UPPER EAST RIVER VALLEY AREAWIDE

201 FACILITIES PLAN

for

GUNNISON COUNTY

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Executive Summary

Introduction

Rothberg Tamburini & Winsor (RTW) has produced an Areawide 201 Facilities Plan (201 Plan) for the upper East River valley in Gunnison County, CO. This document is intended to serve as the basis for regional wastewater planning and as a guide for future facility consolidations and plant expansions. The individual entities that comprise the 201 Advisory Committee, including the Towns of Crested Butte and Mt. Crested Butte, the area Sanitation Districts, Gunnison County and local environmental and water conservation groups will continue to view this document as a water quality planning tool and have proposed to continue to meet as a group and update the 201 Plan's recommendations, if there are any significant changes.

The 201 Advisory Committee, along with the Colorado Department of Public Health and Environment (CDPHE), has reached consensus on those items that are the most critical to finalize the Areawide 201 Facilities Plan. These items include the growth and wastewater flow projections, the alternatives analysis and evaluation matrix arriving at the preferred alternative, the capital costs of the preferred alternative and the plan for expansion of existing service areas. Only the key conclusions of this study and planning effort will be reviewed in the Executive Summary, with more detail provided in the subsequent sections of the report and the Appendices.

Population and Flows

The population projections have been studied and discussed in depth in Section 5 and the following Table P-1 summarizes the projected growth and wastewater flows for the next 20-year planning period (future) and the ultimate buildout from existing and expanded service areas. Some of these values are lower than the December 1993 values presented earlier to the public and in the draft report, but it is agreed that these are more realistic numbers for the cyclic rate of growth that has been

seen in this valley over time. It was agreed that if an entity experiences or expects growth beyond the current expectations, especially since the extent of the Mt. CB ski area expansion is still unresolved, then that entity would have to update this document accordingly.

Table P-1 Summary of Growth and Flow Projections

Facility	Existing Rated Capacity (MGD)	Housing Units (EA)	Peak Season Population (Persons)		Peak Month Flow (MGD)	Avg Daily Flow (gpcd)	Growth Rate (%)	Planning Period (YRS)
			Low	High				
Meridian Lake Park								
Existing	0.014	40	112	140	0.014	100.0		
Future		106	297	371	0.028	80.0	5.0	20
Buildout		140	392	490	0.036	74.0	5.0	26
Town of Mt. Crested Butte								
Existing	0.40	1513	4236	5295	0.480	90.6		
Future		2793	7820	9775	0.723	74.0	3.0	20
Buildout		3369	9433	11791	0.872	74.0	3.0	29
Town of Crested Butte								
Existing	0.40	1026	1539	2052	0.510	248.5		
Future		1596	2440	3192	0.638	188.0	2.0	20
Buildout		2161	3241	4322	0.820	188.0	2.0	39
East River Regional Sanitation District								
Existing	0.143	131	367	459	0.036	78.4		
Future		463	1295	1620	0.119	73.5	6.5	20
Buildout		630	1764	2205	0.165	75.0	6.5	25
Crested Butte South Metropolitan District								
Existing	0.05	175	438	525	0.036	68.6		
Future		900	2250	2700	0.203	75.0	9.0	20
Buildout		1200	3000	3600	0.270	75.0	9.0	25

The buildout values in the table above also include estimates of flow contributions from the development that may occur within the expanded service areas. These are estimated based on current plans and densities of development proposed and the plant's will be designed to handle

these additional connections. The rate of growth determined above is also based on a continued percentage of growth compared to the size of the community each year (compounded) and not on the basis of a certain number of units constructed per year. These values are difficult to predict with a high level of accuracy and are considered a best guess at this time.

The expanded service areas have been discussed in the 201 Advisory Committee meetings and Figure 6-1 in this report highlights these new geographic limits. The expanded service areas are considered to be critical for maintenance of the area's water quality by limiting the proliferation of small wastewater treatment facilities and individual sewage disposal systems (ISDS). This also prevents the wastewater existing treatment systems from having to treat to lower discharge levels if background pollutant loading increases in the streams from other discharges.

These new service area limits have been agreed to only in concept at this time. Agreements between the County and each expanding District will require formalized negotiations and discussions of limitations on authority. The requirements in housing density and distance for future development to connect to the existing systems, will also need to be determined. It is critical to all the parties involved that the developments that propose growth are responsible for the cost of extending collection and treatment services. Section 8 in this report contains the issues to be identified in the agreements in detail.

Preferred Alternative

The alternatives evaluation estimated the capital cost and the operational costs for five alternatives for regionalization of wastewater facilities. Since there is no acceptable "No Action" alternative, Alternative 1A was introduced after the draft report was reviewed, as a modified "No Action" plan. It allows for some regionalization to occur, with the incorporation of Meridian Lake Park into the Mt. CB system and a regional sludge treatment for the Towns, but without the future decommissioning of the larger facilities at the two towns. Alternative 1A was not the most cost effective alternative because, although capital expenditures were similar, it has the continued operation of four treatment plants where Alternative 3 has only two plants in operation after ten years. Thus the 20-year present worth cost will be higher for Alternative 1A than Alternative 3.

The public and public officials had other significant issues, however, besides present worth cost, that were important to consider in the analysis for the preferred alternative. Issues of importance are summarized in the evaluation matrix that follows:

Table P-2 Alternative Evaluation Matrix

Item	Weight	Alternative 1A Modified No Action	Alternative 2 Upper Basin Regional	Alternative 3 Mid Basin Regional	Alternative 4 Lower Basin Regional	Alternative 5 Mid Basin w\o Town
Present Worth Cost	50	45	40	50	20	15
Ease of Implementation	40	25	10	5	5	20
Water Quality	40	20	25	40	40	30
Consistent with Existing Planning	40	40	15	5	0	20
Maximum Use of Existing Facilities	30	30	25	15	5	20
Water Rights	30	30	20	5	0	20
Limit Proliferation of Small Systems	30	30	30	30	30	30
Wetland Impacts	20	20	0	5	0	20
Odor Control	10	3	1	10	5	2
Visual Impact	10	2	4	10	10	6
TOTAL	300	245	170	175	115	183

It is clear to all that the implementation of a mid-basin regional treatment plant was not feasible at this time for the valley. Alternative 1A is considered the preferred alternative because it offers some consolidation of systems, it expands the current service areas which will help to preserve the water quality of the area, and it is consistent with the current planning in the area.

Capital Cost of Preferred Alternative

The following Table P-3 gives the conceptual estimate of the capital costs needed for the preferred Alternative 1A to be constructed. These estimated cost values are the dollar figures that will go into the CDPHE "priority list" of wastewater projects requiring financial assistance. Loans

from the Water Pollution Control Revolving Fund (SRLF) will be made available to these entities for the dollar values given below at interest rates significantly less than available on the private bond market.

The CDPHE Financial Assistance Program has indicated that the loans can also be granted in portions to cover phased plant expansions. This will allow the individual Districts to expand their plants to the needed levels without building too much capacity and acquiring excessive debt that cannot be paid off until the projected growth occurs.

Table P-3 Cost Estimate for Alternative 1A - (In dollars)

Capital Improvements	Capital Cost	Annual Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
Meridian Lake Park - joins with Mt. CB	550,000	14,000 (20)	147,000	697,000
Pump Station at MLP	230,000			
Force Main to Mt. CB (5400 LF)	320,000			
Mt. Crested Butte - plant expands to 1.0 MGD limit of potential expansion	2,750,000	190,000 (10) 210,000 (10)	1,334,000 752,000	4,836,000
Add Blowers and minor modifications	100,000			
Clarifier Modifications	100,000			
ATAD Sludge Treatment Facility (65% share)	1,500,000			
Primary Clarifiers & Chemical Coagulation	550,000			
Electric & Control Mods.	200,000			
Add Flow Equalization	300,000			
Town of Crested Butte - existing plant expands to 0.6 MGD	2,870,000	150,000 (20)	1,575,000	4,445,000
Headworks Bldg. - screening, grit removal, pumps and blowers	620,000			
UV Disinfection	320,000			
New Oxidation Ditch Aeration Basin	900,000			
ATAD Sludge Treatment Facility (35% share)	800,000			
Standby Power & Misc Sitework	220,000			

Capital Improvements	Capital Cost	Annual Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
East River Regional - existing plant continues as regional plant to 0.17 MGD	100,000	68,000 (20)	714,000	814,000
Aeration Modifications	100,000			
Crested Butte South - expand plant to 0.27 MGD lower basin regional facility	1,000,000	58,000 (10) 100,000 (10)	409,000 360,000	1,769,000
Headworks	50,000			
Aeration Basins	200,000			
Clarifiers	100,000			
Disinfection System Mods.	50,000			
Sludge Treatment (or share at regional ATAD)	200,000			
Building for all Facilities	250,000			
Electrical & Controls	75,000			
Piping & Mechanical	75,000			

Mt. Crested Butte has already received site approval and has constructed the some of the capital improvements listed above to bring their plant to 0.6 MGD capacity. This was approved to keep the facility in compliance with the increasing flows and since it was a part of every alternative studied in the 201 Plan.

