



WEBER BASIN WATER CONSERVANCY DISTRICT



WATER CONSERVATION PLAN UPDATE 2013

Table of Contents

1.0	BACKGROUND.....	3
	1.1 Operating Agency.....	3
	1.2 Weber Basin Project.....	3
	1.3 Authorization and Construction	4
2.0	EXISTING DISTRICT FACILITIES	4
3.0	CURRENT WATER DEMANDS	7
	3.1 Municipal and Industrial Water Uses	7
	3.2 Replacement Water Contracts	8
	3.3 Irrigation Water Uses	8
	3.4 Total Current Water Demand	9
4.0	PROJECTED WATER DEMANDS.....	9
	4.1 Service Area	10
	4.2 Traffic Analysis Zones	10
	4.3 Population Projections.....	10
	4.4 Calculating Per Capita Demand	12
	4.5 Converting Population to Potable Demand	13
	4.6 Total Annual Demands.....	15
	4.7 Service Area of Wasatch Back	15
	4.8 Population Projections.....	15
	4.9 Converting Population To M&I Demand.....	17
5.0	EXISTING AND FUTURE WATER SUPPLY.....	18
	5.1 Wasatch Front Member Agency Sources	18
	5.2 Existing District Sources	23
	5.3 Future	26
	5.4 Total Supply	32
6.0	ANNUAL SUPPLY AND DEMAND EVALUATION.....	33
	6.1 Secondary Water Considerations	33
	6.2 Supply Plans	35
	6.3 Future Supply Development Actions	43
7.0	CURRENT WATER CONSERVATION ACTIVITIES	46
	7.1 Supervisory Control and Data Acquisition (SCADA) System	46
	7.2 Metering and Accounting	46
	7.3 Rehabilitation and Betterment	47
	7.4 Irrigation Water System Policy	47
	7.5 Water Rates and Contracts	47
	7.6 Water Conservation Education Program	48
	7.7 Irrigation Product Rebate Program.....	50
8.0	PROPOSED WATER CONSERVATION ACTIVITIES	50
	8.1 Water Management	50
	8.2 Metering and Accounting	51
	8.3 Rehabilitation	51
	8.4 Outdoor Irrigation / Irrigation Water Policy.....	51
	8.5 Water Rates and Contracts	51
	8.6 Reclaimed Water Use	51
	8.7 Water Conservation Educational Program	51
9.0	CONCLUSION.....	52

1.0 BACKGROUND

1.1 Operating Agency

The Weber Basin Water Conservancy District (WBWCD) is the legal agency representing the people of the five-county area of the project. Those counties involved include Davis, Morgan, Summit, Weber, and part of Box Elder. WBWCD administers the sale and delivery of project water, operates and maintains project facilities, and has contracted with the U.S. Government for repayment of reimbursable costs of the Weber Basin Project.

1.2 Weber Basin Project

The Weber Basin Project was created to conserve and utilize for multiple purposes, practically all of the unused flows of streams in the natural drainage basin of the Weber River, including the basin of the Ogden River, its principal tributary. Other areas encompassed include those lying between the west slope of the Wasatch Mountains and the east shore of the Great Salt Lake.

Water resources of the area were extensively developed before the initiation of the Weber Basin Project. Numerous private developments antedate the Federal projects. Prior federal reclamation developments include the Weber River Project—with its Echo Reservoir on the main stem of the Weber River—and the Ogden River Project with its Pineview Reservoir on the Ogden River. Under the Weber River and Provo River Projects, water is diverted from the high reaches of the Weber River for multiple uses on the Provo River. The Weber Basin Project supplements all of the earlier undertakings, and its operations correlate with them in approaching full practicable development of the area's water resources.

The project was planned to regulate stream flow with four new reservoirs, two enlarged reservoirs, and the correlated operation of project reservoirs and the old Echo Reservoir (owned by the Weber River Project). Three of the six project reservoirs—Wanship (Rockport Lake), Lost Creek, and East Canyon (enlarged)—Echo Reservoir, and Smith and Morehouse Reservoir (built by WBWCD in 1983) regulate the flow of the Weber River before it emerges from its mountain watershed to the east shore area, where the principal water utilization occurs. Two project reservoirs, Causey and Pineview (enlarged), regulate the flow of the Ogden River before it emerges from the mountains to join the Weber River in the east shore area. Willard Reservoir (off-stream) is the lowest reservoir of the system and receives water from the Weber River that is diverted below the mouth of the Ogden River at Slaterville Diversion Dam and conveyed through the Willard Canal. If needed, water is returned to the Weber River from the Willard Reservoir over the same route facilitated by the two Willard pumping plants.

The Wanship, Lost Creek, East Canyon, and Smith and Morehouse reservoirs on the Weber River and its tributary creeks are operated to supply water for irrigation, municipal, and industrial purposes in the east shore area and for power production at Gateway and Wanship Power Plants. Causey Reservoir on the Ogden River side has also been upgraded by WBWCD to produce power. In addition, these reservoirs are operated to provide supplemental irrigation water and replacement water for residential purposes in mountain valleys along the Weber River and its upper tributaries. The reservoirs are also used to provide flood control and for the maintenance of stream flows for supporting game fish.

The Stoddard Diversion Dam—on the Weber River, about 4 miles downstream from Morgan, Utah—diverts water into the Gateway Canal, which extends 8.5 miles westward on the south side of Weber

Canyon. The canal has a capacity of 700 cubic feet per second (cfs) and delivers water to the Gateway Power plant, which requires about 250 cfs. The remaining water is conveyed through the 3.3 mile long Gateway Tunnel to the west face of the Wasatch Mountains. There, bifurcation works direct water north via the Weber Aqueduct and south via the Davis Aqueduct.

The Weber Aqueduct is 5 miles long with a capacity of 80 cfs and conveys irrigation water to lands on the Uintah Bench and municipal and industrial water to Ogden and adjacent communities in Weber County. Part of the irrigation water is pumped to lands above the aqueduct, and the remainder is delivered by a high pressure distribution system. At the terminal of the aqueduct, water is delivered to the District's Weber South water treatment plant from which it is distributed to Ogden City and other surrounding communities.

The Davis Aqueduct extends to the south along the foot of the Wasatch Mountains about 23 miles to North Salt Lake City and has an initial capacity of 355 cfs. Part of the water is pumped for irrigation to lands above the aqueduct; the remainder of the water is sold by WBWCD to irrigation companies, improvement districts, subconservancy districts, and individual landowners. The remaining water is processed through WBWCD's Davis North water treatment plant for distribution to communities in north Davis County and through the Davis South water treatment plant for communities in the south end of Davis County. A large block of treated and untreated industrial water is also delivered to the Chevron Oil Company and Big West Oil Company in the extreme south end of Davis County.

Project laterals from these aqueducts include pipe systems that distribute irrigation water to farmland and suburban areas. The project includes the Willard Canal extending north and the Layton Canal extending south from the Weber River in conjunction with other canals to serve the lower project lands adjacent to the Great Salt Lake. The Ogden Valley Canal distributes Ogden River water to mountain valley lands near Huntsville and Eden. The project also includes drains for lower lands in the east shore area. WBWCD has also developed twenty deep wells to help relieve water shortages in dry periods and help meet peak water demands. Streams flowing from the face of the Wasatch Mountains toward the Great Salt Lake also contribute small quantities of water for project use.

1.3 Authorization and Construction

Congress authorized the Project in 1949 and construction funds were first appropriated in 1952. Before the year ended, a contract was awarded to the Utah Construction Company to build the Gateway Tunnel. During 1954, construction started on the Davis Aqueduct, Wanship Dam, the Gateway Canal, and the Weber Aqueduct. In 1955, construction starts included Willard Dam, Pineview Dam enlargement, and the Bountiful Drain. The Wanship and Gateway power plants and switch yards were started in 1956. By July 8, 1957, the Davis and Weber Aqueducts were completed and had begun operating to deliver project water from the Weber River.

2.0 EXISTING DISTRICT FACILITIES

Weber Basin receives its water from the Weber and Ogden Rivers and from various deep groundwater wells. The following tables illustrate a breakdown of the District's existing water resources and distribution facilities:

**Table 2-1
Reservoirs**

Name	Total Capacity*	Usable District Capacity*
Causey	7,870	6,870
East Canyon	51,200	20,110
Lost Creek	22,510	20,010
Pineview	110,150	66,228
Smith & Morehouse	8,350	6,560
Wanship	62,120	60,860
Willard	227,189	202,160
Totals	489,389	381,938
*capacity is in acre-feet		

**Table 2-2
Diversions**

Name	Location	Pass-Capacity (cfs)
Ogden Valley	South Fork of Ogden River	2,000
Slaterville	Weber River west of Ogden	9,000
Stoddard	Weber River west of Morgan	6,000

**Table 2-3
Canals, Tunnels, & Pipelines**

Name	Type	Length (Miles)	Capacity (cfs)
Davis Aqueduct	Concrete pipe	23.00	355
Gateway Canal	Concrete-lined	8.50	700
Gateway Tunnel	Concrete-lined	3.30	435
Layton Canal	Earth-lined/pipe/concrete-lined	18.00	260
Ogden Valley Canal	Part Earth-lined	9.20	35
Weber Aqueduct	Concrete pipe	5.00	80
Willard Canal	Earth-lined/concrete-lined	11.00	1,050

**Table 2-4
Lateral Systems**

Name	Type	Irrigable Acres
Layton	Pipe	26,110
North Davis	Pipe	5,680
Ricks Creek	Pipe	495
South Davis	Pipe	735
Uintah Bench	Pipe	3,340
West Farmington	Pipe	2,720
Willard	Pipe/Open Laterals	22,190
Woods Cross	Pipe/Open Laterals	4,310

**Table 2-5
Pumping Plants**

Name	Location	Capacity (cfs)
Antelope Booster	Layton	22
East Bountiful	Davis Aqueduct	18
East Layton	Davis Aqueduct	10
Kanesville 1	West Haven	3
Kanesville 2	West Haven	10
Layton	Layton Canal	260
Old Post Road Booster	Ogden	6
Rockport	Wanship/Summit	25
Roy Drought Relief	Layton Canal	150
Sand Ridge East	Davis Aqueduct	9
Sand Ridge West	Davis Aqueduct	15
South Davis	Davis Aqueduct	18
Uintah Bench	Weber Aqueduct	18
Val Verda	Davis Aqueduct	6
West Haven 1	West Haven	10
West Haven 2/Hooper	West Haven	3
Willard No. 1	Willard Canal	500
Willard No. 2	Willard Canal	300

**Table 2-6
Underground Water Wells**

Well	Owner	Function	Water	Status	Capacity (cfs)
Bountiful-Red Flame	Project	Peaking	M&I	Operational	5.20
Clearfield 1	Project	Peaking	M&I	Operational	5.00
Clearfield 2	Project	Peaking	M&I	Operational	5.00
District Well 2	District	Water Supply	M&I	Operational	11.00
District Well 3	District	Water Supply	M&I	Operational	10.00
Laytona	Project	Peaking	M&I	Operational	5.00
North Ogden 1	District	Water Supply	M&I	Operational	1.80
Riverdale	District	Peaking	M&I	Operational	6.60
South Weber 1	Project	Peaking	M&I	Operational	10.00
Farmington No.1	District	Water Supply	Irrigation	Operational	5.00
Farmington No.2	District	Water Supply	Irrigation	Operational	5.00
South Weber 2	Project	Peaking	M&I	Operational	10.00
500 S. West Bountiful	District	Water Supply	Irrigation	Operational	5.00
Orchard Dr. Bountiful	District	Water Supply	M&I	Operational	0.80
Golf Course Well Bountiful	District	Water Supply	Irrigation	Operational	2.00
Ben Lomond Golf Course	District	Water Supply	M&I	Operational	1.80
Davis Boulevard	District	Water Supply	M&I	Operational	2.20
North Weber	District	Water Supply	M&I	Operational	1.60
Mills Park Well	District	Peaking	Irrigation	Operational	2.23
Fairfield Well	District	Water Supply	M&I	Operational	10.0
New South Davis Wells	District	Water Supply	M&I	Being Developed	13.60
New North Ogden Wells	District	Water Supply	M&I	Being Developed	3.86
Total Flow					105.23
Total Water Supply Flow (50% of Flow)					62.62

Table 2-7
Water Treatment Plants

Name	Location	Capacity (cfs)	MGD
Weber South WTP	Ogden	50	32
Davis North WTP	Layton	70	46
Davis South WTP	Bountiful	25	16
Totals		145	94

The District has plans to build a future WTP in West Weber with an initial treatment capacity of 20 million gallons per day (mgd) with a future treatment capacity of 120 mgd.

3.0 CURRENT WATER DEMANDS

3.1 Municipal and Industrial Water Uses

Weber Basin Water contracts with various cities, sub-districts, irrigation companies, and industries to provide water on a yearly basis. Tables 3-1 and 3-2 list these existing municipal and industrial water allocations.

Table 3-1
Summary of M&I Treated Water Contracts

Contracting Entity	Contract Amount (AF/yr)	Contracting Entity	Contract Amount (AF/yr)
Bountiful City	1,000.00	West Bountiful City	750.00
Centerville City	500.00	West Point City	700.00
Chevron, Usa	2,000.00	Woods Cross City	100.00
Clearfield City	5,348.00	Advanced Fluid Containment	5.00
Clinton City	1,630.00	Total Davis County	30,412.79
Farmington City	501.00	Bona Vista Water Imp. Dist	3,786.00
Fruit Heights City	595.00	Great Salt Lake Minerals	789.00
Geneva Rock	44.00	Hooper Water Imp. District	57.65
Hill Air Force Base	1,018.79	Little Mtn Rail	5.00
Kaysville City	2,500.00	Ogden City	7,000.00
Layton City	6,789.00	Riverdale City	1,165.00
Mutton Hollow Wid	220.00	Roy City	3,263.00
North Salt Lake City	1,905.00	South Ogden City*	785.00
South Davis County Wid	360.00	Taylor-West Weber Wid	465.30
South Weber City	700.00	Uintah Highlands Wid	237.00
Sunset City	1,400.00	Uintah City	378.00
Syracuse City	1,925.00	Washington Terrace City	1,000.00
Wasatch Integrated Waste Mgmt	353.00	West Warren-Warren Wid	400.00
Webbs Canyon Water Company	9.00	Western Zirconium	560.00
Weber Basin Job Corp	60.00	Total Weber County	27,214.95
		Total Treated Water	<u>48,803.74</u>

**Table 3-2
Summary of M&I Untreated Water Contracts**

Contracting Entity	Contract Amount (AF/yr)
Big West Oil	100.00
Chevron, Usa	1,200.00
Great Salt Lake Minerals	7,980.00
Ogden City	1,500.00
North Salt Lake City	830.00
Parsons	22.00
Roy Water Conservancy District	365.00
Wasatch Energy Systems	3.00
Total Untreated	12,000.00
Total Treated And Untreated	87,163.74

3.2 Replacement Water Contracts

WBWCD maintains a large number of replacement water contracts with irrigators, potable water retailers, and other users throughout the District. These replacement water contracts provide for the withdrawal of water from private wells and diversion structures, in exchange for the release of an equivalent amount of water from District reservoirs. Replacement water contracts are currently used to meet both M&I and non-M&I demands. Current District replacement water contracts total 26,360 acre-feet and are the primary method of District supply throughout the Wasatch Back service area. Table 3-3 divides replacement water contracts by county.

