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A. Capital Facilities Plan

1. SERVICE STANDARD

Kanab City has chosen to use the service standard set forth in the *Public Drinking Water Design and Operation Rules* (Revised 2005) published by the *Department of Environmental Quality, Division of Drinking Water*. The service standard consists of three parts: source, storage, and distribution (Utah.Gov, 2005).

The rules contain provisions for both culinary and irrigation (secondary) water. The service standard is briefly summarized below.

Source: Available water sources must be able to legally (water rights) and physically provide a *peak day demand* of 800 GPD/ERU and an *average yearly demand* of 146,000 gallons/ERU for indoor use. For outdoor use, the requirement for this area (Irrigated Crop Consumptive Use Zone 4) for *peak day demand* is 3.96 gpm per irrigated acre and the *average yearly demand* is 1.87 acre-feet per year per irrigated acre. These requirements may be modified to reflect actual demand if adequate records are available. The city has kept records of culinary water use (indoor and outdoor) which will be used to establish source requirements.

Storage: Includes *equalization storage, fire suppression storage, and emergency storage*.

- Equalization storage: A minimum 400 gallons/ERU for indoor use and 2,848 gallons per irrigated acre for outdoor use. City records of water use will be used to determine the combined indoor and outdoor use requirement.
- Fire suppression storage: Minimum 180,000 gallons (1,500 gpm for 2 hours), or quantity determined by the local fire suppression authority, whichever is greater.
- Emergency storage: May be required by the *Executive Secretary* of the *Drinking Water Board*. Emergency storage is mentioned but will not be fully evaluated in this analysis.

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Distribution: The distribution system shall be designed to insure that a minimum of 20 psi exists at all points within the system during simultaneous fire flow and peak day demand. The fire flow includes 750 gpm at any two points in the system for a total of 1,500 gpm simultaneous flow.

2. INVENTORY OF EXISTING FACILITIES

Source – Water Rights: The water rights owned by Kanab City are summarized below.

TABLE 9 – KANAB CITY EXISTING WATER RIGHTS

No.	Priority	Source	Flow	
			CFS	Ac-Ft*
85-28	1956	Well	0.448	324.56
85-39	1956	Well	0.885	641.15
85-55	1963	Well	1.000	724.46
85-59	1964	Well	1.810	1,311.28
85-112	1864	Springs: Trough, Big, Cave 1&2, Cold, Iron 1&2, Little, Robinson, Slab, Slide, South, Twin, Weeping, Willow, Boiling, Head 1&2, Spring 1&2	0.500	362.23
85-703	1896	City Chicken Spring	0.033	23.91
85-708	1896	Hog Canyon Springs	0.075	54.33
85-736	1962	Well	0.930	673.75
85-772	1977	Well	3.480	2,521.13
85-946	1975	Well	3.020	2,187.88
85-956	1962	Well	1.500	1,086.69
Total Flow			13.680	9,910.65

*Calculated from CFS.

Kanab's current water rights will allow the diversion of up to 13.68 cubic *feet per second* (cfs) of water which is equal to 8,842,000 *gallons per day* (gpd). The total allowable diversion over a period of one year is 9,910.65 acre-feet, which is equal to 3,229 million *gallons per year*.

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Source – Delivery: Kanab receives water from a number of wells and springs with a total capacity of 3,065 gpm in the existing system. Springs and wells currently capable of delivering water to Kanab are summarized below.

TABLE 10 – KANAB CITY EXISTING DELIVERY CAPACITY

Source	Yield (gpm)	Comments
Cave Lake Springs	70	12 of 22 springs are used year around
Cave Lake Well #3	(225)	Backup to well #5, seldom used(sandy)
Mace Well #2	110	
Mace Pink Well #9	350	
Chicken Canyon Well #4	110	
Cave Lakes Well #5	(575)	Sandy, seldom used
Well #12	400	
School Section Well #11	235	
Hinckley Well #13	550	
Well #14	425	
West Fork Well #1	250	
West Fork Well #2	400	
West Fork Well #3	100	
Well #15	65	
Total	3,065	Does not include yields in ()

Storage: Kanab City owns four storage tanks with a total capacity of 5.0 million gallons.

