



**City of Reno and Washoe County  
TMSA/FSA  
Water, Wastewater,  
and Flood Management  
Facility Plan**

**Volume 2**

**November 2007**

Prepared for  
**City of Reno  
Washoe County  
Regional Water Planning Commission**

Prepared by  
**ECO:LOGIC Engineering  
HDR**

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Consulting Engineers

**HDR**



**ECO:LOGIC**

**Consulting Engineers**

**City of Reno and Washoe County TMSA/FSA  
Water, Wastewater, and Flood Management  
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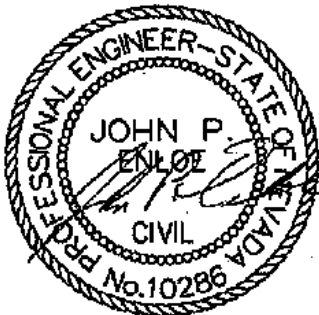
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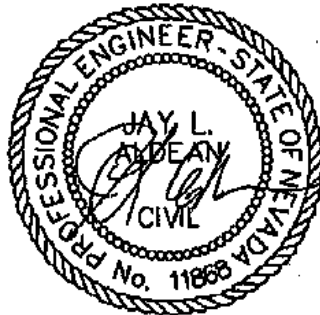
Water and Wastewater

Flood Management  
and Stormwater



EXPIRES 12/31/08

10/10/07



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10/10/07

# **City of Reno and Washoe County TMSA/FSA Water, Wastewater, and Flood Management Facility Plan**

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Methodologies, Design Criteria  
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## Appendix A - Design Criteria, Methodology and Cost Basis

The design criteria, methodology and cost basis are described in Appendix A for water, wastewater, and stormwater. The limitations of the TAZ data are also discussed.

### LIMITATIONS OF TAZ ANALYSIS

The land use basis for facility planning is Traffic Analysis Zone (TAZ) data provided by the City of Reno and Washoe County, with supplemental information derived from the City's Master Plan and Washoe County planned land uses. Using TAZ data is not ideal for water and wastewater infrastructure planning. The TAZ boundaries were created by the Regional Transportation Commission (RTC) in a manner that made sense for transportation planning. The challenges of using the TAZ data for water and wastewater planning and the assumptions used are listed in the following.

City and County Boundaries. The TAZ boundaries do not take into account jurisdictional boundaries between Reno, Sparks, and Washoe County.

Utility Agency Boundaries. The boundaries do not account for different water purveyors, wastewater treatment areas, and flood control jurisdictions. Water demands and wastewater flows are generated per TAZ. The TAZ generated demands and flows are allocated between different entities by the location of the TAZ centroid. Many of the TAZs in new areas are very large and cross many boundaries. These demands and flows are distributed manually instead of allocating all of the demand and flow in one area.

Target Zones. The TAZ boundaries crossed target area boundaries for the City of Reno Transit Oriented Development and Center areas. To determine the amount of water demand and wastewater flow from the target areas, a TAZ with an area of 10 percent or greater in a target zone is included.

Dwelling Units. The TAZ data lists projected dwelling units by planning year by TAZ. This dwelling unit data does not reflect the most current planned development data. These data are modified with more detailed information provided by the University of Nevada, Reno Small Business Development Center and developer's representatives. In areas with planned unit development designations, the TAZ data were modified to reflect the planned unit development designations. For the next TAZ data update, these new projections should be used as a starting base.

Constrained Areas. The original TAZ data do not take into account constrained areas such as playas, airports, slope constrained areas and floodways. An artificially high number of developable acres causes the dwelling unit projections to be high when multiplied by a dwelling unit per acre factor. The constrained areas were removed.

The water demands are based on lot size, which is calculated by dividing the dwelling units by the available developable acreage to determine the average lot size. For Reno, available residential acreage is determined by subtracting the 2095 commercial industrial acreage from the developable land. The 2095 average lot size is applied for both the 2030 and 2095 projections.

Commercial and Industrial Acreage. The City of Reno commercial and industrial acreage is projected for buildout and not by planning year. Therefore, the same commercial industrial acreage is assumed for 2030 and 2095. The Washoe County TAZ data does not enumerate commercial and industrial acreage. This acreage is estimated using the County planned land use data.

## INFRASTRUCTURE ANALYSIS

The design criteria and methodology for water and wastewater are described in this section.

### Water

The water demands and infrastructure design are based on the criteria shown in Table A.1.

Table A.1 - Water Design Criteria

<b>Demand Factors (TMWA)</b>	
Single Family Residential maximum day demand with Potable Water Irrigation (gpm)	$MDD = 0.00904\sqrt{area}$ (area units are square feet)
Per Unit Multi Family Residential maximum day demand without Potable Water Irrigation (gpm)	MDD = 0.15 gpm x # of units
Commercial/Industrial demand factors	1,000 gal/acre/day (Average Day Demand)
<b>Demand Factors (County)</b>	
Residential average day demand	700 gpd per connection
Residential maximum day demand	2,100 gpd per connection
Commercial/Industrial average day demand	1,490 gpd per connection
Commercial/Industrial maximum day demand	3,243 gpd per connection
<b>Peaking Factor (a) (TMWA)</b>	
ADD to MDD (Multi-family residential)	Multiply by 1.21 (current TMWA peaking factor)
ADD to MDD (Single family residential)	Multiply by 1.72 (current TMWA peaking factor)
ADD to MDD (Commercial Industrial)	Multiply by 1.72 (current TMWA peaking factor)
<b>Water Rights Factor (County)</b>	
Warm Springs	2.5 AF per dwelling unit
St. James's Village	0.86 AF per dwelling unit
All other areas	1.12 AF per dwelling unit
<b>Water Rights Factor (TMWA)</b>	
Rule 7	Factor (AF) = 1.1 + 10,000/(lot size); 0.12 AF minimum

<b>Pressures</b>	
Minimum Service Pressures During Maximum Day Demands	45 psi
Maximum Service Pressures During Static Conditions	100 psi (b)
Minimum Distribution System Pressure under Maximum Day Demands + Fire	20 psi
<b>Fire Flows</b>	
Residential	2,000 gpm for 2 hours (per International Fire Code)
Commercial	4,000 gpm for 4 hours (per International Fire Code)
<b>Pipe Sizing</b>	
General Pipe sizing	Per NAC criteria for velocity and pressure
Maximum Distribution System Velocities during Max Day Demands	5 fps
Maximum Distribution System Velocities During Max Day Demands + Fire	10 fps
Hazen Williams "C" Factor for new pipes	130
<b>Storage Tank Sizing (County)</b>	
Total Operational and Emergency Storage (gallons)	= Total ERUs x 850
Total ERUs	= Total average day demand + 700 gal/day
Fire storage	Based on International Fire Code flow and duration
<b>Storage Tank Sizing (TMWA)</b>	
Operational storage	= 15% of total maximum day demand
Emergency storage	= average day demand
Fire storage	Based on International Fire Code flow and duration

(a) Only average day demands, maximum day demands and maximum day demands + fire flow were considered for facility planning.

(b) It is important to note that transmission main pressures are not limited to 100 psi as are distribution system mains with service taps.

## Wastewater

The wastewater flows and facilities are based on the design criteria shown in Table A.2.

Table A.2 - Wastewater Design Criteria

Treatment Plant Flow		
Residential flow rate	per 208 Plan	gpcd
Capita per dwelling unit	2.19	capita/ DU
Commercial/Industrial flow rate	750	gpad

<b>Interceptor Criteria</b>		
Residential flow rate	per 208 Plan, 1.5 PF	gpcd
Commercial flow rate	10,000	gpcd
Industrial flow rate	3,000	gpcd
Infiltration and Inflow	add 10% of avg gpd	gpd
Depth of Flow	<0.5 pipe diameter (City of Reno) <0.7 pipe diameter (Washoe County)	
Manning Roughness Coefficient	n= 0.014	

### Wastewater Collection System Analysis

The wastewater collection system was analyzed and designed using the following method.

1. Compile data from existing interceptors and previously planned interceptors if available. Define new interceptors to serve future development areas where necessary.
2. Define sewer collection areas by interceptor location and topography
  - a. Create separate collection areas for County areas and City of Reno
3. Define analysis reaches for interceptors based on length and collection area. Define the pipe geometry:
  - a. Diameter(s)
  - b. Avg. slope (upstream inv. - downstream inv. / length)
4. Determine existing capacity of interceptors
  - a. 0.5 d/D
  - b. n = 0.014
5. Select TAZs by collection area based on TAZ centroid
  - a. Divide large TAZs as necessary
6. Sum 2030 wastewater interceptor flows by collection area
7. Apply flows to interceptors
  - a. Apply entire collection area flow if only 1 interceptor is in a collection area
  - b. If more than 1 interceptor in collection area, divide flow by number of interceptors
  - c. Ignore interceptors that fall on collection boundaries – assume “Conveyors” not “collectors”
  - d. Sum flow for each consecutive downstream interceptor
8. For existing interceptors:
  - a. Compare 2030 interceptor flow versus existing interceptor capacity, if exceeds:
  - b. Determine size of **parallel** interceptor required to carry excess flow at 0.5 d/D (assume same average slope as existing)
9. For new interceptors:
  - a. Determine size of new interceptor required to carry flow at 0.5 d/D (assume average slope = slope of existing grade)
10. For new force mains:
  - a. Size for full flow such that the velocity is less than 5 fps

## Non-Residential Reclaimed Water Demands

Irrigation demands are based on an application rate of 3.5 AFA. The land area assumed to be irrigated is 50% of gross acreage for parks, 50% of gross acreage for open spaces, 20% of gross acreage for schools, and 15% of gross acreage for commercial and industrial.

## WATER AND WASTEWATER COST BASIS

The cost estimates for water and wastewater infrastructure are based on the costs shown in Table A.3.

Table A.3 - Water and Wastewater Cost Basis

May 2007 20 Cities ENRCCI	7,942
Pipeline Cost	\$12/in/LF
Pump Station Efficiency	70 %
Water Pump Station Cost	30,500*HP <sup>A</sup> 0.558 (\$400,000 min)
Wastewater Lift Station Cost	250,000+1.0*ADD (gpd)
Reclaimed Water Pump Station Cost	250,000+1.0*ADD (gpd)
Storage Tank Cost	\$1/gal
Engineering Cost	20%
Contingency	20%

## STORMWATER

The goals and desired outcomes for this update have been explained in other sections of this report. The Washoe County Regional Water Management Plan, 2004 – 2025, Policy 3.1.a includes a recommendation for the development of a Regional Floodplain Management Plan and a Regional Flood Control Master Plan, and adoption of the plan by each of the three entity members of the Regional Water Planning Commission. The Water Management Plan is conceived as a guidance document for the promulgation of non-structural types of flood reduction controls, i.e. the identification of potential flood hazards, strategies to mitigate flood damage in existing areas and strategies to manage future development. The Flood Control Master Plan is a plan that receives guidance from the Water Management Plan and identifies specific projects within a watershed for the protection of life and property.

The Water Management Plan also stipulates the need for consistent and regionally recognized flood control/drainage engineering design criteria. Therefore, the Draft Hydrologic Criteria and Drainage Design Manual was developed and utilized for additional specific engineering criteria to provide guidance for this planning update. In addition, Chapter 18.12, Articles 17 through 19 of the City of Reno General Development and Design Standards, as well as Chapter II – Storm Drainage was also used. Finally, not all of the necessary engineering criteria are defined in the above cited references and engineering judgment will be discussed and applied in those cases.

## **FLOODPLAIN DELINEATION**

### **Hydrology**

Initial watershed delineation was performed with ArcHydro, using USGS 10m DEM coverage. The minimum contributing area was specified as one square mile. Final basin outlines were delineated by hand in ArcMap using USGS 1:24,000 DRGs.

In order to meet the original timeline for work completion of this update, it was the intention to utilize HEC1/HEC-HMS to estimate flows for floodplain delineation and project size requirements. This program would be adept at predicting future flows based on project land use information. Midway through the plan update it was realized that the land use information would not be made available with adequate time to provide consistent recommendations for all of the study areas. Therefore a more expedient method was selected.

To calibrate the methodology, a representative test watershed was modeled using HMS. The modeled parameters included an assumed 5% impervious surface coverage and a composite curve number of 68. This number was compared to results obtained from the USGS flood-frequency regression equations for Regions 2 and 6 and found that an average of the two equations yielded a reasonable number for our test case. Precipitation values for the HMS model were derived from the NOAA Atlas 14 website.

### **Hydraulics**

Manning's n values were assumed to be 0.06 for overbank areas, and 0.045 for in-channel areas. The value for channel areas represents a normal condition channel which is clean, winding, with some pools and shoals with some weeds and stones. The value for overbank areas represents floodplains with light brush and trees in summer. These values are taken from the Manning's n information table contained in HEC-RAS.

### **Geomorphological Interpretation**

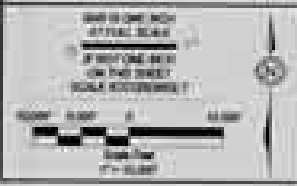
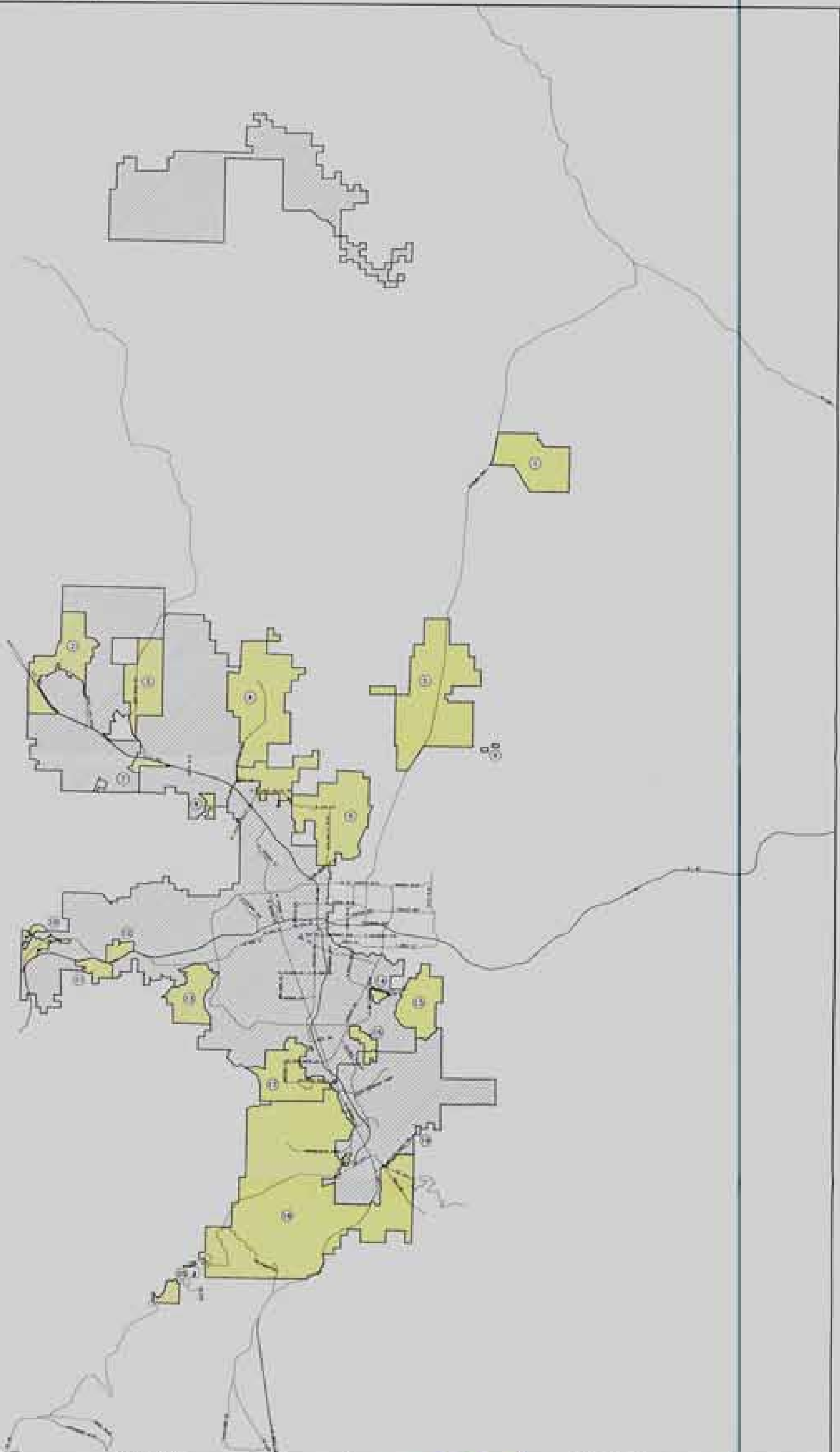
Meander belt width was estimated using geomorphic empirical relationships. Three equations were used, two from Inglis (1949), and one from Leopold & Wolman (1957). All three equations related meander amplitude to channel width. Channel widths were measured on USGS Digital Orthophoto Quarter Quads (DOQQs) where the channel was visible. When a defined channel was not visible, no belt width was calculated. Channel width polylines were drawn using the DOQQs. The lengths of the channel line segments were calculated in ArcMap and exported to an Excel spreadsheet, which was used to calculate meander belt width using each empirical relationship mentioned above. The relationship that gave the most conservative result was used to develop the meander belt polygons. This equation (from Inglis 1949) is  $A = 18.6w^{0.99}$ , where A is amplitude in feet and w is channel width at bankfull stage, also in feet. Using the amplitude lengths calculated in Excel, polylines were created at the location of the channel width measurements. Meander belt polygons were created by joining the ends of the amplitude polyline segments.

Channel widths were difficult to distinguish along the Cold Springs and Red Rock Valley streams, making it impossible to calculate meander belt widths for those basins.

### **Playas**

The following reference provided guidance for development of the FEMA base flood elevation in White Lake; *Hydrologic Analysis of Silver Lake and Lemmon Valley Playas*, as revised December 1987. The model assumed impervious surface coverages of 3% to represent existing development and 10% to represent full development within the watershed. The 10% value should be considered as conservative for future conditions.

Although approximate methods were used in this update, the detail will be sufficient to provide a commensurate level of project costs and good planning guidance for the undeveloped areas.



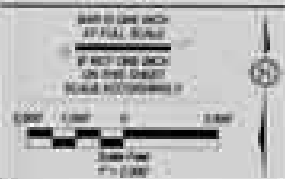
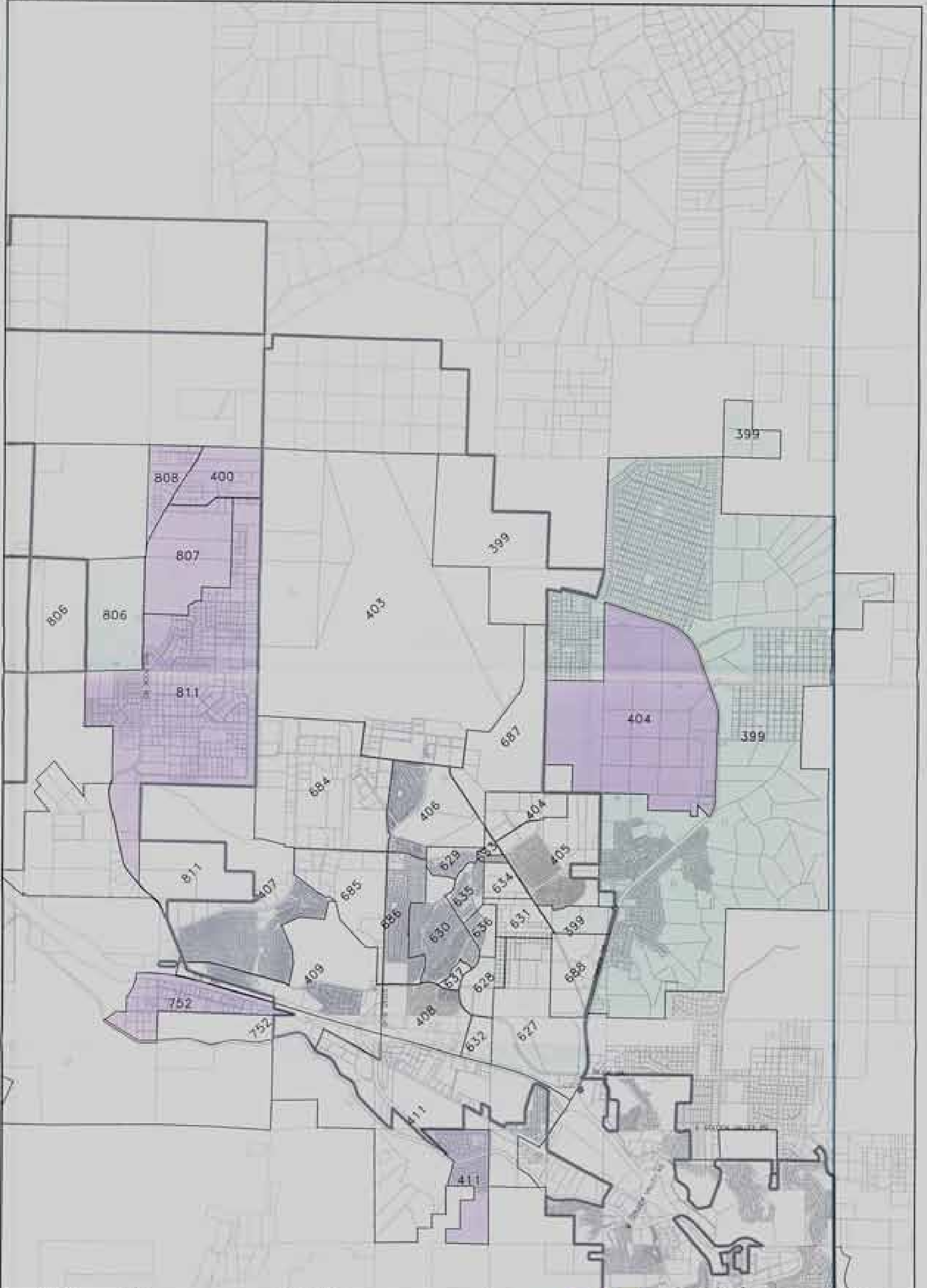
**MAP SYMBOLS**

	WASHOE COUNTY AREAS		REFERENCE NUMBER
	CITY OF RENO AREAS		

**HDR**  
**ECO-LOGIC**  
 12801 Canyon Blvd., Suite 200  
 Reno, NV 89521  
 Phone: (775) 851-8911  
 Fax: (775) 851-8914

<b>TMSAFSA FACILITY PLAN - FIGURE 1-A1</b>			
<b>WASHOE COUNTY AREA NUMBERS</b>			
<b>COUNTY OF WASHOE, NEVADA</b>			
DESIGNED BY	REVIEWED BY	DATE	SCALE
DRAWN BY	CHECKED BY	DATE	SCALE





**MAP SYMBOLS**

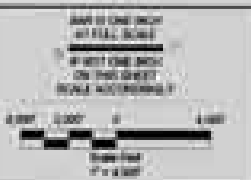
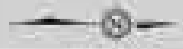
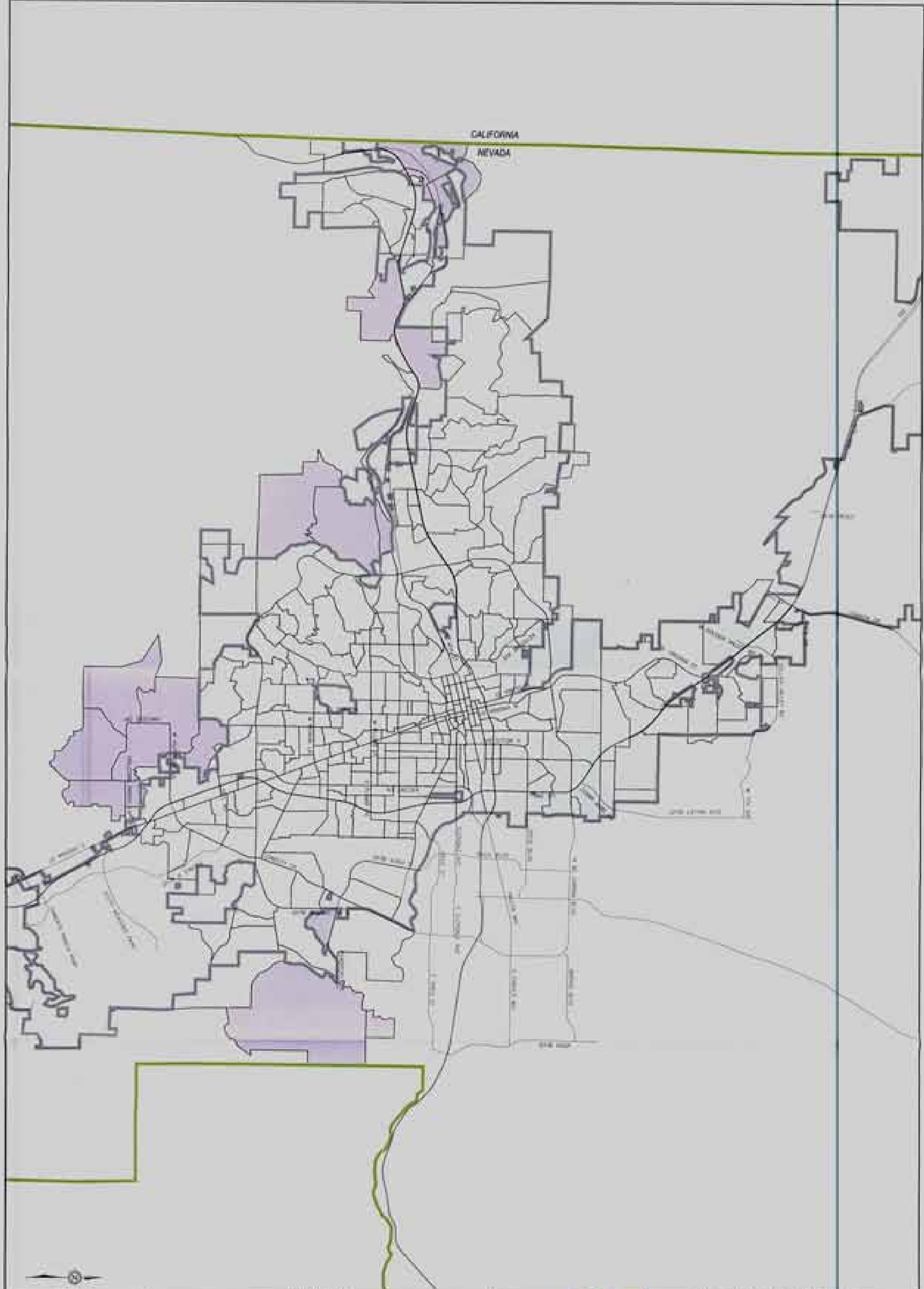
NEW TAX DATA MODIFIED	WASHOE COUNTY TAX DATA MODIFIED	CITY OF RENO MAPS
NEW TAX DATA NOT MODIFIED	WASHOE COUNTY TAX DATA NOT MODIFIED	

**HDR**  
**ECOLOGIC**  
 10000 Boulder & Boulder  
 Reno, Nevada 89502  
 Phone: (775) 857-2000  
 Fax: (775) 857-2000

**STADLEMMON VALLEY TMSA - FIGURE 6-A1  
 TAX BOUNDARIES WITH DATA MODIFICATION  
 COUNTY OF WASHOE, NEVADA**

REVISED	REVISION	BY	DATE	REASON FOR CHANGE	DESIGNED	APPROVED
			NOV 2017		JAW	JAW
					CHANGED	CHK

CALIFORNIA  
 NEVADA



MAP SYMBOLS

- RENO TAZ DATA MODIFIED
- RENO TAZ DATA NOT MODIFIED
- WASHOE COUNTY TAZ DATA NOT MODIFIED
- CITY OF RENO (LIMITS)

**ECO:LOGIC**  
 Environmental Engineering  
 10200 Canyon Blvd., Suite 200 Reno, Nevada 89521 Phone: (775) 837-2010 Fax: (775) 837-2018

TRUCKEE MEADOWS TMSA - FIGURE 9-A1 TAZ BOUNDARIES WITH DATA MODIFICATION COUNTY OF WASHOE, NEVADA						
REV. NO.	REVISION	BY	JOB #	PERSON/DATE	DESIGNED / CHECKED	APPROVED
				NOV 2005 T. A. L. / J.S.	J.S. / J.S.	J.S.

**Water Calculations and Cost Estimates  
Spring Mountain**

Appendix B  
Water Calculations and Cost  
Estimates

Walter Galkaullattonis and Michael J. Hallin  
Copa and Communications

**Estimated Costs for the Facilities in Spring Mountain**

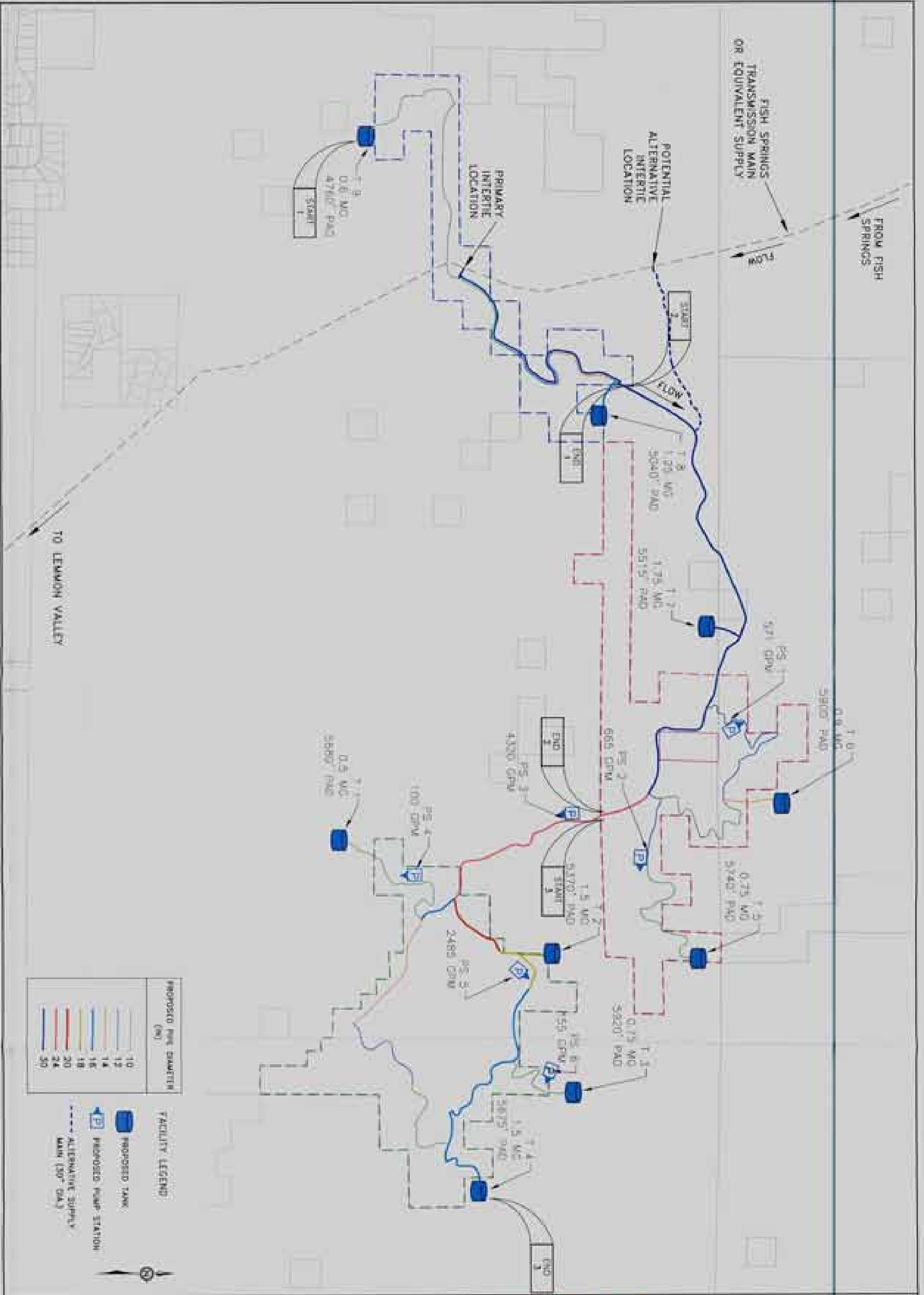
No.	Description	Qty.	Unit	Unit Cost	Cost	East	Central	West	
<b>1 From South End of West Area Development to Tank B</b>									
<b>1.1 Transmission</b>									
	30" Pipe	13,520	L.F.	\$360	\$4,867,200	\$ 2,324,560	\$ 1,643,400	\$ 899,240	
	16" Pipe	1,460	L.F.	\$192	\$280,300	-	-	\$280,300	
	14" Pipe	3,560	L.F.	\$168	\$598,100	-	-	\$598,100	
	12" Pipe	4,620	L.F.	\$144	\$664,100	-	-	\$664,100	
	10" Pipe	18,400	L.F.	\$120	\$2,208,000	-	-	\$2,208,000	
<b>1.2 Storage</b>									
	Tanks	1,850,000	Gal	\$1	\$1,850,000	-	-	\$1,850,000	
					<b>Subtotal =</b>			<b>\$ 10,498,000</b>	
<b>2 From Vidler Connection to the South End of Central Area</b>									
<b>2.1 Transmission</b>									
	30" Pipe	25,820	L.F.	\$360	\$9,295,200	\$5,445,430	\$3,849,770	-	
	24" Pipe	2,070	L.F.	\$288	\$598,160	\$349,250	\$246,910	-	
	14" Pipe	2,490	L.F.	\$168	\$418,300	-	\$418,300	-	
	12" Pipe	13,490	L.F.	\$144	\$1,942,600	-	\$1,942,600	-	
	10" Pipe	16,760	L.F.	\$120	\$2,013,600	-	\$2,013,600	-	
	Booster Pump Station 1	82	hp		\$400,000	-	\$400,000	-	
	Booster Pump Station 2	62	hp		\$400,000	-	\$400,000	-	
<b>2.2 Storage</b>									
	Tanks	3,400,000	Gal	\$1	\$3,400,000	\$263,620	\$3,136,380	-	
					<b>Subtotal =</b>	<b>\$ 18,466,000</b>			
<b>3 From South End of Central Area to East Area</b>									
<b>3.1 Transmission</b>									
	24" Pipe	9,200	L.F.	\$288	\$2,649,600	\$2,649,600	-	-	
	20" Pipe	3,460	L.F.	\$240	\$830,400	\$830,400	-	-	
	18" Pipe	3,990	L.F.	\$216	\$861,800	\$861,800	-	-	
	16" Pipe	15,060	L.F.	\$192	\$2,891,500	\$2,891,500	-	-	
	14" Pipe	6,070	L.F.	\$168	\$1,019,800	\$1,019,800	-	-	
	12" Pipe	4,990	L.F.	\$144	\$718,600	\$718,600	-	-	
	10" Pipe	17,380	L.F.	\$120	\$2,085,600	\$2,085,600	-	-	
	Booster Pump Station 3	65	hp		\$400,000	\$400,000	-	-	
	Booster Pump Station 4	5	hp		\$400,000	\$400,000	-	-	
	Booster Pump Station 5	135	hp		\$471,000	\$471,000	-	-	
	Booster Pump Station 6	15	hp		\$400,000	\$400,000	-	-	
<b>3.2 Storage</b>									
	Tanks	4,250,000	Gal	\$1	\$4,250,000	\$4,250,000	-	-	
					<b>Subtotal =</b>	<b>\$ 16,978,000</b>			
<b>Construction Total</b>						<b>\$ 45,942,000</b>	<b>\$ 25,361,000</b>	<b>\$ 14,061,000</b>	<b>\$ 8,630,000</b>
<b>4 Other Costs</b>									
	Engineering Cost (20%)				\$ 9,188,000	\$ 5,072,200	\$ 2,810,200	\$ 1,306,000	
	Contingency (20%)				\$ 9,188,000	\$ 5,072,200	\$ 2,810,200	\$ 1,306,000	
					<b>Subtotal</b>	<b>\$ 18,376,000</b>			
<b>Total =</b>						<b>\$ 64,318,000</b>	<b>\$ 35,505,000</b>	<b>\$ 19,671,000</b>	<b>\$ 9,142,000</b>

Note: 20 Cities ENRCCI = 7,942 May 2007

**Estimated Costs for the Facilities in Spring Mountain**

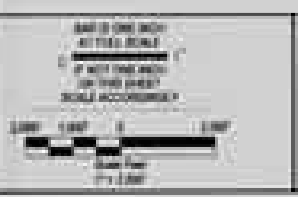
No.	Description	Qty.	Unit	Unit Cost	Cost	East	Central	West	
<b>1</b>	<b>From South End of West Area Development to Tank B</b>								
1.1	Transmission								
	20" Pipe	11,320	L.F.	\$360	\$4,077,200	\$ 2,324,560	\$ 1,643,400	\$ 899,240	
	18" Pipe	1,460	L.F.	\$182	\$263,720	-	-	\$263,720	
	14" Pipe	3,560	L.F.	\$168	\$596,160	-	-	\$596,160	
	12" Pipe	4,820	L.F.	\$144	\$694,080	-	-	\$694,100	
	10" Pipe	18,400	L.F.	\$120	\$2,208,000	-	-	\$2,208,000	
1.2	Storage Tanks	1,850,000	Gal	\$1	\$1,850,000	-	-	\$1,850,000	
	<b>Subtotal =</b>								
					<b>\$ 10,486,000</b>				
<b>2</b>	<b>From Vidler Connection to the South End of Central Area</b>								
2.1	Transmission								
	20" Pipe	25,820	L.F.	\$360	\$9,295,200	\$5,445,430	\$3,849,770	-	
	24" Pipe	2,070	L.F.	\$288	\$596,160	\$249,250	\$246,910	-	
	14" Pipe	2,490	L.F.	\$168	\$418,320	-	\$418,300	-	
	12" Pipe	13,490	L.F.	\$144	\$1,942,600	-	\$1,942,600	-	
	10" Pipe	16,180	L.F.	\$120	\$2,013,600	-	\$2,013,600	-	
	Booster Pump Station 1	62	hp		\$400,000	-	\$400,000	-	
	Booster Pump Station 2	62	hp		\$400,000	-	\$400,000	-	
2.2	Storage Tanks	3,400,000	Gal	\$1	\$3,400,000	\$282,620	\$2,126,380	-	
	<b>Subtotal =</b>								
					<b>\$ 18,464,000</b>				
<b>3</b>	<b>From South End of Central Area to East Area</b>								
3.1	Transmission								
	24" Pipe	6,200	L.F.	\$288	\$1,785,600	\$2,649,600	-	-	
	20" Pipe	3,460	L.F.	\$240	\$830,400	\$830,400	-	-	
	18" Pipe	3,060	L.F.	\$216	\$661,800	\$661,800	-	-	
	16" Pipe	15,660	L.F.	\$180	\$2,818,800	\$2,891,500	-	-	
	14" Pipe	6,070	L.F.	\$168	\$1,021,800	\$1,019,800	-	-	
	12" Pipe	4,990	L.F.	\$144	\$718,600	\$718,600	-	-	
	10" Pipe	17,380	L.F.	\$120	\$2,085,600	\$2,085,600	-	-	
	Booster Pump Station 3	65	hp		\$400,000	\$400,000	-	-	
	Booster Pump Station 4	5	hp		\$400,000	\$400,000	-	-	
	Booster Pump Station 5	125	hp		\$471,000	\$471,000	-	-	
	Booster Pump Station 6	15	hp		\$400,000	\$400,000	-	-	
3.2	Storage Tanks	4,250,000	Gal	\$1	\$4,250,000	\$4,250,000	-	-	
	<b>Subtotal =</b>								
					<b>\$ 18,376,000</b>				
<b>Construction Total</b>					<b>\$ 46,942,000</b>	<b>\$ 28,361,000</b>	<b>\$ 14,851,000</b>	<b>\$ 6,830,600</b>	
<b>4</b>	<b>Other Costs</b>								
	Engineering Cost (20%)				\$ 9,388,000	\$ 5,072,200	\$ 2,810,200	\$ 1,306,000	
	Contingency (20%)				\$ 9,388,000	\$ 5,072,200	\$ 2,810,200	\$ 1,306,000	
	<b>Subtotal</b>					<b>\$ 18,776,000</b>			
	<b>Total =</b>					<b>\$ 64,718,000</b>	<b>\$ 38,805,000</b>	<b>\$ 19,671,000</b>	<b>\$ 9,142,600</b>

Note: 20 Cites EMCCD - 7-94 May 2002



PROPOSED PIPE DIAMETER (in)
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- FACILITY LEGEND**
- PROPOSED TANK
  - PROPOSED PUMP STATION
  - ALTERNATIVE SUPPLY MAIN (30" DIA.)



**HDR**  
 ECO-LOGIC  
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**SPRING MOUNTAIN TMSA - FIGURE 2-01  
 PROJECT DIVISIONS FOR COST ANALYSIS  
 COUNTY OF WASHOE, NEVADA**

REV NO.	REVISION	BY	DATE	SCALE	DESIGNED DRAWN CHECKED	APPROVED DATE

**Water Calculations and Cost Estimates**  
**Sage**

### Estimated Water Supply Costs for Sage

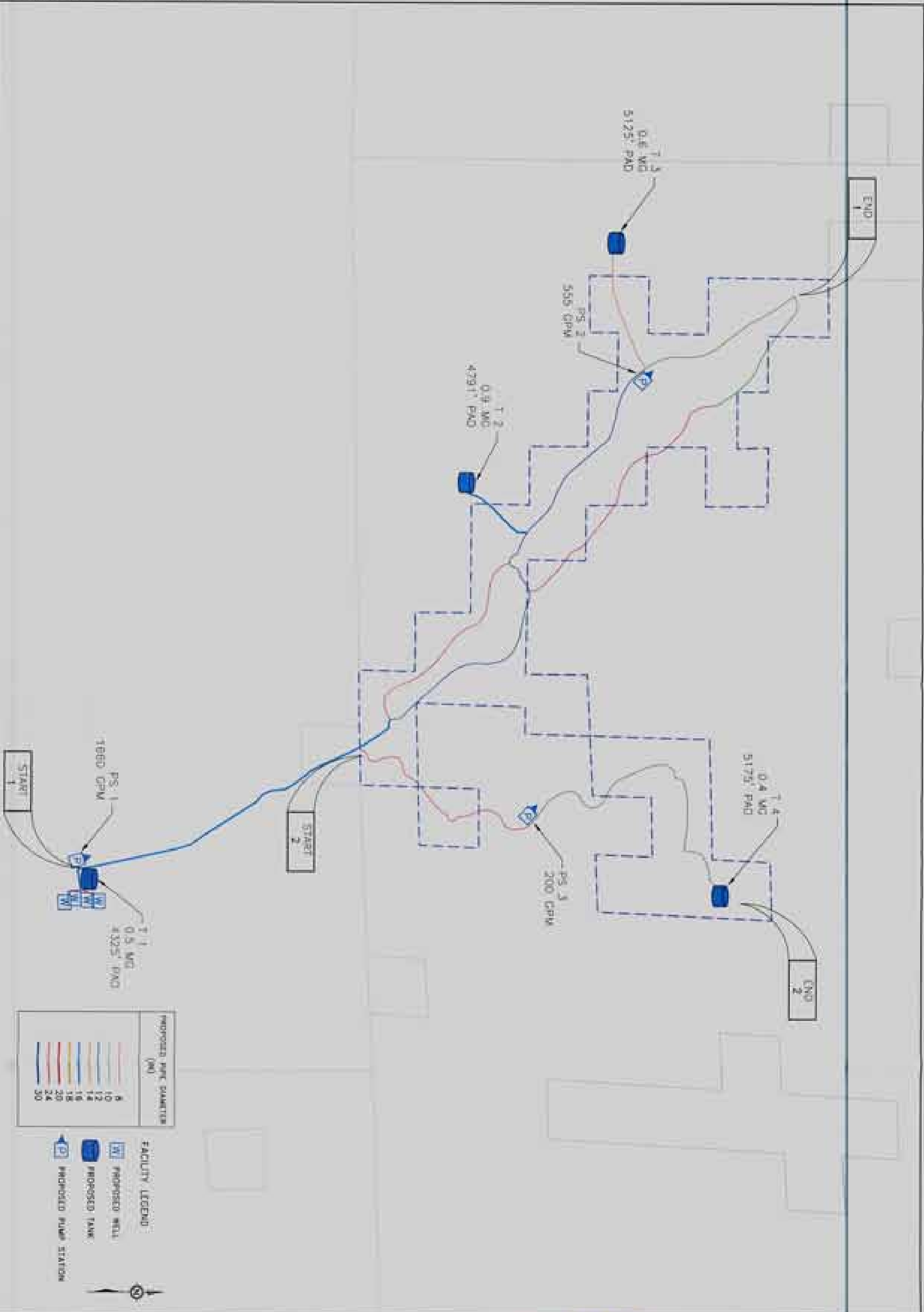
No.	Description	Qty.	Unit	Unit Cost	Total Cost
<b>1</b>	<b>Facility Costs</b>				
1.1	<i>Transmission</i>				
	16" Pipe	310	LF	\$192	\$59,520
	10" Pipe	150	LF	\$120	\$18,000
	8" Pipe	300	LF	\$96	\$28,800
1.2	Well (500 gpm, including pump station)	4	Ea	\$700,000	\$2,800,000
1.3	Tank	500,000	Gal	\$1	\$500,000
1.4	Pump Station 1	300	hp		\$735,400
				<b>Construction Total =</b>	<b>\$ 4,141,700</b>
<b>2</b>	<b>Other Costs</b>				
	Engineering Cost (20%)			\$	828,300
	Contingency (20%)			\$	828,300
				<b>Subtotal =</b>	<b>\$ 1,656,600</b>
				<b>Total =</b>	<b>\$ 5,798,000</b>

Note: 20 Cities ENRCCI = 7,942, May 2007

### Estimated Costs for the Facilities in Sage

No.	Description	Qty.	Unit	Unit Cost	Total Cost		
<b>1</b>	<b>From South Boundary to West area</b>						
<b>1.1 Transmission</b>							
	18" Pipe	9,830	LF	\$192	\$1,887,360		
	14" Pipe	2,630	LF	\$168	\$475,440		
	12" Pipe	5,540	LF	\$144	\$797,760		
	10" Pipe	12,880	LF	\$120	\$1,545,600		
	8" Pipe	11,150	LF	\$66	\$1,070,400		
	Pump Station 2	70	hp		\$400,000		
<b>1.2 Storage</b>							
	Tanks	1,400,000	Gal	\$1	\$1,400,000		
					<b>Subtotal =</b>	<b>\$ 7,577,000</b>	
<b>2</b>	<b>From South Boundary to East area</b>						
<b>2.1 Transmission</b>							
	10" Pipe	7,290	LF	\$120	\$874,800		
	8" Pipe	5,160	LF	\$96	\$495,400		
	Pump Station 3	25	hp		\$400,000		
<b>2.2 Storage</b>							
	Tanks	500,000	Gal	\$1	\$500,000		
					<b>Subtotal =</b>	<b>\$ 2,270,000</b>	
					<b>Construction Total</b>	<b>\$ 9,847,000</b>	
<b>3</b>	<b>Other Costs</b>						
					\$ 1,959,400		
					\$ 1,959,400		
					<b>Subtotal</b>	<b>\$ 3,939,000</b>	
					<b>Total =</b>	<b>\$ 13,786,000</b>	

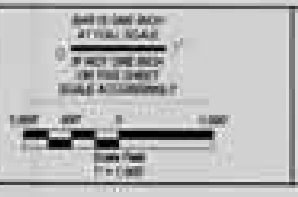
Note: 20 Cities ENRCI = 7,942, May 2007



**PROPOSED PIPE DIAMETER (in)**

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- FACILITY LEGEND**
- PROPOSED WELL
  - PROPOSED TANK
  - PROPOSED PUMP STATION



**MAP SYMBOLS**



**HDR**  
 ECOLOGIC  
 Consulting Engineers

1000 Lakes & Mountains Blvd., Reno, NV 89502  
 Phone: (775) 851-2211 Fax: (775) 851-2288

**SAGE TMSA - FIGURE 3-81  
 PROJECT DIVISIONS FOR COST ANALYSIS  
 COUNTY OF WASHOE, NEVADA**

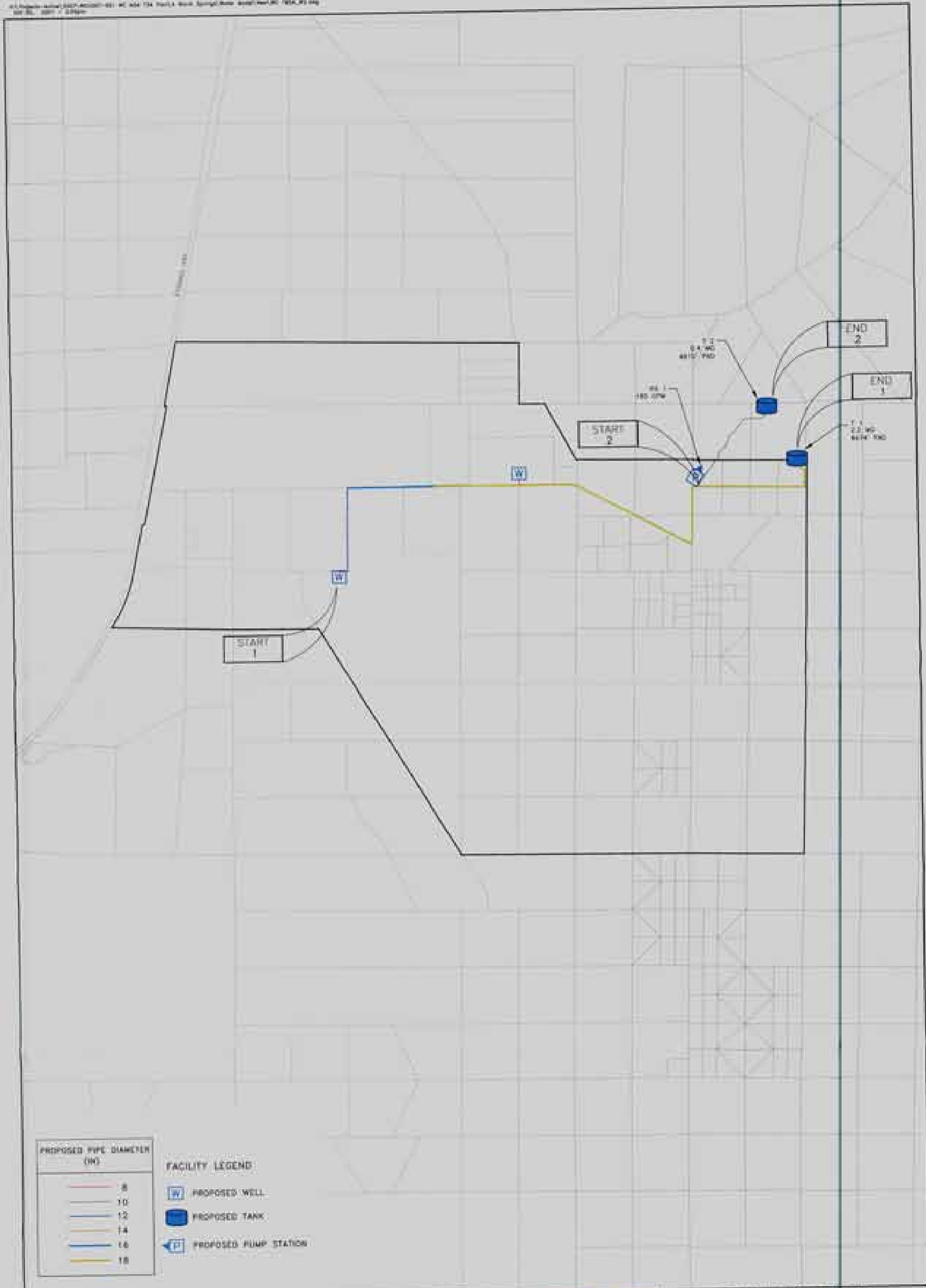
REV NO.	REVISION	BY	JOB #	690006402	DESIGNED	AVRNS
			DATE	05/01/2007	DRAWN	BA
			SCALE	1" = 100'	CHECKED	JVR

**Water Calculations and Cost Estimates  
Warm Springs**

### Estimated Costs for the Facilities in Warm Springs

No.	Description	Qty.	Unit	Unit Cost	Total Cost	
<b>1 From Well to Tank 1</b>						
1.1	<b>Transmission</b>					
	18" Pipe	10,810	L.F.	\$216	\$2,334,960	
	16" Pipe	2,050	L.F.	\$192	\$393,600	
	12" Pipe	2,000	L.F.	\$144	\$288,000	
	8" Pipe	500	L.F.	\$96	\$48,000	
1.2	<b>Storage</b>					
	Tanks	2,200,000	Gal	\$1	\$2,200,000	
					<b>Subtotal =</b>	<b>\$ 6,264,560</b>
<b>2 From Tank 1 Main to Tank 2</b>						
2.1	<b>Transmission</b>					
	10" Pipe	2,500	L.F.	\$120	\$300,000	
	Pump Station 1	10	hp		\$400,000	
2.2	<b>Storage</b>					
	Tanks	400,000	Gal	\$1	\$400,000	
					<b>Subtotal =</b>	<b>\$ 1,100,000</b>
<b>3 Supply Wells</b>						
	Well (750 gpm. including pump station)	2	Ea	\$1,000,000	\$2,000,000	
					<b>Subtotal =</b>	<b>\$ 2,000,000</b>
					<b>Construction Total</b>	<b>\$ 8,365,000</b>
<b>4 Other Costs</b>						
	Engineering Cost (20%)				\$ 1,673,000	
	Contingency (20%)				\$ 1,673,000	
					<b>Subtotal =</b>	<b>\$ 3,346,000</b>
					<b>Total =</b>	<b>\$ 11,700,000</b>

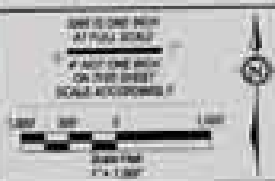
Notes: 20 Cities ENRCCI = 7,942, May 2007



**PROPOSED PIPE DIAMETER (IN)**

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- FACILITY LEGEND**
- W PROPOSED WELL
  - PROPOSED TANK
  - P PROPOSED PUMP STATION



**HDR**  
**ECO-LOGIC**  
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 Reno, Nevada 89503  
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 Fax: (775) 857-8312

**WARM SPRINGS TRSBA - FIGURE 4-B1  
 PROJECT DIVISIONS FOR COST ANALYSIS  
 COUNTY OF WASHOE, NEVADA**

REV NO.	REVISION	BY	DATE	IN CHARGE	DESIGNED

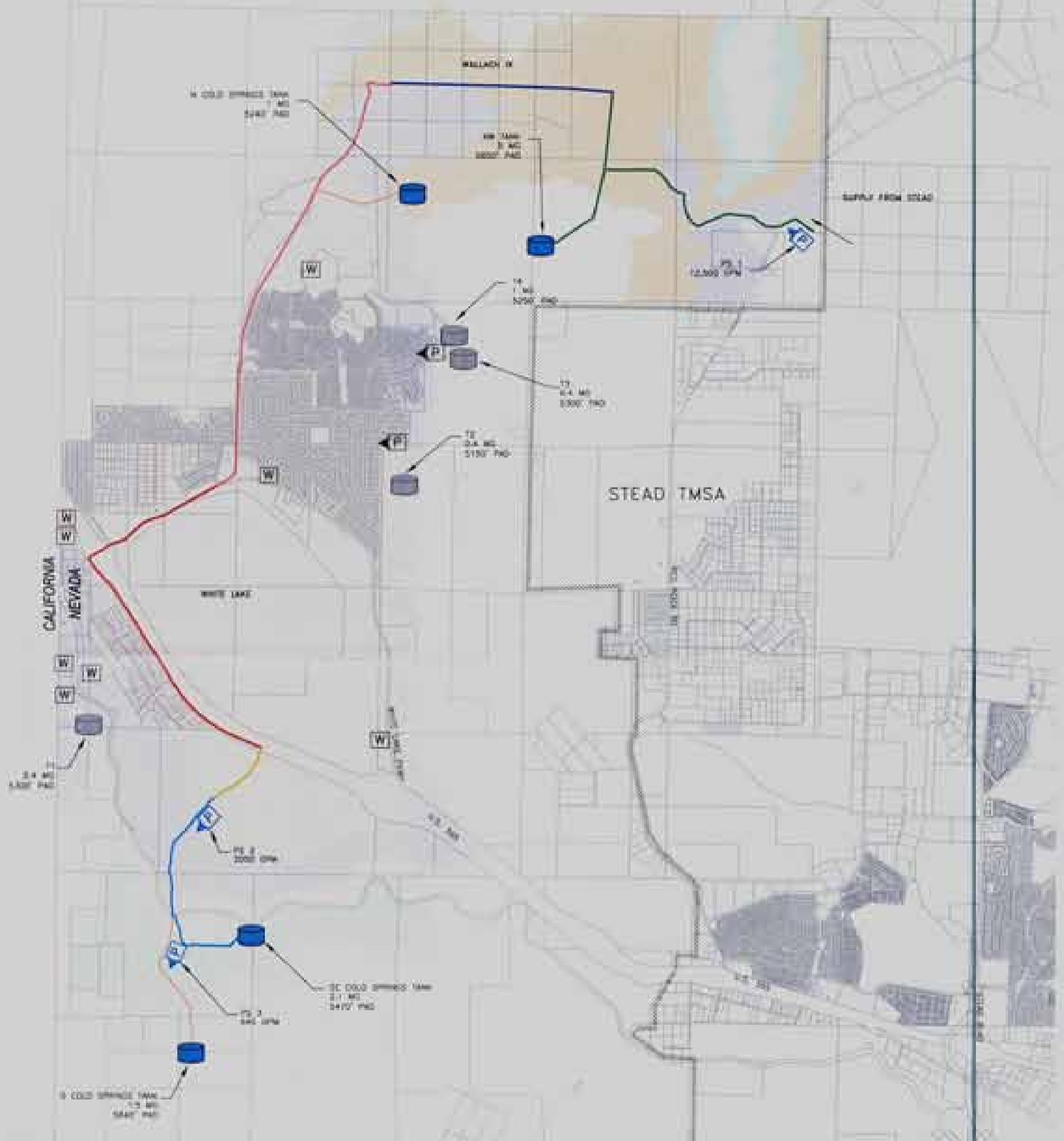
SCALE: 1" = 100'

**Water Calculations and Cost Estimates  
Cold Springs**

### Estimated Costs for the Facilities in Cold Springs

No.	Description	Qty.	Unit	Unit Cost	Total Cost	Reno TMSA	County TMSA	
<b>1 Airport Property to Wallach IX Southwest Boundary</b>								
<b>1.1 Transmission</b>								
	36" Pipe	15,640	L.F.	\$432	\$6,756,500	\$ 5,786,020	\$ 970,480	
	30" Pipe	8,110	L.F.	\$360	\$2,918,600	\$ 2,291,610	\$ 627,990	
	24" Pipe	4,110	L.F.	\$288	\$1,183,700	\$ 908,190	\$ 275,510	
	Pump Station 1	1,805	hp		\$2,001,770	\$ 1,715,050	\$ 286,720	
<b>1.2 Storage</b>								
	Tank (Northwest Tank)	5,000,000	Gal	\$1	\$5,000,000	\$ 4,365,000	\$ 635,000	
					<b>Subtotal =</b>	<b>\$ 17,861,600</b>		
<b>2 Wallach IX Boundary to North end of White Lake</b>								
<b>2.1 Transmission</b>								
	24" Pipe	10,820	L.F.	\$216	\$2,337,100	\$ 2,084,100	\$ 253,000	
	14" Pipe	3050	L.F.	\$216	\$658,800	-	\$ 658,800	
<b>2.2 Storage</b>								
	Tank (North Cold Spring)	1,000,000	Gal	\$1	\$1,000,000	\$ 873,000	\$ 127,000	
					<b>Subtotal =</b>	<b>\$ 3,995,900</b>		
<b>3 White Lake North end to South end (In US-395)</b>								
<b>3.1 Transmission</b>								
	20" Pipe	15,000	L.F.	\$288	\$4,320,000	\$ 4,285,980	\$ 34,020	
					<b>Subtotal =</b>	<b>\$ 4,320,000</b>		
<b>4 South White Lake end (In US-395) to the South Cold Spring Tank</b>								
<b>4.1 Transmission</b>								
	18" Pipe	2,650	L.F.	\$216	\$572,400	\$ 572,400	-	
	16" Pipe	8,310	L.F.	\$192	\$1,595,500	\$ 1,595,500	-	
	14" Pipe	5,540	L.F.	\$168	\$930,700	\$ 930,700	-	
	Pump Station 2	203	hp		\$591,400	\$ 591,400	-	
	Pump Station 3	92	hp		\$400,000	\$ 400,000	-	
<b>4.2 Storage</b>								
	Tank (Southeast Cold Spring)	2,100,000	Gal	\$1	\$2,100,000	\$ 1,833,300	\$ 266,700	
	Tank (South Cold Spring)	1,500,000	Gal	\$1	\$1,500,000	\$ 1,309,500	\$ 190,500	
					<b>Subtotal =</b>	<b>\$ 7,690,000</b>		
<b>Construction Total</b>						<b>\$ 33,868,000</b>	<b>\$ 29,642,000</b>	<b>\$ 4,326,000</b>
<b>5 Other Costs</b>								
	Engineering Cost (20%)				\$ 6,773,600	\$ 5,908,400	\$ 865,200	
	Contingency (20%)				\$ 6,773,600	\$ 5,908,400	\$ 865,200	
					<b>Subtotal =</b>	<b>\$ 13,547,000</b>		
<b>6 Costs from Stead Area</b>								
	Transmission				\$ 10,730,000	\$ 10,730,000	\$ 9,183,090	
					<b>Total =</b>	<b>\$ 58,145,000</b>	<b>\$ 60,552,000</b>	<b>\$ 7,593,000</b>

Note: 20 Cites ENROCI = 7,942 May 2007



NOTE: PRESSURE ZONES APPEAR HATCHED.

