

An aerial photograph of a dam and reservoir. The dam is a long, low structure with a small tower in the center. The reservoir is a large, blue body of water behind the dam. The surrounding hills are covered in dense forest with trees in various shades of green and brown, suggesting autumn. The sky is a clear, light blue.

City of Lock Haven
Draft 2023 Water Fund Budget
First Look: May 2, 2022

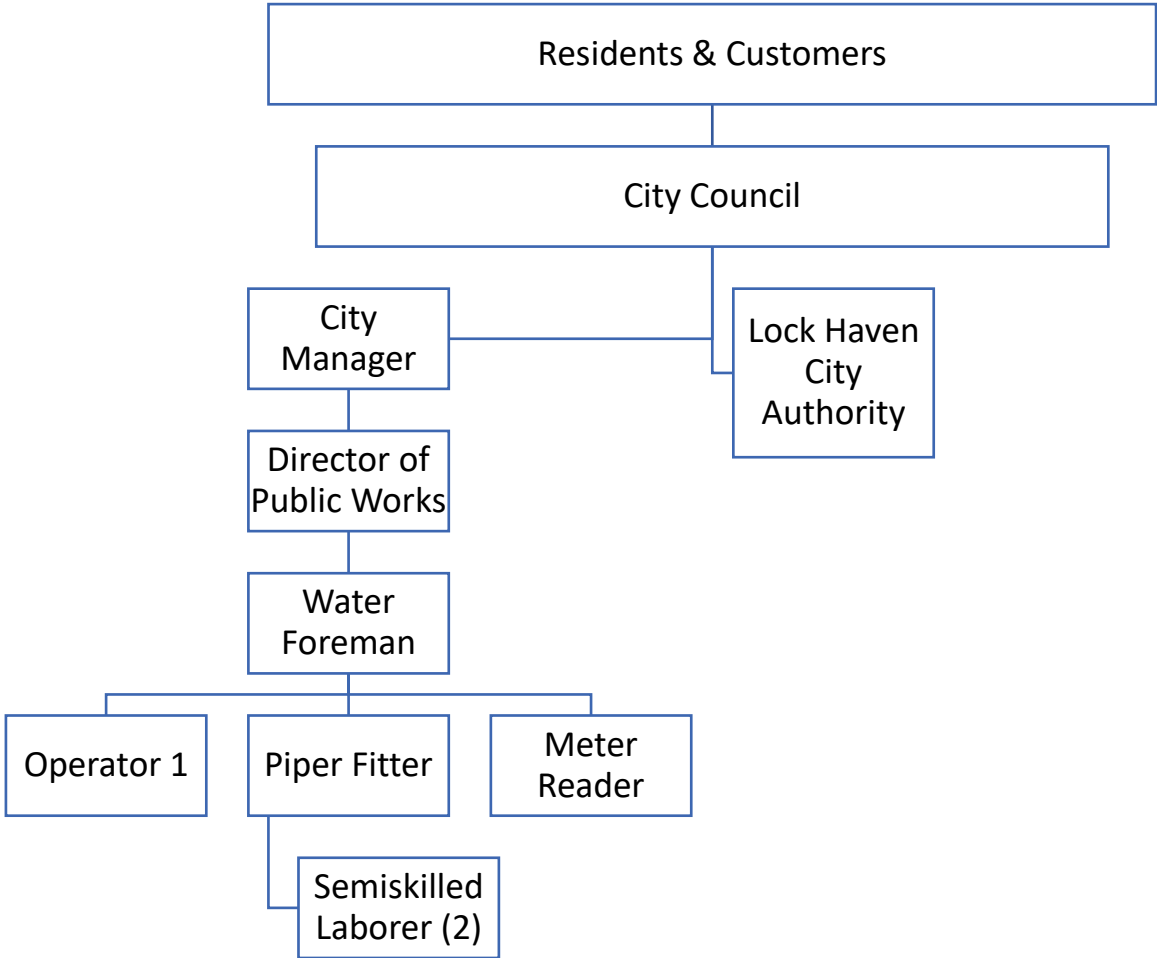
**Presented to City Council and the public
for its review by Gregory Wilson, City Manager**

Cover photo from public posting on Facebook: aerial view of the Keller Dam and Reservoir in McElhattan

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DPW WATER ORGANIZATIONAL CHART



2023 BUDGET MESSAGE: THE DRIVER OF COSTS

Two necessities drive the need to address the water service fees to become effective by January 1, 2023:

1. the required upgrades to Ohl and Keller dams and installation of supplemental water wells to accommodate this work,
2. the replacement of aging water mains in the distribution system.

The customers of the water system bear those costs in addition to regular operational costs. For the city, that's 2186 customers in the city limits, plus an additional 526 in Wayne Township, 525 in Castanea Township, and 24 in Allison Township for a total of 3,237 customers. In addition, the Suburban Lock Haven Water Authority has 3,322 customers that share the same water system and its costs.

Dam Projects

All the water consumed in the system that serves the city's customers and the system of the Suburban Lock Haven Water Authority comes from the Keller Reservoir in Wayne Township. That reservoir is supplemented by the Ohl Reservoir which is also part of the McElhattan Creek but upstream (and uphill) in Greene Township. The city no longer draws water from the Upper Castanea Reservoir.

Over the next several years, the city will be undertaking its most significant infrastructure projects since the construction of the new wastewater treatment plant including DEP-required upgrades to Ohl Dam, Keller Dam, the installation of water wells & a pipeline to supplement water use during dam projects, and the removal of the Upper Castanea Dam. In all, this is more than \$27 million in improvements that are required by the state to ensure the safety of the dams.

Currently, none of these dams can be insured by the city because they are listed at varying degrees of high hazard by DEP (Keller & Castanea High 1, Ohl High 2). That means that any partial or total failure of the dams would not only be catastrophic for properties and residents downstream from the dam, but something that the city has complete liability for without the ability of insurance coverage.