Distribution: An inventory of distribution facilities has been completed. Existing facilities including the storage tank, water lines, and fire hydrants are shown on maps in Appendix E. The existing distribution system does not meet the established *service standard*. Required upgrades are discussed in section IV-A-5 below.

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3. METHOD OF FINANCING OF EXISTING FACILITIES

Existing Facilities have been financed through the *water and sewer fund* with revenues coming from impact fees, monthly usage fees, grants, and loans. Long term debt that will be paid from the water and sewer fund is summarized below.

TABLE 11 – KANAB CITY LONG TERM WATER AND SEWER DEBT

Description	Balance Due June 30, 2005	Interest Rate	Payments (annual)	Matures
1987 Water & Sewer Bond	$39,416	5.00%	$25,276	2007
1988 Water Bond	$81,000	7.40%	$30,360 - $31,496	2008
1992 Water Bond	$53,000	5.00%	$7,750 - $8,650	2013
1998 Water Bond	$897,769	2.00%	$21,400 - $91,180	2019
Total	$1,071,185			

For impact fee analysis, *water and sewer bonds* will be divided evenly between water and sewer projects. With this assumption, the total water debt on June 30, 2005 was $1,051,477.00.

4. EXCESS CAPACITY

In order to determine excess capacity, it is necessary to establish the source and storage requirements for the city. Source and storage requirements for the culinary water system will be determined using the city's monthly records of water usage. Monthly water use from January 2005 to December 2005 is summarized in the following table.

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TABLE 12 – KANAB CITY WATER USE HISTORY

Date		Usage[1]
Month	Year	Reading
January	2005	25,900
February	2005	14,892
March	2005	18,879
April	2005	23,709
May	2005	62,512
June	2005	68,354
July	2005	92,292
August	2005	60,459
September	2005	75,183
October	2005	38,946
November	2005	27,005
December	2005	21,342
Total		529,473
Total (acre feet)		1,625

[1]Values are in thousands of gallons.

In addition to monthly water use, it is necessary to determine the current number of *equivalent residential units* (ERUs). The calculation of current ERUs is summarized in the table below.

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TABLE 13 – KANAB CITY EQUIVALENT RESIDENTIAL UNITS

Land Use	Units	No[1]	Demand[2]	ERUs	
				Multiplier	Total
Residential	Dwelling	1,519	800	1.000	1,519
Multiunit	Dwelling	60	800	1.000	60
High School	Person	264	15	0.0188	5
Middle School	Person	131	15	0.0188	2
Elementary School	Person	387	15	0.0188	7
Hotel	Room	713	150	0.1875	134
Service Station	Pump	40	250	0.3125	13
Restaurant	Seat	340	35	0.0438	15
RV Park	Vehicle	84	100	0.1250	11
Church	Seat	2,200	5	0.0063	14
Nursing Home	Bed	15	200	0.500	8
Doctor's Office	Patient	100	10	0.0125	1
	Staff	20	35	0.0438	1
Fire Station (volunteer)	Person	15	5	0.0063	0
Commercial	Building	3	1,600	2.000	6
Industrial	Building	3	3,200	4.000	12
Total Equivalent Residential Connections					1,808

1 Number of units are estimates
2 Assumed Peak Day Demand per Unit in gallons for the purpose of calculating ERUs only

Assuming the peak day demand for indoor water use is equal to the average daily flow of 900,167 gallons (27,005,000/30 days) in November of 2005 (peak winter month), the *peak day demand for indoor use* is 498 gpd/ERU.

Assuming the peak day demand for outdoor and indoor water use is equal to the average daily flow of 2,977,161 gallons (92,292,000/31 days) in July of 2005, the *peak day demand for indoor and outdoor use* is (1,647 gpd) /ERU. The *peak day demand for outdoor use* is (1,149 gpd) /ERU (1,647 gpd - 498 gpd). Using the total flow for the year ending in December 2005, the *average yearly demand per ERU* is 292,850 gallons (529,473,000 gallons / 1,808 ERUs).

- Peak day demand for indoor use: 498 gpd/ERU

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- Peak day demand for outdoor use: 1,149 gpd/ERU
- Total peak day demand: 1,647 gpd/ERU
- Average yearly demand for indoor use: 146,000 gallons/ERU (assumes 400 gpd/ERU)
- Average yearly demand for outdoor use: 146,850 gallons/ERU (292,850 gallons 146,000 gallons)
- Total average yearly demand: 292,850 gallons/ERU

The total average yearly demand for outdoor use is 265,504,800 gallons (814.80 acre-feet) or the equivalent of 435.72 acres in zone 4.