**Table 3-3
Summary of Replacement Water Contracts**

CONTRACTING ENTITY	CONTRACT AMOUNT (AF/yr)
Morgan County	4,733.00
Summit County	12,803.00
Weber County	7,324.00
Total Replacement Contracts	26,360.00

3.3 Irrigation Water Uses

The District currently holds contracts to provide 78,795 acre-feet of water to irrigation companies. Most District irrigation contracts include a 10 percent reduction in delivery at the point of demand to account for conveyance and system losses within the District's system. When the total irrigation contract amount is reduced by an expected 10 percent conveyance loss, the required irrigation demand on the District at the point of delivery is 71,617 acre-feet. Weber Basin Water Conservancy District also owns and operates its own irrigation water system that provides water for parts of Weber and Davis counties. The current average amount of water distributed via this irrigation system is approximately 59,889 acre-feet annually. Therefore, the current total irrigation water demand on the District is approximately 138,648 acre-feet annually. The following data lists the District's current irrigation water contracts.

**Table 3-4
Summary of Irrigation Company Water Contracts**

Contracting Entity	Contract Amount (AF/yr)	Contracting Entity	Contract Amount (AF/yr)
Benchland Irrigation	4,475.00	North Morgan Irrigation	160.00
Bountiful Water Sub District	17,500.00	North Round Valley	150.00
Centerville Duel Creek	2,891.00	Oakridge County Club	500.00
Chalk Creek Irrigation	643.00	Ogden River Water Users Assoc	3,705.00
Co-Op Farms Irrigation	300.00	Peterson Irrigation	614.00
Croyden Irrigation	450.00	Pintail Duck Club	100.00
Davis & Weber Counties Canal	606.00	Salmaho Irrigation	167.00
Downs Creek Irrigation	100.00	So Davis County Wtr Imp District	3,210.00
East Porterville Irrigation	200.00	South Morgan Water Company	400.00
East Wanship/Gibbons & Pace	100.00	So Ogden Conservation District	2,345.00
Eden Irrigation	1,200.00	South Weber Water Imp District	2,148.00
Emmertsen Irrigation	100.00	Sun Hills Golf	496.00
Felt, Peterson, Slater Irrigation	100.00	Syracuse City	1,113.00
Hights Creek Irrigation	6,922.00	Utah Mountain Streams	200.00
Hill A.F.B. Golf Course	640.00	Valley View Golf Course	373.00
Hill Field At 193	139.00	Warren Irrigation	700.00
Hooper Irrigation	5,663.00	Weber Basin Job Corps	300.00
Huntsville Irrigation	600.00	Weber-Box Elder Cnsrvcy District	4,147.00
Huntsville So. Bench Irrigation	600.00	Weber Canal Company	200.00
Kays Creek Irrigation	2,000.00	Welch Field Ditch	240.00
Kaysville Irrigation	1,775.00	West Bountiful Golf	294.00
Lagoon Amusement Park	225.00	West Hoytsville Irrigation	300.00
Layton Canal & Irrigation Co	5,491.00	West Wanship Irrigation	150.00
Littleton-Milton Irrigation	300.00	Wilson Irrigation	1,500.00
Middle Fork Irrigation	830.00	Subtotal	78,759.00
Mountain Valley Canal Irrigation	1,297.00	Retail Irrigation Water Sales	59,889.00
Mountain View Irrigation	100.00	Total	138,648.00

3.4 Total Current Water Demand

Given the above stated demands, the total current water demands that the District meets on an annual basis is approximately 252,000 acre-feet.

4.0 PROJECTED WATER DEMANDS

There are several methods that can be used to estimate future water demand. In 2011, the District conducted a study to develop demand projections based on population and average per capita water use. The methodology used in this study was as follows:

- Define the Wasatch Front and Wasatch Back study areas.
- Divide the study areas into a number of smaller sub-areas using geographical information system (GIS) mapping.
- Project population for each sub-area based on existing and projected patterns of development.

- Convert population to water demand based on historic per capita water use and conservation trends.

Each step of this process is summarized in the sections below. Because of the varied range of data availability and water use characteristics between the Wasatch Front and the Wasatch Back, demand projections for each study area were developed separately.

4.1 Service Area

WBWCD service area boundaries include Davis, Weber, and Morgan counties as well as a majority of Summit County. Because the overall WBWCD service area extends eastward as far as Morgan and Summit counties, the area of focus for this section of the study includes communities in Davis and Weber counties located along the Wasatch Front and discusses some of the issues for the Wasatch Back in section 4.7. WBWCD currently provides wholesale water service to almost all of the communities in Davis and Weber counties. The only exceptions to this are the communities of Pleasant View and North Ogden. For the study it was assumed that the existing WBWCD service area would remain unchanged in the future.

In addition to establishing an overall service area for the report, it was necessary to define service areas for each of the District's member agencies. In currently undeveloped areas, some assumptions were made about who would provide future service based on input from District personnel.

4.2 Traffic Analysis Zones

Division of the District service area into smaller sub-areas was important for two reasons. First, it increased the accuracy of the population and demand projections by examining land use and development patterns on a smaller aerial scale. Second, it yielded projections that were distributed across the service area. This will aid the District in future modeling efforts to assess its ability to deliver water to various locations within its service area.

For the Wasatch Front portion of this study, sub-areas were defined based on Traffic Analysis Zones (TAZ). A TAZ is the smallest geographic unit used for population projections by the Wasatch Front Regional Council (WFRC). These units are based on arbitrary boundaries established by the WFRC for travel demand modeling. This means their boundaries do not necessarily correspond with community or water system boundaries.

TAZ boundaries were used for the analysis because population projections have already been developed based on TAZ boundaries by the WFRC. The projections are provided for several years starting in 2007 and continuing to 2040. TAZ boundaries were also used because they are small enough to give an adequate distribution of demand across the service area for use in modeling.

4.3 Population Projections

Population projections for each TAZ in WBWCD's service area were prepared through ultimate build out. Population projections were assembled in three phases:

- First, population projections between 2007 and 2040 were taken directly from TAZ projections prepared by WFRC.

- Second, ultimate build out population was estimated for each TAZ based on existing and projected development patterns. GIS mapping tools were used to collect data on existing densities, developable area, land use patterns, and zoning. These items were then used to estimate a potential build out population for each TAZ.
- Finally, population projections were interpolated between 2040 and ultimate build out based on historic growth patterns. Countywide projections from the GOPB were used to check the accuracy of the projections between 2040 and 2060

Population Projection Results

Following the procedures above, population projections were developed for each TAZ in the WBWCD service area through 2150. For each TAZ, the projected growth curve was reviewed individually to look for irregularities. These results are summarized in Table 4-0.

Table 4-0
Estimated WBWCD Service Area Population

Year	Davis Area Population	Weber Area (Wasatch Front) Population	Total WBWCD (Wasatch Front) Population	Average Annual Population Growth
2007	295,500	216,000	511,500	--
2010	323,000	227,500	550,500	2.48%
2015	346,500	248,000	594,500	1.55%
2020	369,500	269,000	638,500	1.44%
2025	380,000	289,000	669,000	0.94%
2030	390,000	309,000	699,000	0.88%
2040	407,000	355,500	762,500	0.87%
2050	424,500	412,000	836,500	0.93%
2060	441,500	472,000	913,500	0.88%
2070	459,500	519,000	978,500	0.69%
2080	478,500	552,500	1,031,000	0.52%
2090	498,000	575,500	1,073,500	0.40%
2100	518,500	592,000	1,110,500	0.34%
2110	539,500	603,000	1,142,500	0.28%
2120	562,000	611,000	1,173,000	0.26%
2130	585,000	617,500	1,202,500	0.25%
2140	608,500	623,500	1,232,000	0.24%
2150	633,500	629,500	1,263,000	0.25%

Current development is largely focused around the I-15 corridor. Over time, growth will spread out from this corridor to both the east and west. By 2050, the area east of I-15 will be largely built out with most remaining growth potential located to the west. Summit and Morgan counties are also experiencing higher levels of growth. It is anticipated that by 2050 Summit County will have nearly

133,000 people, and Morgan County will be close to 50,000 people. A more detailed analysis for Morgan and Summit counties is shown in section 4.8.

4.4 Calculating Per Capita Demand

To convert population to demand, a per capita demand had to be estimated for the service area. This was done based on water use for the year 2000. Two challenges were encountered in the calculation of per capita demands: secondary water and industrial demands.

Secondary Water

To account for the effect of secondary coverage on total demands, it was decided that per capita demand should be calculated for both indoor and outdoor water use. The amount of indoor and outdoor water used in each potable water system was estimated by plotting monthly water use for each entity. It was assumed that no outdoor water use occurs during the winter months, so total indoor water use could be calculated as 12 times the average monthly water use during the winter months. With an estimate of indoor water use, potable water use outdoors was then calculated as total water use minus indoor water use. Once the total outdoor water use was estimated, the per capita usage was calculated by dividing the total use by the number of persons using potable water for irrigation. Based on these estimates, the population served by secondary water was removed for each provider and the per capita potable irrigation was calculated based on the remaining service population. The average per capita potable irrigation for the year 2000 was calculated for the District at 156 gallons per capita per day (gpcd).

It should be emphasized that this outdoor per capita use was for metered potable irrigation only. For areas with unmetered secondary service, per capita use would be significantly higher. Actual use in these areas was difficult to estimate because detailed meter records were not available. However, meters are now being used and data collected with anticipation that the data gathered will significantly change the way secondary water is used and accounted for. Based on the best information available from the Division of Water Resources, it was estimated that the average annual secondary use in the District in 2001 and 2003 was 72,400 acre-feet. In contrast, the population served by secondary service had an estimated annual irrigation demand of only 49,300 acre-feet if demand were estimated based on the average per capita demand calculated for metered potable irrigation. This means that per capita water use in unmetered secondary service areas was, on average, 47 percent greater than in metered potable service areas. This equated to an estimated 2000 per capita secondary use of 229 gpcd.

Industrial Demands

When calculating per capita indoor demand based strictly on population, it was noted that there was a great variation between the various member agencies in the District. After closely examining the results, it was determined that industrial demands were skewing the results in some areas of the District (North Salt Lake, Clearfield, Ogden, etc.). To account for this demand, the industrial demand in each area as reported to the State was removed before calculating per capita demand. Once this demand was removed, the indoor per capita demand was more consistent between the entities. The 2000 average per capita indoor water use in the District was 96 gpcd.

Total Per Capita Demands

Average per capita water demands for various types of users within the District are summarized in Table 4-1.

Table 4-1
Summary of Per Capita Water Demands

	Users with Potable Irrigation	Users with Secondary Service
<i>Potable Water Use</i>		
Indoor Water Use	96 gpcd	96 gpcd
Potable Irrigation	156 gpcd	0 gpcd
Subtotal – Potable Use	252 gpcd	96 gpcd
<i>Secondary Water Use</i>		
Secondary Irrigation	0 gpcd	229 gpcd
Subtotal – Secondary Use	0 gpcd	229 gpcd
Total – All Water Use	252 gpcd	325 gpcd

4.5 Converting Population to Potable Demand

With per capita demands calculated for the District's service area, potable water demand projections were developed for the Wasatch Front portion of the WBWCD service area by taking the population for each TAZ and multiplying it by the appropriate per capita demand. In areas with secondary service, potable demand was estimated as the population times the per capita demand for indoor use only. For areas without secondary service, potable demand was estimated as the population times the per capita demands for indoor and outdoor use. In all areas, industrial demands were added to total potable demand after the calculation of demand based on population alone.

Table 4-2 presents potable demand projections for the Wasatch Front portion of the WBWCD service area in select years through build out. Two estimates of demand are presented for each year in the table. One represents the projected service area demand if water use continues at the same per capita use as calculated for 2000. The other represents the demand if the District's current conservation goal is achieved.

Table 4-2
Estimated WBWCD Service Area Potable Demands – Wasatch Front (Acre-Feet)

Year	Without Conservation			With Conservation		
	Davis Area	Weber Area	Total	Davis Area	Weber Area	Total
2000	47,500	43,300	90,800	47,500	43,300	90,800
2010	56,200	51,100	107,300	54,300	49,400	103,700
2020	63,200	57,500	120,700	59,000	53,700	112,700
2030	68,900	62,600	131,500	62,900	57,100	120,000
2050	77,700	71,200	148,900	67,000	61,300	128,300
Build Out	111,200	119,400	230,600	93,700	100,700	194,400

The State's conservation goal is to reduce per capita consumption (as measured in the year 2000) by 25 percent. In 2013, the State accelerated the time to achieve 25 percent reduction to the year 2025 from 2050. Because the District has such a large secondary component, it was recommended that separate conservation goals be established for indoor and outdoor water use. Because outdoor water use has a larger potential for conservation, it was recommended that the District establish a goal of reducing per capita outdoor water use by 34 percent. Correspondingly, it was recommended that the District establish a goal of reducing per capita indoor water use by only 10 percent. Based on the historic distribution of water use between indoors and outdoors, achieving these two goals will result in a total reduction in water use of 25 percent. The District is on course to achieve this reduction goal and will continue to look for ways to reduce per capita use and increase water use efficiency.

