

**BASIN AREA 71 GROUNDWATER STUDY FOR THE IRON
SPRINGS AREA**

Prepared by Central Iron County Water Conservancy District



And

Nolte Associates, Inc.

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WATER RIGHTS
CEDAR CITY

SUMMARY AND BACKGROUND

This report discusses the timing and area that should be included in the groundwater management plan being discussed by the Utah State Engineer for the Basin Area 71. The ground water management plan is being implemented to prevent damage to the aquifer in the Basin due to overuse of groundwater.

The largest number of groundwater users in Basin Area 71 are located in the valley between Beryl, Newcastle, and Enterprise (Beryl-Enterprise Area), located west of the CICWCD boundary. A small number of users are located east of the Beryl-Enterprise Area on the north side of the Antelope Range (Iron Springs Area). This report addresses groundwater withdrawals and their affect on the aquifer in the Iron Springs Area (see Figure 1).

This report yields the following conclusions:

- A well pumping groundwater from the Iron Springs Area has no measurable effect on groundwater levels in the Beryl-Enterprise Area over a period of forty years according to the State's groundwater model (effects, if any, on groundwater levels will not occur before forty years.)
- Based on model results, the estimated safe yield for the aquifer in the Iron Springs Area is between 5,000 and 10,000 acre-feet. The groundwater rights that will be used in the area are within this range.

Based on the these results, this report concludes that the groundwater management plan being considered by the State Engineer can delay water right cancellations in the Iron Springs Area for a period of at least forty years. This will allow the Central Iron County Water Conservancy District time to provide new sources of water to the Area and limit the economic impact the groundwater management plan will have on the area.

ASSUMPTIONS

The State model for the groundwater Basin Area 71 was used for this study. This model was used as it was found on the Utah Water Rights Website and is assumed to be accurate. No modifications were made to the model except to add groundwater demand as shown in Figure 1. The model was set to run for a period of forty years

MODEL RESULTS

The state groundwater model for the Beryl-Enterprise Area was used to determine the following:

- The effect of a large groundwater demand in the Iron Springs Area on the Beryl-Enterprise Area groundwater elevations.
- The estimated sustainable yield of the aquifer in the Iron Springs Area.

Effects of Iron Springs Demand on Beryl-Enterprise Area Groundwater

To determine the effect of a large ground water demand on the Beryl-Enterprise Area, the model was run with no groundwater demand in the Iron Springs Area for a period of forty years. The ground water elevation was measured at two points (see Figure 1, Points A and B).

A demand volume, from 1,000 acre-feet a year to 15,000 acre-feet a year, was placed in the Iron Springs Area. The groundwater elevation after forty years was measured at the two points for each of the demands. The groundwater elevations for both of the points, after the forty year period at the given demand, are shown in Figure 2.

As seen in Figure 2, the Points A and B do not show measurable drawdown after the forty year period with any of the demands tested. This indicates that removing groundwater from the Iron Springs Area has very little influence on groundwater elevations in the Beryl-Enterprise Area. The model suggest that a significant period of time must pass (more than 40 years) before removing groundwater in the Iron Springs Area will effect the Beryl-Enterprise Area.

A map showing the measured drawdown from 2001 to 2006 in the Basin Area 71 is shown in Figure 3. The State Engineer presented this map at public meeting on August 6, 2007. The map shows that even though significant drawdown occurred during this time in the Beryl-Enterprise Area, the aquifer remained unchanged in the Iron Springs Area. This implies that a long period of time can pass before removing groundwater in the Iron Springs Area affects the Beryl-Enterprise Area groundwater. The recovery in the Iron Springs Area and the drawdown in the Beryl-Enterprise Area show there is a significant delay in groundwater movement between the Areas.

The hydrological delay between the Iron Springs Area and the Beryl-Enterprise Area is most likely caused by the Antelope Range, located between the two areas. This Range of mountains keeps the groundwater from moving directly between the areas. Any interaction between the groundwater in these areas will only occur over a significant amount of time because any ground water drawdown must extend out into the basin and around the Range. As explained above, this period is more than forty years according to the State's model results.

Estimated Safe Yield of the Aquifer in the Iron Springs Area

The model was run to estimate a safe yield for the Iron Springs Area. Water elevations in the groundwater model were measured for demands ranging from 1,000 to 15,000 acre-feet per year. The model showed that the drawdown was confined to a small area around the groundwater demand at a demand of 5,000 acre-feet or less. Between 5,000 and 10,000 acre-feet, the model showed that the demand began to pull groundwater from the areas north of the well. At a demand of 10,000 acre-feet there were significant drawdown to the north. Based on the model results, the estimated safe yield of the aquifer from the Iron Springs Area is between 5,000 and 10,000 acre-feet.