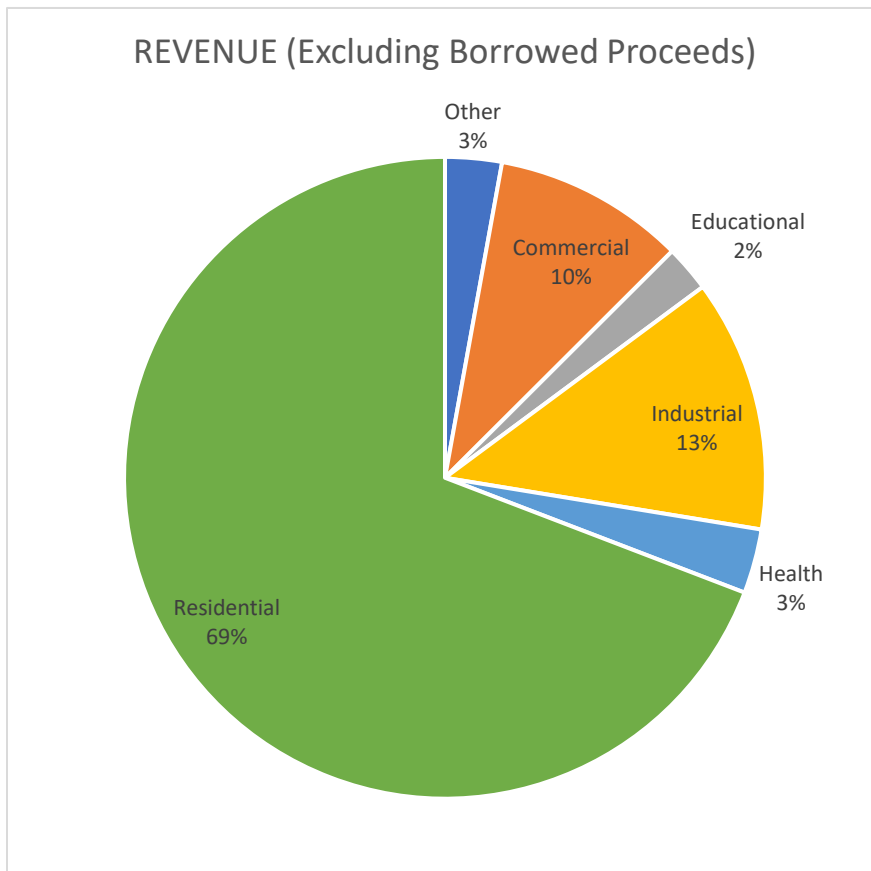
Distribution Mains

With 57.5 miles of water mains and using a conservative \$200 per linear foot for replacement cost, it would cost the city \$2 million a year for 30 years to replace all the water lines. While cast iron and iron pipes have a life expectancy of 100 years, those would be the pipes installed in the 1920 or earlier. Ductile iron pipes installed beginning in the 1950s could have a useful life of 100 years; however, many were jointed with lead & oakum which was the prevailing joint sealer for the time. Polyvinyl Chloride (PVC) pipe began to be a popular line installation starting in the 1970s, but only has a life expectancy of, at best, 70 years. What this all means is that the majority of the city's system in now or will be each year over the next 30 years, in need of replacement to ensure a constant and safe distribution of clean drinking water to the system's customers.

OVERVIEW OF REVENUES & EXPENDITURES

2023 WATER FUND 006 (036) PRELIMINARY DISCUSSION										
Monday, May 2, 2022										
	Title	2021 YE	4/1/21-3/31/22 ACTUAL	2022 EST. YE	2023 PROPOSED	2024 PROPOSED	2025 PROPOSED	2026 PROPOSED	2027 PROPOSED	
General Program (Fund 006, Dept 448)										
	Revenues	1,536,423	1,552,944	3,879,134	2,776,482	2,495,276	2,776,145	5,307,038	3,635,497	
E X P E N D I T U R E S	Labor (Salaries & Benefits)	616,143	612,738	652,483	670,797	685,638	700,956	716,768	733,092	
	Utilities	13,020	14,030	13,541	13,812	13,947	14,084	14,222	14,361	
	Rent	12,366	-	12,366	12,366	12,366	12,366	12,366	12,366	
	Cost of Goods Sold	546,390	592,923	650,718	772,454	795,328	818,887	843,154	868,149	
	Administration	197,933	202,880	236,304	261,255	263,743	266,254	268,790	271,351	
	Professional Fees	17,628	17,548	26,877	27,314	27,533	27,754	27,977	28,202	
	Materials / Supplies	147,518	132,291	141,874	14,480	14,621	14,765	14,909	15,056	
	Outside Services	7,307	7,299	9,843	10,040	10,139	10,238	10,338	10,440	
	Other Expenses	243,199	55,272	221,581	697,073	711,608	722,693	733,677	744,734	
	Program Expenses	12,932	11,983	15,075	15,376	15,527	15,679	15,833	15,988	
	City-Only Debt Service	32,347	41,891	2,638,860	96,009	104,943	131,744	2,607,428	99,323	
		Total Expenses	1,846,781	1,688,855	4,619,521	2,590,976	2,655,392	2,735,419	5,265,462	2,813,060
		Excess (Deficiency)	(310,358)	(135,911)	(740,387)	185,506	(160,116)	40,725	41,576	822,437
Capital Projects (Fund 036)										
	Revenues	719,002	774,627	6,129,287	3,045,000	3,585,000	5,320,000	12,430,000	540,000	
E X P	Improvements to Land	-	-	900,000	-	-	-	-	-	
	Improvements (Not Buildings)	67,621	92,815	70,500	465,610	475,722	485,837	495,953	506,072	
	Improvements to Structures	665,790	721,172	5,042,467	2,545,000	2,875,000	4,800,000	11,900,000	780,000	
	Improvements to Machinery	29,054	18,962	26,376	-	-	-	-	-	
	Total Expenses	762,465	832,949	6,039,344	3,010,610	3,350,722	5,285,837	12,395,953	1,286,072	
	Excess (Deficiency)	(43,463)	(58,321)	89,944	34,390	234,278	34,163	34,047	(746,072)	
	Total City-Only Revenues	2,255,425	2,327,571	10,008,421	5,821,482	6,080,276	8,096,145	17,737,038	4,175,497	
	Total City-Only Expenses	2,609,245	2,521,804	10,658,865	5,601,586	6,006,114	8,021,256	17,661,415	4,099,133	
	Excess (Deficiency)	(353,821)	(194,233)	(650,444)	219,896	74,162	74,889	75,623	76,364	
Shared Costs with SLHWA (through CCCWFA)										
E X P E N D I T U R E S	Labor (Salaries & Benefits)	148,042	129,549	88,519	90,289	91,174	92,067	92,970	93,881	
	Utilities									
	Rent									
	Cost of Goods Sold									
	Administration									
	Professional Fees	20,036	20,306	18,878	19,256	19,444	19,635	19,827	20,022	
	Materials / Supplies	234	1,230	11,500	13,260	13,390	13,521	13,654	13,787	
	Outside Services									
	Other Expenses	15,098	19,339	8,485	8,655	8,740	8,825	8,912	8,999	
	Program Expenses									
	Debt Service	146,056	146,056	194,302	339,040	339,040	339,040	339,040	339,040	
	Total Expenses	329,467	316,480	321,684	470,499	471,788	473,089	474,402	475,729	
	Reimbursement from CCCWFA	146,056	146,056	254,754	251,624	398,656	399,240	399,830	400,426	
	CITY SHARE	183,410	170,424	66,930	218,875	73,132	73,849	74,572	75,303	
	TOTAL CITY REVENUES	2,401,481	2,473,627	10,263,175	6,073,106	6,478,932	8,495,384	18,136,868	4,575,923	
	TOTAL CITY COSTS	2,792,656	2,692,227	10,725,795	5,820,462	6,079,246	8,095,104	17,735,988	4,174,436	
	EXCESS (DEFICIENCY)	(391,175)	(218,600)	(462,620)	252,644	399,686	400,280	400,880	401,487	
	FUND BALANCE	820,903	741,751							
	NEW FUND BALANCE	429,728	523,151							