Implementation

The conclusions of the Areawide 201 Planning efforts were presented in a final public hearing for County-wide attendance on July 12th, 1995. A Public Responsiveness Summary was prepared and several issues regarding expanded service areas, growth projections and ISDS options were incorporated into the discussion of this report.

The participating entities are expected to accept the Plan in writing, with service area expansions needing further negotiation and acceptance prior to site application approvals. This document has been finalized and will serve as the basis for the individual plant expansion projects and associated site applications to the CDPHE. Each entity that desires the use of a SRLF loan with the lower interest rates from CDPHE Financial Assistance Program will have to submit more detailed environmental

assessment information specific to their plant expansion and any pipeline work. The individual Town or District must also hold their own public hearing to inform the affected public of the debt to be carried and any raise in tap fees and/or monthly user charges.

Besides determining the capital improvements needed for existing facilities to meet future loading, this document will also become the wastewater planning tool for the area. For example, if a new development is proposed that is over some size and density limit to be determined in the inter-local agreement, then that development will be required to connect to the existing wastewater treatment plant that serves the area. This report will also need to modified if in future years the population and flow projections are found to be incorrect.

The 201 Advisory Committee also plans to remain active as a planning entity to continue with both water quality planning and protection for the upper East River valley watershed.

SECTION 1

Introduction

Background and Purpose

Recent growth in the upper reaches of the East River Valley, especially in the Slate River basin, have required facility planning to occur at several existing wastewater treatment facilities. The Town of Crested Butte (Town) and the Town of Mt Crested Butte (Mt. CB) and Crested Butte South Metropolitan District (CB South) have seen increased population growth and their wastewater treatment plants are experiencing periods of hydraulic overload. Recent 5-year improvement plans had been prepared for both the Town and Mt. CB, in separate documents, and recommendations made for expansion of these plants. CB South has also produced a Master Plan with preliminary engineering for expansion of their existing facilities. The Meridian Lake Park lagoon facility is presently under a cease and desist order from the Colorado Department of Public Health and Environment (CDPHE) and cannot add taps to their system. They had requested the expansion of their existing facilities prior to the 201 planning process, but now are pursuing the recommended connection to the Mt. CB treatment system.

The CDPHE has financed this study, the Upper East River Valley Areawide 201 Facilities Plan (East River 201), through a contractual agreement with Gunnison County, to produce a wastewater treatment facilities plan that encompasses the entire planning area instead of individual plants. This study concentrates on wastewater treatment options of a regional scope for the five facilities involved. CDPHE is required to coordinate wastewater facilities planning to control the proliferation of small and individual wastewater treatment systems, especially in high growth areas. A previous study of similar scope was performed in 1982 (Ref. 1), but has been considered outdated for current planning purposes and for waste allocations.

Although funding from the EPA construction grants program is no longer available, low interest loans are available through the State of Colorado's Water Quality Revolving Fund Loan program. A condition of this program requires all facility plans be prepared to meet EPA's

"201" plan requirement and to address environmental conditions and public opinion, as well as cost effectiveness. CDPHE requires that all future wastewater facilities in this study area must conform to the intention of this plan in order for low interest State Revolving Fund loans to be made available for facility construction in the next 20 year planning horizon. Phased expansion will be considered for loans as long as the construction builds toward the recommended plant capacity.

This study is an unique application of the facility plan, because there are five facilities being studied for expansion in one document, and in its areawide scope of the study. Emphasis has been placed on regional treatment alternatives, environmental assessment, facility evaluations and infiltration/inflow, while less effort was to be expended in the individual financial analysis and other implementation arrangements. The coordination with the five wastewater treatment providers and other interest groups was also heavily emphasized. An advisory group was established in the initial stages of planning to determine the scope of the study, to meet regularly throughout the process to discuss the findings of the study as it progressed and to provide direction to the consultant team.

Since there is no regional planning authority in this area, the State has assumed jurisdiction for regional wastewater planning. The Water Quality Management Plan (208 Plan) for Region 10, updated in 1990 (Ref. 6), has stated that the East and Slate Rivers could be threatened by increased ammonia levels due to permanent and seasonal population growth. At that time, the existing facilities and discharge limitations were sufficient to maintain compliance with the current stream standards, but growth patterns have changed dramatically in the five years since that 208 Plan, and this threatened designation may become more applicable in this planning cycle.

Planning Area

The attached Figure 1-1 depicts the area of study for the Upper East River Valley Areawide 201 Facilities Plan. The original limits of study were from Almont, north to the undeveloped lands in the upper reaches of the drainage basins of both the East and Slate Rivers. During the initial refinement of the scope of work, the advisory group determined that the study area was to be limited to those areas that were highly developable. Federal lands, steep slopes and remote regions of the river basins were eliminated from the study area. The group also decided that the five existing treatment plants and their present and expanded