Projecting Secondary Demands

While using per capita water use worked well for estimating potable demands, another method was selected to estimate secondary demands. This change was implemented to avoid overestimating outdoor water use in areas with high populations but little irrigated areas (e.g. large apartment buildings, city centers, etc.). The method used for estimating secondary demand was as follows:

- Current secondary demands were estimated based on the current population in each secondary service area times the per capita secondary water use as estimated above. Estimated 2000 secondary demands based on this approach were 73,300 acre-feet.
- Secondary demands at build out were estimated based on the total acreage available for development times the estimated average irrigation rate in the District. Based on metered water use records, the outdoor irrigation rate in areas of the District using potable water outdoors was calculated at approximately 1.5 acre-feet per gross developed acre. It was assumed that secondary irrigation use was 47 percent greater than potable irrigation, or the irrigation rate for secondary water use was 2.2 acre-feet per acre. The estimated developable area in the District's Wasatch Front service area is 180,000 acres. Of this, 120,000 acres are projected to have secondary water coverage at build out. This resulted in a projected secondary demand at build out of 265,900 acre-feet.
- Between current conditions and build out, secondary demands have been estimated to grow proportionally with population growth.
- To the secondary irrigation demands described above were added untreated M&I demands contracted by the District. These demands include 10,870 acre-feet of demand from Chevron, Great Salt Lake Minerals, and others.

Following the procedure outlined above, secondary demands were projected for the WBWCD service area through build out. These projections are summarized in Table 4-3. In each case, two values are presented. One represents the projected service area demand if water use continues at the same per capita use as calculated for 2000. The other represents the demand if the District's conservation goal is achieved as discussed above.

Table 4-3
Estimated WBWCD Service Area Secondary Demands – Wasatch Front (Acre Feet)

Year	Without Conservation			With Conservation		
	Davis Area	Weber Area	Total	Davis Area	Weber Area	Total
2000	41,500	42,700	84,200	41,500	42,700	84,200
2010	54,800	63,600	118,400	50,100	58,200	108,300
2020	62,100	76,000	138,100	51,500	63,100	114,600
2030	68,400	86,700	155,100	52,900	67,100	120,000
2050	78,100	104,300	182,400	51,600	68,800	120,400
Build Out	115,500	160,500	276,000	76,200	106,000	182,200

4.6 Total Annual Demands

Total demands in the District will be the sum of potable and secondary demands and are summarized in Table 4-4. It should be noted that these are total demands in the service area and not actual District demands. To calculate District demands, member agency supplies must be subtracted from the total demand. This is discussed as part of the supply analysis in Section 5.

Table 4-4
Estimated WBWCD Service Area Total Demands – Wasatch Front (Acre Feet)

Year	Without Conservation			With Conservation		
	Davis Area	Weber Area	Total	Davis Area	Weber Area	Total
2000	89,000	86,000	175,000	89,000	86,000	175,000
2010	111,000	114,700	225,700	104,400	107,600	212,000
2020	125,300	133,500	258,800	110,500	116,800	227,300
2030	137,300	149,300	286,600	115,800	124,200	240,000
2050	155,800	175,500	331,300	118,600	130,100	248,700
Build Out	226,700	279,900	506,600	169,900	206,700	376,600

4.7 Service Area of Wasatch Back

The Wasatch Back portion of WBWCD includes Morgan County, the portions of Summit County within the District's current boundaries, and the Ogden Valley area of Weber County located along the Wasatch Back. For the study, it was assumed that the existing WBWCD service area along the Wasatch Back would remain unchanged in the future.

4.8 Population Projections

Because of its smaller existing population, the Wasatch Back did not have as much available population projection data as the Wasatch Front. As a result, detailed projections at the same level as the Wasatch Front were not possible. Instead, population projections were developed on a countywide basis for each county area in WBWCD's Wasatch Back service area through ultimate build out. Population projections were assembled in four phases:

- First, population projections between 2005 and 2060 were taken directly from county projections prepared by the GOPB.
- Second, GIS mapping tools were used to obtain the developable area using data of existing land use patterns for each county area.
- Third, the total developable land area was multiplied by a projected future population density to estimate the total potential build out population for each county.
- Finally, population projections were interpolated between the end of the GOPB projections (2060) and ultimate build out based on historic growth patterns.

Ultimate build out population was estimated for each county area based on an assumed development density of 7 persons per gross acre of developable land. This was done uniformly across all developable land along the Wasatch Back because detailed long-range planning documents did not exist for the vast majority of the study area. The assumed development density was based on the average density for residential development as observed on the Wasatch Front. Current land use patterns in the fully developed portions of the Snyderville Basin in Summit County result in a residential development density of approximately 5.5 persons per developable acre. Thus, development at 7 persons per acre appears to be a reasonable estimate for future development in other portions of the Wasatch Back. A summary of the total developable acreage and build out populations are included below in Table 4-5.

**Table 4-5
Wasatch Back - Build Out Area and Population**

County Area	Developable Land (Acres)	Build out Population
Weber	15,737	110,200
Morgan	21,398	149,800
Summit	60,313	422,200
Totals	97,448	682,200

Based on a simplified S-curve growth model and recent growth projections from the GOPB, the population of each county area in the WBWCD Wasatch Back Service Area was interpolated between 2060 and build out. Geometric growth was assumed in areas with densities less than 50 percent of build out. Arithmetic growth was assumed in areas with densities between 50 and 75 percent of build out. Above 75 percent of build out, a declining rate of growth was assumed. In each year, growth in each county was based on the mean growth rate observed for the county during the previous five years. Thus, the interpolation would be most accurate immediately after 2060 and more speculative in later years.

Following the procedures above, population projections were developed for each county area in the WBWCD Wasatch Back service area through 2150. These results are summarized in Table 4-6.

Table 4-6
Estimated WBWCD Service Area Population -- Wasatch Back

Year	Weber Area Population	Morgan Area Population	Summit Area Population	Total Population	Average Annual Growth
2005	3,600	8,500	36,300	48,400	-
2010	5,200	10,600	42,300	58,100	3.73%
2020	9,500	16,750	61,750	88,000	4.23%
2030	12,000	24,500	83,500	120,000	3.15%
2040	15,000	34,500	104,500	154,000	2.55%
2050	18,000	48,500	131,500	198,000	2.54%
2060	21,500	68,500	165,000	255,000	2.56%
2070	26,500	85,000	205,000	316,500	2.19%
2080	32,000	102,000	249,500	383,500	1.93%
2090	39,000	115,000	290,000	444,000	1.47%
2100	47,500	123,500	326,000	497,000	1.15%
2110	57,000	130,000	357,000	544,000	0.90%
2120	67,500	135,000	378,500	581,000	0.66%
2130	78,000	139,500	393,000	610,500	0.50%
2140	86,500	143,000	404,000	633,500	0.37%
2150	93,500	145,500	411,000	650,000	0.26%

4.9 Converting Population to M&I Demand

To convert population to municipal and industrial (M&I) demand, a per capita demand was estimated for the service area. Due to the large quantity of individual replacement water users and the large number of small potable water providers, accurate water use data was not available for much of the Wasatch Back region. Without reliable data, it was determined that the 2000 M&I water use rates as calculated for the Wasatch Front study area should be used as the best available estimates of future use on the Wasatch Back. Thus, an average of 252 gallons per capita per day total M&I water use was assumed for the Wasatch Back.

With per capita demands, total M&I water demand projections were developed by taking the population in the Wasatch Back for each county and multiplying it by the per capita demand. Table 4-7 presents potable demand projections for the Wasatch Back portion of the WBWCD service area in select years through build out.

In addition to supplying water to satisfy M&I demands, WBWCD must also supply water for two other types of demand: replacement water contracts (in excess of M&I demands) and wholesale deliveries to irrigation retailers. The total amount of water replacement contracts for the District is detailed in Table 3-3. Of that, it was determined that 26,310 acre-feet supplied the Wasatch Back. Irrigation contracts were summarized in Table 3-4. Wasatch Back totals for irrigation contracts were 8,942 acre-feet, or 8,048 after the 10% delivery loss.

Table 4-7
Estimated WBWCD Service Area M&I Demands – Wasatch Back (Acre Feet)

Year	Without Conservation				With Conservation			
	Morgan Area	Weber Area	Summit Area	Total	Morgan Area	Weber Area	Summit Area	Total
2005	2,405	1,015	10,245	13,664	2,405	1,015	10,245	13,664
2010	2,990	1,473	11,949	16,412	2,865	1,412	11,451	15,728
2020	4,731	2,662	17,432	24,825	4,140	2,330	15,253	21,722
2030	6,911	3,437	23,506	33,855	5,759	2,864	19,589	28,212
2040	9,715	4,274	29,540	43,528	7,691	3,383	23,385	34,460
2050	13,740	5,021	37,156	55,917	10,305	3,766	27,867	41,938
2100	34,881	13,405	92,120	140,406	26,160	10,054	69,090	105,304
2150	41,058	26,413	116,042	183,514	30,794	19,810	87,032	137,635

5.0 EXISTING AND FUTURE WATER SUPPLY

This section examines sources of supply for the District and other water suppliers within the District's overall service area. For the purpose of discussion, existing municipal water supplies have been grouped into three categories: District sources, member agency sources along the Wasatch Front, and other municipal sources on the Wasatch Back. Member agencies current demands are identified in Section 3.0 of this plan.

5.1 Wasatch Front Member Agency Sources

WBWCD is a wholesale water provider for a large number of potable and secondary retailers along the Wasatch Front. Most of these retailers have some of their own supplies in addition to the water purchased from the District. To quantify these supplies, each agency within the Wasatch Front study area was contacted to discuss their existing water rights and plans for future development. After speaking with each entity, the estimated production reported by each entity was compared against their available water rights, their projected demands, and their current contract amounts with the District. After considering all of this information, an estimate of potential source development by member agencies was developed for both potable and secondary water providers. The results of this investigation for secondary and potable water providers are summarized in Tables 5-1 and 5-2, respectively.

The projected yield of potable member agency sources is expected to increase from 45,600 acre-feet per year currently to 78,400 acre-feet per year at build out. This increase is mostly the result of new groundwater to be developed by member agencies. The projected yield of member agency sources to be used in secondary systems at build out is estimated to be 84,400 acre-feet per year. The amount currently used in secondary systems is unknown because metering data within the secondary systems does not exist. However, based on projected demands and contract amounts for secondary water from the District, it was estimated that current member agency source use in secondary systems was 29,000 acre-feet per year with the remaining amount being used for non-M&I irrigation demands. Unlike potable sources, the increase in annual secondary yield is not generally the result of the development of new sources. Instead, it primarily represents demand shifting from irrigation demand to secondary M&I demand within each secondary provider's service area.

Table 5-1
Member Agency Secondary Supplies

Supplier	Current WBWCD Contract (AF/yr)	Current Contract with Conveyance and Drought Losses (AF/yr)	Future Demand (AF/yr)	Estimated Member Agency Max Production at Build Out (AF/yr)	WBWCD Demand at Build Out (AF/yr)	Comments
Bountiful	17,500	13,020	6,936	-	6,936	Current contract in excess of demand at build out
Centerville Duel Creek	2,891	2,100	3,010	900	2,110	
Davis and Weber	-	-	20,209	20,209	-	
Hights Creek (Kaysville Irr.)	6,922	4,984	6,352	800	5,552	
Kays Creek	2,000	1,440	1,269	-	1,269	Current contract in excess of demand at build out
South Davis	3,210	2,313	1,505	-	1,505	Current contract in excess of demand at build out
South Weber	2,148	2,148	2,474	-	2,474	
Syracuse	1,000	720	12,033	6,388	5,645	"Member Agency Production" from D&W
Untreated M&I	1,390	1,390	917	-	917	
WBWCD - Retail	18,619	14,895	16,680	-	16,680	
Sub-total - Davis Area	60,010	46,127	76,200	29,995	46,206	
Hooper Irr.	5,700	4,077	13,253	9,176	4,077	Limited to water above WBWCD Contract
Pineview	9,162	6,870	44,258	37,388	6,870	Limited to water above WBWCD Contract
Roy	-	-	7,808	7,808	-	600 AF from Roy sources, other from D&W
Untreated M&I	9,480	9,480	6,257	-	6,257	
WBWCD - Retail	38,425	30,740	34,424	-	34,424	
Sub-total - Weber Area	62,767	51,167	106,000	54,372	51,628	
Total	122,777	97,294	182,200	84,366	97,833	

**Table 5-2
Member Agency Potable Supplies**

	Current Conditions		Conditions at Build Out		
	2000 Measured Production (acre-ft/yr)	Current WBWCD Contract (acre-ft/yr)	Projected Buildout Demand - With Conservation (acre-ft/yr)	Estimated Member Agency Max Production (acre-ft/yr)	WBWCD Demand (acre-ft/yr)
Bountiful Water	4,151	1,000	6,710	5,710	1,000
Centerville	1,262	500	2,616	2,116	500
Clearfield	1,802	4,380	8,228	2,650	5,578
Clinton	-	1,600	3,110	1,404	1,706
Farmington	1,325	501	5,014	4,513	501
Fruit Heights	49	445	905	10	895
Hill AFB	2,211	1,019	10,771	5,600	5,171
Kaysville	-	2,500	7,591	-	7,591
Layton	6,398	6,789	22,396	9,865	12,531
North Salt Lake	2,092	1,905	6,861	3,000	3,861
South Davis	704	360	934	574	360
South Weber	230	600	1,734	240	1,494
Sunset	-	1,400	1,513	-	1,513
Syracuse	-	1,525	6,699	1,750	4,949
West Bountiful	-	750	2,956	400	2,556
West Point	154	700	1,794	750	1,044
Woods Cross	1,043	100	3,868	2,500	1,368
Subtotal - Davis Area	21,422	26,074	93,700	41,082	52,618
Bona Vista	2,248	2,786	24,548	2,980	21,568
Hooper WID	1,411	5	12,159	3,250	8,909
North Ogden	1,293	-	3,948	3,948	-
Ogden	15,264	7,000	24,989	17,989	7,000
Pleasant View	617	-	3,091	3,091	-
Riverdale	1,496	1,100	4,107	2,944	1,163
Roy	52	3,263	4,825	1,562	3,263
South Ogden	896	785	2,749	-	2,749
Taylor-West Weber	801	450	16,620	1,450	15,170
Uintah Highlands	95	237	886	100	786
Uintah Municipal	-	358	1,407	-	1,407
Washington Terrace	-	1,000	1,371	-	1,371
Subtotal - Weber Area	24,174	16,984	100,700	37,314	63,386
Total	45,597	43,058	194,400	78,396	116,004

Wasatch Back Municipal Sources

The majority of potable water supplies currently used in public water systems along the Wasatch Back is controlled by water companies other than the District. Many of these water-providing entities have replacement water contracts with the WBWCD, but most have additional supplies outside of those provided through replacement water. Several water providing entities have no contracts with the District.

