8-483-513

BASTROP REGIONAL WASTEWATER STUDY MAHA CREEK/CEDAR CREEK EXTENDED STUDY AREA

FOR THE LOWER COLORADO RIVER AUTHORITY

BASTROP REGIONAL WASTEWATER STUDY
MAHA CREEK/CEDAR CREEK
EXTENDED STUDY AREA

APPENDIX
VOLUME 3

Prepared for
Lower Colorado River Authority
February 1988

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1.0 INTRODUCTION

The purpose of this report is to examine the feasibility of alternatives for providing regional wastewater treatment and disposal in the Upper Cedar Creek and Maha Creek Watersheds in Western Bastrop County. The study of the two subject watersheds is an extension of a regional wastewater study in Bastrop County undertaken by the Lower Colorado River Authority (LCRA). In order to complete the study of alternatives for these two watersheds estimates of population were prepared for the years 1990, 2000 and 2010 for each of the watershed areas by sectors shown on the map in the enclosed pocket. Population estimates were used to project wastewater flows from portions of the study area which could reasonably be served by collective wastewater systems in the foreseeable future.

2.0 STUDY AREA CONDITIONS

The key ingredients in evaluating alternatives for wastewater service are the projected populations to be served, the type and density of development, and water quality issues. Historical development trends in the area, soils, geography and other physical characteristics are also important to consider since they have an impact on the attractiveness of an area for development and on the cost of various wastewater service alternatives.

2.1 CURRENT CONDITIONS

The study area is located in western Bastrop County, which by most estimates is the most rapidly growing area in the County. Population growth is a function of the availability of jobs so one would expect that proximity to major employment centers in the Austin area would cause this area to experience growth. Most of the area development in the past has been on large lots served by septic tanks. Many older subdivisions in the area have unpaved roads and other problems with infrastructure. In some areas low permeability soils cause septic system drainfields to function poorly, especially in wet weather. More recent developments are subject to the subdivision standards of Bastrop County and the City of Bastrop since much of the area falls within the City of Bastrop Extraterritorial Jurisdiction.

The study area does not have any unusual development constraints. Terrain is rolling, most areas having less than 10% slope. Soils are of the Crockett-Wilson and Behring-Crockett- Heiden association with loamy or clay soils on the surface with slowly permeable lower layers. Some areas have large amounts of gravel with clay loam soil binder.

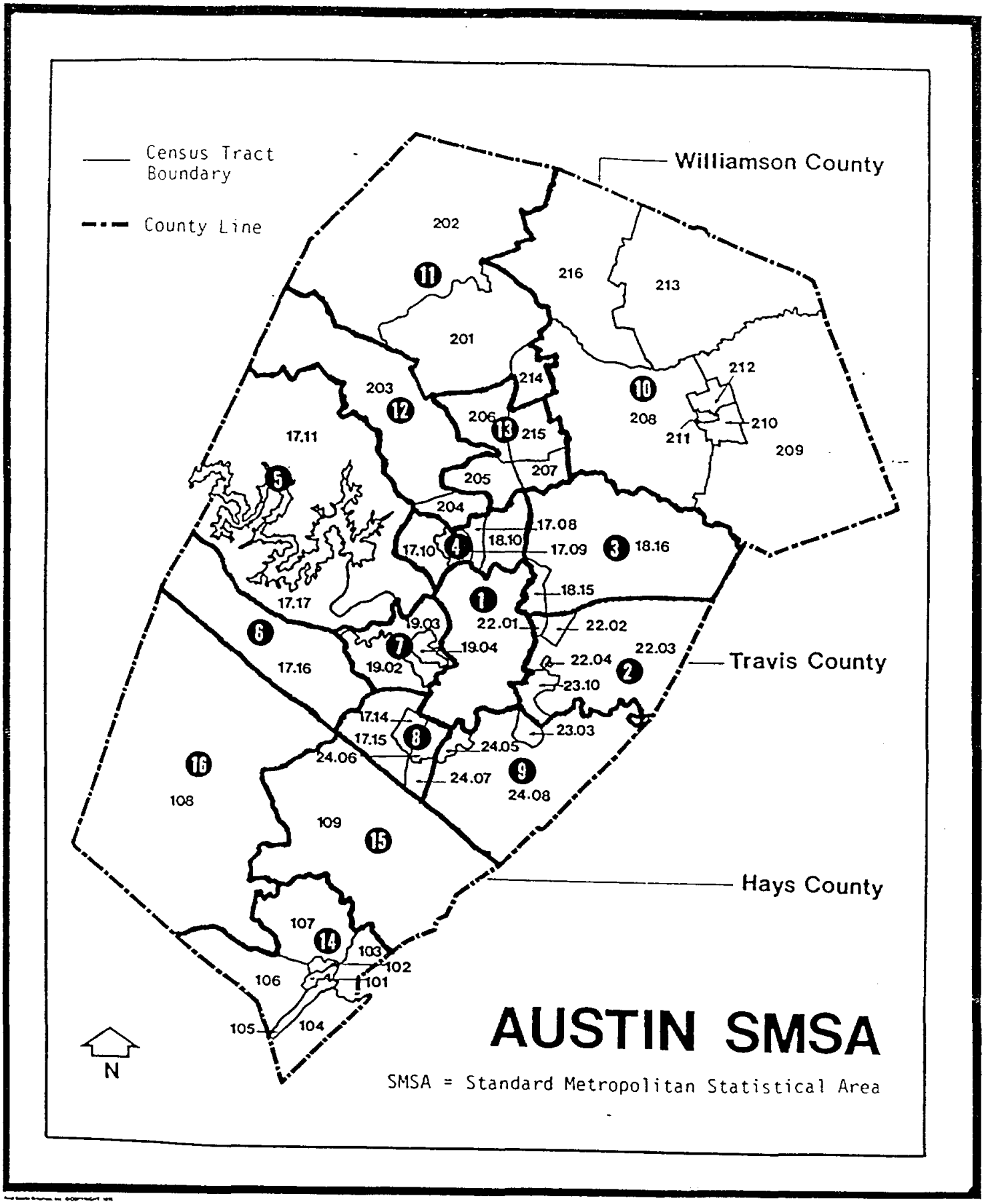
No unusual floodplain conditions exist in the area. The main branches of the Maha and Cedar Creeks have wide floodplains due to channel topography and their tributary areas of 40 square miles and 60 square miles respectively.