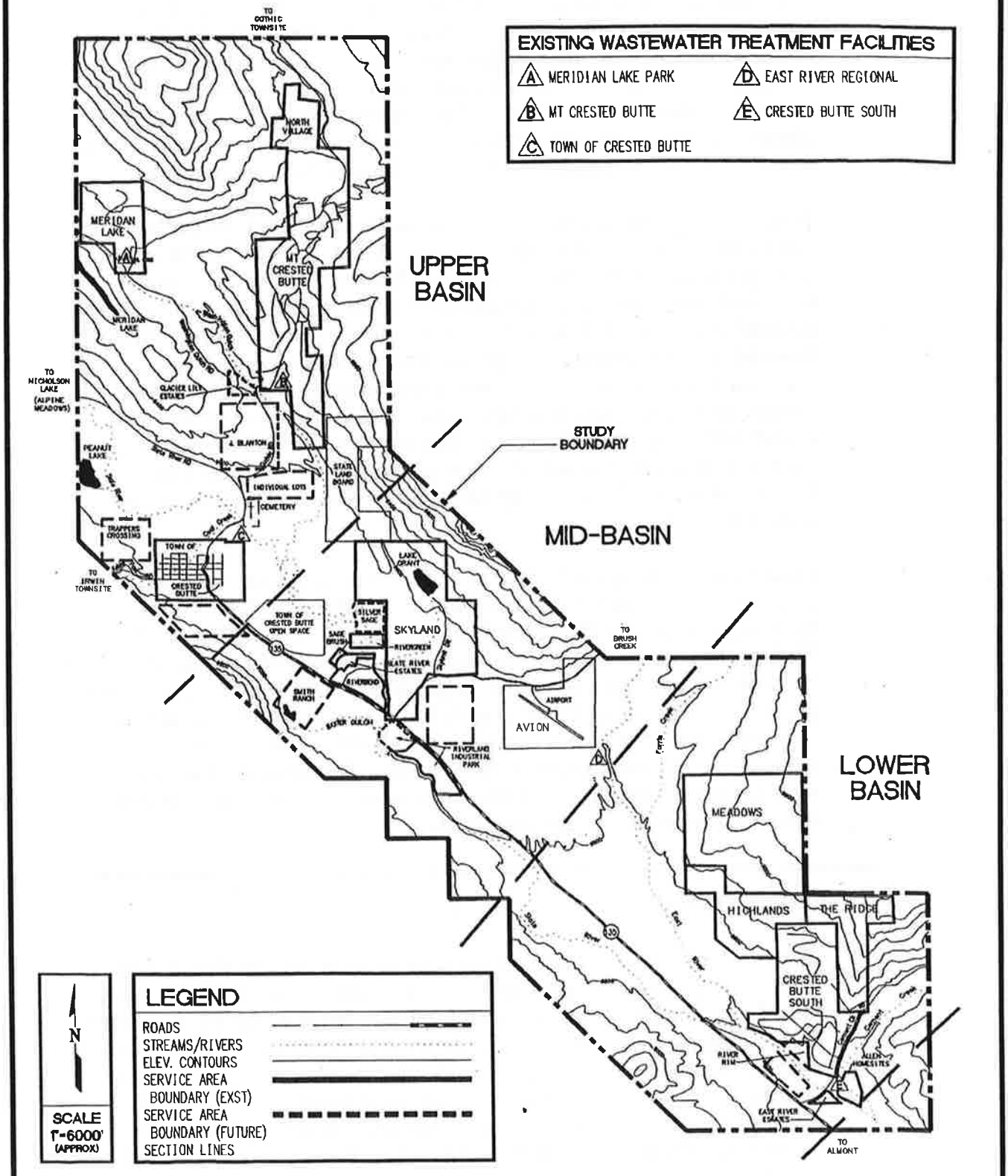

FIGURE 1-1 Upper East River Valley – 201 Study Area

service areas in the upper section of the valley would be the focus of study. This then established the limits of study from Mt. Crested Butte in the north, down to Crested Butte South and Allen Homesites. The upper sections of the East River drainage basin were to be studied only to the potential limits of the East River Regional Sanitation District's service area.

Study Development

Rothberg Tamburini & Winsor (RTW), and subconsultant Westwater Engineering, have been contracted with Gunnison County to perform the required study and prepare the areawide 201 document. The consultant team has regularly met with the local advisory group consisting of members of all the existing municipalities and sanitation districts, plus County planning and management, the Upper Gunnison Water Conservancy District (UGWCD) and the High Country Citizen's Alliance (HCCA).

A concurrent study was also performed by the Federal Bureau of Reclamation (BOR) for water supply and water quality in the East River basin. The UGWCD coordinated several items regarding this study's environmental assessment section and provided information from the BOR study. New stream gaging stations were established in the Slate River below the confluence with Washington Gulch and in the East River below the confluence with Cement Creek. A water quality sampling program was also begun for the area. The timing of the additional gage and quality data, however, was not sufficient to modify the previous assumptions made by CDPHE permit writers. Unfortunately, most additional information from the BOR study was cursory and provided little additional data or detail. The water quality assessment in this study has used this new data and existing reports to describe the receiving streams.

CDPHE was given the new stream monitoring data and recent information collected by the existing plants as part of their permit requirements. CDPHE then ran the Colorado Ammonia Model for the existing and potential regional plant sites and the resulting effluent discharge limits are such that all expanded and/or regional facilities will have to remove ammonia to some degree. The ammonia discharge limits should not be too restrictive for existing mechanical treatment processes to meet, while the limits for the East River plant will not be restrictive for the design flows. The projected effluent discharge limits are

discussed in later sections and the letter from CDPHE is attached in Appendix C.

Gunnison County Planning was consulted on land use issues, housing and population figures. The projected number of housing units provided by the County were used and modified by input from Advisory group members and a public meeting was held on the subject. The projected housing figures were then used to produce population figures and to predict the quantity of wastewater generated.

Existing treatment facilities were evaluated for performance and capability to meet NPDES discharge standards as well as the ability to meet the new Federal 503 Sludge Regulations, which are summarized in later sections. Both Mt. CB and the Town have had recent facility evaluations performed by others and this data was used to a large extent by the consultant team. The study of the influence of infiltration and inflow on the hydraulic capacity of these existing plants also relied on the existing studies recently performed by others, but additional field work was done in those Districts that did not have previous data.

An analysis of the most feasible regional alternatives, including a modified "no action" alternative and wetland treatment systems, was then performed. The relative and differing costs of each alternative were compared on a 20-year present worth basis, including operation and maintenance costs, to determine the most cost effective alternative. The alternatives considered were also evaluated for environmental impact and the ability to provide for the needs of the planning area in an evaluation matrix.

After the preferred alternative was determined from the analysis described above, the study also addressed the non-monetary issues of implementation and further agreements between the regional treatment providers and Gunnison County. Issues that need additional study, including individual sewage disposal systems, have also been highlighted in the public responsiveness survey in Appendix A.

Public Involvement Program

Without public involvement, the 201 plan's future usefulness could be severely diminished. While the Advisory Committee comprised much of the public directly involved, there needed to be a more open forum for input from the general public. There were two public information meetings held on the evenings of December 8th, 1993 and March 2nd,

1994 at the Old Town Hall in the Town of Crested Butte and a final public hearing for the adoption of this plan was held on July 12th, 1995 and a public responsiveness summary was prepared. This summary along with minutes and attendance lists of these meetings are attached in Appendix A.

The first meeting covered the housing, population and wastewater flow projections as presented by the consultant team. The main objective of the initial meeting was to determine whether the approach to projecting future sizes of wastewater treatment plants, (i.e. area growth) was reasonable in the opinions of the public and public officials. The initial public meeting was successful in introducing the planning process and validating the advisory group's approach to growth projections for the area. While it was clear that many of the interested public and public officials didn't like the high growth rates projected, the consensus of the group at the time was to plan for higher growth rates in the 201 planning document, but not construct facilities that become dependent upon growth for financial viability.

Other areas of concern expressed by the public and public officials dealt with solving water quality problems, most of which can be categorized into non-point sources and water resources. Specifically the non-point sources are areas where stream pollution occurs due to activities other than municipal wastewater treatment plant discharges. These include pavement runoff, individual septic systems, agricultural runoff, and abandoned mine seepage. The water resource issues include interbasin transfers, water rights, minimum stream flows, municipal water use, and supply snowmaking, water conservation, etc. While these issues will be recognized and discussed in the 201 plan for how they relate to wastewater treatment alternatives, in depth investigations, thorough analysis and assessments of these practices and solutions for these problems are not a part of the 201 planning process. For example, the 201 plan has identified areas where septic systems are used, and any previously documented problem areas, but does not cover groundwater investigations to determine or quantify their contribution to the overall water quality of the area.

The majority of these additional issues are often addressed in 208 or 303 Water Quality Management Plans. However, even in these plans, specific solutions to problems are not usually investigated or recommended in detail. It was recommend this action be taken in separate study.

In the second meeting on March 2nd, the consultants presented their preliminary alternative analysis and present worth cost comparison.

Representatives of CDPHE also were on hand to present their viewpoint on the 201 process and the need to consider regional facilities for wastewater treatment. There was much discussion on the regional alternatives presented and the ability of a wastewater authority to operate in the valley. Funding of regional facilities and interceptor sewers, including easement acquisition, was an issue of contention. The additional costs of land application and varied levels of sludge treatment were other factors that required comparative analysis. There was also another alternative presented by the Town of Crested Butte for inclusion into the analysis, allowing for both major plants to operate and expand in place well into the future.

It was determined in this meeting that consultant team would continue with the report and produce a draft report for both CDPHE and the advisory group's review and proceed with the final report after receiving concurrence with the advisory group and CDPHE.

After this meeting there were significant changes to the preferred alternative based mostly on revised population and growth projection's by Mt. CB and the lower requirements for future plant capacity, but also on further study by each district on service areas and contributing flows. The final public hearing changed the recommended alternative from that of the preliminary alternative analysis to address the issues of implementation and local control.