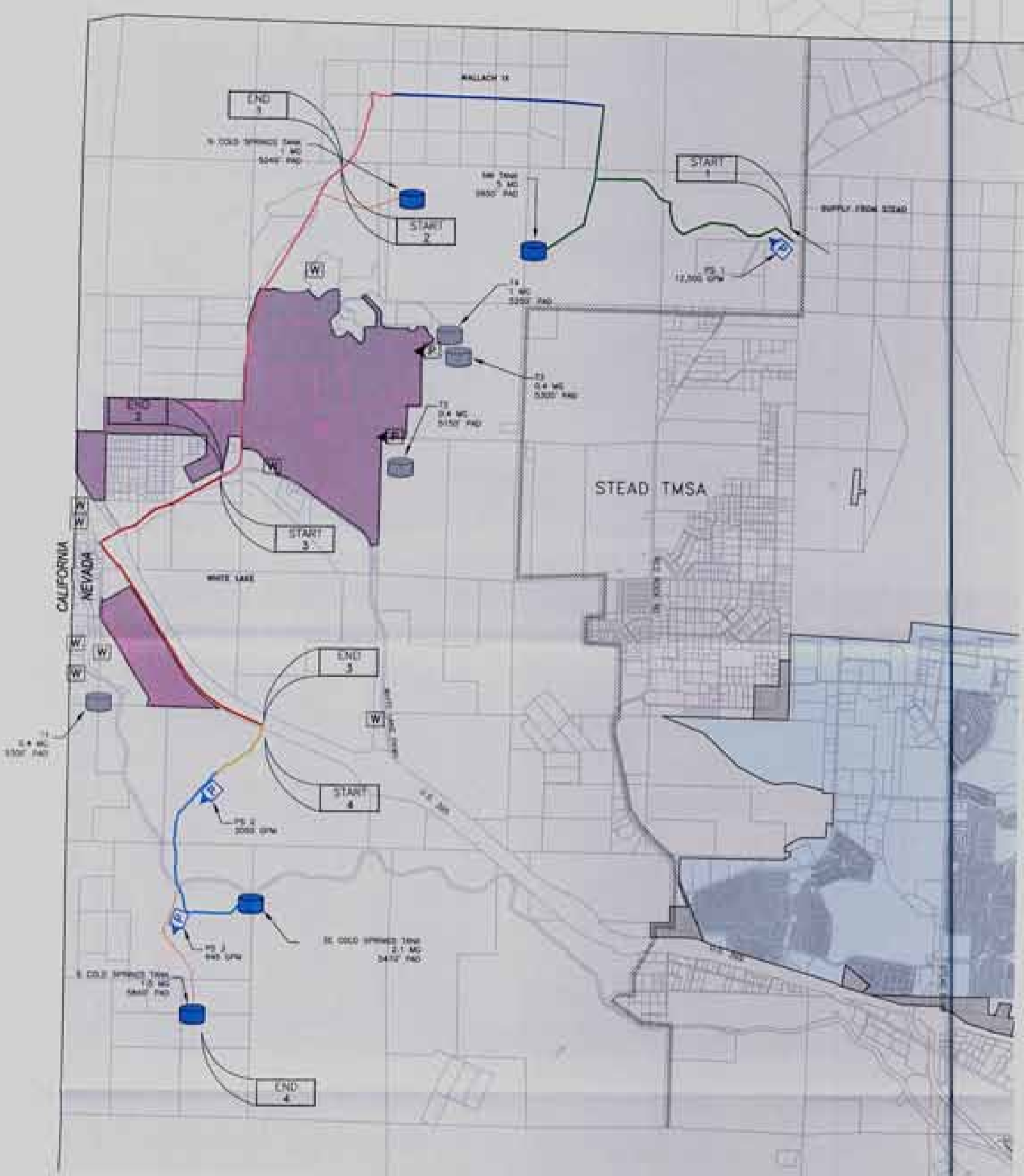
PROPOSED PIPE DIAMETER (IN)
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FACILITY LEGEND	
	EXISTING WELL
	EXISTING TANK
	PROPOSED TANK
	PROPOSED PUMP STATION
	EXISTING PUMP STATION



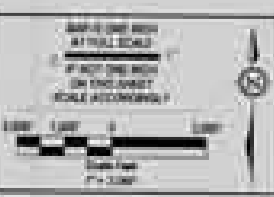
**HDR**  
**ECO-LOGIC**  
 10801 Garden St. Suite 1000  
 Reno, Nevada 89521  
 Phone: (775) 857-8911  
 Fax: (775) 857-8914

COLD SPRINGS TMSA - FIGURE 5-B1 WATER SYSTEM PRESSURE ZONES COUNTY OF WASHOE, NEVADA					
REV NO.	REVISION	BY	JOB #	REVISION NO.	DATE
			2007-11-0000	NOV 2007	
			SCALE	1" = 1,000'	
DESIGNED	CHECKED	DATE	BY	DATE	BY



PROPOSED PIPE DIAMETER (IN)
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FACILITY LEGEND
EXISTING WELL
EXISTING TANK
PROPOSED TANK
PROPOSED PUMP STATION
EXISTING PUMP STATION



MAP SYMBOLS	
TOWN RETAIL AREA	WASHOE COUNTY SPHERE OF INFLUENCE
TOWN SPHERE OF INFLUENCE	UTILITY SERVICE AREA

**HDR**  
**ECOLOGIC**  
 Consulting Engineers

COLD SPRINGS TMSA - FIGURE 5-32 PROJECT DIVISIONS FOR COST ANALYSIS COUNTY OF WASHOE, NEVADA					
REV NO.	REVISION	BY	DATE	APPROVED BY	DESIGNED BY

**Water Calculations and Cost Estimates  
Stead/Lemmon Valley**

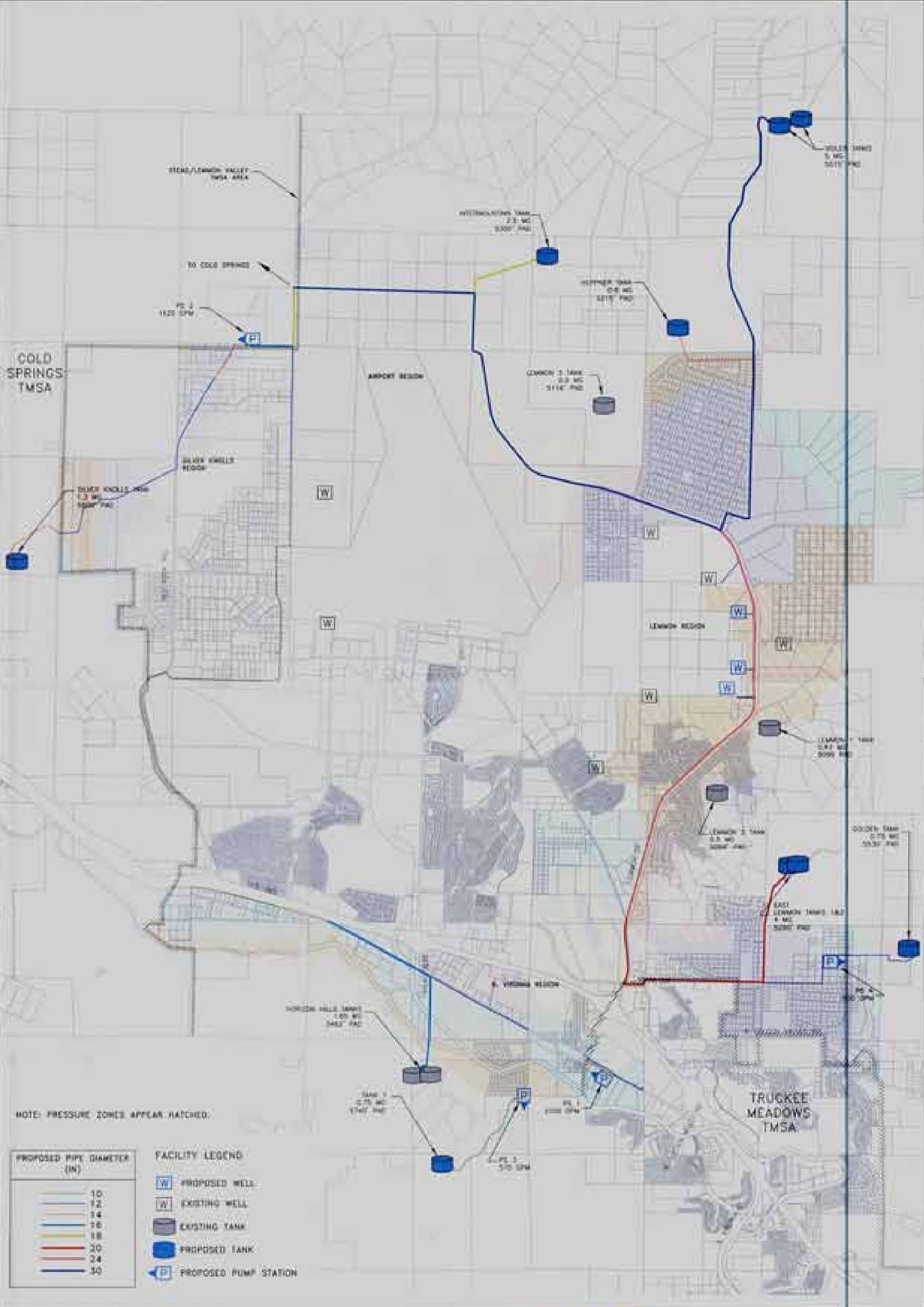
**Estimated Costs for the Water Facilities in Stead/Lemmon Valley**

No.	Description	Qty.	Unit	Unit Cost	Total Cost	Reno TMSA	County TMSA
	10" Pipe	23,040	L.F.	\$120.00	\$2,764,800	\$1,382,540	\$1,382,260
					<b>Subtotal = \$ 4,092,500</b>		
<b>9</b>	<b>Heppner Tank</b>						
<b>9.1</b>	<b>Transmission</b>						
	14" Pipe	4310	L.F.	\$168.00	\$724,100	-	\$724,100
<b>9.2</b>	<b>Storage</b>						
	Tank (Heppner)	600,000	Gal	\$1.00	\$600,000	-	\$800,000
					<b>Subtotal = \$1,324,100</b>		
<b>10</b>	<b>E Lemmon Tank</b>						
<b>10.1</b>	<b>Transmission</b>						
	20" Pipe	10860	L.F.	\$240.00	\$2,606,400	\$880,900	\$1,725,500
<b>10.2</b>	<b>Storage</b>						
	Tank (E Lemmon 1)	2,500,000	Gal	\$1.00	\$2,500,000	\$1,498,110	\$1,001,890
					<b>Subtotal = \$5,106,400</b>		
<b>11</b>	<b>Horizon Hills area to South of Horizon Hills</b>						
<b>11.1</b>	<b>Transmission</b>						
	10" Pipe	5,320	L.F.	\$120.00	\$638,400	-	\$638,400
	Pump Station 3	58	HP		\$400,000	-	\$400,000
<b>11.2</b>	<b>Storage</b>						
	Tank	750,000	Gal	\$1.00	\$750,000	-	\$750,000
					<b>Subtotal = \$ 1,788,400</b>		
<b>12</b>	<b>East Lemmon Tank Main to Golden Tank</b>						
<b>12.1</b>	<b>Transmission</b>						
	12" Pipe	8,750	L.F.	\$144.00	\$1,260,000	-	\$1,260,000
	Pump Station 4	50	HP		\$400,000	-	\$400,000
<b>12.2</b>	<b>Storage</b>						
	Tank (E Lemmon 2 & Golden)	2,250,000	Gal	\$1.00	\$2,250,000	-	\$2,250,000
					<b>Subtotal = \$ 3,910,000</b>		
<b>13</b>	<b>Wells</b>						
	Proposed Well Pump Station (1000gpm @ 550ft)	3	Ea	\$760,000.00	\$2,280,000*	\$475,510	\$1,267,030
	Reconstruction of Well (Well 8) with new Pump (1000gpm @ 550ft)	1	Ea	\$600,000.00	\$600,000*	\$125,130	\$333,430
	Reconstruction of Well (Well 5 & 7) with new Pump (1000gpm @ 400ft)	2	Ea	\$540,000.00	\$1,080,000*	\$225,200	\$600,200
					<b>Subtotal = \$ 3,960,000</b>		
					<b>Construction Total = \$60,515,000</b>	<b>\$ 18,637,000</b>	<b>\$ 34,214,000</b>
<b>14</b>	<b>Other Costs</b>						
	Engineering (20%)				\$12,103,000	\$ 3,727,000	\$ 6,842,800
	Contingency (20%)				\$12,103,000	\$ 3,727,000	\$ 6,842,800
					<b>Total = \$84,700,000</b>	<b>\$ 26,100,000</b>	<b>\$ 47,900,000</b>

Note: \* - A portion of the total costs is allocated to Cold Springs area  
20 Cities ENRCCI = 7,942, May 2007

**Estimated Costs for the Water Facilities in Stead/Lemmon Valley**

No.	Description	Qty.	Unit	Unit Cost	Total Cost	Reno TMSA	County TMSA
<b>1 Vidler Tank to Lemmon Drive at Matterhorn Intersection</b>							
<b>1.1 Transmission</b>							
	30" Pipe	21,600	L.F.	\$360.00	\$7,776,000*	\$1,632,510	\$4,298,290
<b>1.2 Storage</b>							
	Tank (Vidler 2)	2,500,000	Gal	\$1.00	\$2,500,000*	\$484,310	\$2,015,690
					<b>Subtotal =</b>	<b>\$10,276,000</b>	
<b>2 Lemmon Drive at Matterhorn Intersection to the Proposed Pump Station at Virginia Street</b>							
<b>2.1 Transmission</b>							
	24" Pipe	20,080	L.F.	\$288.00	\$5,783,000	\$2,351,020	\$3,431,980
	16" Pipe	3,130	L.F.	\$192.00	\$601,000	\$284,830	\$316,170
	12" Pipe	2,670	L.F.	\$144.00	\$384,500	\$241,690	\$142,810
					<b>Subtotal =</b>	<b>\$ 6,768,500</b>	
<b>3 Proposed Pump Station at Virginia Street to 100'</b>							
<b>3.1 Transmission</b>							
	16" Pipe	9,790	L.F.	\$192.00	\$1,879,700	\$1,564,640	\$315,060
	14" Pipe	9,780	L.F.	\$168.00	\$1,643,000	\$1,521,820	\$121,180
	12" Pipe	5,810	L.F.	\$144.00	\$836,600	\$562,400	\$274,200
	10" Pipe	4,100	L.F.	\$120.00	\$492,000	\$492,000	-
	Pump Station 1	196	HP		\$563,200	\$360,080	\$203,120
					<b>Subtotal =</b>	<b>\$ 5,414,500</b>	
<b>4 North Virginia Supply</b>							
<b>4.1 Transmission</b>							
	12" Pipe	1,310	L.F.	\$144.00	\$188,600.00	\$120,580	\$68,020
	Wholesale Meter	1	Ea	\$60,000.00	\$60,000.00	\$38,360	\$21,640
					<b>Subtotal =</b>	<b>\$ 248,600</b>	
<b>5 Lemmon Drive to Airport</b>							
<b>5.1 Transmission</b>							
	30" Pipe	26,180	L.F.	\$360.00	\$9,424,800*	\$1,866,360	\$3,066,280
					<b>Subtotal =</b>	<b>\$ 9,424,800</b>	
<b>6 Inter Mountain Tank to Airport</b>							
<b>6.1 Transmission</b>							
	18" Pipe	3,820	L.F.	\$216.00	\$825,100*	\$220,150	\$211,680
<b>6.2 Storage</b>							
	Tank (Inter Mountain)	2,500,000	Gal	\$1.00	\$2,500,000	\$1,274,510	\$1,225,490
					<b>Subtotal =</b>	<b>\$ 3,325,100</b>	
<b>7 Airport to Silver Knolls Tank</b>							
<b>7.1 Transmission</b>							
	16" Pipe	2,020	L.F.	\$192.00	\$387,800	-	\$387,800
	14" Pipe	5,590	L.F.	\$168.00	\$939,100	-	\$939,100
	12" Pipe	11,290	L.F.	\$144.00	\$1,625,800	-	\$1,625,800
	Pump Station 2	223	HP		\$623,200	-	\$623,200
<b>7.2 Storage</b>							
	Tank (Silver Knolls)	1,300,000	Gal	\$1.00	\$1,300,000	\$662,750	\$637,250
					<b>Subtotal =</b>	<b>\$ 4,875,900</b>	
<b>8 Silver Knolls Area</b>							
<b>8.1 Transmission</b>							
	18" Pipe	2,620	L.F.	\$216.00	\$565,900	\$94,320	\$471,580
	12" Pipe	5,290	L.F.	\$144.00	\$761,800	\$277,420	\$484,380

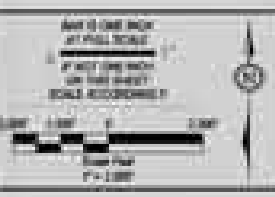


**PROPOSED PIPE DIAMETER (IN)**

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**FACILITY LEGEND**

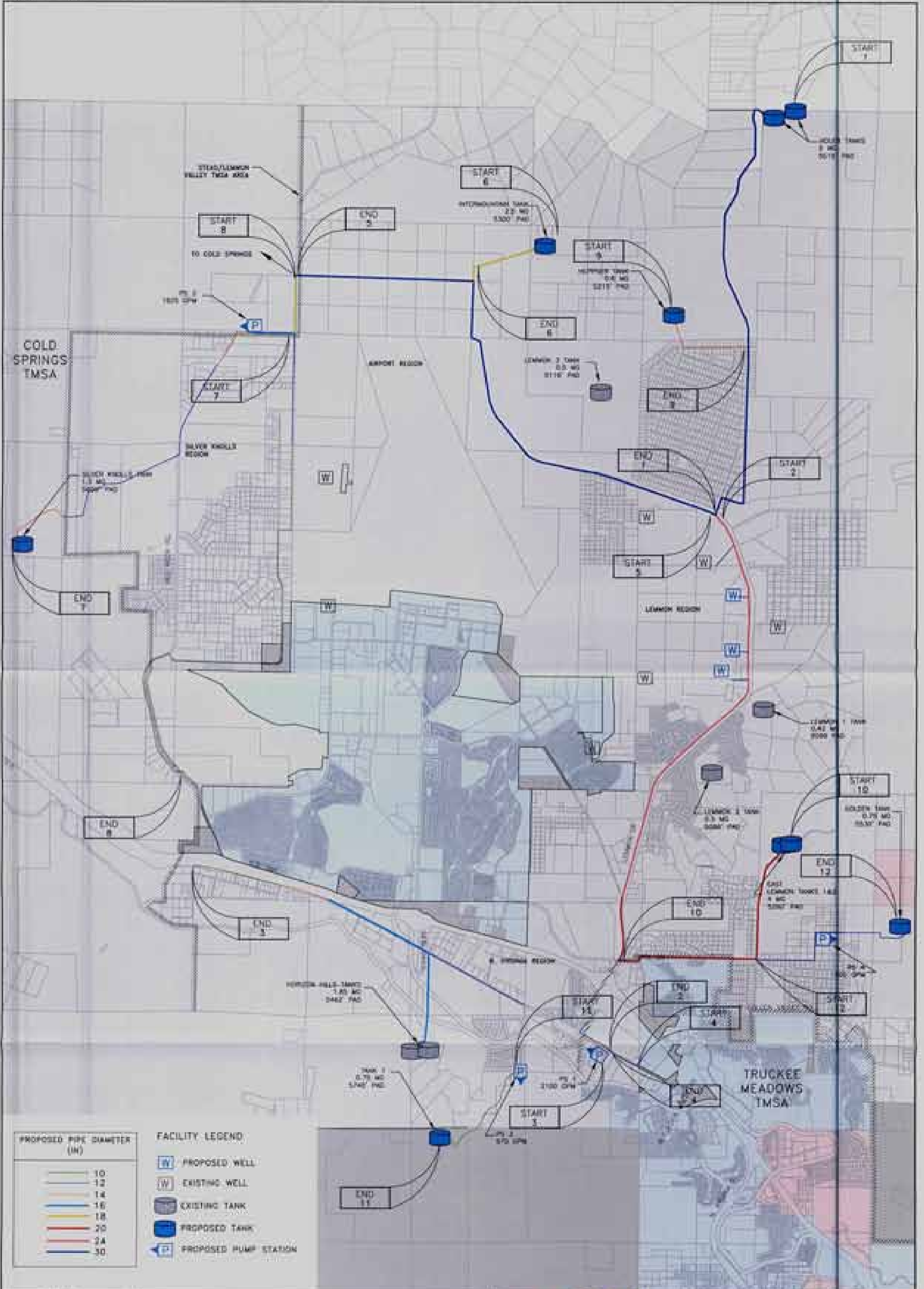
	PROPOSED WELL
	EXISTING WELL
	EXISTING TANK
	PROPOSED TANK
	PROPOSED PUMP STATION



**ECO-LOGIC**  
 2027 Garden Rd. Suite 100 Las Vegas, NV 89102  
 Phone: (702) 735-1100 Fax: (702) 735-1101

**STEAD/LEMMON VALLEY TMSA - FIGURE 6-B1**  
**WATER SYSTEM PRESSURE ZONES**  
 COUNTY OF WAGNER, NEVADA

REV NO.	REVISION	BY	DATE	DESIGNED BY	DESIGNED	IN CHARGE
			NOV 2007			
			SCALE	1" = 1,000'	CHECKED	CWB

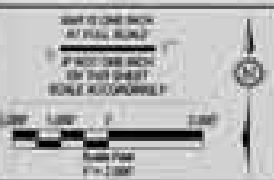


**PROPOSED PIPE DIAMETER (IN)**

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**FACILITY LEGEND**

(W) PROPOSED WELL
(W) EXISTING WELL
(T) EXISTING TANK
(T) PROPOSED TANK
(P) PROPOSED PUMP STATION



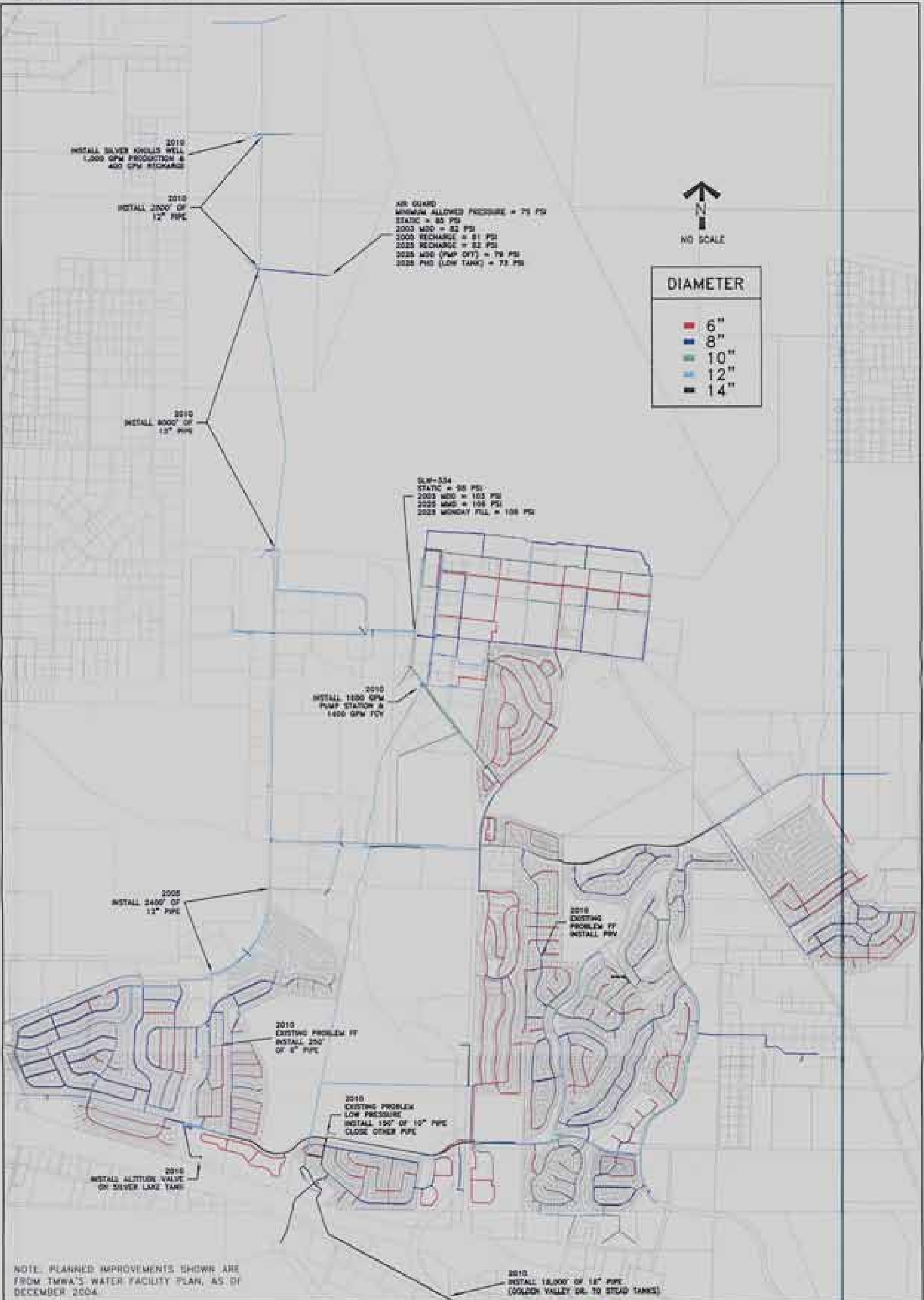
**MAP SYMBOLS**

(---) TRUCKEE RIVER	(---) WASHOE COUNTY WATER SPHERE OF INFLUENCE
(---) TRUCKEE SPHERE OF INFLUENCE	(---) OTHER WATER WAREABLE AREAS

**ECO-LOGIC**  
 10001 Quaker Rd, Reno, NV 89521  
 Phone: (775) 857-2001  
 Fax: (775) 857-2008

**STEAD/LEMMON VALLEY TMSA - FIGURE 5-B2**  
**PROJECT DIVISIONS FOR COST ANALYSIS**  
 COUNTY OF WASHOE, NEVADA

REV NO	REVISION	BY	JOB #	INVENTORY	DATE	DRAWN	BY
			2401	500' 200'	8/1/2024	DRANK	SK
			SCALE	1" = 500'		CHECKED	SK



NOTE: PLANNED IMPROVEMENTS SHOWN ARE FROM TMWA'S WATER FACILITY PLAN, AS OF DECEMBER 2004.

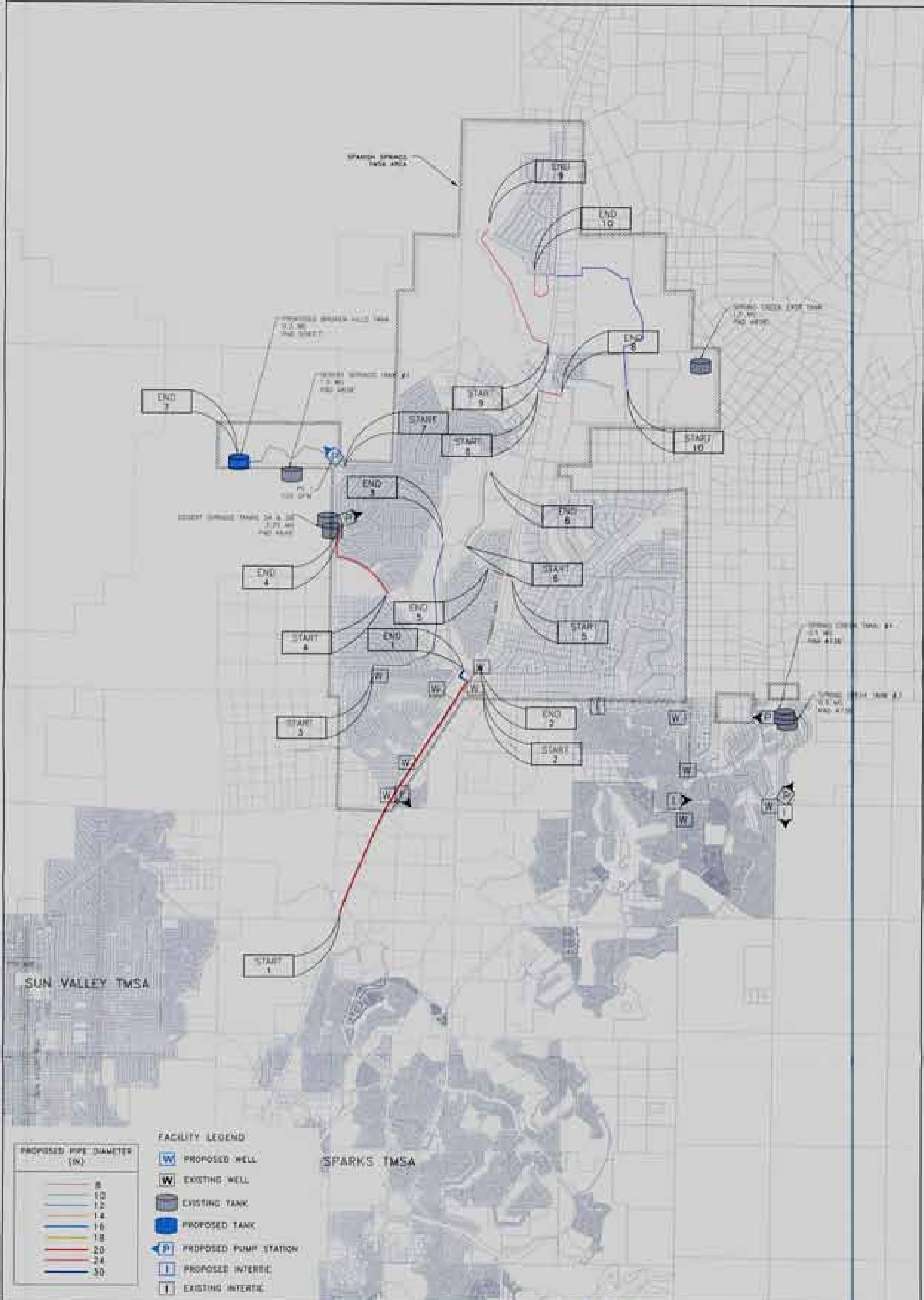
		<b>STEADLEMON VALLEY TMSA - FIGURE 6-B3</b> <b>PLANNED TMWA WATER FACILITIES</b> COUNTY OF WASHINGTON, NEVADA	
ECO-LOGIC 1007 South E. Boulevard Reno, Nevada 89502	Phone: (775) 871-0011 Fax: (775) 871-0014	REV # _____ NUMBER _____ BY _____ DATE _____ SCALE _____	DESIGNED _____ DRAWN _____ CHECKED _____ DATE _____ SHEET _____ OF _____

**Water Calculations and Cost Estimates  
Spanish Springs**

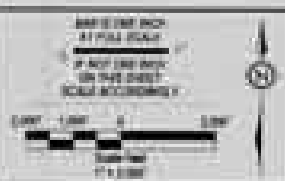
**Estimated Costs for the Facilities in Spanish Springs**

No.	Description	Qty.	Unit	Unit Cost	Total Cost
<b>1. In Pyramid Way from Highland Ranch PKWY to Eagle Canyon Dr.</b>					
1.1	Transmission				
	30" Pipe	760	L.F.	\$360	\$273,600
	20" Pipe	12,000	L.F.	\$240	\$2,880,000
	10" Pipe	900	L.F.	\$120	\$108,000
				Subtotal =	\$ 108,000
<b>2. In Pyramid Way and La Posada Dr.</b>					
2.1	Transmission				
	14" Pipe	1,200	L.F.	\$168	\$201,600
	8" Pipe	2,000	L.F.	\$98	\$192,000
				Subtotal =	\$ 393,600
<b>3. In David James Blvd. and Ember Dr. from Lany Dr. to Eagle Canyon Dr.</b>					
3.1	Transmission				
	12" Pipe	4,900	L.F.	\$144	\$705,600
	10" Pipe	3,300	L.F.	\$120	\$396,000
				Subtotal =	\$ 396,000
<b>4. In Eagle Canyon Dr. from Alera Way to Desert Springs 2A &amp; 2B Tank Plant</b>					
4.1	Transmission				
	24" Pipe	4,500	L.F.	\$288	\$1,296,000
				Subtotal =	\$ 1,296,000
<b>5. In Egyptian Dr. from East of Pyramid Way to Palm Springs Dr.</b>					
5.1	Transmission				
	8" Pipe	900	L.F.	\$98	\$88,400
				Subtotal =	\$ 88,400
<b>6. Connection Between the Existing Mains in Lanster Dr. to Sand Dune Dr.</b>					
6.1	Transmission				
	10" Pipe	3,700	L.F.	\$120	\$444,000
				Subtotal =	\$ 444,000
<b>7. From Existing Main at Kinglet Dr. to Proposed Broken Hills Tank</b>					
7.1	Transmission				
	12" Pipe	750	L.F.	\$144	\$108,000
	10" Pipe	5,000	L.F.	\$120	\$600,000
	Pump Station 1	10	hp		\$400,000
7.2	Storage				
	Tanks	300,000	Gal	\$1	\$300,000
				Subtotal =	\$ 1,408,000
<b>8. In South of Ingenuity Ave from West of Pyramid Way to East</b>					
8.1	Transmission				
	8" Pipe	1,050	L.F.	\$98	\$100,800
				Subtotal =	\$ 100,800
<b>9. From Pyramid Way to the West End of Mystic Mountain Way</b>					
9.1	Transmission				
	8" Pipe	6,500	L.F.	\$98	\$624,000
				Subtotal =	\$ 624,000
<b>10. From East End of Horizon View Ave to Pebble Creek Dr.</b>					
10.1	Transmission				
	12" Pipe	9,600	L.F.	\$144	\$1,382,400
	8" Pipe	2,400	L.F.	\$98	\$230,400
				Subtotal =	\$ 230,400
				<b>Construction Total</b>	<b>\$ 5,087,000</b>
<b>11. Other Costs</b>					
	Engineering Cost (20%)				\$ 1,017,000
	Contingency (20%)				\$ 1,017,000
				Subtotal =	\$ 2,034,000
				<b>Total =</b>	<b>\$ 7,100,000</b>

Note: 20 Cities ENRCCI = 7,942, May 2007



SPANISH SPRINGS TMSA - FIGURE 1-B1  
 PROJECT DIVISIONS FOR COST ANALYSIS  
 COUNTY OF WASHOE, NEVADA

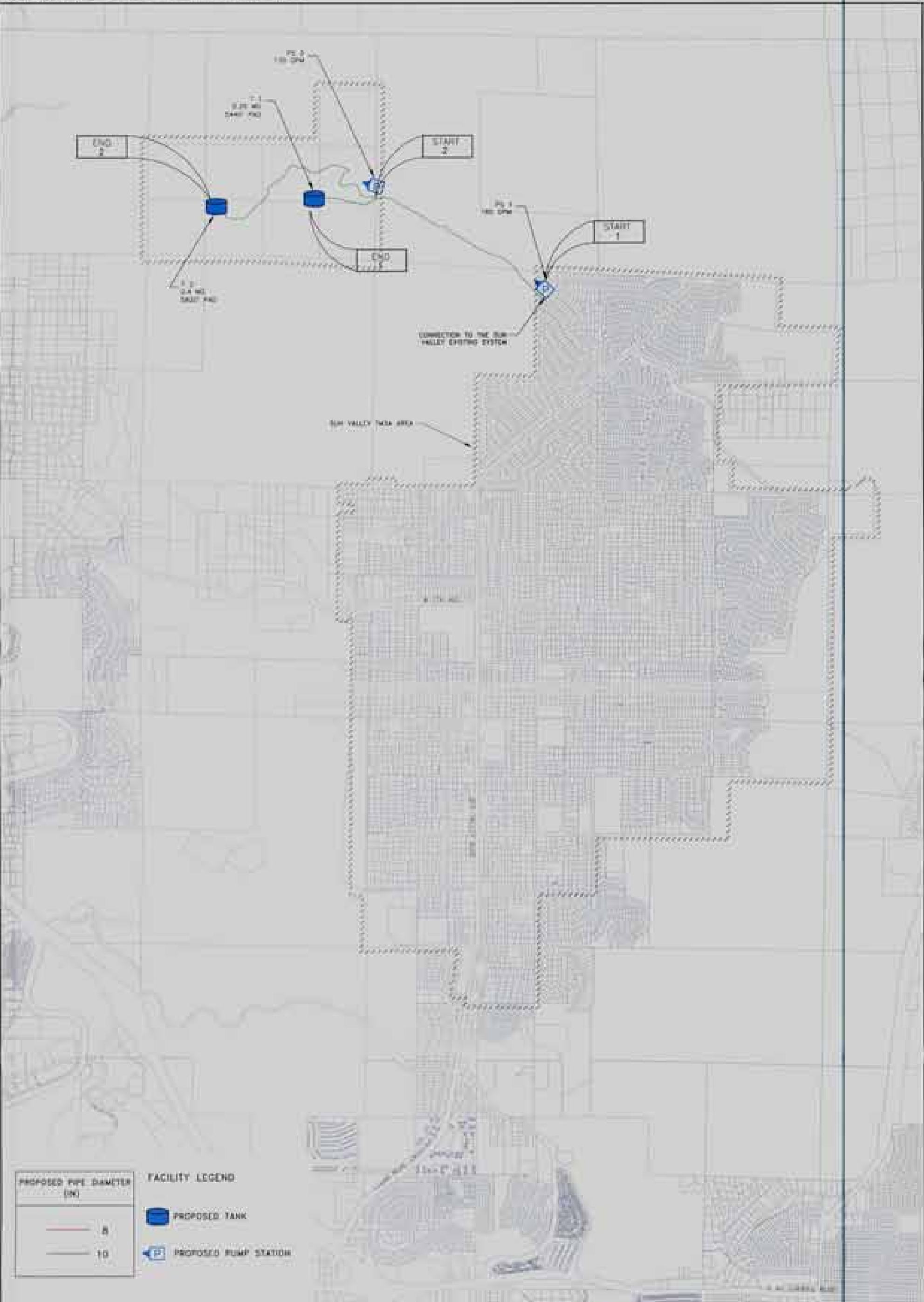


**Water Calculations and Cost Estimates  
Sun Valley**

### Estimated Costs for the Facilities in Sun Valley

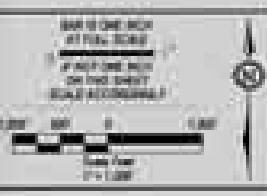
No.	Description	Qty.	Unit	Unit Cost	Total Cost	
<b>1 From Connection to the Existing Sun Valley System to Tank 1</b>						
<b>1.1 Transmission</b>						
	10" Pipe	6,010	L.F.	\$120	\$721,200	
	Pump Station 1	25	HP		\$400,000	
<b>1.2 Storage</b>						
	Tank	250,000	Gal	\$1	\$250,000	
					<b>Subtotal =</b>	<b>\$ 1,371,200</b>
<b>2 From New 10" Main to Tank 2</b>						
<b>2.1 Transmission</b>						
	10" Pipe	5,180	L.F.	\$120	\$621,600	
	Pump Station 2	25	HP		\$400,000	
<b>2.2 Storage</b>						
	Tank	400,000	Gal	\$1	\$400,000	
					<b>Subtotal =</b>	<b>\$ 1,421,600</b>
<b>Construction Total</b>						<b>\$ 2,793,000</b>
<b>3 Other Costs</b>						
	Engineering Cost (20%)				\$ 559,000	
	Contingency (20%)				\$ 559,000	
					<b>Subtotal</b>	<b>\$ 1,118,000</b>
					<b>Total =</b>	<b>\$ 3,900,000</b>

Note: 20 Cities ENRCCI = 7,942, May 2007



PROPOSED PIPE DIAMETER (IN)	
8	—
10	- - -

FACILITY LEGEND	
	PROPOSED TANK
	PROPOSED PUMP STATION



**HDR**  
**ECOLOGIC**  
 1000 Fourth Street  
 Reno, Nevada 89501  
 Phone: (775) 837-2511  
 Fax: (775) 837-2514

SUN VALLEY TMSA - FIGURE E-01					
PROJECT DIVISIONS FOR COST ANALYSIS					
COUNTY OF WASHOE, NEVADA					
REV. NO.	DESCRIPTION	BY	DATE	REVISIONS	APP.



LEGEND	
●	STORAGE TANK
▲	PRESSURE REDUCING STA.
■	PUMP STATION
— (solid)	6" DISTRIBUTION MAIN
— (dashed)	8" DISTRIBUTION MAIN
— (dotted)	10" DISTRIBUTION MAIN
— (dash-dot)	12" TRANSMISSION MAIN
— (long-dash)	14" TRANSMISSION MAIN
— (short-dash)	16" TRANSMISSION MAIN
— (dash-dot-dot)	18" TRANSMISSION MAIN



SVGID Water Master Plan Update  
**Figure E.3**  
 Water System Plan View

OTHER ITEMS NOT SPECIFICALLY SHOWN

PRV FLOW MONITOR  
SECTION 5.4.1, \$35,000

SIDEHILL/CHIMNEY SEWER INVESTIGATION  
SECTION 5.5.4, \$10,000

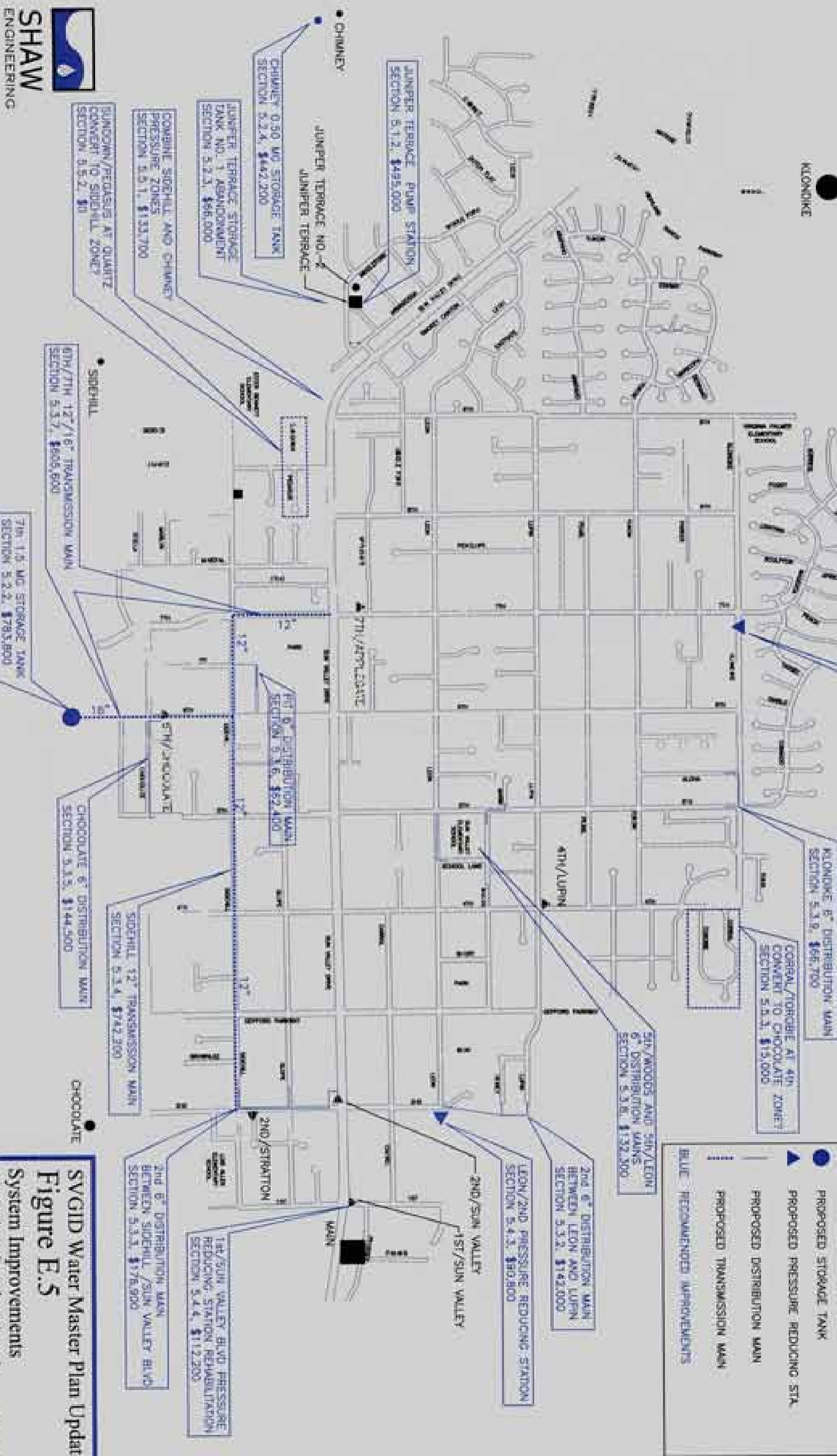
FAHNEY QUARTZ SYSTEM - WASTING WATER  
SECTION 5.5.5, \$70,000 TO \$130,000

KLONDIKE/7TH PRESSURE REDUCING STATION  
SECTION 5.4.2, \$95,400

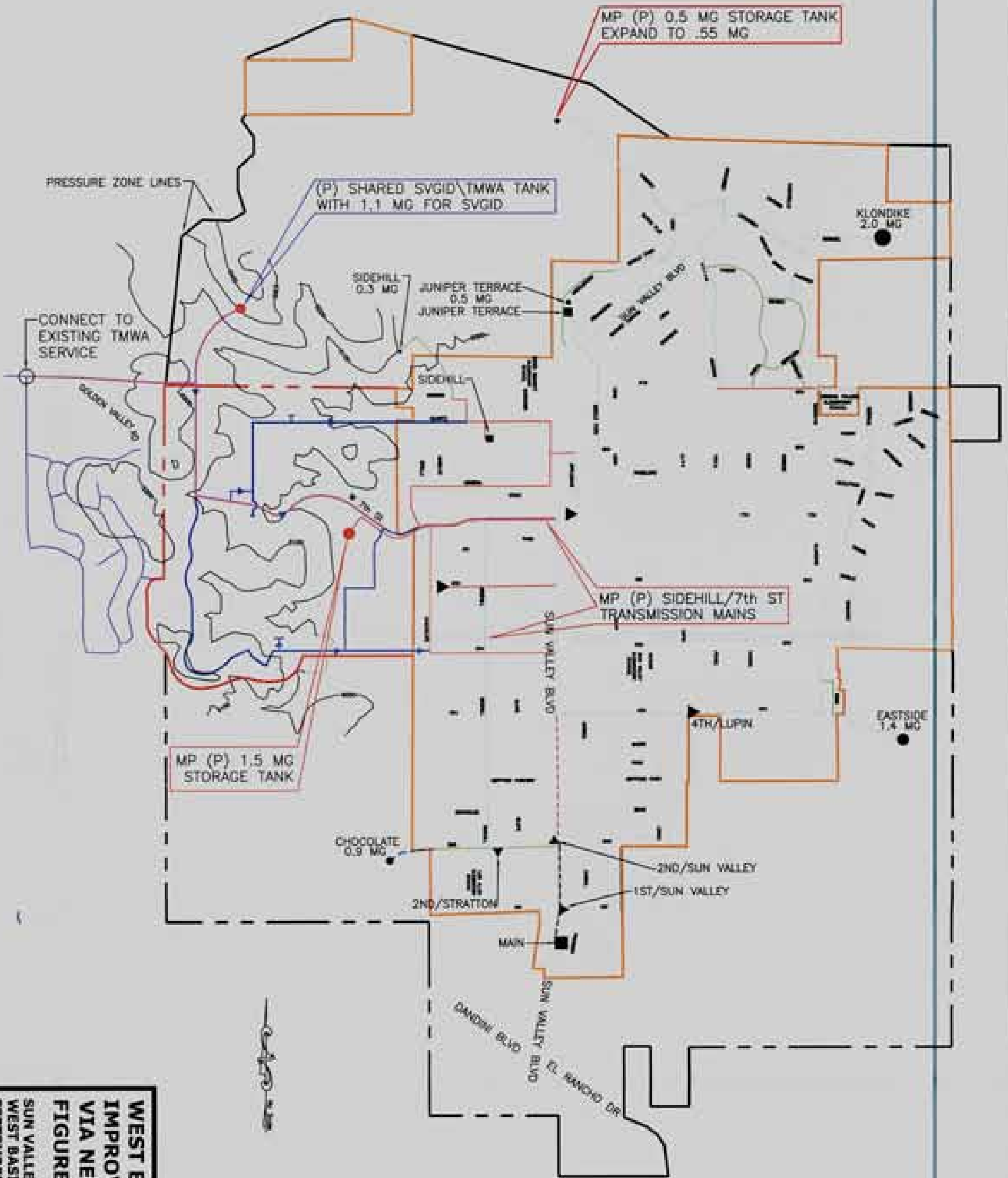
EASTSIDE

**LEGEND**

- EXISTING STORAGE TANK
- ▲ EXISTING PRESSURE REDUCING STA.
- EXISTING PUMP STATION
- PROPOSED STORAGE TANK
- ▲ PROPOSED PRESSURE REDUCING STA.
- PROPOSED DISTRIBUTION MAIN
- - - PROPOSED TRANSMISSION MAIN
- BLUE RECOMMENDED IMPROVEMENTS



**SVGID Water Master Plan Update**  
**Figure E.5**  
 System Improvements  
 (Existing Service Area)



LEGEND			
▲	PRESSURE REDUCING STA.	MP	MASTER PLAN
■	PUMP STATION	P	PROPOSED
●	STORAGE TANK	E	EXISTING
— (orange)	6" DISTRIBUTION MAIN	— (blue)	NEW 12" TRANSMISSION MAIN
— (yellow)	8" DISTRIBUTION MAIN	— (purple)	NEW 16" TRANSMISSION MAIN
— (green)	10" DISTRIBUTION MAIN	— (orange)	EXISTING SERVICE AREA BOUNDARY
- - - (black)	12" TRANSMISSION MAIN	- - - (red)	EXPANDED SERVICE AREA BOUNDARY
- - - (grey)	14" TRANSMISSION MAIN		
- - - (red)	16" TRANSMISSION MAIN	▭ (red)	MASTER PLAN IMPROVEMENTS
- - - (green)	18" TRANSMISSION MAIN	▭ (blue)	WEST BASIN IMPROVEMENTS

**WEST BASIN WATER SYSTEM IMPROVEMENTS VIA NEW TMWA SUPPLY**  
**FIGURE 3.3**  
SUN VALLEY GENERAL IMPROVEMENT DISTRICT  
WEST BASIN IMPROVEMENTS  
SEPTEMBER 2004  
Page 10

**Water Calculations and Cost Estimates  
Truckee Meadows**

## **Available Truckee Meadows Water Resources**

### **Verdi Area Current Demand and Water Resources**

The majority of the present single family residential water needs of the Verdi area are currently met by domestic wells. The exception to the domestic well source for single family residential use is the Verdi Meadows Water Company, which supplies 171 single family detached homes. In addition, commercial/industrial development and several mobile home parks are supplied by small private water systems. The Verdi Mutual Water Company supplies Firth-Rixon and Wells Manufacturing Co. The Gold Ranch and Boomtown Casinos are self supplied by means of their own respective water supply facilities.