2.2 POPULATION PROJECTIONS

Capitol Market Research was selected to prepare population projections for the study area due to their recent experience in preparing similar forecasts for the proposed Bastrop County M.U.D. Nos. 1 and 2. The following information briefly presents the approach that was used to forecast the population for the Maha and Cedar Creek watersheds.

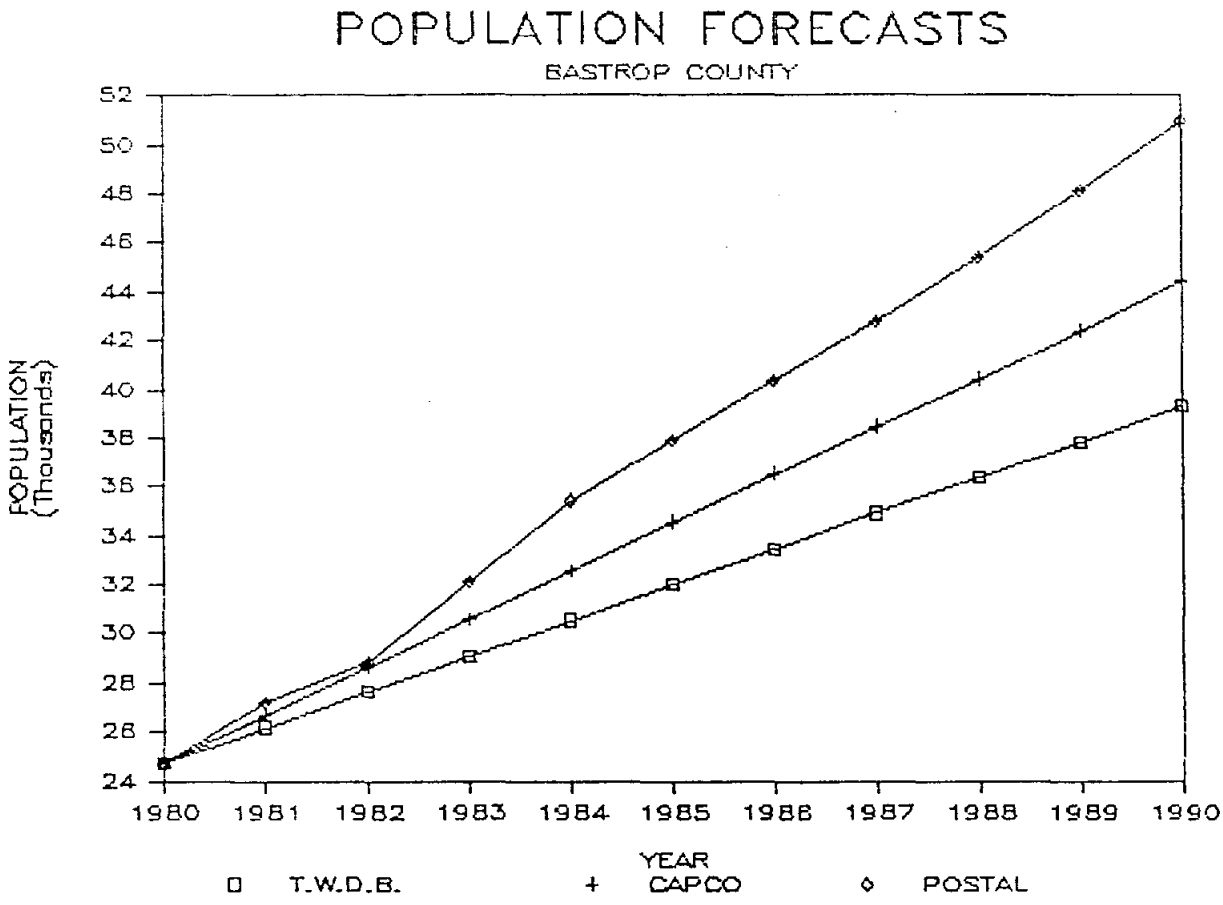
2.2.1 County Forecasts

The first part of the analysis involves preparing a regional population forecast (Table 1). This five county forecast is based in part on a model developed for the Austin Metropolitan Statistical Area by Capitol Market Research and partially on forecasts that were developed by the Texas Water Development Board. Hays, Travis and Williamson County forecasts for 1990 through 2000 are from a model developed by Capitol Market Research which uses the State employment forecast from the Comptroller's Office as the basis for developing an Austin area employment and population forecast. By forecasting the relationship between employment and population in the Austin area and combining that data and the State Forecast, an Austin area population forecast is developed for the three counties within the MSA (Exhibit 1). Caldwell County forecasts are based on the Texas Water Development Board February 1986 county level population forecasts. The Bastrop County 1990 - 2010 forecast was developed from historical growth trends in Bastrop County based on the increases in postal deliveries and utility connections within the county.



Market Area

Exhibit 1



SOURCE:	POPULATION 1980	PROJECTED POPULATION 1990	PROJECTION PREPARED
Texas Water Development Board	24,726	39,271	February, 1986
Capital Area Planning Council	24,726	44,376	January, 1987
Postal Delivery Forecast	24,726	50,989	December, 1986

Exhibit 2

In the other four counties, the population increase between 2000 and 2010 is the TWDB forecasted increase.

The Texas Water Development Board (TWDB) forecasts for Bastrop County were not used for the short-term (1990 - 2000) forecast period because they do not reflect the recent acceleration of growth experienced by Bastrop County.

While Bastrop County is currently not a part of the Austin MSA, it is beginning to develop a commuting pattern that will make it a candidate for inclusion in the 1990 Census. The areas closest to Travis County (including the Maha and Cedar Creek watersheds) are likely to experience a growth rate that will exceed other areas of the county.