Environmental Assessment

Introduction

This chapter presents background data which is intended to determine the existing environmental setting in the East River 201 Planning area. The environmental assessment of the existing conditions essentially paints a picture of the 201 planning area from which the environmental evaluation of alternative wastewater treatment options can commence. Without this initial environmental assessment of the existing conditions, it is not possible to accurately evaluate the impacts on the existing environment from construction of the various wastewater treatment options. To this end, the following topics were investigated and addressed:

- Natural and manmade features
  - Climate
  - Population
  - Topography and geology
  - Soils
  - Individual sewage disposal systems
- Environmentally sensitive areas
  - Floodplains
  - Wetlands
  - Important farmlands
  - Wild, scenic and recreational rivers
  - Cultural resources
  - Indigenous wildlife and endangered species
- Land Use
  - Housing
  - Transportation
  - Undeveloped and vacant land
  - Recreational open space
  - Land use controls

- Air Quality
- Water Quality Assessment
  - Water quality
  - East River ammonia study
  - Major beneficial uses
  - Water rights

Over the past several decades, the Upper East River Valley region has had extensive environmental reviews performed by or for the U.S. Forest Service, U.S. Environmental Protection Agency, U.S. Soil Conservancy Service, U.S. Bureau of Reclamation, U.S. Flood Insurance Administration, the Colorado Department of Health, the Colorado Division of Wildlife, the Town of Crested Butte, and the Upper Gunnison River Conservancy District. Inasmuch as these previous studies would constitute a significant amount of data, we have attempted to extract the more important, salient factors for inclusion in the 201 Study. Much of the following text is reproduced verbatim from these previous studies in order to minimize errors of interpretation and also so as not to "re-invent the wheel." If more complete information is desired, the original text may be referenced. A bibliography of references used is included in Appendix D.

Natural and Manmade Features

Climate

Climate in the Upper East River Valley is characterized by cold, snowy winters and cool, short summers, mainly due to the high altitude. Topographic differences cause wide extremes of climate, both locally and throughout the area. Local differences are caused by air drainage, relief, and elevation modified by gradient and aspect.

High pressure areas tend to form in winter and remain stationary for several days. Unless the ground is covered with snow or air drainage is poor, the sky is clear under high pressure systems. Day time temperatures are moderately high and uniform and nights are very cold. Night time temperatures depend largely on topography, where air drainage exerts a greater control than the actual elevation. Some of the lowest temperature readings are in mountain parks where the air is calm. In these parks, the greatest cold is confined to the lower strata of air. The mildest weather during cold spells is below or near the mouth

of large canyons. Average seasonal temperatures recorded in Crested Butte have ranged from 13.5 to 58.0 degrees Fahrenheit with extremes of -42 degrees and 95 degrees Fahrenheit. The latest killing frost in spring has been reported as late as July 2 and the first killing frost in fall may occur as early as mid-August. The growing season in Crested Butte is approximately 51 days.

Most of the precipitation occurs in winter and early in spring. January, February and March are the months of heaviest snow fall. June is normally the driest month. Frequent showers occur during the later part of July and August. Generally, precipitation increases substantially as elevation increases. Average annual precipitation at the Town of Crested Butte is 23". Approximately 7½" is in the form of rain and the remaining 15½" is in the water equivalent of snow. (One inch of rain is about equal to 14" snow.) Records for high alpine areas are not available, but annual precipitation in areas above 11,800' Mean Sea Level (MSL) is probably more than 30".

Prevailing winds are from the southwest and are frequently strong in winter and the spring. Drifting snow accumulates in the more protected areas. These snowdrifts are the last to melt, and thus retard runoff which allows more even distribution of stream flow in spring and summer. At elevations above timberline, some large snow drifts remain throughout most of the summer. Timberline is at about 11,800 feet in the area and is generally beyond the limits of the 201 planning area boundary. Warming trends in May and June are the periods of greatest runoff. During this time, streams are at peak runoff and stream banks overflow onto floodplains and lowlands along major drainage ways.

Population Distribution

Residency in the Upper East River Valley 201 region varies substantially throughout the year. Base populations may be fairly stable, but seasonal occupancy can impact populations in certain areas by upwards of a factor of 10. Residency is either seasonal, partial year, or a combination of full time and transient. Seasonal variations in population is primarily the result of recreation-based economics, such as downhill skiing in the winter at the Crested Butte Ski Area and summertime mountain biking and other outdoor recreational opportunities.

Specific statistics available through the 1990 census include only the Towns of Crested Butte and Mt. Crested Butte. Remaining individual community clusters within the 201 region are encompassed in overall numbers for Gunnison County, and need to be evaluated separately.

From the 1990 census, statistics for the Town of CB and Mt. CB are summarized as follows.

Table 2-1 1990 Census Data

	Crested Butte	Mt. Crested Butte
Base Population	878	264
Occupied Homes	388	129
Vacant Homes	262	684
(Seasonal, recreational and second home use)	———	———
Total Homes	650	813

Crested Butte has estimated the Town's seasonal population in the recent "Crested Butte Three Mile Plan" (Ref. 7) based on variations of influent flows to the wastewater treatment plant (with inflow and infiltration flows subtracted). According to Crested Butte, high influent flows are 60% greater than low flows, which infers that seasonal peak population is 60% greater than the permanent population. Using this comparison, the 1990 visitor population in Crested Butte could have been around 527 people, for a total of 1,405 people in the peak months.

Additionally, current statistics have been developed by the Town of Crested Butte, Mount Crested Butte, the Upper Gunnison Water Conservancy District and the Gunnison County Planning department for the 201 area (Refs. 4, 5&6) and are summarized in Table 2-2. These numbers are constantly changing and, as of July 1995, some differences have occurred in current population. For consistency with other studies, these numbers will not be added to this section, but will be updated in the wastewater flow projections in Section 5.

Table 2-2 East River Existing Population as of 1/94

201 Study Area	Housing Summary (Units)	Peak Seasonal Population Range		Permanent Population	Residency
		Low	High		
On Centralized Water System					
Meridian Lake	40	112	140	86	60-70%
Mt. Crested Butte	1410	3562	5343	*	10-30%
Town of Crested Butte	802	1700	2012	1154	60-70%
East River Regional (Incl: Riverbend, Skyland, Slate River Est.)	131	367	459	261	Year-Round
Crested Butte South	149	438	522	304	60-70%
Subtotal	2532	6238	8476	*	
On Septic Systems					
Mt. CB/Wash. Gulch	13	36	46	*	
Slate River Above CB	29	81	102	*	
Crested Butte/Skyland	29	81	102	*	
Crested Butte South	39	103	137	*	
Subtotal	110	308	385		
Total - 201 Study Area	2642	6546	8861		

*Information not available

Peak seasonal population estimates assume full occupancy of hotels, condominiums, and houses. The low and high population range is the range of population that would be expected to be occupying housing units during a period of peak seasonal use such as the week after Christmas or spring break. The low and high range for population estimates vary with each reporting entity. Most are based upon an occupancy range from 2.8 to 3.5 persons per housing unit, which is close to the County-wide averages. Population estimates differ for the Town of Crested Butte, and the Crested Butte South area and are separately derived from information provided by each entity.

Housing estimates for Mt. Crested Butte include 220 single family residences, 841 condominium units, and 499 hotel rooms. Hotel units have been expressed as an equivalent number of single family residential units. The housing estimate for Skyland includes the 50 unit Skyland

Lodge and employee housing. Lodge and condominium units are expressed as an equivalent number of single family residential units.

Topography/Geology

The Upper East River Valley is in the Southern Rocky Mountain Province of the Rocky Mountain system. This Southern Rocky Mountain Province consists of complex mountains of various types and intervening basins.

Topography

Topography of the Crested Butte area is typical of glaciated mountainous regions. Altitude ranges from about 8,600' MSL at the confluence of Cement Creek with the Slate River to greater than 12,000' at peaks of Mt. Crested Butte and Wheatstone Mountain. The area is a series of river valleys flanked by high mountains. The valley is drained by the Slate River and its tributaries, including Washington Gulch, Coal Creek and Baxter Gulch from the west; and the East River, Brush Creek, Ferris Creek and Cement Creek from the east. The narrow valleys of the East and Slate River have a gradient of approximately 1%. Side slopes of mountains in the region vary from about 20% to over 100%. The general topography and rivers in the 201 Planning Area are shown on Figure 2-1.

The Crested Butte Three Mile Plan identifies several potential hazards involved with steep slopes. Areas having 60% to 100% slopes (30 to 45 degrees) are highly subject to avalanches, primarily on south exposed slopes where unstable snow conditions are most likely to occur. Thousands of snow avalanches occur throughout the Colorado mountains each year. The majority of these take place in remote mountain regions. Once started, an avalanche moves downslope and reaches maximum velocity in its track(s). Avalanche tracks may be confined by gullies or may be open slopes as wide or wider than the starting zone. Avalanches decelerate and stop within runout zones. Runout zone slopes are more gentle than track slopes and are sometimes flat or may even extend partway up a slope of a reversed gradient.