To quantify the total supplies of potable water providers and to identify supplies above those provided through District replacement water contracts, water use records were obtained for state regulated potable water suppliers. These water use records were analyzed to determine the reliable production of each public supply entity. For the larger water providers in Summit County, future projected supply production data for 2050 was taken from the Snyderville Basin Water Transport Study (BC&A, October 2006) and incorporated into the total supply estimates where available. The estimated reliable production of each potable entity on the Wasatch Back was then compared against their current contract amounts with the District to determine the potable production beyond that supplied through replacement water. An estimate of the reliable potable production of public suppliers in each Wasatch Back county area is detailed in the sections below.

- **Morgan** - As can be seen from the Table 5-3 below, the majority of public potable supply in Morgan County is provided from water sources outside of District replacement contracts.

Table 5-3
Potable Water Supplies – Morgan County Area

Potable Supplier	WBWCD Replacement Water (AF)	Other Potable Supply (AF)
Central Enterprise Water Association	50	12
Croydon Pipeline Company	-	14
Highlands Water Company	100	87
Monte Verde Water Association	26	6
Morgan City Corporation	10	775
Mt. Green Sub-Division Water Association	20	-
Peterson Pipeline Association	2	73
Richville Pipeline Company	-	21
South Robinson Spring Water Users	-	27
Wilkinson Water Company	31	137
Total	239	1,153

- **Weber** – Unlike Morgan and Summit counties, the Weber County area along the Wasatch Back has very little potable supply outside of that provided through District replacement water contracts. The breakdown of replacement water and other potable supplies for Weber area public water providers is detailed in Table 5-4 below.

Table 5-4
Potable Water Supplies - Weber County Area

Potable Supplier	WBWCD Replacement Water (AF)	Other Potable Supply (AF)
Eden Water Works Company	310	
Green Hills Country Estates	110	
Huntsville Municipal Water System	80	120
Lakeview Water Company	180	
Nordic Mountain Water Company	217	
Total	897	120

- **Summit** - Although potable suppliers in Summit County do hold sizable replacement water contracts, the majority of potable water is currently supplied without WBWCD involvement. In Table 5-5 below, it can be seen that the majority of Summit County supplies originate from three major entities: Park City, Summit Water Distribution Company, and Mountain Regional Water Special Service District (MRWSSD). It should be noted that, while 13,907 acre-feet/year will eventually be able to be supplied by Summit County providers by 2050, only 9,665 acre-feet/year is currently supplied by potable providers.

**Table 5-5
Potable Water Supplies – Summit County Area**

Potable Supplier	WBWCD Replacement Water (AF)	Other Potable Supply (AF)
Cluff Ward Pipeline Co.		27
Coalville Culinary Water		202
Community Water Company	275	15
Cool Springs Mutual Water Company	45	
Eco Mutual Water System		10
Francis Culinary Water		255
Gorgoza Mutual Water Company	1,039	417
Henefer Town	71	149
High Valley Water Company	287	
Hoytsville Pipeline Company	20	86
Kamas Culinary Water System		447
Marion Waterworks Company		86
Oakley City		763
Summit County Service Area #3	7	239
Peoa Pipeline Company		353
Questar Pipeline Co. (Coalville)		1
Stage Coach Estates	77	
Wanship Cottage Sites	10	
Wanship Mutual Water Company	44	
Wooden Shoe Water Company		11
Woodland Mutual Water Company		65
Mountain Regional Water SSD	3,789	
Park City Culinary Water	336	6,626
Summit Water Distribution	755	4,155
Total	6,755	13,907

Total Supply, Existing Public Water System

The total reliable water supplies for existing public water systems within the Wasatch Back service area are summarized in Table 5-6. The total available yield of sources from public water systems (not provided through replacement water) is estimated to be 15,180 acre-feet per year. Of this, approximately 10,937 acre-feet per year is currently in use.

**Table 5-6
Total Wasatch Back Public Water System Supplies**

County Area	WBWCD Replacement Water (AF)	Other Potable Supply (AF)
Morgan	239	1,153
Summit	6,755	13,907
Weber	897	120
Total	7,891	15,180

It should be noted that replacement water contracts currently held by public water suppliers total 7,891 acre-feet per year. This is only a small portion of the total contracted amount of replacement water on the Wasatch Back (26,310 acre-feet). The balance of the District's replacement water is being used to meet demands outside public water systems or is not yet developed. This could include uses such as irrigation, private water systems, snow making at ski resorts, incomplete development projects, etc. As M&I demand increases along the Wasatch Back, it is expected that more of the existing replacement water will be used for M&I purposes. The final quantity of replacement water ultimately available to satisfy M&I demands will be discussed in greater detail in section 6.

5.2 Existing District Sources

For planning purposes, the supplies of the Wasatch Front and the Wasatch Back regions were evaluated separately. The study divided the Weber Basin Project water between the Wasatch Front and the Wasatch Back based on discussions with District personnel, current uses, and possible future demands. With the reductions in yield as discussed previously, the dry year yield of Weber Basin Project water was divided between the study areas as summarized in Table 5-7. Dry year yield represents the expected yield of a source in the fifth year of a five-year drought based on historic District production records.

**Table 5-7
Projected Dry Year Annual Yield – Weber Basin Project Water**

Description	Annual Yield – 2000 (AF)	Annual Yield – Build Out (AF)
Total Weber Basin Project Water	206,914	206,914
Water Reserved for Wasatch Back	53,585	65,309
Dry Year Yield for Wasatch Front	153,329	141,605

As can be seen from the table, the current dry year yield of the Weber Basin Project water available for use on the Wasatch Front is 153,329 acre-feet. However, this will decrease to 141,605 acre-feet as water needs grow on the Wasatch Back.

District Storage

In addition to the reservoirs constructed for the Weber Basin Project, the District owns and operates the Smith and Morehouse Reservoir. This is a small reservoir relative to the drainage basin in which it is located. As a result, it fills completely every year, even in years with little precipitation. This results in an annual yield of 6,560 acre-feet in both dry and average water years. The District also owns 1,288

acre-feet in Echo Reservoir, bringing total District storage to 7,848 acre-feet. 100 percent of District storage water has been set aside for satisfying demands in the Wasatch Back.

District Groundwater Sources

The District owns a number of groundwater wells used for both potable and secondary service. The capacities of wells drilled and equipped using District funds were summarized in Table 2-6. District owned wells have a capacity of 51.43 cubic feet per second (cfs) or 18,612 acre-feet. Based on guidelines used in the Division of Water Rights groundwater management plan for the area, it is assumed that 50 percent of each well's maximum production capacity is available for use as reliable dry year supply. While actual water rights and physical capacity would generally allow for greater production, this lower yield is recommended for planning purposes to account for two limitations: potential mechanical failure at one or more wells; and lower demands during the winter months during which well production is not needed in the system. All District groundwater sources are designated as Wasatch Front supply, as all these wells are located within the Wasatch Front.

Weber Basin Project Groundwater Sources

In addition to wells owned by the District, the District controls a number of Weber Basin Project wells. While these wells are generally reserved to provide a backup for other Weber Basin Project facilities, they could be used to produce additional water during dry years. The capacities of Project wells were also summarized in Table 2-6. Project wells have a combined capacity of 46.6 cfs or 16,883 acre-feet. As with the District wells, annual production has been based on 50 percent of each well's maximum production capacity. All project water wells are also designated as a supply source for the Wasatch Front.

Weber River Decreed Water

The District owns a number of direct flow rights in the Weber River. These rights are summarized in Table 5-8.

**Table 5-8
Projected Annual Yield – Weber River Decreed Water**

Water Right	Projected Dry Year Yield (AF)
Weber River Decreed Rights #1, #3, and #13	2,564
Weber River Decreed Rights #14, #34, and #39	1,146
Line Creek Irrigation Company	250
Subtotal – Decreed Water Rights	3,960
Drought Year Reduction	(792)
Subtotal – Decreed Water Rights Reliable Production	3,168

For planning purposes, the District's surface water supplies have been reduced by 20% to account for potential yield reductions in drought years. The nature of these water rights may also result in some restrictions on where this water is used. It should be noted that these rights may be used as part of an

aquifer storage and recovery (ASR) program in the District. If this occurs, it will not change the total yield of these rights but will allow for more flexible use of the water during the year.

Water Stock

In addition to its own water rights, the District is entitled to a significant amount of water through stock ownership in various irrigation companies along the Wasatch Front. Table 5-9 summarizes the projected yield of water stock owned by the District. Average year yields have been based on an analysis of each irrigation company prepared by District personnel. From these values, a 20 percent reduction has been assumed for dry year yields.

**Table 5-9
Projected Annual Yield – WBWCD Water Stock**

Irrigation Company	Projected Average Year Yield (AF)	Projected Dry Year Yield (AF)
Davis & Weber Canal	16,437	13,150
North Ogden Irrigation Company	338	270
Hooper Irrigation Company	169	135
Wilson Irrigation Company	3,037	2,430
Riverdale Bench Canal Company	620	496
Subtotal – WBWCD Water Stock	20,601	16,481

Total District Water, Existing Sources

The total yield of all existing District water sources as discussed above is 243,682 Acre-feet. The total designation of District sources for the Wasatch Front as discussed above is summarized in Table 5-10, and the total yield of District water sources designated for the Wasatch Back is summarized in Table 5-11.

**Table 5-10
Projected Dry Year Annual Yield – Existing District Water Sources – Wasatch Front**

Source	Annual Yield 2000 (AF)	Annual Yield Build Out (AF)
Weber Basin Project Water (Wasatch Front)	153,329	141,605
District Wells	18,612	18,612
Project Wells	16,883	16,883
Decreed Water Rights	3,168	3,168
WBWCD Water Stock	16,481	16,481
Dry Year Yield for Wasatch Front	208,473	196,749

**Table 5-11
Projected Dry Year Total Annual Yield – Existing District Water Sources – Wasatch Back**

Source	Annual Yield 2000 (AF)	Annual Yield Build Out (AF)
Weber Basin Project Water (Wasatch Back)	53,585	65,309
District Storage (Smith and Morehouse & Echo Reservoirs)	7,848	7,848
Dry Year Yield for Wasatch Back	61,433	73,157

5.3 Future

To meet the projected future municipal demands, additional sources of supply will need to be developed within the District's service area. This includes new sources for both the Wasatch Front and Wasatch Back.

Wasatch Front Future Sources

There are several potential sources of future supply along the Wasatch Front. This includes new well development, conversion of agricultural water to municipal supply, wastewater reuse, aquifer storage and recovery, and Bear River development.

New Well Development – To meet future demands, the District is considering developing additional wells along the Wasatch Front. One issue of possible concern associated with this type of development is the State of Utah's groundwater management plan. Because the District has generally junior groundwater rights, it is recommended that the District consider any restrictions that could be imposed as part of with the groundwater management plan before committing resources to develop these sources.

Groundwater development by the District would fall into either the Bountiful or Weber Delta sub-areas of the State's East Shore management plan. Within each of these sub-areas, the State Engineer has indicated he will limit groundwater withdrawals to certain sustainable limits. Two limits have been established for each sub-area. The first is a limit on the long-term average withdrawal in the sub-area. The second is a limit on the maximum withdrawal in any single year. A comparison of existing water rights to these withdrawal limits is shown in Table 5-12. City M&I rights are based on 90 percent of the planned development of groundwater. The small reduction is to account for water rights that may be junior to those held by the District. Irrigation and private rights are based on historical withdrawals as estimated by the State. District water rights are as described previously.

As can be seen in the table, there is very little water available in the sub-areas under average year conditions. It is estimated that the Bountiful sub-area has only 813 acre-feet available while the Weber Delta sub-area already surpasses its allowance by 15,898 acre-feet. For single year withdrawals, both sub-areas have significant amounts of capacity available.

Based on these results, the District will consider carefully any amount of new groundwater development. While there may be a small amount of additional groundwater development that can

Table 5-12
Summary of Groundwater Rights by Management Area

Description	Potential Yield of Groundwater Rights – Bountiful Management Area (AF)	Potential Yield of Groundwater Rights – Weber Delta Management Area (AF)
City M&I Groundwater Rights	12,530	62,570
Irrigation and Private Groundwater Rights	5,770	13,720
Currently Developed District Groundwater Rights (including Project Wells)	5,887	29,608
Total Groundwater Rights	24,187	105,898
Management Area Withdrawal Allowance – Long-Term Average	25,000	90,000
Remaining Groundwater Rights – Average Year	813	(15,898)
Management Area Withdrawal Allowance – Maximum Year	30,000	120,000
Remaining Groundwater Rights – Maximum Year	5,813	14,102

occur, the District will need to consider how this water will be used. It is likely that additional water developed in these areas will be available for use only occasionally and will need to be offset by reduced water use in other years.

While some additional development may still be recommended for redundancy or conveyance reasons, this report assumes that future groundwater development will result in no additional reliable supply to the District. Furthermore, it is recommended that the projected groundwater yield of the District and its member agencies be reduced by 15,085 acre-feet to account for potential future restrictions associated with the State's groundwater management plan.

Conversion of Agricultural Water to M&I – In its most recent Weber Basin River Plan, the State estimated that agricultural water use in Weber and Davis counties for the year 2000 was 236,000 acre-feet. Of this, it was estimated that 218,000 acre-feet were used within the service area of the District along the Wasatch Front (with the remaining 18,000 acre-feet being used in Weber County and the Wasatch Back). Sources of this irrigation water can be grouped into three major categories: District sources, irrigation companies with secondary service, and irrigation companies without secondary service.

- **District Sources** – The District currently has a contract to provide 68,300 acre-feet of water to irrigation companies on the Wasatch Front. Of this amount, it is estimated that 44,300 is used to satisfy M&I secondary demands. This means the remaining 24,000 acre-feet of water use is currently used for agricultural irrigation purposes.
- **Irrigation Companies with Secondary Service** – While a few of the secondary water providers in the District provide water for only M&I demands, most include agricultural irrigated area as well as M&I secondary demands. The projected yields of these companies for both average and dry year conditions are summarized in Table 5-13. The values in the

table are based on estimates provided to the District from the individual irrigation companies. It is estimated that about 29,000 acre-feet is required from these sources to satisfy M&I secondary demands with the remaining amount used for agricultural irrigation.