WATER REVENUES



Through a cost-sharing agreement, the city and Suburban will both be responsible for their share of the cost of improvements based on percent-to-total flow of use. Currently, the city covers about 55% of shared costs and Suburban 45%. Each entity also has its own operating budgets to account for maintenance and replacement of their own water mains, as well the cost of billing and other operational costs. Excluding costs of required items like the purchases of easements & property and the cost of interim financing during

construction, the debt service for the \$27 million in projects will exceed \$32 million without grant support. That means that over the next 30 years, without grant subsidies, the city's customers would be responsible for about \$585,899 per year in new debt service and including costs ineligible for funding through the Pennsylvania Infrastructure Investment Authority (PennVEST), rises to \$717,642 per year.

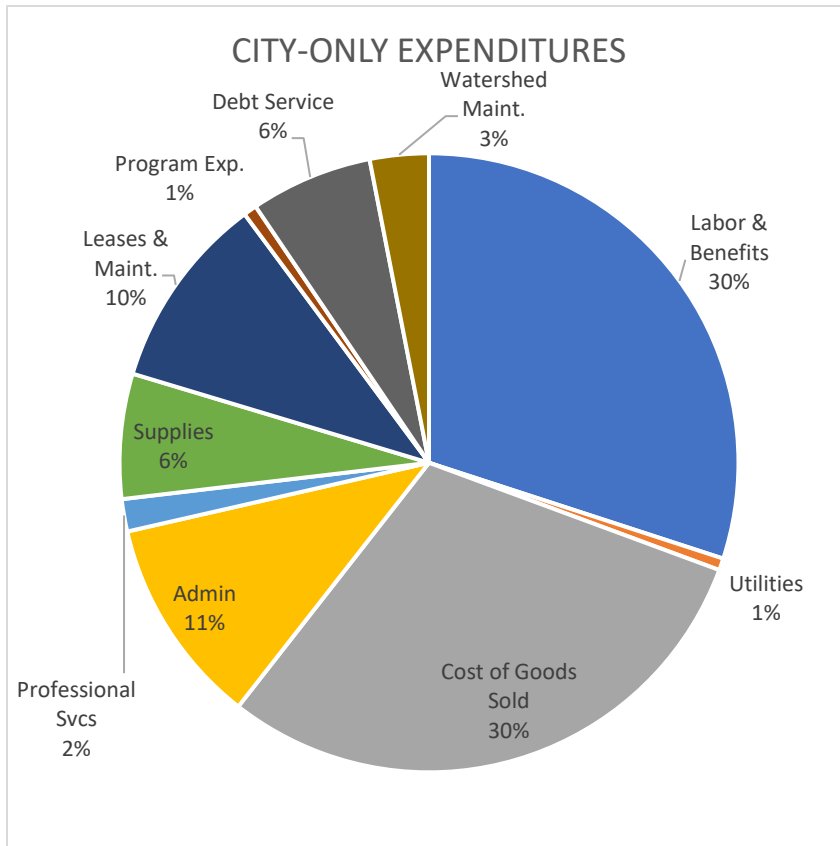
Inflation verses Current Fees

The city last adjusted fees for water use in 2011. The cumulative inflation rate since rates were adjusted 11 years ago is 27.8%; however, according to the Bureau of Labor Statistics, prices for water maintenance have risen 54.32% during that same time. That's a difference of \$27.92 between what the city currently charges as a minimum for residential use per quarter and what inflation is driving should be charged (1).

The current average annual residential rate is \$355 per year. Adjusted for inflation from the rates set in 2011, that would be \$547.84 in 2022 (about \$136.96 per quarter compared to the current \$88.75 per quarter).

1 <https://www.in2013dollars.com/Water-and-sewerage-maintenance/price-inflation/2011-to-2022?amount=51.40>

WATER EXPENDITURES



The primary drivers of about 60% of the water fund’s expenditures are labor & benefits for non-administrative employees, and the cost of goods sold. Costs under that category include both the city’s share of the cost of the water filtration authority, and an annual \$10,000 fee to DEP for having a water system.

In 2021, the cost per gallon of water to the city was \$0.0057 per gallon with the city only collecting \$0.0051 per gallon to cover those costs.

In 2022, the cost per gallon will end the year at about \$0.0061 per gallon, with the

city using its remaining fund balance to fund the difference between the \$0.0051 it collects per gallon and the additional cost.

Because the city bears the cost of interim financing without reimbursement, there are years when that financing must be paid off (like 2022, 2026) when both the revenues and expenditures of the city jump as new borrowed proceeds provide an influx of resources to pay down the debt service that is coming due. In those years the cost-per-gallon of the city’s enterprise jumps to adapt to this cost. Estimating for the future puts the city’s cost-per-gallon in 2027 at \$0.0095 per gallon, nearly double the current charge.

The largest expense not accounted for above is capital construction which is described more in the next section. While the dams and wells easily take a lot of the attention of not only Council and staff, engineers, and bankers, the importance of distribution main investments is equally important. What good is a safe and secure source water system if it can’t be delivered to the homes and businesses of customers? Included in the budget is a “jumping off point” for Council’s consideration to begin to make the long-term benefit investments in upgrading this aging infrastructure. Knowing \$2 million a year is a significant amount, the budget includes a starting place of \$460,000 in 2023 and increasing by \$10,000 each year thereafter.

CAPITAL PROJECTS

With more than \$27 million in investment just in the dam and well projects, these will be the capital investments that have an impact on generations to come. With the most recent update from the city engineers with Gwin Dobson & Foreman at the February 7, 2022, regular meeting of Council, the following updated cost and schedule were provided detailing how much each of the assets of the water system will require.