WATER RIGHTS

A search on the approved underground water rights along the rail corridor from Palladon to Lund (see Figure 4) was performed. The results of the search are shown in Table 1. In addition, Table 1 includes water rights that CICWCD anticipates will be transferred to the rail corridor for future economic development. The allowable diversion of the water rights in this area sums to 7,030 acre-feet a year. The consumptive use (the number used by the model) is less than the allowed diversion.

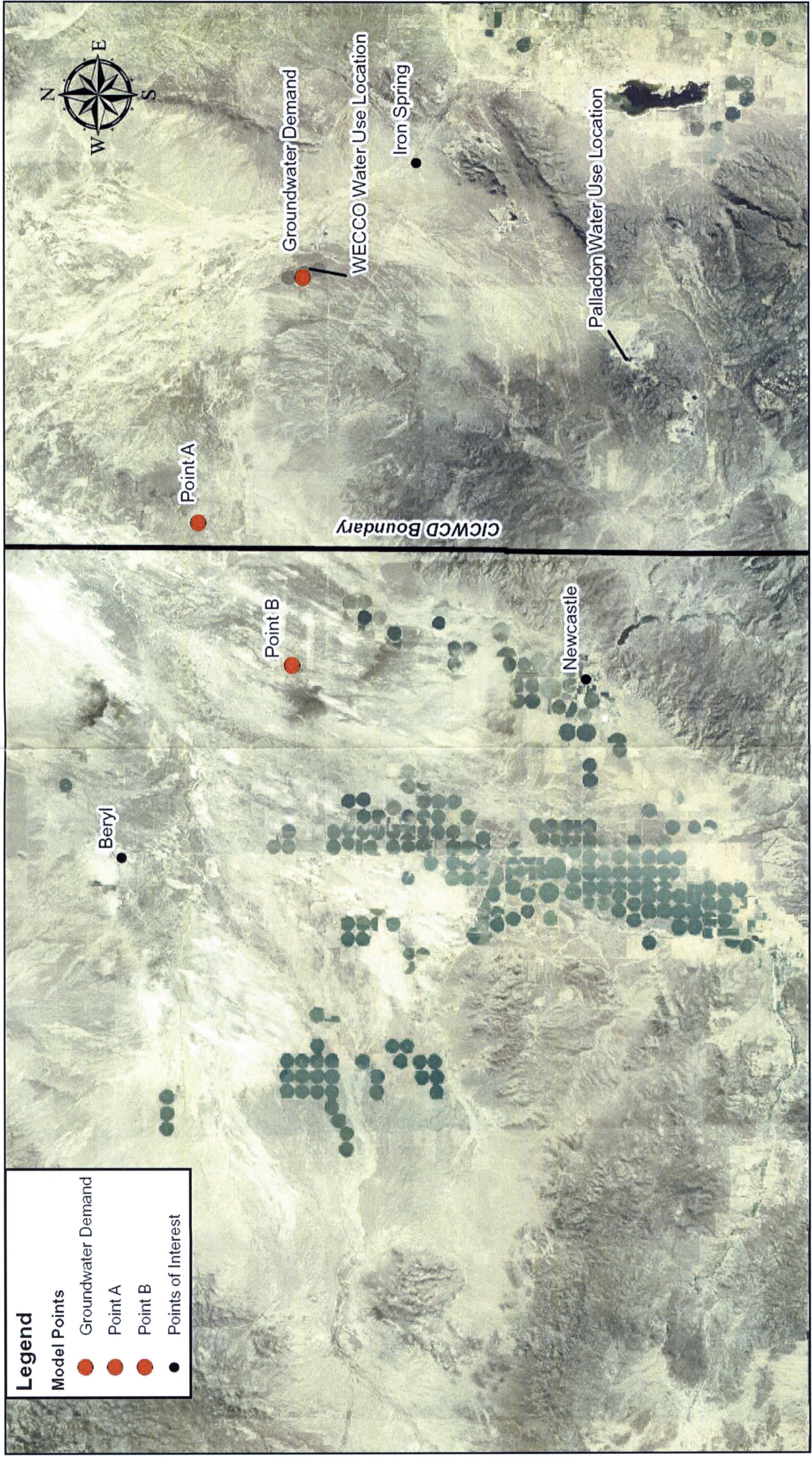
The majority of the water rights are owned by Palladon, WECCO and Fiddlers Canyon L.L.C. Palladon owns 2,039 acre-feet of water rights and WECCO owns 2,134 acre-feet of water rights under the names AMPAC Development Company of Utah and Western Electrochemical Company. Fiddler Canyon L.L.C. owns 2,096 acre-feet. The remaining 843 acre-feet of water are owned by different entities.

