservoir Area:	194	acres	280	acres
Reservoir Volume	10820	acre-feet	17500	acre-feet
Safe Yield:	3200	acre-feet	6100	acre-feet
Drainage Basin:	10	square miles	12.5	square miles

Cost Estimate: Not performed due to comparison with Canyon Creek. Project will cost more and provide less benefits.

APPENDIX 4

Rubicon River diversion

Georgetown Divide Public Utility District
Options to Increase Water Supply

OPTION 4 - Rubicon River Diversion (50 cfs)

Water Year	Water Demand ac-ft	Stumpy Safe Yield ac-ft	GDPUD Defficiency ac-ft	Water Req'd to meet Deff.[1] ac-ft	Power Foregone Cost[2]	2009 Power Foregone	Option 4(a) With Tunnel O&M	Option 4(a) With Tunnel 2009 Discounted O&M	Option 4(b) Without Tunnel O&M	Option 4(b) Without Tunnel 2009 Discounted O&M	Cost of Water	2009 Discounted Cost of Water
2005	11,257	10,500	757	0	Year Not Used in Analysis							
2006	11,734	10,500	1,234	135	Year Not Used in Analysis							
2007	12,211	10,500	1,711	270	Year Not Used in Analysis							
2008	12,688	10,500	2,188	405	Year Not Used in Analysis							
2009	13,166	10,500	2,666	540	Year Not Used in Analysis							
2010	13,643	10,500	3,143	675	Year Not Used in Analysis							
2011	14,120	10,500	3,620	810	$ 162,000	$ 147,393	$25,000	$ 22,746	$250,000	$ 227,458	$ 60,750	$ 55,272
2012	14,597	10,500	4,097	945	$ 189,000	$ 166,626	$25,000	$ 22,040	$250,000	$ 220,405	$ 70,875	$ 62,485
2013	15,074	10,500	4,574	1,080	$ 216,000	$ 184,525	$25,000	$ 21,357	$250,000	$ 213,571	$ 81,000	$ 69,197
2014	15,551	10,500	5,051	1,215	$ 243,000	$ 201,154	$25,000	$ 20,695	$250,000	$ 206,948	$ 91,125	$ 75,433
2015	16,028	10,500	5,528	1,350	$ 270,000	$ 216,574	$25,000	$ 20,053	$250,000	$ 200,531	$101,250	$ 81,215
2016	16,506	10,500	6,006	1,485	$ 297,000	$ 230,844	$25,000	$ 19,431	$250,000	$ 194,313	$111,375	$ 86,567
2017	16,983	10,500	6,483	1,620	$ 324,000	$ 244,021	$25,000	$ 18,829	$250,000	$ 188,288	$121,500	$ 91,508
2018	17,460	10,500	6,960	1,755	$ 351,000	$ 256,159	$25,000	$ 18,245	$250,000	$ 182,450	$131,625	$ 96,060
2019	17,937	10,500	7,437	1,890	$ 378,000	$ 267,310	$25,000	$ 17,679	$250,000	$ 176,792	$141,750	$ 100,241
2020	18,414	10,500	7,914	2,025	$ 405,000	$ 277,523	$25,000	$ 17,131	$250,000	$ 171,310	$151,875	$ 104,071
2021	18,891	10,500	8,391	2,160	$ 432,000	$ 286,845	$25,000	$ 16,600	$250,000	$ 165,998	$162,000	$ 107,567
2022	19,369	10,500	8,869	2,295	$ 459,000	$ 295,323	$25,000	$ 16,085	$250,000	$ 160,851	$172,125	$ 110,746
2023	19,846	10,500	9,346	2,430	$ 486,000	$ 302,999	$25,000	$ 15,586	$250,000	$ 155,864	$182,250	$ 113,625
2024	20,323	10,500	9,823	2,565	$ 513,000	$ 309,915	$25,000	$ 15,103	$250,000	$ 151,031	$192,375	$ 116,218
2025	20,800	10,500	10,300	2,700	$ 540,000	$ 316,110	$25,000	$ 14,635	$250,000	$ 146,347	$202,500	$ 118,541
2026	20,800	10,500	10,300	2,700	$ 540,000	$ 306,309	$25,000	$ 14,181	$250,000	$ 141,810	$202,500	$ 114,866
2027	20,800	10,500	10,300	2,700	$ 540,000	$ 296,811	$25,000	$ 13,741	$250,000	$ 137,412	$202,500	$ 111,304
2028	20,800	10,500	10,300	2,700	$ 540,000	$ 287,607	$25,000	$ 13,315	$250,000	$ 133,151	$202,500	$ 107,853
2029	20,800	10,500	10,300	2,700	$ 540,000	$ 278,689	$25,000	$ 12,902	$250,000	$ 129,023	$202,500	$ 104,508
2030	20,800	10,500	10,300	2,700	$ 540,000	$ 270,048	$25,000	$ 12,502	$250,000	$ 125,022	$202,500	$ 101,268
2031	20,800	10,500	10,300	2,700	$ 540,000	$ 261,674	$25,000	$ 12,115	$250,000	$ 121,145	$202,500	$ 98,128
2032	20,800	10,500	10,300	2,700	$ 540,000	$ 253,560	$25,000	$ 11,739	$250,000	$ 117,389	$202,500	$ 95,085
2033	20,800	10,500	10,300	2,700	$ 540,000	$ 245,698	$25,000	$ 11,375	$250,000	$ 113,749	$202,500	$ 92,137
2034	20,800	10,500	10,300	2,700	$ 540,000	$ 238,079	$25,000	$ 11,022	$250,000	$ 110,222	$202,500	$ 89,280
2035	20,800	10,500	10,300	2,700	$ 540,000	$ 230,697	$25,000	$ 10,680	$250,000	$ 106,804	$202,500	$ 86,511
2036	20,800	10,500	10,300	2,700	$ 540,000	$ 223,544	$25,000	$ 10,349	$250,000	$ 103,492	$202,500	$ 83,829
2037	20,800	10,500	10,300	2,700	$ 540,000	$ 216,612	$25,000	$ 10,028	$250,000	$ 100,283	$202,500	$ 81,230
2038	20,800	10,500	10,300	2,700	$ 540,000	$ 209,895	$25,000	$ 9,717	$250,000	$ 97,174	$202,500	$ 78,711
Total (2011 - 2025)			100,000			$ 3,700,000		$ 300,000		$ 2,800,000		$ 1,388,745