A significant feature of the Verdi Area is that the Truckee River flows through it. The Highland Ditch diversion to the Truckee Meadows Water Authority (TMWA) Chalk Bluff Water Reclamation facility is located in the Verdi Area.

The local geology plays a major role in determining groundwater availability and quality in the Verdi Area. Three primary geologic units act as aquifers in the area including fractured volcanic rocks, partially cemented lake sediments and the overlying unconsolidated alluvial materials. The fractured volcanic rocks exhibit typical rock hydraulic properties and do not generally yield more than a few hundred gallons per minute to a well. These fractured volcanic rocks also contain water that in the western part of the area contains arsenic in concentrations that exceed the drinking water standards.

The water supply wells for the Verdi Meadows Water Company are completed in the fractured volcanic rocks. Throughout the area the volcanic rocks also contain dissolved ammonia and hydrogen sulfide in concentrations that can present an odor problem for domestic use without treatment. The lake sediments are generally considered to be "tight" aquifers with minimal yields even to domestic wells. The overlying unconsolidated alluvial deposits are not generally extensive and in some areas may not have sufficient thickness to permit construction of wells with the required surface seals. The unconsolidated alluvial deposits do act as a significant aquifer in some portions of the Verdi Area supplying the well field for Boomtown and supplying the spring utilized by Verdi Mutual Water Company. The Gold Ranch water supply may also be derived from this aquifer or the underlying volcanic rocks. In other portions of the Verdi area, the unconsolidated alluvial aquifer is generally not present in sufficient thickness to provide a significant beneficial supply for municipal supply purposes.

Washoe County Water Resources is undertaking a water resource investigation of the groundwater resources in the Verdi Area.

The Verdi Area is mostly in the Washoe County water service area. In addition to developing the local groundwater resources, the expanded supply for future development will be derived from the conversion of agricultural surface water rights from the area and elsewhere along the Truckee River. The surface water supply will be provided to the area through wholesale supply from TMWA with treatment at the Chalk Bluff Water Reclamation facility. New additional

treatment facilities in the Verdi Area could also be considered to treat a portion of the Truckee River supply.

The water rights associated with some of the major pending developments and the water purveyors are listed in Table AAA. Additional water rights exist in the area, and some of the area surface water rights have recently been sold for development purposes in other areas. Due to the changing balance of these rights that are not associated with pending developments, they are not listed. Additional surface water rights are available in the Truckee Meadows area that can be potentially acquired to support development in the Verdi Area.

**Table B-1 - Verdi Area Water Rights**  
(Partial list related to purveyors and some of the properties under development)

<b>Water Right</b>	<b>Amount (AF)</b>
<b>Groundwater</b>	
Boomtown	880
Verdi Meadows	255
Washoe County (for domestic wells)	200
Verdi Mutual Water Co	724
Verdi Business Park	34
<b>Total Groundwater Rights</b>	<b>2,093</b>
<b>Surface water</b>	
Mortensen	43
Verdi Mutual Water Co (Spring)	1,200
Quilici	330
Verdi Meadows	194
Boomtown	700
<b>Total Surface Water</b>	<b>2,467</b>
<b>Total</b>	<b>4,560</b>

### **Truckee Meadows Area Current Demand and Water Resources**

Total commitments of TMWA are approximately 102,000 AF and rely upon water from a variety of resources listed in Table B-1. These 142,900 AF of water rights provide the reliable drought supply to support the 102,000 AF of commitments. These commitments also include demands in Sparks and outside of the Truckee Meadows basin. The estimated distribution of the TMWA demand is listed in Table B-2. The TMWA water supply is planned to grow through the addition of approximately 18,870 AF of converted agricultural surface water rights from lands generally located in the Truckee Meadows vicinity. This conversion of agricultural surface water rights to municipal use is supported through the drought storage, which results from the Truckee River Operating Agreement (TROA). The Final EIS/EIR on TROA is expected to be published in the next several months and the agreement is expected to become effective sometime in 2009.

Table B-2 - TMWA Water Resources (including wholesale)

	Current (AF)	Future (AF)
<b>Municipal Supply Decreed rights</b>		
Truckee (40 cfs)	28,959	28,959
Hunter Creek (13.6 cfs)	9,847	9,847
<b>Total Decreed Municipal Rights</b>	<b>38,806</b>	<b>38,806</b>
<b>Storage Rights (which are also refilling appropriations)</b>		
Independence Lake	17,500	17,500
Donner Lake (1/2 interest)	4,750	4,750
<b>Total Storage</b>	<b>22,250</b>	<b>22,250</b>
<b>Groundwater Rights</b>		
Truckee Meadows Basin	16,010	16,010
Lemmon Valley West Basin	883	883
Spanish Springs Basin	410	410
<b>Total Groundwater</b>	<b>17,303</b>	<b>17,303</b>
<b>Main stem Truckee River Irrigation Rights</b>	<b>64,541</b>	<b>83,411</b>
<b>Total rights</b>	<b>142,900</b>	<b>161,770</b>
<b>Commitment associated with rights</b>	<b>102,000</b>	<b>120,353</b>

The water supply for the South Truckee Meadows area supplied by STMGID and Washoe County is planned to grow primarily through the conversion of agricultural surface water rights to municipal use. These water rights would be provided by a wholesale supply from TMWA and through facilities owned by Washoe County, including the Longley Lane Water Reclamation Facility and a planned surface water reclamation facility, which will utilize water from the local stream resources in the South Truckee Meadows (Galena, Whites, Thomas, and Steamboat Creeks). The growth in this supply is addressed in the 2002 South Truckee Meadows Facility Plan and the October 2006 Steamboat and Tributary Municipal Water Supply Yield Analysis, both prepared by ECO:LOGIC for Washoe County (see Table B-3).

Table B-3 – Water Resources - South Truckee Meadows and Pleasant Valley

	Current (AF)	Future (AF)
Groundwater (fully committed to projects)	9,575	9,575
Surface water (yield of resources utilized)	n/a	4,679
Wholesale from TMWA	2,166	3,472
<b>Total supply</b>	<b>11,741</b>	<b>17,726</b>
<b>Total water demand (normalized 2006)</b>	<b>6,939</b>	

The Hidden Valley portion of the Truckee Meadow is supplied by Washoe County utilizing a combination of treated surface water and groundwater. The surface water supply may be increased through the acquisition of agricultural surface water rights and groundwater rights. These resources are managed conjunctively with drought protection provided by high capacity wells that are generally reserved for drought and emergency conditions. Table B-4 describes the existing water rights and demands placed upon the Hidden Valley water system.

Table B-4 – Water Resources and Demand - Hidden Valley

	(AF)
Groundwater Rights	803.7
Main stem Truckee River Irrigation Rights	608.8
Total rights (fully committed)	1,412.5
Total water demand (normalized 2006)	1,329

**Estimated Costs for the Water Facilities in the Verdi Area**

No.	Description	Qty.	Unit	Unit Cost	Total Cost	Reno TMSA	County TMSA
<b>1 Water Facility Improvements Within TMWA System (Source TMWA)</b>							
<b>1.1 Transmission</b>							
	16" Pipe	6,300	L.F.	\$352	\$2,217,600	\$1,663,200	\$554,400
	20" Pipe	3,500	L.F.	\$400	\$1,400,000	\$1,050,000	\$350,000
	18" Pipe	3,300	L.F.	\$360	\$1,188,000	\$891,000	\$297,000
	24" River Crossing (Mayberry)	625	L.F.	\$800	\$500,000	\$375,000	\$125,000
	US 40 Pump Station Rebuild	1	L.S.	\$200,000	\$200,000	\$150,000	\$50,000
	Pump Station Verdi 1	1	L.S.	\$1,100,000	\$1,100,000	\$825,000	\$275,000
					<b>Subtotal = \$ 6,605,600</b>		
<b>2 Backbone Water Facility Improvements From West Mogul to River Crossing (Source TMWA)</b>							
<b>2.1 Transmission</b>							
	18" Pipe	4,900	L.F.	\$270.00	\$1,323,000	\$992,250	\$330,750
	18" Pipe	6785	L.F.	\$360	\$2,442,600	\$1,831,950	\$610,650
	18" River Crossing	200	L.F.	\$180	\$36,000	\$27,000	\$9,000
					<b>Subtotal = \$ 3,801,600</b>		
<b>3 Backbone Water Facility Improvements From River Crossing to the Boomtown Tank (Source TMWA)</b>							
<b>3.1 Transmission</b>							
	16" Pipe	5,530	L.F.	\$240.00	\$1,327,200	\$1,327,200	-
	18" Pipe	6,500	L.F.	\$270.00	\$1,755,000	\$1,755,000	-
	Pump Station Verdi 2	1	L.S.	\$850,000	\$850,000	\$850,000	-
	16" I-80 Crossing	500	L.F.	\$400.00	\$200,000	\$200,000	-
<b>3.2 Storage</b>							
	Boomtown Tank	1,500,000	Gal	\$1.25	\$1,875,000	\$1,875,000	-
					<b>Subtotal = \$ 6,007,200</b>		
<b>4 Backbone Water Facility Improvements From U.S. 40 to the Tank #1 (Source TMWA)</b>							
<b>4.1 Transmission</b>							
	12" Pipe	3,450	L.F.	\$180.00	\$621,000	\$310,500	\$310,500
	18" Pipe	5,300	L.F.	\$270.00	\$1,431,000	\$715,500	\$715,500
<b>4.2 Storage</b>							
	Lower Verdi Tank	1,500,000	Gal	\$1.25	\$1,875,000	\$937,500	\$937,500
					<b>Subtotal = \$ 3,927,000</b>		
<b>5 Improvements from Viking Metallurgical to Gold Ranch Tank</b>							
<b>5.1 Transmission</b>							
	16" Pipe	9,000	L.F.	\$192.00	\$1,728,000	\$864,000	\$864,000
	18" Pipe	4,800	L.F.	\$216.00	\$1,036,800	\$518,400	\$518,400
	Pump Station 4	1	L.S.	\$400,000	\$400,000	\$200,000	\$200,000
	Wholesale Meter	1	L.S.	\$60,000	\$60,000	\$30,000	\$30,000
	River Crossing (Bore & Jack)	400	L.F.	\$1,000	\$400,000	\$200,000	\$200,000
	Ditch Crossing	100	L.F.	\$800	\$80,000	\$40,000	\$40,000
<b>5.2 Storage</b>							
	Gold Ranch Tank	1,500,000	Gal	\$1.00	\$1,500,000	\$750,000	\$750,000
					<b>Subtotal = \$ 5,204,800</b>		
<b>6 Improvements from Lower Verdi Tank to Tank #1</b>							
<b>6.1 Transmission</b>							
	14" Pipe	2,750	L.F.	\$168.00	\$462,000	\$462,000	-
	Pump Station 3	1	L.S.	\$400,000	\$400,000	\$400,000	-
<b>6.2 Storage</b>							
	Tank #1	400,000	Gal	\$1.00	\$400,000	\$400,000	-
					<b>Subtotal = \$ 1,262,000</b>		
<b>7 Improvements from Boomtown Area to Tank #4</b>							
<b>7.1 Transmission</b>							
	14" Pipe	7,000	L.F.	\$168.00	\$1,176,000	\$1,176,000	-
	16" Pipe	10,000	L.F.	\$192.00	\$1,920,000	\$1,920,000	-
	Pump Station 1	1	L.S.	\$400,000	\$400,000	\$400,000	-
	Pump Station 2	1	L.S.	\$400,000	\$400,000	\$400,000	-
<b>7.2 Storage</b>							
	Tank #3	1,400,000	Gal	\$1.00	\$1,400,000	\$1,400,000	-
	Tank #4	700,000	Gal	\$1.00	\$700,000	\$700,000	-
					<b>Subtotal = \$ 5,996,000</b>		
					<b>Proposed TMWA Facilities Total = \$ 20,341,400</b>	<b>\$15,776,100</b>	<b>\$4,565,300</b>
					<b>Planned facilities Total (not including TMWA) = \$ 12,462,800</b>	<b>\$ 9,860,400</b>	<b>\$ 2,602,400</b>
					<b>Construction Total = \$ 32,804,200</b>	<b>\$ 25,636,500</b>	<b>\$ 7,167,700</b>
<b>8 Other Costs</b>							
	Engineering (20%) <sup>2</sup>					\$ 1,972,000	\$ 520,000
	Contingency (20%) <sup>2</sup>					\$ 1,972,000	\$ 520,000
					<b>Total = \$ 37,789,000</b>	<b>\$ 29,581,000</b>	<b>\$ 8,208,000</b>

Note: 20 Cities ENRCCI = 7,942, May 2007

1 - TMWA Cost Estimates Used

2-Engineering and Contingency costs were already included for TMWA's planned improvements

### Estimated Costs for the Facilities in Hidden Valley

No.	Description	Qty.	Unit	Unit Cost	Total Cost	
<b>1 From Booster Pump Station at Existing 14" Main to Tanks 1&amp;2</b>						
<b>1.1 Transmission</b>						
	10" Pipe	9,890	L.F.	\$120	\$1,186,800	
	Pump Station 1	20	hp		\$400,000	
	Pump Station 2	30	hp		\$400,000	
<b>1.2 Storage</b>						
	Tanks	600,000	Gal	\$1	\$600,000	
					<b>Subtotal =</b>	<b>\$ 2,586,800</b>
<b>2 From Proposed 10" Main to the Existing 12" Tank Main</b>						
<b>2.1 Transmission</b>						
	8" Pipe	2,330	L.F.	\$96	\$223,700	
					<b>Subtotal =</b>	<b>\$ 223,700</b>
<b>3 From the Connection to the Existing 16" Main to Tank 3</b>						
<b>3.1 Transmission</b>						
	8" Pipe	3,470	L.F.	\$96	\$333,120	
	Pump Station 3	10	hp		\$400,000	
<b>3.2 Storage</b>						
	Tanks	250,000	Gal	\$1	\$250,000	
					<b>Subtotal =</b>	<b>\$ 983,100</b>
					<b>Construction Total</b>	<b>\$ 2,811,000</b>
<b>4 Other Costs</b>						
	Engineering Cost (20%)				\$ 562,000	
	Contingency (20%)				\$ 562,000	
					<b>Subtotal</b>	<b>\$ 1,124,000</b>
					<b>Total =</b>	<b>\$ 3,900,000</b>

Note: 20 Cities ENRCCI = 7,942, May 2007

### Estimated Costs for the Facilities in Caughlin Ranch

No.	Description	Qty.	Unit	Unit Cost	Total Cost
<b>From Existing Main to Tanks</b>					
<b>1.1</b>	<b>Transmission</b>				
	8" Pipe	7,440	L.F.	\$96	\$714,240
	Pump Station 1	22	hp		\$400,000
	Pump Station 2	22	hp		\$400,000
	Pump Station 3	40	hp		\$400,000
<b>1.2</b>	<b>Storage</b>				
	3 - 0.22 MG Tanks	660,000	Gal	\$1	\$660,000
					<b>Subtotal =</b>
					<b>\$ 2,574,240</b>
					<b>Construction Total</b>
					<b>\$ 2,574,000</b>
<b>Other Costs</b>					
	Engineering Cost (20%)				\$ 515,000
	Contingency (20%)				\$ 515,000
					<b>Subtotal</b>
					<b>\$ 1,030,000</b>
					<b>Total =</b>
					<b>\$ 3,600,000</b>

Note: 20 Cities ENRCCI = 7,942, May 2007

**2005-2025**

**WATER FACILITY PLAN**

**DECEMBER 2004**



## Section I

### **EXECUTIVE SUMMARY**

#### **PURPOSE & OBJECTIVES:**

The objectives of the 2025 Water Facility Plan (WFP) are as follows:

1. Determine the necessary water distribution and treated water storage facilities to meet the forecasted demands and resource optimization goals in the 2025 Water Resource Plan (WRP).
2. Determine the optimum combination of facilities that satisfy TMWA and NAC 445A criteria while minimizing the financial cost to the community.
3. Obtain District Health acceptance of the Facility Plan to reduce and streamline subdivision submittal, review and approval requirements.
4. Secure Regional Water Planning Commission approval for conformance with the regional plan.
5. Provide a firm foundation to fairly allocate facility costs to new growth and existing customers.
6. Identify the phasing of improvements to allow timely completion of improvements prior to the need, as well as to insure the logical and orderly expansion of the water system.
7. Provide cost information and project construction timing for the Ten Year Financial and Funding Plan.

#### **INTRODUCTION:**

This planning effort represents the first time that TMWA has fully utilized the capabilities of GIS technology to develop a fully integrated database consisting of water meter billing information attached to the associated land parcel. The result was an average day demand data set which is very accurate from a perspective of both geographical distribution and total volume. In addition, daily meter reads obtained during the summer of 2003 provided actual peak day water use data that provided average day to maximum day peaking factors by rate class. In general, it is believed that this is the most accurate data that TMWA planning engineers have ever been able to work with.

#### **FUTURE DEMANDS & FACILITY COST SUMMARY:**

The maximum day demand on TMWA's supply and distribution facilities is anticipated to increase from about 152 million gallons per day (MGD) in 2005 to about 201 MGD in 2025 (a 32 percent increase over the 20 year period). Due to the future conversion of all remaining flat rate users to metered rates, it is anticipated that overall system demand will decrease slightly in the 2010 timeframe (it is assumed that the system is 100 percent metered in the next three

years). The estimated decrease in demand almost entirely offsets new demand from in-fill development within portions of the existing system, thus some older parts of the distribution system will see very little, if any net growth in demand over the 20-year planning period. WFP demand projections were developed independently and then compared to WRP estimates. It was anticipated that some adjustment and reconciliation with WRP projections would be necessary, but the two demand sets were in close agreement, which is summarized below.

### 2005-2025 Maximum Day Demand Projections\*

Year	WRP MDD (MGD)	WFP MDD (MGD)	Percent Difference
2005	153.1	152.1	(0.3)
2010	159.6	161.0	0.9
2015	171.0	177.1	3.6
2020	180.5	189.7	5.1
2025	189.5	201.0	6.1

\* The difference between WRP and WFP forecasts include: (1) the WFP uses more recent and accurate parcel size data with current peaking factors to arrive at revised meter retrofit savings that are about 4 MGD less than the WRP estimate; and (2) the WFP includes 4 MGD for the Verdi area and an additional 3.2 MGD for SVGID, which was not included in the WRP. After considering these factors, the net result is a 0.3 MGD difference (189.5 vs. 189.8) between the two demand projections.

The major growth in water demand is expected to primarily occur in four geographic areas as summarized below:

### 2005-2025 High Growth Areas

Service Area	Increase in Retail MDD (MGD)	Increase in Wholesale MDD (MGD)	Total Increase In MDD (MGD)
Northwest - Verdi	8.7	4.0	12.7
Spanish Springs	15.9	5.3	21.2
So. Truckee Meadows	(0.3)	6.7	6.4
North Virginia - Stead	2.7	4.8	7.5
<b>Totals</b>	<b>27.0</b>	<b>17.6</b>	<b>47.8</b>

The estimated cost of water system facilities required to meet the demands of new growth and/or correct deficiencies for existing customers are summarized below under the categories of Supply, Storage, Distribution and Pumping Systems.

### 2005-2025 Facility Costs & Preliminary Allocations

Facility Category	Total Estimated Costs	Costs Allocated to New Growth	Costs Allocated to Existing Customers
Supply	\$51.0 M	\$41.4 M	\$ 9.6 M
Storage	\$53.3 M	\$30.7 M	\$22.6 M
Distribution	\$53.7 M	\$40.7 M	\$13.0 M
Pumping	\$30.9 M	\$21.6 M	\$ 9.3 M
<b>Totals</b>	<b>\$188.9 M</b>	<b>\$134.4 M</b>	<b>\$54.5 M</b>

As indicated in 2005-2025 High Growth Areas table above, the majority of the new demand is expected to occur in the Spanish Springs area over the next 20 years. As might be expected, a proportional share (approximately \$25M) of the \$53.7M in distribution facility costs is tentatively allocated to Feeder Main Areas 2, 2A, 4 and 5. Although the next highest increase in demand is expected to occur in the Northwest (including Verdi), the preliminary allocation of facility costs to Area 3 are relatively small. This is because the bulk of the Verdi distribution and storage facilities would be constructed downstream of the wholesale meter point and most likely built and dedicated by developers. Some relatively high facility costs are anticipated for the North Valleys area since a complete rebuild or replacement of both the North Virginia and Stead supply systems is required for new growth and/or normal age related replacement purposes. Since the details regarding costs, allocation of costs and the probable impact on water rates and developer facility charges will be presented in the 10-Year Funding Plan, the 2025 WFP will focus on the facility requirements and the phasing or timing of those improvements.

#### FACILITY REQUIREMENTS:

A brief discussion of the major Supply, Distribution, Pumping and Storage facility recommendations with required project in-service dates and estimated costs are presented below:

## Major Supply Improvements

Project	Required Completion	Estimated Cost
A. Highland Canal Lining	2005-2010	\$1,100,000/ year
B. Glendale Pumping Improvements	2006	\$3,500,000
C. Glendale Diversion	2010	\$9,000,000
D. Sparks Groundwater Treatment Plant	2013	\$12,000,000
E. New Production Wells		
Stead-Silver Lake Wells	2005	\$1,600,000
Tucker Well	2006	\$1,000,000
School District Well	2016	\$1,000,000
Longley #2 Well	2017	\$1,000,000
F. Chalk Bluff Expansions		
Phase 4	2018	\$10,500,000
Phase 5	2025	\$10,500,000

### A. Highland Canal Lining

The Highland Canal is the primary raw water conveyance system for Chalk Bluff due to the cost of pumping from the Orr Ditch diversion, the increase in water quality afforded by the upstream diversion and the higher reliability of gravity flow. The Highland Canal currently has the capacity to deliver about 60 percent of the current net treatment capacity of the Chalk Bluff plant. Approximately 23,800 feet of the 38,700 feet total length of the Highland Canal between the diversion head works and Chalk Bluff has been improved. The long-term goal of the Highland Canal improvements is to provide a secure, protected, all-weather conveyance system capable of diverting as much of the Chalk Bluff supply by gravity flow as possible. In some locations such as the Mogul area, existing flume sections represent a potential major liability from damage to personal property should a canal failure occur. The proposed Mogul Bypass project would eliminate the potential liability.

## **B. Glendale Pumping Improvements**

The net treatment capacity of the Glendale plant is about 34.5 MGD, but the existing raw water diversion capacity limits net production to about 27 MGD. When the new arsenic standard goes into effect in 2006, TMWA will begin delivering up to 7.6 MGD of high arsenic groundwater to the Glendale site from the Mill, Corbett and Greg wells to insure PCE remediation goals continue to be met and to preserve normal production capacity. Arsenic concentrations in these wells are such that they can be blended with finished water from the plant and thus add to and not displace surface water treatment capacity. Following construction of the Glendale diversion, blending of groundwater at the finish water pump station wet well during a non-drought year would require a finish water pumping rate from the Glendale plant of around 45 MGD. Expansion of the finish water pumping capacity will take full advantage of the available plant treatment capacity, maximize surface water production in a non-drought year, reduce dependence on Chalk Bluff and provide flexibility to operate the Mill and Corbett PCE wells on a year-round basis. The planning and design of this facility will include an analysis of both high- and/or low-head pumping into the Highland and Sparks Regulated gravity zones, respectively, to minimize energy costs and the potential of piping additional arsenic wells to Glendale for treatment. The cost of this improvement is included in the Arsenic Compliance budget.

## **C. Glendale Diversion**

An appropriate mix of ground water and surface water supplies are necessary to meet demands in both a drought and a non-drought year. As the population grows, it will become even more important to delay or extend the use of drought reserves from upstream reservoirs (referred to as Privately Owned Stored Water (POSW)) in the event of an extended drought situation. Once upstream POSW is released, it is critical to capture that water at either the Chalk Bluff Treatment Plant via the Highland Canal or the Orr Ditch pump station, or at the Glendale Treatment Plant. The minimum river flow expected to be available for diversion at Glendale during the critical drought year is 25 cubic feet per second (cfs), which consists of the minimum 20 cfs bypass flow beyond the Orr Ditch diversion structure when the pump station is operated plus an assumed 5 cfs of combined contributions from City storm drains and natural river accretion between Chalk Bluff and Glendale. This results in a minimum surface water supply to Glendale of about 16.2 MGD. The Glendale Diversion project is necessary in part to allow capture of that important POSW under drought (low flow) conditions. This drought year surface water supply to Glendale, in conjunction with existing high arsenic

ground water supplies will insure that the plant can continue to produce a finished water flow near its rated capacity. During a non-drought year, the Glendale Diversion will provide reliable delivery of up to 38 MGD of river water to the Glendale plant to maximize surface water production and take full advantage of the 34.5 MGD of available net treatment capacity. In addition, the new diversion will improve reliability, reduce the environmental impact of diversion maintenance, enhance the fisheries habitat, improve recreational opportunities, and provide some flood benefits. This project does not create significant additional non-drought year capacity without increasing the finished water pumping capacity from the plant. Due to the significant non-capacity related aspects of this project, it may be constructed one to two years earlier than noted above if environmental and construction permits and funding assistance are secured.

#### **D. Sparks Groundwater Treatment Plant**

To maintain water service during drought conditions and to maximize the yield of TMWA's water resources under all conditions, it will be necessary to develop a groundwater production capacity of at least 72.6 MGD. This estimate is based on the provisions of the conjunctive use agreement which allows TMWA to pump approximately 22,000 AF in a drought year. Maximizing the yield of this drought supply results in a peak month extraction of 6900 AF, or 72.6 MGD. Although the Glendale plant has adequate treatment capacity (37.5 MGD) to allow adding more arsenic groundwater to the treatment train during a drought year (the Pezzi, Poplar #1 and Terminal wells are already piped to Glendale), a separate groundwater treatment facility is recommended due to: (a) a resulting increase in overall system reliability; (b) a reduction in raw water piping costs by locating the treatment facility closer to potential sources; and (c) because additional non-drought capacity is created (additional groundwater sent to Glendale would only displace surface water in a "normal" year). Because Sparks would benefit from the addition of another reliable supplemental source of supply; additional good quality groundwater sources have been extremely hard to locate and develop; and because new supply capacity must be developed anyway, the project needs to be implemented.

#### **E. New Production Wells**

The conjunctive use of ground and surface water supplies provides many benefits to the TMWA system. An adequate groundwater supply is necessary to maintain water service during periods of drought or other periods when surface supplies are temporarily curtailed. In an emergency

situation where surface supplies are unavailable and mandatory conservation is imposed, groundwater could satisfy the essential indoor water needs of the community for an extended period. TMWA also utilizes its groundwater as a peaking supply to meet seasonal peak use demands that exceed surface water treatment capacity. Strategically located production wells can reduce distribution system facility requirements by placing supply sources closer to areas of large demand that may be located a great distance away from surface water production facilities (e.g. Spanish Springs well). In order to defer Chalk Bluff Phase 4 expansion as long as possible and provide adequate drought period supply, it is necessary to develop about 73 MGD of net groundwater capacity. Current groundwater capacity is about 61 MGD including the arsenic wells that are piped to Glendale. The total increase in groundwater capacity from the new well projects will be about 6.4 MGD.

#### **F. Chalk Bluff Treatment Plant Expansion**

The proposed Glendale and groundwater improvements will provide adequate drought supply and meet resource optimization goals while also providing new capacity to meet the anticipated needs of new development for the next 11-13 years. At that point in time, additional sources of supply will be needed. The additional supply will most likely be provided by constructing Chalk Bluff Phase 4, unless additional groundwater rights are developed and extraction of those rights is allowed by the State Engineer. Once drought supplies are secured and resource optimization goals are met, the most cost effective alternative for creating additional supply is through expansion of the Chalk Bluff plant.

## Major Distribution Improvements

Major distribution facility improvements are presented below by regional area of influence and contribution:

Projects	Required Completion	Estimated Cost
<b>A. Sparks-Spanish Springs</b>		
NE Sparks Feeder Main Ph. 3	2005	\$4,236,000
NE Sparks Feeder Main Ph. 4	2009	\$3,466,000
NE Sparks Feeder Main Ph. 5	2010	\$1,533,000
NE Sparks Feeder Main Ph. 6	2012	\$4,173,600
NE Sparks Feeder Main Ph. 7	2018	\$1,227,000
SE Sparks Feeder Main Ph. 1	2009	\$ 248,000
SE Sparks Feeder Main Ph. 2	2020	\$2,048,000
<b>B. North Valleys</b>		
Silver Lake Main Improvements	2005	\$2,570,000
Stead-North Virginia Trans. Main	2009	\$9,800,000
Hoge Main	2009	\$ 475,000
Raleigh Heights Trans. Main	2009	\$1,789,000
Raleigh-Stead Trans. Main	2013	\$4,050,000
<b>C. Northwest-Verdi</b>		
US 40 - Mae Anne Parallel Main	2008	\$ 664,000
Mogul Parallel Main	2009	\$2,014,000
Mayberry River Crossing	2010	\$ 180,000

### **A. Sparks Distribution Improvements**

Due to the lack of good quality of groundwater sources of sufficient volume in northeast Sparks, it is necessary to convey surface water production from the Glendale treatment plant over a very long distance out to the Spanish Springs area. A similar situation will also exist when the proposed Copper Canyon project begins development on the east side of Sparks. Several alternatives that had potential to offset or reduce the size of required distribution facilities in Sparks were evaluated, including a groundwater treatment plant (GWTP) and a low-head pumping facility south of Spanish Springs valley. As intuitively anticipated, a Sparks GWTP reduces the main size between Glendale and the GWTP location; however, there is very little that can be done to reduce the main size from the GWTP to Spanish Springs valley. This is because a very large pipe is required just to overcome cumulative friction losses produced as a result

of the significant length of the main (pipe velocity is relatively low for a surprisingly wide range of pipe diameters). The proposed Disc Drive pump station may only be operated for 3-4 months per year, but its contribution during the peak use period reduces Sparks Feeder main costs by about \$3 million. The projects listed above are just a short list of the major facilities. As previously mentioned, the total cost of distribution facilities for the Sparks area is about \$25 million over the next 20 years. The need for these facilities is directly related to growth and will be paid for by new development through appropriate area-based feeder main fees.

## **B. North Valleys Distribution Improvements**

With the annexation of the Sky Vista development in Stead in the mid-1990's, it was projected that the Stead main would need to be replaced with a higher capacity pipeline around 2001. Sierra's purchase of the Silver Lake system in the late 1990's provided sufficient additional peak day supply to delay the Stead main replacement project, but did not indefinitely defer the need for a higher capacity pipeline, nor the need to replace the aging existing pipeline. From a water resource perspective, the Regional Water Planning Commission (RWPC) has recommended that further use of Truckee river water rights for growth in the North Valleys be limited, due to the additional return flow dedication requirement associated with the export of Truckee river water outside of the Truckee Meadows basin. Even if a groundwater importation project provides adequate supply to the North Valleys, it is still several years out and it is uncertain whether it will replace the supply for existing customers within the TMWA retail service area. The existing Stead main is approximately 50-years old and is approaching the end of its useful life. Most of the major leaks in recent years have occurred in the low pressure section of the pipeline between the Stead #2 pump station and the Stead tanks where the wall thickness of the cement mortar lined steel pipe is less. However, demand for new water service TMWA's North Virginia system is very strong and the analyses have indicated that a combined Stead-North Virginia pump system replacement project would be the most cost effective alternative to develop. The project would be completed in two phases with the initial pipeline and pumping improvements delivering water to the Raleigh Heights system followed by a phase two pipeline extension to Stead. Due to the commitment to serve existing customers in the Stead area, TMWA would be responsible for a portion of the Stead-North Virginia system and all of the Raleigh-Stead system.

### C. Northwest-Verdi Distribution Improvements

The Northwest-Verdi projects listed above do not include any facilities required to serve Verdi beyond an assumed meter point at Mogul and does not reflect oversizing investment already made in the 2003 Mayberry parallel main project.

### Storage Improvements

Projects	Required Completion	Estimated Cost
<b>A. Gravity Zones</b>		
Hunter Creek Gravity Storage	2007	\$6,650,000
Highland Gravity Storage	2008	\$6,650,000
<b>B. Pumped Storage Zones</b>		
1.25 MG Beaumont Tank	2005	\$1,780,000
1.5 MG Ridgeview Tank	2006	\$2,760,000
4.0 MG Pyramid Tank	2006	\$4,520,000
1.5 MG Vista #2 Tank	2006	\$1,800,000
1.25 MG D'Andrea Tank	2006	\$1,875,000
1.5 MG Community College Tank	2006	\$2,000,000
2.5 MG Raleigh Heights #3 Tank	2008	\$2,750,000
0.75 MG Vista #3 Tank	2008	\$1,125,000
1.25 MG Caughlin #2 Tank	2009	\$1,750,000
2.0 MG Stead Tank	2012	\$2,400,000

### A. Gravity Zone Storage Improvements

An analysis of 2005 treated water storage requirements indicates a slight overall surplus of about 4.5 MG for the major gravity zones (Hunter Creek, Highland and Sparks Regulated). From a system hydraulic standpoint, surplus storage in the Hunter Creek zone can flow by gravity to the Highland zone, which in turn can pass flow "downstream" to the Sparks regulated zone. Working "backwards" in the gravity flow scheme, the Sparks regulated gravity zone will have a projected 2005 storage deficit of around 19.6 MG, the Highland zone will have a projected 2005 storage surplus of about 0.7 MG and the Hunter Creek zone will have a 2005 storage surplus of about 23.4 MG. The large surplus at Hunter Creek is appropriate since the zone's elevation provides the hydraulic flexibility to supply all other gravity zones in an emergency situation. The projected

growth in wholesale demands will slightly increase the operating storage requirements in the gravity reservoirs to meet the incremental volume between max day and peak hour demands. However, the 2025 storage projections indicate that the gravity zones will still contain an overall surplus of storage (from a TMWA design criteria standpoint), primarily because the Canoe Hill wholesale demand is shifted from the gravity zone to a tank zone (the proposed 2006 Pyramid tank in Spanish Springs). From a Nevada Administrative Code (NAC) total capacity compliance standpoint, a minor amount of additional operating storage is required to satisfy the requirements of NAC 445A.66725 under 2005 max day demand conditions. Even with the addition of 10 MG of gravity storage, it is possible that there could still be a slight deficit in total capacity (per NAC 445A.6672) under 2025 peak hour demand conditions. However, the accuracy of 2025 demand estimates does not warrant an addition of more than 10 MG of storage at this time. In addition, the increased maintenance requirements of the two major treated water storage reservoirs constructed with liners and floating covers (one 30 MG reservoir at Hunter Creek and one 20 MG reservoir at Highland) has revealed a need for redundant storage facilities within these zones. Because of the need for additional operating storage and redundancy concerns, it is recommended that additional gravity storage be constructed within both the Hunter Creek and Highland zones.

## **B. Pumped Storage Improvements**

The pumped storage tank projects reflect only those facilities that will be paid in whole or part by existing customers, either as incremental oversizing of storage facilities to serve new development, or as stand alone additional storage required for existing customers. The estimated costs above do not reflect the anticipated cost sharing with new development. Additional storage is required to eliminate existing storage deficiencies (Vista #2, Community College, Caughlin) or provide storage where none currently exists (Ridgeview, Pyramid, D'Andrea, Vista #3). The Stead tank may be constructed at a Raleigh Heights site since gravity flow from there to Stead is possible. The Vista #3 tank will cover existing customers in the Wingfield Hills pump zone. The Caughlin tank is a very important storage facility because it provides emergency backup to seven continuous pumping zones in addition to the eight pump zones it normally serves. The existing deficit may be due to several factors, including higher actual demands or that the original sizing of the Caughlin tank may not have considered simultaneous emergency service to all zones. Detailed discussions of storage deficits can be found in the Storage section of this report.

## Pumping System Improvements

<b>Pumping System Projects</b>	<b>Required Completion</b>	<b>Estimated Cost</b>
<b>Pyramid-Point View</b>	<b>2005</b>	<b>\$1,150,000</b>
<b>Hunter Creek-Ross</b>	<b>2005</b>	<b>\$ 900,000</b>
<b>Glendale High-Lift</b>	<b>2006</b>	<b>\$3,500,000</b>
<b>Truckee River Highlands #1 &amp; #2</b>	<b>2007</b>	<b>\$1,500,000</b>
<b>Vista #2 &amp; #3 Capacity Increase</b>	<b>2008</b>	<b>\$ 600,000</b>
<b>North Virginia-Stead</b>	<b>2009</b>	<b>\$8,600,000</b>
<b>Spanish Springs #2 Capacity Increase</b>	<b>2010</b>	<b>\$ 500,000</b>
<b>Disc Drive Low Head</b>	<b>2015</b>	<b>\$ 800,000</b>

The pump system projects noted above are driven by various factors including new growth as well as increased reliability for existing customers. Pump stations that will only serve new growth are not necessarily shown in the table above.

The Pyramid pump station project is necessary to expand capacity to the west side of Spanish Springs valley and also provides the opportunity to eliminate the deteriorated Point View continuous pumping station.

Water use within the Hunter Creek and Ross pump zones has increased to the point where adequate peak hour pressures cannot be maintained with current pumping equipment. Consolidation of these two old underground pump stations into one new building at the Hunter Creek reservoir site is cost effective and with the addition of standby power generation, almost all of the existing Caughlin storage deficit will be eliminated from an NAC compliance standpoint.

Replacement of the Glendale Hi-Lift station (in conjunction with the Glendale diversion project) will allow full utilization of the plant's treatment capacity; creating about 7.5 MGD of additional surface water capacity and another 7.6 MGD of capacity from blending high arsenic groundwater (Mill, Corbett & Greg) without having to construct separate treatment facilities.

The original Vista #1 pump station was located in an underground vault within the right-of-way of Vista Boulevard and was subject to repeated flooding from groundwater intrusion. This station was replaced in 2004 with a new above ground building and also provided with higher capacity pumps to meet future needs. Vista #2 & #3 will also need capacity increases in the near future in conjunction with the #2 tank project.

The cost of the proposed combined North Virginia-Stead system (including the pipeline) would be shared by new North Virginia development and existing Stead customers.

The Truckee River Highlands pump system will meet demands in the lower Northgate area without having to pump into the higher Northgate #1 & #2 tank zones and will also free up pumping capacity at US 40 for potential increased pumping to Somerset or Verdi. The cost of this system is currently being collected through a feeder main fee for Area 3.

The Disc Drive Low Head facility reduces Sparks Feeder Main capital costs and only needs to be operated during peak use months.

The pumping capacity of the Spanish Springs #2 pump station will need to be expanded to meet the future needs of the Spanish Springs valley. Any increase in capacity would be paid for by growth.

MAINS, PUMPING & DISTRIBUTION IMPROVEMENTS BY FEEDER MAIN AREA

Year	Dia. (in.)	Length (ft)	Unit Cost	Main Cost	Addl. Costs	Total Cost	Allocation		Cost to Existing Customers	Cost to Existing Customers	Comments	
							to New Develop.	to New Develop.				
<b>AREA 1</b>												
2005						\$90,000	0.00	\$0	1.00	\$90,000	Write Sands PSV. Zol. Reg rebuild, LaSuardia tie	
2010						\$1,057,000	1.00	\$1,057,000	0.00	\$0	5750' of 8", 2300' 14", Longley PZ & Zolazzi	
2014						\$400,000	1.00	\$400,000	0.00	\$0	includes a second genset, may require bldg extn	
2025	8	3500	\$15.00	\$420,000		\$500,000	1.00	\$500,000	0.00	\$0	includes new PRV station	
							\$2,037,000			\$1,957,000		
<b>AREA 2</b>												
2005	36	8000	\$12.50	\$3,600,000		\$3,664,000	1.00	\$3,664,000	0.00	\$0	Stanford to Goldy (Greenbrae, McCarran, Baring)	
2005	18	1350	\$12.50	\$303,750		\$367,750	1.00	\$367,750	0.00	\$0	Stanford - I-Street to Greenbrae	
2005	16	700	\$12.50	\$140,000		\$204,000	1.00	\$204,000	0.00	\$0	Stanford - Prater to I-Street	
2009	36	5900	\$15.00	\$3,186,000		\$3,466,000	1.00	\$3,466,000	0.00	\$0	Glendale to Prater (21st, A, 19th, 180 bore	
2009	14	1100	\$13.50	\$207,900		\$247,900	1.00	\$247,900	0.00	\$0	Greg - 21st to Rock	
2009	36	8200	\$14.00	\$4,132,800		\$4,172,800	1.00	\$4,172,800	0.00	\$0	Prater to Pyramid (19th, F, 15th, Rock, Greenbrae)	
2012	12	2900	\$13.50	\$469,800		\$565,800	1.00	\$565,800	0.00	\$0	Fill-in sections on Rock, Greg & Capital	
2020	12	5300	\$13.50	\$868,600		\$878,600	1.00	\$878,600	0.00	\$0	Mill - Rock to McCarran	
2020	18	2400	\$13.50	\$563,200		\$603,200	1.00	\$603,200	0.00	\$0	Mill - Telegraph to Rock	
							\$14,170,050			\$14,170,050		
<b>AREA 3</b>												
2008	16	2600	\$15.00	\$624,000		\$332,000	1.00	\$332,000	0.00	\$0	for Verdi and Somerset (50-50 split)	
2009						\$300,000	0.00	\$0	1.00	\$300,000	cost already collected from new development	
2009						\$750,000	1.00	\$750,000	0.00	\$0	paid by Area 3 Feeder Main Fees	
2009						\$750,000	1.00	\$750,000	0.00	\$0	paid by Area 3 Feeder Main Fees	
2009						\$150,000	1.00	\$150,000	0.00	\$0	paid by Area 3 Feeder Main Fees	
2010						\$1,500,000	1.00	\$1,500,000	0.00	\$0		
2010						\$750,000	1.00	\$750,000	0.00	\$0		
2010						\$200,000	1.00	\$200,000	0.00	\$0	Verdi & NW growth	
2014						\$750,000	1.00	\$750,000	0.00	\$0		
2015						\$1,500,000	1.00	\$1,500,000	0.00	\$0		
2015						\$1,500,000	1.00	\$1,500,000	0.00	\$0		
							\$8,482,000			\$8,182,000		
<b>AREA 4</b>												
2005	8	2400	\$15.00	\$288,000		\$538,000	0.00	\$0	1.00	\$538,000	Pt. View eliminated, new reg sta, JPRV's/BPs	
2005						\$1,150,000	0.00	\$0	1.00	\$1,150,000	Modify PS #1, construct new #2 PS	
2005	8	200	\$12.50	\$20,000		\$35,000	0.00	\$0	1.00	\$35,000	gravity zone tie w/CV	
2006	6	1080	\$15.00	\$97,200		\$112,200	0.00	\$0	1.00	\$112,200	distribution looping for connection to Pyramid PZ	
2006						\$50,000	0.00	\$0	1.00	\$50,000	altitude valve, misc ties to combine zones	
2010	30	1000	\$12.50	\$375,000		\$415,000	1.00	\$415,000	0.00	\$0	Disc/Sparks to Los Altos/Vesta	
2010	18	4400	\$15.00	\$1,188,000		\$1,208,000	1.00	\$1,208,000	0.00	\$0	Vista Blvd - Disc to No. Los Altos	
2015	12	400	\$15.00	\$72,000		\$87,000	1.00	\$87,000	0.00	\$0	Vista Blvd - Disc on Vista - velocity deficiency	
2015						\$800,000	1.00	\$800,000	0.00	\$0	reduces Sparks Fdr Main sizes	
2020	12	700	\$12.50	\$105,000		\$140,000	1.00	\$140,000	0.00	\$0	10,000 gpm capacity, full standby power (reduces storage)	
2025	16	6800	\$12.50	\$1,360,000		\$1,395,000	1.00	\$1,395,000	0.00	\$0	WSS-Cmg; WSS-FH14 (peak hour pressure)	
2025	24	800	\$12.50	\$240,000		\$280,000	1.00	\$280,000	0.00	\$0	Vista Blvd - So. Los Altos to Disc	
2025	14	2700	\$12.50	\$472,500		\$502,500	1.00	\$502,500	0.00	\$0	Parallel to Disc	
							\$7,212,700			\$6,327,500	Vista Blvd - Los Altos to SSP2	
											\$1,885,200	

DISTRIBUTION IMPROVEMENTS BY FEEDER MAIN AREA

**AREA 5**

Los Altos Parallel Main	2005	12	800	\$15.00	\$144,000	\$64,000	\$208,000	1.00	\$208,000	0.00	\$0	transmission capacity increase Vista #1-#2
Vista #2/#3 Capacity Increase	2008						\$600,000	1.00	\$600,000	0.00	\$0	increase capacity, add genset to #3; succidisch parallel piping at #2
Vista PZ Improvements	2010	8	850	\$15.00	\$102,000	\$20,000	\$122,000	1.00	\$122,000	0.00	\$0	Canyon Pkwy parallel, Glanadi CV
<b>Area 5 Total</b>							\$3,512,800		\$3,512,800		\$0	prelim. Barker development plans require relocation

**AREA 1**

Golden Valley Imp.	2006	16	5900	\$10.00	\$944,000	\$180,000	\$1,124,000	1.00	\$1,124,000	0.00	\$0	secondary feeder from Security Circle
Stead-N. Virginia T-Main	2005	14	2400	\$12.50	\$420,000	\$64,000	\$484,000	1.00	\$484,000	0.00	\$0	Spearthead loop
Hoge Feeder Main	2009	12	2300	\$12.50	\$345,000	\$130,000	\$475,000	1.00	\$475,000	0.00	\$0	24000 LF of 30"-36" T-Main + 6 Reg Sta
Raleigh #3 Feeder Main	2009	30	3800	\$13.50	\$1,539,000	\$250,000	\$1,789,000	1.00	\$1,789,000	0.00	\$0	part of N.Virg-Stead project (Hoge 1/2 retired)
Stead-N. Virg. Pump Sta	2009						\$8,640,000	0.50	\$4,320,000	0.50	\$4,320,000	required for Raleigh #3 tank
Raleigh #2 P.S.	2009						\$400,000	1.00	\$400,000	0.00	\$0	18.7 mgd PS w/3MW genset at HL Res.
Parr Main & Reg Station	2015	12	2000	\$13.00	\$312,000	\$70,000	\$382,000	1.00	\$382,000	0.00	\$0	in-line p.s. at top of zone for pressure support
Talus Main & Reg Station	2025	12	1300	\$14.00	\$218,400	\$65,000	\$283,400	1.00	\$283,400	0.00	\$0	off of hi-pressure North Virginia feeder
<b>Area 1 Total</b>							\$23,377,400		\$14,157,400		\$9,220,000	off of hi-pressure North Virginia feeder

**AREA 10**

Silver Lake Main Imp.	2005	12	17400	\$12.00	\$2,505,600	\$64,000	\$2,569,600	1.00	\$2,569,600	0.00	\$0	integrate new wells, provide recharge capacity
Stead Main - 395 Bore	2005	24	1000	\$600.00	\$600,000	\$150,000	\$750,000	0.00	\$0	1.00	\$750,000	Peavine tank & Stead main replacement
Silver Lake Recharge Imp	2008						\$480,000	1.00	\$480,000	0.00	\$0	Mt Anderson Pump/FCV/Alt. Valve, FCV/PSV at tank
Silver Lake Improvements	2009						\$127,200	0.00	\$0	1.00	\$127,200	deficiency corrections, reg sta, alt valve
Raleigh-Stead Gravity Main	2013	20	18000	\$11.00	\$3,960,000	\$90,000	\$4,050,000	0.00	\$0	1.00	\$4,050,000	Stead main replacement (Golden Valley to Stead)
<b>Area 10 Total</b>							\$7,956,800		\$3,029,600		\$4,927,200	

**AREA X**

Oddie-Sullivan 24" Mains	2015	20	1700	\$15.00	\$510,000	\$20,000	\$530,000	1.00	\$530,000	0.00	\$0	Sullivan - Byrd to Oddie
W. Fourth 30" Main	2015	24	4900	\$13.50	\$1,587,600	\$70,000	\$1,657,600	1.00	\$1,657,600	0.00	\$0	Oddie - Sutor to Helena & Wall to Sullivan
<b>Area X Total</b>							\$354,000	1.00	\$354,000	0.00	\$0	W. Fourth - Vine to Washington

**VERDI**

US 40 - Mae Anne 1 Parallel	2008	16	2900	\$15.00	\$624,000	\$40,000	\$332,000	1.00	\$332,000	0.00	\$0	for Verdi and Somerset (50-50 split)
Mogul 14" Parallel Main	2009	14	9400	\$15.00	\$1,974,000	\$40,000	\$2,014,000	1.00	\$2,014,000	0.00	\$0	Verdi
Mayberry River Crossing	2010	20	250		\$100,000	\$80,000	\$180,000	1.00	\$180,000	0.00	\$0	Verdi
US 40 Capacity Increase	2010						\$200,000	1.00	\$200,000	0.00	\$0	Verdi-Somerset
<b>Verdi Total</b>							\$2,726,000		\$2,726,000		\$0	

**DISTRIBUTION IMPROVEMENTS  
BY FEEDER MAIN AREA**

2005-2025 MAJOR DISTRIBUTION FACILITY REQUIREMENTS

Note: The "Additional Costs" column account for hot taps, connections to existing system, boring, etc.