Table 5-13
Projected Annual Yields for Irrigation Companies with Secondary Service

Irrigation Company	Projected Average Year Yield (AF)	Projected Dry Year Yield (AF)
Benchland (FAPID)	8,000	6,400
Centerville-Deuel Creek	2,600	900
Davis & Weber Canal	36,493*	26,611*
Haight's Creek	1,000	800
Hooper Irrigation	36,400	27,500
Kayscreek	1,600	800
Pineview Water Systems	44,200	44,200
Roy Water Subconservancy	600	600
South Davis	200	50
South Weber	0	0
Syracuse	0	0
Total – All Water	131,093	107,861
<i>Less: M&I Secondary Water</i>	<i>(29,000)</i>	<i>(29,000)</i>
Total – Irrigation Water	102,093	78,861

*Actual estimated Davis and Weber Canal yield is 41,493 AF in average years and 31,611 AF in dry years. Totals have been reduced to account for water projected to be transferred to the Wasatch Back for the East Canyon Project (5,000 AF).

Table 5-14
Projected Annual Yields for Irrigation Companies without Secondary Service

Irrigation Company	Projected Average Year Yield (AF)	Projected Dry Year Yield (AF)
Plain City Canal	2,692	2,150
South Weber Canal	1,745	1,410
Riverdale Bench Canal	1,350	980
South Slaterville Canal	4,074	2,800
Warren Irrigation Company	12,525	10,500
Wilson Canal	13,369	9,800
Holmes Creek	1,200	1,000
Marriott Irrigation Company	2,328	1,487
Lynn Ditch	5,149	3,702
Western Irrigation Company	10,590	8,832
Mound Fort	1,217	771
North Ogden Canal	6,979	5,480
North Slaterville Canal	2,640	2,100
Plain City Canal	4,782	3,900
South Ogden Canal	8,298	5,562
Misc. Minor Weber River Canals ¹	3,947	3,158
Misc. Minor Ogden River Canals ¹	1,434	1,147
Total	84,319	64,779

¹ Misc. minor canals include: Old Wilson, Pioneer, Uinta Central, Bybee, Cliff Heslop, Enoch Farr, Glenwood, and Upper Club.

- **Irrigation Companies without Secondary Service** – In addition to the secondary water providers in the District, there are a large number of additional irrigation companies that exist solely to satisfy agricultural irrigation demands. The projected yield of these companies for both average and dry year conditions is summarized in Table 5-14. The values in the table are based on historical yield records from the Division of Water Rights.

The total of irrigation yields for all three categories is summarized in Table 5-15. A large part of the increasing M&I demands discussed herein will be the result of converting currently agricultural irrigated land to residential and commercial development. It is therefore logical that a significant part of the projected demand would be satisfied through the conversion of agricultural water to M&I supply. If it is assumed that 75 percent of all agricultural irrigation water will be converted to M&I supply at build out, this results in 125,775 acre-feet of new dry year supply.

**Table 5-15
Total Irrigation Production for the District’s Wasatch Front Service Area**

Description	Projected Average Year Yield (AF)	Projected Dry Year Yield (AF)
WBWCD	24,000	24,000
Irrigation Companies with Secondary Service	102,100	78,900
Irrigation Companies without Secondary Service	84,300	64,800
Total	210,400	167,700

It should be noted, however, that a large portion of this supply has already been accounted for in two of the other sources noted previously:

- **District Water Sources:** While District supply may convert from one type of use to another, this will not represent a new source to the District above and beyond those already discussed. Instead, this conversion is simply a different way of using the same water. As a result, 24,000 acre-feet of agricultural conversion has already been accounted for under District water sources.
- **Secondary Service Providers:** Since a significant number of irrigation companies already provide secondary service, it will be relatively easy for them to convert water service from agricultural irrigation to M&I as currently irrigated properties in their service areas develop. In calculating the yield of member agency supplies, it was assumed that the amount of water use from irrigation company supplies would increase from 29,000 acre-feet to 84,400 acre-feet. As a result, 55,400 acre-feet of agricultural conversion has already been accounted for under member agency water sources.

With these two quantities removed, the total amount of additional water available for agricultural irrigation conversion is summarized in Table 5-16.

**Table 5-16
Conversion of Agricultural Water to M&I**

Description	Projected Reliable Yield (AF)
Total Irrigation Water	167,700
Irrigation Water to be converted to M&I (75% of total)	125,775
District Water Sources	(24,000)
Secondary Service Providers	(55,400)
Remaining Available Ag. Water Conversion	46,375

Wastewater Reuse – WBWCD is actively pursuing opportunities for wastewater reuse. Based on preliminary discussions with each of the major wastewater treatment plants within the District, potential reuse projects could result in the following volumes of additional water supply:

- South Davis WWTP = 1,500 acre-feet
- Central Davis WWTP = 2,000 acre-feet
- North Davis WWTP = 1,500 acre-feet
- Central Weber WWTP = 3,000 acre-feet
- **Total = 8,000 acre-feet**

This water would be used in existing secondary systems and would yield the same amount of water in both dry and average water years.

Aquifer Storage and Recovery – Another potential new source of water for the District is the ASR program. Excess runoff during the early spring months could be treated and injected into the ground for removal later in the season or in a subsequent year. As noted previously, most of the rights used for this program will come from decreed Weber River rights. As such, the ASR program would not enlarge these rights but would allow the District more flexibility in when the rights were used.

There is a small amount of new water that would be created as a result of the ASR program. During periods of peak runoff, some District water is currently unusable because it is available in excess of system demands. This water will become available through the ASR program if it can be stored during peak runoff and then recovered during a period of greater demand. District personnel indicate that the estimated yield of the District's future ASR project will be 5,000 acre-feet. Since 2,851 acre-feet of this is already accounted for as decreed Weber River water, this represents an additional supply of 2,149 acre-feet.

Bear River Development – The final potential new source the District is exploring is development of additional surface water from the Bear River. As part of the Bear River Development Act in 1991, the District was allocated up to 50,000 acre-feet of water from the Bear River.

Wasatch Back Future Sources

There are also a few potential sources of future supply along the Wasatch Back including conversion of agricultural water to municipal supply, and additional water import projects.

Conversion of Agricultural Water to M&I

A large part of the future growth along the Wasatch Back will occur by converting irrigated land into residential and commercial developments. As a result, the future M&I demands of the Wasatch Back will likely not be able to be met without the substantial conversion of agricultural water to M&I supply.

The Wasatch Back has over 100 irrigation water retailers and wholesalers. Due to the large amount of individual and small irrigation water companies, it was very difficult to assemble accurate water use and supply data for each irrigation entity within the region. As a result, the report relied on estimates of Wasatch Back irrigation production as presented in the most recent version of the Weber River Basin Plan as prepared by the State of Utah Division of Water Resources (July 2004). In this report, the State estimated that agricultural water use in Morgan, Summit and Weber counties for the year 2000 was 282,400 acre-feet. Of this, it is estimated that 155,500 acre-feet of agricultural water was used within the service area of the District along the Wasatch Back (with the remaining 126,900 acre-feet being used in Weber County on the Wasatch Front). A summary of irrigation supply estimates for each county in the Wasatch Back service area is given below in Table 5-17.

Table 5-17
Total Wasatch Back Service Area Irrigation Production (AF)

County Areas	Average Year Irrigation Supply	Dry Year Supply (20% reductions)	WBWCD Irrigation Contracts	Total Dry Year Other Irrigation Company Supply
Morgan	35,100	28,080	2,354	25,726
Weber	18,000	14,400	4,620	9,780
Summit	102,400	81,920	1,074	80,846
Total	155,500	124,400	8,048	116,352

As can be seen in the table, not all of the 155,500 acre-feet of irrigation water can be considered available to meet M&I demands. This total has been reduced to account for two factors:

- **Drought Year Reduction** – The reported value of 155,500 acre-feet of available irrigation water is for average water year conditions. To account for potential yield reductions in drought years, this total was reduced. While the actual reduction will vary depending on the severity of the drought, the study assumed a total dry year yield reduction of 20 percent, which is consistent with the assumption used for District irrigation company water stock.
- **District Water Sources** – A portion of the irrigation water used on the Wasatch Back is the result of irrigation contracts with the District. Since this water is accounted for as part of the District's project water, it cannot count again as an available irrigation source. As a result, the available irrigation production for the service area was reduced by 8,048 acre-feet.

Another issue that could potentially affect the yield of irrigation production would be "haircuts" imposed by the State Engineer relative to the conversion of the irrigation rights to municipal use. However, based on the State Engineer's recommended rates of depletion, the actual depleted water by

irrigation use and by residential municipal use is approximately equal as long as reuse does not occur.¹ Thus, no reductions in irrigation yield associated with water right haircuts have been included in this report.

Water Import Projects

In addition to the existing sources in the Wasatch Back, there are two projects currently under construction that will affect the overall water supply in the District's Wasatch Back service area:

- **Lost Creek Canyon Project** – The District (in conjunction with Park City and Mountain Regional Special Service District) is nearing completion of a new diversion, pipeline, and pump station that will bring 5,000 acre-feet of water from Rockport Reservoir to the Snyderville Basin area. It should be noted, however, that all of this water will come from District supplies. As a result, it represents a new supply to satisfy M&I demands on the Wasatch Back but does not add to the overall supply in the District's water sources since any water used through the project will come from District project water or storage water as noted above. For the purpose of the report, it was assumed that all water from this project was available for use beginning in 2010.
- **East Canyon Project** – Another project currently under consideration is the East Canyon Project. Portions of this project have already been constructed by Summit Water Distribution Company based on initial plans that called for an ultimate capacity of 12,500 acre-feet. More recent studies and estimates indicate the yield of this project will be slightly lower. For the purposes of the report, it was assumed that the project's ultimate yield would be 10,000 acre-feet. The first 5,000 acre-feet of this water would come from irrigation shares currently held by the Davis and Weber Canal Company on the Wasatch Front. The source for all additional water for the project is currently unknown. For the purpose of the report, it was assumed all additional water would also come from District stock water rights on the Wasatch Front. Since this water is being imported from outside the study area it represents a real increase of 10,000 acre-feet to the total supply of the Wasatch Back.

TOTAL SUPPLY

The projected production for the Wasatch Front and Wasatch Back study areas as described above is summarized in Tables 5-18 and 5-19. For long-term supply planning, the amount of water available to satisfy District demands will need to be reduced for conveyance and system losses. The demands calculated in this report are demands at the point of delivery for each member agency. To account for conveyance and system losses within the District's system, the total dry year yield has been reduced by 10 percent for Weber Basin Project water, Weber River decreed water, and WBWCD water stock.

5.4 Total Supply

The projected production of each category of supply described above is summarized in Table 5-18 and Table 5-19.

Table 5-18
Wasatch Front Projected Dry Year Annual Yield – All Water Sources

Source	Annual Yield 2000 (AF)	Annual Yield Build Out (AF)
Member Agency Potable Sources	45,600	78,400
Member Agency Secondary Sources	29,000	84,400 ¹
WBWCD Sources, Wasatch Front	208,473	196,749 ¹
Potential Groundwater Management Plan Restrictions	0	(15,085)
Additional Agricultural Water Conversion	0	48,025 ¹
Wastewater Reuse	0	8,000
Aquifer Storage and Recovery	0	2,149
Bear River	0	50,000
East Canyon Project	0	(5,000)
Conveyance/System Losses	(17,298)	(16,126)
Dry Year Yield for Wasatch Front	265,775	431,512

¹ Total agricultural water conversion is 125,775 acre-feet. This includes 24,000 acre-ft from WBWCD sources, 55,400 acre-ft from member agency sources, and 48,025 acre-ft from other irrigation companies.

Table 5-19
Wasatch Back Projected Dry Year Annual Yield – All Water Sources

Source	Annual Yield 2000 (AF)	Annual Yield Build Out (AF)
WBWCD Sources, Wasatch Back	61,433	73,157
Other Municipal Water Supplies	10,937	15,180
Additional Agricultural Water Conversion	116,352 ¹	116,352 ¹
Lost Creek Canyon	0	0 ²
East Canyon Project	0	10,000 ³
Conveyance/System Losses	(5,358)	(6,531)
Dry Year Yield for Wasatch Back	183,364	208,158

¹ Total dry year irrigation water is 124,400 acre-ft. The total in this table has been reduced to account for 8,048 acre-ft already included under WBWCD sources.

² The Lost Creek Canyon Project will create 5,000 acre-ft of additional M&I supply. However, all of this amount will come from WBWCD sources, resulting in no net increase in Wasatch Back supply.

³ Assumes all East Canyon water will come from sources imported from outside the Wasatch Back service area. 5,000 acre-ft comes from the Davis and Weber Canal Company, and 5,000 acre-ft comes from WBWCD sources on the Wasatch Front.

6.0 ANNUAL SUPPLY AND DEMAND EVALUATION

The purpose of this chapter is to evaluate the adequacy of District supply relative to projected demands in the WBWCD service area for both potable and secondary service. As part of this evaluation, a water supply plan will be developed to guide the District in decisions regarding future source development.

6.1 Secondary Water Considerations

One unique aspect of the District that presents a challenge in planning future supplies is the large amount of water held by private secondary water providers in the District. Many of the District's secondary water providers are private companies. This makes it very difficult to predict what areas they

will be willing to serve in the future and how cooperative they will be relative to the state's water conservation goal. As a result, outside water held by secondary providers becomes a large, variable supply over which the District has little or no control.

To best estimate the future supply from secondary providers, the District has tried to consider all of the variables that will affect conversion of this water. The best scenario, in terms of full and efficient use of water from private secondary providers, would require the following conditions to occur:

- All secondary providers would need to achieve the long-term conservation goal of the 34 percent reduction from 2000 per capita water use.
- Some existing secondary providers currently have adequate water resources of their own to serve existing demands. As demands decrease as the result of conservation, these providers would need to expand their service areas as necessary to fully use their available resources. In some cases this is only a small increase in additional service area (Bountiful, Kayscreek, etc.), in others it is substantial (Pine View, Davis & Weber, Hooper Irrigation, etc.).
- With the reduction in water demand due to conservation, some existing water providers will have more water than needed, even after they expand their service boundaries. In these cases, the water provider would need to reduce their contracts with the District to their actual need to free up this extra water for other users.

There are many reasons why the ideal conditions listed above will be difficult to achieve:

- Nearly all of the secondary water in the District is currently provided through unmetered connections at a flat fee. This means there is no incentive for customers to conserve.
- Because most of the secondary providers are private companies, they have no accountability to the State relative to its current conservation goal. Thus there is no incentive for them to add meters to their connections or implement other changes to encourage conservation. Since most are not municipalities, there is also no requirement that they expand their service areas. They have complete freedom to close their boundaries to expansion and use as much water as they have in the past, with little incentive to do otherwise.
- The best case scenario listed above would require secondary water providers to expand their service area without obtaining new water, or even give back some of their currently contracted water to the District. Making this happen will take a major policy shift among the secondary providers. In the past, these providers have been very reluctant to pursue any action that would result in less available water to their users, even if our analysis suggests they have more than enough.