[1] Estimated amount of water needed to supplement Stumpy Meadows Project.

[2] UARP Power Forgone estimated at $200/acre-foot

OPTION 4(a) - Rubicon River Diversion (50 cfs) with tunnel

Item	Qty	Unit	Unit Price	Total Price
1 Clearing				
Clearing for Pipeline	14	AC	$ 4,000	$ 56,000
Clearing for Intake	3	AC	$ 3,000	$ 9,000
Clearing for Tunnel Entrance Portal	4	AC	$ 3,000	$ 12,000
Clearing for Tunnel Exit Portal	3	AC	$ 3,000	$ 9,000
TOTAL CLEARING				**$ 86,000**
2 Diversion at/near Robbs Peak Forebay				
Cofferdam	1	LS	$ 300,000	$ 300,000
Bypass Piping	250	LF	$ 500	$ 125,000
Diversion Intake Structure	1	LS	$ 2,500,000	$ 2,500,000
Demolition, Temp. structure removal	1	LS	$ 50,000	$ 50,000
TOTAL DIVERSION				**$ 2,975,000**
3 Pipeline				
≈30" Pipeline with excavation and backfill	13,700	LF	$ 550	$ 7,535,000
structures/supports at above ground location (assumed 15% of length)	2,100	EA	$ 1,500	$ 3,150,000
TOTAL PIPELINE				**$ 10,685,000**
4 Tunnel with pipe lining				
Entrance Portal	1	LS	$ 750,000	$ 750,000
Tunnel 8' dia.	13,700	LF	$ 1,100	$ 15,070,000
Tunnel Lining & Grouting (8' dia.)	13,700	LF	$ 650	$ 8,905,000
Exit Portal	1	LS	$ 450,000	$ 450,000
TOTAL TUNNEL AND PIPE LINING				**$ 25,175,000**
			Subtotal (Direct Construction Costs)	$ 38,900,000
			Contingency @ 25%	$ 9,700,000
			OPTION 5(a) Total Estimated Construction Cost =	**$ 48,600,000**