Source – Water Rights: In order to meet the legal requirements for source capacity for the current number of ERUs (1,808) the city must own water rights providing 4.61 CFS and 1,624.89 acre-feet of water. The city's current water right of 13.680 cfs or 9,910.65 acre-feet results in an excess capacity of 8,285.76 acre-feet of water per year. At an estimated value of $3,000 per acre-foot per year, the value of excess capacity of water rights is $24,857,280.

Source – Delivery: The existing delivery system is adequate to deliver water currently needed by the city. There does not appear to be significant excess capacity in the delivery system.

Storage: The storage requirement for the existing population is as follows.

- Fire suppression storage: 180,000 gallons
- Equalization storage for indoor use: 723,200 gallons (400 gal/ERU x 1,808 ERUs)

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- Equalization storage for outdoor use: 1,240,931 gallons (435.72 acres x 2,848 gal/acre)
- Total required storage: 2,144,131 gallons (1,186 gallons/ERU)

The existing 5,000,000 gallons of available storage exceeds the requirement by 2,855,869 gallons. The estimated replacement cost of the existing tanks is $0.85 per gallon of storage (Allen, 2005), giving a value of excess storage of $2,427,489.

Emergency Storage: Assuming a peak day demand of 2,977,161 gallons per day as outlined above with the tanks full there will be an estimated 1.5 days of storage in the system.

Distribution: There is no excess capacity in the existing distribution system with upgrades required in some areas to meet the service standard.

Summary: There is excess capacity in water rights valued at approximately $24,857,280 and excess capacity in storage valued at approximately $2,247,489 for a total value of $27,104,769.

5. ADDITIONAL FACILITIES NEEDED AT PRESENT

The City of Kanab covers an area varying in elevation from about 4,800 feet to about 5,100 feet. This elevation difference of approximately 300 feet results in a pressure difference of 130 psi between the high and low ends of the city. If the minimum recommended pressure of 40 psi is maintained at the upper end, the pressure at the lower end of the city would be about 170 psi which is well above acceptable limits.

The city has been divided into two separate pressure zones to provide more reasonable pressures. For the purpose of this plan, the city was divided into two zones with the upper zone (4,900+ Zone) serving areas with elevations above 4,900 feet and the lower zone (4,900- Zone) areas with elevations

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below 4,900 feet. Each zone will be referred to by a number representing the elevation of the tanks serving that zone as shown in parenthesis above.

TABLE 14 – CULINARY WATER PRESSURE ZONES

Zone	Ground Elevation		Existing System*		
	High	Low	Tank Elev.	Pressure (PSI) Low	Pressure (PSI) High
4,900+	5,100	4,910	5,160	38	122
4,900	4,910	4,800	5,160	65	124

*With pressure reducing stations.

With the existing system, static pressures (calculated assuming no pressure loss in the pipelines and no pressure reducing stations) can range from a low of 38 psi to a high of 124 psi (The required minimum static pressure is 40 psi.). Fire flows cause the pressures to drop below the required 20 psi in some areas. Upgrades to portions of the existing system will be necessary in order to meet minimum fire flow pressures. A preliminary cost estimate for the additional facilities needed to meet minimum fire flow requirements is given below.

A portion of the pipelines in the Three Lakes Canyon area also need to be upsized in order to accommodate the addition of the additional West Fork wells. The existing transmission line has been modeled and the addition of a booster pump in mouth of Three Lakes Canyon has been evaluated. In order to achieve capacity for two new wells in the canyon a booster pump could be installed on the 16-inch line after well number 11. This pump will need to be approximately 50 HP to boost the estimated additional 700 GPM that could be produced by the two new wells in addition to the existing flow. We estimate a booster pump, building & controls will cost approximately $100,000.00 In addition, the pipelines upstream near the West Fork wells will also need to be upsized or have a parallel line run to accommodate the additional flow and have been included in the cost estimate below. The additional capacity in the existing 16-inch line could also be achieved by eliminating or moving the sand trap, but the City would then have to retrofit at least 8 existing wells/springs to pump to the higher head that will be in the pipe. This option will be considerably more expensive than the booster pump option.