A second potential hazard in steep terrain is wildfire. Conditions of high winds, low humidity and high temperatures generally increase the potential for wildfires to occur. Once started, the

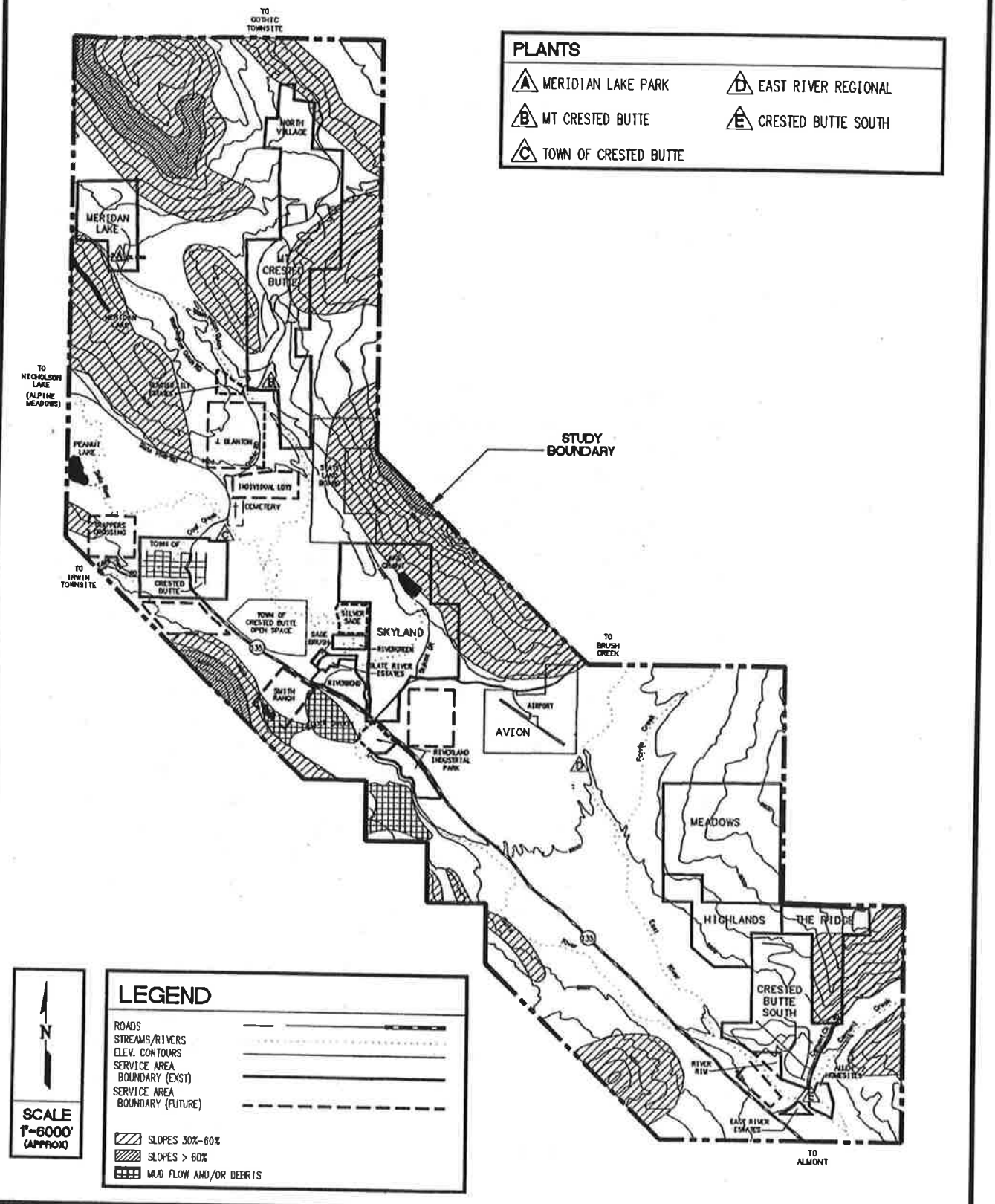

FIGURE 2-1 Upper East River Valley - 201 Study Area - Topography

magnitude of a wildfire is influenced by fuels, slope and aspect. Fires spread twice as fast on 30% slopes as on flat ground. When the slope reaches 55%, the rate of spread doubles again. If a fire occurs in a box canyon, called a fire chimney, the rate of spread may increase 400% to 1000% because of the channelizing effect.

Other potential hazards of steep slopes include unstable or potentially unstable slopes, landslides and mud flow, and/or debris fans.

Geology

Precambrian intrusive and metamorphic rocks are the most extensive in the region. Sedimentary rocks of the Paleozoic and Mesozoic era include sandstone, conglomerate and shale. The geologic rock units in the vicinity are of the Mancos shale, Dakota sandstone, Morrison sandstone, and Mesa Verde formations. The Morrison and Dakota formations contain interbedded shales. The Dakota sandstone is probably the hardest sedimentary unit in the area, and is a noted cliff former. The Mancos shale is known for its expansive characteristics, general topography and rivers in 201 Planning area landslide susceptibility, and sulfite salts content.

The area was subject to glaciation during Wisconsin time. Glacial till deposits are discontinuous deposits on mountain slopes and the remnants of moraines mostly in high mountain areas. They are stoney and gravelly mixed deposits generally leached of free carbonates in excess of five feet. Alluvium occurs in the valley bottoms and consists of reworked glacial material and weathered rock. Lithologic logs from wells drilled near Crested Butte as a part of a ground water source evaluation, report glacial debris to a depth of 30 feet in certain areas.

An integral part of the planning process is to perform a geological analysis so that hazards can be identified and avoided or otherwise mitigated to protect public safety and well-being. Geologic hazards are defined as a geologic phenomenon which is so adverse to past, current, or foreseeable construction or land use as to constitute a significant hazard to public health and safety or to property. Specific hazards include avalanches, landslides, mud flows and debris fans, unstable or potentially unstable slopes, seismic effects, radioactivity, ground subsidence, and expansive soil and rock. Geologic hazards which may exist

within the study area include potentially unstable slopes, avalanches, and moderately expansive soils. The siting and/or routing of alternative wastewater management facilities within the study area must therefore give consideration to these hazards in planning, design and construction. Further study of critical areas may be necessary to fully evaluate management options.

Soils

Soil characteristics are important in evaluating wastewater treatment alternatives. Parameters such as depth to bedrock, bearing capacity, resistivity, permeability, shrink- swell potential, and many others can have a great impact on a feasibility evaluation. The Soil Conservation Service has identified several soils series which occur within the study area (Refs. 2 &3). It must be noted that these are general soil classifications, and, within a given area, small areas of different soils may occur. A brief description of soils within the study area are presented in Table 2-3 and are also shown on Figure 2-2. The table is organized to begin with soils in river basins and progressing outward and upwards in elevation to the end of the list with soils located around the perimeter of the 201 area. The majority of native soils are unsuitable for sewer lagoons and septic tank and leach field wastewater treatment and disposal systems.