The current population estimates and forecasts provided by the Capitol Area Planning Council (CAPCO) verify this higher growth rate of population expansion. Thus it seems reasonable to assume a higher rate of growth for the county than is reflected by the TWDB 1990 and 2000 forecast numbers. Exhibit 2 shows a comparison of the population forecasts between the Texas Water Development Board, the Capital Area Planning Council, and the Postal Delivery Service.

2.2.2 Watershed Forecasts

Using the population forecasts for the region as the departure point, the watershed forecast for Maha and Cedar Creek can be developed. First, a 1980 estimate is needed. In 1980 it is assumed that there were approximately 3,400 people living within the Maha Creek Watershed and approximately 1,800 people living within the Cedar Creek Watershed. These estimates were developed by proportionately allocating the population in a larger area to the smaller watershed areas. For example, a portion of the Maha Creek Watershed falls within Sector 9 in the Austin MSA forecast model. It is also located in Bastrop County. By estimating the population for the larger area, either Sector 9 or Bastrop County, and the total number of acres within that area, an estimate of the current population was made utilizing the acreage within the watershed. This estimate assumes a uniform and proportional allocation of population within the subarea which is a reasonable method for allocation for a preliminary analysis. (However, a current population survey should be conducted prior to concluding feasibility of a regional wastewater treatment facility.) Following this procedure, it was estimated that approximately 19.9% of the population in Sector 9 was located within the Maha Creek Watershed and about 1.5% of the total Bastrop County population in 1980 was located within the watershed. This was forecasted to change only slightly by 1987 resulting in approximately 20.6% of the Sector 9 population and 1.5% of the Bastrop County population residing in the watershed.

Based on (1) the size of the study area, (2) its proximity to development in Southeast Austin and to major employers located on Hwy. 71 and 183, (3) the natural terrain, and (4) relatively low land costs, it was assumed that future development within the market area would occur at slightly greater rates than would be suggested by only a proportional allocation based on acreage. Consequently, again using the Maha Creek example, the proportion of Sector 9 population growth that would fall within the Maha Creek Watershed would grow from 20% in 1980 to approximately 28% in the year 2010. These estimates are based on the assumption that with the availability of a regional wastewater treatment facility a significant amount of growth that might have gone to other parts of southeast Travis and Bastrop counties will occur within the identified market area.