With the factors listed above in mind, the District's supply plan should be based on the following assumptions regarding water from secondary providers:

- It is recommended that the plan ultimately include 100 percent of the secondary water controlled by private providers as available supply to meet future demands with conservation (i.e. best case scenario). While providers may be reluctant to share this water initially, future

demands are such that political pressure and economic incentives should ultimately combine to motivate full use of this resource.

- Based on the difficulties associated with accessing this water, it is recommended that the supply plan convert this water very slowly. Its availability will likely lag significantly behind increases in demand.

It should be noted that potable water held by member agencies is also a significant supply outside of District control but is far more predictable than secondary water. This is because nearly all of the potable water providers in the District are municipalities. This makes their service area more predictable because they are largely tied to municipal boundaries. It also makes compliance with the State's conservation goal more likely.

6.2 Supply Plans

The following sections discuss how future sources would need to be developed under the "best case" and "worst case" scenarios described above.

Best Case Scenario

The District satisfies a significant amount of irrigation demand. This irrigation demand was estimated based on the difference between the amount of water actually contracted by secondary water providers and the calculated M&I demand. This irrigation demand will be reduced over time but will not disappear completely. Even at build out, it is expected that there will be a small amount of irrigation demand on the District. A summary of the supply development assumptions used is included in Table 6-1.

The best case scenario depends on significant growth in the use of supplies from secondary water providers. This and the conversion of agricultural water will allow Weber Basin Project water to be removed from secondary usage and transferred to potable use. This in turn allows projected potable demands to be satisfied from existing sources for many years, delaying all of the new potable supply projects until 2055 and later. A summary of required supply development based on this scenario is included as Table 6-1.

Wasatch Front Supply Plan Conclusions

Based on the assumptions, several conclusions can be made regarding future District water supplies:

- The District faces significant growth along the Wasatch Front in the future. To meet growing demands, the District must be proactive in the acquisition and development of reliable water sources. This will eventually need to include the development of the Bear River.
- Even with the full development of all sources currently being considered by the District, supply will be inadequate to meet projected demands without conservation. Therefore, conservation must be an essential component of the District's supply plan.
- The water supply plan depends on significant agricultural water conversion and growth in the use of supplies from secondary water providers. This and the reduction in existing demand

**Table 6-1
Wasatch Front Service Area Supply Plan**

Supply Source	Year	Dry Year Yield (acre-ft/yr)	Assumptions
Potable Sources			
Member Agency Sources (Potable)	2000	45,600	Based on historic production records Linear growth in source yield Estimated maximum production based on member agency water rights and production capacity with a proportional reduction for potential groundwater restrictions
	2001-2149	Increasing	
	2150+	67,433	
Weber Basin Project	2000	34,499	25% of available project water (percentage based on current portion of project sales for M&I use) Project water transferred from secondary to potable service as possible Totals include 10% reduction for system conveyance losses.
	2001-2149	Increasing	
	2150+	76,745	
Decreed Weber River Water Rights	2000+	2,851	Projected dry year yield of existing decreed water rights less 10% conveyance losses
Existing District and Project Wells	2000+	29,705	Projected dry year yield of existing District and Project potable wells Proportional reduction based on potential groundwater restrictions
	2001-2049	Decreasing	
	2050+	25,589	
Aquifer Storage and Recovery	2030+	2,149	New water yielded by ASR project above base yield of rights without ASR
Bear River	2040-2109	25,000	Projected Phase 1 Yield Maximum yield allocated by the Utah Legislature
	2110+	50,000	
Secondary Sources			
Member Agency Sources (Secondary)	2000-2010	29,000	Based on historic production records Linear growth in source yield Estimated maximum production based on member agency water rights and production capacity
	2011-2149	Increasing	
	2150+	84,400	
Existing District Wells	2000+	5,790	Projected dry year yield of existing District irrigation wells
Water Stock	2000+	14,833	Projected dry year yield of existing District Water stock less 10% conveyance losses. 5,000 acre-ft is removed in 2,500 acre-ft increments beginning in 2030 and again in 2040 for the East Canyon Project.
	2030, 2040	Decreasing	
	2150+	9,833	
Weber Basin Project	2000	103,497	75% of available project water (percentage based on current portion of project sales for irrigation use) Project water transferred from secondary to potable service as possible. Totals include 10% reduction for system conveyance losses.
	2001-2149	Decreasing	
	2150+	50,700	
Conversion of Agricultural Water	2011-2099	Increasing	Growth in source yield proportional to growth in demand Max. yield based on converting 75 percent of existing ag. water in Davis and Weber Counties. Total does not include converted water already accounted for in other District or member agency sources
	2150+	48,025	
Wastewater Recycling	2020-2029	4,000	Projected Phase 1 Yield Current planned maximum yield based on preliminary discussions with wastewater districts
	2030+	8,000	

through conservation will allow Weber Basin Project water to be removed from secondary usage and transferred to potable use.

- Because the supply plan is very dependent on agricultural and secondary water conversion (sources outside of the control of the District), the required development dates of future supply projects are very volatile. Depending on how agricultural and secondary water is used, the District could need the Bear River project much earlier than the current planning date of 2040. Other operational scenarios considered by the District indicate that the project could be needed as early as 2020 if agricultural and secondary water conversion lag significantly behind what has been assumed here.
- To postpone development of additional potable sources, the District will need to transfer the use of Weber Basin Project water from secondary to potable use. This will only be possible if the District can reduce existing secondary demand through conservation.

Wasatch Back Supply Plan

As discussed above, the Wasatch Back supply and demand evaluation was approached from two perspectives: municipal and industrial demand for the study area as a whole and demand on WBWCD alone.

Wasatch Back Service Area M&I Supply and Demand Evaluation

The supply available to meet the M&I demands of the Wasatch Back include the following sources:

- **Potable Supplies By Others** – As documented in Chapter 3, existing public water suppliers provided an estimated 10,937 acre-feet of water to satisfy M&I demands. For the purposes of this report, it has been assumed that these suppliers will develop their remaining water rights (up to a total of 15,180 acre-feet) by the year 2050.
- **WBWCD Replacement Water** – The District has 26,310 acre-feet of replacement water contracts in the Wasatch Back service area. Unfortunately, it is estimated that only a small portion of this is currently being used to satisfy M&I demands. Contracts with public water suppliers only account for 30 percent (7,891 acre-feet) of the existing replacement water. Of the 7,891 acre-feet of water contracted to public water suppliers, it is approximated that only 4,292 is currently being used to meet annual M&I demands. The exact nature of use of the balance of the replacement water is unknown, but it is believed that it is being used for non-municipal purposes or has not yet been developed. Over 73% of all the replacement water is held in contracts greater than 50 acre-feet, with approximately half of all the replacement water being held in contracts greater than 200 acre-feet. It is believed that large portions of these sizeable replacement water contracts were secured in speculation of future development and are currently underutilized by water providers.

This is expected to change over time. While a small portion of the replacement water will never be used for M&I purposes, the majority will eventually be converted to M&I use. Of the current replacement contracts it is estimated that approximately 4,600 acre-feet is used for snow making or other uses that will not be available for municipal supply through build out. For the report, it was assumed that the

remaining 21,720 acre-feet of the existing replacement contracts will gradually be made available to M&I supply as demands increase in the region.

- **Import Water Sources** – The Lost Creek Canyon and East Canyon import projects will develop significant additional water for M&I use in the Wasatch Back service area. Based on plans provided by the project developers, the report assumed 5,000 acre-feet from Lost Canyon beginning in 2010, and 5,000 acre-feet from East Canyon developed in 2,500 acre-feet increments beginning in 2030 and again in 2040.
- **Irrigation Sources** – The largest potential source of water in the Wasatch Back study area is irrigation water. This presents a challenge in planning future M&I supplies because this source is held by a large number of private irrigation providers and individuals. This makes it very difficult to predict how cooperative these entities will be to the conversion of agricultural water to M&I use as land use patterns change in the Wasatch Back. As a result, water held by irrigation providers becomes a large, variable supply over which the District has little or no control.

A summary of the supply development assumptions and values used to generate the assumptions is included as Table 6-3.

Wasatch Back Service Area Supply Plan Conclusions

Several conclusions can be made regarding the Wasatch Back M&I supplies:

- The Wasatch Back service area faces significant growth in the future creating a large demand on existing sources. Fortunately, enough water exists to meet projected long term demands if irrigation water is converted to M&I supply. To delay the timing of irrigation water conversion, all providers in the region must be proactive in the efficient and full use of each source. Although efficient use of WBWCD sources is essential, much of the supplies in the Wasatch Back are outside District Control.
- Total water supplies available on the Wasatch Back are adequate to meet projected water demand, even without further conservation. However, to postpone the need for new water sources, conservation should be an essential component of the supply plans of all providers in the Wasatch Back.
- The use of existing WBWCD replacement water contracts as M&I supply is critical to the overall supply plan for the Wasatch Back. However, current replacement water contracts appear to be far in excess of actual demands. The District should be proactive in encouraging existing contracting entities to make existing unused replacement water available as M&I supply.
- With the achievement of state conservation goals and the development of the Lost Canyon and East Canyon projects, District water and existing supplies on the Wasatch Back will be sufficient to meet projected M&I demands for the foreseeable future. To meet ultimate demands, however, significant conversion of agricultural water to M&I supply or development of another source will be required. While the need for irrigation conversion may not be immediate, the District should begin working with irrigation providers as possible to facilitate the conversion of irrigation water rights to M&I supply as irrigated parcels are developed.

**Table 6-3
Wasatch Back Service Area M&I Supply Plan**

Supply Sources	Year	Reliable Yield (Ac-Ft/Yr)	Assumptions/Notes
Potable Providers (Others)	2005	10,937	Based on historic water use records
	2005-2050	Increasing	Assumed linear growth in source yield
	2050+	15,180	Projected potable providers reliable future supply
WBWCD Replacement Water as M&I Supply	2008	4,292	WBWCD replacement water currently used to satisfy M&I demands
	2008-2150	Increasing	Gradual increasing of the use of existing replacement contracts for M&I supply
	2150+	21,720	Maximum expected use of existing replacement water contracts towards M&I supply
Lost Canyon Project	2010+	5,000	Additional M&I water through the WBWCD supply of the Lost Canyon Project
WBWCD Additional Water Sales as M&I Supply	2008-2150	Increasing	Gradual increasing of additional water sales for M&I supply
	2150+	22,728	Maximum additional water sales based on available District supply
East Canyon Project	2010	2,500	New Water Yield from Phase 1 - Davis and Weber Canal Company
	2020	5,000	New Water Yield from Phase 2 - Davis and Weber Canal Company
	2030	7,500	New Water Yield from Phase 3 - Assumed Davis and Weber Canal Company
	2040	10,000	New Water Yield from Phase 4 - Assumed Davis and Weber Canal Company
Irrigation Water Conversion or other supply	2067 - 2150	Increasing	Conversion of agricultural water to M&I supply
	2150 +	60,508	Projected conversion of agricultural water required to meet M&I demands

- With the development of the planned Lost Canyon and East Canyon projects, the overall supply plan indicates projected supplies will be adequate to meet demands through 2065 without the conversion of irrigation water to M&I supply. Unfortunately, this does not account for the spatial availability of water supplies. Since the Lost Canyon and East Canyon projects service only the Snyderville Basin portion of Summit County, it is likely that this area will have a surplus of water for some time while irrigation water conversion may be needed sooner in other parts of the Wasatch Back service area.

WASATCH BACK SUPPLY AND DEMAND EVALUATION – WBWCD SOURCES ONLY

The evaluation of the Wasatch Back presented above is based on looking at the service area as a whole. To get another perspective of supply and demand on the Wasatch Back, this section looks at demand on the District alone.

WBWCD Wasatch Back Demand

Demand on the District is strictly determined by its contractual obligations, not actual demands. Contractual obligations of the District include the following:

- **Irrigation Water Contracts** – The District supplies water to a number of irrigators on the Wasatch Back. The total demand at the point of delivery associated with these contracts is 8,048 acre-feet.
- **Replacement Water Contracts** – Regardless of how much of its contract water is actually being used to meet M&I demands, the District must release the amount of each contract that is consumed, between 30-50% of the full contract. Replacement water contracts totaled 26,310 acre-feet as of January 2008.
- **Lost Canyon Project** – All 5,000 acre-feet for the Lost Canyon Project will come from the District. While this project represents a new supply for the service area, it is a demand for the District.
- **East Canyon Project** – It has been assumed that the final phases of the East Canyon Project will be supplied with water from the District. Similar to the Lost Canyon Project, this 5,000 acre-feet represents an additional demand for the District.
- **Additional District Water Sales** – Additional water sales are based on available District sources beyond existing contracts less 10 percent conveyance losses. The WBWCD currently has 16,717 acre-feet of water available for future replacement water sales or other sales within the Wasatch Back (in addition to the Lost Canyon Project). As supplies are transferred from the Wasatch Front to the Wasatch Back, the available District supply available will gradually increase to 27,268 acre-feet at build out.

WBWCD Wasatch Back Supply

Supplies available to meet these demands include the Weber Basin Project water reserved for use on the Wasatch Back and District storage. A summary of the supply development assumptions and values used to generate the assumptions is included as Table 6-4.