City of Lock Haven								3/10/2021
Capital Expenditures Projections (2021-2026)								Rev'd 12/9/2021
Task Activity	2021	2022	2023	2024	2025	2026	Total	
Water: Keller Dam preliminary design	\$ 175,000	\$ 85,000					\$ 260,000	
Water: Keller Dam/Ohl Dam Ph II engr ¹		\$ 500,000	\$ 200,000	\$ 100,000	\$ 300,000	\$ 400,000	\$ 1,500,000	
Water: Keller Dam/Ohl Dam Ph II const ¹					\$ 4,500,000	\$ 11,500,000	\$ 16,000,000	
Water: Ohl Dam Ph I engr/const mgmt	\$ 500,000	\$ 160,000	\$ 90,000				\$ 750,000	
Water: Ohl Dam Ph 1 construction ²		\$ 2,750,000	\$ 1,500,000				\$ 4,250,000	
Water: Pipeline final design/const mgmt	\$ 125,000	\$ 135,000	\$ 55,000	\$ 75,000			\$ 390,000	
Water: Pipeline construction ³			\$ 350,000	\$ 2,000,000			\$ 2,350,000	
Water: Well Field design/hydrogeology ⁴	\$ 150,000	\$ 100,000	\$ 100,000	\$ 100,000			\$ 450,000	
Water: Well Field construction ⁵	\$ 800,000	\$ 100,000	\$ 250,000	\$ 500,000			\$ 1,650,000	
Total⁶	\$ 1,750,000	\$ 3,830,000	\$ 2,545,000	\$ 2,775,000	\$ 4,800,000	\$ 11,900,000	\$ 27,600,000	
Notes								
1. Keller Dam construction proceeds (2025) when the Well Field and Ohl Dam Phase I projects are completed (2024) which allows for draining of Keller Reservoir. Scope of work increase required for drilling & grouting left abutment, downstream slope filter zone & seepage collection system; not previously included.								
Ohl Dam Phase II is the intake tower upgrade project which is included with the Keller Dam project. Ohl Dam Ph II can only proceed after the Youngdale Well Field is completed and Keller Dam is finished and refilled. This construction scenario will allow Ohl Reservoir to be lowered to complete the intake tower work estimated to occur in 2026.								
2. Ohl Dam Phase I is the DEP compliance project (2022) to increase spillway capacity for the probable maximum flood. Phase I cost escalation is due to pandemic-related cost increases, new spillway terminal structure (stilling basin) & soft costs (2022-23).								
3. Pipeline and Well Field development work are projected to commence in 2023 when issuance of the DEP and SRBC withdrawal permits are projected								
4. "Well Field design/hydrogeology" cost item includes estimated fees for hydrogeological consultant (Cassellberry & Associates) from 2021-2024.								
5. "Well Field construction" includes the total incurred cost to construct/test, well access/pads & production wells (H.A.D./Matz) updated through 12/31/2021								
6. March 10, 2021 total project cost was estimated at \$21,850,000.								

At the same time, the city is taking significant steps for the first time in more than 20 years at serious exploration of leak detection and repair, and maintenance of the storage tanks, pump stations, and pressure reducing valves of the city's system. These investments have not only drawn down the Water Fund unrestricted balance, but also the Capital Improvement Fund's balance of the Lock Haven City Authority which has provided funding for some of these projects.

Grant Sources

Much of the federal funds being made available for infrastructure projects like the dams through the Bipartisan Infrastructure Law are being directed to existing state-level funding sources like PennVEST with which the city has had a long collaborative relationship. Much of the improvements, like the new wastewater treatment plant, came with significant investment from PennVEST through not only low-interest loans, but subsidized by grant funding as well. What is true is that without significant amounts of grant funding for the phases of asset improvement from Keller onward, those projects will have to be put on a less aggressive timeline.

Utilities		2021 YE	4/1/21-3/31/22 ACTUAL	2022 EST. YE	2023 PROPOSED	2024 PROPOSED	2025 PROPOSED	2026 PROPOSED	2027 PROPOSED
006 448	32100 PHONE AND INTERNET	5,412	5494.93	4,673	4,766	4,813	4,860	4,908	4,956
006 448	36110 ELECTRIC/CUMMINGS PUMP	1,158	1150.41	993	1,013	1,022	1,032	1,043	1,053
006 448	36120 ELECTRIC/CASTANEA PUMP	6,450	7385.1	7,875	8,033	8,112	8,191	8,271	8,353
		13,020	14,030	13,541	13,812	13,947	14,084	14,222	14,361
Rent			4/1/21-3/31/22 ACTUAL	2022 EST. YE	2023 PROPOSED	2024 PROPOSED	2025 PROPOSED	2026 PROPOSED	2027 PROPOSED
006 492	26105 MAINTENANCE GARAGE RENTAL	9,966	0	9,966	9,966	9,966	9,966	9,966	9,966
006 492	38300 OFFICE RENTAL	2,400	0	2,400	2,400	2,400	2,400	2,400	2,400
		12,366	-	12,366	12,366	12,366	12,366	12,366	12,366
Cost of Goods Sold			4/1/21-3/31/22 ACTUAL	2022 EST. YE	2023 PROPOSED	2024 PROPOSED	2025 PROPOSED	2026 PROPOSED	2027 PROPOSED
006 448	22600 CCCWFA WATER	536,390	582922.99	640718	762,454	785,328	808,887	833,154	858,149
006 448	31600 PUC WATER SYSTEM ANNUAL FEE	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
		546,390	592,923	650,718	772,454	795,328	818,887	843,154	868,149
Administration Expenses			4/1/21-3/31/22 ACTUAL	2022 EST. YE	2023 PROPOSED	2024 PROPOSED	2025 PROPOSED	2026 PROPOSED	2027 PROPOSED
006 448	10111 COUNCILMEN	4,903	4,903	4,968	4,968	4,968	4,968	4,968	4,968
006 448	10112 MAYOR	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104
006 448	10114 TREASURER	300	319	384	384	384	384	384	384
006 448	10115 CONTROLLER	276	323	480	480	480	480	480	480
006 448	10121 CITY MANAGER	17,201	20,335	30,783	31,399	31,706	32,017	32,331	32,648
006 448	10122 ASSISTANT MANAGER	-	-	6,606	26,954	27,218	27,484	27,754	28,026
006 448	10124 DIRECTOR OF PUBLIC WORKS	22,873	23,067	23,578	24,050	24,285	24,523	24,764	25,006
006 448	10140 STENOGRAPHER	547	547	508	508	508	508	508	508
006 448	10142 CLERICAL STAFF	76,608	75,980	95,092	96,994	97,944	98,904	99,873	100,852
006 448	10147 METER READER	23,398	20,297	21,437	21,866	22,080	22,296	22,515	22,736
006 448	10149 INTERN	-	-	1,513	1,543	1,558	1,574	1,589	1,605
006 448	21100 OFFICE SUPPLIES	1,573	2,287	2,000	2,040	2,060	2,080	2,101	2,121
006 448	21200 COMPUTER REPAIR	4,248	6,900	350	357	360	364	368	371
006 448	31120 BANK FEES	495	396	500	510	515	520	525	530
006 448	31700 TRAINING	3,473	5,370	3,202	3,266	3,298	3,331	3,363	3,396
006 448	31810 CONSERVATION EDUCATION	-	-	-	-	-	-	-	-
006 448	32101 COMPLIANCE TESTING	303	524	100	102	103	104	105	106
006 448	32500 POSTAGE	4,455	4,614	4,540	4,631	4,676	4,722	4,768	4,815