The total number of underground water rights that will be used along the rail corridor is within the estimated range of the safe yield determined from the model. Based on the model results, allowing these water right holders to use underground water in this area of the aquifer will not have an affect on the Beryl-Enterprise Area groundwater. The listed water rights can be used at their allocated diversions for at least forty years before any drawdown in groundwater could affect the groundwater levels in the Beryl-Enterprise Area.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results discussed above, Nolte Associates, concludes that water rights in the Iron Springs Area will not affect the groundwater management plan for at least forty years. This will allow the Central Iron County Water Conservancy District time to provide water from other sources to meet the water needs in this area.

Delaying any action in the Iron Springs area will allow the economic development along the rail spur in the area to continue (see Figure 4). This will allow the region to maintain its economic viability and will not impact the State Engineer's plan to reduce use in the basin to a safe yield.



Legend

Model Points

- Groundwater Demand
- Point A
- Point B
- Points of Interest



Figure 1
Map of the Beryl-Enterprise Area
 Including GMS Monitoring Points Used over a 40-year Period

Figure 2
Current Conditions
Drawdown Results over a 40-year Period Points A and B (Figure 1)

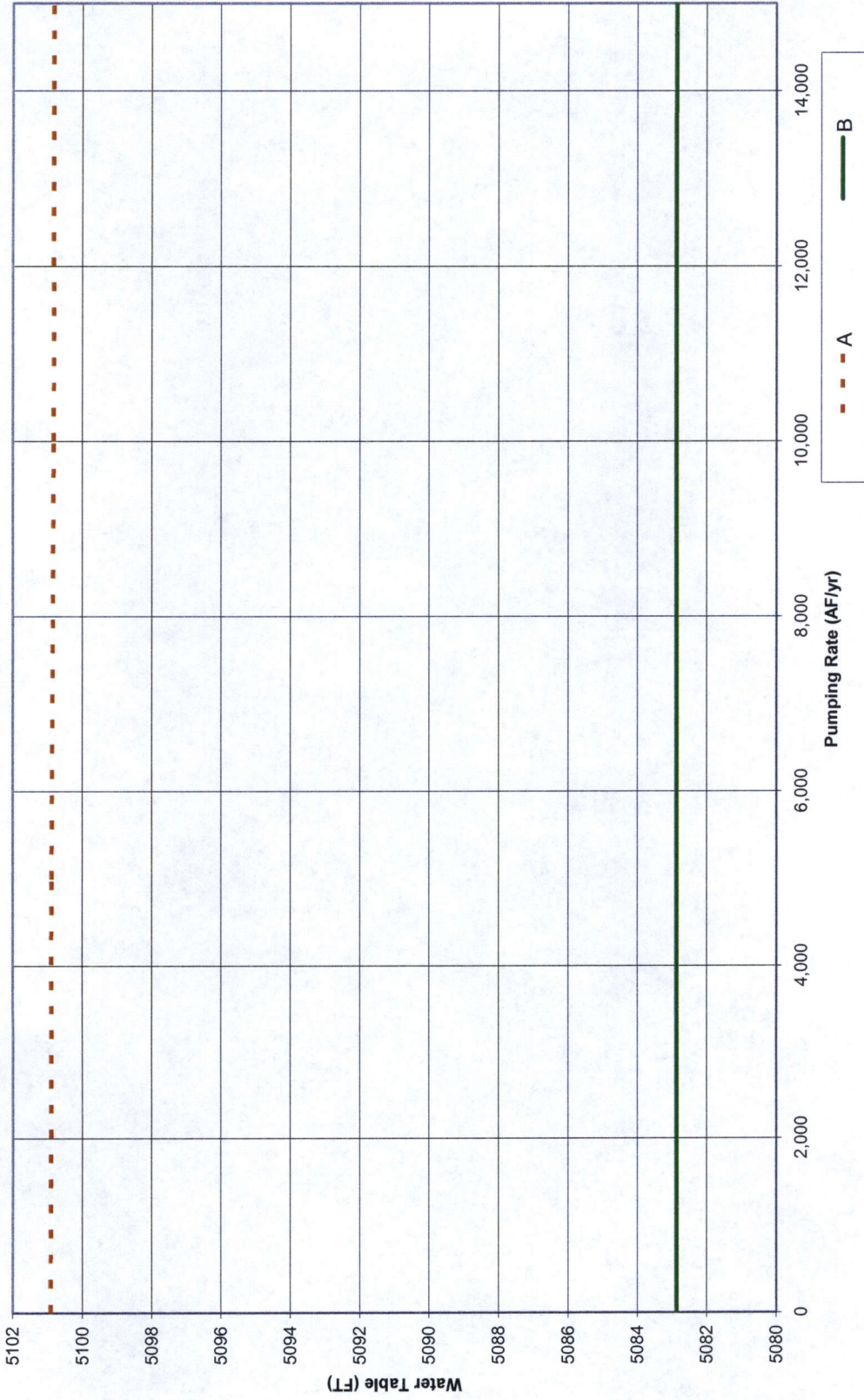
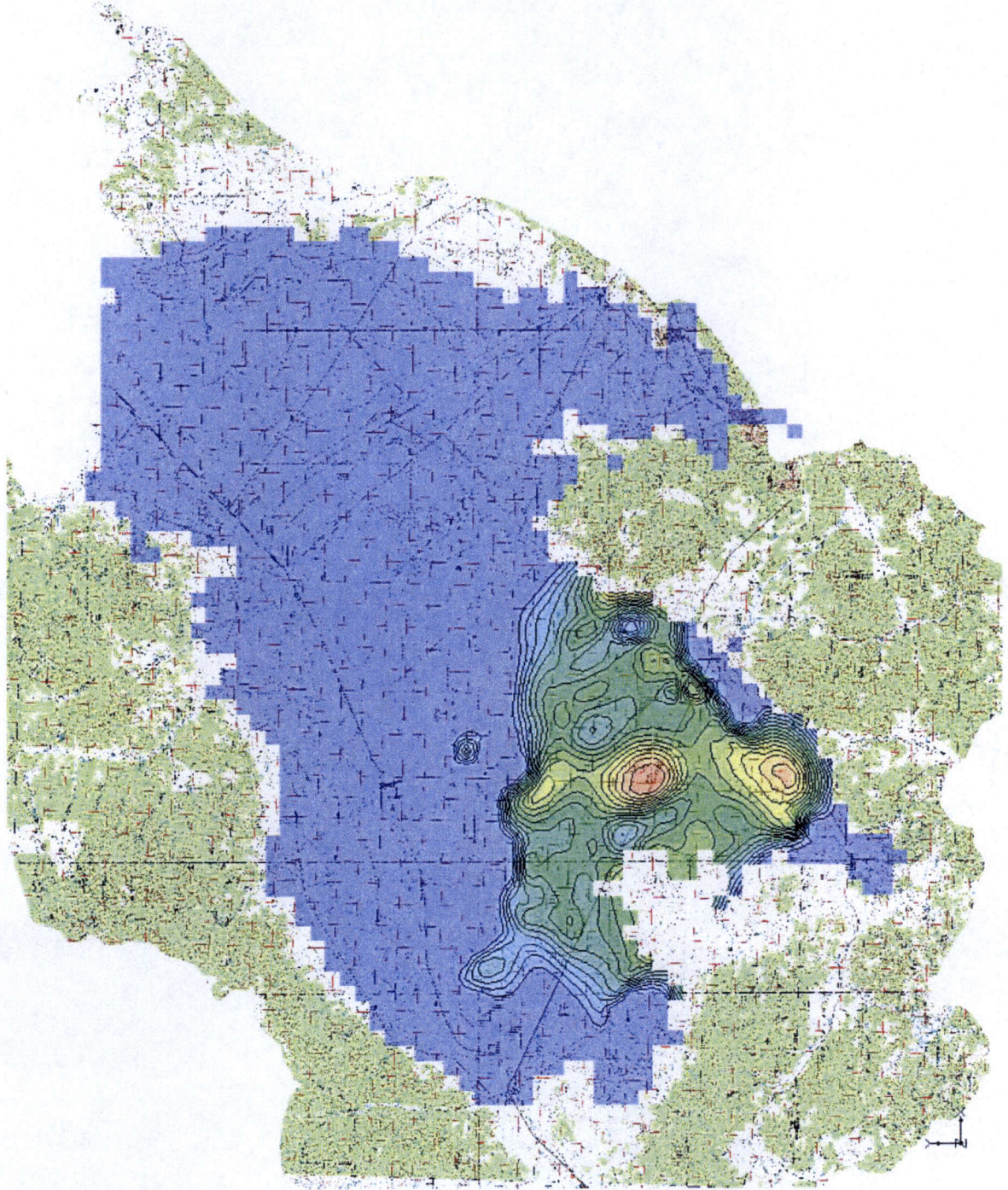


