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Engineering, Environmental and Construction Services - Worldwide

Mr. Scott Wilson
General Manager
Central Iron County Water Conservancy District
88 East Fiddlers Canyon Road
Cedar City, UT 84721

Dear Mr. Wilson:

Subject: Central Iron county Water Conservancy District Population Growth and Water Demands

Central Iron County Water Conservancy District (CICWCD) was formed in 1997 to benefit the people and municipalities within the CICWCD boundaries. With the recent concerns of water availability that has been evidenced by groundwater mining and the rapid population growth, the major water purveyors in within the CICWCD boundaries are in the process of studying available water resources and planning for future population growth. This letter has been prepared to summarize the expected population growth and water demands and supply within the CICWCD boundaries. Since the District's responsible charge, in part, is to the municipalities within the District boundaries the draft copy of the Cedar City Water System Master Plan Update dated August 2008, and the final copy of the Enoch City Water Master Plan Report dated December 2007 were used in preparing this letter

Growth Projections

Estimates of future growth within the service area of CICWCD are based upon projections developed by CICWCD participating entities including Cedar City and Enoch, and the Governor's Office of Planning and Budget (GOPB). Both Cedar City and Enoch, the two largest constituents in CICWD, have completed Water System Master Plans or have them available in projects estimates a population increase of approximately 136,400 between 2008 and 2060. Enoch City estimates a population increase of approximately 32,350 between 2008 and build-out in 2039. Current (2008) GOPB projections estimate a 2.7% Average Annual Rate of Change (AARC) in the balance of Iron County through 2060 which represent a population increase of approximately 29,000. The actual growth rates experienced in Iron County indicate that GOPB estimates may be conservative. For the purposes of planning infrastructure needs, the combination of Cedar City, Enoch City, and GOBP, for the balance of Iron County, are used. Refer to Table 1 for projected population estimates for the Central Iron County planning area over the project planning period. The planning period is from present to 2060.

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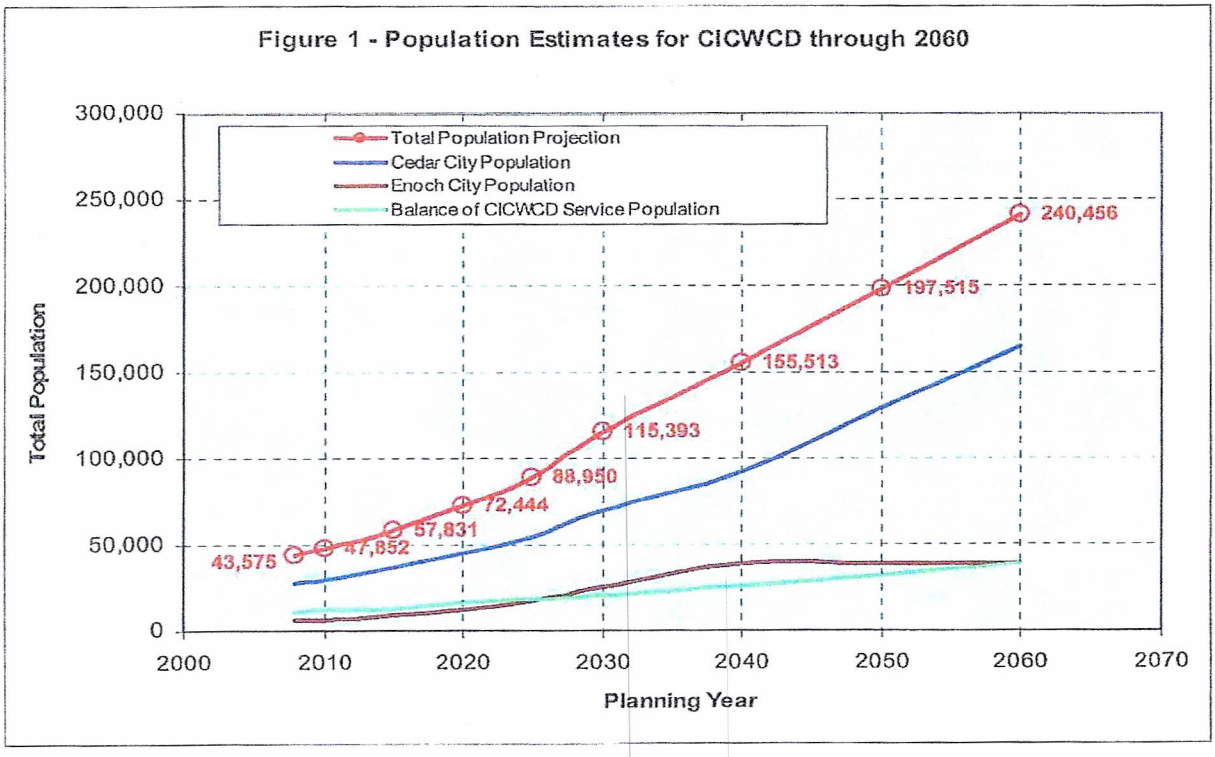
TABLE 1: CICWCD Growth Projections					
Year	Cedar City Population[1]	Enoch City Population[2]	Balance of County Popoulation[3]	Balance of CICWCD Service Area[4]	**Total Population**
2008	27,599	6,200	10,078	9,776	**43,575**
2010	29,961	6,500	11,743	11,391	**47,852**
2015	36,644	9,000	12,564	12,187	**57,831**
2020	44,566	12,500	15,854	15,378	**72,444**
2025	53,896	17,500	18,097	17,554	**88,950**
2030	69,663	26,000	20,340	19,730	**115,393**
2040	92,148	38,548	25,585	24,817	**155,513**
2050	128,078	38,548	31,844	30,889	**197,515**
2060	164,008	38,548	39,072	37,900	**240,456**