2.2.3 Growth Allocation within the Watershed

Once an estimate of the overall population for the forecast period had been determined, it was then necessary to disaggregate that population amount the various sub-areas within each watershed. For the purposes of planning, the two watersheds were subdivided into 14 different market segments (map in pocket). These market segments were then objectively analyzed on the basis of several criteria that were felt to have a

significant influence on the probability of growth occurring within that sub-market. These factors include the following:

- Proximity to employment
- The presence of major developments planned within the sub-area
- Proximity to major roads
- The quality of the environment (trees, rolling terrain)
- Access to urban services (cleaners, grocery stores, gas stations)

Each sub-area was evaluated according to these criteria and assigned attractiveness ratings. These attractiveness ratings are combined with an infrastructure rating in order to determine the probability of development occurring in a particular sub-area. The infrastructure rating is based on the availability of wastewater service within the tract. If the tract is serviced by septic tanks exclusively, it has a very low infrastructure rating because the carrying capacity of the land based on septic systems is extremely low. If on the other hand, the tract receives service from a Municipal Utility District or is within the boundaries of a municipality and receives City service, then the infrastructure rating would be substantially higher. The rating itself indicates what percentage of the tract is served by a municipality or utility district, (thus enabling higher density development to occur). Thus if 25% of the tract is within

a water district, then the infrastructure rating would be 25. Obviously, during the forecast period this is likely to change as new developments occur especially if, as is assumed herein, LCRA provides wastewater treatment service through a regional wastewater treatment plant. Based on the analysis of attractiveness and constraints as defined by the infrastructure rating, growth is allocated among the various sectors for the next 23 years. The result of this allocation forecast is that Maha Creek has a population forecast of approximately 29,000 in 2010 and Cedar Creek has a population estimate of approximately 15,000. The allocation of the growth within the sub-markets is shown on Tables 3 through 6 accompanying this description. Generally speaking, however, the growth is most likely to occur in the areas that are closest to Hwy. 71 and Hwy. 183.

TABLE 1

POPULATION FORECASTS

COUNTY	1980	1990	2000	2010
BASTROP	24,726	50,989	77,252	103,515
CALDWELL	23,637	31,439	37,867	40,028
HAYS	40,594	60,301	71,970	107,199
TRAVIS	419,573	662,696	905,165	1,080,888
WILLIAMSON	76,521	126,244	181,152	249,651
TOTAL	585,051	931,669	1,273,406	1,581,281

Source: Capitol Market Research, Austin MSA Population Forecasts,December 1986

WATERSHED	1980	1990	2000	2010
MAHA CREEK	3,406	8,427	18,422	29,420
CEDAR CREEK	1,842	4,489	9,728	14,540

Note: Population in 1980 Based On The Acreage Within The Watershed

TABLE 2

PROPORTION OF REGIONAL GROWTH ALLOCATED TO THE MARKET AREA

AREA	1980	1986	1990	2000	2010
SECTOR 9:	15,289	27,069	36,323	59,351	77,641
MAHA CREEK:	3,046	5,588	7,673	15,042	21,444
PERCENT:	19.9%	20.6%	21.1%	25.3%	27.6%
BASTROP CO:	24,726	40,388	50,989	77,252	103,515
MAHA CREEK:	360	606	754	3,380	7,976
PERCENT:	1.5%	1.5%	1.5%	4.4%	7.7%
CEDAR CREEK:	1,009	2,137	3,110	7,706	12,302
PERCENT:	4.1%	5.3%	6.1%	10.0%	11.9%
CALDWELL CO:	23,637	28,318	31,439	37,867	40,028
CEDAR CREEK:	833	1,145	1,379	2,022	2,238
PERCENT:	3.5%	4.0%	4.4%	5.3%	5.6%
TOTAL:	5,248	9,476	12,917	28,151	43,960
MAHA CREEK:	3,406	6,194	8,427	18,422	29,420
CEDAR CREEK:	1,842	3,282	4,489	9,728	14,540
CHANGE:	...	4,228	3,441	15,234	15,810