OPTION 4(b) - Rubicon River Diversion (50 cfs) without tunnel

Item	Qty	Unit	Unit Price	Total Price
1 Clearing				
Clearing for Pipeline	38.4	AC	$ 4,000	$ 154,000
Clearing for Intake	3	AC	$ 3,000	$ 9,000
TOTAL CLEARING				**$ 163,000**
2 Diversion at/near Robbs Peak Forebay				
Cofferdam	1	LS	$ 300,000	$ 300,000
Bypass Piping	250	LF	$ 500	$ 125,000
Diversion Intake Structure	1	LS	$ 2,500,000	$ 2,500,000
Demolition, Temp. structure removal	1	LS	$ 50,000	$ 50,000
TOTAL DIVERSION				**$ 2,975,000**
3 Pipeline				
≈30" Above ground pipeline with structures and supports	38,000	LF	$ 400	$ 15,200,000
TOTAL PIPELINE				**$ 15,200,000**
			Subtotal (Direct Construction Costs)	$ 18,300,000
			Contingency @ 25%	$ 4,600,000
			OPTION 5(b) Total Estimated Construction Cost =	**$ 22,900,000**

OPTION 4 - Rubicon River Diversion (50 cfs)

Monthly diversion from Robbs Peak Res. based on a target of 23,000 acre-feet for sum of April 1 storage and remaining April-Oct inflow. Volumes are listed as thousands of acre-feet.

Calendar Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1923	0	0	0	0	0	0	0	0	0	0	0	0	0
1924	0	0	0	2.975	2.975	2.975	2.975	0.34	0	0	0	0	12.24
1925	0	0	0	0	0	0	0	0	0	0	0	0	0
1926	0	0	0	2.975	1.895	0	0	0	0	0	0	0	4.87
1927	0	0	0	0	0	0	0	0	0	0	0	0	0
1928	0	0	0	0	0	0	0	0	0	0	0	0	0
1929	0	0	0	2.975	2.975	2.581	0	0	0	0	0	0	8.531
1930	0	0	0	2.975	2.65	0	0	0	0	0	0	0	5.625
1931	0	0	0	2.975	2.975	2.975	2.975	1.446	0	0	0	0	13.346
1932	0	0	0	0	0	0	0	0	0	0	0	0	0
1933	0	0	0	2.975	1.675	0	0	0	0	0	0	0	4.65
1934	0	0	0	2.975	2.975	2.975	1.117	0	0	0	0	0	10.042
1935	0	0	0	0	0	0	0	0	0	0	0	0	0
1936	0	0	0	0	0	0	0	0	0	0	0	0	0
1937	0	0	0	0	0	0	0	0	0	0	0	0	0
1938	0	0	0	0	0	0	0	0	0	0	0	0	0
1939	0	0	0	2.5	0	0	0	0	0	0	0	0	2.5
1940	0	0	0	0	0	0	0	0	0	0	0	0	0
1941	0	0	0	0	0	0	0	0	0	0	0	0	0
1942	0	0	0	0	0	0	0	0	0	0	0	0	0
1943	0	0	0	0	0	0	0	0	0	0	0	0	0
1944	0	0	0	2.975	0.725	0	0	0	0	0	0	0	3.7
1945	0	0	0	0	0	0	0	0	0	0	0	0	0
1946	0	0	0	0	0	0	0	0	0	0	0	0	0
1947	0	0	0	2.975	0.71	0	0	0	0	0	0	0	3.685
1948	0	0	0	0.3	0	0	0	0	0	0	0	0	0.3
1949	0	0	0	0.7	0	0	0	0	0	0	0	0	0.7
1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	0	0	0	0	0	0	0	0	0	0
1953	0	0	0	0	0	0	0	0	0	0	0	0	0
1954	0	0	0	0	0	0	0	0	0	0	0	0	0
1955	0	0	0	2.975	1.195	0	0	0	0	0	0	0	4.17
1956	0	0	0	0	0	0	0	0	0	0	0	0	0
1957	0	0	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	0	0	0	0	0	0	0	0	0	0
1959	0	0	0	2.975	1.11	0	0	0	0	0	0	0	4.085
1960	0	0	0	2.975	1.175	0	0	0	0	0	0	0	4.15
1961	0	0	0	2.975	2.975	2.975	2.975	0.765	0	0	0	0	12.665
1962	0	0	0	2.975	0.4	0	0	0	0	0	0	0	3.375
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	1.9	0	0	0	0	0	0	0	0	1.9
1965	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	2.975	0.68	0	0	0	0	0	0	0	3.655
1967	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	1.4	0	0	0	0	0	0	0	0	1.4
1973	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	0	0	2.975	2.975	2.975	0.85	0	0	0	0	0	9.775
1977	0	0	0	2.975	2.975	2.975	2.975	2.975	2.975	0.3	0	0	18.15
1978	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0.8	0	0	0	0	0	0	0	0	0.8
1980	0	0	0	0	0	0	0	0	0	0	0	0	0

OPTION 4 - Rubicon River Diversion (50 cfs)

Monthly diversion from Robbs Peak Res. based on a target of 23,000 acre-feet for sum of April 1 storage and remaining April-Oct inflow. Volumes are listed as thousands of acre-feet.