Other Expenses	2021 YE	4/1/21-3/31/22 ACTUAL	2022 EST. YE	2023 PROPOSED	2024 PROPOSED	2025 PROPOSED	2026 PROPOSED	2027 PROPOSED
006 449 37130 MCELHATTAN PROPERTY MAINT	-		12,000	12,240	12,360	12,481	12,603	12,727
006 449 37140 CASTANEA PROPERTY MAINT	-		-	-	-	-	-	-
006 449 37150 ROSECRANS PROPERTY MAINT	-		-	-	-	-	-	-
006 448 37200 CUMMINGS PUMP MAINT	-		15,000	15,300	15,450	15,601	15,754	15,909
006 448 37205 CUMMINGS TANK MAINT	85	85.43	-	-	-	-	-	-
006 448 37220 CASTANEA PUMP MAINT	4,476	4414.22	15,000	15,300	15,450	15,601	15,754	15,909
006 448 37225 CASTANEA TANK MAINT	-		-	-	-	-	-	-
006 448 37400 VEHICLE PARTS	7,371	2648.45	1,801	1,838	1,856	1,874	1,892	1,911
006 448 37430 ACCIDENT REPAIRS	2,951	2950.5	3,782	3,858	3,896	3,934	3,972	4,011
006 448 37500 TIRES	998	548	577	588	594	600	606	612
006 448 37600 OIL & GREASE	678	681.58	674	687	694	701	708	715
006 448 37601 VEHICLE FUEL	7,371	8165.06	7,677	7,830	7,907	7,985	8,063	8,142
006 448 37820 REGULATING VALVE MAINT	15,055	16555	16,113	16,435	16,596	16,759	16,923	17,089
006 448 45200 EQUIPMENT REPAIRS	5,111	1963.47	5,664	5,777	5,834	5,891	5,949	6,007
006 448 45300 EQUIPMENT RENTAL	1,121	1036.71	1,437	1,465	1,480	1,494	1,509	1,524
006 492 49336 CAPITAL PROJECTS FUND ALLOCATION	181,758		0	500,000	510,000	520,000	530,000	540,000
006 492 49360 LHCA RESERVE FUND PAYMENT		0	-	73,061	76,380	76,238	75,983	75,788
006 448 75330 VEHICLE LEASES	16,223	16223.29	41,856	42,693	43,112	43,534	43,961	44,391
	243,199	55,272	221,581	697,073	711,608	722,693	733,677	744,734
Program Expenses								
006 448 22500 WATER ANALYSIS	4,995	4935	5,153	5,256	5,308	5,360	5,412	5,465
006 448 36610 HYDRANT EXPENSES	1,133	773.84	1,200	1,224	1,236	1,248	1,260	1,273
006 448 37720 CUSTOMER METER MAINT	6,804	6274.61	8,722	8,896	8,983	9,071	9,160	9,250
006 448 74101 CAPITAL PURCHASES FOR RESALE	-	0	-	-	-	-	-	-
	12,932	11,983	15,075	15,376	15,527	15,679	15,833	15,988
DEBT SERVICE PRINCIP								
006 471 75318 2018C NOTE			2,500,000					
006 471 75321 2021A NOTE (ends '41)								
006 471 2022A NOTE (REFI 2018C)							2,500,000	
006 471 2024A NOTE (REFI 2022A)								
006 471 75326 FINANCING UNFUNDED BY PENNVEST	-	-	-	-	-	-	-	-
	-	-	2,500,000	-	-	-	2,500,000	-
DEBT SERVICE INTERES								
006 472 75318 2018C NOTE	32,347	41,891	82,750					
006 472 75321 2021A NOTE (ends '41)	-		24,316	32,421	32,421	32,421	8,105	
006 472 2022A NOTE (REFI 2018C)								
006 472 2024A NOTE (REFI 2022A)				63,588	63,588	63,588	63,588	63,588
006 472 75326 FINANCING UNFUNDED BY PENNVEST	32,347	41,891	138,860	96,009	104,943	131,744	107,428	99,323

**City of Lock Haven Water Department
Description of System Facilities and Operations
January 14, 2022**

General - The City of Lock Haven Water Department provides potable water service to 3,258 customers in the greater Lock Haven area including the City of Lock Haven (2,175) and Wayne (527), Castanea (531) and Allison (24) Townships. The estimated service area population is 9,750.

The City Water Department provides water to a large consecutive system (Suburban Lock Haven Water Authority (SLHWA)) that serves Flemington and Mill Hall Boroughs; Bald Eagle, Lamar and Woodward Townships and a portion of the City of Lock Haven. SLHWA has a similar service area population as the City. Together, these systems provide most of the public water supply needs of southern Clinton County.

Water Production, Water Loss & Projected Demand – Average annual and peak day demand with water loss data for 2018-2021 is shown below.

Year	Average Annual Demand (gpd)	Peak Day (gpd)	Unaccounted-for-Water
2018	2,836,973	3,492,000	29.8%
2019	2,705,730	3,612,000	7.9%
2020	1,877,755	3,198,000	23.7%
2021	2,487,000	3,458,000	16.2% (est)
Average	2,476,865 (2.5 MGD)	3,440,000	19.2%

The peak-to-average day demand factor is 1.4 which is considered normal for similar systems. For unaccounted-for-water, the 2018-2021 average (19.2%) is below the 20% limit in the 2013 DEP Water Allocation Permit. It is noted the 2011 unaccounted-for-water loss was 50.4%. The average 2018-2021 annual demand (2.48 MGD) is also below the 2.8 MGD permit limit as is the 2018-2021 maximum day demand (3.44 MGD) versus the 3.9 MGD permit limit. Based on the above data, current system demand is estimated to be 2.5 MGD.