1. Cedar City Water System Master Plan Update (Draft Copy subject to revision), August 2008, Table ES-1
   2060 population assumes the same percentage growth for the 2040-2050 time period
2. Enoch City Water Master Plan, December 2007, Figure 19.
3. GOPB 2008 Baseline City Population Projections excluding Parowan and Paragonah (not included in total population)
4. Assumed 97% of Balance of County population within CICWCD based on GOPB population projections



The population growth within the balance of Iron County CICWCD service area boundaries are expected to be approximately 97% of the population growth of Iron County excluding Parowan and Paragonah.

Projected Water Demands

Projected water demands for the study area are based primarily upon increases in population and heavy industrial users along the industrial corridor which includes Western Electrochemical Company (WECCO) and Palladon Mines.

WECCO is located northwest of Cedar city and is a producer of rocket fuel. The current source of water is ground water in the Beryl/Enterprise ground water basin. Palladon Mines is an iron mining company that is re-opening the iron mines west of Cedar City in planned growth phases. Due to over drafting and potential curtailment of the Beryl/Enterprise ground water aquifer, these entities have expressed interest in CICWCD supplying water. WECCO is estimating approximately 5,000 ac-ft of water and Palladon estimates 1,500 ac-ft of water needed, for a combined total of 6,500 ac-ft.

Total water demand for both Cedar City and the CICWCD service area is calculated as the product of per-capita usage and expected total population, adjusted for conversion of agricultural lands as well as water conservation initiatives over the planning period. The water demand for Enoch is calculated dividing the population by the average persons per household and using the State's Equivalent Residential Connection (ERC) requirements (Enoch City Water System Master Plan, 2007). The current total M&I water demand for the planning area is approximately12,130 ac-ft/yr. It should be noted that the agriculture demand is estimated at 27,500 ac-ft/yr (DWRe, 2005). The sustainable yield of the aquifer is estimated at 37,600 ac-ft/yr. The total demand for M&I and agriculture demands exceeds the sustainable yield of available sources by about 2,400ac-ft/yr. This has been evidenced by the decline of the groundwater elevation in the area.

Water Conservation Offsets

In order to make the best use of limited water resources in the arid Intermountain West, the State of Utah Governor's Office and Division of Water Resources have taken a leadership role in promoting water conservation in Utah. The Utah Board of Water Resources currently requires implementation of water conservation initiatives as a condition for funding of major projects. The current requirement is a 25% per capita reduction in culinary and irrigation consumption by year 2050 using 1995 consumption rates as the baseline quantity. Including the required reduction the total per-capita M&I demand goal for 2050 is 0.270 ac-ft per year. (DWRe, 2003). It should be noted that the CICWCD area is currently using about 0.273 ac-ft/capita-yr which is less than the State-wide average of 0.360 ac-ft/capita-yr. This represents a decrease of 9% in Iron County since the State wide goal was implemented. For the purposes of this study it is assumed that the additional 16% State conservation goal will be realized and that progress toward that goal will be more or less linear over the project planning period to 2050.