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TABLE 15 – PRELIMINARY COST ESTIMATE FOR ADDITIONAL IMPROVEMENTS NEEDED AT PRESENT

Item	Description	Quantity	Units	Unit Price	Item Cost
1	12" Ductile Iron Waterline	68,048	L.F.	$44	$2,994,112
2	10" PVC C-900 Waterline	14,137	L.F.	$30	$424,110
3	8" PVC C-900 Waterline	23,949	L.F.	$26	$622,674
4	Appurtenances	1	L.S.	$250,000	$250,000
Subtotal					$4,290,896
Engineering (12%)					$514,908
Legal & Fiscal (3%)					$128,727
Contingency (10%)					$429,090
Total					$5,363,620

In addition to the improvements needed at present described above we recommend the City pursue a pressurized irrigation system to remove the Golf Course and any future additions, City parks and the Cemetery off of the culinary system. This could be accomplished by working with the Canal Company and the Kane County Water Conservancy District to utilize their existing system. The City gains an estimated additional 570 connections if the golf course, parks & cemetery were taken off of the culinary system.

6. ADDITIONAL FACILITIES NEEDED AT BUILDOUT

Equivalent Residential Units: In order to determine what Facilities will be required at build-out, it is necessary to estimate the approximate number of equivalent residential connections (ERCs) at build-out. Calculations for ERCs at build-out are summarized below.

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TABLE 16 – KANAB CITY ESTIMATED EQUIVALENT RESIDENTIAL UNITS AT BUILDOUT

Land Use	Units	No.	Demand[1]	ERCs	
				Multiplier	Total
Residential – very low density	Dwelling	3,665	1,647	1.0	3,665
Residential – low density	Dwelling	9,162	1,647	1.0	9,162
Residential – medium density	Dwelling	1,835	1,647	1.0	1,835
Residential – PUD	Dwelling	6,330	1,647	1.0	6,330
Commercial	Acre	1,291	9,882	6.0[2]	7,746
Total Equivalent Residential Connections (ERC's)					28,738

[1] Assumed Peak Day Demand in gallons per unit using existing flow records as a basis.

[2] A multiplier of 6.0 was given based on 2 commercial units per acre and 3 ERUs per unit.

Source – Water Rights: The City of Kanab will need water rights for 8,415,923,300 (28,738 ERUs x 292,850 gallons per ERU) gallons or 25,827.49 acre-feet per year of water rights at build-out.

There are an estimated 25,994 acre-feet per year of underground water rights and 340,363 acre-feet of surface water rights in the Kanab Creek drainage area. For this study, it is assumed that the city will be able to acquire 50% of the underground water rights (12,997 acre-feet/year) with the remainder (12,830.49 acre-feet/year) coming from surface water. Using these assumptions it is anticipated that 50.32% of the water used will ultimately be obtained from underground water sources and 49.68% obtained from surface water.

The city owns water rights for 9,910.65 acre-feet and will need to acquire rights to an additional 16,083.35 acre-feet. At an estimated cost of $3,000 per acre-foot per year for underground water rights (3,086.35 acre-feet/year) and $2,000 per acre-foot per year for surface water rights (12,830.49 acre-feet/year), the total cost of additional water rights required to meet projected build-out conditions will be $34,920,030.

The Lake Powell Pipeline has been proposed to bring water to Kane, Iron, and Iron Counties from the Colorado River. It is anticipated that this project will

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be a State Project. The Division of Water Resources will likely work together with the Iron County Water Conservancy District, the Kane County Water Conservancy District and the Iron County Water Conservancy District to complete the pipeline. Preliminary alignment studies indicate the pipeline is planned to be routed through Kanab and will be tied into the proposed Jackson Flat Reservoir currently under design by the Kane County Water Conservancy District. The Lake Powell Pipeline will make 10,000 acre feet of water available to Kane County. Preliminary design for the pipeline will begin this year (2006) and is expected to be completed in three to five years. Construction of the pipeline is projected to begin in approximately 2020, depending on growth and need of the counties involved in the project. The addition of this resource to the Kanab area will provide additional water that could be utilized as Kanab City area continues to grow.

Source – Delivery: Underground water will require new wells and pipelines to connect to the existing delivery system. Surface water sources will require diversion structures and water treatment facilities. The type and location of facilities required will depend upon the type of water rights obtained and the location of the point of diversion.