Primary reasons for the severe ratings include:

- high seasonal water table
- permeability - areas vary from rapid to slow rates
- flood hazards
- steep slopes
- 20 to 40 inches to bedrock

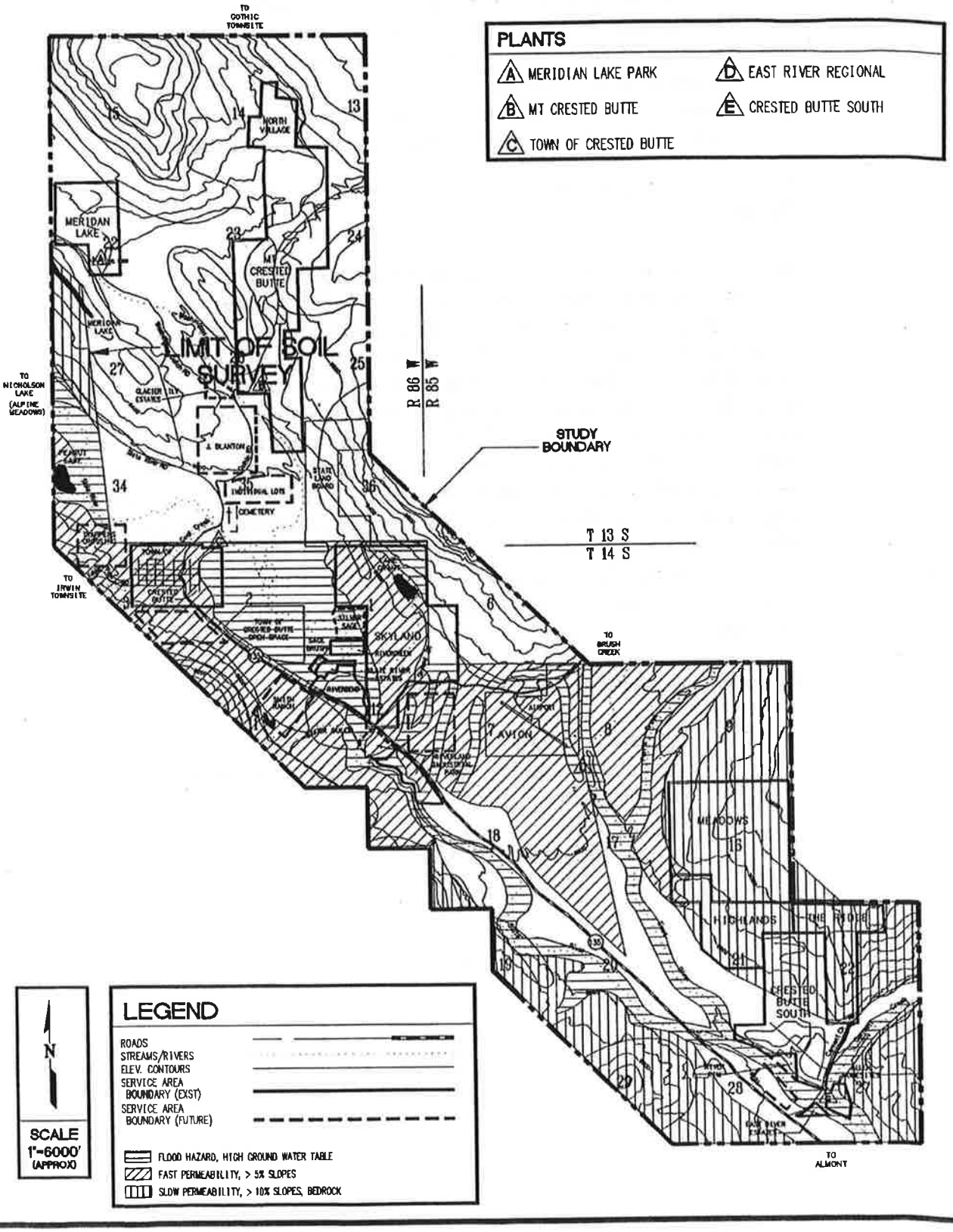

FIGURE 2-2 Upper East River Valley – 201 Study Area – Soils

Table 2-3 201 Planning Area Soil Classification

Soil Series	Description	Limitations for Wastewater Systems
Gas Creek GaA, gab	Deep, poorly to somewhat poorly drained soils on floodplains and low terraces. Slopes are 0%-5%. Typically, these soils have a 3" mat of partially decomposed organic material at the surface. Permeability is rapid with seasonal water table at the surface or within a depth of 36".	Lagoons - severe ISDS - severe
Alluvial Land Ad, Ao, Aw	Commonly located in flood plains, along streams and side drainages and winding valleys. It consists of an accumulation of valley fill sediment that was derived from many kinds of rocks and upland soils. It is subject to flooding erosion from floods and changes in stream channels, and also deposition of new sediment. Slopes are dominantly 0%-5%. The water table is at the surface or at depth of about 1' during most of the year.	Lagoons - severe ISDS - severe
Fola fob	Consists of deep, well drained soils on alluvial fans and terraces. Slopes are 1%-8%. Permeability is rapid and averages 3-10 minutes per inch.	Lagoons - severe ISDS - slight (may pollute nearby water supplies
Irim IrA, Irb	This soil is on floodplains adjacent to major streams and on side drainage ways. The water table fluctuates with the water level in adjacent streams. Irim soils are subject to occasional overflow from adjacent rivers and the deposition of silt, sand or gravel is common. Permeability is moderate, averaging about 10-30 minutes per inch.	Lagoons - severe ISDS - severe
Leaps LeE	An isolated lens is located along the west bank of the Slate River about ½ mile upstream from the confluence with East River. The material has a very low permeability with a maximum rate of about 0.2" per hour. The soil was formed from silty shale and other sedimentary rock and has a high shrink-swell potential.	Lagoons - severe ISDS - severe
Gateview GeB, GeE	Located primarily on outwash fans and glacial moraines. Gateview cobbley loam is found extensively throughout the valley floor of the 201 area. Slopes range from 2%-8% near the rivers, and increase to 8%-30% up-valley. Permeability is moderate, runoff is slow to medium, and the erosion hazard is moderate during periods of snow melt.	Lagoons - severe ISDS - severe
Evanston EvB, EvD	Limited isolated areas are located on alluvial fans and valley sides. The soil is classified as a loam having low permeability and low to moderate shrink-swell potential.	Lagoons - severe ISDS - moderate
Cochetopa CoE	Consists of deep, well-drained soils in upland areas of the southwestern portion of the 201 area. Slopes are 5%-30%. Soil textures vary significantly with depth, with loam at the surface underlaid by gravelly clay above stoney clay loam. Permeability is generally low and the shrink-swell potential ranges from low to high depending on the clay content.	Lagoons - severe ISDS - severe
Cebolia CeE	Consists of deep, well-drained soils on hillsides, benches and mountain sides. Slopes range from 5%-30%. These soils formed in alluvium that was derived from sandstone and shale. Permeability is slow and the shrink-swell potential may be high.	Lagoons - severe ISDS - severe

Soil Series	Description	Limitations for Wastewater Systems
Stony Rockland St	Consists mostly of exposed bedrock, loose stones and boulders, and is located intermittently in the southeast portion of the 201 area. Slopes are 10%-30%. Stoney rockland provides concealment and escape for wildlife.	Not Applicable
Bead BaF	Consists of deep, well-drained medium acid soils on upland hills and valley sides. Slopes are 10%-50%. These soils formed in stoney residual alluvium and colluvium that were derived from sandstone and sandy shale. Permeability is low and there is low shrink-swell potential.	Lagoons - severe ISDS - severe
Bogan BoE	Consists of moderately deep, well-drained soils on uplands. Slopes are 5%-30%. These soils formed in material derived in place from interbedded shale and fine grained sandstones. Depth to bedrock is reportedly 2-3 feet. One isolated area appears immediately east of Meridian Lake. Permeability is moderate and there is a low to moderate shrink-swell potential.	Lagoons - severe ISDS - severe

Individual Sewage Disposal Systems

The soil characterization mapping presented in Figure 2-2 identifies only limited areas that may be suitable for conventional individual sewage disposal systems (ISDS). Along rivers and creeks of the 201 area, land is either subject to flooding or the seasonal ground water table is high. Other areas are rated severe for conventional ISDS because of permeability rates, excessive ground slope, shallow depth to bedrock or a combination of factors. Because a larger percentage of the area has unsuitable soil and/or groundwater conditions, the area may support only limited numbers of ISDS's. Nevertheless, all residences in unsewered areas of the 201 planning area are on ISDS's.