Note: Population in 1980 Based On The Acreage Within The Watershed

TABLE 3

LCRA WATERSHED PROJECTIONS

SECTOR:	1980 POPULATION	POPULATION ALLOCATED	1990 POPULATION	POPULATION ALLOCATED	2000 POPULATION	POPULATION ALLOCATED	2010 POPULATION
SECTOR 1:	164	1,153	1,317	1,437	2,754	1,492	4,246
SECTOR 2:	196	1,384	1,580	2,587	4,167	2,685	6,852
SECTOR 3:	683	1,730	2,413	2,156	4,569	2,237	6,806
SECTOR 4:	518	173	691	431	1,122	447	1,570
SECTOR 5:	482	231	713	1,150	1,862	1,193	3,056
SECTOR 6:	705	231	936	1,150	2,085	1,193	3,279
SECTOR 7:	658	173	831	862	1,693	895	2,588
SECTOR 8:	241	115	356	719	1,075	746	1,821
SECTOR 9:	316	2,018	2,334	3,521	5,855	3,654	9,509
SECTOR 10:	253	115	368	575	943	597	1,540
SECTOR 11:	199	115	314	144	458	149	607
SECTOR 12:	356	58	414	72	486	75	560
SECTOR 13	329	115	444	287	732	298	1,030
SECTOR 14:	149	58	207	144	350	149	500
TOTAL:	5,249	7,669	12,918	15,234	28,152	15,810	43,962

WATERSHED	1980	1990	2000	2010
MAHA CREEK:	3,406	8,480	18,253	28,395
CEDAR CREEK:	1,843	4,438	9,899	15,567

Note: The small area allocation procedure outlined on the following pages redistributes the initial watershed forecasts among the 14 subareas. In reaggregating these sectors to the appropriate watershed a small deviation from the market area forecast results. The small area forecasts following and the watershed forecasts above are considered to be more accurate.

TABLE 4

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POPULATION PROJECTION
1980 - 1990
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PROJECTED POPULATION GROWTH = 7,669

AREA	1980 POPULATION	DENSITY PER ACRE	LAND AVAILABLE IN 1980	ATTRACTIVENESS RATING:	INFRASTRUCTURE RATING	ADVANTAGE RATING:	% OF POPULATION ALLOCATED	POPULATION ALLOCATED	% of POPULATION GROWTH	LAND ABSORBED	LAND AVAILABLE IN 1990	1990 POPULATION
SECTOR 1:	164	6.00	3,783	50.00	20.00%	10.00	15.04%	1,153	703.19%	192	3,590	1,317
SECTOR 2:	196	6.00	4,497	60.00	20.00%	12.00	18.05%	1,384	706.06%	231	4,267	1,580
SECTOR 3:	683	6.00	3,826	50.00	30.00%	15.00	22.56%	1,730	253.27%	288	3,538	2,413
SECTOR 4:	518	6.00	2,904	30.00	5.00%	1.50	2.26%	173	33.39%	29	2,875	691
SECTOR 5:	482	6.00	2,701	40.00	5.00%	2.00	3.01%	231	47.85%	38	2,662	713
SECTOR 6:	705	6.00	3,953	40.00	5.00%	2.00	3.01%	231	32.72%	38	3,914	936
SECTOR 7:	658	6.00	3,690	30.00	5.00%	1.50	2.26%	173	26.29%	29	3,662	831
SECTOR 8:	241	6.00	5,550	20.00	5.00%	1.00	1.50%	115	47.85%	19	5,531	356
SECTOR 9:	316	6.00	7,257	70.00	25.00%	17.50	26.32%	2,018	638.66%	336	6,921	2,334
SECTOR 10:	253	6.00	5,828	20.00	5.00%	1.00	1.50%	115	45.58%	19	5,809	368
SECTOR 11:	199	6.00	4,567	10.00	10.00%	1.00	1.50%	115	57.95%	19	4,548	314
SECTOR 12:	356	6.00	5,201	10.00	5.00%	0.50	0.75%	58	16.20%	10	5,191	414
SECTOR 13:	329	6.00	4,805	20.00	5.00%	1.00	1.50%	115	35.05%	19	4,786	444
SECTOR 14:	149	6.00	2,175	10.00	5.00%	0.50	0.75%	58	38.70%	10	2,166	207
TOTAL:	5,249		60,736			66.50	100.00%	7,669	146.10%	1,278	59,458	12,918

TABLE 5

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POPULATION PROJECTION
1990 - 2000
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PROJECTED POPULATION GROWTH = 15,234