At build-out there will be an estimated 28,738 equivalent residential connections with a peak day demand of 1,647 gallons per day per ERU. This will result in a peak daily requirement of approximately 47.33 million gallons. Using the assumptions stated in the water rights section above, it is anticipated that 23.82 (50.32%) million gallons will be obtained from underground sources and 23.51 million (49.68%) gallons will be obtained from surface water sources.

The cost of facilities required to deliver underground water (including wells and pipelines) to Kanab is estimated at approximately $0.91 per gallon per day of capacity. Of the estimated 23.82 million gallons per day required from underground sources, approximately 4.67 million have already been developed (3,243 gpm x 60 min x 24 hours, see *Existing Delivery Capacity* table in section V-A-2) leaving 19.15 million gallons per day of capacity needed in the future. At an estimated cost of $0.91 per gallon per day of

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capacity, the total estimated cost of facilities to deliver 19.15 million gallons of underground water would be $17,426,500.

Based upon costs obtained from the recent expansion of the St. George City water treatment plant, it is estimated that construction of treatment facilities for surface water will cost approximately $1,728 per gallon per minute of capacity. Assuming an efficiency of 85%, the construction cost of surface water treatment facilities will be $1.41 per gallon per day of capacity. With an estimated 23.51 million gallons per day needed at build-out, the estimated construction cost for surface water treatment facilities is $33,149,100.

Storage: Storage needs at build-out are as follows:

- Fire Suppression storage: 180,000 gallons
- Equalization storage: 34,083,268 gallons (1,186 gal/ERU x 28,738 ERUs, see section V-A-4)
- Total required storage: 34,263,268 gallons.

In addition to the existing 5,000,000 gallons of storage an additional 29,263,268 gallons of storage will be needed. At an estimated cost of $0.85 per gallon of storage capacity (including construction cost, engineering, contingencies, and legal fees), the estimated construction cost of additional storage facilities needed at build-out is $24,873,778.

Distribution: This study assumes that property owners will supply and install all required culinary water facilities within their respective developments including water lines, fire hydrants, pressure reducing valves, valves, and fittings. However, there will also be upgrades required to the system outside of new developments which will need to be furnished and installed by the City. Additional distribution facilities expected to be required at build-out outside of new developments are summarized below along with the estimated costs.

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TABLE 17 – PRELIMINARY COST ESTIMATE FOR ADDITIONAL FACILITIES NEEDED AT BUILDOUT

Item	Description	Quantity	Units	Unit Price	Item Cost
1	30" Ductile Iron Waterline	10,911	LF	$130.00	$1,418,430
2	24" Ductile Iron Waterline	20,198	LF	$92.00	$1,858,216
3	20" Ductile Iron Waterline	33,785	LF	$72.00	$2,432,520
4	16" Ductile Iron Waterline	56,514	LF	$60.00	$3,390,840
5	14" Ductile Iron Waterline	17,254	LF	$53.00	$914,462
6	12" Ductile Iron Waterline	24,065	LF	$44.00	$1,058,860
7	10" PVC C-900 Waterline	13,398	LF	$30.00	$401,940
8	8" PVC C-900 Waterline	29,296	LF	$26.00	$761,696
9	Appurtenances	1	Each	$250,000	$250,000
Subtotal					**$12,486,964**
Engineering (12%)					$1,498,436
Legal & Fiscal (3%)					$374,609
Contingency (10%)					$1,248,696
Total					**$15,608,705**

The costs of additional facilities needed at build-out are as follows.

- Water rights: $34,920,030
- Delivery of underground water: $17,426,500
- Delivery of surface water: $33,149,100
- Storage: $24,873,778
- Distribution: $15,608,705
- Total: $125,978,113

The total cost of additional facilities needed at build-out is expected to be $125,978,113 or $4,384 ($125,978,113/28,738 ERUs) per ERU.

7. METHOD OF FINANCING NEEDED FACILITIES

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Additional Facilities included in the Capital Facilities Plan (CFP) are as follows.