As a part of the Upper Gunnison River Water Conservancy water quality/water quantity study, the Gunnison County Office of Environmental Health compiled the following information in regards to individual sewage disposal systems:

Township 13S Range 86W

Section 26 - 7 dwellings
Section 27 - 7 dwellings
Section 34 - 3 dwellings
Section 35 - 1 dwelling

Township 14S Range 85W

Section 16 - 3 dwellings
Section 18 - 7 dwellings
Section 20 - 3 dwellings
Section 21 - 3 dwellings
Section 27 - 3 dwellings
Section 28 - 5 dwellings
Section 29 - 1 dwelling

Township 14S Range 86W

Section 2 - 8 dwellings
Section 11 - 2 dwellings
Section 12 - 5 dwellings
Section 13 - 2 dwellings

Records of Gunnison County indicate a total of 60 permitted systems are in operation in the 201 region. Only two large systems, over the 2000 gallon per day capacity limit, are located in the ski area and will require groundwater discharge permits from the CDPHE. Gunnison County has recently adopted ISDS regulations which meet and/or exceed State criteria. Because the County enforces the ISDS regulations, the systems permitted by the County and listed above are presumed to have been properly engineered and constructed. Although the County has no record of failed systems, it questions several areas and will pursue testing of these systems in the near future.

The recent population estimates (12/93) were conducted jointly between the Towns of Crested Butte, Mount Crested Butte, Gunnison County Planning Department, the Bureau of Reclamation and the Upper Gunnison River Water Conservancy District identified the following housing units on ISDS's.

Mt. Crested Butte/ Washington Gulch	13 homes
Slate River above Crested Butte	29 homes
Crested Butte/Skyland Area	29 homes
Crested Butte South Area	39 homes
Total	110 homes

There is no explanation for the variation between the above total of homes (110) and the 60 ISDS systems on file with Gunnison County Environmental Health. This is being investigated by others.

ISDS's are considered non-point sources that may impact ground and/or surface water quality. Negative impacts occur when an ISDS fails to function properly or when a system is used that hasn't been properly engineered or constructed.

The Colorado Department of Health has conducted a non- point assessment in the 201 area, including ISDS, mine drainage, storm drainage and salinity and timber harvesting (Ref. 18). According to the study, no problems with ISDS's are adversely impacting the environment or water quality in the 201 Planning area.

Environmentally Sensitive Areas

Flood Hazards

In August, 1977, the Federal Emergency Management Agency (FEMA) completed a flood insurance study which identified flood hazard areas inundated by the 100-year floods in unincorporated areas of Gunnison County, Colorado. Additional detailed study and mapping for the 100-year flood plan of Coal Creek through the Town of Crested Butte became effective in September 1985 and was been studied further in 1992 (Ref. 20), resulting in several flood control projects in the Town. The purpose of the studies was to investigate the existence and severity of flood hazards, and to aid in the administration of the National Flood Insurance Act of 1968, along with the Flood Disaster Protection Act of 1973. No detailed study is available for other reaches of the 201 planning area.

Flooding occurs when soils become saturated from prolonged rains and/or snowmelt. If runoff or rain continue beyond saturation, water accumulates faster than it can be absorbed or carried away in stream channels. Stream levels begin to rise and eventually overflow the normal stream channel. The gradual rise in water levels may take a few hours or a few days. The Slate and East Rivers experience floods like this each spring. Tributaries and the main rivers have been known to experience flash floods which happen so fast that little warning can be given.

Figure 2-3 shows the 100-year flood inundation limits for most areas of the Crested Butte region. The 100-year flood has been adopted as the base flood for purposes of floodplain management. The FEMA study did not include the reaches of Washington Gulch or Woods Creek that include the areas of the

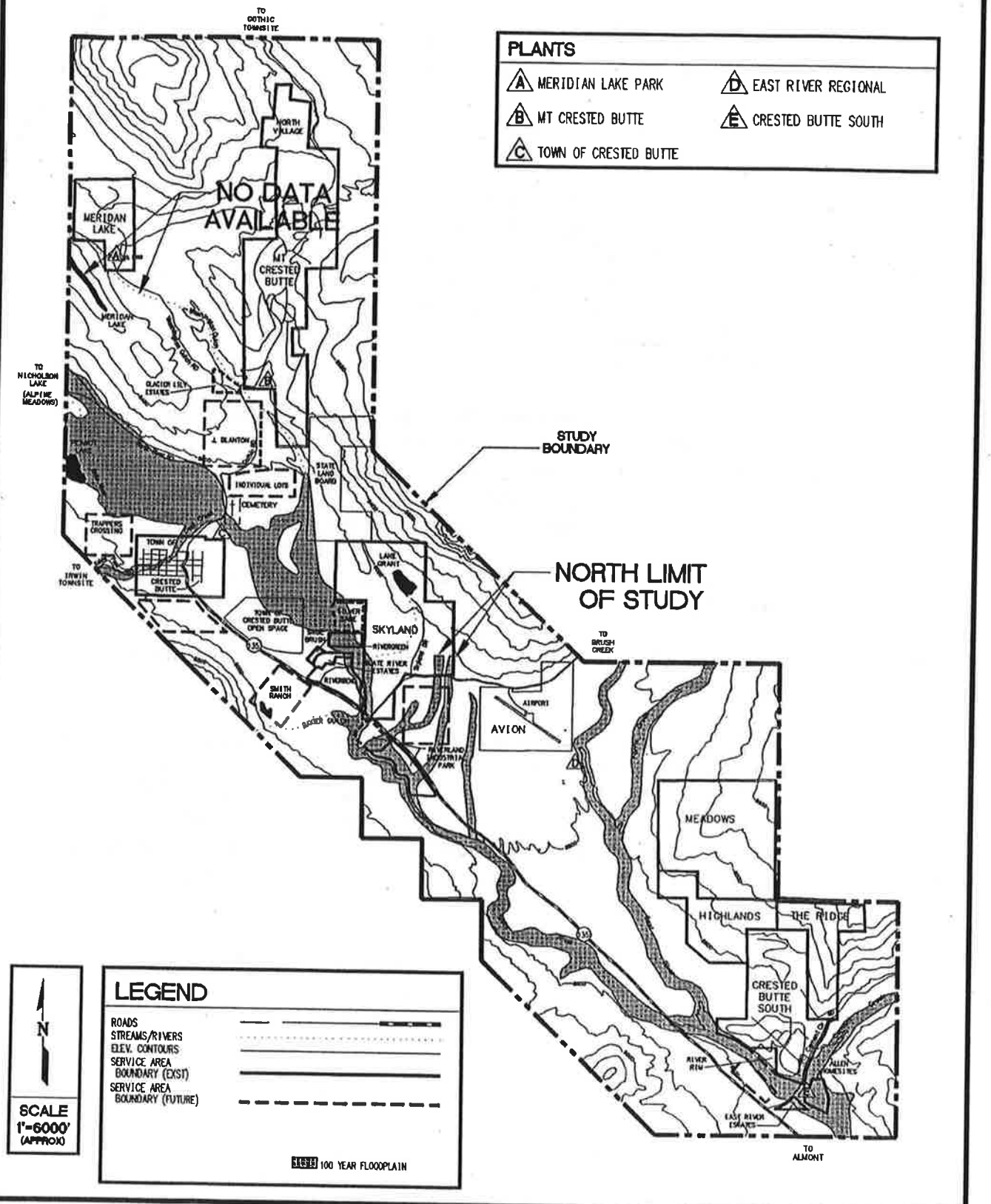

FIGURE 2-3 Upper East River Valley – 201 Study Area – 100 Year Floodplain

WestWater Engineering — Rothberg, Tamburini & Winsor, Inc.

Town of Mt. Crested Butte and Meridian Lake that were formed after the 1977 FEMA study. For these areas, no information was found to identify the 100-year floodplain.

Wetlands

A comprehensive study of wetlands in the Upper East River Valley region was recently completed for the Town of Crested Butte and the Environmental Protection Agency by Dr. David Cooper (Ref. 8). A map of the wetlands study area as compared to the 201 boundary and including wetland delineation is shown in Figure 2-4. Beyond the study area, the State River enters where there is little wetland area beyond the limits of 100-year floodplain.

As a part of an advanced identification of wetlands, the Cooper report provides functional values associated with wetlands, including water quality improvement, water storage, and wildlife habitat. According to the Cooper study, approximately 30% of the river valleys studied contained natural wetlands; however, only priority wetlands were identified on maps of the report. The Town of Crested Butte provided additional information on wetlands of the study area that were not categorized as priority wetlands. Any wastewater management alternative located in questionable areas should be closely examined to determine whether natural wetlands are impacted and the extent of mitigation necessary.