Description	Year	Dia. (in)	Length (ft)	Unit Cost	Main Cost	Addl. Costs	Total Cost	Allocation to New Develop.	Allocation to Existing Customers	Cost to Existing Customers	Comments
Western Reg Sta	2004						\$50,000	0.00	1.00	\$50,000	fire flow (FF) & pressure deficiencies (PD)
Socrates #2 Reg Sta	2005						\$50,000	0.00	1.00	\$50,000	FF & PD's
Zolezzi Improvements	2005						\$80,000	0.00	1.00	\$80,000	FF - White Sands PSV, Zol Reg Reburd, LaGuardia main the Stanford to Gandy (Greenbrae, McCarran, Bering)
NE Sparks Fdr Main Ph. 3	2005	36	8000	\$12.50	\$3,600,000	\$64,000	\$3,664,000	1.00	0.00	\$0	Stanford - I-Street to Greenbrae
	2005	18	1350	\$12.50	\$303,750	\$64,000	\$367,750	1.00	0.00	\$0	Stanford - I-Street
	2005	16	700	\$12.50	\$140,000	\$64,000	\$204,000	1.00	0.00	\$0	Integrate new wells, provide recharge capacity transmission capacity increase Vista #1-#2
Silver Lake Main Imp.	2005	12	17400	\$12.00	\$2,508,000	\$64,000	\$2,572,000	1.00	0.00	\$0	fire flow & pressure deficiencies main replacement
Los Altos Parallel Main	2005	12	800	\$15.00	\$144,000	\$64,000	\$208,000	1.00	0.00	\$0	Secondary feeder from Security Circle
Canyon Drive Main Imp.	2005	6	1100	\$15.00	\$99,000	\$45,000	\$144,000	0.00	1.00	\$163,000	fire flow & pressure deficiencies main replacement
Stead Main - 395 Bore	2005	24	500	\$600.00	\$300,000	\$45,000	\$345,000	0.00	1.00	\$345,000	main replacement
Golden Valley Imp.	2005	16	5900	\$10.00	\$994,000	\$180,000	\$1,174,000	1.00	0.00	\$0	Secondary feeder from Security Circle
Pyramid Zone Conversion	2005	14	2400	\$12.50	\$420,000	\$64,000	\$484,000	0.00	1.00	\$0	Spearthead loop
Vintage Hills Main Tr	2005	8	2400	\$15.00	\$288,000	\$250,000	\$538,000	0.00	1.00	\$538,000	Pt. View eliminated, new reg sta, JPRV/SBP's
Queens Way Imp.	2005	8	200	\$12.50	\$20,000	\$15,000	\$35,000	0.00	1.00	\$35,000	gravity zone connection w/ check valve
Valley Road Rezoning	2006	6	1080	\$15.00	\$97,200	\$15,000	\$112,200	0.00	1.00	\$112,200	distribution looping for connection to Pyramid PZ
Daniel Webster Imp.	2006	8	350	\$15.00	\$42,000	\$0	\$42,000	0.00	1.00	\$42,000	Dennos Ct Reg Sta; check valve (MAC pressures)
Spanish Springs Rezoning	2006	12	3500	\$14.00	\$598,000	\$15,000	\$613,000	0.00	1.00	\$613,000	fire flow & pressure deficiencies
Sun Valley Imp.	2006	8	1650	\$12.50	\$166,000	\$15,000	\$181,000	0.00	1.00	\$181,000	main replacement
Lakewood/Skyline Imp.	2007						\$50,000	0.00	1.00	\$50,000	fire flow & pressure deficiencies
Susaleen Reg Sta	2007						\$50,000	0.00	1.00	\$50,000	main replacement
Hunter Lake Imp.	2007	6	500	\$15.00	\$45,000	\$40,000	\$85,000	0.00	1.00	\$85,000	main the, pressure zone conversion
Outlook Drive Main Repl	2007	8	1400	\$15.00	\$180,000	\$48,000	\$228,000	0.00	1.00	\$228,000	replaces extd. 4" w/8" (500 vs 1000 gpm FF)
Huffaker Dist. Imp.	2007	8	900	\$15.00	\$108,000	\$24,000	\$132,000	0.00	1.00	\$132,000	fire flow deficiency
US 40-Male Anne 1 Parallel	2008	16	2600	\$15.00	\$524,000	\$40,000	\$564,000	1.00	0.00	\$0	for Verdi and Somersett
Silver Lake Recharge Imp	2008	14	3300	\$15.00	\$593,000	\$150,000	\$743,000	0.50	0.50	\$460,000	50-yr old steel main w/ capacity, RR bore
Valley Road Main Repl.	2008						\$843,000	0.00	1.00	\$843,000	24000 LF of 30"-36" T-Main + 6 Reg Sta
Stead N.Virginia T-Main	2009						\$8,800,000	0.00	1.00	\$8,800,000	Glendale to Prater (21st, A, 19th), 1-90 bore
NE Sparks Fdr Main Ph. 4	2009	36	5900	\$15.00	\$3,186,000	\$280,000	\$3,466,000	1.00	0.00	\$0	part of N.Ving-Stead project (Hoge 1/2 retired)
SE Sparks Fdr Main Ph. 1	2009	14	1100	\$13.50	\$207,900	\$40,000	\$247,900	1.00	0.00	\$0	required for Raleigh #3 tank
Hoge Feeder Main	2009	12	2300	\$12.50	\$345,000	\$130,000	\$475,000	1.00	0.00	\$0	deficiency corrections, reg sta, all valve
Raleigh #3 Feeder Main	2009	30	3800	\$13.50	\$1,599,000	\$250,000	\$1,789,000	1.00	0.00	\$0	Verdi
Silver Lake Improvements	2009						\$1,272,000	0.00	1.00	\$1,272,000	Disc/Spartes to Los Altos/Vista
Mogul 14" Parallel Main	2009	14	9400	\$15.00	\$1,974,000	\$40,000	\$2,014,000	1.00	0.00	\$0	Vista Blvd - Disc to No. Los Altos
NE Sparks Fdr Main Ph. 5	2010	30	950	\$10.00	\$285,000	\$40,000	\$325,000	1.00	0.00	\$0	2400' of 8", 4100' 14"; Longley PZ on Len Cir. & S. Virginia
	2010	18	4400	\$15.00	\$1,188,000	\$20,000	\$1,208,000	1.00	0.00	\$0	Canyon Pkwy parallel, Giannoli CV
South Virginia Imp.	2010	8	850	\$15.00	\$102,000	\$90,000	\$192,000	1.00	0.00	\$0	Burkington zone (reg station)
D'Andrea Improvements	2010	8	900	\$13.50	\$97,200	\$60,000	\$157,200	1.00	0.00	\$0	Banker project plans require relocation
Vista Tank Fdr Main Relec.	2010	18	3300	\$12.00	\$712,800	\$20,000	\$732,800	1.00	0.00	\$0	Prater to Pyramid (19th, F, 15th), Rock, Greenbrae)
NE Sparks Fdr Main Ph. 6	2012	36	8200	\$14.00	\$4,132,800	\$40,000	\$4,172,800	1.00	0.00	\$0	Needed when GWTP is in-service
GWTP Dist. Imp	2013	20	1900	\$13.50	\$351,000	\$20,000	\$371,000	1.00	0.00	\$0	Stead main replacement (Golden Valley to Stead)
Raleigh-Stead Gravity Main	2013	20	18000	\$11.00	\$3,960,000	\$90,000	\$4,050,000	0.00	1.00	\$4,050,000	Verdi
Mayberry River Crossing	2014	18	250	\$67.00	\$100,000	\$80,000	\$180,000	0.00	1.00	\$180,000	parallel main on Vista - velocity deficiency
Spanish Springs #2 Disch.	2015	12	400	\$15.00	\$72,000	\$15,000	\$87,000	0.00	1.00	\$87,000	off of hi-pressure North Virginia feeder
Par Main & Reg Station	2015	12	2000	\$13.00	\$312,000	\$70,000	\$382,000	1.00	0.00	\$0	Sullivan - Byrd to Oddie
Oddie-Sullivan 24" Mains	2018	20	1700	\$15.00	\$510,000	\$20,000	\$530,000	1.00	0.00	\$0	Oddie - Suro to Helena & Wall to Sullivan
	2018	24	4900	\$13.50	\$1,587,600	\$70,000	\$1,657,600	1.00	0.00	\$0	Greenbrae - Pyramid to Stanford
W. Fourth 30" Main	2018	30	700	\$14.00	\$294,000	\$60,000	\$354,000	1.00	0.00	\$0	Mill - Rock to McCarran
NE Sparks Fdr Main Ph. 7	2018	36	2700	\$12.50	\$1,215,000	\$12,000	\$1,227,000	1.00	0.00	\$0	Mill - Telegraph to Rock
SE Sparks Fdr Mains Ph. 2	2020	18	5300	\$13.50	\$883,600	\$20,000	\$903,600	1.00	0.00	\$0	Fill-in sections on Rock, Greg & Capital
	2020	18	2400	\$13.50	\$583,200	\$60,000	\$643,200	1.00	0.00	\$0	4 reg sta, 2 canned p.s., D'Andrea ties
	2020	12	2900	\$13.50	\$469,800	\$96,000	\$565,800	1.00	0.00	\$0	Includes new PRV station
Copper Canyon Imp.	2020	8	3500	\$15.00	\$420,000	\$80,000	\$500,000	1.00	0.00	\$0	WS9-Cimb; WS9-FH14 (peak hour pressure)
Jeppson Lane Imp.	2025	8	700	\$12.50	\$105,000	\$35,000	\$140,000	1.00	0.00	\$0	off of hi-pressure North Virginia feeder
Wingfield Springs Imp.	2025	12	1300	\$14.00	\$218,400	\$65,000	\$283,400	1.00	0.00	\$0	Vista Blvd - S. Los Altos to Disc
Talus Main & Reg Station	2025	16	6800	\$12.50	\$1,360,000	\$35,000	\$1,395,000	1.00	0.00	\$0	Parallel to Disc Drive
NE Sparks Fdr Main Ph. 8	2025	24	800	\$12.50	\$240,000	\$35,000	\$275,000	1.00	0.00	\$0	Vista Blvd - Los Altos to SSP2
	2025	14	2670	\$12.50	\$467,250	\$35,000	\$502,250	1.00	0.00	\$0	
					\$53,753,950	\$40,709,650	\$113,043,400				

MAJOR DISTRIBUTION IMPROVEMENTS

2005-2025 STORAGE REQUIREMENTS

Tank	Year	Volume (MG)	Material	Unit Cost	Tank Cost	Addl Costs	Total Cost	Allocation to New Develop.	Cost to New Develop.	Allocation to Existing Customers	Cost to Existing Customers	Comments
Somerset #1	2004	2.10	Pcon	\$1.30	\$2,730,000	\$0	\$2,730,000	0.97	\$2,648,100	0.03	\$81,900	allocations based on existing MDD = 73 gpm & future MDD = 2715 gpm
Vaughn Mill	2004	1.20	Steel	\$1.20	\$1,440,000	\$0	\$1,440,000	0.00	\$0	1.00	\$1,440,000	allocations based on existing MDD = 629 gpm & future MDD = 1223 gpm
Somerset #2	2004	1.00	Steel	\$1.50	\$1,500,000	\$0	\$1,500,000	1.00	\$1,500,000	0.00	\$0	replaces an existing tank built and dedicated by developer
Beaumont	2005	1.25	Steel	\$1.20	\$1,500,000	\$280,000	\$1,780,000	0.49	\$872,200	0.51	\$907,800	allocations based on existing MDD = 810 gpm & future MDD = 912 gpm
Ridgeview	2005	1.50	Pcon	\$1.50	\$2,250,000	\$510,000	\$2,760,000	0.11	\$303,600	0.89	\$2,456,400	allocations based on existing MDD = 842 gpm
Pyramid	2006	4.00	Steel	\$1.00	\$4,000,000	\$520,000	\$4,520,000	1.00	\$4,520,000	0.00	\$0	old part of zone will remain a continuous pumping area
Vista #2	2006	1.50	Steel	\$1.20	\$1,800,000	\$0	\$1,800,000	0.27	\$486,000	0.73	\$1,314,000	allocations based on existing MDD = 2210 gpm & future MDD = 3035 gpm
Comm. College	2006	1.50	Steel	\$1.20	\$1,800,000	\$200,000	\$2,000,000	0.33	\$660,000	0.67	\$1,340,000	allocations based on existing MDD = 1710 gpm & future MDD = 2539 gpm
D'Andrea	2006	1.25	Pcon	\$1.50	\$1,875,000	\$0	\$1,875,000	0.79	\$1,481,250	0.21	\$393,750	allocations based on existing MDD = 178 gpm & future MDD = 842 gpm
Somerset #3	2007	0.50	Steel	\$1.50	\$750,000	\$250,000	\$1,000,000	1.00	\$1,000,000	0.00	\$0	allocations based on existing MDD = 99,306 gpm & future MDD = 137,222 gpm
Hunter Creek #2	2007	5.00	Pcon	\$1.30	\$6,500,000	\$150,000	\$6,650,000	0.28	\$1,862,000	0.72	\$4,788,000	may need to oversize for projected deficit in #1 zone
Peavine Roof	2007	0.50	Pcon	\$1.30	\$650,000	\$50,000	\$700,000	0.00	\$0	1.00	\$700,000	allocations based on existing MDD = 445 gpm & future MDD = 740 gpm
Raleigh Heights #3	2007	2.50	Steel	\$1.00	\$2,500,000	\$50,000	\$2,550,000	0.00	\$0	1.00	\$2,550,000	assume demo and replace
Vista #3	2008	0.75	Steel	\$1.00	\$750,000	\$250,000	\$1,000,000	1.00	\$1,000,000	0.00	\$0	220K SF @ \$4.50/SF
Highland #2	2008	5.00	Pcon	\$1.30	\$6,500,000	\$150,000	\$6,650,000	0.28	\$1,862,000	0.72	\$4,788,000	will need two tanks due to topography
Pines	2009	1.25	Steel	\$1.20	\$1,500,000	\$250,000	\$1,750,000	0.60	\$1,050,000	0.40	\$700,000	actual timing of 2nd tank depends on develop. phasing
Sewerth St Repl.	2009	2.50	Steel	\$1.00	\$2,500,000	\$250,000	\$2,750,000	0.00	\$0	1.00	\$2,750,000	
Highland Liner	2011	0.75	Pp	\$1.50	\$990,000	\$0	\$990,000	0.00	\$0	1.00	\$990,000	
Northgate #4	2010	2.00	Steel	\$1.20	\$2,400,000	\$250,000	\$2,650,000	1.00	\$2,650,000	0.00	\$0	
Copper Canyon 1	2012	1.00	Steel	\$1.20	\$1,200,000	\$0	\$1,200,000	1.00	\$1,200,000	0.00	\$0	
Beaumont #2	2015	0.50	Steel	\$1.50	\$750,000	\$250,000	\$1,000,000	1.00	\$1,000,000	0.00	\$0	
Copper Canyon 2	2020	1.00	Steel	\$1.50	\$1,500,000	\$250,000	\$1,750,000	1.00	\$1,750,000	0.00	\$0	
Somerset #4	2020	0.50	Steel	\$1.50	\$750,000	\$250,000	\$1,000,000	1.00	\$1,000,000	0.00	\$0	
							\$53,445,000		\$30,802,650		\$22,642,350	

Notes:  
 1. The "Additional Costs" column accounts for remote sites requiring lengthy feeder main, utility and access road extensions. (assumed per LF unit cost of \$120 (pipe), \$45 (road), \$35 (pavelect) = \$200/LF); integration facilities, etc.  
 2. 0.8 MG of the Pyramid tank will be purchased by WCUD and SVGLD, which will reduce cost to new development by approx \$800K.

Vol (MG)	Pcon	Steel
0.5-1.0	\$1.80	\$1.50
1.0-2.0	\$1.50	\$1.20
>2.0	\$1.30	\$1.00

STORAGE IMPROVEMENTS

2005-2025 PUMP STATION PROJECTS

Facility or Project	Year	Estimated Cost	Allocation		Cost to Existing Customers	Existing Customers	Comments
			to New Develop.	to Existing Customers			
Hunter Creek-Ross PS	2005	\$900,000	0.00	1.00	\$900,000		Replaces existing pump stations
Pyramid PS #2	2005	\$1,150,000	0.00	1.00	\$1,150,000		Modify PS #1, construct new #2 PS
Coleman PS Piping Repl.	2005	\$250,000	0.00	1.00	\$250,000		Includes bypass for Comstock deficit
D'Andrea #1&#2 Cap. Inc.	2006	\$600,000	1.00	0.00	\$0		replace pumps/motors, generators
Holcomb Fire Pump & Genset	2007	\$275,000	0.00	1.00	\$275,000		redundant max day + fire required
Daniel Webster Rebuild	2008	\$250,000	0.00	1.00	\$250,000		maintenance rebuild
Stead-N V/ig. Pump Sta	2009	\$8,600,000	0.50	0.50	\$4,300,000		18.7 mgd PS w/2MW genset at HL Res.
Raleigh Hts #2 P.S.	2009	\$350,000	1.00	0.00	\$0		pressure support at top of zone
Vista #2#3 Capacity Increase	2009	\$600,000	1.00	0.00	\$0		increase capacity; add genset to #3; suct/disch parallel piping at #2
Tappan P.S. Rebuild	2009	\$300,000	0.00	1.00	\$300,000		already collected from new development
Truckee River Highlands #1 PS	2009	\$750,000	1.00	0.00	\$0		paid by Area 3 Feeder Main Fees
Truckee River Highlands #2 PS	2009	\$750,000	1.00	0.00	\$0		paid by Area 3 Feeder Main Fees
Driscoll Rebuild	2009	\$250,000	0.00	1.00	\$250,000		maintenance rebuild
Sky Ridge In-Line PS	2010	\$350,000	1.00	0.00	\$0		NAC compliance
US 40 PS Expansion	2010	\$200,000	1.00	0.00	\$0		Verdi & NW growth
Somerset #3 PS	2010	\$750,000	1.00	0.00	\$0		pump to Somerset #3 tank
Somerset #4 PS	2010	\$750,000	1.00	0.00	\$0		pump to Somerset #3 tank
Ventana Pt #1 PS	2010	\$750,000	1.00	0.00	\$0		
Folsom Rebuild	2010	\$250,000	0.00	1.00	\$250,000		maintenance rebuild
Sagittarius Rebuild	2011	\$250,000	0.00	1.00	\$250,000		maintenance rebuild
Sutro #1 & #2 Standby Power	2012	\$500,000	0.00	1.00	\$500,000		deficit storage in Valley Rd system (land, conduit runs)
Hunter Lake Rebuild	2012	\$250,000	0.00	1.00	\$250,000		maintenance rebuild
Socrates #2 Standby Power	2013	\$150,000	0.00	1.00	\$150,000		deficit storage in Valley Rd system
Yuma Rebuild	2013	\$250,000	0.00	1.00	\$250,000		maintenance rebuild
Ventana Pt #2 PS	2014	\$750,000	1.00	0.00	\$0		
Longley Capacity Increase	2014	\$400,000	1.00	0.00	\$0		Includes a second genset, may require bldg extr
Vista #4 PS	2015	\$750,000	1.00	0.00	\$0		
Vista #5 PS	2015	\$750,000	1.00	0.00	\$0		
Disc Drive Lo-Head P.S.	2015	\$800,000	1.00	0.00	\$0		reduces Sparks Fdr Main sizes
Copper Canyon #1-#3 P.S.'s	2015	\$2,250,000	1.00	0.00	\$0		three new pump stations w/generators
Beaumont #3 Pump Station	2015	\$750,000	1.00	0.00	\$0		
Beaumont #4 Pump Station	2015	\$750,000	1.00	0.00	\$0		
Somerset #4 (upper) P.S.	2015	\$750,000	1.00	0.00	\$0		
Somerset #5 (upper) P.S.	2020	\$750,000	1.00	0.00	\$0		
Copper Canyon #4-#6 P.S.'s	2020	\$2,250,000	1.00	0.00	\$0		three new pump stations w/generators
Spanish Springs #2 Cap. Inc.	2020	\$500,000	1.00	0.00	\$0		10,000 gpm capacity, full standby power (reduces storage)

\$30,925,000

\$21,600,000

\$9,325,000

PUMP FACILITY IMPROVEMENTS

# Truckee Meadows Water Authority

## RATE SCHEDULES

### WSF - WATER SYSTEM FACILITY CHARGES

#### APPLICABILITY

Pursuant to procedures set forth in Rule 5, the addition of new Service or Modified Service to existing water system Facilities in order to provide water Service to a particular Service Property(ies) subject to the following charges. Charges are based on the Maximum Day flow estimated in gallons per minute (gpm) by the Authority to serve the Service Property(ies) multiplied by these charges. The following water system Facility charges will be assessed where applicable and as identified in the Water Service Agreement.

#### A. Feeder Main Charge by Charge Area

1	South Truckee Meadows	\$955.00	per gpm
2	Sparks-East Reno	1,578.00	per gpm
2A	Sparks-East Reno-A	789.00	per gpm
3	Northwest Reno - Northgate/Mogul	1,214.00	per gpm
4	Sparks - Pyramid/Spanish Springs	2,337.00	per gpm
5	Sparks - The Vistas	2,965.00	per gpm
6	Sun Valley-Sullivan Pump Zones	1,303.00	per gpm
7	Northwest Reno - Verdi	4,882.00	per gpm
8	Sierra-North Virginia Pump System	2,596.00	per gpm
9	Lakeridge-Plumas Pump System	1,291.00	per gpm
10	Stead - Silver Lake	6,048.00	per gpm

B. Supply and Treatment Facility Charge                      \$3,236.00 per gpm

"Supply and Treatment Facility Unit Cost" is the unit cost in dollars per gpm of Maximum Day Demand, representing the cost to construct and finance supply/treatment improvements identified in the Authority's facility plan.

C. Storage Facility Charge    \$1,240.00 per gpm

"Storage Facility Unit Cost" is the unit cost in dollars per gpm of Maximum Day Demand, representing the cost to construct and finance storage improvements identified in the Authority's facility plan.

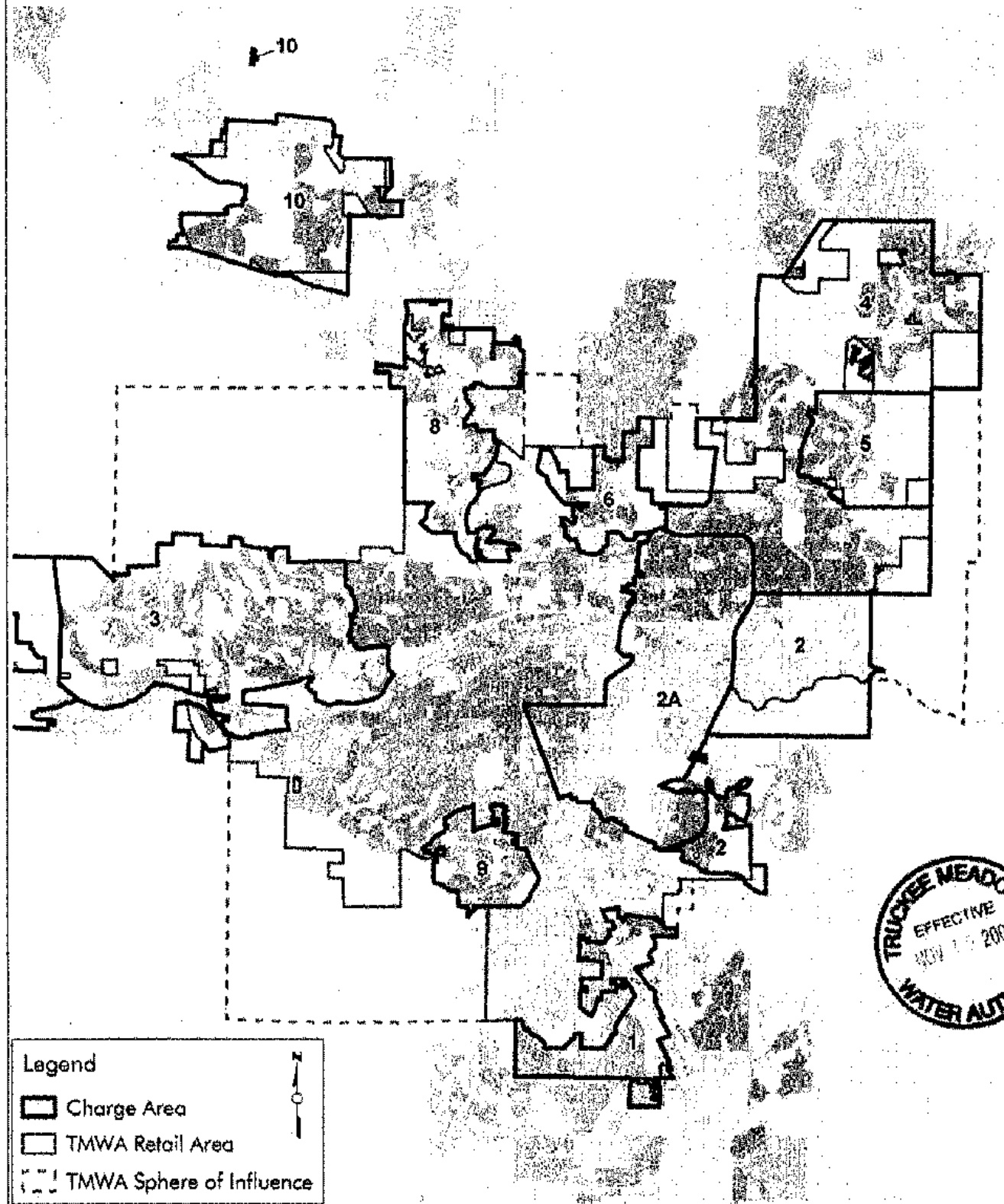
NOTE: The approximate boundaries of the Feeder Main Charge Areas are depicted by number on the included map. Please note that because TMWA's distribution system undergoes frequent modification, Feeder Main Charge Area boundaries are subject to frequent adjustment. TMWA attempts to keep a current map posted on its website, at [www.tmh2o.com](http://www.tmh2o.com); however, this map may not show sufficient detail to depict Charge Areas precisely. The Authority will determine, at the time of application, the Feeder Main Charge Area and associated Feeder Main charges to serve the Applicant's Service Property(ies), and said charges will be collected when the Water Service Agreement is executed.



# Truckee Meadows Water Authority

## RATE SCHEDULES

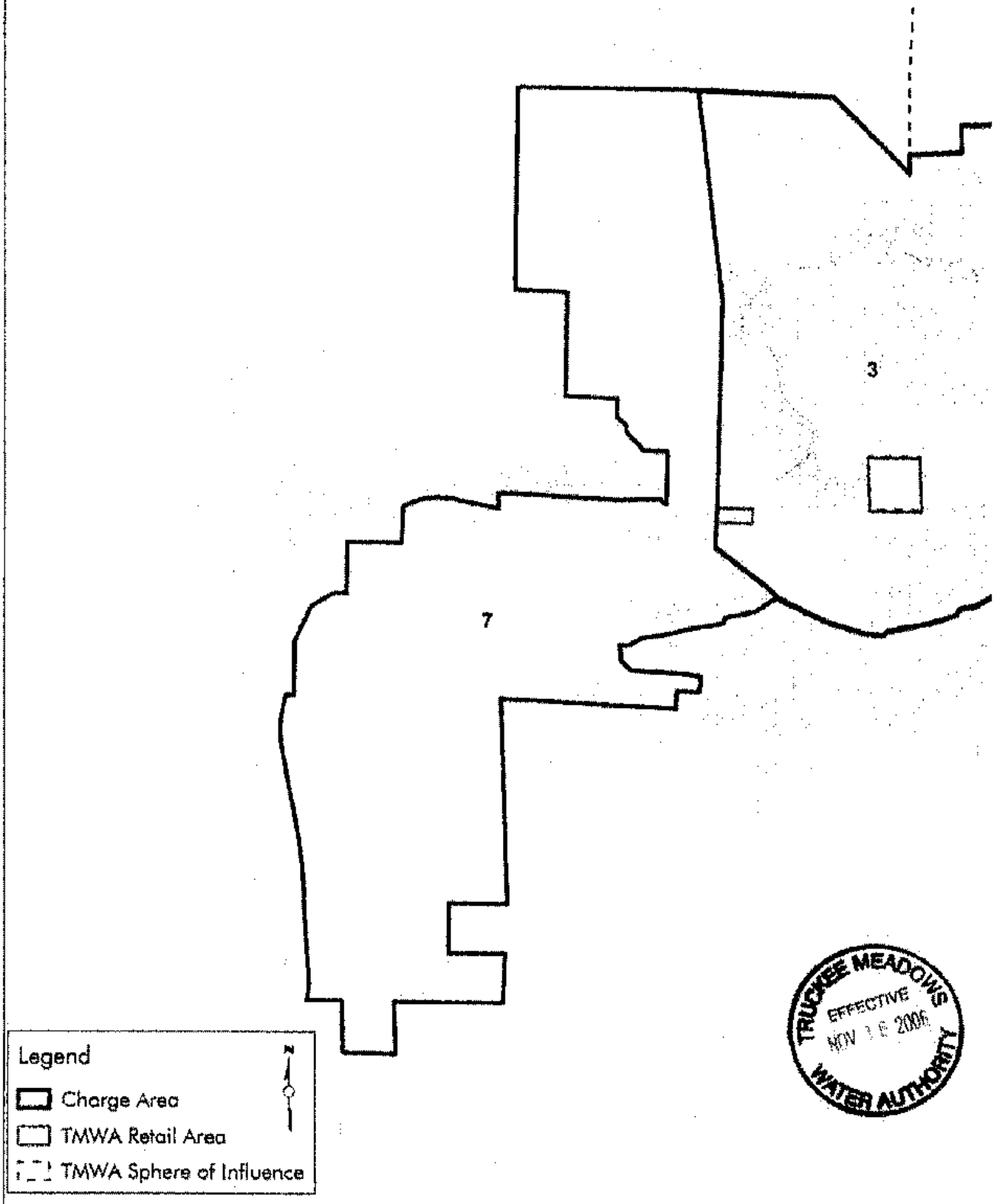
### WSF - WATER SYSTEM FACILITY CHARGES



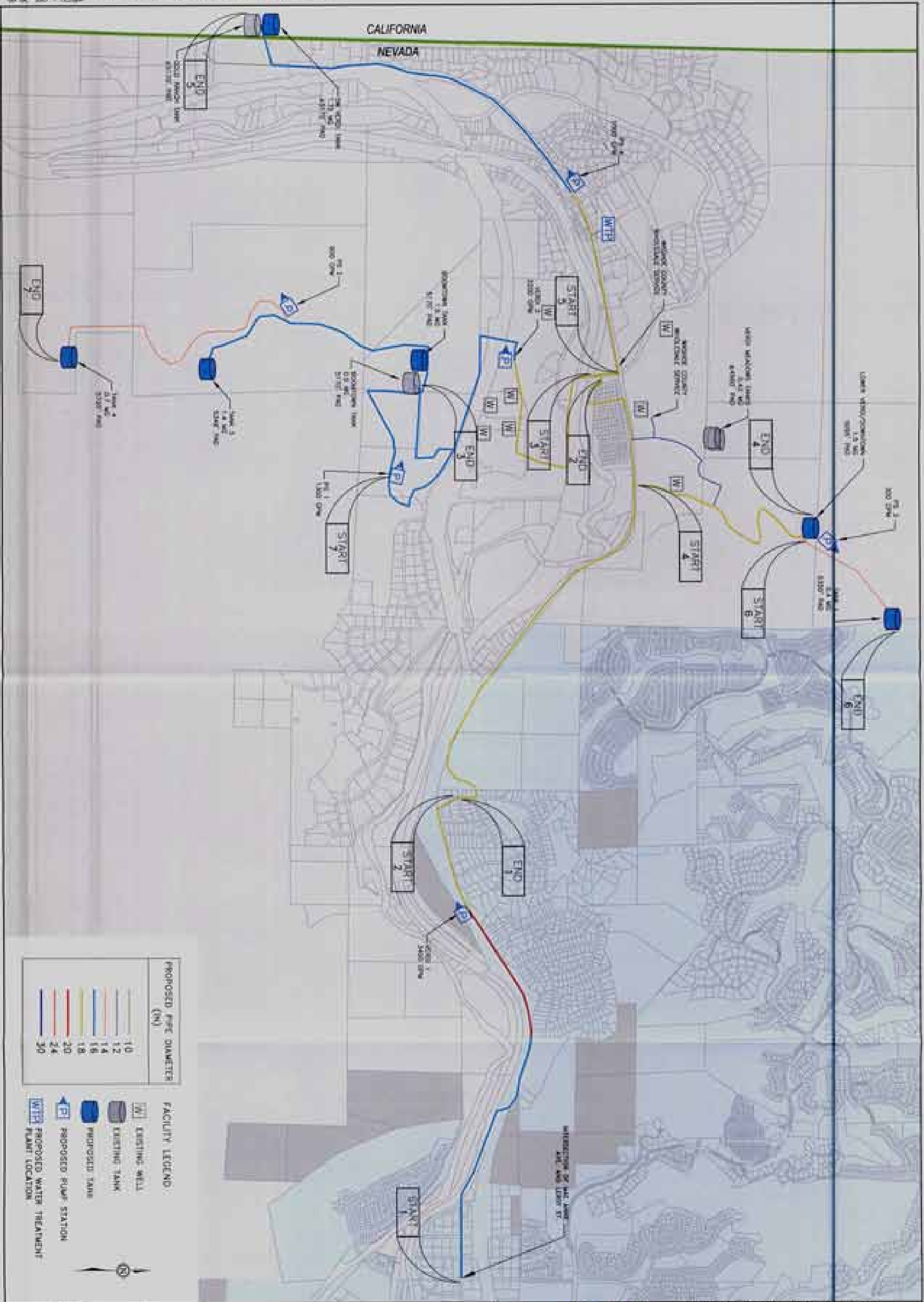
**Truckee Meadows Water Authority**

**RATE SCHEDULES**

**WSF - WATER SYSTEM FACILITY CHARGES**





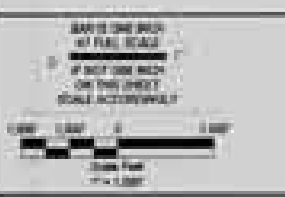


**PROPOSED PIPE DIAMETER (IN)**

10
12
14
16
18
20
24
30

**FACILITY LEGEND**

	EXISTING WELL
	EXISTING TANK
	PROPOSED TANK
	PROPOSED PUMP STATION
	PROPOSED WATER TREATMENT PLANT LOCATION



**MAP SYMBOLS**

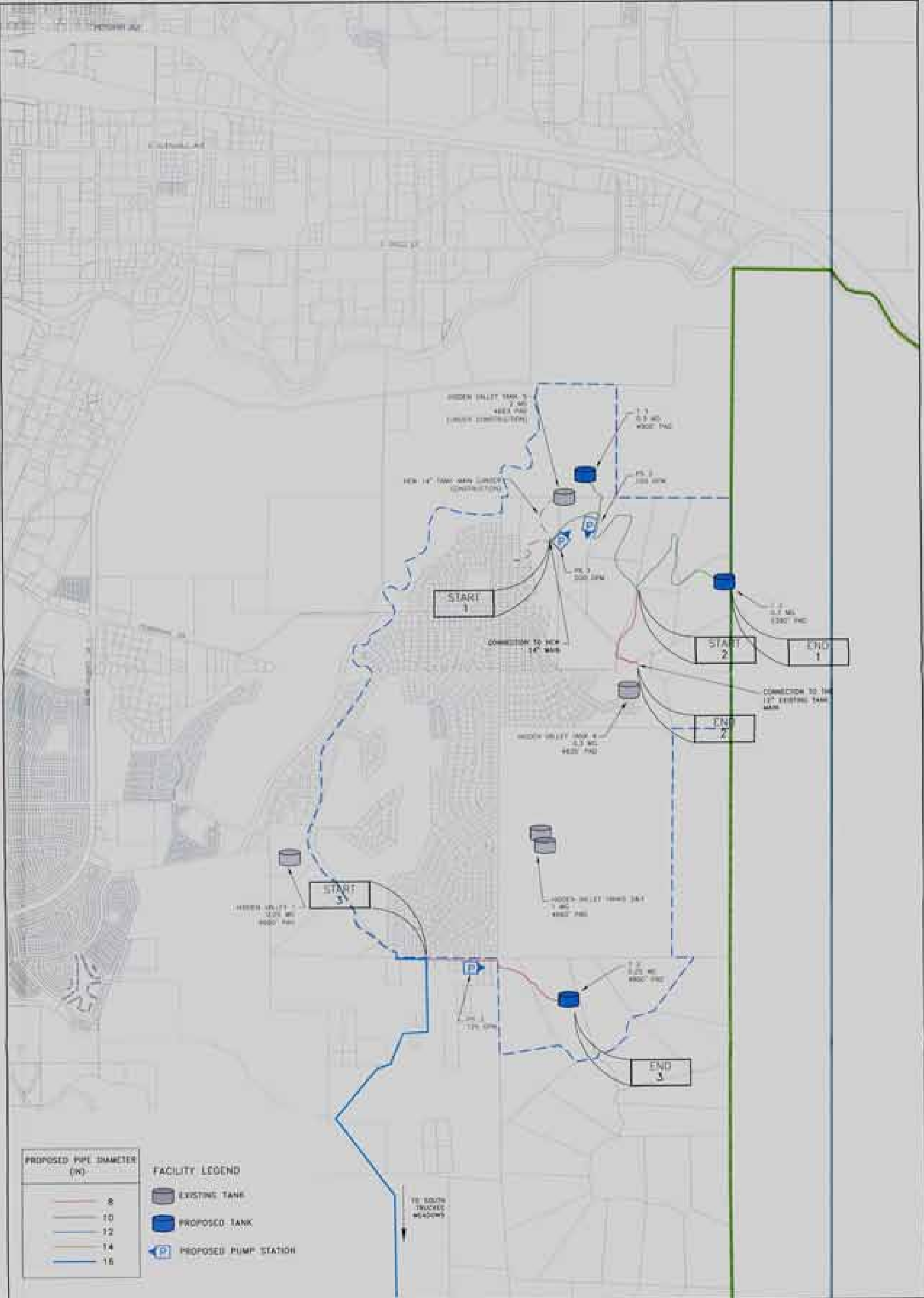
	TANK RETAIL AREA		WASHOE COUNTY WATER SPHERE OF INFLUENCE
	TANK SPHERE OF INFLUENCE		WASHOE COUNTY BOUNDARY

**HDR**  
**ECO LOGIC**

1100 Douglas Blvd., Suite 200  
 Reno, Nevada 89502  
 Phone: (775) 857-8911  
 Fax: (775) 857-8914

**TRUCKEE MEADOWS TMSA - FIGURE 0-82  
 VERDI PROJECT DIVISIONS FOR COST ANALYSIS  
 COUNTY OF WASHOE, NEVADA**

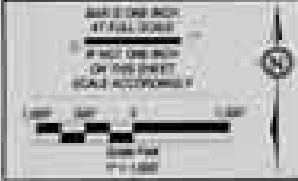
REV NO.	REVISION	BY	DATE	REVISION NO.	DATE	DESIGNED / CHECKED	SCALE	REVIEW
01				01			1" = 100'	



PROPOSED PIPE DIAMETER (IN)	
8	—
10	—
12	—
14	—
18	—

FACILITY LEGEND	
	EXISTING TANK
	PROPOSED TANK
	PROPOSED PUMP STATION

MAP SYMBOLS	
	HIDDEN VALLEY PLANNING LIMIT
	WASHOE COUNTY BOUNDARY



		<b>TRUCKEE MEADOWS TMSA - FIGURE 9-B3</b> <b>HIDDEN VALLEY - PROJECT DIVISIONS FOR COST ANALYSIS</b> COUNTY OF WASHOE, NEVADA	
ECO-LOGIC 11001 Douglas St. Suite 200 Reno, Nevada 89501 Phone: (775) 837-2000 Fax: (775) 837-2001	REV. NO. _____ REVISION _____ BY _____ DATE: NOV 2007 SCALE: 1" = 100'	DESIGNED: JTB DRAWN: JTB CHECKED: JTB	NO. _____ DATE: _____ SCALE: _____

**Water Calculations and Cost Estimates  
South Truckee Meadows**

**Estimated Costs for the Facilities in South Truckee Meadows**

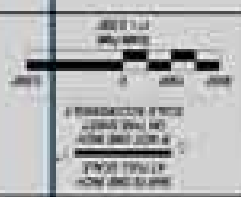
No.	Description	Qty.	Unit	Unit Cost	Total Cost		Reno TMSA	County TMSA
<b>1 From Rio Wrangler Pkwy to Tank 3 (T3)</b>								
1.1	<b>Transmission</b>							
	14" Pipe	5,480	L.F.	\$168	\$920,640		\$920,640	\$0
	12" Pipe	25,000	L.F.	\$144	\$3,600,000		\$3,600,000	\$0
	10" Pipe	1,400	L.F.	\$120	\$168,000		\$168,000	\$0
	Pump Station 1	232	hp	\$637,151	\$637,150		\$637,150	\$0
	Pump Station 3	238	hp	\$646,293	\$646,290		\$646,290	\$0
	Pump Station 4	115	hp	\$430,694	\$430,690		\$430,690	\$0
	Pump Station 5	25	hp		\$400,000		\$400,000	\$0
	Pump Station 6	10	hp		\$400,000		\$400,000	\$0
1.2	<b>Storage</b>							
	Tanks	1,750,000	Gal	\$1	\$1,750,000		\$1,750,000	\$0
					<b>Subtotal =</b>	<b>\$ 8,953,000</b>	<b>\$8,953,000</b>	<b>\$0</b>
<b>2 From South Meadows Pkwy to the Main from Tank 1</b>								
2.1	<b>Transmission</b>							
	14" Pipe	6,100	L.F.	\$168	\$1,024,800		\$1,024,800	\$0
	Pump Station 2	232	hp	\$637,151	\$637,150		\$637,150	\$0
					<b>Subtotal =</b>	<b>\$ 1,662,000</b>	<b>\$1,661,960</b>	<b>\$0</b>
<b>3 From Hidden Valley to the Existing County System in South</b>								
3.1	<b>Transmission</b>							
	16" Pipe	18,400	L.F.	\$192	\$3,532,800		\$0	\$3,532,800
	14" Pipe	16,500	L.F.	\$168	\$2,772,000		\$0	\$2,772,000
3.2	<b>Storage</b>							
	Tanks	4,000,000	Gal	\$1	\$4,000,000		\$0	\$4,000,000
					<b>Subtotal =</b>	<b>\$ 10,305,000</b>	<b>\$0</b>	<b>\$10,305,000</b>
<b>4 Extension of County Water System East of Rio Wrangler Pkwy</b>								
4.1	<b>Transmission</b>							
	8" Pipe	4,200	L.F.	\$96	\$403,200		\$0	\$403,200
					<b>Subtotal =</b>	<b>\$ 403,000</b>	<b>\$0</b>	<b>\$403,000</b>
<b>5 From Existing 12" at Guyton Lane to DD 4 Tank</b>								
5.1	<b>Transmission</b>							
	12" Pipe	5,050	L.F.	\$144	\$727,200		\$0	\$727,200
5.2	<b>Storage</b>							
	Tanks	750,000	Gal	\$1	\$750,000		\$0	\$750,000
					<b>Subtotal =</b>	<b>\$ 1,477,000</b>	<b>\$0</b>	<b>\$1,477,000</b>
<b>6 From Proposed WTP to Proposed Zone 11 Tank</b>								
6.1	<b>Transmission</b>							
	18" Pipe	18,850	L.F.	\$216	\$4,071,600		\$0	\$4,071,600
6.2	<b>Storage</b>							
	Tanks	2,000,000	Gal	\$1	\$2,000,000		\$0	\$2,000,000
					<b>Subtotal =</b>	<b>\$ 6,072,000</b>	<b>\$0</b>	<b>\$6,072,000</b>
<b>7 From Proposed WTP to Upper Mount Rosa Fan</b>								
7.1	<b>Transmission</b>							
	18" Pipe	9,600	L.F.	\$216	\$2,073,600		\$0	\$2,073,600
	16" Pipe	14,700	L.F.	\$192	\$2,822,400		\$0	\$2,822,400
	14" Pipe	11,900	L.F.	\$168	\$1,999,200		\$0	\$1,999,200
					<b>Subtotal =</b>	<b>\$ 6,895,000</b>	<b>\$0</b>	<b>\$6,895,000</b>
<b>8 From Shawna Lane to Matara Ridge Tank</b>								
8.1	<b>Transmission</b>							
	10" Pipe	11,100	L.F.	\$120	\$1,332,000		\$0	\$1,332,000
	Pump Station 9	10	hp		\$400,000		\$0	\$400,000
8.2	<b>Storage</b>							
	Tanks	250,000	Gal	\$1	\$250,000		\$0	\$250,000
					<b>Subtotal =</b>	<b>\$ 1,982,000</b>	<b>\$0</b>	<b>\$1,982,000</b>
<b>9 From St James Pkwy to the Existing Water System at Sunrise</b>								
9.1	<b>Transmission</b>							

**Estimated Costs for the Facilities in South Truckee Meadows**

No.	Description	Qty.	Unit	Unit Cost	Total Cost		Reno TMSA	County TMSA
	14" Pipe	2,150	L.F.	\$168	\$361,200		\$0	\$361,200
	12" Pipe	5,000	L.F.	\$144	\$720,000		\$0	\$720,000
	10" Pipe	9,870	L.F.	\$120	\$1,184,400		\$0	\$1,184,400
	8" Pipe	22,500	L.F.	\$96	\$2,160,000		\$0	\$2,160,000
					<b>Subtotal =</b>	<b>\$ 4,426,000</b>	<b>\$0</b>	<b>\$4,426,000</b>
<b>10</b>	<b>From New Hwy Crossing at South of St. James Pkwy. to Tank 5</b>							
<b>10.1</b>	<b>Transmission</b>							
	10" Pipe	16,500	L.F.	\$120	\$1,980,000		\$0	\$1,980,000
<b>10.2</b>	<b>Storage</b>							
	Tank	1,000,000	Gal	\$1	\$1,000,000		\$0	\$1,000,000
					<b>Subtotal =</b>	<b>\$ 2,980,000</b>	<b>\$0</b>	<b>\$2,980,000</b>
<b>11</b>	<b>From Rocky Vista Rd to Tank 6</b>							
<b>11.1</b>	<b>Transmission</b>							
	10" Pipe	29,700	L.F.	\$120	\$3,564,000		\$0	\$3,564,000
	Pump Station 7	25	hp		\$400,000		\$0	\$400,000
	Pump Station 8	20	hp		\$400,000		\$0	\$400,000
<b>11.2</b>	<b>Storage</b>							
	Tanks	700,000	Gal	\$1	\$700,000		\$0	\$700,000
					<b>Subtotal =</b>	<b>\$ 5,064,000</b>	<b>\$0</b>	<b>\$5,064,000</b>
<b>12</b>	<b>Thomas Creek Tank</b>							
<b>12.1</b>	<b>Storage</b>							
	Tanks	500,000	Gal	\$1	\$500,000		\$0	\$500,000
					<b>Subtotal =</b>	<b>\$ 500,000</b>	<b>\$0</b>	<b>\$500,000</b>
					<b>Construction Total</b>	<b>\$50,719,000</b>	<b>\$10,815,000</b>	<b>\$40,104,000</b>
<b>13</b>	<b>Other Costs</b>							
	Engineering Cost (20%)				\$ 10,144,000		\$ 2,129,000	\$ 8,021,000
	Contingency (20%)				\$ 10,144,000		\$ 2,129,000	\$ 8,021,000
					<b>Subtotal =</b>	<b>\$ 20,288,000</b>	<b>\$ 4,248,000</b>	<b>\$ 16,042,000</b>
					<b>Total =</b>	<b>\$ 71,000,000</b>	<b>\$ 14,900,000</b>	<b>\$ 56,100,000</b>

Note: 20 Cities ENRCCI = 7,942, May 2007





- MAP SYMBOLS**
- TRUCKEE AREA
  - WASHOE COUNTY AREA
  - TRUCKEE
  - WASHOE COUNTY WATER
  - WASHOE COUNTY WATER
  - WASHOE COUNTY WATER

- MAP SYMBOLS**
- WASHOE COUNTY WATER
  - WASHOE COUNTY WATER
  - WASHOE COUNTY WATER
  - WASHOE COUNTY WATER
  - WASHOE COUNTY WATER

**MAP SYMBOLS**

- WASHOE COUNTY WATER
- WASHOE COUNTY WATER
- WASHOE COUNTY WATER
- WASHOE COUNTY WATER
- WASHOE COUNTY WATER

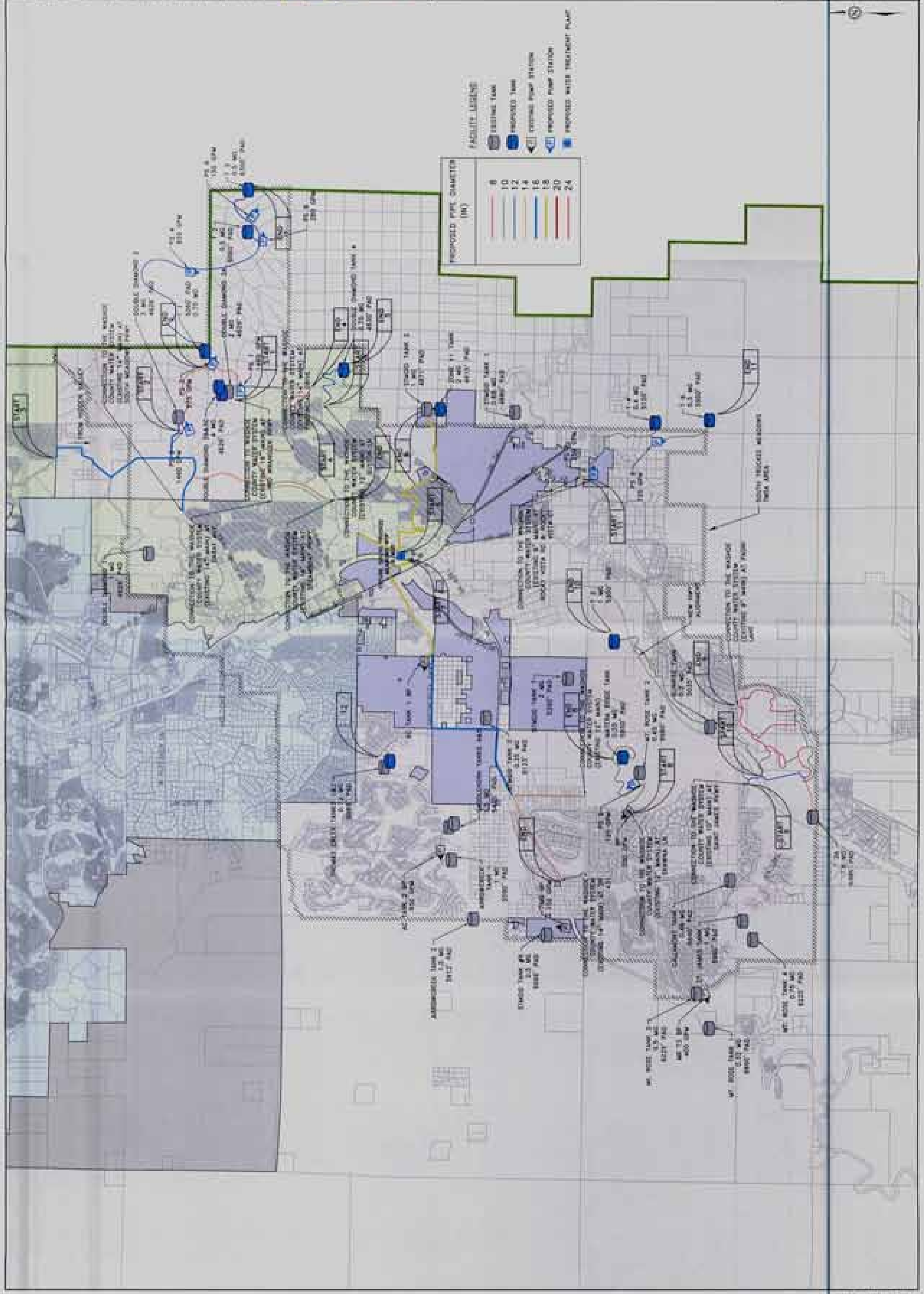
**MAP SYMBOLS**

- WASHOE COUNTY WATER
- WASHOE COUNTY WATER
- WASHOE COUNTY WATER
- WASHOE COUNTY WATER
- WASHOE COUNTY WATER

**PROPOSED PIPE DIAMETER (IN)**

8
10
12
14
16
18
20
24

- FACILITY LEGEND**
- EXISTING TANK
  - PROPOSED TANK
  - EXISTING PUMP STATION
  - PROPOSED PUMP STATION
  - PROPOSED WATER TREATMENT PLANT



**PROJECT DIVISIONS FOR COST ANALYSIS**

DATE: 11/11/11  
 SCALE: 1" = 100'  
 DRAWN: J. HARRIS  
 CHECKED: J. HARRIS  
 COUNTY OF WASHOE, NEVADA





# DANIEL WEBSTER FUTURE FACILITIES

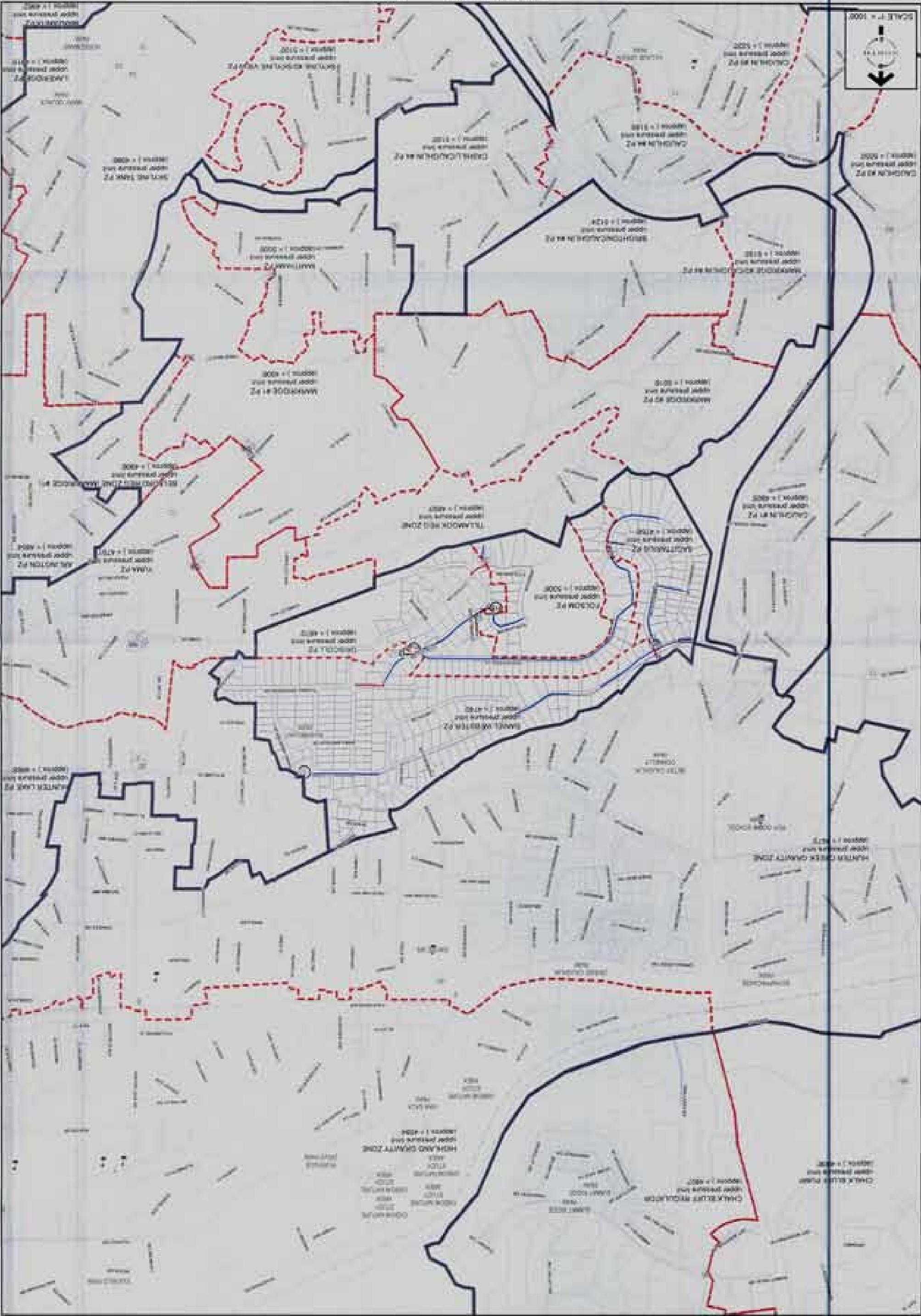
**EXISTING**

- ROAD EXISTING
- RAIL EXISTING
- WATER EXISTING
- SEWER EXISTING
- STREET LIGHTS
- UTILITY
- MEASURE ZONE
- BOUNDARY FUTURE
- SCHOOL

**FUTURE**

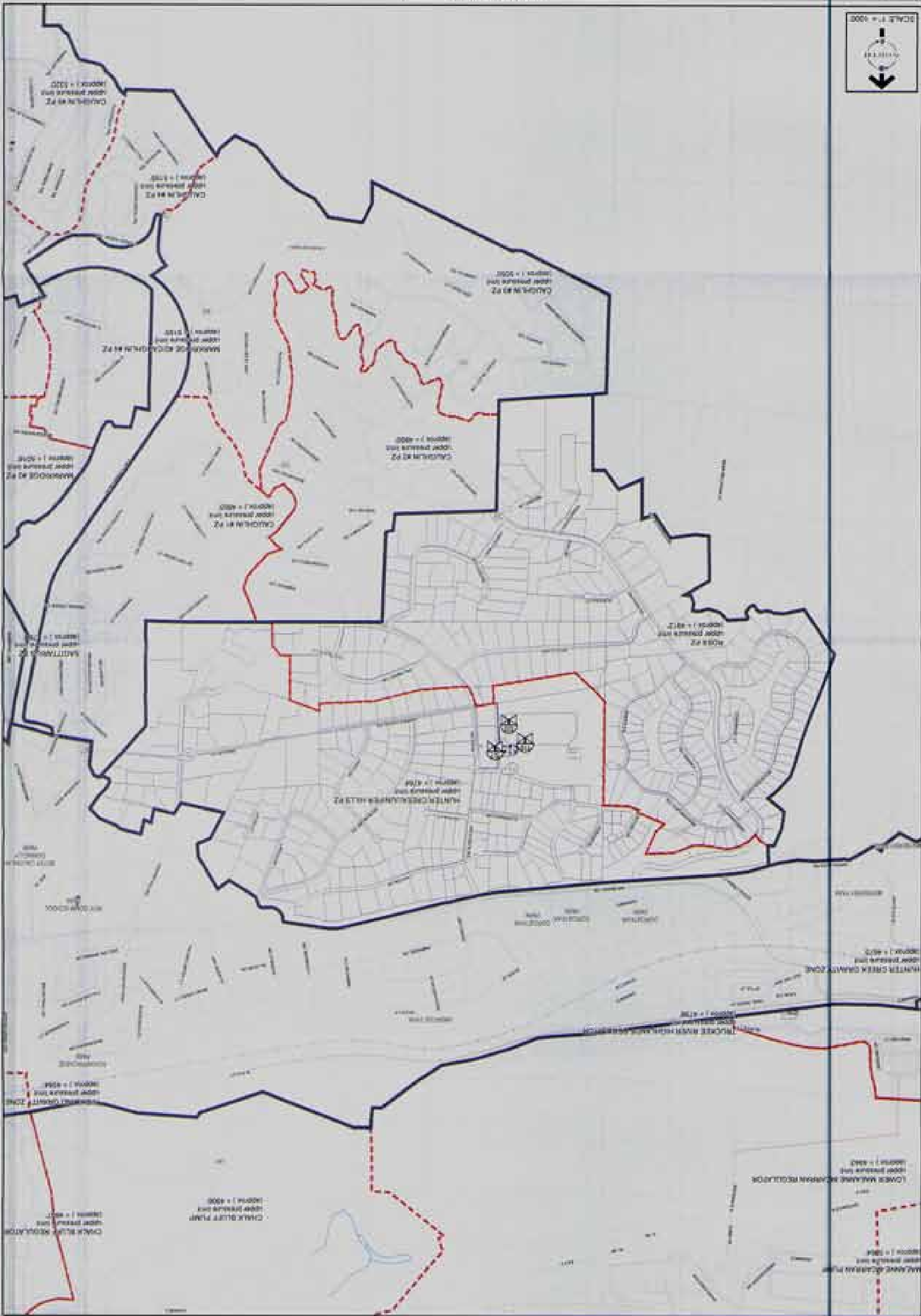
- ROAD FUTURE
- RAIL FUTURE
- WATER FUTURE
- SEWER FUTURE
- STREET LIGHTS
- UTILITY
- MEASURE ZONE
- BOUNDARY FUTURE
- SCHOOL

SCALE 1" = 1000'



WATER FUTURE WELL FUTURE FIRE STATION FUTURE PARK FUTURE SCHOOL FUTURE PRESSURE ZONE FUTURE BOUNDARY FUTURE PIPE FUTURE PIPE DIAMETER FUTURE SYSTEM BOUNDARY FUTURE	WATER FUTURE WELL FUTURE FIRE STATION FUTURE PARK FUTURE SCHOOL FUTURE PRESSURE ZONE FUTURE BOUNDARY FUTURE PIPE FUTURE PIPE DIAMETER FUTURE SYSTEM BOUNDARY FUTURE
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SCALE 1" = 1000'