**Table 6-4
Wasatch Back M&I Supply Plan (District Sources Only)**

District Sources	Year	Reliable Yield (AF/Yr)	Assumptions/Notes
Weber Basin Project Water:	2008	48,227	Existing Project Water designated for the Wasatch Back, less estimated conveyance losses
	2010 - 2150	Increasing	Gradual Project Water transfer from Wasatch Front
	2150 +	58,778	Maximum Project Water designated for the Wasatch Back, less estimated conveyance losses
WBWCD Storage	2005 +	7,848	Annual storage capacity of Smith and Morehouse, and Echo Reservoirs

District Demands	Year	(AF/Yr)	Assumptions/Notes
Replacement Water	2005	19,535	Previous replacement contracts
	2008 +	26,310	Existing Replacement Water Contracts
WBWCD Irrigation	2005 +	8,048	Existing point of delivery Irrigation Contracts
Lost Creek Canyon Project	2010 +	5,000	Dedication of District supplies to the Lost Creek Canyon Project
East Canyon Project	2030	2,500	Dedication of District supplies to Phase III and
	2040 +	5,000	Phase IV of the East Canyon Project
WBWCD Additional Water Sales	2008-2150	Increasing	Gradual increasing of additional water sales
	2150 +	27,268	Maximum additional water sales based on available District supply
M&I demand (With Conservation)	2067-2150	Increasing	M&I demand if conservation goals are met
	2150 +	60,508	Projected unmet M&I demand with conservation
M&I demand (No Conservation)	2053-2150	Increasing	Additional M&I demand if conservation goals are not met
	2150 +	45,878	Additional Projected M&I demand with no conservation

Wasatch Back District Supply Plan Conclusions

Several conclusions can be made regarding District water supplies:

- While the Wasatch Back region as a whole has sufficient water to meet demands through build out, the majority of future municipal and industrial supply is outside of District control.
- Even with the full achievement of State conservation goals, projected M&I demands will place the District in a position of a large demand deficit before 2070. As discussed in the overall service area plan, much of the future M&I demands will need to be satisfied through the conversion of irrigation water. The District should consider enacting policies to acquire any available irrigation water rights associated with irrigated parcels that undergo development.
- The significant growth expected in the Wasatch Back has and will continue to add substantial demands on existing District sources. To reduce the projected demand deficit the District must be proactive in the efficient and full use of its sources.
- The District supply plan is very dependent on the rate of transfer of Weber Basin Project Water from the Wasatch Front to the Wasatch Back. Projected District deficits within the Wasatch Back will place a large demand on the supplies of the Watch Front. The District should take care that future water sales do not result in supplies being used in the Wasatch Back that have been reserved for the Wasatch Front.
- The replacement water program presents a large demand on District supplies while much of the water is not immediately used to satisfy M&I demands and large portions of existing contracts may be unused altogether. The District should consider possible modifications to the replacement program that will encourage full and efficient use of existing contracts before additional water sales are made.
- The rate of replacement water sales over the last several years has far outpaced demand. Since 2004 the District has dramatically increased the volume of replacement water contracts from 17,968 acre-feet to a total of 26,310 acre-feet in 2008. This includes nearly 4,700 acre-feet of replacement water sold in 2007 alone. If water sales continue at the same rate as the previous five years, the District will exhaust the water available for additional sales in the Wasatch Back by the year 2016. The amount of remaining District supply available for additional sales through build out would then be dependent on the slow rate of Project Water transferred from the Wasatch Front to the Wasatch Back.
- If additional water sales could be limited by the District to be more in pace with increases in demand, WBWCD Wasatch Back supplies could last until approximately 2050. There are assumptions that future water sales would be limited to approximately 430 acre-feet per year. If future water sales are in excess of this assumed rate, WBWCD will exhaust the Wasatch Back supplies earlier than planned.
- It should be noted that the supply plan does not consider the potential spatial variations of District demands (water contracts) relative to overall M&I demand throughout the entire Wasatch Back. For purposes of the report it was assumed that full and efficient cooperation between all water supply

entities can be achieved. If cooperation is less than full, it is likely that demand deficits on the District will be greater and occur sooner.

6.3 Future Supply Development Actions

Based on the analysis and observations presented above, it can be concluded that there is a sufficient amount of existing water in the District's service area to meet projected demands for some time. The problem with much of this water is that it is currently being used for secondary and irrigation purposes and is outside the control of the District. As an overall supply strategy for the District, the District will encourage conservation and increased efficiency in secondary water use and that the water savings from these activities be used to meet future demands. To accomplish this overall plan the District has and will continue to follow the specific actions below:

Wasatch Front Recommendations

1. **Promote conservation.** Even with the development of new sources, the District will be unable to meet projected demands without conservation. The District will pursue the State's conservation goal so that long-term demands will not exceed available supplies.
2. **Develop a plan to encourage the efficient use of secondary water by wholesale customers.** Two scenarios are shown that show drastically different new water needs for the District. The major difference between these scenarios is how secondary water sources currently controlled by entities other than the District are used. While the District does not have ultimate control over any of these sources, it can implement policies and programs that will encourage the efficient use of this water. To do this, the District will promote the following:
 - Encourage secondary water providers to extend service to the boundaries determined. By extending their boundaries, the secondary water providers will see increased demands that will naturally increase their use of any existing supplies that may be underutilized. Along this line, the District shall encourage all new development seeking secondary service to first pursue service from one of its existing wholesale secondary customers. Only as a last resort will retail secondary service be provided by the District.
 - Limit new water sales to existing secondary providers. Most of the secondary water providers in the District already have enough water through a combination of their own sources and existing contracts with the District to meet projected demands for the service areas assumed by the District's study. Limiting sales to these providers will result in a natural increase in their use of existing sources as demands increase in their systems. The exceptions to this recommendation are Hights Creek Irrigation and Syracuse City. If these entities expand to serve the areas assumed in the study, they will need additional water from the District to meet projected demands.
 - Renegotiate contracts with secondary providers as much as possible to reduce contract amounts to volumes consistent with projected demands. A few entities currently have contracts in excess of projected demands through build out (Bountiful Water District and South Davis County Water Improvement District). Several more have contracts that may be appropriate now, but will become excessive as conservation and agricultural conversion occurs in the future (Benchland Irrigation, Hooper Irrigation, Kayscreek Irrigation, and Pineview Water Systems).

The District will pursue opportunities to renegotiate these contracts so that their annual yield is consistent with actual demands.

- Part of the reason for these excess contract amounts may be the District's current policy of reducing irrigation contract yields in drought years. It appears that some entities may be contracting for more water than they actually need to offset potential drought year reductions. If the District could renegotiate the contracts based on a firm yield without drought year reductions, the total volume of contracted water could likely decrease.
 - Encourage conservation in secondary water systems. Conservation in secondary systems will be a critical component of the District's plan to meet future demands. While much of the secondary demand is outside of the District's control, it will endeavor to implement policies and programs to encourage conservation where possible. This will include: conservation oriented rate structures or rate incentives for both wholesale and retail customers, support of public education efforts regarding conservation, and increased metering of secondary use.
3. **Negotiate for flexible use of Weber Basin Project water between the District's secondary and potable water systems.** In order to meet projected potable demands in the future, it is essential that the District be able to use some of its Weber Basin Project water currently designated for irrigation use to satisfy M&I demands. The District will work with the USBR to allow for this transfer as growth continues along the Wasatch Front. In reality, some use of irrigation water for municipal purposes is already occurring within the District. While water sales to secondary water providers, such as Bountiful Water District are currently designated as irrigation of residential and commercial landscaping.
 4. **Pursue opportunities for conversion of agricultural water to M&I use.** The largest single source of new water available to the District will come from the conversion of agricultural water to M&I use. The District will continue to pursue acquisition and conversion of all water associated with agricultural lands to be developed for residential, commercial, or industrial use. Ultimately, 75 percent of water used for agricultural purposes must be acquired for use to satisfy M&I demands, either by the District or one of its member agencies.
 5. **Encourage development of wastewater reuse.** Wastewater reuse provides a valuable opportunity to develop new water within the District. The District will pursue wastewater reuse in its own system or encourage its development in member agency systems to take advantage of this new source where it makes the most sense.
 6. **Develop new wells and aquifer storage and recovery facilities.** There is a small amount of new water that can be created through new groundwater wells and aquifer storage and recovery facilities. While this new water may not be needed for some time, these facilities should be completed in the near future to provide redundancy for other District sources.
 7. **Prepare for development of the Bear River.** Even under the ideal conditions, the District will eventually need at least a portion of the Bear River to meet projected demands. The District will continue to acquire easements and prepare for the eventual development of the Bear River. The timing of this development, however, could vary greatly depending on other factors. It could be needed as early as 2020 or as late as 2065. The District will pursue the plan contained in this report

to increase the production and efficient use of other sources. Supply and demand will continue to be monitored for a period of time.

8. **Continue to monitor development and water use patterns.** The study was based on current development trends and the State's current conservation goal. The District periodically reviews the assumptions contained in the plan to check their accuracy. Any significant changes in development patterns or conservation habits could seriously affect the conclusions of this conservation plan.

Wasatch Back Recommendations

1. **Limit Replacement Water Sales.** WBWCD has a limited amount of supply available to meet demands on the Wasatch Back. To make sure it preserves sufficient supply to meet its other obligations, the District will limit the sale of replacement water to the volumes identified in this report. District management will determine if it is best to simply limit the total volume of water sold and allow it to be purchased as quickly as the market dictates, or if an annual sales limit should be established to stretch the existing supply.
2. **Develop a plan to encourage the efficient use of the District's existing replacement water by contract holders and increase the use of future replacement water as M&I supply.** One of the major challenges of the Wasatch Back is that current replacement water contracts are underutilized in meeting M&I demand. To extend the available water supply, the District will develop policies that will encourage existing contract holders to allow more of their water to be used for M&I purposes. The District will also consider ways to ensure that future replacement contracts are efficiently used for M&I supply. To do this, the following actions will be promoted:
 - Renegotiate contracts as possible to reduce replacement contract amounts to volumes Encourage existing water providers to extend their service areas. This will allow new users to use available water under existing replacement contracts instead of initiating new contracts.
 - Limit the quantity of new replacement water sold. Limiting sales to new users will force them to look for water from existing providers. This will result in a natural increase in their use of existing sources as demands increase in the existing systems consistent with projected demands. If entities secured replacement contracts in speculation of future development, they may be willing to relinquish some of this water back to the District.
3. **Pursue opportunities for conversion of agricultural water to M&I use.** The largest source of new water available to the Wasatch Back will come from the conversion of agricultural water to M&I use. The District will encourage the acquisition and conversion of all water associated with agricultural lands to be developed for residential, commercial, or industrial use. Ultimately, 52 percent of water used for agricultural purposes must be acquired for use to satisfy M&I demands, either by the District or other potable providers in the service area.
4. **Negotiate for flexible use of Weber Basin Project water between the District's irrigation and replacement water systems.** In order to meet projected potable demands in the future, it is essential that the District be able to use some of its Weber Basin Project water currently designated for irrigation use to satisfy M&I demands through additional replacement water contracts. It is recommended that the District work with the USBR to allow for this transfer as growth continues along the Wasatch Back.

5. **Promote conservation.** Even with the development of all District supplies set aside for the Wasatch Back, the District will be unable to meet projected demands. The build out supply of the Wasatch Back relies heavily on the conversion of irrigation water controlled by others to M&I use. The District will pursue the State's conservation goal to extend the length of time that District Sources are available to meet rising M&I demands and to reduce the overall volume of required irrigation water conversion.
6. **Continue to monitor development and water use patterns.** All of this is based on current development trends, assumptions about the future use of water outside of the District's control, and the State's current conservation goal. The District will periodically review the assumptions contained in this plan to check their accuracy. Any significant changes in development patterns or conservation habits could seriously affect the conclusions and timing of this conservation plan.

7.0 CURRENT WATER CONSERVATION ACTIVITIES

The District currently has a full time employee working as the conservation programs coordinator, as well as an employee that commits approximately half time to the conservation program. These employees, with the assistance of other District staff, oversee the implementation of all current conservation activities and work with District administration in the implementation of additional conservation plans and measures as needed to meet the needs of water supply and planning in the overall District water supply plan. As programs are implemented, the District will continue to evaluate the needs for staff involvement and resources needed to ensure that the programs are used appropriately to meet the District's supply needs in connection with other District projects and programs. At the end of this section is Figure 7-1, which shows the reduction of water use since the base year of 2000. While water use is somewhat determined by whether it is a dry or wet year, the overall trend in water usage is a significant decline even when not adjusting for population growth.

7.1 Supervisory Control and Data Acquisition (SCADA) System

The District has installed and continues to install SCADA system devices on all of its water control facilities. This system gives the district the ability to monitor and record operational data throughout the District including treatment facilities, reservoir levels, valves, flow meters, pumps, and screening devices. This system is used to operate the District as efficiently as possible and to minimize water waste and/or loss.

7.2 Metering and Accounting

The District currently meters all M&I water delivered to its wholesale customers and larger irrigation customers. The District is also now engaged in the implementation of metering their retail secondary irrigation system. The District Board of Directors has adopted a policy which requires that all new retail secondary connections will have a meter installed. In the past couple of years, there have also been a couple of larger projects which have resulted in the current number of meters installed being approximately 1,300. Meters are still being tested and data gathered which will assist the District in the future metering efforts. With the meters, the District is able to monitor usage patterns and trends, overuse by customers as well as system losses. The District monitors the accuracy of all of its meters and calibrates, repairs, and/or replaces them as needed on an annual basis. All residences of the metered secondary water connections are

sent monthly water use statements showing their use and comparing that to their estimated need, based on their landscaped area.

7.3 Rehabilitation and Betterment

The District has received loans from the Bureau of Reclamation on a limited basis, for the purpose of rehabilitation and betterment. The District has directed much of these funds towards relining damaged portions of the Gateway Canal as well as worked extensively on several of the landslide areas above and below the canal. This canal is located along the side-slope of a mountain and land movement has caused significant damage to many portions of the original concrete lining. The work being done on this canal includes removing the damaged concrete, stabilizing the sub-grade material and reforming a new concrete lining. The District also monitors the condition of its other canals and lateral systems to determine where future rehabilitation and betterment funds will be allocated, if available. These funds were also used to pipe some of the canal laterals, which were losing significant amounts of water from liner damage.

7.4 Irrigation Water System Policy

Weber Basin Water Conservancy District currently operates its irrigation water system under a water conservation policy. This policy forbids the use of irrigation water during 'mid-day' hours (10:00 a.m. to 6:00 p.m.). Watering during these hours results in significant water loss, as much of the water applied is evaporated. During the irrigation season, District staff monitor and police this policy providing information and resources to those that are found in violation. Currently there are no punitive repercussions in place for not following the policy, but people are being educated on why they need to follow it.

7.5 Water Rates and Contracts

The District encourages water conservation for its municipal and industrial water wholesale customers through the terms of their contracts. All water used in excess of the yearly contract amount is leased to the customer for a price that is approximately \$60.00 more per acre-foot than the contract amount. The District has also increased the M&I water rates in general in order to cover the increasing operating costs and capital projects, as well as encourage conservation.

Irrigation water wholesale customers are also encouraged to conserve water through the terms of their contract. Customers that exceed their yearly contract amount must re-contract with the District for an amount of water sufficient to meet the past contract amount plus the overage. In most cases this additional water contracted for will be at a water rate that is more expensive than the previous contract.

The District has been meeting biannually with all of its wholesale customers, which include most every municipality and water district in Davis and Weber counties, as well as the wholesale irrigation customers. Among other agenda items, the District has stressed the importance of landscape and irrigation system design ordinances as well as conservation encouraging rate structures. The District has supplied each customer agency with samples of ordinances and rate structures. To date, there have been about a third of the M&I agencies that have established conservation ordinances and rate structures. Every year there seems to be others interested in pursuing these concepts.