- Additional Facilities needed at present: $5,364,000
- Additional distribution facilities needed at build-out: $125,978,113
- Total additional Facilities included in CFP: $131,342,113

The proportionate share directly attributable to growth less applicable credits (See section V-B-4) is $146,537,481which exceeds the expected cost of additional facilities needed ($131,342,113). As a result, it is anticipated that the entire cost of additional facilities required will be financed through development impact fees.

B. Development Impact Fee Analysis

1. SERVICE AREA

Although two separate pressure zones are planned, all portions of the culinary water system will be closely tied together. Most of the city's water at build-out is expected to be delivered to the upper pressure zone and from there to the lower pressure zone. Most of the key facilities requiring upgrading at build-out will benefit the entire system. As a result, the entire culinary water system will be included in a single service area.

2. PROPORTIONATE SHARE OF COSTS

To determine the proportionate share of required improvements that are the direct result of new development; additional facilities needed at present, excess capacity, and additional facilities needed at build-out need to be considered.

- Additional Facilities Needed at Present: $5,364,000

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- Excess Capacity: $26,910,769
- Additional Facilities Required at Build-out: $125,978,113

Additional Facilities Needed at Present: Additional facilities needed at present are discussed in detail in section V-A-5 above. The improvements needed have a total estimated cost of $5,364,000.

Excess Capacity: Excess capacity includes the $26,910,769 discussed in section V-A-4.

Additional Facilities Required at Build-out: The estimated cost of additional Facilities required at build-out is $125,978,113 as detailed in section V-A-6 above.

Proportionate Share: The proportionate share of the capital facility plan costs which can be directly attributable to growth is equivalent to the value of the *excess capacity* ($26,910,769 [see paragraph above]) plus the value of *additional Facilities required at build-out* ($125,978,113) less the cost of *additional facilities needed at present* ($5,364,000) which is equal to $147,524,882.

3. CREDITS FOR PAST AND FUTURE CONTRIBUTIONS

Existing improvements have been paid for out of the water and sewer fund with little or no contribution from the general fund. As a result, no credit for past contributions is applicable. There were outstanding loans in the amount of $1,051,477 as of June 30, 2005, which will be paid out of the water fund. This amount will be applied as a credit toward the impact fee.

4. IMPACT FEE CALCULATION

The culinary water impact fee is calculated using a total value equivalent to the proportionate share directly attributable to growth ($147,524,882) less credits for past and future contributions ($1,051,477), an amount equal to $146,473,405. The number of additional ERUs at build-out (26,930) is found by subtracting the number of ERUs at present (1,808) from the expected

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number at build-out (28,738). The cost of additional facilities directly attributable to growth is $5,439 per ERU ($146,473,405/26,930). Assuming an interest rate of 5.00% and a loan period of 20 years, payments would total $1.605 for every dollar borrowed. Therefore, the maximum allowable impact fee is $8,729.

Impact fees are commonly assessed by meter size using the typical size for a single-family residence (1 ERU) as the base. The impact fee for each meter size is then determined by multiplying the base impact fee by the ratio of the area of each meter to the area of the typical meter size (in this case 3/4”). Using this method, the maximum allowable impact fees are summarized in the table below.

TABLE 18 – CULINARY WATER DEVELOPMENT IMPACT FEES

Meter Size (in)	Proposed Impact Fee
3/4	$8,729.00
1	$15,518.22
1 1/2	$34,916.00
2	$62,072.89
3	$139,664.00
4	$248,291.56
6	$558,656.00

It should be noted that Kanab City water rights will allow for a current diversion of 8,842,000 GPD. Subtracting current delivery capacity (8,842,000-4,413,600 GPD) yields an available water right of 4,428,400 GPD. This will allow approximately 3,525 additional connections to the system before additional water sources will need to be obtained but would require upgrades to the delivery/distribution system. Possible future water sources include the proposed Kane County Water Conservancy District Jackson Flat Reservoir and the Lake Powell Pipeline.

The distribution system can currently supply 4,413,600 GPD. Using peak use for the month of July of 2,977,161 gallons per day there is extra production capacity of 1,436,439 GPD or enough water for 1,143

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(1,436,439GPD/1,256GPD[1]/Connection) additional connections to the system before upgrades will be necessary.

In order to assist the City with financing improvements funded by impact fees, it is recommended that the water impact fee be assessed and paid in full when a proposed development plat is recorded.

[1] Use per connection calculated by removing large irrigation demands from billing records and dividing by the number of current connections.

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