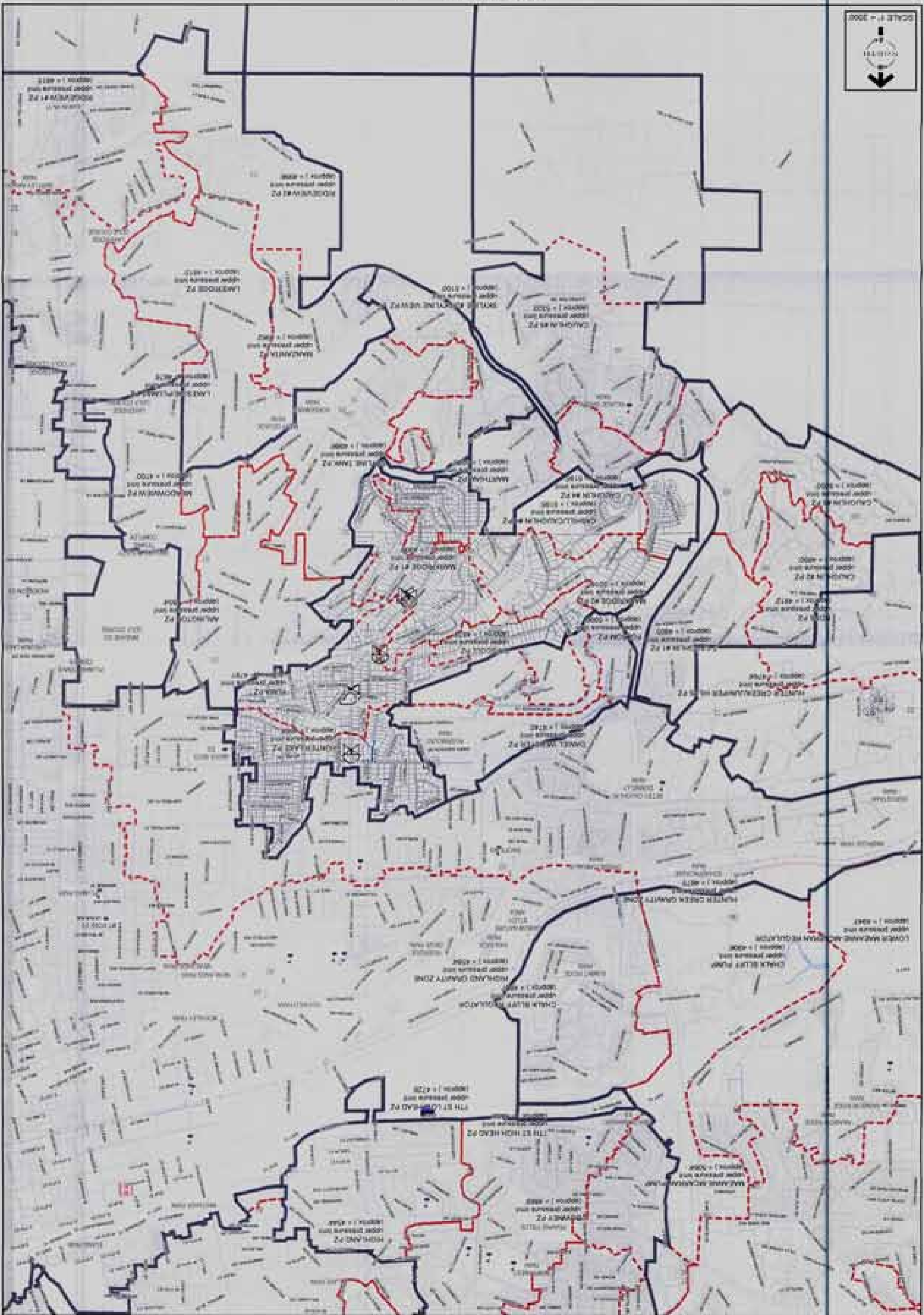


### HUNTER LAKE FUTURE FACILITIES

**LEGEND**

- WATER FUTURE: (Symbol: Diamond with dot)
- WELL FUTURE: (Symbol: Circle with dot)
- PUMP STATION FUTURE: (Symbol: Square with 'X')
- RAVE FUTURE: (Symbol: Square with 'X')
- SYSTEM BOUNDARY: (Symbol: Solid line)
- PRE-EXISTING FUTURE: (Symbol: Dashed line)
- MEASURE ZONE: (Symbol: Dotted line)
- BOUNDARY FUTURE: (Symbol: Dashed line)
- SCHOOL: (Symbol: Square with 'S')
- TRAIL: (Symbol: Line with cross-ticks)
- ROAD: (Symbol: Line with cross-ticks)
- RAIL: (Symbol: Line with cross-ticks)

SCALE 1" = 2000'



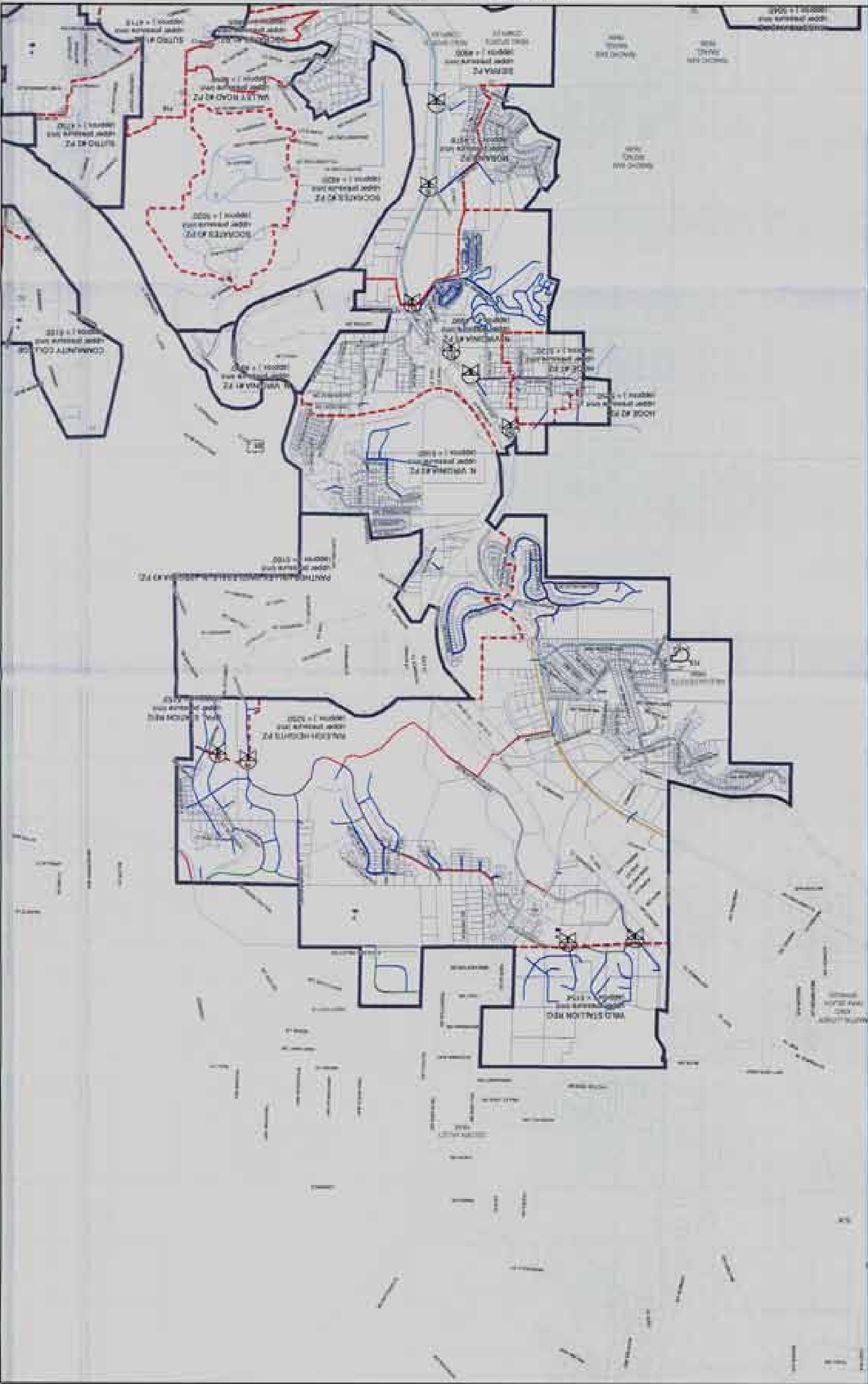


# NORTH VIRGINIA NORTH FUTURE FACILITIES

	METER FACILITY
	WELL FACILITY
	PUMP STATION FACILITY
	MAIN FACILITY
	TANK FACILITY
	SCHOOL
	SYSTEM BOUNDARY (FUTURE)
	PRESSURE ZONE BOUNDARY (FUTURE)
	QUARTER BOUNDARY (FUTURE)
	12" W.M. (FUTURE)
	18" W.M. (FUTURE)
	24" W.M. (FUTURE)
	36" W.M. (FUTURE)
	48" W.M. (FUTURE)
	60" W.M. (FUTURE)

SCALE: 1" = 2000'

N



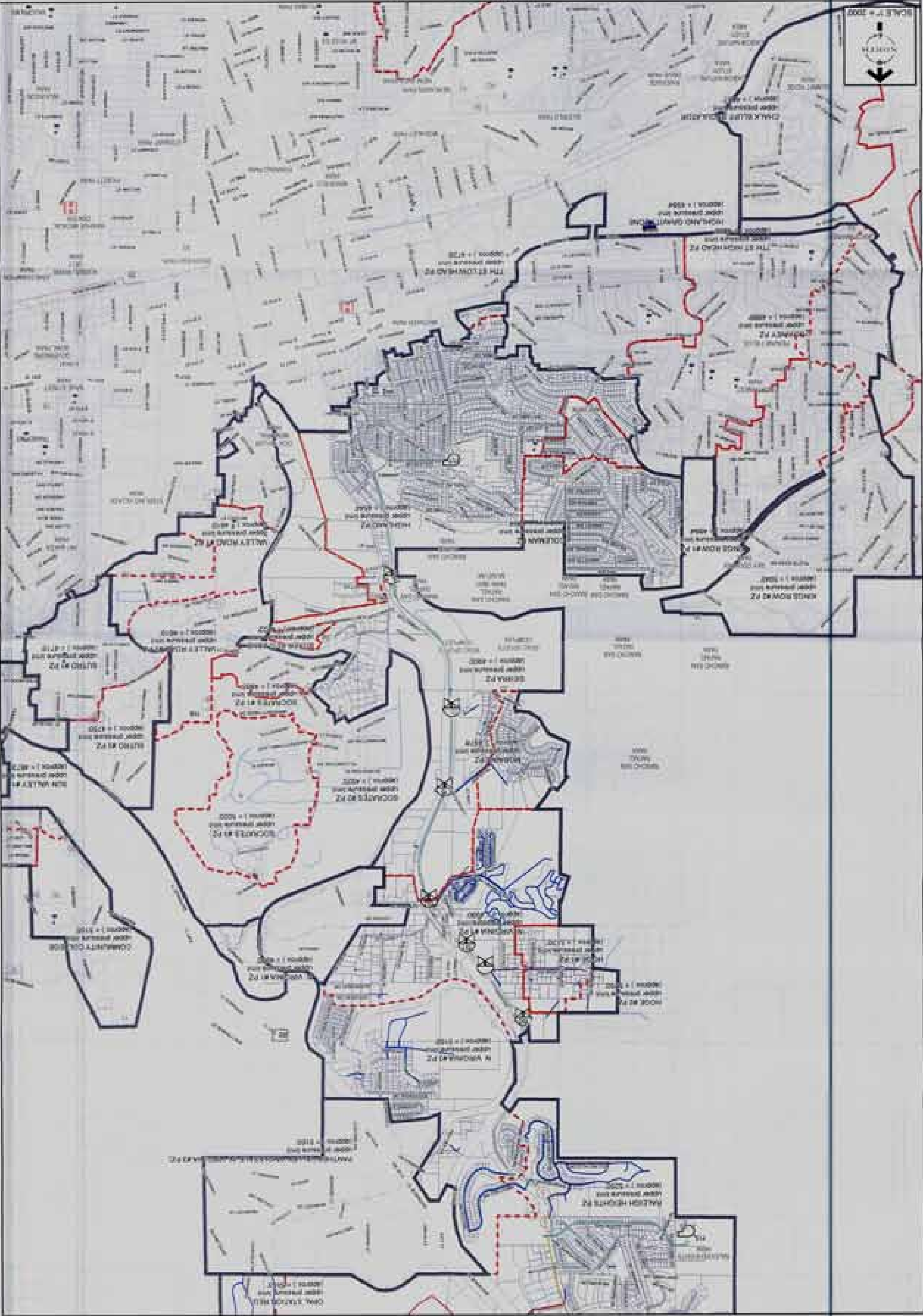
The inset map shows a larger geographic area, likely the surrounding region, with a red dashed line indicating the specific location of the 'NORTH VIRGINIA NORTH' study area. It includes labels for 'NORTH VIRGINIA NORTH' and 'STUDY AREA'.

# NORTH VIRGINIA SOUTH FUTURE FACILITIES

TWMA 2005 - 2025 Facility Plan

Map No. 2004

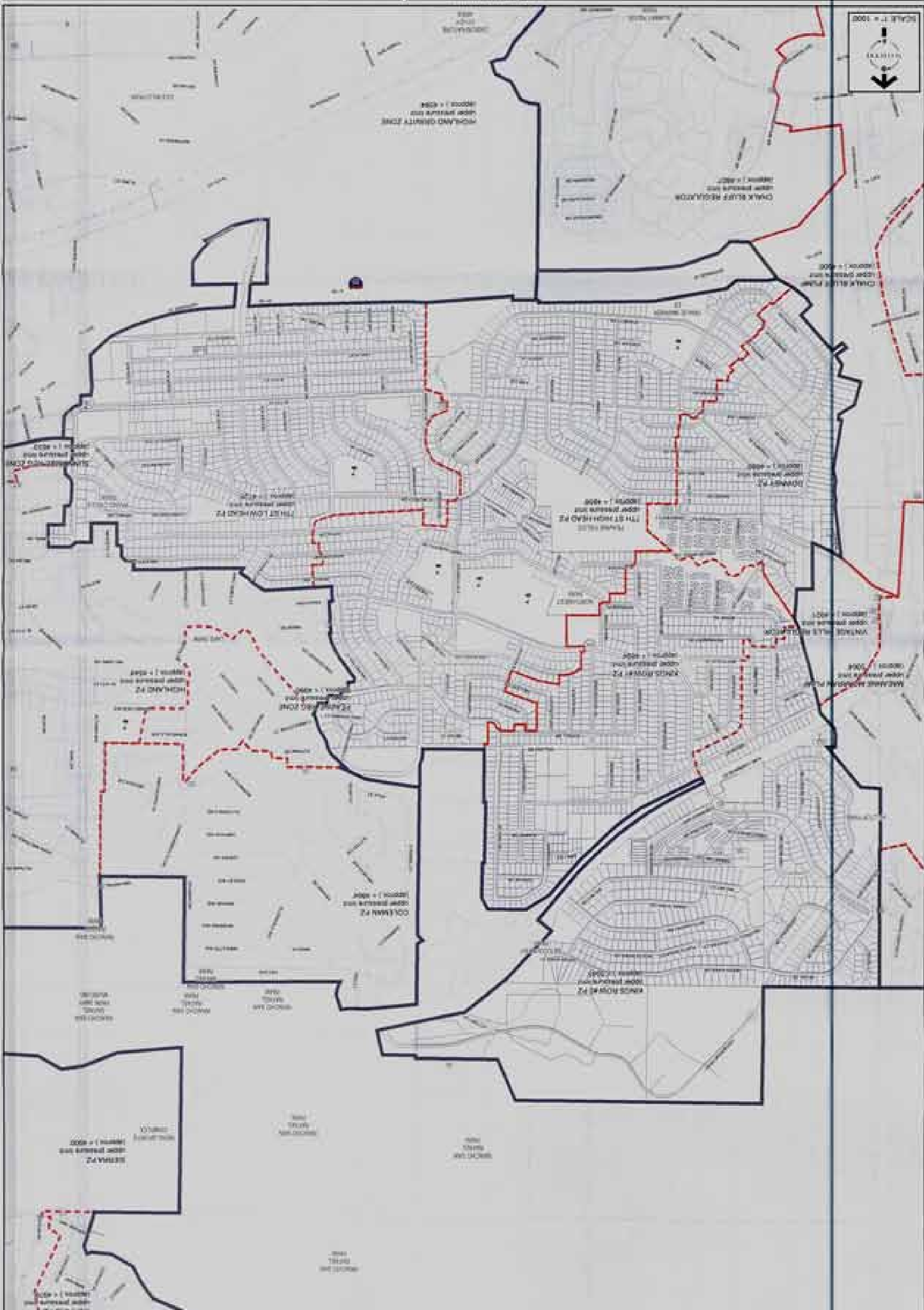
EXISTING BOUNDARY	FUTURE BOUNDARY
EXISTING WATER MAIN	FUTURE WATER MAIN
EXISTING SANITARY MAIN	FUTURE SANITARY MAIN
EXISTING FACILITY	FUTURE FACILITY
EXISTING SCHOOL	FUTURE SCHOOL
EXISTING WATER TREATMENT PLANT	FUTURE WATER TREATMENT PLANT
EXISTING SEWER TREATMENT PLANT	FUTURE SEWER TREATMENT PLANT
EXISTING STATION	FUTURE STATION
EXISTING SUMP	FUTURE SUMP

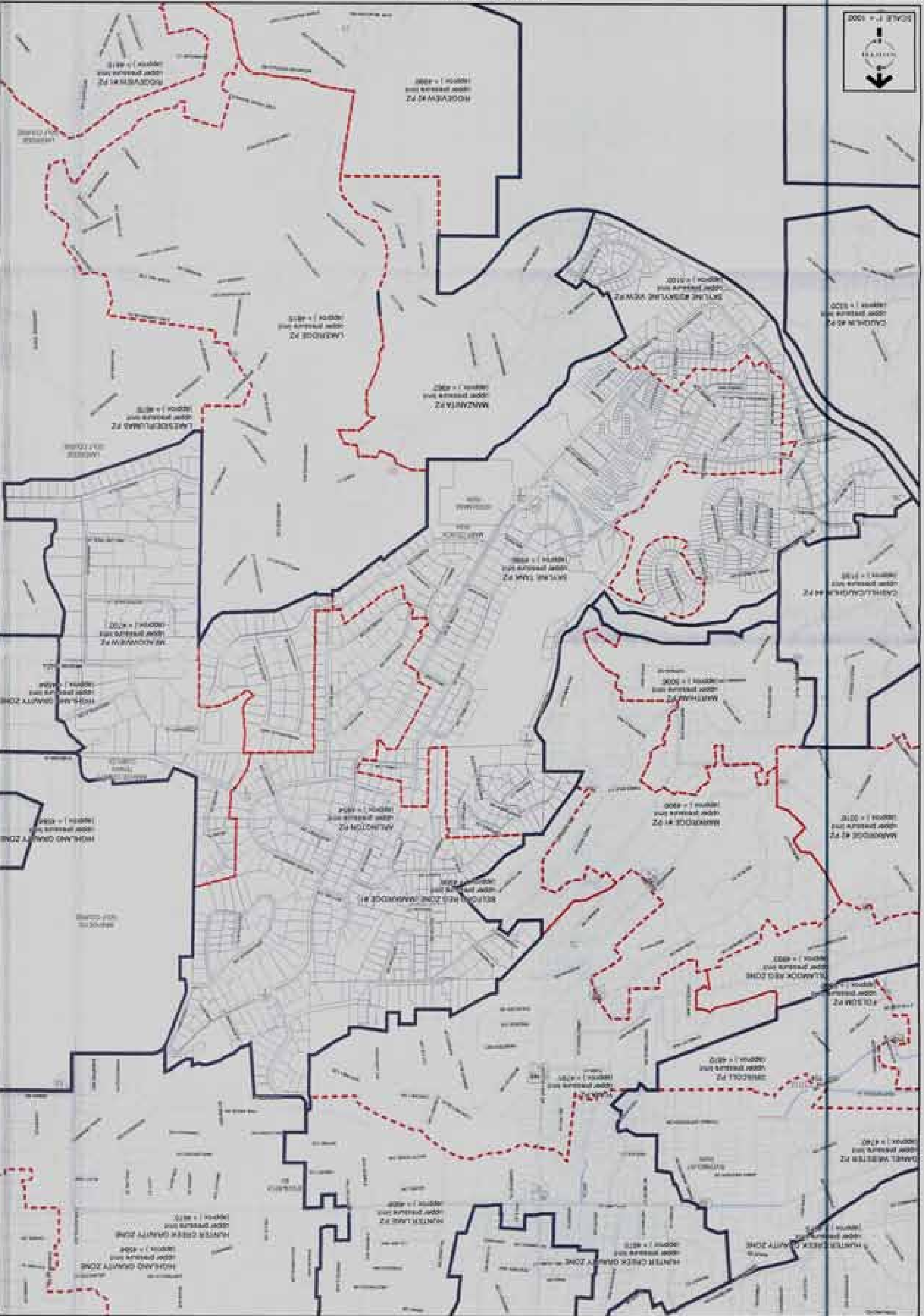






<ul style="list-style-type: none"> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> </ul>	<ul style="list-style-type: none"> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> </ul>	<ul style="list-style-type: none"> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> </ul>	<ul style="list-style-type: none"> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> </ul>	<ul style="list-style-type: none"> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> </ul>	<ul style="list-style-type: none"> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> <li>1.5" - 1.5" (1.5" DIA) (1.5" DIA) (1.5" DIA)</li> </ul>
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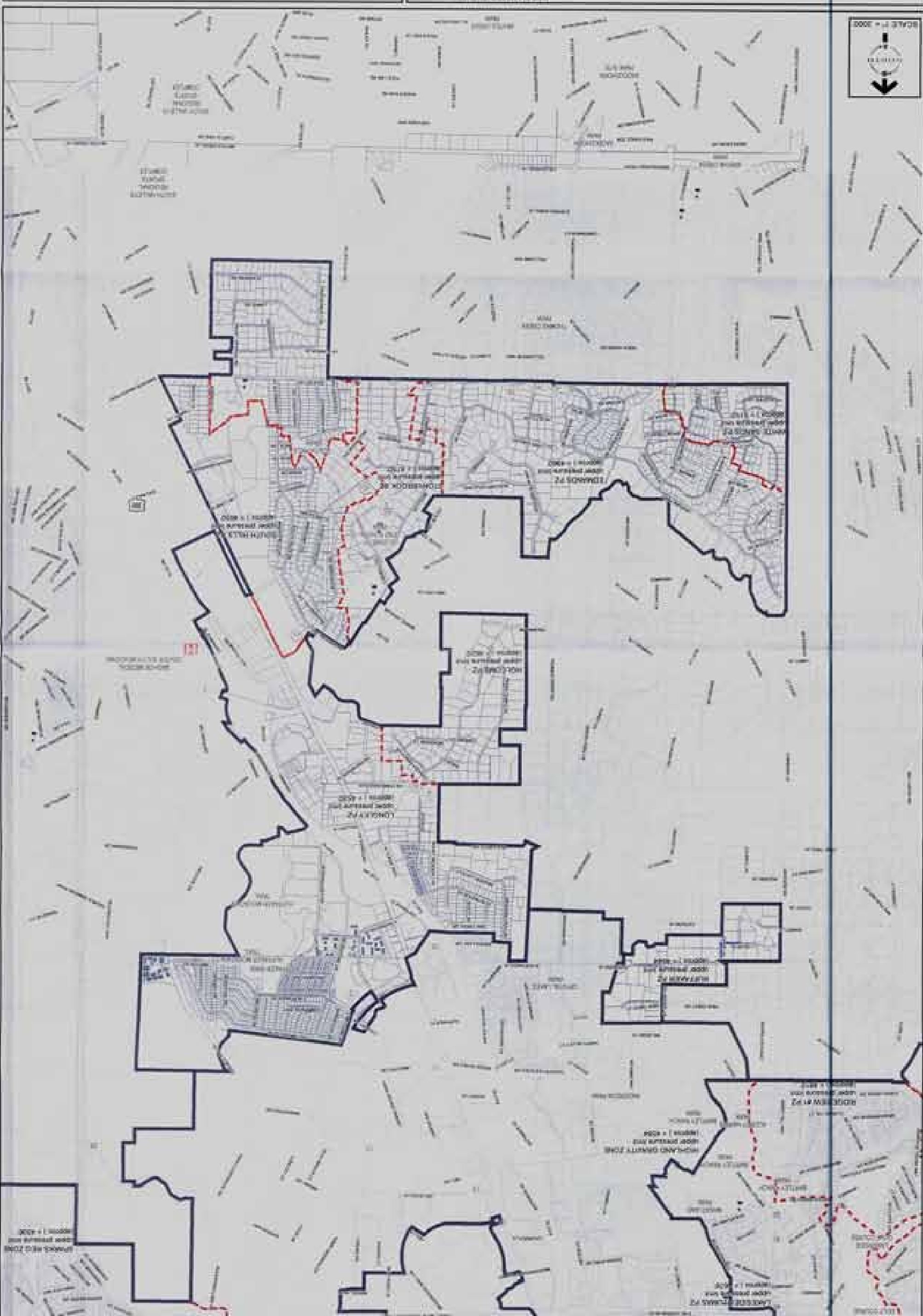


# SOUTH VIRGINIA-HUFFAKER FUTURE FACILITIES

	WATER FACILITY		PARK FACILITY
	WELL FACILITY		SEWER FACILITY
	PUMP STATION FACILITY		VALVE FACILITY
	FIRE STATION FACILITY		SCHOOL FACILITY

	SYSTEM BOUNDARY		BOUNDARY (FUTURE)
	BOUNDARY (FUTURE)		BOUNDARY (FUTURE)
	BOUNDARY (FUTURE)		BOUNDARY (FUTURE)
	BOUNDARY (FUTURE)		BOUNDARY (FUTURE)

SCALE 1" = 2000'



**SUN VALLEY  
FUTURE FACILITIES**  
TMAA 2005 - 2025 Priority Plan

**PERMITS (FUTURE)**

- WAVE PERMIT (FUTURE)
- WELL PERMIT (FUTURE)
- WATER PERMIT (FUTURE)

**PERMITS (EXISTING)**

- WAVE PERMIT (EXISTING)
- WELL PERMIT (EXISTING)
- WATER PERMIT (EXISTING)

**PERMITS (FUTURE)**

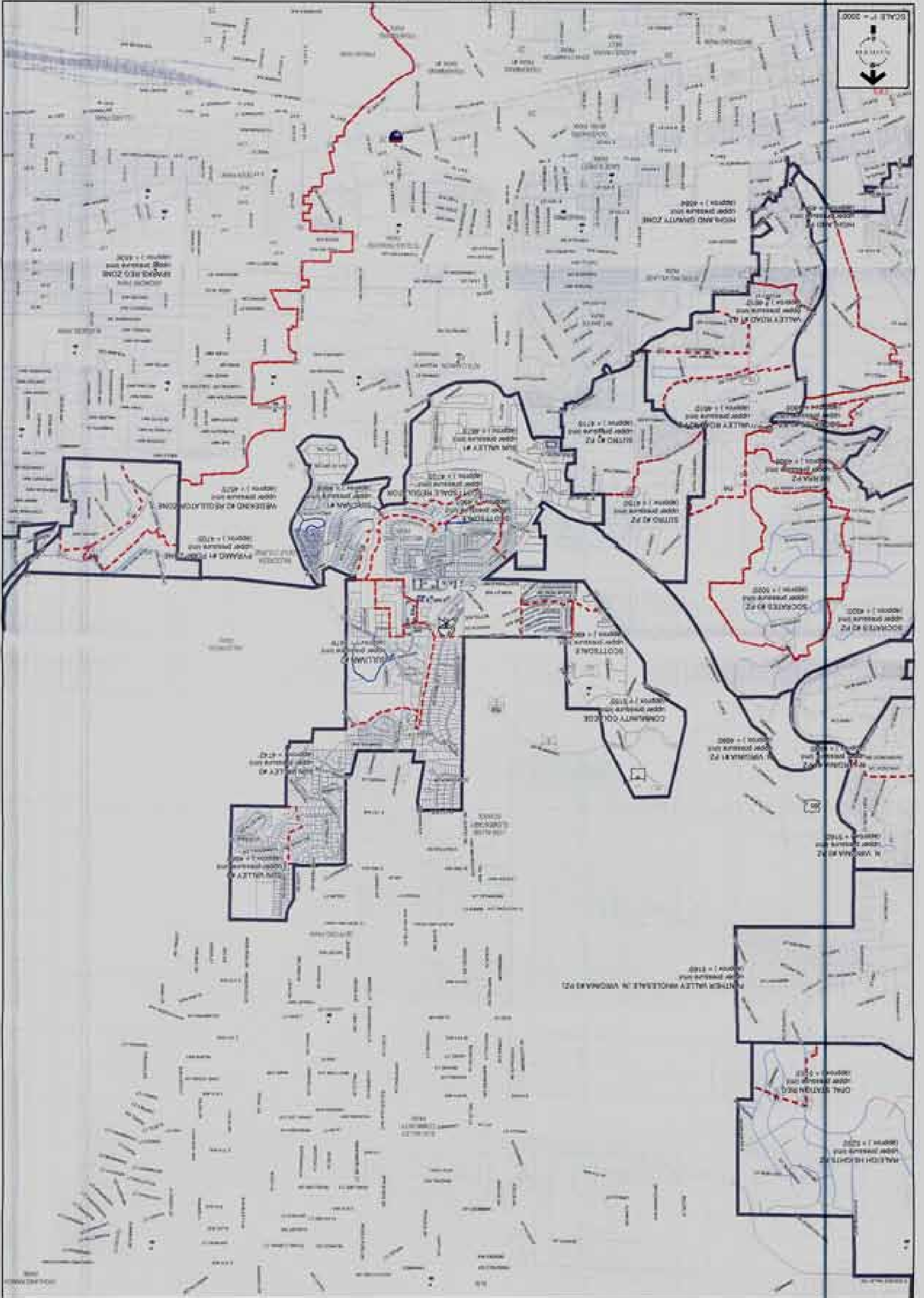
- WAVE PERMIT (FUTURE)
- WELL PERMIT (FUTURE)
- WATER PERMIT (FUTURE)

**PERMITS (EXISTING)**

- WAVE PERMIT (EXISTING)
- WELL PERMIT (EXISTING)
- WATER PERMIT (EXISTING)

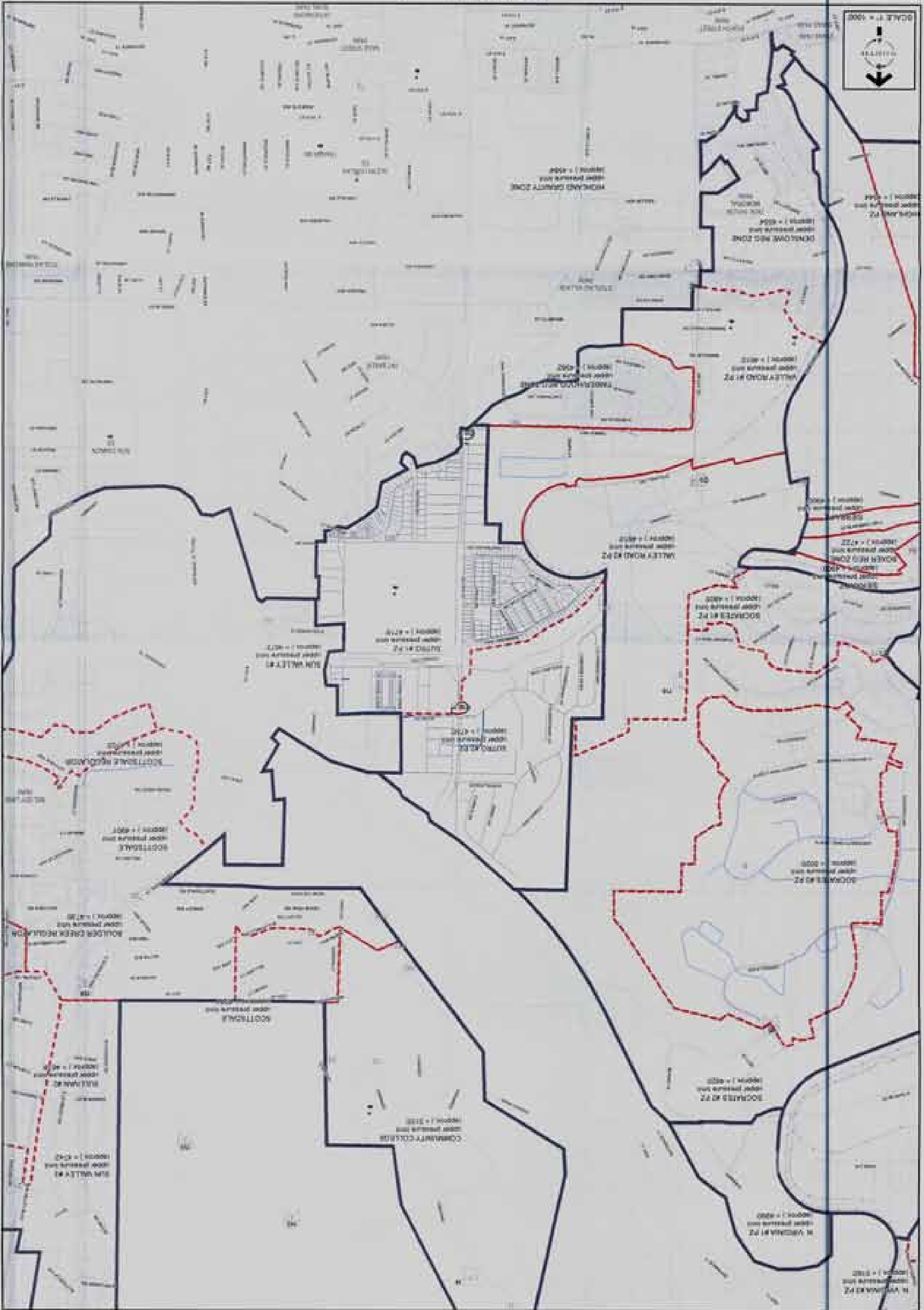
**PERMITS (FUTURE)**

**PERMITS (EXISTING)**



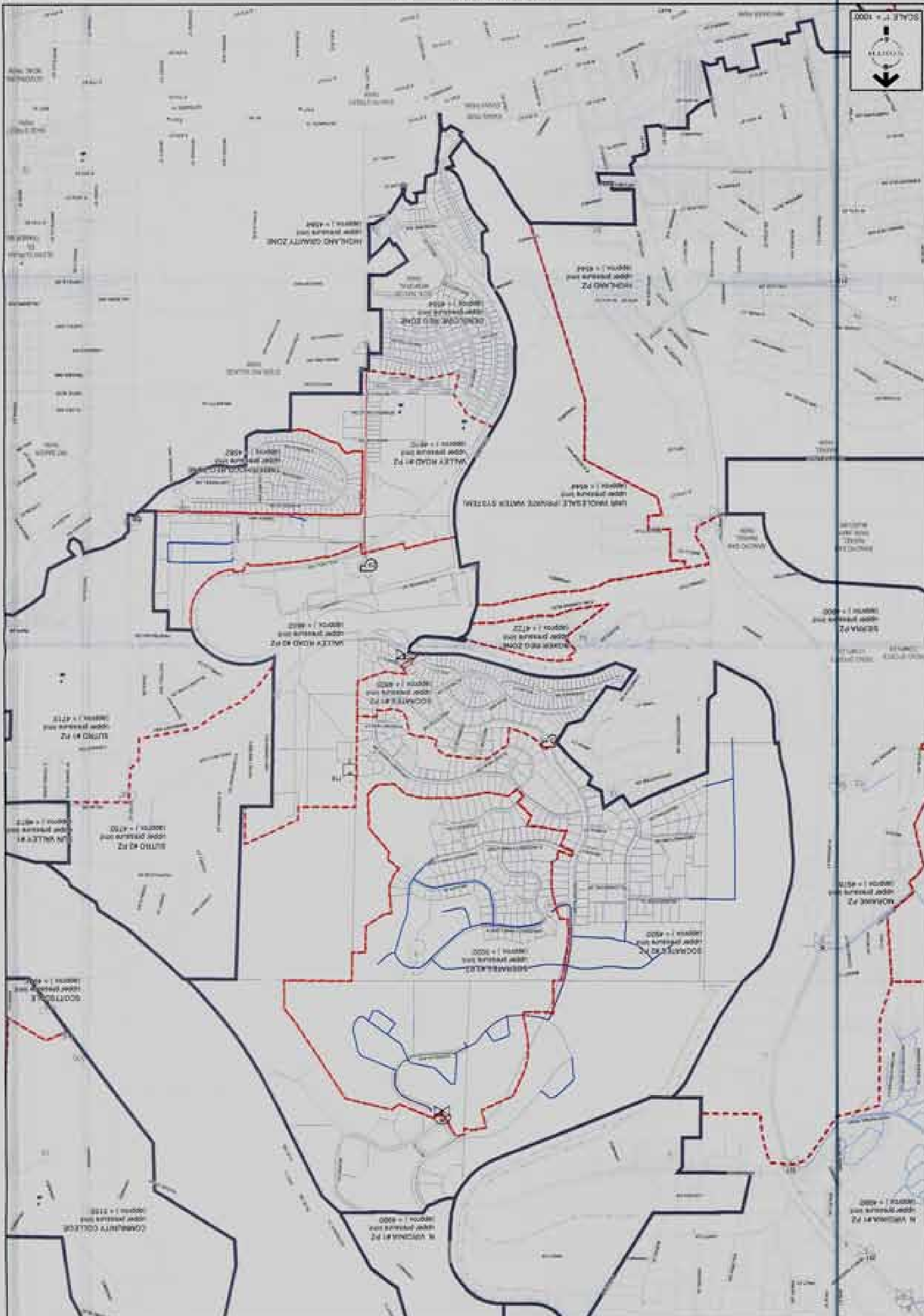
# SUTRO FUTURE FACILITIES

	WATER FACILITY		PARK FACILITY
	WALL FACILITY		SYSTEM BOUNDARY
	PLANT STATION FACILITY		FUTURE FACILITY
	PROPOSED ZONE		BOUNDARY FACILITY
	PARK FACILITY		PARK FACILITY
	SCHOOL		SCHOOL
	FIRE STATION FACILITY		FIRE STATION FACILITY
	FIRE STATION FACILITY		FIRE STATION FACILITY



SCALE 1" = 1000'

	STATION BOUNDARY (FUTURE)
	MAIN ROAD (FUTURE)
	WATER MAIN (FUTURE)
	SEWER MAIN (FUTURE)
	STORM SEWER (FUTURE)
	ROAD (FUTURE)
	BOUNDARY (FUTURE)
	PRESSURE ZONE (FUTURE)
	SCHOOL (FUTURE)
	WATER TOWER (FUTURE)
	WELL (FUTURE)
	VALVE (FUTURE)
	METER (FUTURE)



Appendix C  
Wastewater Calculations and  
Cost Estimates

**Wastewater Calculations and Cost Estimates  
Spring Mountain**

**SPRING MOUNTAIN INTERCEPTORS, FORCE MAINS, AND RECLAIMED WATER PIPELINES CALCULATIONS**

**INTERCEPTORS**

Pipe Segment	Pipe (ft)	Diameter (In.)	Slope (ft/ft)	Upstr Q (mgd)	Q In (mgd)	Total Q	Capacity		Velocity (fps)	Comments
							0.5 d/D (mgd)	0.5 d/D (mgd)		
A	14,251	14	0.0256	2.24	2.24	2.24	2.59	2.59	7.5	Contribution from half of East Collection Area
B	6,066	14	0.0206	2.24	2.24	2.24	2.32	2.32	6.7	Contribution from half of East Collection Area
C	3,303	18	0.0303	4.48	4.48	4.48	5.50	5.50	9.6	Conveys flows from A & B
E	6,518	12	0.0233	0.57	0.88	1.45	1.64	1.64	6.4	Conveys flow from D plus half of Central Collection Area
G	6,983	16	0.0186	2.33	2.33	2.33	3.15	3.15	7.0	Conveys flows from E & F
H	16,448	10	0.0133	0.57	0.57	0.57	0.76	0.76	4.3	Contribution from West Collection Area
I	14,202	10	0.0235	0.88	0.88	0.88	1.01	1.01	5.7	Contribution from half of Central Collection Area
<b>FORCE MAINS</b>										
D	36,542	6		0.57	0.57	0.57			4.5	Contribution from West Collection Area
F	5,166	8		0.88	0.88	0.88			3.9	Contribution from half of Central Collection Area
<b>RECLAIMED WATER PIPELINES</b>										
Main	32,481	12		2.00	2.00	2.00			3.9	Pipeline that connects East and central plant and is the main reclaimed water transmission main.
East	31,567	10		1.54	1.54	1.54			4.4	Conveys 44% of reclaimed water.
Central	23,892	8		0.66	0.66	0.66			2.9	Conveys 19% of reclaimed water.
Central	10,870	6		0.32	0.32	0.32			2.5	Conveys 9% of reclaimed water
West	28,140	8		0.98	0.98	0.98			4.3	Conveys 28% of reclaimed water

SPRING MOUNTAIN INTERCEPTORS, LIFT STATIONS, PUMP STATIONS, AND RECLAIMED WATER PIPELINES COSTS

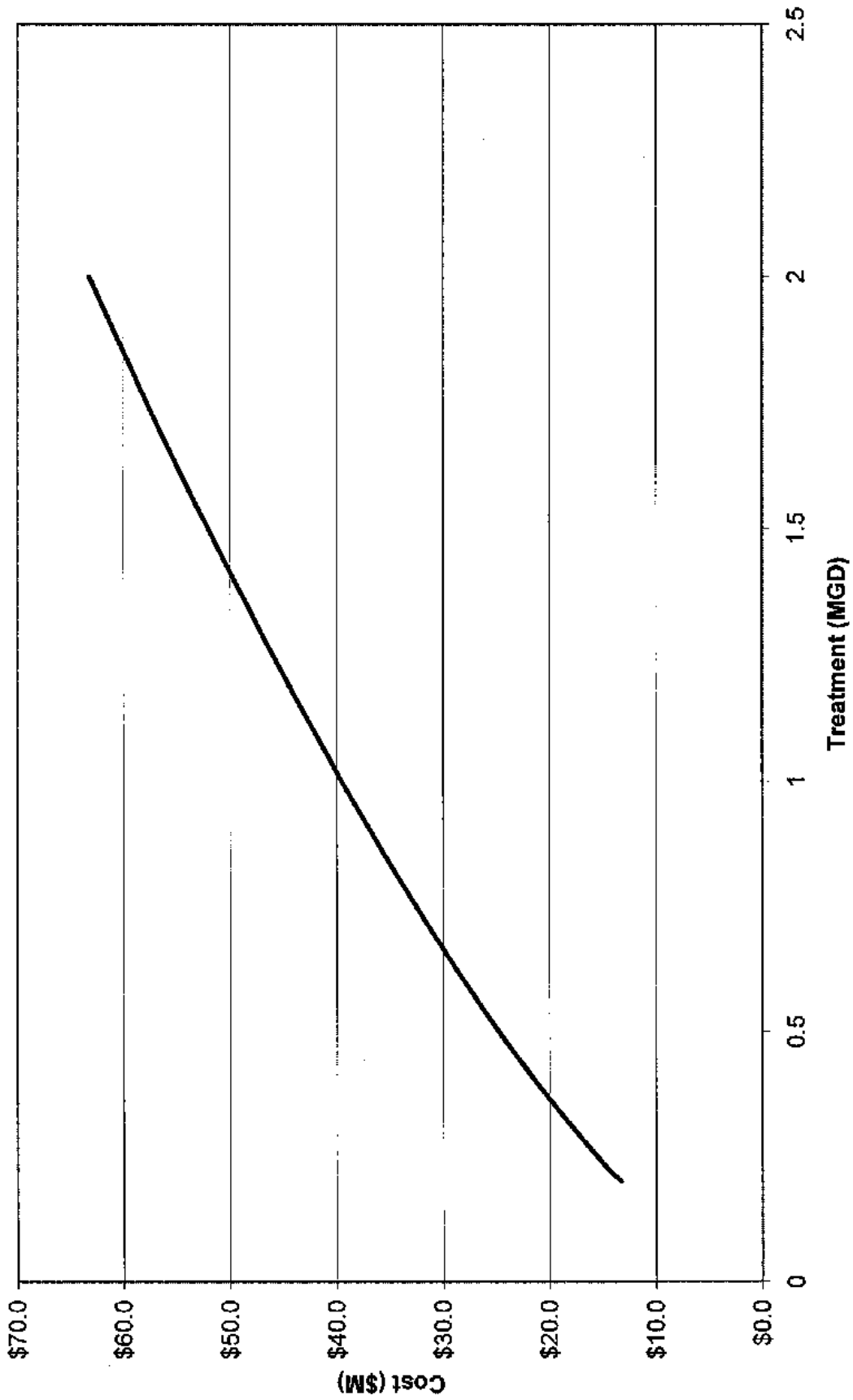
INTERCEPTORS			
SPRING MOUNTAIN			
Pipe Segment	Pipe (ft)	Diameter (In.)	Cost
A	14,251	14	\$2,394,000
B	6,066	14	\$1,019,000
C	3,303	18	\$714,000
E	6,518	12	\$939,000
G	6,963	16	\$1,341,000
H	16,448	10	\$1,974,000
I	14,202	10	\$1,704,000
Sub Total			\$10,710,000
WASTEWATER FORCE MAINS			
D	36,542	6	\$2,631,000
F	5,166	8	\$496,000
Sub Total			\$3,127,000
RECLAIMED WATER PIPELINES			
Main	32,481	12	\$4,677,000
East	31,567	10	\$3,788,000
Central	23,892	8	\$2,294,000
Central	10,870	6	\$783,000
West	28,140	8	\$2,701,000
Sub Total			\$14,243,000
WASTEWATER LIFT STATION COSTS			
Total			\$30,380,000
Engineering (20%)			\$6,100,000
Contingency (20%)			\$6,100,000
Total			\$42,580,000

20 Cities ENRCCI = 7,942 May 2007

WASTEWATER LIFT STATION COSTS		
Force Main	Total Q	Cost
D	0.57	\$440,000
F	0.88	\$544,000
Sub Total		\$980,000
RECLAIMED WATER PUMP STATION COSTS		
East WRF		\$1,000,000
Central WRF		\$1,000,000
Sub Total		\$2,000,000

20 Cities ENRCCI = 7,942 May 2007

Spring Mountain Wastewater Cost Curve



**Wastewater Calculations and Cost Estimates**  
**Sage**

**SAGE INTERCEPTOR AND RECLAIMED WATER PIPELINE CALCULATIONS**

**INTERCEPTORS**

Pipe Segment	Pipe (ft)	Diameter (in.)	Slope (ft/ft)	Node Q (mgd)	Total Q (mgd)	Capacity		Velocity (fps)	Full Pipe Capacity (mgd)	Comments
						0.5 d/D (mgd)	0.73 (mgd)			
A	9,050	8	0.0400	0.18	0.18	0.73	6.4	5	Flow from Collection Area 2.	
B	6,400	10	0.0200	0.54	0.54	0.93	5.3	1.85	50% Flow from Collection Area 1.	
C	8,780	12	0.0200	1.07	1.07	1.52	6.0	3.02	Flow from Pipe B and 50% Flow from Collection Area 1.	
D	9,160	14	0.0100	1.25	1.25	1.62	4.7	3.23	Combined Flow from Pipe A and C.	

**RECLAIMED WATER PIPELINES**

E	9,100	8			0.70		3.1	0.00	Conveys total reclaimed flow.
F	15,100	6			0.53		4.1	0.00	Conveys 75% of total reclaimed flow.
G	9,000	4			0.18		3.1	0.00	Conveys 25% of total reclaimed flow.

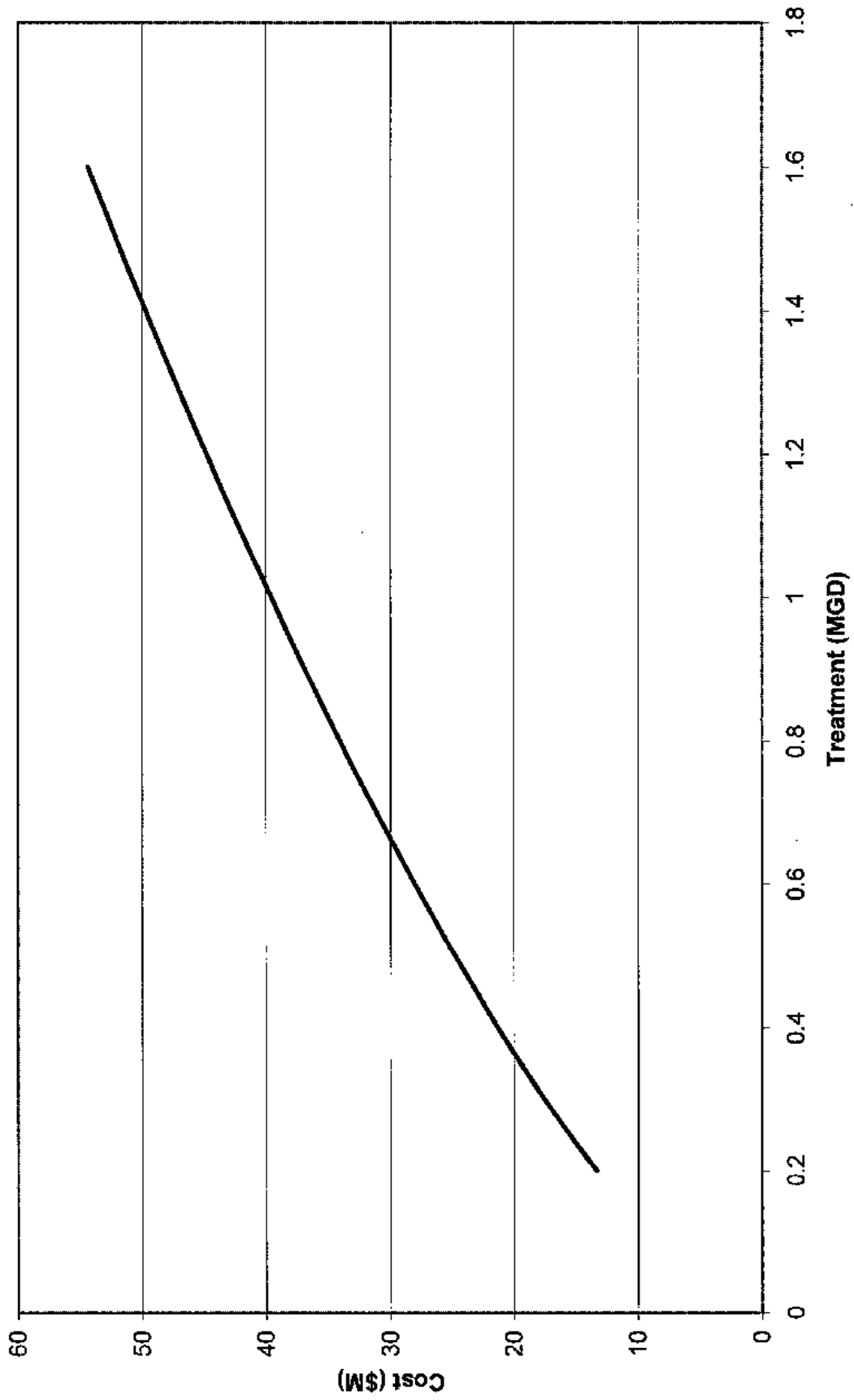
**SAGE INTERCEPTORS, RECLAIMED WATER PUMP STATIONS, AND RECLAIMED WATER PIPELINES COSTS**

<b>INTERCEPTORS</b>			
<b>Interceptor</b>	<b>Pipe (ft)</b>	<b>Diameter (In.)</b>	<b>City Cost</b>
A	9,050	8	\$869,000
B	6,400	10	\$768,000
C	8,780	12	\$1,264,000
D	9,160	14	\$1,539,000
<b>Sub Total</b>			<b>\$4,410,000</b>
<b>RECLAIMED WATER PIPELINES</b>			
E	9,100	8	\$874,000
F	15,100	6	\$1,087,000
G	9,000	4	\$432,000
<b>Sub Total</b>			<b>\$2,400,000</b>
<b>RECLAIMED WATER PUMP STATIONS</b>			
North [b]			\$1,000,000
South [b]			\$1,000,000
<b>Sub Total</b>			<b>\$2,000,000</b>
<b>Total</b>			<b>\$8,800,000</b>
Engineering (20%)			\$1,800,000
Contingency (20%)			\$1,800,000
<b>Total</b>			<b>\$12,300,000</b>

[a] 20 Cities ENRCCI = 7,942 May 2007.

[b] Does not include detailed cost analysis.

**Sage Wastewater Cost Curve**



**Sage Effluent Disposal**

Area	Disposal Land (ac)	Available Effluent Disposal (AFY)
Irrigated Reclamation Fields	231 (a)	675
Effluent Storage Pond	66 (b)	427
<b>Total</b>		<b>1,102</b>

(a) Acreage based on 3.5 ac-f/yr demand. Assumes no other reclaimed water usage.

(b) Acreage based on 139 million gallon basin with 8 ft depth and 3:1 side slopes

Costs	Area	Cost unit	Total
Irrigation Cost	231	\$31,000	\$7,200,000
Pond Costs	66	\$197,000	\$13,100,000
<b>Total</b>			<b>\$20,300,000</b>

20 Cities ENRCCI = 7,942 May 2007

**Wastewater Calculations and Cost Estimates  
Warm Springs**

WARM SPRINGS INTERCEPTORS, FORCE MAINS, AND RECLAIMED WATER PIPELINES CALCULATIONS									
NEW INTERCEPTORS									
Pipe Segment	Pipe (ft)	Diameter (in.)	Slope (ft/ft)	Upstr Q (mgd)	Q In (mgd)	Total Q	Capacity 0.7 d/D (mgd)	Velocity (fps)	Comments
A	9,960	10	0.0063	0.60	0.60	0.60	0.73	4.2	Contribution from Collection Area 3.
B	3,621	10	0.0058	0.16	0.30	0.46	0.70	4.0	Contribution from Pipe D and Collection Area 2.
C	1,442	8	0.0027	0.16	0.16	0.16	0.26	2.3	Contribution from Collection Area 1.
FORCE MAINS									
D	3,444	4		0.16	0.16	0.16		2.9	Contribution from Pipe C.
RECLAIMED WATER PIPELINES									
E	9,960	6		0.22	0.22	0.22		1.8	Conveys 60% of Reclaimed water.
F	3,441	4		0.15	0.15	0.15		2.6	Conveys 40% of Reclaimed water.
G	9,516	6		0.37	0.37	0.37		2.9	Conveys 100% of Reclaimed water.