Calendar Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1981	0	0	0	2.975	2.975	0.19	0	0	0	0	0	0	6.14
1982	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	2.8	0	0	0	0	0	0	0	0	2.8
1986	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	2.975	2.975	2.975	0.209	0	0	0	0	0	9.134
1988	0	0	0	2.975	2.975	2.975	2.975	2.775	0	0	0	0	14.675
1989	0	0	0	2.826	0	0	0	0	0	0	0	0	2.826
1990	0	0	0	2.975	2.975	2.975	0.867	0	0	0	0	0	9.792
1991	0	0	0	2.975	2.975	2.975	0.885	0	0	0	0	0	9.81
1992	0	0	0	2.975	2.975	2.975	2.188	0	0	0	0	0	11.113
1993	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	2.975	2.975	0.65	0	0	0	0	0	0	6.6
1995	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0

Avg=	0	0	0	1.099	0.700	0.469	0.273	0.108	0.039	0.004	0	0	2.691
Min=	0	0	0	0	0	0	0	0	0	0	0	0	0
Max=	0	0	0	2.975	2.975	2.975	2.975	2.975	2.975	0.3	0	0	18.15

APPENDIX 5

North Fork American River Pumping Plant

Georgetown Divide Public Utility District
Options to Increase Water Supply

OPTION 5 - North Fork American River Pumping Plant

Water Year	Water Demand ac-ft	Stumpy Safe Yield ac-ft	GDPUD Defficiency ac-ft	Water Req'd to meet Deff. ac-ft	Pumping Hours Per Year	Annual Pumping Cost	2008 Discounted Cost	Cost of Water[1]	2008 Discounted Cost of Water	O&M Cost	2008 Discounted O&M
2005	11,257	10,500	757	0	Year Not Used in Analysis						
2006	11,734	10,500	1,234	433	Year Not Used in Analysis						
2007	12,211	10,500	1,711	865	Year Not Used in Analysis						
2008	12,688	10,500	2,188	1,298	Year Not Used in Analysis						
2009	13,166	10,500	2,666	1,730	Year Not Used in Analysis						
2010	13,643	10,500	3,143	2,163	Year Not Used in Analysis						
2011	14,120	10,500	3,620	2,596	1,472	$ 321,973	$ 292,941	$ 64,890	$ 59,039	$ 200,000	$ 181,966
2012	14,597	10,500	4,097	3,028	1,717	$ 375,636	$ 331,168	$ 75,705	$ 66,743	$ 200,000	$ 176,324
2013	15,074	10,500	4,574	3,461	1,962	$ 429,298	$ 366,742	$ 86,520	$ 73,913	$ 200,000	$ 170,857
2014	15,551	10,500	5,051	3,893	2,208	$ 482,960	$ 399,791	$ 97,335	$ 80,573	$ 200,000	$ 165,559
2015	16,029	10,500	5,529	4,326	2,453	$ 536,622	$ 430,438	$ 108,150	$ 86,750	$ 200,000	$ 160,425
2016	16,506	10,500	6,006	4,759	2,698	$ 590,284	$ 458,800	$ 118,965	$ 92,466	$ 200,000	$ 155,451
2017	16,983	10,500	6,483	5,191	2,943	$ 643,947	$ 484,990	$ 129,780	$ 97,744	$ 200,000	$ 150,630
2018	17,460	10,500	6,960	5,624	3,189	$ 697,609	$ 509,114	$ 140,595	$ 102,606	$ 200,000	$ 145,960
2019	17,937	10,500	7,437	6,056	3,434	$ 751,271	$ 531,276	$ 151,410	$ 107,072	$ 200,000	$ 141,434
2020	18,414	10,500	7,914	6,489	3,679	$ 804,933	$ 551,574	$ 162,225	$ 111,163	$ 200,000	$ 137,048
2021	18,891	10,500	8,391	6,922	3,924	$ 858,596	$ 570,102	$ 173,040	$ 114,897	$ 200,000	$ 132,799
2022	19,369	10,500	8,869	7,354	4,170	$ 912,258	$ 586,951	$ 183,855	$ 118,293	$ 200,000	$ 128,681
2023	19,846	10,500	9,346	7,787	4,415	$ 965,920	$ 602,207	$ 194,670	$ 121,368	$ 200,000	$ 124,691
2024	20,323	10,500	9,823	8,219	4,660	$ 1,019,582	$ 615,952	$ 205,485	$ 124,138	$ 200,000	$ 120,824
2025	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 628,266	$ 216,300	$ 126,620	$ 200,000	$ 117,078
2026	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 608,785	$ 216,300	$ 122,694	$ 200,000	$ 113,448
2027	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 589,908	$ 216,300	$ 118,889	$ 200,000	$ 109,930
2028	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 571,616	$ 216,300	$ 115,203	$ 200,000	$ 106,521
2029	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 553,892	$ 216,300	$ 111,631	$ 200,000	$ 103,218
2030	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 536,717	$ 216,300	$ 108,169	$ 200,000	$ 100,018
2031	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 520,075	$ 216,300	$ 104,815	$ 200,000	$ 96,916
2032	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 503,948	$ 216,300	$ 101,565	$ 200,000	$ 93,911
2033	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 488,322	$ 216,300	$ 98,416	$ 200,000	$ 90,999
2034	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 473,180	$ 216,300	$ 95,364	$ 200,000	$ 88,178
2035	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 458,508	$ 216,300	$ 92,407	$ 200,000	$ 85,443
2036	20,800	10,500	10,300	8,652	4,906	$ 1,073,244	$ 444,291	$ 216,300	$ 89,542	$ 200,000	$ 82,794
	Total (2011-2025)		104,399				$ 7,400,000		$ 1,500,000		$ 2,200,000