Figure 3
Groundwater Drawdown from 2001 to 2006



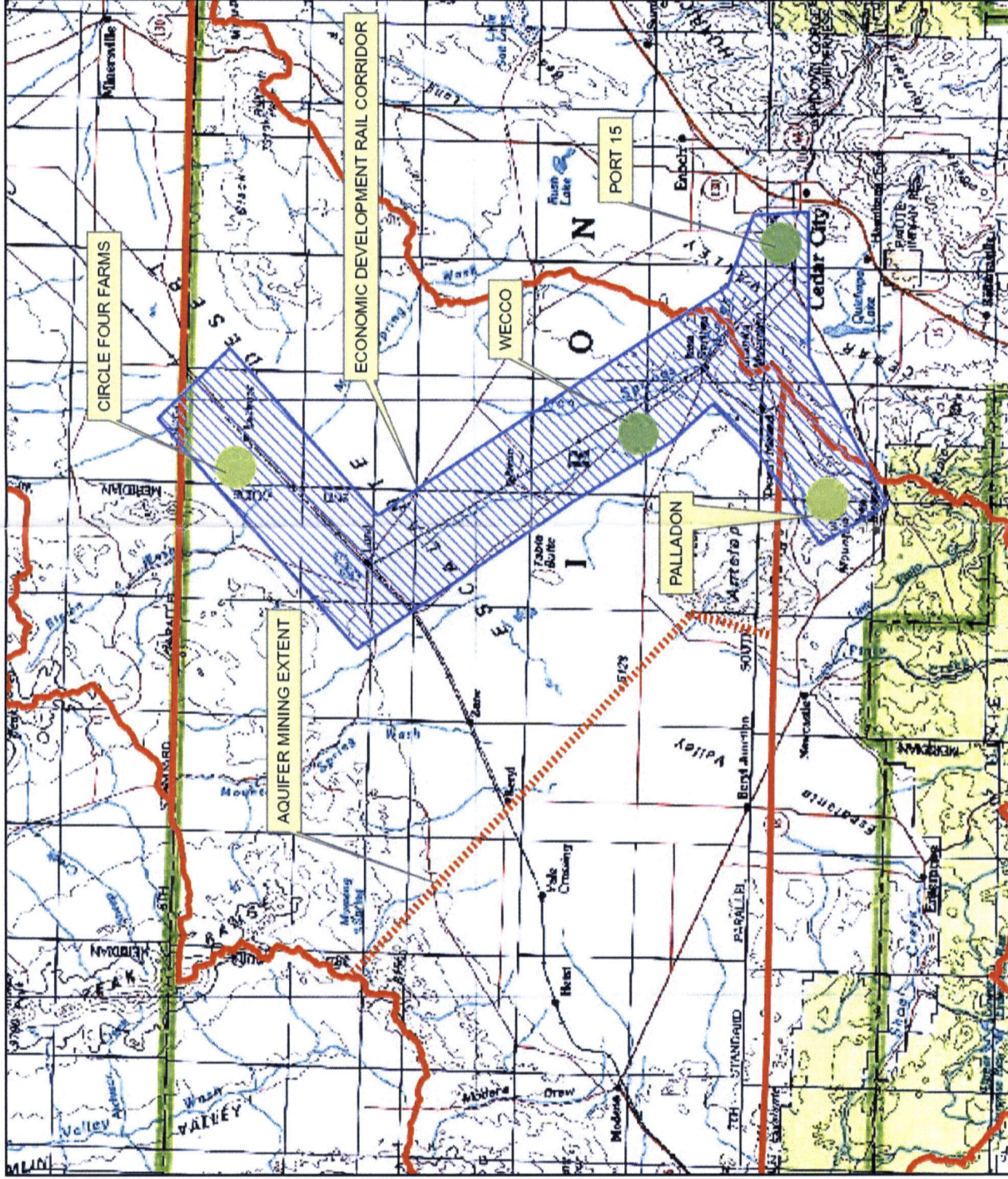
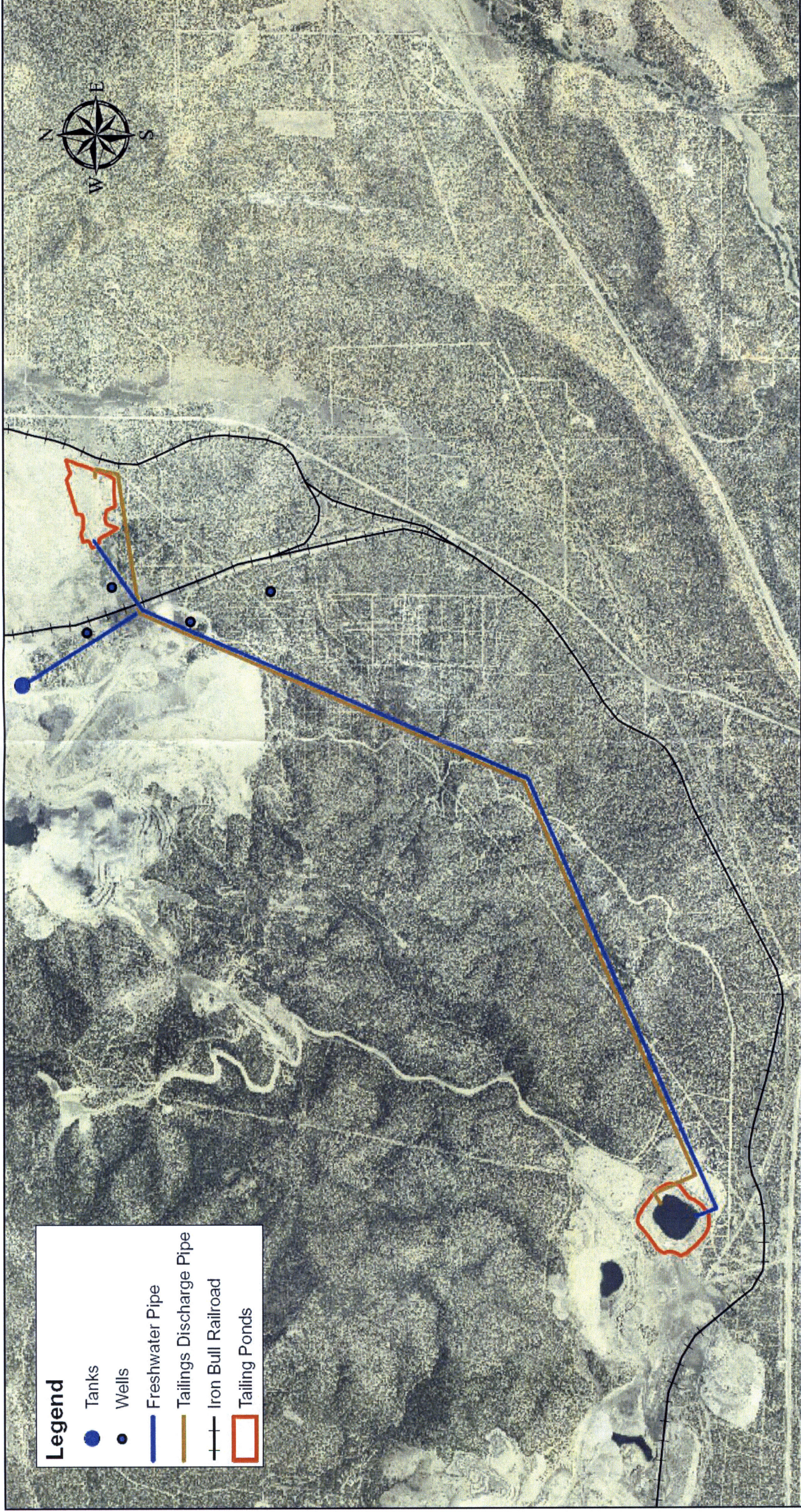