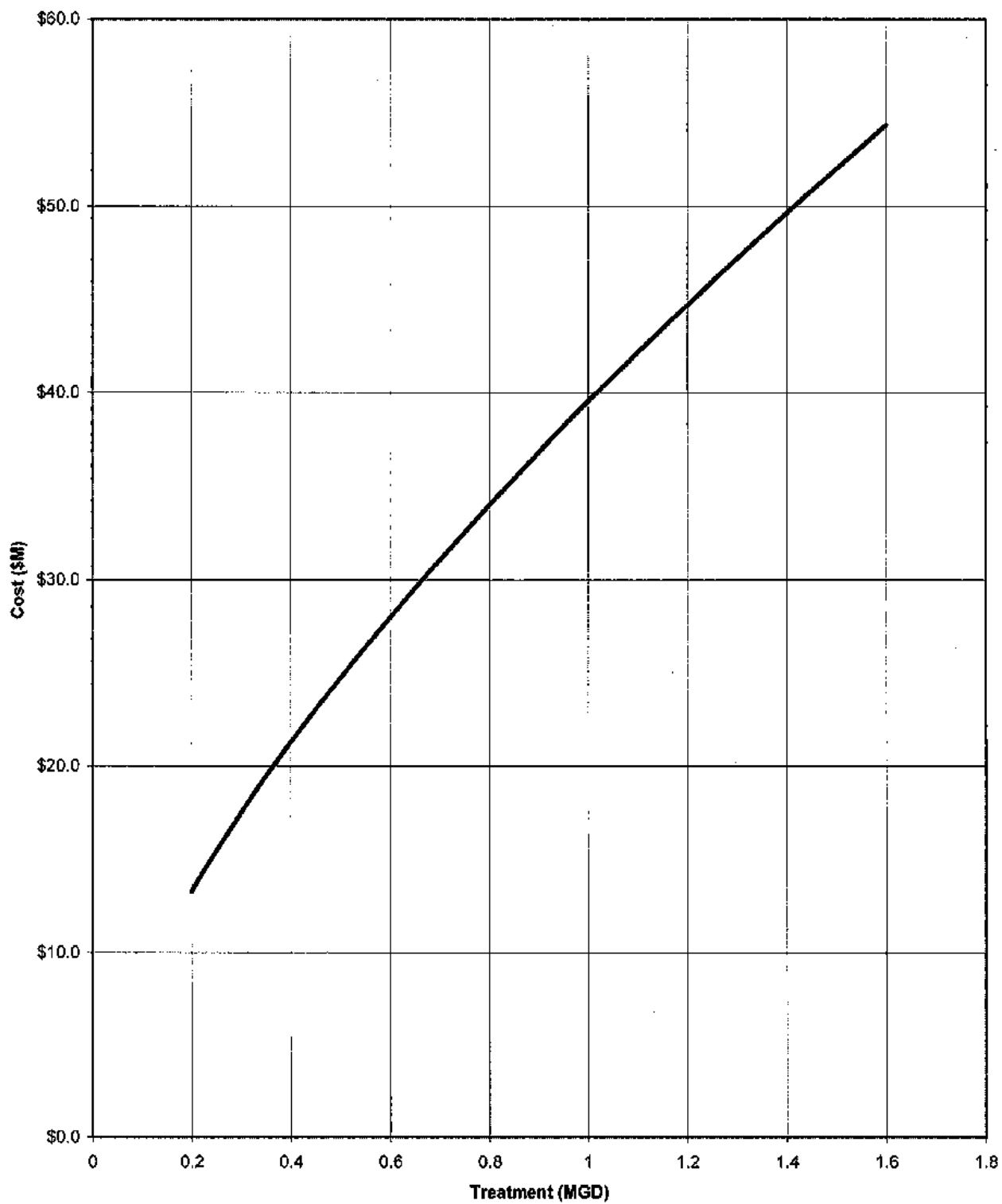
<b>WARM SPRINGS</b>			
<b>INTERCEPTORS</b>			
<b>Pipe Segment</b>	<b>Pipe (ft)</b>	<b>Diameter (In.)</b>	<b>Cost</b>
A	9,960	10	\$1,195,000
B	3,621	10	\$435,000
C	1,442	8	\$138,000
Sub Total			\$1,800,000
<b>WASTEWATER FORCE MAINS</b>			
D	3,444	4	\$165,000
Sub Total			\$200,000
<b>WASTEWATER LIFT STATION COSTS</b>			
D			\$304,000
Sub Total			\$300,000
<b>Total</b>			<b>\$2,300,000</b>
Engineering (20%)			\$500,000
Contingency (20%)			\$500,000
<b>Total</b>			<b>\$3,200,000</b>

20 Cities ENRCCI = 7,942 May 2007

<b>RECLAIMED WATER PIPELINES</b>			
	<b>Pipe (ft)</b>	<b>Diameter (In.)</b>	<b>Cost</b>
E	9,960	6	\$717,000
F	3,441	4	\$165,000
G	9,516	6	\$685,000
Sub Total			\$1,600,000
<b>RECLAIMED WATER PUMP STATION COSTS</b>			
1			\$1,000,000
Sub Total			\$1,000,000
<b>Total</b>			<b>\$2,600,000</b>
Engineering (20%)			\$500,000
Contingency (20%)			\$500,000
<b>Total</b>			<b>\$3,600,000</b>

20 Cities ENRCCI = 7,942 May 2007

### Warm Springs WWTP Cost



**Warm Springs Effluent Disposal**

	<b>Area</b>	<b>Cost unit</b>	<b>Total</b>
Irrigation Area	125	\$30,924	\$3,900,000
Pond Area	30	\$197,000	\$6,000,000
<b>Total</b>			<b>\$9,900,000</b>

20 Cities ENRCCI = 7,942 May 2007

**Wastewater Calculations and Cost Estimates  
Cold Springs**

**COLD SPRINGS INTERCEPTORS, FORCE MAINS, AND RECLAIMED PIPELINE CALCULATIONS**

<b>NEW INTERCEPTORS</b>									
Pipe Segment	Pipe (ft)	Diameter (in.)	Slope (ft/ft)	Upstr Q (mgd)	Q In (mgd)	Total Q	Capacity 0.5 d/D (mgd)	Velocity (fps)	Comments
F	7,428	20	0.0194	3.98	0.44	4.42	5.83	8.3	Conveys flows from E. Add Shed 5
G	4,641	20	0.0129	3.98	3.98	3.98	4.75	6.7	Contribution from Shed 1
H	5,738	18	0.0052	2.20	2.20	2.20	2.28	4.0	Contribution from Shed 2 and half of Shed 5 (other half to existing FM)
I	2,640	20	0.0152	4.26	4.26	4.26	5.16	7.3	Contribution from Shed 3
<b>NEW FORCE MAINS</b>									
A	3,077	16		4.26	4.26	4.26		4.7	Contribution from Shed 3
B	13,308	18		4.26	1.33	5.59		4.9	Add Shed 4
C	9,007	12		2.20	2.20	2.20		4.3	Contribution from Shed 2 and half of Shed 5 (other half to existing FM)
D	7,772	22		7.79	7.79	7.79		4.6	Conveys flows from B & C, no inflow
E	10,986	16		3.98	3.98	3.98		4.4	Contribution from Shed 1
<b>RECLAIMED WATER PIPELINE</b>									
	18,080	16		4.50	4.50	4.50		5.0	Conveys all reclaimed water. Cost is in reclaimed water table.

Bold numbers represent where capacity criteria have been exceeded.  
Data received from the city current as of July 2006

**NEW COLD SPRINGS INTERCEPTORS, FORCE MAINS, WASTEWATER LIFT STATIONS, AND RECLAIMED WATER PUMP STATION COSTS**

<b>INTERCEPTORS</b>										
Pipe Segment	Pipe (ft)	Diameter (In.)	County (mgd)	City (mgd)	Total Q	County % Flow	City % Flow	County Cost	City Cost	City Cost
F	7,428	20	0.44	3.98	4.42	10	90	\$177,465	\$1,805,000	\$1,805,000
G	4,641	20	0.00	3.98	3.98	0	100	\$0	\$1,114,000	\$1,114,000
H	5,738	18	0.67	1.53	2.20	30	70	\$377,456	\$862,000	\$862,000
I	2,640	20	0.00	4.26	4.26	0	100	\$0	\$634,000	\$634,000
<b>Sub Total</b>								<b>\$600,000</b>	<b>\$4,200,000</b>	<b>\$4,200,000</b>
<b>FORCE MAINS</b>										
A	3,077	16	0.00	4.26	4.26	0	100	\$0	\$591,000	\$591,000
B	13,308	18	1.33	4.26	5.59	24	76	\$684,000	\$2,191,000	\$2,191,000
C	9,007	12	0.67	1.53	2.20	30	70	\$395,000	\$902,000	\$902,000
D	7,772	22	2.00	5.79	7.79	26	74	\$527,000	\$1,525,000	\$1,525,000
E	10,986	16	0.00	3.98	3.98	0	100	\$0	\$2,109,000	\$2,109,000
<b>Sub Total</b>								<b>\$1,600,000</b>	<b>\$7,300,000</b>	<b>\$7,300,000</b>
<b>WASTEWATER LIFT STATIONS</b>										
A	3,077	16	0.00	4.26	4.26	0	100	\$0	\$1,670,000	\$1,670,000
B	13,308	18	1.33	4.26	5.59	24	76	\$503,000	\$1,611,000	\$1,611,000
C	9,007	12	0.67	1.53	2.20	30	70	\$299,000	\$684,000	\$684,000
D	7,772	22	2.00	5.79	7.79	26	74	\$731,000	\$2,116,000	\$2,116,000
E	10,986	16	0.00	3.98	3.98	0	100	\$0	\$1,577,000	\$1,577,000
<b>Sub Total</b>								<b>\$1,530,000</b>	<b>\$7,650,000</b>	<b>\$7,650,000</b>
<b>RECLAIMED WATER PUMP STATION</b>										
<b>Total</b>								<b>\$4,000,000</b>	<b>\$19,900,000</b>	<b>\$19,900,000</b>
<b>Engineering (20%)</b>								<b>\$800,000</b>	<b>\$4,000,000</b>	<b>\$4,000,000</b>
<b>Contingency (20%)</b>								<b>\$800,000</b>	<b>\$4,000,000</b>	<b>\$4,000,000</b>
<b>Total</b>								<b>\$5,600,000</b>	<b>\$27,900,000</b>	<b>\$27,900,000</b>

20 Cities ENRCCI = 7,942 May 2007  
 Data received from the city current as of July 2006

**Cold Springs Treatment Cost and Flow Allocations**

**Capital Cost for CSWWTP (Expansion from 0.7 MGD to 4.5 mgd)**

Component	Cost, \$ M
New Headworks and Grit removal	1.7
Five Oxidation Ditches	7.0
Four Secondary Clarifiers	3.1
Two RAS/MAS Pump Stations	2.2
Tertiary Filters	2.7
Chlorine Contact Basin	1.6
Chemical Feed Facilities	1.6
Solids Holding Tank	1.1
Solids Handling Facilities	3.3
<b>Subtotal</b>	<b>29.2</b>
Yard Structures (10%)	2.4
Yard Piping/Stework (10%)	2.4
<b>Subtotal</b>	<b>29.0</b>
Electrical (25%)	7.3
<b>Subtotal</b>	<b>36.3</b>
Contingency (20%)	7.3
<b>Total Construction Cost</b>	<b>43.6</b>
Engineering, Admin, CM (20%)	8.7
<b>Total Project Cost</b>	<b>52.3</b>

20 cities ENRCCI = 7,942 May 2007

**Cold Springs Stead Flow Allocations**

	2007		2030		New		County %
	Existing Capacity (MGD)	Total New Regional Capacity (MGD)	2030 County Capacity (MGD)	Existing Capacity (MGD)	New County Capacity (MGD)	County %	
RSWRF	2.75	1.85	2.75	0	2.75	56.7%	
CSWWTP	0.7	0.7	1.4	0.7	0.7	18.4%	

20 cities ENRCCI = 7,942 May 2007

**Cold Springs Regional Reservoir and Long Valley Export Costs**

**Reservoir - Regional Disposal/Reclaimed Water Costs**

Facility	Length (ft)	Diameter (in)	Subtotal
Stormwater Bypass	5,500	36	\$1,188,000
Dam/Earthwork			\$4,573,000
Subtotal			\$5,800,000
Engineering (20%)			\$1,200,000
Contingency (20%)			\$1,200,000
<b>Total</b>			<b>\$8,200,000</b>

20 Cities ENRCCI = 7,942 May 2007

**Long Valley Export - Regional Disposal/Reclaimed Water Costs**

Facility	Length (ft)	Diameter (in)	Pump Q (MGD)	Subtotal
Discharge Piping	33,000	24		\$9,504,000
Pump Station			5	\$1,900,000
Whites Lake Disposal	1,800	16		\$345,600
Total				\$11,400,000
Engineering (20%)				\$2,300,000
Contingency (20%)				\$2,300,000
<b>Total</b>				<b>\$16,000,000</b>

[1] Discharge piping sized at 24" based on input from City of Reno staff  
20 Cities ENRCCI = 7,942 May 2007

**Cold Springs-Stead Regional Disposal/Reclaimed Water Costs**

Regional Facilities	Cost	Cold Springs	
		City	County
Reservoir	\$8,200,000	\$2,000,000	\$2,600,000
Long Valley Creek Disposal	\$16,000,000	\$3,900,000	\$5,100,000
<b>Total</b>	<b>\$24,200,000</b>	<b>\$5,900,000</b>	<b>\$7,700,000</b>
		<b>\$7,000,000</b>	<b>\$1,300,000</b>
		<b>\$10,600,000</b>	<b>\$2,000,000</b>

[1] Based on percent-flow allocations (See Cold Springs Treatment Cost & Flow Allocation)  
20 Cities ENRCCI = 7,942 May 2007

**Cold Springs Regional Disposal/Reclaimed Water Costs**

**Cold Springs Reclaimed Water Costs**

Reclaimed Water Facilities	Length (ft)	Diameter (in)	Pump Q (MGD)	Subtotal	Comments
Pump Station			4.2	\$1,700,000	For reservoir pumping & expanded reuse distribution
Distribution Piping	18100	16		\$3,500,000	
Subtotal				\$5,200,000	
Engineering (20%)				\$1,040,000	
Contingency (20%)				\$1,040,000	
<b>Total</b>				<b>\$7,280,000</b>	
City Share				\$5,020,000	
County Share				\$2,260,000	

20 Cities ENRCCI = 7,942 May 2007

System Info	
Flow, Q (cfs)	6.5016
Static Head (ft)	300
Headloss (ft)	20
Total Head, H (ft)	320

4.2 MGD



**Wastewater Calculations and Cost Estimates**  
**Stead**

**STEADY INTERCEPTORS AND FORCE MAIN CALCULATIONS**

NEW INTERCEPTORS										Capacity		Autonomous Required Capacity		Notes		
Node Upstr	Pipe Segment	Pipe (ft)	Diameter (in.)	Slope (ft/ft)	Upstr Q (mgd)	Node Q (mgd)	Total Q (mgd)	Capacity 0.5 d/D (mgd)	Velocity (fps)	Additional Capacity (mgd)	Required Diameter (in.)	Capacity 0.5 d/D (mgd)				
1	A	13,877	14	0.0040	1.00	1.00	1.00	1.02	3.0	0.00	0.00	0.00	Contribution from Collection Area 1.			
2	B	10,448	20	0.0058	1.0000	1.64	2.64	3.19	4.5	0.00	0.00	0.00	Contribution from Node 1 and Collection Areas 8 & 9.			
13	M	16,491	24	0.0050	3.18	3.18	4.81	4.7	4.7	0.00	0.00	0.00	Contribution from Collection Areas 2, 11, & 12. Includes 5778 ft of sewer in shed 2.			
14	N*	7,000	18	0.0008	1.08	1.08	1.25	2.2	2.2	0.00	0.00	0.00	Contribution from Collection Area 12.			
<b>EXISTING INTERCEPTORS</b>																
Node Upstr	Diameter (in.)	Slope (ft/ft)	Upstr Q (mgd)	Node Q (mgd)	Total Q (mgd)	Capacity 0.5 d/D (mgd)	Velocity (fps)	Additional Capacity (mgd) <td>Required Diameter (in.)</td> <td>Capacity 0.5 d/D (mgd)</td> <td colspan="5"></td>	Required Diameter (in.)	Capacity 0.5 d/D (mgd)						
3	C	9,849	24	0.0030	0.2020	3.30	3.50	3.73	3.7	0.00	Contribution from Collection Areas 4 & Pipe V*.					
4	D	10,440	8	0.0187	2.08	2.08	0.50	4.4	1.6	14	2.21	Contribution from Collection Area 5. Includes 3463 ft of new pipe.				
5	E	6,375	24	0.0010	2.46	2.46	2.15	2.1	0.3	12	0.34	Contribution from Collection Area 3. Assume 0.0010 slope.				
6	F	844	24	0.0011	7.84	7.84	2.26	2.2	5.6	36	6.65	Contribution from Node 3, 4 & 5.				
7	G	10,383	8	0.0060	2.08	2.08	0.28	2.5	1.8	18	2.45	Contribution from Collection Area 5.				
8	H	2,065	24	0.0011	9.92	9.92	2.26	2.2	7.7	36	6.65	Contribution from Node 6 & 7. Assume 76% capacity to meet demand; 36" okay.				
9	I	1,044	36	0.0015	12.56	12.56	7.77	3.4	4.8	36	7.77	Contribution from Node 2 & 8. Assume 82% capacity to meet demand; 36" okay.				
10	J	18,092	21	0.0054	0.44	3.10	3.54	3.50	4.5	0.0	0.00	Contribution from Collection Areas 6 & Pipe U*. Includes 3600 ft of new pipe.				
11	K	10,532	24	0.0006	1.55	1.55	1.67	1.6	0.0	0.00	0.00	Contribution from Collection Area 6. Includes 4847 ft of new pipe.				
12	L	21,537	10	0.0003	2.61	0.40	3.01	0.11	0.6	2.9	3.47	Contribution from Collection Areas 7 & 13.				
<b>70% AVG. Capacity</b>																
U*	7.034	8-12	0.0118	0.44	0.44	0.93	3.7	Contribution from Collection Area 14.								
V*	6.000	8	0.0198	0.20	0.20	0.72	6.3	Contribution from Collection Area 10. Includes 3309 ft of new pipe.								
W*	6.200	8	0.0060	0.30	0.30	0.45	4.0	Contribution from Collection Area 15.								
<b>NEW FORCE MAIN</b>																
O	9.590	14	2.64	3.8												
P	14.589	14	3.18	4.6												
Q	5.358	12	1.96	3.9												
R	1.216	18	3.54	3.9												
S	11.460	16	4.10	4.5												
T	4.407	8	1.08	4.8												

\*County Area calculated using 0.7 d/D Capacity.  
 Bold numbers represent where capacity criteria have been exceeded.  
 Data received from the City current as of July 2006  
 Data received from the County current as of April 2007

**NEW STEAD INTERCEPTORS, FORCE MAINS, AND LIFT STATION COSTS**

NEW INTERCEPTORS										
Pipe Segment	Pipe (ft)	Diameter (In.)	County (mgd)	City (mgd)	Total Q	County % Flow	City % Flow	County Cost	City Cost	City Cost
A	13,877	14	0.00	1.00	1.00	0	100	\$0	\$2,331,000	\$2,331,000
B	10,448	20	1.52	1.12	2.64	58	42	\$1,443,000	\$1,064,000	\$1,064,000
M	16,491	24	1.22	1.96	3.18	38	62	\$1,822,000	\$2,927,000	\$2,927,000
N	7,000	18	1.08	0.00	1.08	100	0	\$1,512,000	\$0	\$0
D	10,440	14	0.00	2.08	2.08	0	100	\$0	\$1,754,000	\$1,754,000
E	6,375	12	0.00	2.46	2.46	0	100	\$0	\$918,000	\$918,000
F	844	36	0.20	7.84	8.04	2	98	\$9,000	\$356,000	\$356,000
G	10,383	18	0.00	2.08	2.08	0	100	\$0	\$2,243,000	\$2,243,000
H	2,065	36	0.20	9.92	10.12	2	98	\$18,000	\$874,000	\$874,000
J	3,600	21	0.44	3.10	3.54	12	88	\$113,000	\$794,000	\$794,000
K	4,847	24	0.00	1.55	1.55	0	100	\$0	\$1,366,000	\$1,366,000
L	21,537	36	0.40	2.61	3.01	13	87	\$1,236,000	\$8,068,000	\$8,068,000
V	3,309	8	0.20	0.00	0.20	100	0	\$318,000	\$0	\$0
Sub Total	111,216							\$6,500,000	\$22,700,000	\$22,700,000
NEW FORCE MAINS										
O	9,590	14	1.52	1.12	2.64	58	42	\$927,000	\$684,000	\$684,000
P	14,589	14	1.22	1.96	3.18	38	62	\$940,000	\$1,511,000	\$1,511,000
Q	5,358	12	0.00	1.96	1.96	0	100	\$0	\$772,000	\$772,000
R	1,216	16	0.44	3.10	3.54	12	88	\$29,000	\$205,000	\$205,000
S	11,460	16	1.48	2.61	4.09	36	64	\$796,000	\$1,404,000	\$1,404,000
T	4,407	8	1.08	0.00	1.08	100	0	\$423,000	\$0	\$0
Sub Total	46,619							\$3,100,000	\$4,600,000	\$4,600,000
LIFT STATIONS										
O	9,590	14	1.52	1.12	2.64	58	42	\$651,000	\$480,000	\$480,000
P	14,589	14	1.22	1.96	3.18	38	62	\$503,000	\$807,000	\$807,000
Q	5,358	12	0.00	1.96	1.96	0	100	\$0	\$903,000	\$903,000
R	1,216	16	0.44	3.10	3.54	12	88	\$178,000	\$1,252,000	\$1,252,000
S	11,460	16	1.48	2.61	4.09	36	64	\$584,000	\$1,030,000	\$1,030,000
T	4,407	8	1.08	0.00	1.08	100	0	\$610,000	\$0	\$0
Sub Total	46,619							\$2,530,000	\$4,470,000	\$4,470,000
Total								\$12,100,000	\$31,600,000	\$31,600,000
Engineering (20%)								\$2,400,000	\$6,400,000	\$6,400,000
Contingency (20%)								\$2,400,000	\$6,400,000	\$6,400,000
Total								\$16,900,000	\$44,500,000	\$44,500,000

20 Cities ENRCCI = 7,942 May 2007  
 Data received from the City current as of July 2006  
 Data received from the County current as of April 2007

Stead Treatment Cost and Flow Allocations

**Stead - Treatment Costs**

Treatment (Membrane/UV)	Cost	Date	ENR
Projected Incremental Tertiary Treatment Cost 2 to 4.8MGD	\$26,414,000	Apr-05	7355
Additional Ozone Treatment	\$8,270,000	Apr-05	7355
Adjusted Treatment Volume 4.8 to 7.20MGD	\$46,067,000	Apr-05	7355
Adjusted Treatment Volume 4.8 to 7.20MGD	\$49,700,000	May-07	7942
Engineering (20%)	\$9,900,000		
Contingency (20%)	\$9,900,000		
<b>Total</b>	<b>\$150,300,000</b>		

20 cities ENRCCI = 7,942 May 2007

**Stead-Cold Springs Flow Allocations**

	Total		2030		Existing		New		2030 City		Existing		New City	
	Capacity (MGD)	Regional Facilities (%)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)	Capacity (MGD)
RSWRF	7.2	56.1%	2.35	2.75	0	2.75	4.45	2.1	3.1	2.35	0	3.1	56.7%	43.3%
CSWWTP	4.5	43.9%	0.7	1.4	0.7	0.7	3.1	0.7	3.1	0	0.7	3.1	16.4%	81.6%

**Stead Regional Reservoir and Long Valley Export Costs**

**Reservoir - Regional Disposal/Reclaimed Water Costs**

Facility	Length (ft)	Diameter (in)	Subtotal
Stormwater Bypass	5,500	36	\$1,188,000
Dam/Earthwork			\$4,573,000
Subtotal			\$5,800,000
Engineering (20%)			\$1,200,000
Contingency (20%)			\$1,200,000
<b>Total</b>			<b>\$8,200,000</b>

20 Cities ENRCCI = 7,942 May 2007

**Long Valley Export - Regional Disposal/Reclaimed Water Costs**

Facility	Length (ft)	Diameter (in)	Pump Q (MGD)	Subtotal
Discharge Piping	33,000	24		\$9,504,000
Pump Station			5	\$1,900,000
Whites Lake Disposal	1,800	16		\$345,600
<b>Total</b>				<b>\$11,400,000</b>
Engineering (20%)				\$2,300,000
Contingency (20%)				\$2,300,000
<b>Total</b>				<b>\$16,000,000</b>

20 Cities ENRCCI = 7,942 May 2007

**Stead-Cold Springs Regional Disposal/Reclaimed Water Costs**

Regional Facilities	Cost	Stead		Cold Springs	
		Total	City	Total	County
Reservoir	\$8,200,000	\$4,600,000	\$2,000,000	\$3,600,000	\$700,000
Long Valley Creek Disposal	\$16,000,000	\$9,000,000	\$3,900,000	\$5,100,000	\$1,300,000
<b>Total</b>	<b>\$24,200,000</b>	<b>\$13,600,000</b>	<b>\$5,900,000</b>	<b>\$7,700,000</b>	<b>\$2,000,000</b>

[1] Based on percent-flow allocations (See Appendix)

20 Cities ENRCCI = 7,942 May 2007

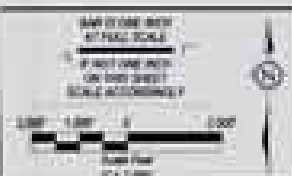
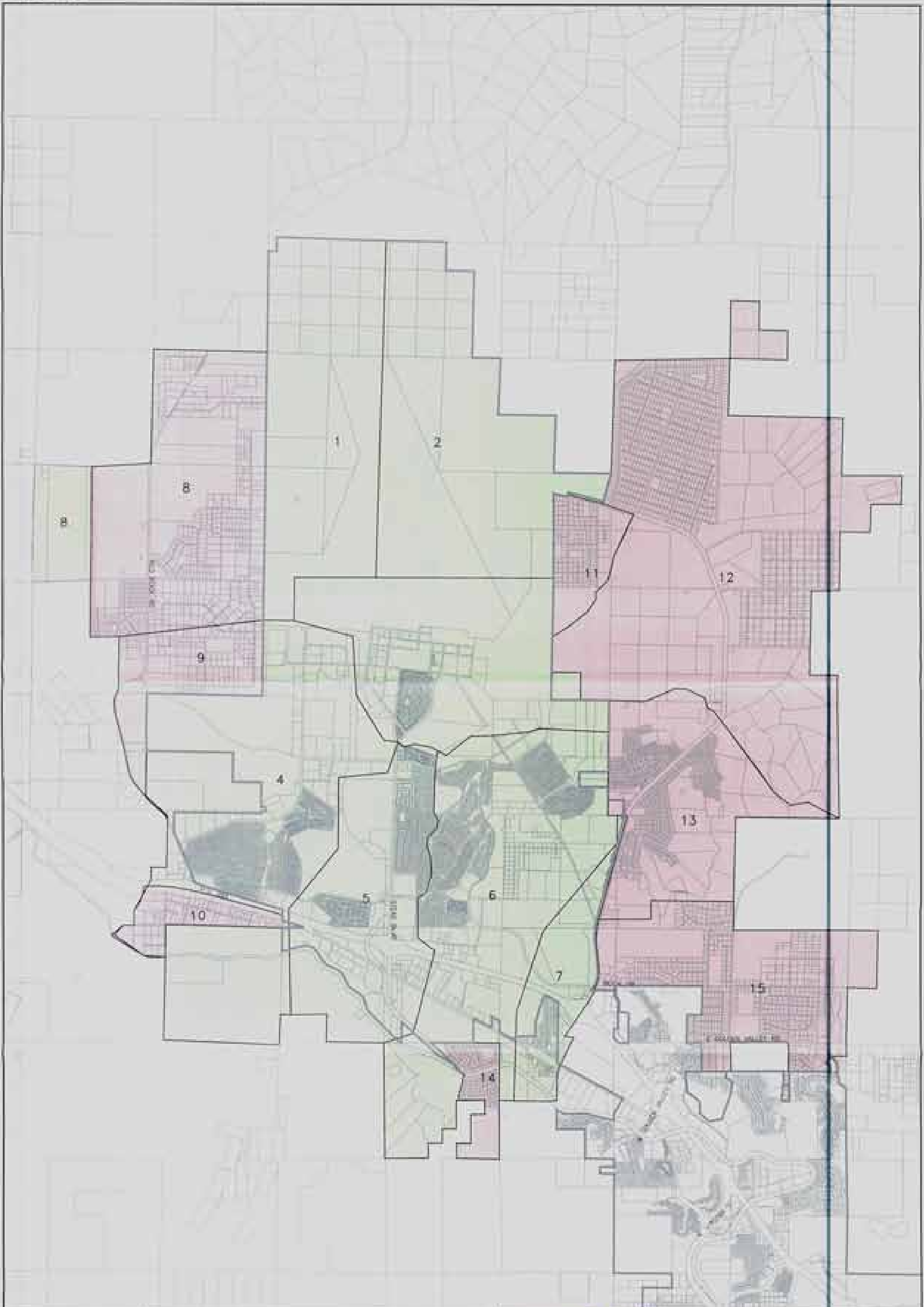
Stead Regional Reclaimed Water Costs

Stead - Reclaimed Water Costs



Facility	Length (ft)	Diameter (in)	Pump Q <sub>peak</sub> (MGD)	Subtotal
Distribution Piping	12,500	6		\$900,000
	11,700	8		\$1,123,000
	12,800	10		\$1,536,000
Pipe to Reservoir	38,500	24		\$11,088,000
Pump Station [4]			4.85	\$1,900,000
2 MG Storage Tank				\$2,000,000
<b>Subtotal</b>				<b>\$18,500,000</b>
Engineering (20%)				\$3,700,000
Contingency (20%)				\$3,700,000
<b>Total</b>				<b>\$25,900,000</b>

[1] Pump to serve for expanded reuse distribution and supply to reservoir

20 Cities ENRCCI = 7,942 May 2007



**MAP SYMBOLS**

 STSAD COLLECTION AREA CITY	 STSAD COLLECTION AREA COUNTY
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**HDR**  
**ECO-LOGIC**  
 WSPC

**STEADLENNON VALLEY TMSA - FIGURE 6-C1  
 SEWER COLLECTION AREAS  
 COUNTY OF WASHOE, NEVADA**

REV. NO.	REVISION	BY	JOB #	INCLUDE	DESIGNED	APPROV
			DATE	DATE	DATE	DATE
			SCALE	SCALE	SCALE	SCALE

**Wastewater Calculations and Cost Estimates  
Spanish Springs**

**SPANISH SPRINGS INTERCEPTOR AND FORCEMAIN CALCULATIONS**

Reach #	Length (ft)	Min Diameter (in)	Max Diameter (in)	Slope (ft/ft)	Upstr Q (MGD)	Q In (MGD)	Q Total (MGD)	Capacity		70% Avg Capacity (MGD)	Velocity (fps)	Additional		Capacity d/D (MGD)	Notes
								0.7 d/D (MGD)	Max. Capacity (MGD)			Capacity (MGD)	Required Diameter (in)		
1	4,382	10	10	0.002	0.47	0.47	0.47	0.36	0.36	0.36	2.0	0.11	8	0.20	Contribution from 50% Collection Area 1
2	2,948	10	10	0.002	0.72	0.72	0.72	0.40	0.40	0.40	2.3	0.32	10	0.40	Contribution from Collection Area 2
3	608	10	10	0.007	1.20	1.20	1.20	0.80	0.80	0.80	4.5	0.40	8	0.44	Conveys flow from Pipe 1 & 2
4	3,351	8	12	0.003	0.47	0.47	0.47	0.28	0.82	0.68	2.5			0.00	Contribution from 50% Collection Area 1
6	5,981	15	18	0.002	1.67	1.32	2.99	1.30	2.11	1.91	3.3	1.08	14	1.08	Contribution from 40% Collection Area 3 & Pipe 5
7	9,352	15	15	0.002	3.64	1.32	4.96	1.34	1.34	1.34	3.4	3.63	24	4.67	Contribution from 40% Collection Area 3 & Pipe 6
8	4,308	10	10	0.007	0.97	0.97	0.97	0.76	0.76	0.76	4.3	0.21	8	0.42	Contribution from Collection Area 5
10	1,955	8	8	0.005	0.71	0.38	1.09	0.37	0.37	0.37	3.3	0.72	12	1.09	Contribution from 35% Collection Area 4 & Pipe 12
11	134	15	15	0.007	7.03	7.03	7.03	2.28	2.28	2.28	5.7	4.75	20	4.90	Conveys flow from Pipe 9 & 10
12	7,052	8	8	0.025	0.05	0.05	0.05	0.80	0.80	0.80	7.1			0.00	Contribution from 5% Collection Area 4
13	6,258	8	8	0.029	0.66	0.66	0.66	0.86	0.86	0.86	7.6			0.00	Contribution from 20% Collection Area 3
14	4,400	8	8	0.013	0.65	0.65	0.65	0.59	0.59	0.59	5.2	0.06		0.00	Contribution from 60% Collection Area 4, Assume 0.06 is negligible
<b>Total</b>						<b>7.02</b>									
<b>FORCEMAINS</b>															
5		12	12		1.67	0.00	1.67								Conveys flow from Pipe 3 & 4
9		8	8		5.94	0.00	5.94								Conveys flow from Pipe 7 & 8

Bold numbers represent where capacity criteria have been exceeded.  
 Pipe data current as of April 2007.

**SPANISH SPRINGS INTERCEPTORS COSTS**

<b>INTERCEPTORS</b>						
<b>Pipe Segment</b>	<b>Pipe (ft)</b>	<b>Diameter (In.)</b>	<b>County (MGD)</b>	<b>Total Q (MGD)</b>	<b>County % Flow</b>	<b>County Cost</b>
1	4,382	8	0.47	0.47	100	\$420,000
2	2,948	10	0.72	0.72	100	\$350,000
3	608	8	1.20	1.20	100	\$60,000
6	5,981	14	2.99	2.99	100	\$1,000,000
7	9,352	24	4.96	4.96	100	\$2,690,000
8	4,308	8	0.97	0.97	100	\$410,000
10	1,955	12	1.09	1.09	100	\$280,000
11	134	20	7.03	7.03	100	\$30,000
12	7,052	8	0.05	0.05	100	\$680,000
<b>Sub Total</b>	<b>36,720</b>					<b>\$5,900,000</b>
<b>Total</b>						<b>\$5,900,000</b>
<b>Engineering (20%)</b>						<b>\$1,200,000</b>
<b>Contingency (20%)</b>						<b>\$1,200,000</b>
<b>Total</b>						<b>\$8,300,000</b>

20 Cities ENRCCI = 7,942 May 2007

**Spanish Springs Flow to TMWRF Treatment Cost**

<b>Treatment</b>	<b>County Cost</b>
Projected Incremental Treatment Cost of 1.9 MGD	\$28,500,000
Engineering (20%)	\$5,700,000
Contingency (20%)	\$5,700,000
<b>Total</b>	<b>\$39,900,000</b>

[1] Treatment cost based on \$15 million per additional MGD treated.

[2] Approximately 1.1 MGD of treatment was assumed to be paid for by interceptor connection charges.

[3] 20 Cities ENRCC = 7,942 May 2007



**Wastewater Calculations and Cost Estimates  
Sun Valley**

SUN VALLEY INTERCEPTOR CALCULATIONS												
Reach #	Length (ft)	Diameter (in)	Slope (ft/ft)	Upstr Q (MGD)	Q In (MGD)	Q Total (MGD)	Capacity 0.75 d/D (MGD)	Velocity (fps)	Additional Capacity (MGD)	Additional Required Diameter (in)	Capacity 0.75 d/D (MGD)	Notes
1	1,417	10	0.0033	0.88	0.88	0.88	0.57	3.2	0.32	10	0.53	20% Contribution from Sun Valley Collection Area 1
2	2,982	12	0.007	0.88	0.88	0.88	1.34	5.3	0.00	12	0.00	Conveys Pipe 1 Flow
3	668	10	0.0015	0.44	0.44	0.44	0.38	2.2	0.00	10	0.00	10% Contribution from Sun Valley Collection Area 1, Negligible Additional Capacity
4	4,001	12	0.0084	1.33	0.22	1.55	1.29	5.1	0.26	8	0.41	Conveys Pipe 2 & 3 Flow & 5% Contribution from Sun Valley Collection Area 1
4A	10,600	8	0.027	0.00	0.00	0.00	0.80	7.9	0.00	8	0.00	Conveys Pipe 6 & 5% Contribution from Sun Valley Collection Area 1
5	1,337	12	0.011	1.33	0.22	1.55	1.69	6.6	0.16	8	0.60	30% Contribution from Sun Valley Collection Area 1
6	2,639	10	0.014	1.33	1.33	1.33	1.17	6.6	0.01	8	0.60	Conveys Pipe 4, 5, & 13 Flow, Negligible Additional Capacity
7	7,535	15	0.0147	3.54	0.88	4.42	3.94	6.9	0.49	10	0.77	Conveys Pipe 7 Flow & 20% Contribution from Sun Valley Collection Area 1
8	5,624	18	0.0069	3.54	0.88	4.42	3.76	6.6	0.68	10	0.78	Conveys Pipe 8 Flow
9	6,327	21	0.01378	4.42	4.42	4.42	4.11	5.3	0.32	10	0.53	Conveys Pipe 9 Flow
10	1,941	18	0.0063	4.42	4.42	4.42	4.11	5.3	0.00	10	0.00	Conveys Pipe 10 Flow
11	5,431	21	0.0033	4.42	4.42	4.42	17.66	11.1	0.00	10	0.00	Conveys Pipe 11 Flow
12	103	30	0.0081	4.42	4.42	4.42	1.34	11.8	0.00	10	0.00	Conveys 10% Contribution from Sun Valley Collection Area 1
13	2,940	8	0.06	0.44	0.44	0.44	1.24	11.0	0.00	8	0.00	Conveys Pipes 15 & 16
14	4,280	8	0.052	0.046	0.046	0.046	1.22	10.8	0.00	8	0.00	Conveys Pipe 17 Flow
15	2,296	8	0.05	0.023	0.023	0.023	1.22	10.8	0.00	8	0.00	Conveys Pipe 18 Flow
16	3,640	8	0.05	0.023	0.023	0.023	1.22	10.8	0.00	8	0.00	Conveys Pipe 18 Flow
<b>FORGEMAINS</b>												
17	958	4		0.023	0.023	0.02		0.4				50% Contribution from from Sun Valley, Collection Area 2
18	1,476	4		0.023	0.023	0.02		0.4				50% Contribution from from Sun Valley, Collection Area 2
Total						4.47						

Bold numbers represent where capacity criteria have been exceeded.  
Pipe data current as of April 2007.

<b>SUN VALLEY</b>						
<b>INTERCEPTORS</b>						
Pipe Segment	Pipe (ft)	Diameter (in)	County (MGD)	Total Q (MGD)	County % Flow	County Cost
1	1,417	10	0.88	0.88	100	\$170,000
4	4,001	8	1.55	1.55	100	\$380,000
6	2,639	8	1.33	1.33	100	\$250,000
8	5,624	10	4.42	4.42	100	\$670,000
10	1,941	10	4.42	4.42	100	\$230,000
11	5,431	10	4.42	4.42	100	\$650,000
14	4,280	8	0.046	0.046	100	\$410,000
15	2,296	8	0.023	0.023	100	\$220,000
16	3,640	8	0.023	0.023	100	\$350,000
Sub Total	31,270					<b>\$3,300,000</b>
<b>FORCEMAINS</b>						
17	958	4			100	\$50,000
18	1,476	4			100	\$70,000
Sub Total	2,430					<b>\$100,000</b>
<b>LIFT STATIONS</b>						
17						\$500,000
18						\$500,000
Sub Total						<b>\$1,000,000</b>
Sub Total						<b>\$4,500,000</b>
Engineering (20%)						\$900,000
Contingency (20%)						\$900,000
<b>Total</b>						<b>\$6,300,000</b>

20 Cities ENRCCI = 7,942 May 2007

<b>Sun Valley Flow to TMWRF Treatment Cost</b>	
<b>Treatment</b>	<b>Cost</b>
Projected Incremental Treatment Cost of 1.45 MGD	\$11,300,000
Engineering (20%)	\$2,300,000
Contingency (20%)	\$2,300,000
<b>Total</b>	<b>\$15,900,000</b>

[1] Current plant expansion will increase treatment capacity to 46 MGD.

[2] Based on total existing flow of 29.3 MGD.

[3] Treatment cost based on \$15 million per additional MGD treated.

[4] 20 Cities ENRCCI = 7,942 May 2007

**Wastewater Calculations and Cost Estimates  
Truckee Meadows**

TRUCKEE MEADOWS INTERCEPTOR AND FORCE MAIN CALCULATIONS

Reach #	Length (ft)	Min. Diameter (in)	Max. Diameter (in)	Slope (ft/ft)	Upstr Q (MGD)	Q In (MGD)	Q Total (MGD)	Capacity 0.5 d/D		70% Avg. Capacity	Velocity (fps)	Additional		Capacity d/D	Collection Areas and Comments
								Min. (MGD)	Max. (MGD)			Capacity Required	Required Diameter		
A	11000	24	24	0.006595	8.81	8.81	8.81	5.53	10.02	8.90	5.4			0.00	TM 20, WC 1, WC 2, SC 1
B	2241	24	30	0.006595	8.81	0	8.81	5.53	10.02	8.90	5.4			0.00	Pipe A
1	10792	24	30	0.005902	8.81	0.47	9.28	5.23	9.48	8.42	5.2	0.86	14	1.24	Pipe B, TM 19
2	11118	15	18	0.032954	2.41	2.41	2.41	3.53	5.74	5.18	8.9			0.00	50% - TM 17
3	12283	24	33	0.005116	11.69	11.69	11.69	4.87	11.38	9.75	4.8	1.94	18	2.26	Conveys pipes 1 & 2
3A	3726	36	36	0.002858	0.55	0.55	0.55	10.73	10.73	10.73	4.7			0.00	TM 18 & Pipe 40
4	8042	15	24	0.029111	4.74	4.74	4.74	3.31	11.61	9.54	8.4			0.00	50% - TM 17, TM 16
5	8136	30	36	0.004971	16.98	16.98	16.98	8.70	14.15	12.78	6.5	4.20	24	4.80	Pipes 3, 3A & 4
6	8859	15	24	0.023301	3.26	3.26	3.26	2.97	10.39	8.53	7.5			0.00	TM 15
7	3113	39	42	0.005994	20.25	20.25	20.25	19.23	23.43	22.38	7.2			0.00	Pipes 5 & 6
8	17331	8	30	0.010787	3.31	3.31	3.31	0.38	12.81	9.71	3.3	11.71	32	0.00	TM 13 & Pipe 41
9	729	30	32	0.007078	23.56	23.56	23.56	10.38	12.33	11.84	6.5			12.33	Pipes 7 & 8
9A	240	30	30	0.003917	11.78	11.78	11.78	7.72	7.72	7.72	4.9	4.06	24	4.26	50%-Pipe 9
9B	244	32	32	0.003852	11.78	11.78	11.78	9.10	9.10	9.10	5.0	2.68	24	4.22	50%-Pipe 9
10	4237	12	18	0.019061	3.40	3.40	3.40	1.48	4.36	3.64	5.8			0.00	TM 12
10A	7943	18	36	0.004218	3.40	3.53	6.94	2.05	13.03	10.29	3.6			0.00	Pipe 10, 35% TM 1
11	1142	33	33	0.007234	11.78	11.78	11.78	13.53	13.53	13.53	7.1			0.00	Pipe 9A
11A	1160	32	32	0.007121	11.78	11.78	11.78	12.37	12.37	12.37	6.9			0.00	Pipe 9B
12	8804	36	42	0.004996	11.78	3.52	15.30	14.18	21.39	19.59	6.2			0.00	pipe 11, 50% TM 9
13	7007	24	36	0.002979	11.78	1.51	13.29	3.71	10.95	9.14	3.7	4.15	30	6.73	Pipe 11A, 15% TM 1
14	4569	18	24	0.005883	3.53	3.53	3.53	2.41	5.20	4.50	4.2			0.00	35% TM 1
15	1640	18	24	0.000817	3.53	1.51	5.05	0.90	1.95	1.68	1.6	3.36	30	3.53	15% TM 1, Pipe 14
15A	1816	36	36	0.004526	11.98	11.98	11.98	13.50	13.50	13.50	5.9			0.00	Pipe 15, 10A
16	4922	15	24	0.002182	3.52	3.52	3.52	0.91	3.18	2.61	2.3	0.91	16	1.08	50% TM 9
17	2112	39	39	0.006817	18.83	18.83	18.83	20.51	20.51	20.51	7.7			0.00	Pipes 16 & 12
18	1419	39	39	0.011973	18.83	18.83	18.83	27.18	27.18	27.18	10.1			0.00	Pipe 17
19	9696	30	42	0.00502	25.27	25.27	25.27	9.57	23.48	20.01	6.0	5.27	24	5.28	Pipes 13 & 15A
20	15047	12	27	0.008962	6.34	6.34	6.34	1.01	8.82	6.87	4.0			0.00	70% TM 2
21	2634	27	27	0.001708	6.34	6.34	6.34	3.85	3.85	3.85	3.0	2.49	24	2.81	Pipe 20
22	937	45	45	0.003073	25.17	25.17	25.17	20.17	20.17	20.17	5.7	5.00	30	6.84	Pipe 18 & 21
23	7216	Force Main				2.87	2.87								TM 4
24	19131	45	60	0.001915	28.04	2.72	30.75	15.92	34.29	29.70	4.5	1.06	18	1.38	Pipe 22 & 23, 30% TM 2
25	20049	15	18	0.025913	4.85	4.85	4.85	3.13	5.09	4.60	7.9	4.81	20	6.73	50% TM 11, Pipe 52
26	19266	18	42	0.004511	9.41	10.22	19.63	2.12	20.33	15.78	3.7	3.85	24	4.57	Pipe 25, TM 10, TM 22
28	7292	15	18	0.027934	2.71	2.71	2.71	3.25	5.28	4.77	8.2			0.00	TM 14
29	11936	18	48	0.015945	2.71	5.11	7.82	4.46	61.03	46.89	7.8			0.00	Pipe 28, TM 23, 50% TM 5
30	2577	36	36	0.009694	3.95	3.95	3.95	19.76	19.76	19.76	8.7			0.00	TM 6
31	2721	60	60	0.006916	11.77	11.77	11.77	65.17	65.17	65.17	10.3			0.00	Pipes 29 & 30
31A	7449	8	36	0.002801	2.23	2.23	2.23	0.19	10.62	8.01	1.7			0.00	50% TM 5
31B	1478	60	60	0.002429	13.99	13.99	13.99	38.62	38.62	38.62	6.1			0.00	Pipes 31 & 31A
31C	2023	18	24	0.007794	1.44	1.44	1.44	2.79	6.01	5.20	4.9			0.00	TM 7
32	1677	60	60	0.002916	15.43	15.43	15.43	42.31	42.31	42.31	6.7			0.00	Pipes 31B & 31C
33	10070	18	30	0.006105	2.31	2.31	2.31	2.47	9.64	7.85	4.3			0.00	TM 8

TRUCKEE MEADOWS INTERCEPTOR AND FORCE MAIN CALCULATIONS

Reach #	Length (ft)	Min. Diameter (in)	Max. Diameter (in)	Slope (ft/ft)	Upstr Q (MGD)	Q In (MGD)	Q Total (MGD)	Capacity 0.5 d/D (MGD)	Max. Capacity 0.5 d/D (MGD)	70% Avg. Capacity	Velocity (fps)	Additional Capacity Required	Required Diameter	Capacity 0.5 d/D	Collection Areas and Comments
34	4550	48	60	0.001178	17.74	2.78	17.74	14.83	26.90	23.88	3.7			0.00	Pipes 32 & 33
35	7143	24	33	0.007199	0.31	1.94	2.25	5.77	13.50	11.57	5.7			0.00	25% TM 3, Pipes 51
36	2615	18	24	0.002485	5.03	2.47	7.50	1.58	3.39	2.94	2.8			0.00	TM 21 + Pipe 49
37	9589	33	36	0.005344	25.89	4.94	30.83	11.63	14.67	13.91	6.1			0.00	Pipe 35 & 36, 25% TM 3
38	18561	54	72	0.000895	61.59	61.59	61.59	17.70	38.12	33.02	3.4			0.00	Pipes 34 & 37, 50% TM 3, WC 5
39	3244	72	72	0.001008	0.29	0.29	0.29	40.46	40.46	40.46	4.4		21.13	24.87	Pipes 24 & 38
40*	6290	8	8	0.026669	0.15	0.15	0.29	0.83	0.83	0.83	7.4			0.00	50% WC 3
41*	5878	10	10	0.041511	0.15	0.15	0.29	1.88	1.88	1.88	10.7			0.00	25% WC 3 & Pipe 42
42*	3627	8	8	0.022608	0.29	0.29	0.29	0.76	0.76	0.76	6.8			0.00	25% WC 3
43*	6602	8	8	0.028825	0.29	0.29	0.29	0.86	0.86	0.86	7.7			0.00	45% WC5
44*	7063	8	10	0.015164	0.58	0.29	0.29	0.63	1.14	1.01	5.6			0.00	45% WC5
45*	4398	10	10	0.001595	0.06	0.06	0.58	0.37	0.37	0.37	2.1	0.21	10	0.37	Assume 10"
46*	3625	8	8	0.000503	0.06	0.06	0.06	0.11	0.11	0.11	1.0			0.00	10% WC 5
47*	2582	8	8	0.000503	0.06	0.06	0.06	0.11	0.11	0.11	1.0			0.00	Pipe 46
48*	3893	8	8	0.022348	0.31	0.31	0.31	0.76	0.76	0.76	6.7			0.00	50% WC 4
49*	8241	8	12	0.010193	0.31	0.31	0.31	0.51	1.51	1.26	4.6			0.00	Pipe 48
50*	6394	8	8	0.038004	0.31	0.31	0.31	0.99	0.99	0.99	8.8			0.00	50% WC 4
51*	8581	8	8	0.008507	0.31	0.31	0.31	0.47	0.47	0.47	4.2			0.00	Pipe 50
52	5128	12	15	0.0342	4.85	4.85	4.85	1.98	3.59	3.19	7.8		1.66	1.98	50% TM11 & Pipe 53
53	5561	Force Main			0.30										WC 15

\*County Area calculated using 0.7 d/D Capacity.  
 Bold numbers represent where capacity criteria have been exceeded.  
 Data as provided by the City (July 2006) and County (March 2007)

**TRUCKEE MEADOWS INTERCEPTOR COSTS**

**INTERCEPTORS**

Pipe Segment	Pipe (ft)	Diameter (In.)	County (mgd)	City (mgd)	Total Q	County % Flow	City % Flow	County Cost	City Cost
A	11,000	24	1.32	7.95	9.28	14	86	\$452,000	\$2,716,000
1	10,792	14	1.32	7.95	9.28	14	86	\$259,000	\$1,554,000
3	12,283	18	1.32	10.37	11.69	11	89	\$300,000	\$2,363,000
5	8,136	24	1.91	15.07	16.98	11	89	\$264,000	\$2,079,000
9	729	32	1.91	23.56	25.47	8	92	\$21,000	\$259,000
9A	240	24	0.00	11.78	11.78	0	100	\$0	\$69,000
9B	244	24	0.00	11.78	11.78	0	100	\$0	\$70,000
13	7,007	30	0.00	13.29	13.29	0	100	\$0	\$2,522,000
15	1,640	30	0.00	5.05	5.05	0	100	\$0	\$590,000
16	4,922	16	0.00	3.52	3.52	0	100	\$0	\$945,000
19	9,696	24	0.00	25.27	25.27	0	100	\$0	\$2,793,000
21	2,634	24	0.00	6.34	6.34	0	100	\$0	\$759,000
22	937	30	0.00	25.17	25.17	0	100	\$0	\$337,000
24	19,131	18	0.00	30.75	30.75	0	100	\$0	\$4,132,000
25	20,049	20	0.00	9.41	9.41	0	100	\$0	\$4,812,000
26	19,266	24	0.00	19.63	19.63	0	100	\$0	\$5,549,000
39	3,244	60	1.26	60.33	61.59	2	98	\$48,000	\$2,288,000
45	4,388	10	0.88	0.00	0.88	100	0	\$527,000	\$0
52	5,128	12	0.00	4.85	4.85	0	100	\$0	\$738,000
<b>Sub Total</b>	<b>141,470</b>							<b>\$1,900,000</b>	<b>\$34,600,000</b>
<b>Engineering (20%)</b>								<b>\$400,000</b>	<b>\$6,900,000</b>
<b>Contingency (20%)</b>								<b>\$400,000</b>	<b>\$6,900,000</b>
<b>Total</b>								<b>\$2,700,000</b>	<b>\$48,400,000</b>

20 Cities ENRCCI = 7,942 May 2007  
 Data received from the City current as of July 2006  
 Data received from the County current as of April 2007

**Truckee Meadows Water Reclamation Facility Treatment Cost**

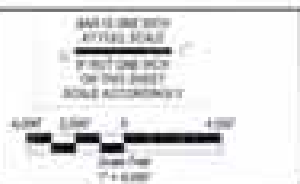
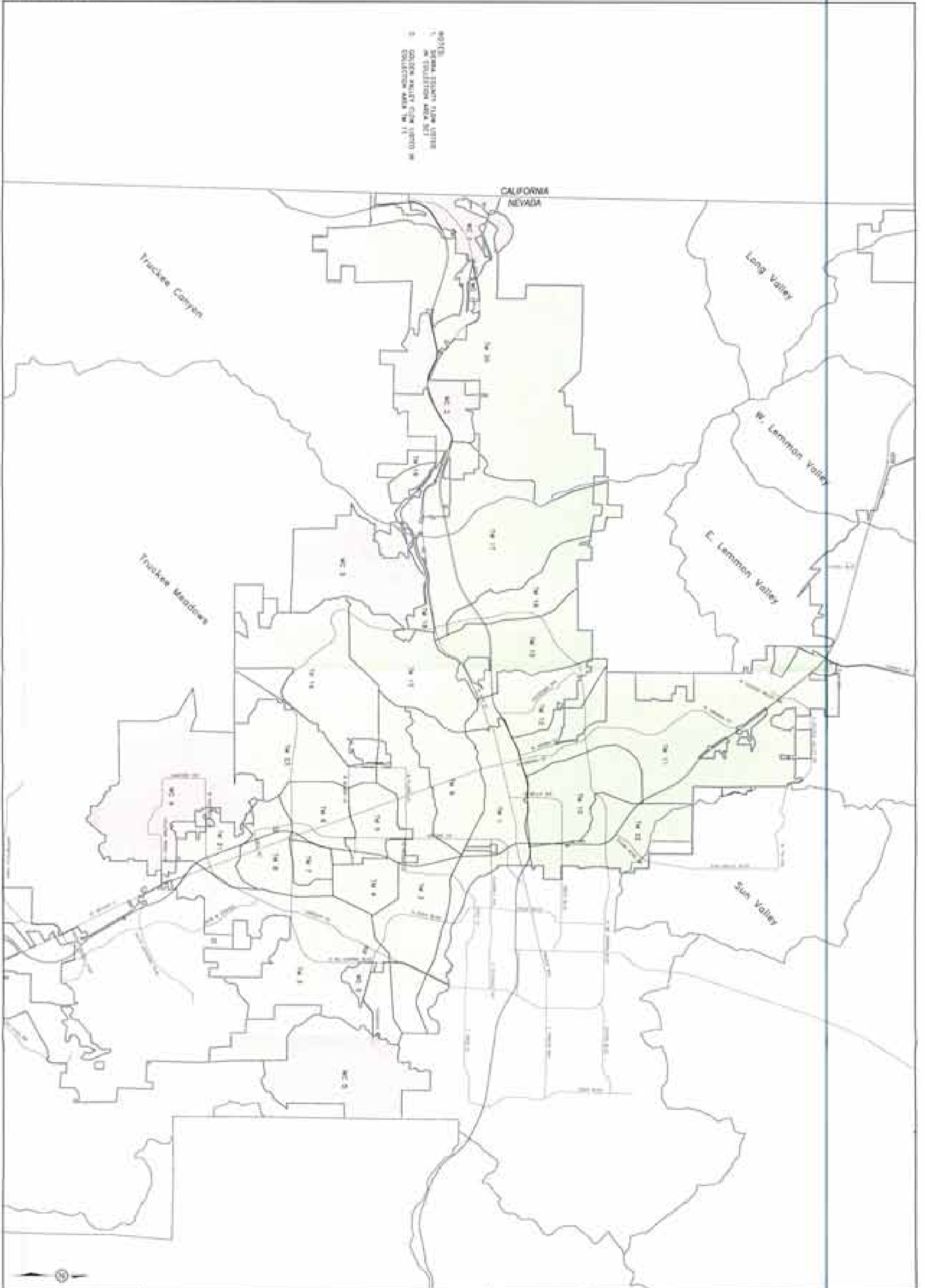
<b>Treatment</b>	<b>City</b>	<b>County</b>	<b>Cost</b>
Projected Incremental Treatment Cost of 46 MGD to 49.8	\$54,400,000	\$2,600,000	\$57,000,000
Engineering (20%)	\$10,900,000	\$500,000	\$11,400,000
Contingency (20%)	\$10,900,000	\$500,000	\$11,400,000
<b>Total</b>	<b>\$76,200,000</b>	<b>\$3,600,000</b>	<b>\$79,800,000</b>

[1] Current plant expansion will increase treatment capacity to 46 MGD.

[2] Based on total existing flow of 29.3 MGD.