Information based on 1997 Sierra Hydrotech Memo

Pumping					
	Static Head:	1,080	ft		
	Length Of Pipe:	17,000	ft		
	Pipe Diameter:	2	ft		
	Discharge:	21.3	cfs		
	Headloss:	132	ft		
	Velocity:	6.8	fps		
	PS Efficiency:	65%			
	Pumping Power:	3,366	kW	or 4,514	hp
	Power Cost:	$ 0.065	/kW-hr		

Pumping Cost Per Acre-foot			
	Flowrate:	21.3	cfs
	Time:	1	hour
	Volume:	1.76	Acre-Feet
Average	Power Cost:	$ 0.065	/kW-hr
	Unit Cost:	*$ 124.05*	*/acre-foot*
High:	. Power Cost:	$ 0.085	/kW-hr
	Unit Cost:	*$ 162.21*	*/acre-foot*
Low:	. Power Cost:	$ 0.045	/kW-hr
	Unit Cost:	*$ 85.88*	*/acre-foot*

[1]Assume $25 per acre-foot to secure right to water typical of what might be charged for PL 101-514 water.

OPTION 5 - North Fork American River Pumping Plant

Project cost estimation as of 1997 from Sierra Hydrotech study.

1997 S.H. Study		
Estimated Cost:	$ 8,440,000	
Remove Treatment Plant	$ (3,000,000)	(remove treatment plant cost for consistancy with other options)
1997 Project Cost for Evaluation	$ 5,440,000	
Escalation factor 1997 to 2009	1.46	3.2% annual escalation rate
Updated Construction Cost		
Updated Project Cost:	$ 7,900,000	
Contingencies @ 25%	$ 2,000,000	
Total 2009 Cost	$ 9,900,000	(Cost does not include new or expanded water treatment plant)

Initial Costs		
Construction Cost	$ 9,900,000	
Engineering	$ 1,500,000	(15% of Construction Cost)
Financing	$ 300,000	(3% of Construction Cost)
Land	$ 1,000,000	(Assumed $1.0 million)
Approvals	$ 1,500,000	(Assumed $1.5 million)
Total Initial Cost Estimate =	$ 14,200,000	
Annual Costs		
Pumping Cost:	$ 1,100,000	
Cost of Water:	$ 220,000	(Cost of water asumes full water demand for all years)
O&M	$ 100,000	(Assumed at $100,000)
Total Annual Cost Estimamte =	$ 1,400,000	

Total Costs		
Project Life =	20	years
Discount Rate =	3.2	%
Present =	$ 34,900,000	
Annual =	$ 2,400,000	

Water Supply Safe Yield =	10,300	(acre-feet)
Cost of Water =	**$ 230**	**($/acre-foot/year)**

APPENDIX 6

Canyon Creek Reservoir

Georgetown Divide Public Utility District
Options to Increase Water Supply

OPTION 6 - Canyon Creek Reservoir

Project cost estimated as of July 1986 taken from DWR study.