Figure 4
Economic Development Area



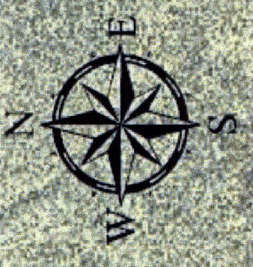
Water Rights

WR Number	Diversion Type/Location	Priority	ACFT	Owner Name
71-433	Underground	1927	294.32	FIDDLERS CANYON L.L.C (JACK E. JR. & PATRICIA J. MOYLE)
71-434	Underground	1927	294.32	FIDDLERS CANYON L.L.C (JACK E. JR. & PATRICIA J. MOYLE)
71-435	Underground	1927	294.32	FIDDLERS CANYON L.L.C (JACK E. JR. & PATRICIA J. MOYLE)
71-436	Underground	1927	294.32	FIDDLERS CANYON L.L.C (JACK E. JR. & PATRICIA J. MOYLE)
71-437	Underground	1927	294.32	FIDDLERS CANYON L.L.C (JACK E. JR. & PATRICIA J. MOYLE)
71-142	Underground	1933	10.045	FIDDLERS CANYON L.L.C (JACK E. JR. & PATRICIA J. MOYLE)
71-438	Underground	1933	4.65	FIDDLERS CANYON L.L.C (JACK E. JR. & PATRICIA J. MOYLE)
71-141	Underground	1934	10.045	FIDDLERS CANYON L.L.C (JACK E. MOYLE)
71-584	Underground	1935	36.2	PALLADON IRON CORPORATION
71-800	Underground	1936	599.39	FIDDLERS CANYON L.L.C (JACK E. MOYLE)
71-155	Underground	1941	474.9	PALLADON IRON CORPORATION
71-181	Underground	1945	499.8	PALLADON IRON CORPORATION
71-1197	Underground	1946	330.2	PALLADON IRON CORPORATION
71-1205	Underground	1946	116.8	PALLADON IRON CORPORATION
71-2403	Underground	1949	81.08	PALLADON IRON CORPORATION
71-801	Underground	1951	320	PALLADON IRON CORPORATION
71-4510	Underground	1900	8	PATRICK D. AND ENRIQUETA I. ROURKE
71-4521	Underground	1900	1	KENT HYRUM PRISBREY
71-15	Underground	1914	264.8	WESTERN ELECTROCHEMICAL COMPANY
71-207	Underground	1915	0.984	ROBERT RUSSELL & SHIRLEY ANN NEAL
71-3219	Underground	1922	10.9	H. WENDELL AND CARMEN C. JONES
71-580	Underground	1923	241.8	C/O JACK NELSON UNION PACIFIC RAILROAD COMPANY
71-746	Underground	1924	16.8	JONES 1990 INVESTMENT PARTNERSHIP
71-764	Underground	1925	0	GLORIA JEAN BULLOCH
71-432	Underground	1927	38.4	WESTERN ELECTROCHEMICAL COMPANY
71-785	Underground	1927	32.6	ALFRED GRANT BIEDERMAN
71-325	Abandoned Well	1928	5.6	HARRIS MAC & SCOTT LEON NELSON
71-2491	Underground	1929	5.6	GRANT R. AND FERN S. ELLSWORTH
71-131	Underground	1939	6	WESTERN ELECTROCHEMICAL COMPANY
71-353	Underground	1939	3.2	WESTERN ELECTROCHEMICAL COMPANY
71-4348	Underground	1939	2	WESTERN ELECTROCHEMICAL COMPANY
71-3273	Underground	1941	20	ANNETTE EKMAN
71-3599	Underground	1941	1	THE MARRAY FAMILY TRUST
71-3743	Underground	1941	2	HOWARD E. WRIGHT
71-3769	Underground	1941	2	WILLIAM YOUNG
71-3806	Underground	1941	1	LYNN R. ELAM
71-4159	Underground	1941	1	ROBERT EUGENE WARD
71-4160	Underground	1941	0.76	N. S. BRANDSTETER
71-717	Underground	1941	291.78	CHARLES R. REEVE
71-776	Abandoned Well	1942	12.1	LEIGH LIVESTOCK COMPANY
71-1279	Underground	1943	26.1	PALLADON IRON CORPORATION
71-1176	Underground	1944	8.01	GORDON AND GLORIA BULLOCH
71-4422	Underground	1944	1	ROBERT AND JOY GESLER
71-1234	Underground	1945	10.9	PALLADON IRON CORPORATION
71-2844	Underground	1945	15.9	IRON COUNTY
71-4420	Underground	1945	1	STEWART AND JOAN SOMERVILLE
71-4421	Underground	1945	1	PAUL AIZLEY
71-914	Underground	1945	18.71	CEDAR CITY DISTRICT USA BUREAU OF LAND MANAGEMENT
71-1573	Underground	1947	12.6	HENRY WENDELL JONES TRUST
71-2843	Underground	1947	22.44	FRANK W. & CELESTIA A. NICHOLS
71-2425	Underground	1948	25.3	FRANK W. AND CELESTIA A. NICHOLS
71-2402	Underground	1949	106.4	PALLADON IRON CORPORATION
71-1162	Underground	1950	8.4	LEIGH LIVESTOCK COMPANY
71-1938	Underground	1953	160	WESTERN ELECTROCHEMICAL COMPANY
71-3810	Underground	1954	136.8	WESTERN ELECTROCHEMICAL COMPANY
71-2812	Underground	1955	10.9	USA BUREAU OF LAND MANAGEMENT
71-2813	Underground	1956	7	ROBERT S. AND DONNA JEAN W. CLARK
71-2835	Underground	1956	36.2	PALLADON IRON CORPORATION
71-2867	Underground	1962	7.25	SILVIA BUSTAMANTE
71-4277	Underground	1962	1522.75	AMPAC DEVELOPMENT COMPANY OF UTAH
71-4590	Underground	1962	1	BRUCE H. AND JUDITH LEHMAN
71-4632	Underground	1962	1	CARLYLE G. AND FONDA MARIE JOHNSON
71-4640	Underground	1962	1	TALKAD L. AND KATHLEEN M. PATHI
71-4641	Underground	1962	1	JOHN AND BARBARA SHIPP
71-4643	Underground	1962	1	CHARLOTTE PEDERSEN
71-4644	Underground	1962	0.45	GILBERT & GILBERT, L.L.C.
71-4645	Underground	1962	0.45	JAMES W. AND DANA L. DARRIN CAMPBELL
71-4646	Underground	1962	0.9	JEFFREY A. KEYS
71-4647	Underground	1962	0.45	JEANETTE MACDANIELS
71-4648	Underground	1962	0.45	JAMES W. AND DANA L. DARRIN CAMPBELL
71-4649	Underground	1962	4.5	NELSON FAMILY TRUST
71-4651	Underground	1962	11	ZAPHIROPOULOS 1992 LIVING TRUST
71-4653	Underground	1962	1	DONALD E. AND DEBRA L. BAKER
71-4654	Underground	1962	3	DIXIE CABLE SERVICES
71-4655	Underground	1962	1	DONALD E. AND DEBRA L. BAKER
71-4656	Underground	1962	2.7	MARK. A. CARROLL
71-4671	Underground	1962	4	DONALD E. & DEBRA L. BAKER
71-4696	Underground	1962	0.65	JACK L. & ANNA M. DOYLE
71-4717	Underground	1962	1	CRAIG-JORGENSEN L.L.C.
71-4889	Underground	1962	4.05	CERVANDO GONZALES
71-4893	Underground	1962	3.15	BERNARD MENAKER
71-2479	Underground	1963	5.768	ROBERT S. AND DONNA JEAN W. CLARK