SECTOR:	1990 POPULATION	DENSITY PER ACRE	LAND AVAILABLE IN 1990	ATTRACTIVENESS RATING:	INFRASTRUCTURE RATING	ADVANTAGE RATING:	% OF POPULATION ALLOCATED	POPULATION ALLOCATED	% of POPULATION GROWTH	LAND ABSORBED	LAND AVAILABLE IN 2000	2000 POPULATION
SECTOR 1:	1,317	6.00	3,590	50.00	20.00%	10.00	9.43%	1,437	109.11%	240	3,351	2,754
SECTOR 2:	1,580	6.00	4,267	60.00	30.00%	18.00	16.98%	2,587	163.74%	431	3,836	4,167
SECTOR 3:	2,413	6.00	3,538	50.00	30.00%	15.00	14.15%	2,156	89.34%	359	3,179	4,569
SECTOR 4:	691	6.00	2,875	30.00	10.00%	3.00	2.83%	431	62.40%	72	2,803	1,122
SECTOR 5:	713	6.00	2,662	40.00	20.00%	8.00	7.55%	1,150	161.33%	192	2,471	1,862
SECTOR 6:	936	6.00	3,914	40.00	20.00%	8.00	7.55%	1,150	122.88%	192	3,722	2,085
SECTOR 7:	831	6.00	3,662	30.00	20.00%	6.00	5.66%	862	103.77%	144	3,518	1,693
SECTOR 8:	356	6.00	5,531	20.00	25.00%	5.00	4.72%	719	201.67%	120	5,411	1,075
SECTOR 9:	2,334	6.00	6,921	70.00	35.00%	24.50	23.11%	3,521	150.85%	587	6,334	5,855
SECTOR 10:	368	6.00	5,809	20.00	20.00%	4.00	3.77%	575	156.08%	96	5,713	943
SECTOR 11:	314	6.00	4,548	10.00	10.00%	1.00	0.94%	144	45.72%	24	4,524	458
SECTOR 12:	414	6.00	5,191	10.00	5.00%	0.50	0.47%	72	17.37%	12	5,179	486
SECTOR 13:	444	6.00	4,786	20.00	10.00%	2.00	1.89%	287	64.69%	48	4,738	732
SECTOR 14:	207	6.00	2,166	10.00	10.00%	1.00	0.94%	144	69.54%	24	2,142	350
TOTAL:	12,918		59,458			106	100.00%	15,234	117.93%	2,539	56,919	28,152

TABLE 6

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POPULATION PROJECTION
2000 - 2010
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PROJECTED POPULATION GROWTH = 15,810

SECTOR:	2000 POPULATION	DENSITY PER ACRE	LAND AVAILABLE IN 2000	ATTRACTIVENESS RATING:	INFRASTRUCTURE RATING	ADVANTAGE RATING:	% OF POPULATION ALLOCATED	POPULATION ALLOCATED	% of POPULATION GROWTH	LAND ABSORBED	LAND AVAILABLE IN 2010	2010 POPULATION
SECTOR 1:	2,754	6.00	3,351	50.00	20.00%	10.00	9.43%	1,492	54.15%	249	3,102	4,246
SECTOR 2:	4,167	6.00	3,836	60.00	30.00%	18.00	16.98%	2,685	64.43%	447	3,388	6,852
SECTOR 3:	4,569	6.00	3,179	50.00	30.00%	15.00	14.15%	2,237	48.97%	373	2,806	6,806
SECTOR 4:	1,122	6.00	2,803	30.00	10.00%	3.00	2.83%	447	39.88%	75	2,728	1,570
SECTOR 5:	1,862	6.00	2,471	40.00	20.00%	8.00	7.55%	1,193	64.07%	199	2,272	3,056
SECTOR 6:	2,085	6.00	3,722	40.00	20.00%	8.00	7.55%	1,193	57.22%	199	3,524	3,279
SECTOR 7:	1,693	6.00	3,518	30.00	20.00%	6.00	5.66%	895	52.85%	149	3,369	2,588
SECTOR 8:	1,075	6.00	5,411	20.00	25.00%	5.00	4.72%	746	69.38%	124	5,287	1,821
SECTOR 9:	5,855	6.00	6,334	70.00	35.00%	24.50	23.11%	3,654	62.41%	609	5,725	9,509
SECTOR 10:	943	6.00	5,713	20.00	20.00%	4.00	3.77%	597	63.25%	99	5,613	1,540
SECTOR 11:	458	6.00	4,524	10.00	10.00%	1.00	0.94%	149	32.56%	25	4,499	607
SECTOR 12:	486	6.00	5,179	10.00	5.00%	0.50	0.47%	75	15.36%	12	5,167	560
SECTOR 13:	732	6.00	4,738	20.00	10.00%	2.00	1.89%	298	40.77%	50	4,688	1,030
SECTOR 14:	350	6.00	2,142	10.00	10.00%	1.00	0.94%	149	42.57%	25	2,117	500
TOTAL:	28,152		56,919			106	100.00%	15,810	56.16%	2,635	54,284	43,962

3.0 ALTERNATIVES

Alternative wastewater systems have been evaluated for providing regional service to the study area. The evaluation of appropriate alternatives takes in to consideration two development projects, Champion's Run and Elm Ridge (Bastrop Co. WCID No.3), both contemplating Municipal Utility Districts as vehicles for collecting and treating wastewater. Also taken into consideration was the likelihood of additional development in the lower portions of both watersheds in the near future. Other considerations in the evaluation of alternatives include cost, environmental impact, acceptability to the public and regulatory authorities, reliability and flexibility.