According to the recent 2020 US Census, due to service area population decline, the current 2.5 MGD water demand is not projected to increase over the next 15 years or through 2037.

Customer Usage - Estimated 2021 metered consumption by customer classification is as follows:

Type	No. of Customers	Metered Consumption (gpd)	% of Total
Domestic	2,891	474,710	22.4%
Commercial	250	84,850	4.0%
Industrial	24	375,285	17.7%
Institutional	14	49,630	2.3%
Other	78	47,755	2.3%
Bulk (SLHWA)	1	1,085,400	51.3%
Total	3,258	2,117,630	100%

Water Supply - The Lock Haven Water Department operates two water supply reservoirs that constitute the principal water sources for the system. Both reservoirs are located on McElhattan Creek with Keller Reservoir in Wayne Township and Ohl reservoir in Greene Township.

Watershed Description and Stream Classification - McElhattan Creek is classified by the PADEP as a “cold water fishery” upstream of Keller Reservoir and a “high quality fishery” below Keller dam. A significant portion of the heavily forested watershed is located on PA State Forest and City of Lock Haven property. Except for the lower reach near McElhattan (residential/commercial) and upper reach at Rosecrans (agricultural), the watershed is undeveloped. The total watershed capture area at Keller Reservoir is 18.5 square miles or 90% of the total McElhattan Creek drainage basin (20.5 sq. mi.).

The PADEP and PA Fish Commission have placed rigorous conservation releases on Ohl and Keller Reservoirs. Ohl dam is subject to a conservation release (pass-by flow) of 0.444 MGD and Keller dam must release 1.055 MGD as measured at the Cottage Dam in Zindel Park.

Water Allocation Permit – PADEP issued a water allocation permit to the City of Lock Haven on June 6, 2013. The City is permitted to withdraw 2.8 MGD as an average annual flow and up to 3.9 MGD as a daily maximum flow along with the specific conservation releases noted above. The City complies with all aspects and special conditions of the water allocation permit. The permit will expire on June 6, 2038.

Warren H. Ohl Dam and Reservoir - The Warren H. Ohl dam and reservoir is located in Rosecrans just north of Exit 185 (Loganton) on Interstate 80. Constructed in 1964, the dam consists of a zoned-earth embankment with an uncontrolled overflow spillway and intake tower. The dam is 65-feet high with a crest length of 1,015 feet. The reservoir has a capacity of 576 million gallons (MG).

Reservoir Operation - The reservoir is not connected to the water system and is a storage dam only. More water could be released from Ohl reservoir during periods of low flow and extended droughts. However, the dam has never been used in this capacity because the current pass-by release, through experience, is the only sustainable flow from Ohl dam. During droughts, Ohl’s large capacity provides a steady-state flow that is just sufficient to maintain a consistent conservation release (0.445 MGD) but little more. An intake tower valve controls normal water withdrawals from the dam.

Dam Safety Considerations - Because of the potential for downstream loss of life and extensive property damage during a dam breach, Ohl dam is classified by the PADEP Division of Dam Safety as a “High Hazard” structure and subject to passing the maximum flood event known as the “Probable Maximum Flood (PMF).” Engineering studies have revealed that the existing dam has inadequate spillway capacity, passing only 68% of the PMF. The PADEP designated Ohl dam as having a “*significant deficiency in spillway capacity*” and has directed the City to upgrade the spillway to current standards.

Ohl Dam Upgrade Project - Plans and specifications were then prepared by Gwin, Dobson & Foreman, Inc. (GDF) Engineers and a Dam Safety Permit issued by DEP on December 15, 2021. The project includes a “dam raise” using a crest parapet wall to increase flow over the spillway and thus achieve full passage of the PMF. Additional improvements include concrete spillway rehabilitation, new terminal structure (stilling basin) and intake tower mechanical work, control building and access bridge (Phase II).

The City plans to obtain financing and start construction of the Phase I compliance project (parapet wall/stilling basin) in 2022 with completion in mid-2023. The estimated Phase I project cost is \$5,000,000. The Phase II project (intake tower work) will require lowering the reservoir and cannot be currently undertaken for the reasons stated below.

Reservoir Yield and Supply Problems - The safe yield of Ohl reservoir, based on a 50-year drought event, is comparatively low at 1.71 million gallons per day (MGD). The reason is the reservoir has a very small drainage area (3.3 sq. mi.) in relation to its large storage capacity (576 MG). The critical duration (or reservoir recovery) computed for Ohl reservoir during the 50-year drought event is 24 months. During extended droughts, pass-by flow, evaporation losses and low stream inflow can cause Ohl reservoir to drain at a rate 50-75 MG per month.

Loss of storage at Ohl reservoir has caused supply shortages in the past. Droughts in 1980 and 1991 reduced Ohl storage to 62% and 68% capacity, respectively. In 2007, a grouting project that required lowering of the reservoir coincided with a drought event. This resulted in severe shortages and emergency supply measures and rationing. DEP approved pumping from the W. Branch of the Susquehanna River as an emergency source with a mile of pipeline laid to the Central Clinton County Water Filtration Plant (CCCWFA) for treatment.

In the fall of 2020, a 10-in. rainfall deficit reduced Ohl reservoir storage by 38% capacity (217 MG) and a water emergency was declared. DEP waived conservation releases and the City was prepared to issue rationing measures and again employ the W. Branch as an emergency source. Rainfall and reservoir recovery in Dec. 2020 - Jan. 2021 precluded these measures.

Summary - Because of limited reservoir recharge, associated pass-by flow and documented loss of storage, Ohl reservoir is not considered a reliable water supply during long-term drought events. This is a major vulnerability of the City water supply and certainly is not sustainable if the reservoir is artificially lowered for dam rehabilitation and construction purposes.

Boyd H. Keller Dam and Reservoir - The Boyd H. Keller dam and reservoir is located 3-½ miles north of Ohl reservoir on McElhattan Creek. Constructed in 1955, the dam consists of a zoned-earth embankment with an uncontrolled overflow spillway and intake tower. The dam is 53-feet high with a crest length of 570 feet. With a capacity of 94 MG, the reservoir is the primary feed for the CCCWFA treatment plant.

Reservoir Operation – Pertaining to reservoir controls, a downstream outlet valve regulates flow to the treatment plant. An upstream intake valve has the ability to divert a portion of McElhattan Creek into an adjacent bypass channel for pass-by flow or to divert turbid water. Obviously, the uncontrolled overflow spillway will release water when the reservoir is full. Keller reservoir has no direct means to withdraw water from the intake tower for conservation releases. The “wet-tower” arrangement has no ability to separately drain water from the pool without cutting off flow to the system.