[3] 20 Cities ENRCCI = 7,942 May 2007

NOTES:  
 1. TRUCKEE MEADOWS TMSA TMSA  
 2. TRUCKEE MEADOWS TMSA TMSA  
 3. TRUCKEE MEADOWS TMSA TMSA



**MAP SYMBOLS**

	TRUCKEE MEADOWS TMSA TMSA		CITY OF RENO LIMITS
	TRUCKEE MEADOWS TMSA TMSA		PROPRIETARY BOUNDARY

**HDR**  
**ECO-LOGIC**  
 10000 University Blvd., Reno, NV 89521  
 Phone: (775) 857-2000  
 Fax: (775) 857-2000

**TRUCKEE MEADOWS TMSA - FIGURE 9-C1  
 TMSA TMSA SEWER COLLECTION AREAS  
 COUNTY OF WASHOE, NEVADA**

REV	REVISION	BY	DATE	PROJECT NO.	DRAWN	CHECKED	APPROVED
1			08/11/2011	11-4-087			

**Wastewater Calculations and Cost Estimates  
South Truckee Meadows**

**SOUTH TRUCKEE MEADOWS INTERCEPTOR CALCULATIONS**

Reach #	Length (ft)	Min. Diameter (in)	Max. Diameter (in)	Slope (ft/ft)	Upstr Q (MGD)	Q In (MGD)	Q Total (MGD)	Capacity	Max.	70% Avg. Capacity	Velocity (fps)	Additional Capacity (MGD)	Additional Required Diameter (in)	Capacity 0.5 or 0.7 d/D (MGD)	Notes
								0.5 or 0.7 d/D (MGD)	0.5 or 0.7 d/D (MGD)						
1*	4,194	36	36	0.000572	9.46	9.46	9.46	6.72	6.72	6.72	2.9	2.74	30	4.13	Contribution from Pipe 1A
1A	7,855	30	30	0.00361	5.82	3.64	9.46	7.41	7.41	7.41	4.7	2.04	20	2.51	Contribution from Pipe 2, 75% - Collection Area 1
2*	1,324	24	24	0.00605	5.82	5.82	5.82	7.41	7.41	7.41	7.3			0.00	Contribution from Pipe 3 & 3A
3*	2,943	12	15	0.004489	3.26	1.28	1.28	1.00	1.82	1.62	4.0			0.00	Contribution from 50% - Collection Area 5
3A*	5,659	24	27	0.004987	3.26	1.28	4.54	6.73	9.21	8.59	6.6			0.00	Contribution from Pipe 8 & 50% - Collection Area 5
4*	10,716	24	24	0.005844	13.31	3.37	3.37	7.28	7.28	7.28	7.2	2.63	18	2.73	Contribution from 30% - Collection Area 2
5*	5,002	30	30	0.003822	13.31	4.50	5.62	10.68	10.68	10.68	6.7			0.00	Contribution from Pipe 5A, 6A, and 7
5A*	10,471	30	30	0.004057	1.12	4.50	5.62	11.04	11.04	11.04	7.0			0.00	Contribution from Pipe 10 & 40% - Collection Area 2
6A*	7,695	18	30	0.001884	3.58	1.12	4.71	1.92	7.50	6.10	3.4			0.00	Contribution from Pipe 6B & 10% - Collection Area 2 & Pipe 15
6B*	5,995	15	18	0.005505	2.29	1.17	3.46	2.02	3.28	2.97	5.1	0.50	10	0.68	Contribution from Pipe 6C & 50% - Collection Area 3
6C*	11,819	12	18	0.00786	2.29	2.29	2.29	1.33	3.92	3.27	5.2			0.00	Contribution from 50% - Collection Area 3 & 50% - Collection Area 7
7	8,875	12	12	0.066254	0.21	0.53	0.74	2.76	2.76	2.76	10.9			0.00	Contribution from Pipe 13
7A	3,838	14	30	0.003387	0.74	2.25	2.99	0.94	7.18	5.62	2.7			0.00	Contribution from Pipe 7 & 20% - Collection Area 2
8*	15,133	18	21	0.02334	0.68	2.58	3.26	6.76	10.19	9.33	11.8			0.00	Contribution from Pipe 9, 50% - Collection Area 6, 25% - Collection Area 1
9*	17,491	15	15	0.036344	0.68	0.68	1.36	5.19	5.19	5.19	13.1			0.00	Contribution from 25% - Collection Area 6 & Pipe 16
10*	3,624	15	15	0.007633	1.12	1.12	1.12	2.38	2.38	2.38	6.0			0.00	Contribution from Pipe 11
12*	21,973	15	15	0.009921	1.12	1.12	1.12	2.71	2.71	2.71	6.8			0.00	Contribution from 50% - Collection Area 7
14	4,177	8	8	0.095763	0.21	0.21	0.21	1.12	1.12	1.12	10.0			0.00	Contribution from 86% - Sunny Hills Area
15	5,187	8	8	0.034702	0.12	0.12	0.12	0.68	0.68	0.68	6.0			0.00	Contribution from 14% - Sunny Hills Area
16*	37,237	8	10	0.073146	0.68	0.68	0.68	1.38	2.49	2.21	12.2			0.00	Contribution from 25% - Collection Area 6 & includes 11,402 feet of proposed 8" pipe
<b>Total</b>															26.82
<b>FORCEMAINS</b>															
11	13,832	8				1.12	1.12				5.0				Contribution from Pipe 12
13	4,176	6				0.21	0.21				1.7				Contribution from Pipe 14
17	3,241	4				0.01	0.01				0.2				Contribution from Materna Ridge Area
18	3,520	10				0.69	0.69				2.0				Contribution from Pipe 16 & 17

\*County Area calculated using 0.7 d/D Capacity.

Bold numbers represent where capacity criteria have been exceeded.

County pipe current as of April 2007.

**SOUTH TRUCKEE MEADOWS INTERCEPTORS, FORCE MAINS, AND LIFT STATION COSTS**

<b>INTERCEPTORS</b>									
Pipe Segment	Pipe (ft)	Diameter (In.)	County (mgd)	City (mgd)	Total Q	County % Flow	City % Flow	County Cost	City Cost
1	4,194	30	5.29	4.85	10.14	52	48	\$787,678	\$722,000
1A	7,855	20	5.29	4.85	10.14	52	48	\$983,502	\$902,000
5	5,002	18	2.24	11.07	13.31	17	83	\$181,831	\$899,000
6B	5,995	10	1.12	2.34	3.46	32	68	\$232,869	\$487,000
7	8,875	12	0.00	0.74	0.74	0	100	\$0	\$1,278,000
12	21,973	15	1.12	0.00	1.12	100	0	\$3,955,140	\$0
14	4,177	8	0.00	0.21	0.21	0	100	\$0	\$401,000
15	5,187	8	0.00	0.12	0.12	0	100	\$0	\$498,000
<b>Sub Total</b>	<b>63,258</b>							<b>\$6,100,000</b>	<b>\$5,200,000</b>
<b>FORCE MAINS</b>									
11	13,832	8	1.12	0.00	1.12	100	0	\$1,327,872	\$0
13	4,176	6	0.00	0.21	0.21	0	100	\$0	\$301,000
17	3,241	4	0.01	0.00	0.01	100	0	\$155,568	\$0
<b>Sub Total</b>								<b>\$1,500,000</b>	<b>\$300,000</b>
<b>LIFT STATIONS</b>									
11			1.12	0	1.12	100	0	\$623,000	\$0
13			0	0.21	0.21	0	100	\$0	\$320,000
17			0.01	0.00	0.01	100	0	\$254,000	\$0
<b>Sub Total</b>								<b>\$600,000</b>	<b>\$300,000</b>
<b>Total</b>								<b>\$8,500,000</b>	<b>\$5,800,000</b>
Engineering (20%)								\$1,700,000	\$1,200,000
Contingency (20%)								\$1,700,000	\$1,200,000
<b>Total</b>								<b>\$11,900,000</b>	<b>\$8,100,000</b>

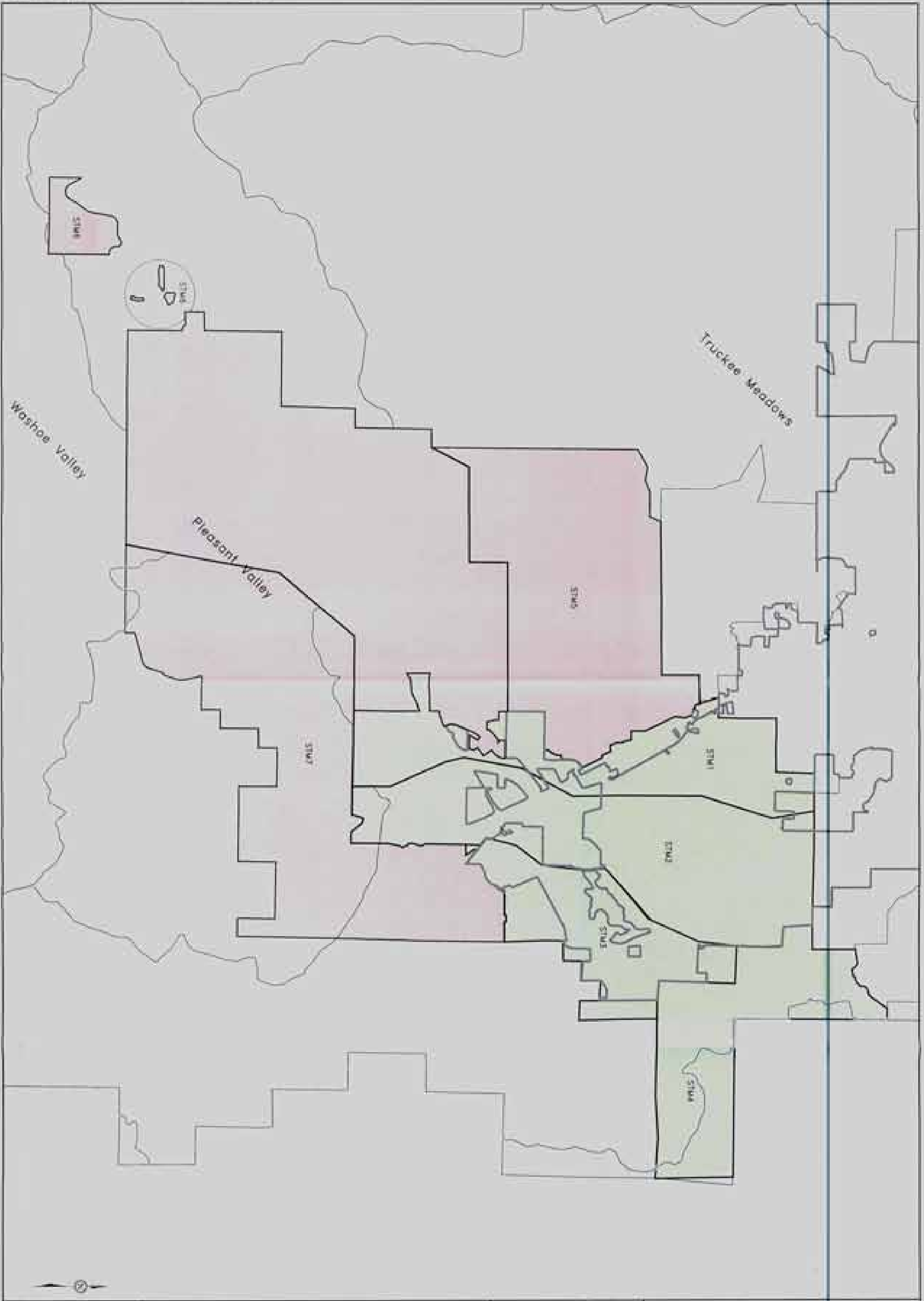
20 Cities ENRCCI = 7,942 May 2007

<b>South Truckee Meadows Reclamation Facility Treatment Cost</b>			
<b>Treatment</b>	<b>City</b>	<b>County</b>	<b>Cost</b>
Projected Incremental Treatment Cost of 6 MGD to 10.8 MGD	\$47,300,000	\$24,700,000	\$72,000,000
Engineering (20%)	\$9,500,000	\$4,900,000	\$14,400,000
Contingency (20%)	\$9,500,000	\$4,900,000	\$14,400,000
<b>Total</b>	<b>\$66,300,000</b>	<b>\$34,500,000</b>	<b>\$100,800,000</b>

[1] Current plant expansion will increase treatment capacity to 6 MGD at a cost of \$45 million.

[2] Treatment cost based on \$15 million per additional MGD treated.

[3] 20 Cities ENRCCI = 7,942 May 2007



<p>SCALE BAR          0 100 200 300 400          FEET          0 100 200 300 400          METERS</p>	<p><b>MAP SYMBOLS:</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; background-color: #e0e0ff;"></span> SOUTH TRUCKEE MEADOWS COLLECTION AREA CITY</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; background-color: #ffe0e0;"></span> SOUTH TRUCKEE MEADOWS COLLECTION AREA COUNTY</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black;"></span> CITY OF RENO LIMITS</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black;"></span> HYDERBERG ACADEMY</li> </ul>	<p><b>HDR</b>    <b>ECOLOGIC</b>            1000 South K. Boulevard Reno, Nevada 89502 Phone: (775) 857-2211 Fax: (775) 857-2244</p>	<p><b>SOUTH TRUCKEE MEADOWS PLANNING AREA - FIGURE 16-C1</b>  <b>STMSRF SEWER COLLECTION AREAS</b>          COUNTY OF WASHOE, NEVADA</p> <table border="1"> <tr> <td>REVISED</td> <td>BY</td> <td>DATE</td> <td>DESCRIPTION</td> <td>DESIGNED</td> <td>APPROVED</td> </tr> <tr> <td></td> <td></td> <td>NOV 2011</td> <td></td> <td>JRW</td> <td>CWR</td> </tr> <tr> <td></td> <td></td> <td>SCALE</td> <td>1" = 500'</td> <td>DRAWN</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>UNCHECKED</td> <td></td> </tr> </table>	REVISED	BY	DATE	DESCRIPTION	DESIGNED	APPROVED			NOV 2011		JRW	CWR			SCALE	1" = 500'	DRAWN						UNCHECKED	
REVISED	BY	DATE	DESCRIPTION	DESIGNED	APPROVED																						
		NOV 2011		JRW	CWR																						
		SCALE	1" = 500'	DRAWN																							
				UNCHECKED																							

Appendix D  
Stormwater Calculations and  
Cost Estimates

## Appendix D – Stormwater Project Descriptions and Cost Estimates

Previous stormwater master plans and reports included general descriptions of each project. Project descriptions for projects from previous master plan studies that were not constructed or superseded by other construction were not repeated in this master plan update. Those projects are included by reference in this master plan update. The remaining projects which includes project proposed specifically for this plan update are described in this appendix.

Table 14.1 includes two project reference numbers for each CIP, the one labeled “Prev CID ID No” is the project reference number used in a previous master plan, most notably the 2005 WRC draft plan, and the one labeled as “CIP ID No” is the reference number used in this master plan update.

### PLANNED FACILITIES

All recommended CIPs were sized to convey runoff from the 100 year storm by approximate USGS regression methods. The noted sizes of channels and culverts are approximate only and could change once a more detailed hydrologic analysis is performed for the particular study area.

Projects are grouped in this appendix by MSA/FSA and separated by City of Reno projects and Washoe County projects. Please notice the footer on each page will delineate the Washoe County projects from the City of Reno projects.

The following section of this appendix includes preliminary CIP descriptions for oprojects within the City of Reno and Washoe County. Descriptions include the following information:

- **CIP#** - This number is formatted to identify and locate CIP's on a Cartesian grid with a lettered horizontal axis and numbered vertical axis.
- **Reason/Purpose** – This category is a summary of the reason and/or purpose for the particular CIP, and is based primarily on field observations. It includes summaries of existing facilities which do not function sufficiently or are in need or repair and new projects required to treat problematic drainage areas.
- **Description** – This category is a general technical description of the specific CIP.
- **Assumptions** – This category describes the assumptions made when identifying CIP needs and developing general design concepts.
- **Cost** – This category is the total cost of the project including capital improvements and other costs (i.e. design, management, maintenance and land acquisitions).

- **Associated CIPs** – This category lists additional CIPs that may need to be constructed in conjunction with the described CIP for proper operation of the entire drainage problem.

## **Water Course # 18 Alum Creek – TMSA: Truckee Meadows**

CIP# B19-3

Reasons/Purpose – During the 2005 event, flow was observed crossing through Roy Gomm Elementary school grounds, north across Mayberry Dr, and into the Edgewater subdivision. This water appears to have come from the Last Chance Ditch which is located just south of the elementary school. At this time the location of the breach/overtopping and how the water entered into the irrigation ditch are unclear. As with any irrigation ditch, the Last Chance Ditch embankment in the Roy Gomm vicinity is penetrated with culverts allowing the release of water into fields.

Description - This CIP is to line the irrigation ditch from the Alum Creek crossing to 1,100' upstream with concrete so that the risk of water breaching the embankment is reduced.

Assumptions – That the water came from a ditch breach, and that Alum Creek stayed contained in its' channel.

Cost – \$360,000

Associated CIPs - none

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**Water Course #23 Evans Creek (Block N Watershed) – TMSA: Truckee Meadows**

CIP# B18-1

Reasons/Purpose – As early as January 1970, the United States Department of Agriculture – Natural Resource Conservation Service proposed a detention basin on Evans Creek north of what is now North McCarran Blvd. Some of the justification and reasons presented include the following:

- a. The largest recorded flow in the watershed was during a 1914 event where flows estimated to be in excess of 1,000 cfs created water 2 feet deep in what is now the University of Nevada Reno (UNR) Business Quad.
- b. In 1970 the construction cost of the dam was estimated at under \$2 million dollars while the damage to UNR property alone was almost \$9 million dollars.
- c. And "...the freeway (I-80) will be depressed in this area (south of UNR), and poses the problem of how to prevent inundation by overland floodwaters."

During the 2005 event, which was estimated at a 20-25 year reoccurrence, floodwaters were 3' deep over Sierra Street, and 6" deep on the Evans Avenue bridge over I-80, thereby indicating that the issues originally posed are still applicable.

Seven years ago, "existing conditions" flow at Sierra St was estimated between 1422 cfs (WRC Nevada, August 2000) and 880 cfs (Nimbus, July 1999) for the 100 year storm. Proposed conditions flows at the same location were estimated to be over 2,000 cfs (WRC Nevada, August 2000). In those studies, the estimated storm drain capacity at Sierra St was approximately 245 cfs.

Including the 1970 project, there have been 2 proposed locations for the dam, the most recent of which was rejected by the public in 2002-2003 over concerns of impact to the recreation trails and wildlife in the canyon. Prior to this, a series of alternatives was evaluated. In summary they were:

- 8,000' long concrete channel to convey flow from Sierra St to the Truckee River
- Enlarge existing storm drain pipe network
- Detention dam sites in Rancho San Rafael Park on both sides of McCarran Blvd.
- Store floodwaters on UNR farms west of Wells Ave.
- Divert floodwaters across N. Virginia and into Dandini Wash of S. McCarran

All of these alternatives were rejected based on feasibility, cost, inferiority to other alternatives, or general dislike by the stakeholders.

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Description - This CIP is to construct an earthen or concrete dam near elevation 4860' and associated culverts/piping which will detain runoff in a basin and release it slowly over time. Additionally to construct adjacent facilities necessary to gain public acceptance of the project (trails, parks, playgrounds, etc)

The site is under the telephone utility line which runs west and east about 750' due north of Cambrian Way. The site is fairly isolated and would not disturb many people, impacts no wetlands, is not visible from McCarran Blvd or N Virginia St, is only partially visible to a few houses on Cambrian Way, and would still control 79% of the Evans Creek Watershed above Sierra St.

Assumptions - That the impoundment would be sized so that discharge plus contributing flow from area runoff below Sierra St would not exceed 200+ cfs.

Cost - \$7,840,000

Associated CIPs - none

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**Water Course #24 Dandini Wash – TMSA: Truckee Meadows**

CIP# C18-1

Reasons/Purpose – Currently, it appears that flows in the Dandini Wash East of Valley Road cross the Orr Ditch via an eroded channel under the concrete structure which conveys ditch water. This structure appears to have been constructed in the flow path of the wash and will significantly impede flow under all but low flow events. At the present time, there are no notches to allow wash flow into or out of the ditch.

Description - This CIP is to construct a structure which will both allow flow in the wash to cross the ditch unimpeded, and to allow excess water in the ditch to return to the wash.

Assumptions – That the downstream storm drain system is able to handle the rate of flow out of the UNR detention pond.

Cost – \$170,000

Associated CIPs - none

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**Water Course #27 Rosewood Wash - TMSA: Truckee Meadows**

CIP# B19-4

Reasons/Purpose – During the 2005 event, full ditch flows were observed in the Last Chance Ditch in the vicinity of Rosewood Wash. One of the more significant contributors to this was the northern most branch of Rosewood Wash. This branch crosses the Last Chance Ditch between Belford Rd. and Barnes Cir. Currently, the configuration of the intersection is such that low flows in the wash are initially intercepted by the ditch.

Description - This CIP is to construct a low profile reinforced concrete structure at this intersection that would both keep the wash and ditch flows separate and allow excess ditch flows to discharge back into the wash.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system will not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boynton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$170,000

Associated CIPs –C19-9, C19-8, C19-7, C19-6, C19-5, C19-4, C19-3, C19-2, and C19-1.

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CIP# B19-5

Reasons/Purpose – During the 2005 event, full ditch flows were observed in the Last Chance Ditch in the vicinity of Rosewood Wash. Currently a structure exists at Cory Dr and Rainna Ct to convey one branch of Rosewood Wash over the ditch. However, other branches still contribute flow directly to the ditch.

Description - This CIP is to either modify the structure at Cory Dr to allow excess ditch water to discharge back into the wash or to construct an entirely new structure.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system will not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$90,000

Associated CIPs –C19-9, C19-8, C19-7, C19-6, C19-5, C19-4, C19-3, C19-2, and C19-1.

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CIP# C19-1

Reasons/Purpose -- Historically, as the branches of Rosewood Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Rosewood Wash conveyance system between Arlington Ave and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets. Once CIPs #C18-1 & #B19-5 are constructed, ditch interception should be reduced and flows in the wash increased substantially. These facts necessitate the up-sizing of the rest of the system down to Virginia Lake.

Description - This CIP is to replace the existing 2-6'x2.5' box culverts under Lakeside Dr. with 3-10'x3' reinforced concrete box culverts.

Assumptions -- That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost -- \$370,000

Associated CIPs --C19-9, C19-8, C19-7, C19-6, C19-5, C19-4, C19-3, and C19-2.

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CIP# C19-2

Reasons/Purpose – Historically, as the branches of Rosewood Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Rosewood Wash conveyance system between Arlington Ave and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets. Once CIPs #C18-1 & #B19-5 are constructed, ditch interception should be reduced and flows in the wash increased substantially. These facts necessitate the up-sizing of the rest of the system down to Virginia Lake.

Description - This CIP is to replace/modify the existing channel between Hillcrest Dr. and Lakeside Dr. The proposed channel should have minimal vegetation and be concrete. The approximate dimensions are 5' deep with a 6.5' wide bottom and 3:1 side slopes.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system will not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$2,240,000

Associated CIPs –C19-9, C19-8, C19-7, C19-6, 19-5, C19-4, C19-3, and C19-1.

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CIP# C19-3

Reasons/Purpose – Historically, as the branches of Rosewood Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Rosewood Wash conveyance system between Arlington Ave and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets. Once CIPs #C18-1 & #B19-5 are constructed, ditch interception should be reduced and flows in the wash increased substantially. These facts necessitate the up-sizing of the rest of the system down to Virginia Lake.

Description - This CIP is to replace the existing 10'x3' box culvert under Hillcrest Dr. with 3-10'x 4' reinforced concrete box culverts.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system should not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$290,000

Associated CIPs –C19-9, C19-8, C19-7, C19-6, C19-5, C19-4, C19-2, and C19-1.

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CIP# C19-4

Reasons/Purpose – Historically, as the branches of Rosewood Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Rosewood Wash conveyance system between Arlington Ave and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets. Once CIPs #C18-1 & #B19-5 are constructed, ditch interception should be reduced and flows in the wash increased substantially. These facts necessitate the up-sizing of the rest of the system down to Virginia Lake.

Description - This CIP is to replace/modify the existing channel between Plumb Ln. and Hillcrest Dr. The proposed channel should have minimal vegetation and be concrete. The approximate dimensions are 4.5' deep with a 3.5' wide bottom and 3:1 side slopes.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system will not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$3,460,000

Associated CIPs – C19-9, C19-8, C19-7, C19-6, C19-5, C19-3, C19-2, and C19-1.

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CIP# C19-5

Reasons/Purpose – Historically, as the branches of Rosewood Wash cross the Last Chance and-Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Rosewood Wash conveyance system between Arlington Ave and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets. Once CIPs #C18-1 & #B19-5 are constructed, ditch interception should be reduced and flows in the wash increased substantially. These facts necessitate the up-sizing of the rest of the system down to Virginia Lake.

Description - This CIP is to replace the existing 10'x 3' box culvert under Plumb Ln. and Watt St. with 2-12'x4' reinforced concrete box culverts.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system will not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$640,000

Associated CIPs –C19-9, C19-8, C19-7, C19-6, C19-4, C19-3, C19-2, and C19-1.

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CIP# C19-6

Reasons/Purpose – Historically, as the branches of Rosewood Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Rosewood Wash conveyance system between Arlington Ave and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets. Once CIPs #C18-1 & #B19-5 are constructed, ditch interception should be reduced and flows in the wash increased substantially. These facts necessitate the up-sizing of the rest of the system down to Virginia Lake.

Description - This CIP is to replace/modify the existing channel between Plumas St. and Watt St. The proposed channel will have minimal vegetation and be concrete. The approximate dimensions are 4.5' deep with a 4.5' wide bottom and 3:1 side slopes.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system will not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$3,910,000

Associated CIPs – C19-9, C19-8, C19-7, C19-5, C19-4, C19-3, C19-2, and C19-1.

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CIP# C19-7

Reasons/Purpose – Historically, as the branches of Rosewood Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Rosewood Wash conveyance system between Arlington Ave and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and ditch breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets. Once CIPs #C18-1 & #B19-5 are constructed, ditch interception should be reduced and flows in the wash increased substantially. These facts necessitate the up-sizing of the rest of the system down to Virginia Lake.

Description - This CIP is to replace the existing 1-10' x 3' box culvert under Plumas St. with 2-12'x 4' box culverts.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system will not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$610,000

Associated CIPs – C19-9, C19-8, C19-6, C19-5, C19-4, C19-3, C19-2, and C19-1.

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CIP# C19-8

Reasons/Purpose – Historically, as the branches of Rosewood Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Rosewood Wash conveyance system between Arlington Ave and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and ditch breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets. Once CIPs #C18-1 & #B19-5 are constructed, ditch interception should be reduced and flows in the wash increased substantially. These facts necessitate the up-sizing of the rest of the system down to Virginia Lake.

Description - This CIP is to replace/modify the existing channel between Plumb Ln. and Plumas St. The proposed channel will have minimal vegetation and be concrete. The approximate dimensions are 4.5' deep with a 6' wide bottom and 3:1 side slopes.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system will not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boynton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$2,030,000

Associated CIPs – C19-9, C19-7, C19-6, C19-5, C19-4, C19-3, C19-2, and C19-1.

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CIP# C19-9

Reasons/Purpose – Historically, as the branches of Rosewood Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Rosewood Wash conveyance system between Arlington Ave and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and ditch breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets. Once CIPs #C18-1 & #B19-5 are constructed, ditch interception should be reduced and flows in the wash increased substantially. These facts necessitate the up-sizing of the rest of the system down to Virginia Lake.

Description - This CIP is to replace the existing culvert under Plumb Ln. with 2-10'x 5' reinforced concrete box culverts.

Assumptions – That the facilities downstream will be constructed in conjunction with this CIP, otherwise the system will not be able to handle the increased volume once the ditches are prevented from intercepting flow.

That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Rosewood Wash in addition to the other elevated flows that the system would experience.

Cost – \$820,000

Associated CIPs – C19-8, C19-7, C19-6, C19-5, C19-4, C19-3, C19-2, and C19-1.

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## **Water Course #28 Dant Wash – TMSA: Truckee Meadows**

CIP# C19-12

Reasons/Purpose – Historically, as the branches of Dant Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Dant Wash system (conveyance through underground city storm drain) between Moana Ln. and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and ditch breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets off of Moana Ln and Plumas St. With the completion of the Dant Wash-Last Chance Ditch flow separating structure (currently under design), and completion of the previously mentioned Dant Wash – Lake Ditch flow separating structure, ditch interception should be minimized and flows in the wash increased substantially. This necessitates the up-sizing of the rest of the system down to Virginia Lake.

Description – This CIP is to upgrade/replace the existing 10'x 4' box culvert which empties into Virginia Lake under Eastshore Dr, to be 3-10'x 4' box culverts.

Assumptions – That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Dant Wash in addition to the other elevated flows that the system would experience.

Cost – \$390,000

Associated CIPs –C19-20, C19-19, C19-16, C19-17, C19-14, and C19-13.

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CIP# C19-13

Reasons/Purpose – Historically, as the branches of Dant Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Dant Wash system (conveyance through underground city storm drain) between Moana Ln. and Virginia Lake to function moderately well even though it is extremely undersized. However, as was observed during the 2005 event, having such large volumes of runoff captured by irrigation ditches results in flooding problems and ditch breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets off of Moana Ln and Plumas St. With the completion of the Dant Wash-Last Chance Ditch flow separating structure (currently under design), and completion of the Dant Wash – Lake Ditch flow separating structure (CIP #C19-19), ditch interception should be minimized and flows in the wash increased substantially. This necessitates the up-sizing of the rest of the system down to Virginia Lake.

Description – This CIP is to upgrade to a 730 ft section of open channel storm drain which conveys wash flows north from Brinkby Ave to Eastshore Dr.

Assumptions – That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Dant Wash in addition to the other elevated flows that the system would experience.

Cost – \$2,890,000

Associated CIPs –C19-20, C19-19, C19-16, C19-17, C19-14, and C19-12.

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CIP# C19-14

Reasons/Purpose – Historically, as the branches of Dant Wash cross the Last Chance and Lake Ditches, much of the water is intercepted and conveyed away from the vicinity by the ditches. This has allowed the Dant Wash system (conveyance through underground city storm drain) between Moana Ln. and Virginia Lake to function moderately well even though it is extremely undersized. However, as was shown during the 2005 event, having such large volumes of runoff being captured by irrigation ditches results in flooding problems and ditch breaches. Additionally, even the reduced volume of water flowing down the wash was more than the channel could handle and flow broke out and flooded neighborhood streets off of Moana Ln and Plumas St. With the completion of the Dant Wash-Last Chance Ditch flow separating structure (currently under design), and completion of the Dant Wash – Lake Ditch flow separating structure (CIP #C19-19), ditch interception should be minimized and flows in the wash increased substantially. This necessitates the up-sizing of the rest of the system down to Virginia Lake.

Description – This CIP is to upgrade a 3400+ ft section of storm drain that conveys wash flows from west of Plumas St, east along Glenda Wy, north along Lakeside Dr., and east along Brinkby Ave., until the system returns to open channel 300+ ft east of Lakeside Dr. on Brinkby Ave.

Assumptions – That the conveyance system between Virginia Lake and Boyonton Slough is large enough to handle 100 year flows from Dant Wash in addition to the other elevated flows that the system would experience.

Cost – \$4,990,000

Associated CIPs –C19-20, C19-19, C19-16, C19-17, C19-13, and C19-12.

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CIP# C19-17

Reasons/Purpose – During the 2005 event, full ditch flows were observed in the Lake Ditch. When the capacity of the ditch was exceeded, streets and residences near the ditch were flooded. For example, large quantities of flow were observed proceeding east on Manzanita Ln across Lakeside Dr. It is doubtful that such volumes as were observed were a result of localized runoff only, and were likely increased by water from the Lake Ditch. Just up channel of the Manzanita Ln crossing of the Lake Ditch is Dant Wash, which intersects the Lake Ditch between Moana Ln and Pheasant Ln. Currently, the configuration of the intersection is such that all flows in the wash are intercepted by the ditch. Once the capacity of the ditch is exceeded, water overtops the ditch and continues down channel.

Description – This CIP is to construct a structure at the Dant Wash – Lake Ditch intersection, that would both keep the wash and ditch flows separate and allow excess ditch flows to discharge back into the wash.

Assumptions –

Cost – \$170,000

Associated CIPs –C19-20, C19-19, C19-16, C19-14, C19-13, and C19-12.

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CIP# C19-16

Reasons/Purpose – Downstream of Pheasant Ln, the channel is in variable condition. In some places it has been planted over with pasture grass, in another it is extremely choked with trees and plants as it intersects the Lake Ditch, and finally it's partially dammed by a driveway just upstream from Moana Ln. During the 2005 event, discharge from the Dant Blvd Detention Basin was initially intercepted by the Last Chance Ditch, and later the Lake Ditch. When the ditches became overwhelmed, flow continued down channel where floodwaters broke out onto Moana Ln and Plumas St.

In addition to this channel improvement, design is currently being conducted for a structure at the intersection of the Dant Wash and the Last Chance Ditch. Once this structure is constructed, the ditch will not be able to intercept flows thereby causing higher than experienced volumes to continue down the wash further creating the need for downstream channel improvements.

Description – This CIP is to improve conditions of the wash in the stretch between Pheasant Ln and Moana Ln. The proposed channel should be concrete and have approximate dimensions of 3' deep with an 8' wide bottom and 2:1 side slopes.

Assumptions – That the structure currently under design for the Dant Wash – Last Chance Ditch intersection will be constructed.

Cost – \$2,020,000

Associated CIPs –C19-20, C19-19, C19-17, C19-14, C19-13, and C19-12.

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CIP# C19-19

Reasons/Purpose – Downstream of the Dant Blvd Dam, the channel is in variable condition. In some places it's wide and almost indefinable, in other locations small earthen berms have been constructed to direct low flows various directions, and in yet other areas the channel is forced into narrow strips by residential structure encroachment. During the 2005 event, discharge from the Dant Blvd Detention Basin was initially intercepted by the Last Chance Ditch. When the ditch became overwhelmed, flow continued down the natural channel where it partially flooded three residences. This CIP is proposed to better protect the residential structures against flooding from low flows, and to improve conditions of the wash in this stretch.

In addition to this channel improvement, design is currently being conducted for a structure at the intersection of the Dant Wash and the Last Chance Ditch. Once this structure is constructed, the intercepted flows should be reduced thereby causing higher than previously experienced volumes to continue down the wash further creating the need for downstream channel improvements.

Description – This CIP is to construct a channel in the wash between Dant Blvd. and Pheasant Ln. to convey discharge from the Dant Blvd Detention Basin. The proposed channel should be concrete and have approximate dimensions of 3' deep with a 6' wide bottom and 2:1 side slopes.

Assumptions – That the structure currently under design for the Dant Wash – Last Chance Ditch intersection, will be constructed.

Cost – \$2,990,000

Associated CIPs – C19-20, 19-16, C19-17, C19-14, C19-13, and C19-12.

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CIP# C19-20

Reasons/Purpose – During the 2005 event, full ditch flows were observed in the Lake Ditch. When the capacity of the ditch was exceeded, streets and residences near the ditch were flooded. For example, large quantities of flow were observed proceeding east on Manzanita Ln across Lakeside Dr. It is doubtful that such volumes observed were a result of localized runoff only, and were likely increased by water from the Last Chance Ditch. Just channel of the Manzanita Ln crossing of the Last Chance Ditch is Dant Wash, which intersects the Last Chance Ditch between Honeywood Ct and Pioneer Dr. Currently, the configuration of the intersection is such that all flows in the wash are intercepted by the ditch. Once the capacity of the ditch is exceeded, water most likely will overtop the ditch and continue down channel.

Description – This CIP is to construct a structure at the Dant Wash – Last Chance Ditch intersection, that would both keep the wash and ditch flows separate and allow excess ditch flows to discharge back into the wash.

Assumptions –

Cost – \$170,000

Associated CIPs – C19-19, C19-16, C19-17, C19-14, C19-13, and C19-12.

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**Water Course #29 Manzanita Park Wash -- TMSA: Truckee Meadows**

CIP# C19-21

Reasons/Purpose – During the 2005 event, water was observed flowing through the high-water spillway after storage had exceeded existing detention capacity in Manzanita Park. Once water exited through the spillway, it proceeded overland where it flooded apartments and inundated the storm drain system. The extents of what flooding occurred are unknown.

Currently all flows that exit the park enter the subterranean city storm drain system, the capacity of which is unknown. However, any flows that pass through the current spillway most likely will cause urban flooding due to the lack of a downstream inlet structure and possible deficient system capacity.

Description – This CIP is to enlarge the existing Manzanita Park detention basin to provide better downstream protection for the 100 year storm. The detention basin needs to be sized so that the maximum discharge will not inundate the downstream storm drain conveyance system.

Assumptions – That the conveyance system between Baker Ln and Boyonton Slough is NOT large enough to handle 100 year flows from Manzanita Park Wash in addition to the other elevated flows that the system would experience.

Cost – \$1,900,000

Associated CIPs – none

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**Water Course #31 Evans Creek – TMSA: Truckee Meadows**

CIP# C19-26

Reasons/Purpose – As Evans Creek approaches Lakeside Dr, and for most of its course afterward, it encounters structures and channels which do not allow for 100 year storm runoff conveyance. During the 2005 event water from Evans Creek was observed entering and exceeding the Last Chance Ditch and flooding residential streets and businesses in the Lakeside Dr. area. A detention basin has been proposed on Evans Creek above the Lakeridge community since 1990. Should this facility be constructed, it would benefit the downstream channel substantially. However, with or without said facility, there still exist areas which cause localized flooding that need addressing.

Sierra Pacific Power Company (SPPCo) owns water rights on Evans Creek, and utilizes a pair of metal headgates S of Delucchi Ln and 300' east of S Virginia St to impound and remove water from the creek for irrigation of their nearby campus. The configuration of these headgates poses a flow impediment, which will be accentuated with the construction of CIP # C19-21.

Description – This CIP is to reconstruct the SPPCo headgates so that the impediment to the flow is reduced and the channel is made capable of passing 1000 cfs.

Assumptions – That the detention pond on the Balardini Ranch property, SW of S McCarran, will be constructed.

Cost – \$190,000

Associated CIPs – C19-27

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CIP# C19-27

Reasons/Purpose – As Evans Creek approaches Lakeside Dr, and for most of its course afterward, it encounters structures and channels which do not allow for 100 year storm runoff conveyance. During the 2005 event water from Evans Creek was observed entering and exceeding the Last Chance Ditch and flooding residential streets and businesses in the Lakeside Dr. area. A detention basin has been proposed on Evans Creek above the Lakeridge community since 1990. Should this facility be constructed, it would benefit the downstream channel substantially. Additionally, the long box conveying Evans Creek under 395 and Neil Road is only capable of flowing approximately 1000 cfs. Even so, there are still areas which cause localized flooding that need addressing.

Between South Virginia and the Cochran Ditch crossing, the creek passes through an unimproved and dilapidated 270 ft stretch. This stretch has unstable banks with exposed tree roots. Additionally, the current reinforced concrete Cochran Ditch crossing poses a significant flow impediment.

Description – CIP is to replace/modify the existing channel in this reach, and to remove the now-defunct concrete Cochran Ditch crossing. The proposed channel should have minimal vegetation and be concrete. The approximate dimensions are 5.5' deep with a 15.5' wide bottom and 3:1 side slopes.

Assumptions – That the detention pond on the Balardini Ranch property will be constructed.

Cost – \$1,250,000

Associated CIPs – C19-26

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CIP# 19-28

Reasons/Purpose – As Evans Creek approaches Lakeside Dr, and for most of its course afterward, it encounters structures and channels which do not allow for 100 year storm runoff conveyance. During the 2005 event water from Evans Creek was observed entering and exceeding the Last Chance Ditch and flooding residential streets and businesses in the Lakeside Dr. area. A detention basin has been proposed on Evans Creek above the Lakeridge community since 1990. Should this facility be constructed, it would benefit the downstream channel substantially. However, with or without said facility, there still exist areas which cause localized flooding that need addressing.

As Evans Creek crosses the Steamboat Ditch by Range View Ln., the creek passes under a structure conveying ditch water. The structure also has a flashboard opening directed downstream to allow any flows which have entered the ditch to exit back into the creek. Such a structure does not exist where Evans Creek crosses the Last Chance Ditch and water from the creek intersects the ditch directly.

Description – This CIP is to construct a reinforced concrete structure at the Evans Creek – Last Chance Ditch crossing. This structure would keep ditch flow and creek flow separate, and also provide a means for the ditch to discharge back into the creek. The structure would be similar to the one which currently exists at the Evans Creek - Steamboat Ditch crossing.

Assumptions – That the detention pond on the Balardini Ranch property will be constructed

Cost – \$210,000

Associated CIPs – none

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**Water Course #34 Boyonton Slough – TMSA: Truckee Meadows**

CIP# C19-22

Reasons/Purpose – By the time the Boyonton Slough reaches Longley Lane, it contains runoff from an area of approximately 38 square miles. Flow is contributed from Dry Creek, Evans Creek, Dant Wash, Rosewood Wash, and the entire city storm drain network bracketed by those drainages. Hydraulic analyses indicate that these culverts are insufficient to pass the currently anticipated flow.

Description – This CIP is to modify the existing 5-12'x10' box culverts under E. McCarran Blvd to be 7-12'x10' reinforced concrete box culverts.

Assumptions – That the detention basins for Dry Creek, and Evans Creek will NOT be constructed.

Cost – \$2,260,000

Associated CIPs –C19-25, C19-24, and C19-23.

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CIP# C19-23

Reasons/Purpose – By the time the Boynton Slough reaches Longley Lane, it contains runoff from an area of approximately 38 square miles. Flow is contributed from Dry Creek, Evans Creek, Dant Wash, Rosewood Wash, and the entire city storm drain network bracketed by those drainages. During the 2005 event, water was observed overtopping the road at Longley Ln. This was mainly due to the occlusions associated with the Longley Ln bridge. The bridge consists of asphalt paving, on top of a corrugated metal deck, supported by an entirely wooden substructure. The bridge has over 80 posts extending into the channel underneath for support. These posts provide many locations to snag debris. Once conglomerated, this debris chokes the flow area. In addition to bridge configuration, basic hydraulic analyses indicate that the bridge does not provide sufficient flow area to pass the anticipated volumes.

Description – This CIP is to replace the existing wooden bridge conveying Longley Ln over Boynton Slough. The proposed structure is 7 – 12' x 10' reinforced concrete box culverts.

Assumptions – That the detention basins for Dry Creek, and Evans Creek will NOT be constructed.

Cost – \$3,320,000

Associated CIPs – C19-25, C19-24, and C19-22.

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CIP# C19-24

Reasons/Purpose – By the time the Boyonton Slough reaches Runway 34R, it contains runoff from an area of approximately 32 square miles. Flow is contributed from Dry Creek, Evans Creek, and the entire city storm drain network between Dry Creek and Peckham Ln. Due to airport access restrictions, a culvert assessment was not possible for this structure. However, hydraulic studies indicate that the structure consists of 3-12'x10' (estimated) box culverts. These culverts are insufficient to pass the currently anticipated flow.

Description – This CIP is to modify the existing 3-12'x10' (estimated) box culverts under Reno Tahoe Airport Runway 34R to be 5-12'x10' reinforced concrete box culverts.

Assumptions – That the detention basins for Dry Creek, and Evans Creek will NOT be constructed. If they are, then the flow quantities may not require an increase in culvert capacity.

Cost – \$2,190,000

Associated CIPs –C19-25, C19-23, and C19-22.

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CIP# C19-25

Reasons/Purpose – By the time the Boyonton Slough reaches Peckham Lane, it contains runoff from an area of approximately 29 square miles. Flow is contributed mainly from Dry Creek, and Evans Creek. During the 2005 event, water was observed overtopping the road at Peckham Ln. This was mostly due to the extremely restrictive culvert configuration at this crossing. Whereas upstream at the S McCarran crossing, Boyonton Slough passes through 3-14'x8' box culverts (flow area = approximately 336 sq ft), the Peckham Ln crossing consists of only 2-60" and 2-84" RCP culverts (flow area = approximately 116 sq ft).

Description – This CIP is to replace the existing 2-60" and 2-84" RCP culverts under Peckham Ln, with 4-12'x10' reinforced concrete box culverts.

Assumptions –

Cost – \$900,000

Associated CIPs –C19-24, C19-23, and C19-22.

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### **Water Course #36 Thomas Creek West Split – TMSA: South Truckee Meadows**

Discussion – The West (North) Split of Thomas Creek has numerous flooding issues along its entire length. During the 2005 event water: flowed overland ½' – 1' deep through the Casazza Ranch neighborhood, overtopped S Virginia St by Allison Mitsubishi, overtopped the north bound 395 off and on ramps at the 395 - S Virginia Interchange by the pink Sclaris, contributed to the flooding of the Huffaker Hills neighborhood (specifically along Autumn Hills Dr), ponded ½' - 1' deep at the McCarran Blvd - Longley Ln intersection, and finally ponded 1'-2' deep in the Rio Poco – Creekside Circle area.

Some of the issues with the creek in this area are:

- A concrete structure associated with the Lake Ditch was constructed so that it blocks the creek flow (Casazza Ranch area).
- Whereas 3 culverts exist to capture flow SW of the S Virginia – 395 interchange, the discharge from only 1 of those 3 culverts was able to be located. Conversations with City of Reno, NDOT, and other civil engineering firms have not revealed the discharge location of the other 2 culverts. It's entirely likely that they discharge to the Huffaker Hills storm drain system (which the 1 culvert which was located eventually does), but there is a possibility that flow is re-directed around the south end of Huffaker Hills to the Gateway Dr – Prototype Dr area.
- At least one 30" culvert, and possibly 2-30" and 1-24", contributes flow directly to the storm drain system of the Huffaker Hills subdivision. As stormdrains are typically sized to handle only urban runoff from medium sized storms, adding elevated creek flows to a system already near capacity will inevitably result in water breaking out and flooding streets and residences.
- In a few locations, the stream has been channelized into ditches or narrow water ways which configurations do not allow elevated flows to stay contained within the banks.

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CIP# C20-2

Reasons/Purpose – During the 2005 event, water was observed flowing through the Casazza Ranch neighborhood. This water appears to have come from a configuration conflict at the Lake Ditch and Thomas Creek West Branch crossing. Currently, flows in the Thomas Creek West Split cross the Lake Ditch east of Dixon Ct. via an eroded channel under the concrete structure which conveys ditch water over the creek. This structure appears to have been constructed in the flow path of the stream and most likely will significantly impede flow under all but low flow events. At the present time, a notch does exist to let water out of the ditch and downstream, but due to elevation differences if the flash boards are removed water will enter instead of exit the ditch. Construction of the previously mentioned detention facility near Arrowcreek, and or CIP #C19-23 may reduce the size and cost of this CIP.

Description – This CIP, located at Lake Ditch and Thomas Creek crossing, E of Dixon Ct., is to construct a reinforced concrete structure which will allow flow in the creek to cross the ditch unimpeded, and allow excess water in the ditch to return to the stream.

Assumptions –

Cost – \$260,000

Associated CIPs –

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**Water Course #37 Thomas Creek East Split – TMSA: South Truckee Meadows**

CIP# C20-3

Reasons/Purpose – Once the reinforced concrete flow splitting structure mentioned previously is constructed, additional flow should be directed down the East Split of Thomas Creek. This necessitates performing downstream culvert improvements to increase capacity.

Description – This CIP is to replace/modify the existing 11'x3.5' reinforced concrete box culverts under S Virginia St in front of Winco Foods. Dimensions are unable to be approximated at this time due to the associated variability of potential discharge flows from the proposed detention basin.

Assumptions – That system capacity between S Virginia and Steamboat Creek has sufficient capacity to handle the flow, which should be comprised of the portion of discharge from the Thomas Creek detention basin which is NOT directed to the North (West ) branch, and any area runoff which is collected in the reach downstream of the proposed detention basin.

Cost – \$2,880,000

Associated CIPs –C20-8, C20-7 and C20-6

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**Water Course: Whites Creek - TMSA: South Truckee Meadows**

CIP #C21-1a

Reasons/Purpose – The current Whites Creek splitting structure fails to utilize 2 of the 4 branches of Whites Creek. In addition, the configuration of the structure, makes the structure vulnerable to debris buildup and resultant overtopping. Conversations with NDOT staff indicate that Interstate 580 was constructed with culverts for each of the branches. These culverts were designed to accommodate flow from a structure that splits the creek flow in four directions. Since downstream culverts are already sized accordingly, it is recommend to utilize all 4 branches of the creek to convey peak flows. This will require a new structure designed to accommodate all four branches of Whites Ck.

Description – This CIP is to construct a new reinforced concrete structure where the main stem of Whites Creek splits into branches. The structure would need to be sized in accordance with downstream culvert capacities underneath I-580.

Assumptions – None

Cost – \$370,000

Associated CIPs – C21-1b

Note: The cost spreadsheet, Table 14.1 combine C21-1a & b into one project listing.

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CIP# C20-6

Reasons/Purpose – Once the reinforced concrete flow splitting structure mentioned previously is constructed, additional flow should be directed down the East Split of Thomas Creek. This necessitates performing downstream channel improvements to increase capacity.

Description – This CIP is to replace/modify the existing channel between the split near Dixon Ln and Sierra Manor Dr (modification of the stretch between Sierra Manor Dr and S Virginia St has been proposed in previous reports). The proposed channel should have minimal vegetation and be concrete. Dimensions are unable to be approximated at this time due to the associated variability of potential discharge flows from the proposed detention basin.

Assumptions – That system capacity between S Virginia and Steamboat Creek has sufficient capacity to handle the flow, which will be comprised of the portion of discharge from the Thomas Creek detention basin which is NOT directed to the North (West ) branch, and any area runoff which is collected in the reach downstream of the proposed detention basin.

Cost – \$5,340,000

Associated CIPs –C20-8, C20-7 and C20-3

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**Water Course #35 Thomas Creek – TMSA: South Truckee Meadows**

CIP #C20-7

Reasons/Purpose – Field observations show that the structure conveying the Last Chance Ditch over Thomas Creek is a flow impediment and is in very poor condition.

Description – This CIP is to replace the reinforced concrete structure to convey the Last Chance Ditch over Thomas Creek with a new reinforced structure. The new structure shall be designed to pass approximately 2000 cfs underneath, and should be designed to allow ditch flows to be discharged to the creek should the ditch become surcharged.

Assumptions – None

Cost – \$220,000

Associated CIPs – C20-8

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**Area: South Reno -Water Course: Whites Creek - Service Area: Truckee Meadows**

CIP #C21-1b

Reasons/Purpose – The configuration of the Whites Creek diversion structure causes each of the two branches to branch off at 90 degree angles to the main creek channel; which makes the structure vulnerable to debris buildup and resultant overtopping. The previous CIP recommended that a new structure be constructed so that all 4 branches of the creek are utilized to convey flows. Such a structure would only work properly if all flow paths remained clear of debris at all times so that they may function as designed.

Description – This CIP is to construct an in-line debris basin on Whites Creek upstream of the proposed splitting structure. The basin should be sized for an approximate flow of 5,000 cfs.

Additionally, the channel between the detention basin and the splitting structure will need to be armored with rip-rap to protect against scour.

Assumptions – None

Cost – \$2,490,000

Associated CIPs – C21-1a

Note: The cost spreadsheet, Table 14.1 combine C21-1a & b into one project listing.

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**Water Course #43 Galena Wash – TMSA: South Truckee Meadows**

CIP# C21-2

Reasons/Purpose – East of where Galena Wash crosses Wedge Parkway, a pair of drop inlets and a 36" CMP culvert carry flow across the Mt Rose Highway and into Branch 4 of Whites Creek. Currently the unimproved channel between Wedge Parkway and these intakes is unimproved, undersized, and susceptible to breakout.

Description – This CIP is to construct an 1800 ft channel with minimal vegetation and be concrete. The approximate dimensions are 4' deep with a 3' wide bottom and 3:1 side slopes.

Assumptions --

Cost – \$1,570,000

Associated CIPs – C21-3

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CIP# C21-3

Reasons/Purpose – Behind Galena High school, the wash is conveyed through an improved channel. Once the wash departs from school property though, the channel is unimproved, undersized, and susceptible to breakout.

Description – This CIP is to construct a 1420 ft channel with minimal vegetation and be concrete. The approximate dimensions are 4.5' deep with a 4' wide bottom and 3:1 side slopes.

Assumptions --

Cost – \$1,650,000

Associated CIPs – C21-2

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**Water Course # Steamboat Creek South of Hwy 341 (Geiger Grade) – TMSA: South Truckee Meadows**

CIP# C21-4

Reasons/Purpose – During the 2005 event, water overtopped Towne Dr to a depth of approximately 3'. For a period of time the only access into or out of the Steamboat Subdivision was impassable. Additionally, some damage occurred to the commercial/professional structure at the corner of Hwy 395 and Towne Dr. Historical USGS Stream gauge records show that Steamboat Creek at Geiger Grade peaked at a flow rate just over 3000 cubic feet per second during the morning of December 31, 2005.

Description – This CIP is to modify/replace the existing 3-6'x5' box culverts under Towne Dr to be 10-20'x6' reinforced concrete box culverts.

Assumptions –

Cost – \$3,100,000

Associated CIPs – none

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CIP# C21-5

Reasons/Purpose – During the 2005 event, water overtopped the Rhodes Rd bridge over Steamboat Creek to a depth of approximately 3'. One vehicle was washed off the bridge and the structure received some damage when floating trees impacted the upstream side. Historical USGS Stream gauge records show that Steamboat Creek at Geiger Grade peaked at a flow rate just over 3000 cubic feet per second during the morning of December 31, 2005.

Description – This CIP is to replace the existing wooden Rhodes Road Bridge (possessing an open area of approximately 13'x8') with 6-20'x8' reinforced concrete box culverts.

Assumptions –

Cost – \$3,100,000

Associated CIPs – none

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**Water Course # Miscellaneous – TMSA: Truckee Meadows**

CIP# B19-1

Reasons/Purpose – During the 2005 event, the Edgewater Subdivision west of West McCarran was inundated with water, some of which came across Mayberry Dr (see CIP #B19-3) and some of which was conveyed from the Truckee River to the community via the Lake Ditch. As river levels rose, the Lake Ditch intake structure near Aspen Glen Dr and White Fir St was inundated and water entered the ditch in large quantities. It is likely that although the ditch was at full capacity, it didn't overtop its banks until flow from Roy Gomm Elementary school was added. Since the ditch was already full there was no freeboard to allow the additional flow from the Last Chance Ditch to be taken away from the vicinity and thus water overtopped the ditch, flooded homes along Willowsprings Dr, and entered the neighborhood.

Description – This CIP is to construct a new structure, or modify the existing one, at the Lake Ditch intake near Aspen Glen Dr and White Fir St. The modified structure would prevent the ditch from accepting large quantities of water during Truckee River high flow events. An alternative to this would be to construct a discharge back to the river near Ambrose Dr (Ambrose Park) to allow high flows in the ditch to discharge back into the river even when the river is experiencing elevated flows.

Assumptions –

Cost – \$260,000

Associated CIPs – no

**Area: Cold Springs -Water Course: "Cold Springs Wash" – Service Area: Cold Springs/White Lake**

CIP# A16-3, A16-4, A16-5, A16-6, A16-7

Reasons/Purpose – As currently configured, the channel conveying flows down the "Cold Springs Wash" could allow flood waters to overtop Cold Springs Dr and flood the neighborhood to the south.

An existing channel captures overland flow near the west end of Nine Mile Ct and conveys it south toward Cold Springs Dr. At Cold Springs Dr the channel makes a 90 degree turn and continues east along Cold Springs Dr parallel to topographic contours. Five hundred feet E of Little Valley Rd additional flow is added and the channel is enlarged accordingly. East of this location, is a series of three (3) 6-foot tall mortar coated weirs, 2 of which have 12" culverts through the base of them along the flowline, and the last is solid. These weirs appear to be intended to force the channel to spill over its entire length to encourage sheet flow discharge downstream of the weirs. As the armoring is only over the weir itself, an overtopping event could wash out the soil around the ends of the weir causing it to fail. This would likely happen to each of the weirs in succession until water overtopped Cold Springs Dr in the vicinity of 230' W. of Kettle Rock Dr. Another possible scenario is that the water would pond up behind the weirs and overtop Cold Springs Dr as sheet flow.

There are two locations where water is able to exit the modified channel and proceed down older channels to White Lake; one is a pair of 24" CMPs 170' E. of Little Valley Dr, and the other is a single 36" RCP located 220' W. of Kettle Rock Dr. Preliminary calculations show the sum capacity of these culverts to be approximately 150 cfs, whereas the anticipated peak flow is approximately 650 cfs. In addition to flooding concerns, stagnant pockets of water are created as runoff is trapped behind the weirs. Anecdotal information received indicates that these pockets of water have created an ideal environment for mosquitoes to breed.

The following 5 CIPs address the above issues.