Total CICWCD Water Demand Estimates

Total water demand estimates for the CICWCD service area were developed to consider M&I only within the CICWCD service area. This considers service to growth-related customers; residences, businesses

and supporting infrastructure resulting from population growth. Total water demands over the planning period for M&I customers is indicated in Table 2. It is expected that total M&I demand will increase from about 12,129 ac-ft/yr (current) to approximately 73,052 ac-ft/yr by 2060. This includes demands identified in both the Cedar City and Enoch City Water System Master Plans discussed earlier, demands for the balance of the County within the CICWCD service area, and demands for future heavy industrial users.

Should the CICWCD elect to provide secondary or irrigation supply to the agricultural interests in the service area, total water demands upon the District will increase beyond levels shown in the previous paragraph. For the purposes of this study, agricultural demands will not be served by the CICWCD. The CICWCD will provide for only the additional demands resulting from M&I growth.

TABLE 2 - CICWCD Water Demand Projections

Year	Cedar City Demand[1]	Enoch City Demand[2]	Balance of CICWCD Service Area[3]	Additional Heavy Industrial Demand[5]	**Total CICWCD Demand**	
	(AF)	(AF)		(AF)		
2008	7,079	2,545	2,669	0	12,293	
2010	7,684	2,668	3,079	500	13,931	
2015	9,398	3,694	3,261	2,000	18,353	
2020	11,425	5,131	4,030	3,500	24,087	
2025	13,823	7,183	4,529	4,250	29,785	
2030	17,866	10,672	5,009	5,000	38,548	
2040	23,635	15,823	6,098	6,500	52,056	
2050	32,854	15,823	7,336	7,000	63,013	
2060	42,070	15,823	8,691	7,000	73,584	Note 4

1. Cedar City Water System Master Plan Update (Draft Copy), August 2008, Table ES-1
2. Enoch City Water Master Plan, December 2007, Figure 19.
3. GOPB 2008 Baseline City Population Projections
4. Obtained by multiplying 229 gal/capita/day (Cedar City Master Plan) by the population
5. WECCO and Palladon Mines

Projected Water Supply

The Cedar basin is essentially a hydrogeologic closed basin, which means there are no significant outflows or inflows of water. All existing water sources are derived from ground water sources though wells or springs. Groundwater sources in the Cedar Basin have been over appropriated and therefore are closed to any new water rights. There are three available existing supplies with CICWCD boundaries to meet future demands: existing developed water, conversion of agriculture water to M&I, and further development of existing water rights. Agriculture users are supplied by both groundwater and surface water. For the purpose of this report it is assumed that the agricultural demands will be met by existing supplies.

Existing Developed Water

Since CICWCD is in it's infancy as a water district almost all of the existing developed water in the Cedar Basin area is comprised of municipal water supplies derived from groundwater sources mostly in Cedar City and Enoch with contributions from other smaller water companies. The total developed existing water supply consists of 11,360 ac-ft of potable water and 800 ac-ft of secondary water.

Conversion of Agricultural Lands

It is anticipated that as growth occurs, significant agricultural land and associated water right holdings within the CICWCD service area will be converted to municipal or industrial use.

It is estimated that approximately 5,936 acres of agricultural land will be converted to municipal and industrial use over the planning period. The UPLAN model (2008) developed by DWR indicates that, based upon expected development patterns in the planning area, conversion of about 40% of available agricultural land (i.e.; 5,936 acres ±) will be required.

The current irrigated agricultural acreage in the planning area is approximately 13,735 acres. Each acre of agricultural land is estimated as accounting for 4.08 ac-ft per year in demand at an approximate overall irrigation system efficiency of 53%. If converted to M&I use, it is expected that the final consumptive use factor will be 1.00, resulting in 4.08 ac-ft per year available source capacity for each acre of agricultural land converted to M&I use.

As noted above the Division of Water Rights (DWRi) has determined that the Cedar Basin has been over-appropriated. In 2005 the USGS completed a groundwater study for the Cedar basin and determined the available yield of the aquifer to be 37,600 AF/yr (USGS, 2005). This represents approximately 66% of the total appropriated groundwater rights for the basin. It is assumed that the DWRi will implement a groundwater management plan for the Cedar basin which will curtail water rights to the available yield of the aquifer.