Population figures used in the following cost analysis of alternatives were derived from the expected population growth of sectors 1, 2, 3, 8 and 9. These are the areas with the highest projected population growth in the eastern end of the two watersheds. The areas along U.S. 183 in the western part of the study areas are too distant for connection to a regional plant on the eastern end of the study area within the 2010 planning horizon.

Only a portion of the populations projected for the sectors included was used to determine the expected wastewater flows. Some of the residents moving to the area will continue to rely on septic tanks in developments which do not provide central wastewater infrastructure. It is also not expected that significant sewering of existing low density subdivisions will take place in the near future.

A number of combinations of treatment plants, lift stations and wastewater mains can be used to provide wastewater service to the subject area. Eventually it is contemplated that a regional treatment plant would be located near the confluence of Cedar and Maha Creeks. This plant would provide gravity service to both watersheds, usually the most energy efficient method of providing wastewater service. However, in this case, wastewater mains would have to be constructed upstream in both watersheds at considerable expense.

Several alternatives were considered in order to reduce cost in the earlier stages of the project. Temporary sub-regional treatment plants could be constructed upstream of the confluence. This approach is less flexible in serving additional customers in the area especially downstream of the plants and once the regional plant is constructed downstream the cost of the temporary plants is lost.

Another alternative would be to pump wastewater from the Upper Maha Creek area, which is projected to have higher early growth rates, over the watershed divide to Cedar Creek interceptors for an interim period delaying the construction of the lower part of the Maha Creek gravity main (Fig. 1). This approach would provide the initial plant construction at the optimum location near the confluence, with a gravity main extended into the Cedar Creek Watershed. Through a process of analyzing the cost of various pumping alternatives it was determined that a pumping capacity of 0.57 MGD would be sufficient until 1995. At that time pumping would cease and the Lower Maha Creek gravity interceptor would be completed to relieve the lift station.