1986 DWR Study			
Estimated Cost:	$	34,000,000	(Cost does not include conveyance system to existing distribution system.)
Year		1986	
Set Inflation Rate		3.2%	
Updated Construction Cost			
Updated Project Cost:	$	68,000,000	
Contingency @ 25%	$	17,000,000	(Represents increases in project cost in addition to inflation)
Total 2009 Cost	$	85,000,000	
Initial Costs			
Construction Cost	$	85,000,000	
Engineering	$	12,800,000	(15% of Construction Cost)
Financing	$	2,600,000	(3% of Construction Cost)
Land	$	3,000,000	(Assumed $3.0 million)
Approvals	$	5,000,000	(Assumed $5.0 million)
Total Initial Cost Estimate =	$	108,400,000	
Annual Costs			
O&M	$	200,000	(Assumed at $200,000)
Total Costs			
Project Life =		20	years
Discount Rate =		3.2	%
Present =	$	111,300,000	
Annual =	$	7,600,000	
Water Supply Safe Yield =		6,100	(acre-feet)
Cost of Water =	**$**	**1,200**	**($/acre-foot/year)**

APPENDIX 7

Mutton Canyon

OPTION 7 - Mutton Canyon

Item	Qty	Unit	Unit Price	Total Price
1 Clearing				
Clearing for Pipeline	0.5	AC	$ 4,000	$ 2,000
Clearing for Intake	0.1	AC	$ 3,000	$ 300
TOTAL CLEARING				**$ 2,300**
2 Diversion at Mutton Canyon				
Cofferdam	1	LS	$ 6,000	$ 6,000
Bypass Piping	50	LF	$ 175	$ 8,750
Diversion Intake Structure	1	LS	$ 30,000	$ 30,000
Demolition, Temp. structure removal	1	LS	$ 5,000	$ 5,000
TOTAL DIVERSION				**$ 50,000**
3 Pipeline				
≈15" Above ground pipeline with structures and supports	400	LF	$ 150	$ 60,000
TOTAL PIPELINE				**$ 60,000**
			Subtotal (Direct Construction Costs)	$ 112,300
			Contingency @ 25%	$ 28,100
			OPTION 7 Total Estimated Construction Cost =	**$ 140,000**