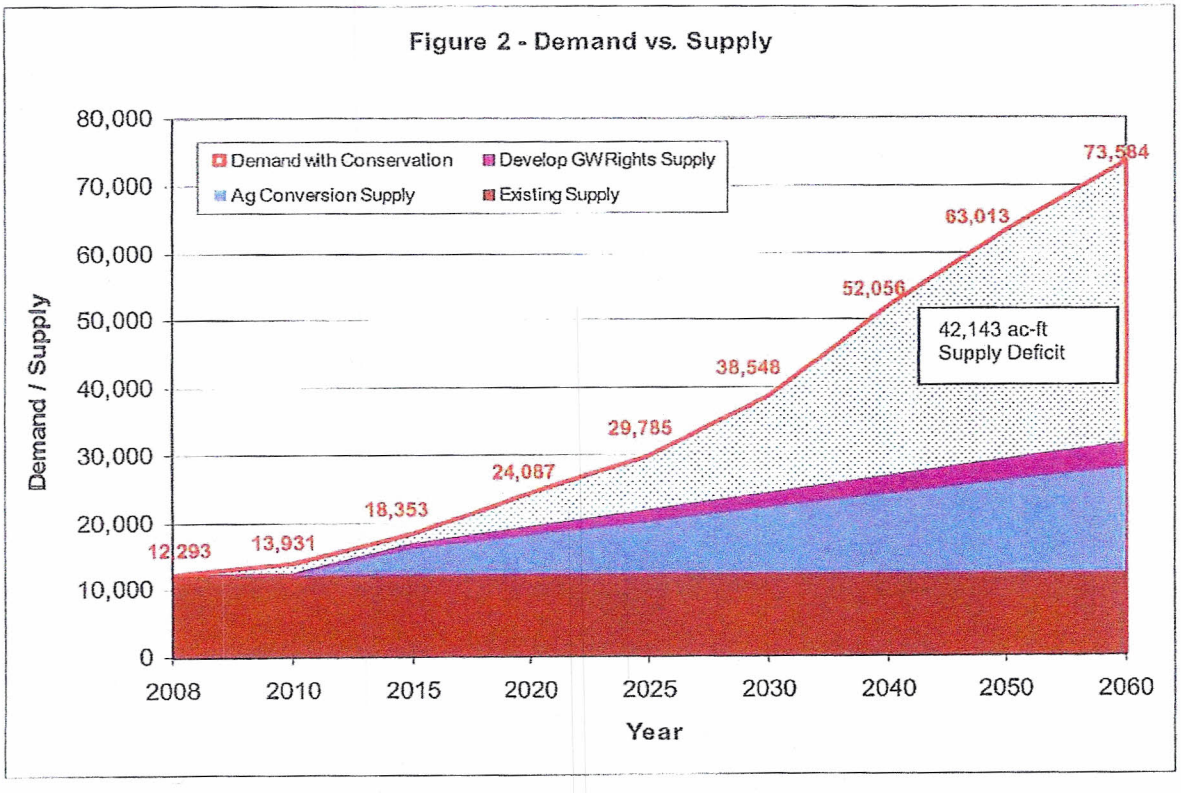
Because the timing of agricultural conversion will be related to factors not readily identifiable, it is assumed for the purposes of this report that conversion will occur linearly over the planning period.

Development of Existing Groundwater Rights

Development of existing groundwater rights includes rights that are currently held by primarily Cedar City and Enoch City limited by the assumed sustainable yield discussed in the previous paragraph.

TABLE 3 - CICWCD Total Supply				
Year	Existing Supply (AF)	Agriculture Conversions[1] (AF)	Development of Existing Rights[2] (AF)	**Total Supply (AF)**
2008	12,160	0	0	**12,160**
2010	12,160	1,959	451	**14,570**
2015	12,160	3,918	903	**16,980**
2020	12,160	5,877	1,354	**19,390**
2025	12,160	7,836	1,805	**21,801**
2030	12,160	9,794	2,256	**24,211**
2040	12,160	11,753	2,708	**26,621**
2050	12,160	13,712	3,159	**29,031**
2060	12,160	15,671	3,610	**31,441**

1. Division of Water Resources Memorandum, June 20, 2008 "CICWCD Uplan Study 2008 Results"
2. Additional water rights that could be developed up to sustainable aquifer yield



Conclusion

Central Iron county Water Conservancy District was formed to benefit the people and municipalities within the district boundaries. Planning efforts of primarily Cedar City, Enoch City, and CICWCD estimate that the population will significantly increase by the year 2060.

Based upon the assumed sustainable yield of existing water sources in the study area (37,600 AF/yr) and the available supply for municipal and industrial use (31,441 AF/yr), approximately 42,000 acre-feet of new source will be required to meet the needs of users in the CICWCD service area through 2060. Additional sources, in addition to the shortfalls estimated, will be required to meet the needs of CICWCD customers beyond 2060.

Sincerely,

Stanley Consultants, Inc.

Ted Mickelsen
Senior Engineer

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