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CIP# A16-3

Reasons/Purpose – Three (3) 6-foot tall concrete armored weirs exist between W. Aspen Cir and Kettle Rock Dr. As previously discussed, these weirs create a variety of problems including the potential that flood waters will most likely overtop Cold Springs Dr and flood residences south of the street.

Description – This CIP is to remove the 3 weirs between 500' E of Little Valley Dr and Kettle Rock Dr. and improve the channel.

Additionally, this CIP is to modify the intersection of the washes at 500' E of Little Valley Dr so that flow doesn't make a hard 90 degree bend. The project will revise the existing bend to a more efficient hydraulic configuration having better sediment transport capability.

Assumptions – None

Cost – \$260,000

Associated CIPs – A16-4, A16-5, A16-6 and A16-7

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CIP# A16-4, A16-5

Reasons/Purpose – As described above, the existing 3 culverts under Cold Springs Dr, have insufficient capacity to convey peak runoff volumes.

Description – This CIP is to modify or replace the existing 1-30” RCP located 220’ E. of Kettle Rock Dr with 2-8’x5’ box culverts

This CIP is also to cap and abandon the current 2-24” CMPs located 170’ E. of Little Valley Dr. The channel downstream of these culverts will be preserved to provide capture and conveyance for localized drainage.

Assumptions – None

Cost – \$440,000

Associated CIPs – CIP A16-3, A16-6 and A16-7

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CIP# A16-6

Reasons/Purpose – As described above, the existing channel between Cold Springs Dr and Village Parkway is unable to convey peak runoff volumes if either a large storm event occurs, or if the channel N of Cold Springs Dr is modified. Currently there is no development on the E. side of the channel and impacts of an overbank release would be minimal. There are however, residences on the W. side of the channel. This development could experience damage by an overbank release.

Description – This CIP is to improve and enlarge 2,600' of channel between Cold Springs Dr and Village Parkway. The approximate dimensions are 5' deep with a 10' wide bottom and 2.5:1 side slopes.

A temporary repair to the situation could be to construct a berm on the W side of the channel to protect the residences located in the adjacent neighborhood.

Assumptions – None

Cost – \$2,940,000

Associated CIPs – A16-3, A16-4, A16-5 and A16-7

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CIP# A16-7

Reasons/Purpose – The existing culvert under Village Parkway (2,300' E of Cold Springs Dr), has insufficient capacity to convey peak runoff volumes if either a large storm event occurs, or if the channel N of Cold Springs Dr is modified.

Description – This CIP is to replace the existing culvert under Village Parkway with 3-10'x4' box culverts.

Assumptions – None

Cost – \$790,000

Associated CIPs – A16-3, A16-4, A16-5 and A16-6

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**Area: Cold Springs -Water Course: "Village Parkway Wash" – Service Area: Cold Springs/White Lake**

CIP# A15-1

Reasons/Purpose – The existing culvert under Village Parkway at Mud Springs Rd, has insufficient capacity to convey peak runoff volumes from a large storm event; existing capacity is approximately 300 cfs vs. approximately 1,200 cfs required. During such an event, flow could potentially break out and proceed S down Village Parkway. This would most likely lead to significant sediment deposition on the roadway as well as washing out the roadway.

Description – This CIP is to modify or replace the existing box culvert under Village Parkway at Mud Springs Dr with 3-10'x 4' box culverts.

Assumptions – None

Cost – \$1,680,000

Associated CIPs – Downstream CIP's already existing in the master plan.

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**Area: Dry Creek-Water Course: Brunswick Mill Branch - Service Area: Truckee Meadows**

CIP# C20-9

Reasons/Purpose – During the 2005 flood, water was observed ponding on the W. side of Lakeside Dr. This water flooded some outbuildings at 8801 Lakeside Dr and overtopped the road. Preliminary calculations show the sum capacity of these culverts to be approximately 110 cfs, whereas the anticipated peak flow is approximately 750 cfs.

Description – This CIP is to modify or replace the existing 24" and 36" CMPs under Lakeside Dr 500' N. of Holcomb Ranch Ln with 1-12'x8' box culvert.

Assumptions – None

Cost – \$300,000

Associated CIPs – C20-10, C20-12 and C20-14

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CIP# C20-10

Reasons/Purpose – With the improvements to the Lakeside Dr., Timothy Dr., and Dieringer Dr crossings allowing additional peak flows down channel, the structure at Panorama Dr is vulnerable to overtopping. Preliminary calculations show the capacity of the current culvert to be approximately 330 cfs, whereas the anticipated peak flow is approximately 2,000 cfs.

Description – This CIP is to modify or replace the existing 2-72" CMPs under Panorama Dr at the wye with Dieringer Dr with 4-12'x6' box culvert(s).

Assumptions – That the detention basin located S of Huffaker Ln and E of Meadow Vista Dr proposed in the City of Reno Storm Drain Master Plan will be constructed.

Cost – \$880,000

Associated CIPs – C20-9, C20-12 and C20-14

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CIP# C20-12

Reasons/Purpose – With the improvements to the Lakeside Dr and Timothy Dr crossings allowing additional peak flows down channel, the structure at Dieringer Dr is vulnerable to overtopping. Preliminary calculations show the capacity of the current culvert to be approximately 700 cfs, whereas the anticipated peak flow is approximately 1670 cfs.

Description – This CIP is to modify or replace the existing 2-10'x6' under Dieringer Dr 1,700' S. of Panorama Dr with 4-12'x6' box culvert(s).

Assumptions – None

Cost – \$690,000

Associated CIPs – C20-9, C20-10 and C20-14

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CIP# C20-14

Reasons/Purpose – With the improvements to the Lakeside Dr crossing allowing additional peak flows down channel, the structure at Timothy Dr is vulnerable to overtopping. Preliminary calculations show the capacity of the current culvert to be approximately 625 cfs, whereas the anticipated peak flow is approximately 1280 cfs.

Description – This CIP is to modify or replace the existing 2-7'x6' box culverts under Timothy Dr 500' N. of Holcomb Ranch Ln with 3-10'x6' box culvert(s).

Assumptions – None

Cost – \$570,000

Associated CIPs – C20-9, C20-10 and C20-12

CIP# C20-16

Reasons/Purpose – During the 2005 flood, residences at 2580 and 2520 Holcomb Ranch Ln had flood waters in their yards, and possibly in their homes. Upon evaluation of available information, it appears that the problem did not originate with the 10'x 6' box under Holcomb Ranch Ln E of the homes. Instead, it appears that the water came from the "Dryden Branch" surcharging the Last Chance Ditch which overwhelmed the ditch's capacity.

A pond at 2740 Holcomb Ranch Ln is positioned such that it intercepts flow from the "Dryden Branch", and then has a pair of overflow culverts which allow water from the pond to both continue down the original channel, and to contribute flow directly to the ditch. The sizes of the overflows are 18" and 24" respectively. A preliminary evaluation of the watershed indicates that during the 100-yr storm, approximately 360 cfs of water will be entering the pond. Observing the pond's configuration, low banks on the S and E sides of the pond appear prime locations for inevitable overtopping. This scenario on the S side would likely fill the Last Chance Ditch before overtopping the banks and continue down the channel as flow is combined with that from the 18" CMP. On the E side of the pond, the ditch would already be flowing full and intercepting flow from the 24" CMP, as well as intercepting overland flow from the sag in the pond bank. The combination of these 3 flow inputs at this location would easily allow water to breakout and proceed toward the homes at 2580 and 2520 Holcomb Ranch Ln before entering the "Diamond J Branch" and passing under Holcomb Ranch Ln.

Description – This CIP is to construct a reinforced concrete structure at 2740 Holcomb Ranch Ln so that any discharge from the pond can pass over the Last Chance Ditch, and continue down the historic channel. This structure should also have means to allow any excess flow in the ditch to exit into the channel.

Additionally, this CIP is to modify the banks of the pond to prevent overtopping and force excess water to exit only through the concrete structure on the S side.

Assumptions –None

Cost – \$400,000

Associated CIPs – None

**Area: Lemon Valley -Water Course: Antelope Valley Wash - Service Area: Swan Lake**

CIP #B15-1

Reasons/Purpose – The current channel conveying Antelope Valley Wash through the neighborhood in Lemon Valley at the N end of Swan Lake passes through a developed area with residences on large (1 + acre) lots. The approximate flow that will enter the neighborhood under Oregon Blvd is 650 cfs, which increases to an approximate flow of 1,200 cfs exiting the neighborhood under Lemmon Dr. The channel and culverts throughout the neighborhood are undersized and have been listed as CIP upgrades in previous master plans. However, based on current construction costs it appears to be more cost effective to leave existing channels and culverts in place, and construct a detention basin at the north end of the community. This basin would need to be sized so that capacities of existing structures are not exceeded.

The preliminary costs to improve the channel through the neighborhood are:

\$7.5 million	4,300'	2.5-1 sides	4.5' deep	5' wide bottom
	3,400'	3-1 sides	5' deep	20' wide bottom
\$9.6 million	12 locations	5-12'x4'	Box culverts	
<b>\$17.1 million</b>	<b>TOTAL</b>			

Included in the costs are easements and land acquisitions. By way of reference, approximately 28 lots may be impacted with either channel or culvert improvements.

Note: this project is not connected with the North Valleys solution, Project # B16-7, but could also provide some benefit to that solution as well.

Description – This CIP is to construct an in-line detention basin 500+' N. of Idaho St.

Assumptions – None

Cost – \$8,720,000

Associated CIPs – None

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**Area: Spanish Springs -Water Course: Kinglet Dr - Service Area: Truckee Meadows**

CIP #D16-1

Reasons/Purpose – An intense rain event on 21 June 2002 resulted in various flooding incidences in locations along the western side of Spanish Springs, particularly to the (then) new Spanish Springs High School. This rain event produced approximately 2" of rain in about an hour's time. The rain event also exploited deficiencies in the stormwater facilities bordering the new subdivisions in the area. One in particular was the detention basin at the end of what is now Kinglet Dr, west of Calle De La Plata. This detention basin captures flow from an approximate 1.2 square mile area. Due to the quantity of sediment which entered the basin during the event, storage volume was reduced so much that the downstream embankment was overtopped and damaged as basin capacity was exceeded.

Description – This CIP is to enlarge the basin so that it has 100-yr storm capacity while also accounting for storage volume lost to sediment inflow; without performing a detailed analysis, it's not prudent to make excavation and basin sizing estimates at this time.

Conversations with Washoe County Public Works staff in September 2007 reveal that engineering is proceeding to address the flooding issues in this area at this time.

Assumptions – None

Cost – \$1,010,000

Associated CIPs – None

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**Area: Spanish Springs -Water Course: Nightingale Way Area - Service Area: Truckee Meadows**

**CIP #D16-2**

Reasons/Purpose – An intense rain event on 21 June 2002 resulted in various flooding incidences in locations along the western side of Spanish Springs, particularly to the (then) new Spanish Springs High School. This rain event produced approximately 2" of rain in about an hour's time. The rain event also exploited deficiencies in the stormwater facilities bordering the new subdivisions in the area. One in particular was the detention basin adjacent to the pair of Washoe County drinking water tanks near the intersection of Nightingale Wy and Calle De La Plata. While armoring was provided on the uphill side of the basin, no grading or flow control was constructed in the channels above. During the storm, runoff fanned out into numerous channels, bypassed the armoring, and scoured the uphill side of the basin with numerous 2'-5' deep rills. As a result, a much greater quantity of sediment entered the basin than was expected and designed for. Even if the banks of the basin don't erode, the runoff from a 100-yr event will be heavily laden with sediment, which sediment will drop out and accumulate in the basin effectively reducing storage capacity and creating a possible over-topping and embankment wash-out situation.

Description – This CIP is to enlarge the basin so that it has 100-yr storm capacity while also accounting for storage volume lost to sediment inflow; without performing a detailed analysis, it's not prudent to make excavation and basin sizing estimates at this time.

This CIP should also include drop structures at the inflow locations on the upstream side of the basin. The drop structures are necessary to prevent the down cutting of the channels on the uphill side of the basin. As mentioned above, this down cutting has already heavily damaged the uphill side of the basin, which will continue to worsen as additional rain events occur. These drop structures should also be accompanied by grading and channel improvements to the washes upstream of the detention basin. These improvements are necessary to keep runoff confined in appropriate channels as opposed to the random and random channels that have formed.

Finally, this CIP should include removal the current grouted riprap channels on the upstream and south side of the basin, and armor the entire upstream side of the basin with appropriately sized, non-grouted, rip rap.

Conversations with Washoe County Public Works staff in September 2007 reveal that engineering is proceeding to address the flooding issues in this area at this time.

Assumptions – None

Cost – \$1,200,000

Associated CIPs – None

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**Area: Spanish Springs -Water Course: Spanish Springs HS Area - Service Area: Truckee Meadows**

CIP #D16-3

Reasons/Purpose – An intense rain event on 21 June 2002 resulted in various flooding incidences in locations along the western side of Spanish Springs, particularly to the Spanish Springs High School. This rain event produced approximately 2” of rain in about an hour’s time. Although the 0.35 square mile contributing watershed is much less than the 1 square mile threshold, the ensuing flooding caused about 500,000\$ damage to both the inside of the school and the adjacent sports fields.

Post-event visits indicated that the concrete lined ditch, which is parallel to topographic contour just west of the sports fields, intercepted flow only briefly until it became filled with sediment and was overtopped. As runoff proceeded down gradient it tore up the sports fields before it went across the parking lot and into/through the school.

Description – This CIP is to construct a 1,800’ diagonal diversion berm and armored interception channel beginning at the SW corner of the Spanish Springs High School property and ending at Eagle Canyon Dr approximately 500’ W of Calle De La Plata. This berm would have to be located and designed carefully to maintain sufficient velocity for sediment transport.

Preliminary evaluations of the existing concrete lined V-ditch along the S side of the school property, the 36” RCP, and the detention basin indicate that they have sufficient capacity for the anticipated flow and volume. These facilities should be re-evaluated using the flows anticipated due to construction of the proposed berm.

Conversations with Washoe County Public Works staff in September 2007 reveal that engineering is proceeding to address the flooding issues in this area at this time.

Assumptions – None

Cost – \$1,710,000

Associated CIPs – None

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**Area: Spanish Springs -Water Course: Carlene Dr. - Service Area: Truckee Meadows**

CIP #D16-4

Reasons/Purpose – The main channel which parallels Carlene Dr through the Spanish Springs Village Subdivision, and contributing channels paralleling Tina Ct and Mia Ct, have inconsistent capacity and have historically experienced flooding and sediment deposition problems resulting from flow breaking out at various locations. The issues appear to lie mainly with the culverts; they have significantly lower capacity than the channels, which appear to be sized appropriately. The culvert conveying Carlene Dr Wash under Beau Dr is an 18" RCP, and will experience an estimated peak flow of 350 cfs during a 100-yr event. The 3 culverts conveying the wash under Nicole Dr are 36" RCPs and will experience an estimated peak flow of 775 cfs during a 100-yr event. Another problem unique to the residences at 470 and 460 Carlene Ct are the fences constructed across the channel. These fences have historically impeded flow briefly until runoff incises the channel to pass underneath and/or simply knocks the fences down.

Conversations with Washoe County Public Works staff in September 2007 reveal that engineering is proceeding to address the flooding issues in this area at this time.

Description – This CIP is to evaluate the approximate 9 street crossings that occur through out the Spanish Springs Village Subdivision, and likely replace at least 5 of them. Additionally this CIP is to make any necessary channel improvements which may include but are not limited to the following: enlargement, armoring, and removal of flow obstructions.

Assumptions – None

Cost – \$2,980,000

Associated CIPs – none

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**Area: Sun Valley -Water Course: Amargosa Dr. Wash (part of Sun Valley Wash) - Service Area: Truckee Meadows**

CIP# C17-1, C17-2, C17-3, C17-4, C17-5, C17-10, C17-15 and C17-16

Reasons/Purpose – Sun Valley is a large and mostly developed watershed. Stormwater runoff originates in the hills on three sides of the valley and drains at the south end to the Sun Valley or Wild Creek Detention facility, through the Wild Creek Golf Course and through the City of Sparks to the Truckee River. Numerous flood control improvements were historically identified for the Sun Valley Area, one of which was a detention basin SW of the intersection of Sun Valley Blvd and Golden Valley Rd. This detention basin has been constructed and is anticipated to reduce the runoff peak from the West branch of Sun Valley Wash. However, based on a preliminary hydrologic analysis for Sun Valley, existing stormwater infrastructure throughout the valley does not allow for 100 year storm runoff conveyance. The total contributing flow area is roughly 6.0 square miles.

The following 8 CIPs address this issue in the North portion of the Valley between Middle Fork Dr and 8<sup>th</sup> Ave.

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CIP #C17-1

Reasons/Purpose – The current configuration at the Amargosa Dr. Wash crossing of Middle Fork Dr. has insufficient capacity to convey peak runoff. Preliminary calculations show the capacity of the 30" CMP to be approximately 30 cfs, whereas the anticipated peak flow is approximately 100 cfs. The undersized culvert creates a situation where flow is impeded and as Middle Fork Dr. becomes overtopped the road risks being washed out. Additionally there are residences in the area that may be impacted by such an overtopping/washout.

Description - This CIP is to replace the existing 30" CMP on Middle Fork Dr 170' SW of Danforth Dr. with 1-7'x 3' box culvert.

Assumptions – None

Cost – \$240,000

Associated CIPs – C17-2, C17-3 and C17-4

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CIP #C17-2

Reasons/Purpose – The current configuration at the Amargosa Dr. Wash crossing of Amargosa Dr. has insufficient capacity to convey peak runoff. Preliminary calculations show the capacity of the 30" CMP to be approximately 30 cfs, whereas the anticipated peak flow is approximately 100 cfs. The undersized culvert creates a situation where flow is impeded and as Amargosa becomes overtopped the road risks being washed out. Additionally there are residences in the area that may be impacted by such an overtopping/washout.

Description - This CIP is to replace the existing 30" CMP on Amargosa Drive, 140' NE of Lansing Dr. with 1-7' x 3' box culvert.

Assumptions – None

Cost – \$240,000

Associated CIPs – C17-1, C17-3 and C17-4

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CIP #C17-3

Reasons/Purpose – Between Amargosa Dr and Sun Valley Blvd (275'), the existing channel has sufficient capacity to convey anticipated runoff. However, field observations indicate that either poor original construction or scour at the flow line has resulted in a gas main being exposed.

Description – This CIP is to modify/protect existing utilities which cross the stream channel so that the service is not compromised and that impediments to flow are removed.

Additionally, this CIP is to armor the channel with riprap along this reach.

Assumptions – None

Cost – \$240,000

Associated CIPs – C17-1, C17-2 and C17-4

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CIP #C17-4

Reasons/Purpose – The current configuration at the Amargosa Dr. Wash crossing of Sun Valley Blvd. has insufficient capacity to convey peak runoff. Preliminary calculations show the capacity of the 30" CMP to be approximately 30 cfs, whereas the anticipated peak flow is approximately 100 cfs. The undersized culvert creates a situation where flow is impeded and as Sun Valley Blvd becomes overtopped the road risks being washed out. In the N. end of Sun Valley, this street is a major collector for adjacent subdivisions and commuters to and from Spanish Springs over Highland Ranch Parkway.

Description - This CIP is to replace the existing 30" CMP on Sun Valley Blvd., 220' NE of Middle Fork Dr. with 1-7'x 3' box culvert.

Assumptions – None

Cost – \$280,000

Associated CIPs – C17-1, C17-2 and C17-3

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CIP #C17-5

Reasons/Purpose -- The current configuration at the Amargosa Dr. Wash crossing of Smokey Canyon Dr. has insufficient capacity to convey peak runoff. Preliminary calculations show the capacity of the 30" CMP to be approximately 30 cfs, whereas the anticipated peak flow is approximately 105 cfs. The undersized culvert creates a situation where flow is impeded and as Smokey Canyon Dr becomes overtopped the road risks being washed out. Additionally there are residences in the area that may be impacted by such an overtopping/washout.

Description - This CIP is to replace the existing 30" CMP on Smokey Canyon Dr., 150' NE of Middle Fork Dr. with 1-7' x 3' box culvert.

Assumptions -- None

Cost -- \$240,000

Associated CIPs -- None

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CIP #C17-10

Reasons/Purpose – The current configuration at the Amargosa Dr. Wash crossing of E. 9<sup>th</sup> Ave. has insufficient capacity to convey peak runoff. Preliminary calculations show the capacity of the 30" CMP to be approximately 30 cfs, whereas the anticipated peak flow is approximately 105 cfs. The undersized culvert creates a situation where flow is impeded and as 9<sup>th</sup> Ave. becomes overtopped the road risks being washed out. Additionally there are residences in the area that may be impacted by such an overtopping/washout.

Description - This CIP is to replace the existing 30" CMP on E. 9<sup>th</sup> Ave., 200' W. of Leon Dr. with 1-7'x 3' box culvert.

Assumptions – None

Cost – \$240,000

Associated CIPs – None

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CIP #C17-15

The current configuration at the Amargosa Dr. Wash crossing of E. 8<sup>th</sup> Ave. has insufficient capacity to convey peak runoff. Preliminary calculations show the capacity of the 30" CMP to be approximately 30 cfs, whereas the anticipated peak flow is approximately 105 cfs. The undersized culvert creates a situation where flow is impeded and as 8<sup>th</sup> Ave. becomes overtopped the road risks being washed out. Additionally there are residences in the area that may be impacted by such an overtopping/washout.

Description - This CIP is to replace the existing 30" CMP on E. 8<sup>th</sup> Ave., 200' W. of Leon Dr. with 2-5' x 3' box culverts.

Assumptions - None

Cost - \$370,000

Associated CIPs - None

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CIP #C17-16

Reasons/Purpose - The existing channel along 8<sup>th</sup> Ave between 190' E of Middle Fork Dr and Leon Dr is undersized. Preliminary calculations show the capacity of the channel to be approximately 60 cfs, whereas the anticipated peak flow is approximately 105 cfs. Additionally, the channel makes a 90 degree turn from a southerly to an easterly direction immediately south of 8<sup>th</sup> Ave, and another 90 degree turn from an easterly direction to a southerly direction immediately west of Leon Dr. These two bends also add to the hydraulic inefficiency of the system.

Description - This CIP is to improve and enlarge 170' of channel between 190' E of Middle Fork Dr and Leon Dr. The approximate dimensions of the proposed channel are 4' deep with a 5' wide bottom and 3:1 side slopes.

A potential addition to this CIP is to purchase the home and property at 190 8<sup>th</sup> Ave, and modify the wash to create a more hydraulically efficient alignment shift. If the wash were allowed to shift the 170' distance to Leon Dr in a diagonal configuration, as opposed to the current series of 90 degree bends, the probability and opportunity for breakout are reduced significantly. This cost however is not included in the cost opinion for this project.

Assumptions - None

Cost - \$400,000

Associated CIPs - None



Project: Washoe County Storm Water Mstr Plan    Computed: GB    Date: 25-Sep-07  
 Subject: CIP - cost breakdown    Checked:    Date:  
 Task:  
 Job #:

<b>CIP# A15 - 1: Cold Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 858,000
	Cleanup		\$ 20,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 918,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 367,200
	Operation & Maintenance	2%	\$ 18,360
	Engineering & Const Mgt	30%	\$ 275,400
	Administration & Legal	10%	\$ 91,800
	<b>Total Other Costs</b>		<b>\$ 752,760</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 1,680,000</b>



Project: Washoe County Storm Water Mstr Plan    Computed: GB    Date: 25-Sep-07  
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<b>CIP# A16 - 3: Cold Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation		\$ 50,000
	Earthwork/Channel Modification		\$ 50,000
	Cleanup		\$ 5,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 125,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 50,000
	Operation & Maintenance	2%	\$ 2,500
	Engineering & Const Mgt	30%	\$ 37,500
	Administration & Legal	10%	\$ 12,500
	<b>Total Other Costs</b>		<b>\$ 102,500</b>
<b>OTHER</b>			
	Land Acquisition		\$ 30,000
	<b>TOTAL</b>		<b>\$ 260,000</b>



Project: Washoe County Storm Water Mstr Plan    Computed: GB    Date: 25-Sep-07  
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<b>CIP# A16 - 4: Cold Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation/Demolition		\$ 10,000
	Box Culvert		\$ 85,500
	Cleanup		\$ 10,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 115,500</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 46,200
	Operation & Maintenance	2%	\$ 2,310
	Engineering & Const Mgt	30%	\$ 34,650
	Administration & Legal	10%	\$ 11,550
	<b>Total Other Costs</b>		<b>\$ 94,710</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 220,000</b>



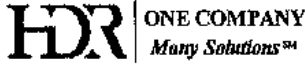
Project: Washoe County Storm Water Mstr Plan    Computed: GB    Date: 25-Sep-07  
 Subject: CIP - cost breakdown    Checked:    Date:  
 Task:  
 Job #:

<b>CIP# A16 - 5: Cold Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation/Demolition		\$ 10,000
	Box Culvert		\$ 85,500
	Cleanup		\$ 10,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 115,500</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 46,200
	Operation & Maintenance	2%	\$ 2,310
	Engineering & Const Mgt	30%	\$ 34,650
	Administration & Legal	10%	\$ 11,550
	<b>Total Other Costs</b>		<b>\$ 94,710</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 220,000</b>



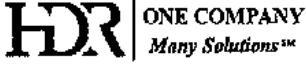
Project: Washoe County Storm Water Mstr Plan    Computed: GB    Date: 25-Sep-07  
 Subject: CIP - cost breakdown    Checked:    Date:  
 Task:  
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<b>CIP# A16 - 6: Cold Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 15,000
	Excavation/Demolition		\$ 150,000
	Channel Construction		\$ 1,349,000
	Cleanup		\$ 30,000
	Demobilization		\$ 15,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,559,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 623,600
	Operation & Maintenance	2%	\$ 31,180
	Engineering & Const Mgt	30%	\$ 467,700
	Administration & Legal	10%	\$ 155,900
	<b>Total Other Costs</b>		<b>\$ 1,278,380</b>
<b>OTHER</b>			
	Land Acquisition		\$ 100,000
	<b>TOTAL</b>		<b>\$ 2,940,000</b>



Project: Washoe County Storm Water Mstr Plan    Computed: GB    Date: 25-Sep-07  
 Subject: CIP - cost breakdown    Checked:    Date:  
 Task:  
 Job #:

<b>CIP# A16 - 7: Cold Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 371,250
	Cleanup		\$ 20,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 431,250</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 172,500
	Operation & Maintenance	2%	\$ 8,625
	Engineering & Const Mgt	30%	\$ 129,375
	Administration & Legal	10%	\$ 43,125
	<b>Total Other Costs</b>		<b>\$ 353,625</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 790,000</b>



Project: Washoe County Storm Water Mstr Plan    Computed: GB    Date: 25-Sep-07  
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<b>CIP# B15 - 1: Lemmon Valley</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 40,000
	Excavation		\$ 100,000
	Construction of Detention Basin		\$ 4,000,000
	Cleanup		\$ 60,000
	Demobilization		\$ 40,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 4,240,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 1,696,000
	Operation & Maintenance	2%	\$ 84,800
	Engineering & Const Mgt	30%	\$ 1,272,000
	Administration & Legal	10%	\$ 424,000
	<b>Total Other Costs</b>		<b>\$ 3,476,800</b>
<b>OTHER</b>			
	Land Acquisition		\$ 1,000,000
	<b>TOTAL</b>		<b>\$ 8,720,000</b>



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<b>CIP# B18 - 1: Evans Creek (Block "N" Watershed)</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 60,000
	Excavation		\$ 300,000
	Dam and Spillway Construction		\$ 3,000,000
	Cleanup		\$ 60,000
	Demobilization		\$ 60,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 3,480,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 1,392,000
	Operation & Maintenance	2%	\$ 69,600
	Engineering & Const Mgt	30%	\$ 1,044,000
	Administration & Legal	10%	\$ 348,000
	<b>Total Other Costs</b>		<b>\$ 2,853,600</b>
<b>OTHER</b>			
	Land Acquisition		\$ 1,500,000
	<b>TOTAL</b>		<b>\$ 7,840,000</b>



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<b>CIP# B19 - 1: Misc</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Prep Work		\$ 50,000
	Form and Pour concrete		\$ 20,000
	Cleanup		\$ 20,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 110,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 44,000
	Operation & Maintenance	2%	\$ 2,200
	Engineering & Const Mgt	30%	\$ 33,000
	Administration & Legal	10%	\$ 11,000
	<b>Total Other Costs</b>		<b>\$ 90,200</b>
<b>OTHER</b>			
	Land Acquisition		\$ 50,000
	<b>TOTAL</b>		<b>\$ 260,000</b>



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<b>CIP# B19 - 3: Alum Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation/Clear and Grubb		\$ 30,000
	Form and Pour concrete		\$ 135,000
	Cleanup		\$ 5,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 180,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 72,000
	Operation & Maintenance	2%	\$ 3,600
	Engineering & Const Mgt	30%	\$ 54,000
	Administration & Legal	10%	\$ 18,000
	<b>Total Other Costs</b>		<b>\$ 147,600</b>
<b>OTHER</b>			
	Land Acquisition		\$ 30,000
	<b>TOTAL</b>		<b>\$ 360,000</b>



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<b>CIP# B19 - 4: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Prep Work		\$ 30,000
	Form and Pour concrete		\$ 15,000
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 75,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 30,000
	Operation & Maintenance	2%	\$ 1,500
	Engineering & Const Mgt	30%	\$ 22,500
	Administration & Legal	10%	\$ 7,500
	<b>Total Other Costs</b>		<b>\$ 61,500</b>
<b>OTHER</b>			
	Land Acquisition		\$ 30,000
	<b>TOTAL</b>		<b>\$ 170,000</b>



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<b>CIP# B19 - 5: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 10,000
	Form and Pour concrete		\$ 10,000
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 45,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 18,000
	Operation & Maintenance	2%	\$ 900
	Engineering & Const Mgt	30%	\$ 13,500
	Administration & Legal	10%	\$ 4,500
	<b>Total Other Costs</b>		<b>\$ 36,900</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 90,000</b>



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<b>CIP# C17 - 1: Sun Valley</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 78,750
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 128,750</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 51,500
	Operation & Maintenance	2%	\$ 2,575
	Engineering & Const Mgt	30%	\$ 38,625
	Administration & Legal	10%	\$ 12,875
	<b>Total Other Costs</b>		<b>\$ 105,575</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 240,000</b>



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<b>CIP# C17 - 2: Sun Valley</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 78,750
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 128,750</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 51,500
	Operation & Maintenance	2%	\$ 2,575
	Engineering & Const Mgt	30%	\$ 38,625
	Administration & Legal	10%	\$ 12,875
	<b>Total Other Costs</b>		<b>\$ 105,575</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 240,000</b>



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<b>CIP# C17 - 3: Sun Valley</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation/Demolition		\$ 15,000
	Channel Construction/Modification		\$ 30,000
	Cleanup		\$ 20,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 75,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 30,000
	Operation & Maintenance	2%	\$ 1,500
	Engineering & Const Mgt	30%	\$ 22,500
	Administration & Legal	10%	\$ 7,500
	<b>Total Other Costs</b>		<b>\$ 61,500</b>
<b>OTHER</b>			
	Land Acquisition		\$ 100,000
	<b>TOTAL</b>		<b>\$ 240,000</b>



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<b>CIP# C17 - 4: Sun Valley</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 15,000
	Excavation/Demolition		\$ 25,000
	Box Culvert		\$ 78,750
	Cleanup		\$ 15,000
	Demobilization		\$ 15,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 148,750</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 59,500
	Operation & Maintenance	2%	\$ 2,975
	Engineering & Const Mgt	30%	\$ 44,625
	Administration & Legal	10%	\$ 14,875
	<b>Total Other Costs</b>		<b>\$ 121,975</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 280,000</b>



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<b>CIP# C17 - 5: Sun Valley</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 78,750
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 128,750</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 51,500
	Operation & Maintenance	2%	\$ 2,575
	Engineering & Const Mgt	30%	\$ 38,625
	Administration & Legal	10%	\$ 12,875
	<b>Total Other Costs</b>		<b>\$ 105,575</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 240,000</b>



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<b>CIP# C17 -10: Sun Valley</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 78,750
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 128,750</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 51,500
	Operation & Maintenance	2%	\$ 2,575
	Engineering & Const Mgt	30%	\$ 38,625
	Administration & Legal	10%	\$ 12,875
	<b>Total Other Costs</b>		<b>\$ 105,575</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 240,000</b>



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<b>CIP# C17 - 15: Sun Valley</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 148,500
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 198,500</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 79,400
	Operation & Maintenance	2%	\$ 3,970
	Engineering & Const Mgt	30%	\$ 59,550
	Administration & Legal	10%	\$ 19,850
	<b>Total Other Costs</b>		<b>\$ 162,770</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 370,000</b>



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<b>CIP# C17 - 16: Sun Valley</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 15,000
	Channel Construction/Modification		\$ 40,000
	Cleanup		\$ 30,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 105,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 42,000
	Operation & Maintenance	2%	\$ 2,100
	Engineering & Const Mgt	30%	\$ 31,500
	Administration & Legal	10%	\$ 10,500
	<b>Total Other Costs</b>		<b>\$ 86,100</b>
<b>OTHER</b>			
	Land Acquisition		\$ 200,000
	<b>TOTAL</b>		<b>\$ 400,000</b>



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<b>CIP# C18 - 1: Dandini Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Prep Work		\$ 30,000
	Form and Pour concrete		\$ 15,000
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 75,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 30,000
	Operation & Maintenance	2%	\$ 1,500
	Engineering & Const Mgt	30%	\$ 22,500
	Administration & Legal	10%	\$ 7,500
	<b>Total Other Costs</b>		<b>\$ 61,500</b>
<b>OTHER</b>			
	Land Acquisition		\$ 30,000
	<b>TOTAL</b>		<b>\$ 170,000</b>



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<b>CIP# C19 - 1: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 40,000
	Box Culvert		\$ 100,000
	Cleanup		\$ 40,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 200,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 80,000
	Operation & Maintenance	2%	\$ 4,000
	Engineering & Const Mgt	30%	\$ 60,000
	Administration & Legal	10%	\$ 20,000
	<b>Total Other Costs</b>		<b>\$ 164,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 370,000</b>



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<b>CIP# C19 -2: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 70,000
	Channel Construction		\$ 448,000
	Cleanup		\$ 40,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 568,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 227,200
	Operation & Maintenance	2%	\$ 11,360
	Engineering & Const Mgt	30%	\$ 170,400
	Administration & Legal	10%	\$ 56,800
	<b>Total Other Costs</b>		<b>\$ 465,760</b>
<b>OTHER</b>			
	Land Acquisition		\$ 1,200,000
	<b>TOTAL</b>		<b>\$ 2,240,000</b>



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<b>CIP# C19 - 3: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 25,000
	Box Culvert		\$ 80,000
	Cleanup		\$ 30,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 155,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 62,000
	Operation & Maintenance	2%	\$ 3,100
	Engineering & Const Mgt	30%	\$ 46,500
	Administration & Legal	10%	\$ 15,500
	<b>Total Other Costs</b>		<b>\$ 127,100</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 290,000</b>



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<b>CIP# C19 - 4: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 200,000
	Channel Construction		\$ 549,000
	Cleanup		\$ 40,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 799,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 319,600
	Operation & Maintenance	2%	\$ 15,980
	Engineering & Const Mgt	30%	\$ 239,700
	Administration & Legal	10%	\$ 79,900
	<b>Total Other Costs</b>		<b>\$ 655,180</b>
<b>OTHER</b>			
	Land Acquisition		\$ 2,000,000
	<b>TOTAL</b>		<b>\$ 3,460,000</b>



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<b>CIP# C19 - 5: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 20,000
	Excavation/Demolition		\$ 50,000
	Box Culvert		\$ 220,000
	Cleanup		\$ 40,000
	Demobilization		\$ 20,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 350,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 140,000
	Operation & Maintenance	2%	\$ 7,000
	Engineering & Const Mgt	30%	\$ 105,000
	Administration & Legal	10%	\$ 35,000
	<b>Total Other Costs</b>		<b>\$ 287,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 640,000</b>



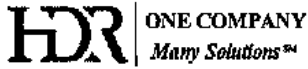
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<b>CIP# C19 - 6: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 200,000
	Channel Construction		\$ 1,008,000
	Cleanup		\$ 50,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,268,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 507,200
	Operation & Maintenance	2%	\$ 25,360
	Engineering & Const Mgt	30%	\$ 380,400
	Administration & Legal	10%	\$ 126,800
	<b>Total Other Costs</b>		<b>\$ 1,039,760</b>
<b>OTHER</b>			
	Land Acquisition		\$ 1,600,000
	<b>TOTAL</b>		<b>\$ 3,910,000</b>



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<b>CIP# C19 - 7: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 20,000
	Excavation/Demolition		\$ 50,000
	Box Culvert		\$ 200,000
	Cleanup		\$ 40,000
	Demobilization		\$ 20,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 330,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 132,000
	Operation & Maintenance	2%	\$ 6,600
	Engineering & Const Mgt	30%	\$ 99,000
	Administration & Legal	10%	\$ 33,000
	<b>Total Other Costs</b>		<b>\$ 270,600</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 610,000</b>



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<b>CIP# C19 - 8: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 200,000
	Channel Construction		\$ 434,000
	Cleanup		\$ 30,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 674,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 269,600
	Operation & Maintenance	2%	\$ 13,480
	Engineering & Const Mgt	30%	\$ 202,200
	Administration & Legal	10%	\$ 67,400
	<b>Total Other Costs</b>		<b>\$ 552,680</b>
<b>OTHER</b>			
	Land Acquisition		\$ 800,000
	<b>TOTAL</b>		<b>\$ 2,030,000</b>



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<b>CIP# C19 - 9: Rosewood Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 20,000
	Excavation/Demolition		\$ 90,000
	Box Culvert		\$ 280,000
	Cleanup		\$ 40,000
	Demobilization		\$ 20,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 450,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 180,000
	Operation & Maintenance	2%	\$ 9,000
	Engineering & Const Mgt	30%	\$ 135,000
	Administration & Legal	10%	\$ 45,000
	<b>Total Other Costs</b>		<b>\$ 369,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 820,000</b>



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<b>CIP# C19 - 12: Dant Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 20,000
	Excavation/Demolition		\$ 40,000
	Box Culvert		\$ 100,000
	Cleanup		\$ 30,000
	Demobilization		\$ 20,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 210,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 84,000
	Operation & Maintenance	2%	\$ 4,200
	Engineering & Const Mgt	30%	\$ 63,000
	Administration & Legal	10%	\$ 21,000
	<b>Total Other Costs</b>		<b>\$ 172,200</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 390,000</b>



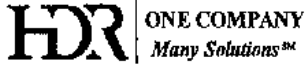
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<b>CIP# C19 - 13: Dant Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 70,000
	Channel Construction		\$ 1,266,000
	Cleanup		\$ 20,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,366,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 546,400
	Operation & Maintenance	2%	\$ 27,320
	Engineering & Const Mgt	30%	\$ 409,800
	Administration & Legal	10%	\$ 136,600
	<b>Total Other Costs</b>		<b>\$ 1,120,120</b>
<b>OTHER</b>			
	Land Acquisition		\$ 400,000
	<b>TOTAL</b>		<b>\$ 2,890,000</b>



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<b>CIP# C19 - 14: Dant Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 20,000
	Excavation/Demolition		\$ 800,000
	Box Culvert		\$ 1,500,000
	Cleanup		\$ 400,000
	Demobilization		\$ 20,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 2,740,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 1,096,000
	Operation & Maintenance	2%	\$ 54,800
	Engineering & Const Mgt	30%	\$ 822,000
	Administration & Legal	10%	\$ 274,000
	<b>Total Other Costs</b>		<b>\$ 2,246,800</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 4,990,000</b>



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<b>CIP# C19 - 16: Dant Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 20,000
	Channel Construction		\$ 680,000
	Cleanup		\$ 10,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 720,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 288,000
	Operation & Maintenance	2%	\$ 14,400
	Engineering & Const Mgt	30%	\$ 216,000
	Administration & Legal	10%	\$ 72,000
	<b>Total Other Costs</b>		<b>\$ 590,400</b>
<b>OTHER</b>			
	Land Acquisition		\$ 700,000
	<b>TOTAL</b>		<b>\$ 2,020,000</b>



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<b>CIP# C19 - 17: Dant Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Prep Work		\$ 30,000
	Form and Pour concrete		\$ 15,000
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 75,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 30,000
	Operation & Maintenance	2%	\$ 1,500
	Engineering & Const Mgt	30%	\$ 22,500
	Administration & Legal	10%	\$ 7,500
	<b>Total Other Costs</b>		<b>\$ 61,500</b>
<b>OTHER</b>			
	Land Acquisition		\$ 30,000
	<b>TOTAL</b>		<b>\$ 170,000</b>



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<b>CIP# C19 - 19: Dant Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 20,000
	Channel Construction		\$ 1,216,000
	Cleanup		\$ 10,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,256,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 502,400
	Operation & Maintenance	2%	\$ 25,120
	Engineering & Const Mgt	30%	\$ 376,800
	Administration & Legal	10%	\$ 125,600
	<b>Total Other Costs</b>		<b>\$ 1,029,920</b>
<b>OTHER</b>			
	Land Acquisition		\$ 700,000
	<b>TOTAL</b>		<b>\$ 2,990,000</b>



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<b>CIP# C19 - 20: Dant Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Prep Work		\$ 30,000
	Form and Pour concrete		\$ 15,000
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 75,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 30,000
	Operation & Maintenance	2%	\$ 1,500
	Engineering & Const Mgt	30%	\$ 22,500
	Administration & Legal	10%	\$ 7,500
	<b>Total Other Costs</b>		<b>\$ 61,500</b>
<b>OTHER</b>			
	Land Acquisition		\$ 30,000
	<b>TOTAL</b>		<b>\$ 170,000</b>



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<b>CIP# C19 - 21: Manzanita Park Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 40,000
	Excavation		\$ 100,000
	Modification of Existing Berm		\$ 800,000
	Cleanup		\$ 60,000
	Demobilization		\$ 40,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,040,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 416,000
	Operation & Maintenance	2%	\$ 20,800
	Engineering & Const Mgt	30%	\$ 312,000
	Administration & Legal	10%	\$ 104,000
	<b>Total Other Costs</b>		<b>\$ 852,800</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 1,900,000</b>



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<b>CIP# C19 - 22: Boyonton Slough</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 40,000
	Excavation/Demolition		\$ 80,000
	Box Culvert		\$ 1,000,000
	Cleanup		\$ 80,000
	Demobilization		\$ 40,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,240,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 496,000
	Operation & Maintenance	2%	\$ 24,800
	Engineering & Const Mgt	30%	\$ 372,000
	Administration & Legal	10%	\$ 124,000
	<b>Total Other Costs</b>		<b>\$ 1,016,800</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 2,260,000</b>



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<b>CIP# C19 - 22: Boyonton Slough</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 40,000
	Excavation/Demolition		\$ 80,000
	Box Culvert		\$ 1,000,000
	Cleanup		\$ 80,000
	Demobilization		\$ 40,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,240,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 496,000
	Operation & Maintenance	2%	\$ 24,800
	Engineering & Const Mgt	30%	\$ 372,000
	Administration & Legal	10%	\$ 124,000
	<b>Total Other Costs</b>		<b>\$ 1,016,800</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 2,260,000</b>



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<b>CIP# C19 - 23: Boyonton Slough</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 60,000
	Excavation/Demolition		\$ 100,000
	New Bridge w/ Box Culvert		\$ 1,500,000
	Cleanup		\$ 100,000
	Demobilization		\$ 60,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,820,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 728,000
	Operation & Maintenance	2%	\$ 36,400
	Engineering & Const Mgt	30%	\$ 546,000
	Administration & Legal	10%	\$ 182,000
	<b>Total Other Costs</b>		<b>\$ 1,492,400</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 3,320,000</b>



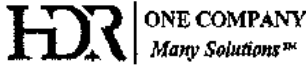
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<b>CIP# C19 - 24: Boyonton Slough</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 50,000
	Excavation/Demolition		\$ 200,000
	Box Culvert		\$ 700,000
	Cleanup		\$ 200,000
	Demobilization		\$ 50,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,200,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 480,000
	Operation & Maintenance	2%	\$ 24,000
	Engineering & Const Mgt	30%	\$ 360,000
	Administration & Legal	10%	\$ 120,000
	<b>Total Other Costs</b>		<b>\$ 984,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 2,190,000</b>



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<b>CIP# C19 - 25: Boyonton Slough</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 30,000
	Excavation/Demolition		\$ 100,000
	Box Culvert		\$ 300,000
	Cleanup		\$ 30,000
	Demobilization		\$ 30,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 490,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 196,000
	Operation & Maintenance	2%	\$ 9,800
	Engineering & Const Mgt	30%	\$ 147,000
	Administration & Legal	10%	\$ 49,000
	<b>Total Other Costs</b>		<b>\$ 401,800</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 900,000</b>



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<b>CIP# C19 - 26: Evans Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation/Demolition		\$ 20,000
	Headgate Construction		\$ 50,000
	Cleanup		\$ 20,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 100,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 40,000
	Operation & Maintenance	2%	\$ 2,000
	Engineering & Const Mgt	30%	\$ 30,000
	Administration & Legal	10%	\$ 10,000
	<b>Total Other Costs</b>		<b>\$ 82,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 190,000</b>



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<b>CIP# C19 - 27: Evans Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation/Demolition		\$ 100,000
	Channel Construction		\$ 528,000
	Cleanup		\$ 20,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 658,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 263,200
	Operation & Maintenance	2%	\$ 13,160
	Engineering & Const Mgt	30%	\$ 197,400
	Administration & Legal	10%	\$ 65,800
	<b>Total Other Costs</b>		<b>\$ 539,560</b>
<b>OTHER</b>			
	Land Acquisition		\$ 50,000
	<b>TOTAL</b>		<b>\$ 1,250,000</b>



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<b>CIP# C19 - 28: Evans Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Prep Work		\$ 40,000
	Form and Pour concrete		\$ 15,000
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 85,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 34,000
	Operation & Maintenance	2%	\$ 1,700
	Engineering & Const Mgt	30%	\$ 25,500
	Administration & Legal	10%	\$ 8,500
	<b>Total Other Costs</b>		<b>\$ 69,700</b>
<b>OTHER</b>			
	Land Acquisition		\$ 50,000
	<b>TOTAL</b>		<b>\$ 210,000</b>



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<b>CIP# C20 - 2: Thomas Creek West Split</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Prep Work		\$ 40,000
	Form and Pour concrete		\$ 15,000
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 85,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 34,000
	Operation & Maintenance	2%	\$ 1,700
	Engineering & Const Mgt	30%	\$ 25,500
	Administration & Legal	10%	\$ 8,500
	<b>Total Other Costs</b>		<b>\$ 69,700</b>
<b>OTHER</b>			
	Land Acquisition		\$ 100,000
	<b>TOTAL</b>		<b>\$ 260,000</b>



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<b>CIP# C20 - 3: Thomas Creek East Split</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 50,000
	Excavation/Demolition		\$ 80,000
	Box Culvert		\$ 1,300,000
	Cleanup		\$ 100,000
	Demobilization		\$ 50,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,580,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 632,000
	Operation & Maintenance	2%	\$ 31,600
	Engineering & Const Mgt	30%	\$ 474,000
	Administration & Legal	10%	\$ 158,000
	<b>Total Other Costs</b>		<b>\$ 1,295,600</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 2,880,000</b>



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<b>CIP# C20 - 6: Thomas Creek East Split</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation/Demolition		\$ 150,000
	Channel Construction		\$ 2,193,000
	Cleanup		\$ 30,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 2,383,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 953,200
	Operation & Maintenance	2%	\$ 47,660
	Engineering & Const Mgt	30%	\$ 714,900
	Administration & Legal	10%	\$ 238,300
	<b>Total Other Costs</b>		<b>\$ 1,954,060</b>
<b>OTHER</b>			
	Land Acquisition		\$ 1,000,000
	<b>TOTAL</b>		<b>\$ 5,340,000</b>



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<b>CIP# C20 - 7: Thomas Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Prep Work		\$ 30,000
	Form and Pour concrete		\$ 40,000
	Cleanup		\$ 10,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 100,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 40,000
	Operation & Maintenance	2%	\$ 2,000
	Engineering & Const Mgt	30%	\$ 30,000
	Administration & Legal	10%	\$ 10,000
	<b>Total Other Costs</b>		<b>\$ 82,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ 30,000
	<b>TOTAL</b>		<b>\$ 220,000</b>



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<b>CIP# C21 - 1a: Whites Creek Flow Splitting Structure</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Prep Work		\$ 90,000
	Form and Pour concrete		\$ 75,000
	Cleanup		\$ 15,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 200,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 80,000
	Operation & Maintenance	2%	\$ 4,000
	Engineering & Const Mgt	30%	\$ 60,000
	Administration & Legal	10%	\$ 20,000
	<b>Total Other Costs</b>		<b>\$ 164,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 370,000</b>



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<b>CIP# C21 - 1b: Whites Creek Debris Basin</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 30,000
	Excavation		\$ 80,000
	Construction of Debris Basin		\$ 1,000,000
	Cleanup		\$ 60,000
	Demobilization		\$ 30,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,200,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 480,000
	Operation & Maintenance	2%	\$ 24,000
	Engineering & Const Mgt	30%	\$ 360,000
	Administration & Legal	10%	\$ 120,000
	<b>Total Other Costs</b>		<b>\$ 984,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ 300,000
	<b>TOTAL</b>		<b>\$ 2,490,000</b>



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<b>CIP# C21 - 2: Galena Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 30,000
	Channel Construction		\$ 800,000
	Cleanup		\$ 20,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 860,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 344,000
	Operation & Maintenance	2%	\$ 17,200
	Engineering & Const Mgt	30%	\$ 258,000
	Administration & Legal	10%	\$ 86,000
	<b>Total Other Costs</b>		<b>\$ 705,200</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 1,570,000</b>



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<b>CIP# C21 - 3: Galena Wash</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 5,000
	Excavation		\$ 30,000
	Channel Construction		\$ 842,000
	Cleanup		\$ 20,000
	Demobilization		\$ 5,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 902,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 360,800
	Operation & Maintenance	2%	\$ 18,040
	Engineering & Const Mgt	30%	\$ 270,600
	Administration & Legal	10%	\$ 90,200
	<b>Total Other Costs</b>		<b>\$ 739,640</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 1,650,000</b>



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<b>CIP# C21 - 4: Steamboat Creek S of Hwy 341</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 50,000
	Excavation/Demolition		\$ 50,000
	Box Culvert		\$ 1,500,000
	Cleanup		\$ 50,000
	Demobilization		\$ 50,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,700,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 680,000
	Operation & Maintenance	2%	\$ 34,000
	Engineering & Const Mgt	30%	\$ 510,000
	Administration & Legal	10%	\$ 170,000
	<b>Total Other Costs</b>		<b>\$ 1,394,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 3,100,000</b>



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<b>CIP# C21 - 5: Steamboat Creek S of Hwy 341</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 50,000
	Excavation/Demolition		\$ 50,000
	Box Culvert		\$ 1,500,000
	Cleanup		\$ 50,000
	Demobilization		\$ 50,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,700,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 680,000
	Operation & Maintenance	2%	\$ 34,000
	Engineering & Const Mgt	30%	\$ 510,000
	Administration & Legal	10%	\$ 170,000
	<b>Total Other Costs</b>		<b>\$ 1,394,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 3,100,000</b>



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<b>CIP# C20 - 9: Dry Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 30,000
	Box Culvert		\$ 90,600
	Cleanup		\$ 20,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 160,600</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 64,240
	Operation & Maintenance	2%	\$ 3,212
	Engineering & Const Mgt	30%	\$ 48,180
	Administration & Legal	10%	\$ 16,060
	<b>Total Other Costs</b>		<b>\$ 131,692</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 300,000</b>



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<b>CIP# C20 - 10: Dry Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 423,000
	Cleanup		\$ 20,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 483,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 193,200
	Operation & Maintenance	2%	\$ 9,660
	Engineering & Const Mgt	30%	\$ 144,900
	Administration & Legal	10%	\$ 48,300
	<b>Total Other Costs</b>		<b>\$ 396,060</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 880,000</b>



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<b>CIP# C20 - 12: Dry Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 317,250
	Cleanup		\$ 20,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 377,250</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 150,900
	Operation & Maintenance	2%	\$ 7,545
	Engineering & Const Mgt	30%	\$ 113,175
	Administration & Legal	10%	\$ 37,725
	<b>Total Other Costs</b>		<b>\$ 309,345</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 690,000</b>



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<b>CIP# C20 - 14: Dry Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Box Culvert		\$ 253,125
	Cleanup		\$ 20,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 313,125</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 125,250
	Operation & Maintenance	2%	\$ 6,263
	Engineering & Const Mgt	30%	\$ 93,938
	Administration & Legal	10%	\$ 31,313
	<b>Total Other Costs</b>		<b>\$ 256,763</b>
<b>OTHER</b>			
	Land Acquisition		\$ -
	<b>TOTAL</b>		<b>\$ 570,000</b>



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<b>CIP# C20 - 16: Dry Creek</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 10,000
	Excavation/Demolition		\$ 20,000
	Form and Pour concrete/Earthwork		\$ 100,000
	Cleanup		\$ 20,000
	Demobilization		\$ 10,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 160,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 64,000
	Operation & Maintenance	2%	\$ 3,200
	Engineering & Const Mgt	30%	\$ 48,000
	Administration & Legal	10%	\$ 16,000
	<b>Total Other Costs</b>		<b>\$ 131,200</b>
<b>OTHER</b>			
	Land Acquisition		\$ 100,000
	<b>TOTAL</b>		<b>\$ 400,000</b>



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<b>CIP# D16 - 1: Spanish Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 30,000
	Excavation		\$ 80,000
	Detention Basin Modifications		\$ 300,000
	Cleanup		\$ 60,000
	Demobilization		\$ 30,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 500,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 200,000
	Operation & Maintenance	2%	\$ 10,000
	Engineering & Const Mgt	30%	\$ 150,000
	Administration & Legal	10%	\$ 50,000
	<b>Total Other Costs</b>		<b>\$ 410,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ 100,000
	<b>TOTAL</b>		<b>\$ 1,010,000</b>



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<b>CIP# D16 - 2: Spanish Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 30,000
	Excavation		\$ 80,000
	Channel Modifications		\$ 100,000
	Detention Basin Modifications		\$ 300,000
	Cleanup		\$ 60,000
	Demobilization		\$ 30,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 600,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 240,000
	Operation & Maintenance	2%	\$ 12,000
	Engineering & Const Mgt	30%	\$ 180,000
	Administration & Legal	10%	\$ 60,000
	<b>Total Other Costs</b>		<b>\$ 492,000</b>
<b>OTHER</b>			
	Land Acquisition		\$ 100,000
	<b>TOTAL</b>		<b>\$ 1,200,000</b>



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<b>CIP# D16 - 3: Spanish Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 30,000
	Excavation		\$ 80,000
	Construction of Diversion Berm		\$ 400,000
	Detention Basin Modifications		\$ 300,000
	Cleanup		\$ 40,000
	Demobilization		\$ 30,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 880,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 352,000
	Operation & Maintenance	2%	\$ 17,600
	Engineering & Const Mgt	30%	\$ 264,000
	Administration & Legal	10%	\$ 88,000
	<b>Total Other Costs</b>		<b>\$ 721,600</b>
<b>OTHER</b>			
	Land Acquisition		\$ 100,000
	<b>TOTAL</b>		<b>\$ 1,710,000</b>



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<b>CIP# D16 - 4: Spanish Springs</b>			
<b>CONSTRUCTION</b>			
	Mobilization		\$ 30,000
	Excavation		\$ 80,000
	Box Culverts		\$ 1,161,000
	Channel Modifications		\$ 200,000
	Cleanup		\$ 80,000
	Demobilization		\$ 30,000
	<b>Total Capital Improvement Costs</b>		<b>\$ 1,581,000</b>
<b>OTHER COSTS</b>			
	Contingencies	40%	\$ 632,400
	Operation & Maintenance	2%	\$ 31,620
	Engineering & Const Mgt	30%	\$ 474,300
	Administration & Legal	10%	\$ 158,100
	<b>Total Other Costs</b>		<b>\$ 1,296,420</b>
<b>OTHER</b>			
	Land Acquisition		\$ 100,000
	<b>TOTAL</b>		<b>\$ 2,980,000</b>