7.6 Water Conservation Education Program

7.6.1 The District currently operates an ongoing water conservation education program. Elements of the larger public education program include:

- The Learning Garden: a two acre garden at the District's headquarters in Layton, built to demonstrate and show ideas of proper landscaping and irrigation methods for the public to follow.
- Public presentations to public schools, home and garden shows, other business and civic organizations.
- The distribution of conservation pamphlets to customers within the District's service area which promote wise use of water and tips for how to conserve and improve efficiency.
- Tours of the District's facilities to individuals or groups that call and request such tours.
- Free water check program to all water users within the District's service area. This includes determination of soil type, root depth, sprinkler system application rate, and uniformity coefficient as well as identifying sprinkler system deficiencies. The home owner is left with a recommended irrigation schedule for the season.
- The District is one of the funding agencies of the Governor's Water Conservation Team which is working towards a 25% reduction in the per capita water use rate in the state of Utah by 2025.
- The District provides its own public advertising campaign with messages promoting the other conservation programs, free classes and events and the proper use of water resources. The funding is limited, but advertising through local papers, local advertising magazines and through local business, has proven to be effective in drawing people to the District to learn and to see the Learning Garden.

7.6.2 The District has constructed a low-water use and drought resistant landscape model along the frontage property of the Davis South Water Treatment Plant (WTP). This facility is a not a publicly open facility but is situated within a residential area and provides a highly visible example of proper landscaping and irrigation methods suitable to home landscaping.

7.6.3 The District committed, along with the other members of the Governor of Utah's Water Conservation Team, to reduce per capita water use 25 percent by the year 2025. To help obtain this goal, WBWCD has constructed the water conservation Learning Garden. The Learning Garden provides an opportunity for community members to learn first-hand about the beautiful types of water-wise landscapes in a semi-arid climate. It is intended that visitors will learn about plant materials that are water-wise and how to care for and irrigate plants in different soil types and other site conditions. The Learning Garden creates a setting for outdoor classrooms and scenic nature walks. There are real examples of residential and commercial landscapes that will provide planning and design tools and give visitors a chance to see mature plants in a beautiful setting.

The District uses the Learning Garden as a key piece in the overall conservation planning and messaging because the greatest potential for savings exists in landscape water use reduction. The free landscape classes and events are an effort to help people understand the plants, soils and water needs for their

landscape. Those that come to the classes are leaving with a greater understanding of all the basic principles of water efficiency in the landscape.

WBWCD realizes that conservation of the resources it manages is an important factor in meeting the long-term needs of the communities it serves. Through the Learning Garden, the District emphasizes the need for the community members to use their water efficiently in the landscape, making efficiency a part of their everyday life style.

Learning Garden Best Management Practices include:

1. **Planning and Design**– Account for existing site conditions, use of the landscape, and landscape maintenance.
2. **Plant Selection**– Use plants that are adapted to Utah’s climate and seasons. There are many beautiful varieties, including native Utah plants that will fit into our urban landscapes and provide the landscaping we desire while reducing water needed to keep them healthy.
3. **Soil Type and Condition**– Good soil is the basis for a successful landscape. Adding organic matter will improve all types of soils; clay, loam or sand. It is a good idea to contact your local Extension Office for a soil test.
4. **Minimize Turf Area**– Water loving turf such as Kentucky Blue Grass should be located only where it provides a useful purpose. Eliminating turf usage in narrow strips and sloped areas is recommended.
5. **Irrigate Efficiently**– Well designed and maintained sprinkler systems save water.
6. **Mulch**– Organic mulch (bark chips, wood shaving, etc.) reduces evaporation, weed growth, runoff, and provides a manicured landscape. Inorganic mulch (rock, decomposed granite, etc.) provides aesthetic value when used properly.
7. **Maintenance**– Regular maintenance preserves the landscape beauty and sprinkler system while saving water.

The Garden demonstrates several types of wise and efficient landscape principles including:

1. Planting and Irrigation
2. Mulch examples with several types and varieties or organic and rock mulches
3. Turf grass demonstration with five different real varieties and two artificial options with information on their respective water use
4. Soil profile demonstration
5. Raised vegetable garden bed demonstration
6. Xeriscape or very low water use garden
7. Residential landscape applications for both front and back yards
8. Commercial landscape applications
9. Park-strip examples and applications

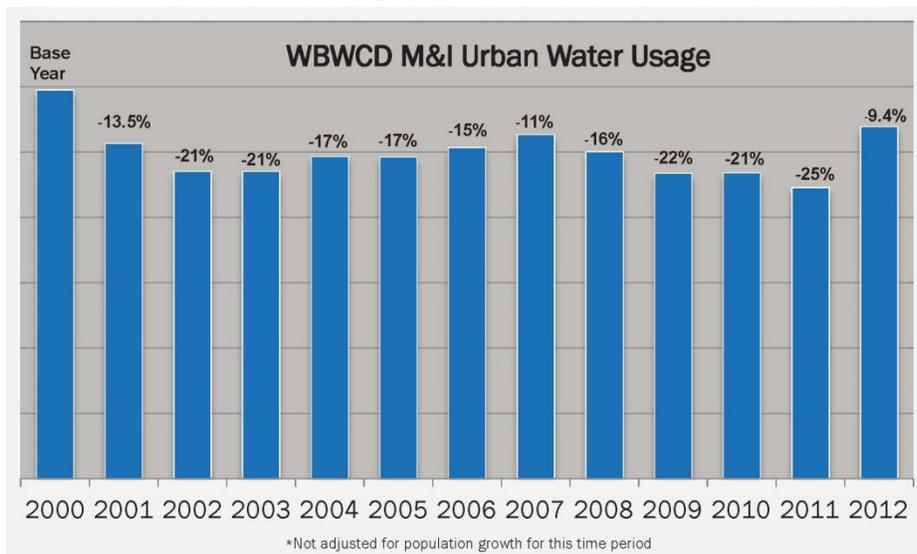
7.6.4 The District has also been working with Utah State University to develop models and/or information on water conserving irrigation systems and effective irrigation patterns that minimize over watering. One feature of this program includes an outdoor water audit program. This program provides trained technicians that visit private water users at their residence or business and perform soil tests and sprinkler audits necessary to create an optimized watering schedule for the customer. Advertisement for this service is done through local papers, general mail ads in advertising mailers, over the radio, and word of mouth. The

service is offered by most of the water districts along the Wasatch Front. The District is also promoting the program with the help of participating member agencies through city newsletters and their city internet sites. Since the District started this service the participation has gained increasing popularity each year. It is anticipated that the District will continue this program with the intent that participants are better educated on their own water use and will use the information provided to them for future years. This service is offered anywhere within the District’s service area, which includes Davis, Weber, Morgan, Summit and Box Elder counties.

7.7 Irrigation Product Rebate Program

The District began a pilot program with the help of the Water Conservation Field Services Program offered by Reclamation. The program began in 2012 with a limited list of irrigation products that promote water efficiency. The focus was on smart controllers that are controlled by either soil moisture or real time weather conditions. The list also allowed for pressure regulation and some highly efficient sprinkler nozzles that reduce misting and have been tested to improve uniformity. This program will continue to be evaluated for its cost compared to its effectiveness in the overall water use patterns that will be seen. This program, coupled with the metering program and the water audit program could prove to be very effective at helping users to take some of the guess work out of how to schedule their irrigation.

**Figure 7-1
Historical Water Use for WBWCD since Governor’s Conservation Plan**



8.0 PROPOSED WATER CONSERVATION ACTIVITIES

In addition to the numerous Future Supply Development Actions, as listed in Section 6.0 above, the District will be implementing several other conservation activities.

8.1 Water Management

The District will continue to add to and upgrade its SCADA system as needed and to maintain the existing SCADA equipment in order to provide operators with the data they need to minimize the amount of water

wasted or lost throughout the District. The District is also creating a Geographic Information System (GIS) base-map. This computerized map will be connected to the SCADA system as well as other information to give system operators a complete graphical, real time model of the District that would improve their ability to run the system at a maximum efficiency rate. This map could also be used to track pipelines and other facilities that have a record of failure and/or other problems thus telling managers where rehabilitation funds most need to be allocated. In addition, this map and portions of its corresponding information could be made available to the public via the internet.

8.2 Metering and Accounting

The District will continue to add to and upgrade its metering system to ensure that losses are detected and kept to a minimum. Also, the residential retail secondary irrigation system will continue to have meters installed. This will assist the users and the District in measuring the amount of water used which will provide the users with accountability and responsibility for their individual usage. The District's adopted policy requires that all new residential developments provide a meter to be installed for each connection to the secondary water system. All metered users will receive a water use report to help them know what they use in comparison to what they need and help for them to reduce consumption if they are using too much. Initially the meters will not be used for separate billing measures but will help the district know if end users are exceeding their allotment of water.

8.3 Rehabilitation

The District will continue to use its rehabilitation funds to repair and/or replace those facilities that are known to be sources of water loss.

8.4 Outdoor Irrigation / Irrigation Water Policy

The District will continue to enforce its policy disallowing the use of irrigation water during daytime hours (10:00a.m. to 6:00p.m.). The District will also begin encouraging its municipal customers to adopt a similar policy to be enforced on their retail customers where irrigation water is not available.

8.5 Water Rates and Contracts

The District will explore conservation minded rates and contracts as needed to ensure that projected future water demands are met. The District will also continue to meet with its customer agencies and encourage them to adopt water conserving ordinances, as well as institute water rate structures that are more conservation minded.

8.6 Reclaimed Water Use

The District is meeting regularly with each of the four wastewater districts, which serve Davis and Weber Counties, to plan and schedule the implementation of the use of reclaimed water for irrigation purposes and commercial, industrial, and residential outdoor uses. Due to the cost of additional treatment as well as conveyance of this reclaimed water, it appears to be five to ten years before this process will be implemented.

8.7 Water Conservation Educational Program

The District will continue promoting its water conservation efforts and programs through public education as described above. In addition, the District will add other aspects to the program. These additional aspects may include the following:

- Creating a larger media campaign to create public awareness of the need to conserve water, primarily focused on secondary water, which is largely available in the District's service area but also unique to most of the United States. Ads would include details of other conservation activities to make the public aware of the tools available to help them conserve water. This is currently being done in connection with the Governor's Water Conservation Team but is not specific enough for District issues and challenges dealing with the unmetered secondary users.
- Developing educational information concerning available water conservation tools available over the internet on the District's web page. This will be ongoing in nature with improvements and additions being added as needed to educate website visitors. The website as well as other media will be used to educate water users and to promote the other programs that the District has to offer to all those that live within its boundaries.
- Continuing to use the water check program as a means to reach the public and help them change their water use practices. This will also be beneficial for involving the District's member agencies in the encouragement and promotion of wise water practices for landscape irrigation. One of the keys to a successful public education program will be the ongoing commitment and support of the member agencies in achieving the long term water conservation goals to ensure future water supply.

9.0 CONCLUSION

Weber Basin Water Conservancy District is dedicated to providing quality services to all of its customers, both those that we now serve and those we anticipate serving in the future. The District shares in the feeling that water must be conserved in order to ensure that all of those future customers will have a right to quality service and a reliable water supply. By continuing to follow the conservation measures that the District has previously adopted and by following those outlined in this plan, the District feels confident that water will be available into the future for all customers within the District boundaries.

Mgr. Anderson reported we received proposals from three engineering firms and CH2M Hill was ranked the highest technically. He said the anticipated costs for the total project follows:

Engineering Design and SDC Fee (CH2MHill):	\$ 441,158
Estimated CMAR Design Fee:	\$ 50,000
Estimated Construction Cost:	\$4,700,000
Total Estimated Project Cost:	\$5,191,158

He said we plan to use Construction Manager at Risk (CMAR) procurement. This method allows input from the contractor throughout the design process and is intended to minimize design conflicts during construction. These open book costs that are developed through design allow us to tailor the design to meet the budget and avoid surprises on bid day. He said procurement of materials can begin as early as the 90% design stage which will expedite construction. If the owner and CMAR are unable to reach an agreement for the cost of construction, the owner still has the option to bid the project competitively. Discussion followed.

Motion was made by Trustee Buttschardt, seconded by Trustee Petroff and passed unanimously, accepting CH2M Hill's proposal for design services for the East Layton 36" Pipeline project.

IX

CONSIDERATION OF APPROVAL OF WATER CONSERVATION PLAN

Gen. Mgr. Flint reported this pertains to the Water Conservation Plan distributed to the trustees in May to review and provide any comments. He asked Mgr. Paxman to continue with details.

Mgr. Paxman said this is an update of the District's existing Water Conservation Plan. He reported the plan is required to be updated and resubmitted to the State Division of Water Resources every five years. The Board's endorsement of the plan is also a requirement of the State. Mgr. Paxman stated the major items that were updated were the water contracts for both irrigation and M&I, the projected water demands, the existing water conservation program project, and the proposed water conservation projects. He recommended approval of the plan.

Motion was made by Trustee Petroff, seconded by Trustee Gibson and passed unanimously, approving the District's Water Conservation Plan as presented.

X

PUBLIC HEARING TO CONSIDER ADOPTION OF IMPACT FEE FOR DISTRICT 3 WATER RATE

Gen. Mgr. Flint reported we have completed the proper public notices required for impact fee adoption. He said the District is introducing a new tier of water rate known as District 3. He stated there will be an impact fee option with this rate that will enable entities to collect the capital portion of the rate in advance. He said we will consider approval of the impact fee today. Gen. Mgr. Flint reported Lewis Young Robertson & Burningham conducted the impact fee analysis. He asked Cody Deeter of their firm to proceed with this item.

Cody Deeter distributed copies of the Treated Water Impact Fee Facilities Plan (IFFP) and Impact Fee Analysis (IFA). He reported impact fees help allocate the cost of new facilities and any excess capacity to new development. He then outlined the proper steps to establish an impact fee. He reported the District is proposing to make 9,000 a.f. of District 3 water available. Of the 9,000 a.f., 6,000 a.f. will be treated water and 3,000 a.f. will be untreated water. This water is anticipated to provide water supply over a ten year period. Cody stated new facilities will be required to make this water available. He then identified existing and future capital facilities necessary to serve the new growth. The treated water capital facilities total \$58,171,667, and the untreated water capital facilities total \$17,708,333. Cody said the impact fee is calculated using treated water capital facilities since the fee is only assessed on purchase of treated water. The impact fee will be \$9,697 per a.f. He said we expect 5% of our customers