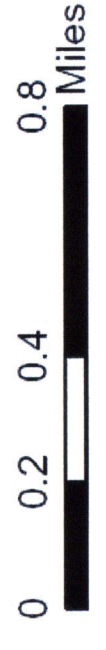


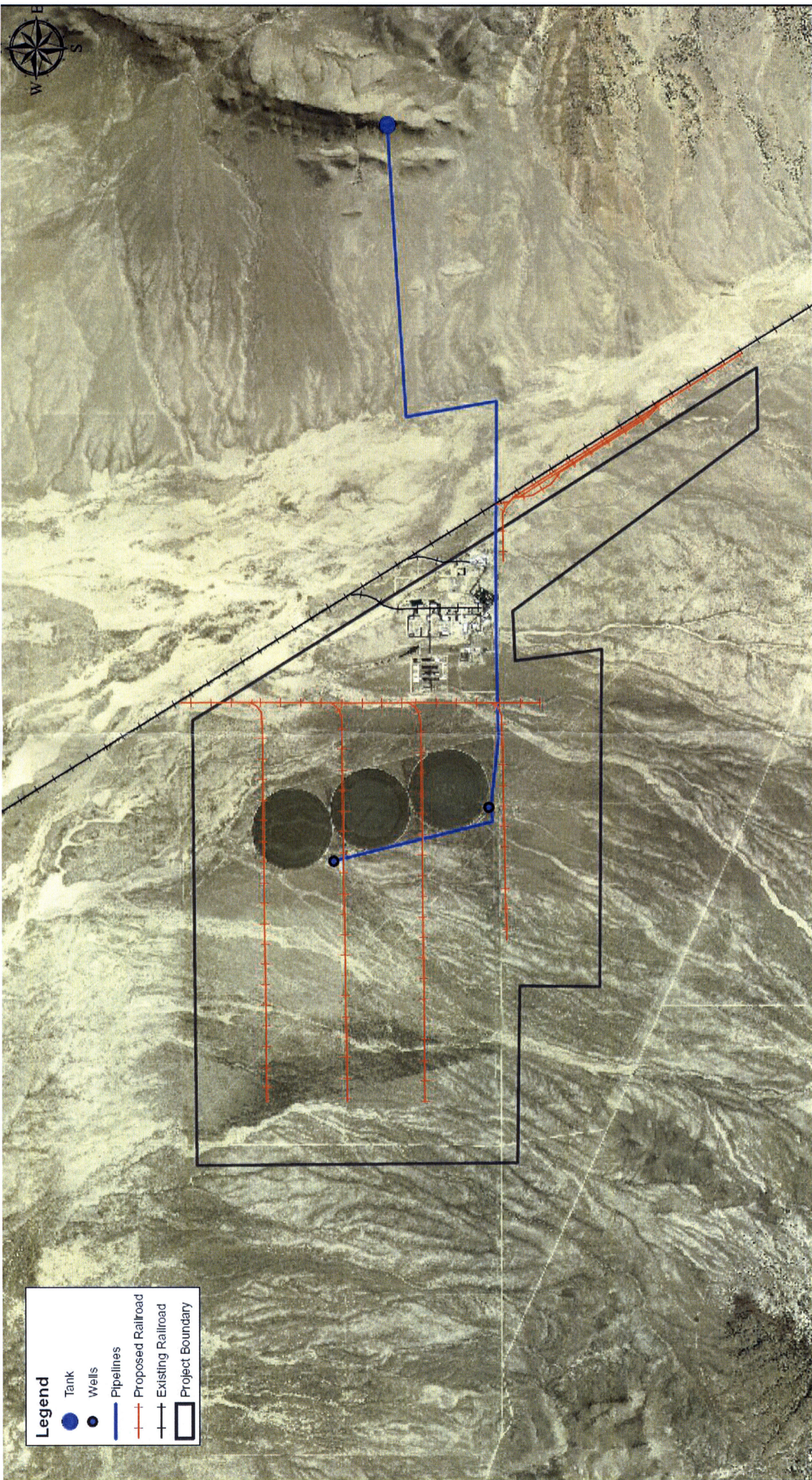
Legend

- Tanks
- Wells
- Freshwater Pipe
- Tailings Discharge Pipe
- Iron Bull Railroad
- Tailing Ponds



Future Palladon Water System





Legend

- Tank
- Wells
- Pipelines
- Proposed Railroad
- Existing Railroad
- Project Boundary

Future WECCO Water System