Given the above, during drought events the only pass-by flow is comprised of reservoir leakage through the dam foundation or the abutments. A test boring project found leakage at the left dam abutment that strongly suggests the reservoir is the source. This leakage could range from 1.0 - 1.5 MGD.

Dam Safety Considerations - Because of the potential for downstream loss of life and extensive property damage during a dam breach, Keller dam is classified by the PADEP as a “High Hazard” structure and subject to passing the PMF. Engineering studies have revealed that the existing spillway can only pass 68% of the PMF. DEP has designated Keller dam as having a “*substantial deficiency in spillway capacity*” and has directed the City to upgrade the spillway to current standards.

Keller Dam Upgrade Project - GDF is currently completing final design and preparation of plans and specifications for the dam upgrade. The project design, consisting of a 5-cycle labyrinth weir, side-channel spillway, chute discharge and terminal structure (flip bucket), will achieve full passage of the PMF. Additional improvements include drilling and grouting of the left abutment to control abutment/reservoir leakage, new downstream drainage blanket and seepage control system (perforated drains and toe drains), outlet valve control vault, pass-by flow piping, new stream diversion intake structure and new intake tower mechanical piping.

A Dam Safety Permit application will be submitted to DEP in late 2022. The City plans to obtain financing and start construction of the Keller dam project in 2024 with completion in 2026. The estimated project cost ranges from \$12 - \$15 million, depending on final design approval by PADEP.

Safe Yield and Supply Problems - The combined safe yield of Keller and Ohl reservoir, based on a 50-year drought event, is a comparatively low flow of 3.31 MGD. Keller reservoir adds only a marginal yield (1.6 MGD) for the opposite reason as Ohl reservoir. Keller reservoir has a small storage capacity (94 MG) in relation to its large drainage area (18.5 sq. mi.). The critical duration computed for Keller reservoir recovery during a 50-year drought event is 5-8 months due to its small capacity.

Based on previous studies, the calculated safe yield of 3.31 MGD is not sustainable as Keller reservoir leakage (est. 1.0 to 1.3 MGD) probably reduces the actual safe yield to 2.0 MGD. A November 1991 drought, judged to be worse than a 100-year drought on McElhattan Creek, revealed that Keller reservoir produced only 2.0 MGD (Nov. 1991 weir measurements) despite steady-state releases from Ohl reservoir. This, of course, would be inadequate to supply current needs. In 1991, the City was also supplied by Castanea reservoir and SLHWA's Queens Run reservoirs (Jerry Hollow and Ram Hollow) which contributed 0.5 MGD. These sources went offline in Dec. 1995 when the CCCWFA plant was operational and Keller and Ohl reservoirs became the sole source of supply.

Summary - Keller's low reservoir capacity, a high conservation release and suspected reservoir leakage combine to deplete Keller reservoir even with releases from Ohl reservoir. This condition has resulted in the water emergencies caused by the extended droughts in 2007 and 2020.

Increasing reservoir storage by expanding Keller dam is not cost-effective. The topography of the dam site is not conducive for additional storage (400-500 MG) without a major capital investment (\$15 - \$20 million). Therefore, draining the Keller reservoir for mandated dam repairs and relying only on Ohl reservoir and McElhattan Creek streamflow as the main water supply entails too much risk for the City over a two-year construction cycle.

Until a supplemental source is permitted and constructed, the mandated dam safety improvements cannot be undertaken at Keller dam or for Phase II work at Ohl dam. Integrating the supplemental source into the overall dam upgrade project is necessary to insure a reliable water supply during construction.

Youngdale Well Field Supplemental Source Development – The City of Lock Haven is exploring a groundwater source along McKinney Road in Youngdale as a supplemental source. The reasons are two-fold. As documented above, the reservoirs are vulnerable during extreme droughts for supplying

ordinary system demand. Secondly, lowering either Ohi or Keller reservoir for construction is an unnecessary risk given the water emergency experience in 2007. Since the City is faced with DEP mandated dam projects (other than Ohi Dam Phase 1) a supplemental source must be developed first.

In 2018, the City retained Casselberry & Associates as a hydrogeological consultant to site and test a new well field. Two production wells, Matz Production Well and Quaker Hills Production Well, have been drilled and pump tested in the Ridgeley Sandstone at a minimum yield of 500 gallon per minute (gpm) each (1.44 MGD total). Although the water quality is good, the source will require filtration.

The preliminary pumping tests are included in the PADEP and Susquehanna River Basin Commission (SRBC) Long-Term Aquifer Testing Plan scheduled for the summer of 2022. A hydrogeologic report documenting the results of all well construction and aquifer testing work will be prepared in the fall of 2022. This report will provide all of the hydrogeologic analyses necessary to file PADEP Public Water Supply and SRBC Groundwater Withdrawal permits for the wells in late 2022/early 2023

The estimated project cost to develop the wells and install a pipeline to the CCCWFP for treatment is \$4.45 million. The construction is scheduled to be funded and started in 2023 and completed in 2024. To maintain this schedule, it is critical that SRBC and PADEP expeditiously review and approve use of the wells and associated permits in early 2023. Otherwise, the DEP-mandated dam improvements cannot be done in a timely manner thus risking the structural integrity of the dams in an extreme flood event.

Water Treatment - Raw water from Keller Reservoir is piped to the CCCWFA treatment plant located on Filtration Drive in Linnippi Village, Wayne Township. The plant is owned and operated by the CCCWFA and has been in continuous operation since December 1995. The Lock Haven Water Department owns two (2) water mains that deliver raw water from Keller Reservoir to the CCCWFA plant. These consist of 12,000-ft. of 16-in. main (1955) and 20-in. main (1995).

Raw water is metered, chemically treated, filtered and reintroduced into the two (2) City 16-in. finished water transmission mains. The CCCWFA is responsible for compliance with all USEPA and PADEP Safe Drinking Water regulations, drinking water quality standards and treatment techniques. The City Water Department and the Suburban Lock Haven Water Authority share the cost of treatment based on metered usage. The plant has a capacity of 4.0 million gallons per day; production currently averages about 2.6 MGD.

Water Transmission - After treatment, three (3) finished water transmission mains are used to supply treated water to the service area. Two (2) 16-in. provide treated water to the City system. The older 16-in. main was installed in 1955 while the newer 16-in. main was constructed in 1995. Both 16-in. mains are five miles in length and are operated by the City Water Department. The original 12-in. cast iron transmission main was constructed in 1893 but has since been abandoned. The third main is a 12-in. main which serves Wayne Township is operated and maintained by the City Water Department.