APPENDIX 8

Onion Creek

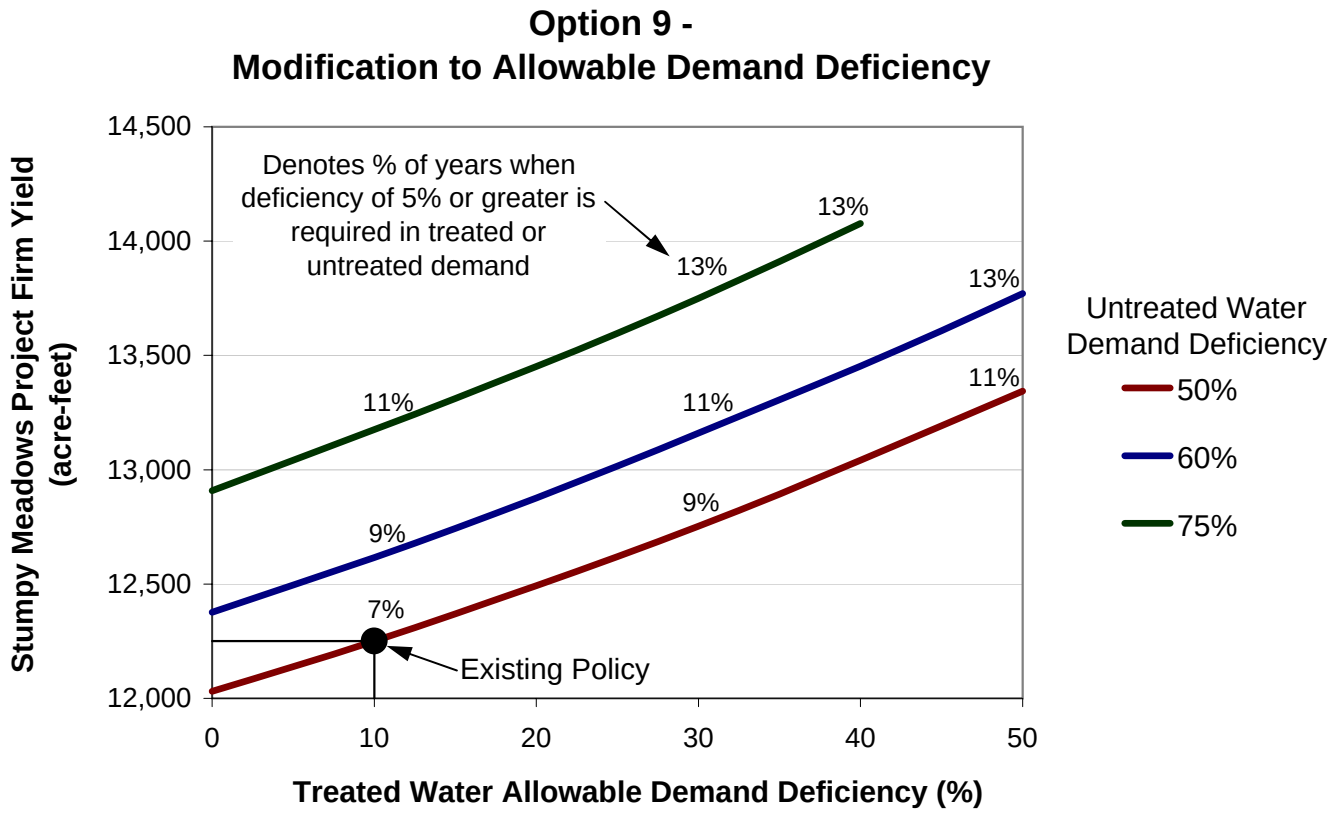
OPTION 8 - Onion Creek

Item	Qty	Unit	Unit Price	Total Price
1 Clearing				
Clearing for Pipeline	9.1	AC	$ 4,000	$ 36,000
Clearing for Intake	0.1	AC	$ 3,000	$ 300
TOTAL CLEARING				**$ 36,300**
2 Diversion at Onion Creek				
Cofferdam	2	LS	$ 6,000	$ 12,000
Bypass Piping	100	LF	$ 175	$ 17,500
Diversion Intake Structure	2	LS	$ 25,000	$ 50,000
Demolition, Temp. structure removal	2	LS	$ 5,000	$ 10,000
TOTAL DIVERSION				**$ 90,000**
3 Pipeline				
≈15" pipeline	9,000	LF	$ 150	$ 1,350,000
TOTAL PIPELINE				**$ 1,350,000**
			Subtotal (Direct Construction Costs)	$ 1,476,000
			Contingency @ 25%	$ 369,000
			OPTION 8 Total Estimated Construction Cost =	**$ 1,800,000**

APPENDIX 9

Modification to allowable demand deficiency

Deficiency Treated (%)	Deficiency Untreated (%)	Project Yield	Delta from Existing Yield	Deficiency Treated (%)	Deficiency Untreated (%)	Project Yield	Delta from Existing Yield	Deficiency Treated (%)	Deficiency Untreated (%)	Project Yield	Delta from Existing Yield
0	50	12,031	-220	0	60	12,377	-239	0	75	12,909	-267
5	50	12,138	-113	5	60	12,495	-121	5	75	13,041	-135
10	50	12,251	0	10	60	12,616	0	10	75	13,176	0
15	50	12,369	118	15	60	12,743	127	15	75	13,312	136
20	50	12,493	242	20	60	12,876	260	20	75	13,451	275
25	50	12,620	369	25	60	13,016	400	25	75	13,597	421
30	50	12,753	502	30	60	13,161	545	30	75	13,750	574
35	50	12,893	642	35	60	13,306	690	35	75	13,911	735
40	50	13,041	790	40	60	13,453	837	40	75	14,077	901
45	50	13,193	942	45	60	13,608	992				
50	50	13,344	1,093	50	60	13,771	1,155				



Demand Deficiency Criteria (%)

Treated	10	50	30	40	30	10	10	30	50	20	40	20	40	20
Untreated	50	50	50	75	75	75	60	60	60	50	50	60	60	75

Water Delivery (% of demand)

Year	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated
1923	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1924	0.82	0.99	0.77	0.89	0.80	0.96	0.63	0.90	0.65	0.93	0.68	0.98	0.77	0.99	0.74	0.95	0.71	0.88	0.81	0.98	0.78	0.93	0.75	0.97	0.72	0.91	0.67	0.96
1925	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1926	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1927	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1928	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1929	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1930	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1931	0.85	1.00	0.75	0.87	0.81	0.97	0.56	0.84	0.60	0.90	0.68	0.98	0.80	1.00	0.73	0.94	0.67	0.82	0.83	0.99	0.78	0.93	0.77	0.98	0.70	0.89	0.64	0.95
1932	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1934	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1935	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1936	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1937	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1938	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1939	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1940	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1941	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1942	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1943	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1944	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1945	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1946	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1947	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1948	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1949	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1950	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1951	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1952	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1953	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1954	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1955	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1956	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1957	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1958	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1959	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1960	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1961	0.97	1.00	0.90	1.00	0.94	1.00	0.80	1.00	0.83	1.00	0.88	1.00	0.94	1.00	0.90	1.00	0.85	1.00	0.95	1.00	0.92	1.00	0.92	1.00	0.87	1.00	0.85	1.00
1962	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1963	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1964	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1965	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1966	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1967	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1968	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1969	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1970	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1971	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1972	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1973	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1974	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Demand Deficiency Criteria (%)