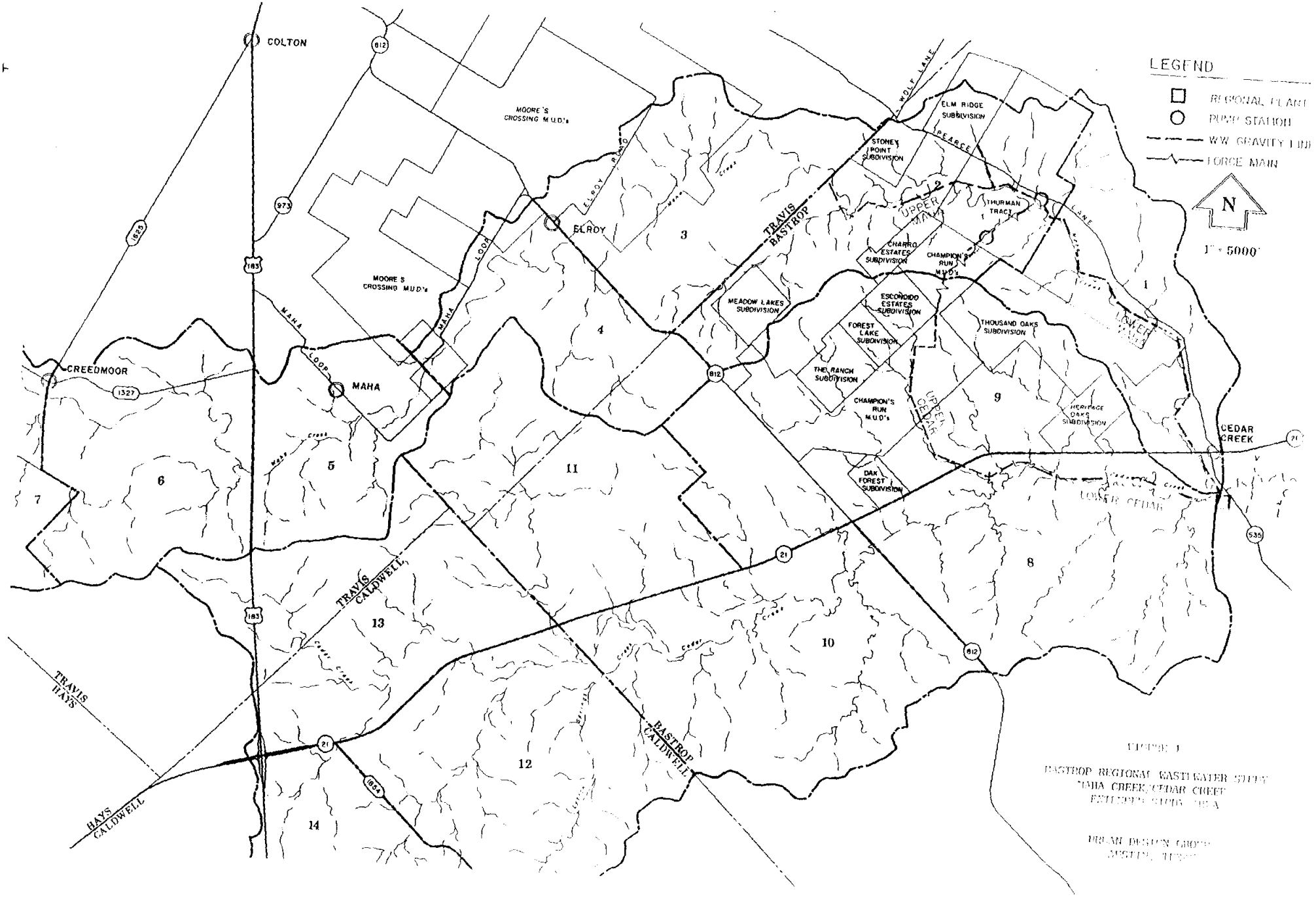

FIGURE 1

BASTROP REGIONAL WASTEWATER STUDY
MAHA CREEK/CEDAR CREEK
FACILITIES PLANNING AREA

URBAN DESIGN GROUP
AUSTIN, TEXAS

Table 7 includes the cost of improvements necessary for the proposed regional wastewater system through the year 2010. The costs estimated reflect the unit costs used in the Bastrop Regional Wastewater Study prepared for the LCRA by Freese and Nichols, Inc.

4.0 ENVIRONMENTAL IMPACTS

4.1 SURFACE WATER

Cedar Creek is an intermittent tributary of the Colorado River (Segment 1428). The distance from its confluence with Maha Creek to its confluence with the Colorado is approximately 14 miles. Major tributaries of Cedar Creek include Maha Creek, Walnut Creek, and Piney Creek. There are no streamflow gauging stations situated on Cedar Creek. The stream channel on Cedar Creek is generally well-defined, with bank heights of 10 to 30 feet. The stream consists of a series of riffles and pools. Width of the channel is typically 5 to 15 feet, with depths ranging from roughly 0.1 to 2 feet. A dense tree canopy covers most of the stream, and banks are densely vegetated.

The proposed treatment plants will discharge effluent with concentration limitations of 5 mg/1 biochemical oxygen demand (BOD_5), 5 mg/1 total suspended solids (TSS), 2 mg/1 ammonia nitrogen (NH_3-N), and 1 mg/1 total phosphorus (TP). The BOD_5 and NH_3-N concentrations of the effluent are in compliance with the recommendations described in the draft waste load evaluation for the Colorado River Segment 1428 prepared by the Texas Water Commission staff (TWC, 1986). The waste load evaluation contained the results of several water quality modeling exercises for the Colorado River

TABLE 7

COST ESTIMATE

1989	
Cedar Creek Plant	$4,127,500
Upper Cedar Creek Interceptor	1,083,750
Lower Cedar Creek Interceptor	1,456,250
Sub-Total 1989	$6,667,500
1990	
Maha Creek Pump Station	$ 431,250
Force Main	752,500
Upper Maha Interceptor	1,372,500
Sub-Total 1990	$2,556,250
1995	
Cedar Creek Plant Expansion	$4,418,750
Lower Maha Interceptor	2,636,250
Sub-Total 1995	$7,055,000
TOTAL ALL PHASES	$16,278,750

and its major tributaries, wherein the effects of alternative effluent quality levels were examined. Cedar Creek was not specifically modeled in the waste load evaluation. The proposed effluent limitations are in conformance with the treatment levels specified in the rule for the Colorado River Watershed recently adopted by the TWC.

The proposed facilities will provide advanced treatment and discharge effluent with 5 mg/1 BOD_5, 5mg/1 TSS, 2 mg/1 NH_3-N and 1mg/1 total phosphorous to an intermittent, nondesignated stream segment. The intermittent receiving stream has a dissolved oxygen standard of 3 mg/1, or, 2 mg/1 if classified as effluent-dominated. It is not anticipated that there will be any detrimental effect upon water quality from the discharges contemplated in this report.

4.2 GROUNDWATER

Due to the high quality of effluent and the low probability of effluent reaching groundwater in significant amounts it is not anticipated that the discharges described herein will have any identifiable adverse impact on groundwater quality.

Bastrop Regional Wastewater Study
Maha Creek/Cedar Creek Extended
Study Area For The Lower Colorado
River Authority
Contract No.8-483-513

The Following Map is not attached to this report. It is located in the official file and may be copied upon request.

Map No.1 Project No. 87-163.020

Please contact Research and Planning Fund Grants Management Division at (512) 463-7926