Distribution system pressures are regulated by pressure reducing valves on the 16-in. transmission mains. The valve vaults are located near the Bald Eagle Creek crossing just off Youngdale Road. The PRV's have reached the end of their useful life and are scheduled for replacement in 2022 with a newer generation of control valves.

The 16-in. main installed in 1955 has a history of large main breaks and the City is considering its replacement (\$4.5 million). However, this is not a priority project compared to the wellfield and mandated dam upgrades and will be programmed after the capital project is completed.

Water Distribution System – The City Water Department operates and maintains 57.5 miles of distribution mains comprised of 4 to 18-in. pipe, 235 fire hydrants and 760 main line valves. The City performs annual flushing of the distribution system to clear lines and improve system water quality. Leak detection equipment is used to identify discrete system leaks. A complete system survey using a leak detection contractor (David Bonkovich Co.) is performed every 3 years.

The main distribution storage is provided by two (2) 1.0 MG storage tanks at the CCCWFA treatment plant. This capacity is just sufficient for one (1) day of finish water storage. These tanks provide the pressure control for the entire system and are operated and maintained by the CCCWFA.

A pump station and storage tank provide service to higher elevations of Castanea Township. A new booster station and 355,000-gallon glass-lined, bolted steel tank were constructed in 1995. This tank is located near the original 1869 City reservoir on Harvey’s Run (which has since been drained and is no longer operational). The tank was serviced and repaired in 2021.

A similar pump station/storage tank arrangement provides service to 50 customers in Cummings Village also located in Castanea Township. The steel tank, with a capacity of 85,000 gallons, is scheduled to be cleaned and repainted in 2022.

GDF will perform a hydraulic model analysis and distribution system evaluation in 2022 to determine capacity restrictions, historical leakage, lead pipe identification and needed fire flow. The result will be a master plan and program as a guide for future water distribution system improvements.

System Interconnections - The Lock Haven Water Department has three system interconnections with the Suburban Lock Haven Water Authority. The interconnect meters are owned and operated by the City Water Department and are calibrated on a semi-annual basis. The City also maintains a metered interconnection where SLHWA provides water back to the City for an area of higher elevation. The average daily SLHWA demand is about 1.0 MGD (including leakage).

Rules, Rates and Regulations - Because the City Water Department has customers outside the City limits, water system rules, rates and regulations are governed by the PA Public Utility Commission. Petitions for increasing water rates must be reviewed and approved by the PUC prior to adoption including any changes to the rules and regulations. The last PUC water rate study and tariff was approved by the PUC in 2010. The City maintains a “declining block” water rate schedule based on tiers of water consumption and meter sizes.

Water Metering - All City water customers are billed based on actual water consumption. Each customer is provided a service connection and water meter. All meters are read and billed on a quarterly basis. Residential meters are replaced within their lifespan (15 to 20 years) to ensure accurate readings and customer billings. The City Water Department is currently reviewing the cost and required implementation of an automatic meter reading system.

All meters 2-in. and large are checked and calibrated every two years by a meter maintenance company (Lawco). If any meter is found to be inaccurate, the meter is replaced by the City at no additional cost to the customer. A tabulation of meters by size, as of December 31, 2020, is as follows:

Meter Size (in.)	No. of Meters
5/8	380
3/4	250
1	81
1-½	33
2	39
3	8
4	8
6	3
Total	3,643

Capital Improvement Projects Cost and Schedule – A capital project cost and implementation schedule is shown in the following table. The total project cost through 2026 is \$27 million including development of a supplemental groundwater source and upgrades to the Ohl and Keller dams to current dam safety standards.

City of Lock Haven							3/10/2021
Capital Expenditures Projections (2021-2026)							Revd 12/9/2021
Task Activity	2021	2022	2023	2024	2025	2026	Total
Water: Keller Dam preliminary design	\$ 175,000	\$ 85,000					\$ 260,000
Water: Keller Dam/Ohl Dam Ph II engr ¹		\$ 500,000	\$ 200,000	\$ 100,000	\$ 300,000	\$ 400,000	\$ 1,500,000
Water: Keller Dam/Ohl Dam Ph II const ¹					\$ 4,500,000	\$ 11,500,000	\$ 16,000,000
Water: Ohl Dam Ph I engr/const mgmt	\$ 500,000	\$ 160,000	\$ 90,000				\$ 750,000
Water: Ohl Dam Ph 1 construction ²		\$ 2,750,000	\$ 1,500,000				\$ 4,250,000
Water: Pipeline final design/const mgmt	\$ 125,000	\$ 135,000	\$ 55,000	\$ 75,000			\$ 390,000
Water: Pipeline construction ³			\$ 350,000	\$ 2,000,000			\$ 2,350,000
Water: Well Field design/hydrogeology ⁴	\$ 150,000	\$ 100,000	\$ 100,000	\$ 100,000			\$ 450,000
Water: Well Field construction ⁵	\$ 800,000	\$ 100,000	\$ 250,000	\$ 500,000			\$ 1,650,000
Total⁶	\$ 1,750,000	\$ 3,830,000	\$ 2,545,000	\$ 2,775,000	\$ 4,800,000	\$ 11,900,000	\$ 27,600,000
Notes							
1. Keller Dam construction proceeds (2025) when the Well Field and Ohl Dam Phase I projects are completed (2024) which allows for draining of Keller Reservoir. Scope of work increase required for drilling & grouting left abutment, downstream slope filter zone & seepage collection system; not previously included. Ohl Dam Phase II is the intake tower upgrade project which is included with the Keller Dam project. Ohl Dam Ph II can only proceed after the Youngdale Well Field is completed and Keller Dam is finished and refilled. This construction scenario will allow Ohl Reservoir to be lowered to complete the intake tower work estimated to occur in 2026.							
2. Ohl Dam Phase I is the DEP compliance project (2022) to increase spillway capacity for the probable maximum flood. Phase I cost escalation is due to pandemic-related cost increases, new spillway terminal structure (stilling basin) & soft costs (2022-23).							
3. Pipeline and Well Field development work are projected to commence in 2023 when issuance of the DEP and SRBC withdrawal permits are projected							
4. "Well Field design/hydrogeology" cost item includes estimated fees for hydrogeological consultant (Cassellberry & Associates) from 2021-2024.							
5. "Well Field construction" includes the total incurred cost to construct/test, well access/pads & production wells (H.A.D./Matz) updated through 12/31/2021							
6. March 10, 2021 total project cost was estimated at \$21,850,000.							