Treated	10	50	30	40	30	10	10	30	50	20	40	20	40	20
Untreated	50	50	50	75	75	75	60	60	60	50	50	60	60	75

Deficeincy over 5% required? (1 = Yes, 0 = No)

Year														
1923	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1924	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1925	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1926	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1927	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1928	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1929	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1930	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1931	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1932	0	0	0	0	0	0	0	0	0	1	1	1	1	1
1933	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1934	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1935	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1936	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1937	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1938	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1939	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1940	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1941	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1942	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1943	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1944	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1945	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1946	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1947	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1948	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1950	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1951	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1953	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1954	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1957	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1959	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1961	0	1	1	1	1	1	1	1	1	0	0	1	1	1
1962	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1968	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Demand Deficiency Criteria (%)																											
Treated	10		50		30		40		30		10		10		30		50		20		40		20		40		20	
Untreated	50		50		50		75		75		75		60		60		60		50		50		60		60		75	
	Water Delivery (% of demand)																											
Year	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated
1975	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1976	0.95	1.00	0.88	1.00	0.92	1.00	0.78	1.00	0.81	1.00	0.86	1.00	0.92	1.00	0.88	1.00	0.83	1.00	0.94	1.00	0.90	1.00	0.90	1.00	0.86	1.00	0.84	1.00
1977	0.50	0.90	0.50	0.50	0.50	0.70	0.25	0.60	0.25	0.70	0.25	0.90	0.40	0.90	0.40	0.70	0.40	0.50	0.50	0.80	0.50	0.60	0.40	0.80	0.40	0.60	0.25	0.80
1978	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1979	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1980	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1981	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1982	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1983	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1984	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1985	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1986	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1987	1.00	1.00	0.98	1.00	1.00	1.00	0.91	1.00	0.94	1.00	0.99	1.00	1.00	1.00	0.99	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	0.97	1.00
1988	0.77	0.98	0.70	0.79	0.73	0.90	0.53	0.82	0.55	0.87	0.58	0.96	0.69	0.97	0.65	0.88	0.63	0.78	0.75	0.94	0.71	0.85	0.67	0.93	0.64	0.83	0.56	0.92
1989	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1990	1.00	1.00	0.95	1.00	1.00	1.00	0.85	1.00	0.89	1.00	0.97	1.00	1.00	1.00	0.97	1.00	0.90	1.00	1.00	1.00	0.98	1.00	1.00	1.00	0.94	1.00	0.93	1.00
1991	1.00	1.00	0.88	1.00	0.95	1.00	0.76	1.00	0.80	1.00	0.88	1.00	0.97	1.00	0.89	1.00	0.82	1.00	0.99	1.00	0.92	1.00	0.93	1.00	0.86	1.00	0.84	1.00
1992	0.86	1.00	0.74	0.85	0.79	0.95	0.58	0.86	0.61	0.91	0.66	0.98	0.78	0.99	0.72	0.93	0.67	0.82	0.82	0.99	0.76	0.91	0.74	0.97	0.69	0.88	0.63	0.95
1993	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1994	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1995	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1996	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1997	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1998	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

	Demand Deficiency Criteria (%)													
Treated	10	50	30	40	30	10	10	30	50	20	40	20	40	20
Untreated	50	50	50	75	75	75	60	60	60	50	50	60	60	75
	Deficeincy over 5% required? (1 = Yes, 0 = No)													
Year														
1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	0	1	1	1	1	1	1	1	1	1	1	1	1	1
1977	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1978	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	1	1	0	0	0	1	0	0	0	0	0
1988	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	1	1	0	0	0	1	0	0	0	0	0
1991	0	1	0	1	1	1	0	1	1	0	0	1	1	1
1992	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of year out of 76 years of record -------> Sum =	5	8	7	10	10	8	7	8	10	7	7	9	9	9
% of years with a deficiency of greater than 5% ---------->	***7%***	***11%***	***9%***	***13%***	***13%***	***11%***	***9%***	***11%***	***13%***	***9%***	***9%***	***12%***	***12%***	***12%***