Three types of wetlands were identified in the Cooper study: 1) riparian ecosystems on stream floodplain, 2) peatlands where the water table is close to the ground surface for the entire growing season and dead leaves and roots do not completely decompose, and instead, accumulate to form the soil, and 3) wet meadows that have shallow or no standing water and a variable water table, but no peat soils. Some wet meadows are agricultural land.

It is the goal of the US Army Corps of Engineers, the Colorado Water Conservation Board, the Division of Wildlife and others to maintain and protect existing wetland resources and to restore wetland functions on a functionally equivalent basis. There are several actions in wetlands are allowed under the Nationwide Permit Program, such as outfall construction, bank stabilization, utility line construction and isolated discharges. Where wastewater management alternatives impact wetlands, mitigation will probably be required. Unless it is clearly demonstrated that an alternative project site does not exist or that alternative sites have more adverse impacts, avoidance of wetland

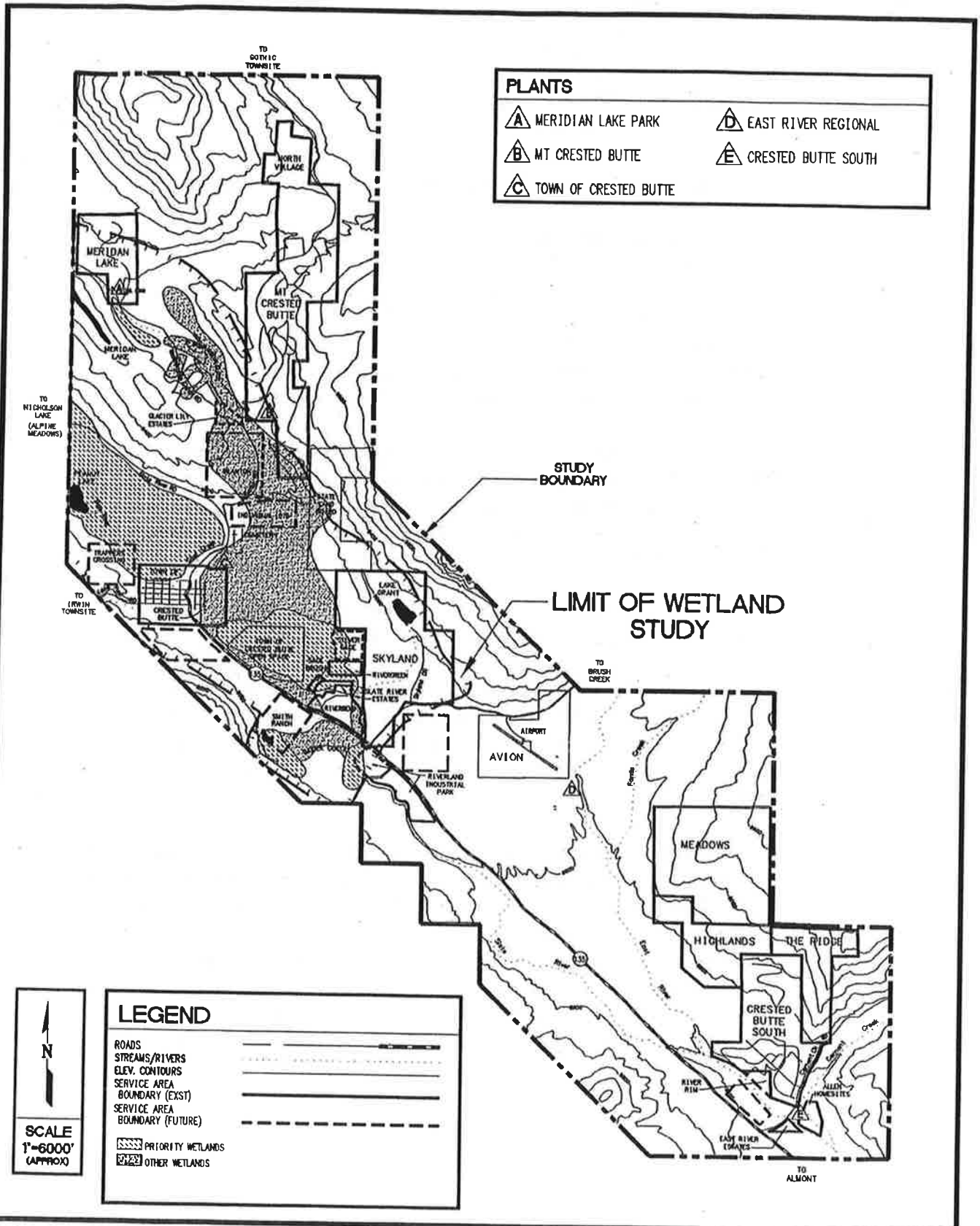

FIGURE 2-4 Upper East River Valley – 201 Study Area – Wetlands

impacts is required by Section 404 (b)(1) of the Clean Water Act. Wetland mitigation proposals are reviewed on a case-by-case basis, considering specific wetland values and functions and types of mitigation proposed.

The preferred sequence for mitigation of impacted wetland areas are: 1) hydrologic restoration, 2) wetland creation, 3) vegetative restoration, and then additional mitigation measures, as defined below:

"Hydrologic restoration" is defined as the act of restoring the natural hydrology of a former wetland area (which was previously impacted by hydrologic modifications and which is not upland) to its original condition so that wetland is restored and the natural hydric soil and vegetation will be restored and be self-perpetuating.

"Wetland creation" is defined as the establishment of a wetland in an upland area which was not a wetland in the past. Wetland creation often required manipulation of topographic contours, hydrology, soil structure, vegetation, and other factors to allow for establishment and maintenance of wetland functions.

"Vegetative restoration" is defined as the act of restoring natural vegetation which existed before man-induced factors were introduced which resulted in degradation of the original wetland functions. Vegetative restoration requires replacement with a self-perpetuating flora and often involves changes in land management practices. Vegetative restoration may require replacement of naturally occurring vegetation when natural vegetation does not or will not develop in response to the changes in management.

"Additional Mitigation Measures" is defined as all other measures which are intended to compensate for adverse impacts of a proposed project. These mitigation measures may include improvement of wildlife habitat, flood retention, water quality, or other wetland functions. The development of wildlife habitat improvement generally involves the act of inducing changes in the vegetative and physical characteristics of an existing wetland area to increase diversity through hydrologic or topographic changes generally for the purpose of enhancing the wildlife habitat functions.

The following ratios are provided as guidance for determining what may constitute acceptable mitigation. The ratios are expressed as acres of mitigation: acres of wetland impact and are based on achieving a goal of 1:1 replacement of wetland functions.

Hydrologic Restoration	1:1
Creation	2:1
Vegetative Restoration	3:1
Additional Mitigation Measures	4:1

In all cases, long-term management of the mitigation areas is required and mitigation should occur concurrently with project construction. Due to lesser or greater chances of success in replacing wetland functions, or in the timing of achieving replacement functions, mitigation ratios identified above may be adjusted.

Important Farmlands

According to the U.S. Department of Agriculture, Soil Conservation Service, Gunnison County (which encompasses the Upper East River Valley) does not contain prime or unique agricultural lands (Ref. 9). Due to the short growing season, high altitude and cool summer temperatures, agriculture is limited to pasture and hay, along with rangeland. Irrigated hay meadows within Gunnison County, however, are identified as being farmlands of statewide importance.

Prime farmland is one of our nation's most important natural resources. When managed properly, this exceptional land can be farmed continuously without degradation. It responds to fertilizers and other soil amendments, and requires less energy input to maintain productivity. However, like other natural resources such as coal, oil, or natural gas, the supply of this land, suitable for food and fiber productions, is limited.

Under U.S. Congressional Public Law 95-87 (published in the Federal Register January 31, 1978; Part 657), the U.S. Department of Agriculture, Soil Conservation Service, was charged with the major responsibility for identifying and locating Prime and Unique Farmlands. In addition to these lands, which are considered to be of national importance, the Important Farmland Program also encouraged the identification of Farmlands of Statewide and Local Importance. Responsibility for identifying and locating these lands are assumed by the State Experiment Station in cooperation with the Colorado Department of Agriculture and Department of Natural Resources -

Colorado State Soil Conservation Board; regional county, and local units of government; and other persons involved in planning the use of land resources.

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

Unique Farmland is land other than Prime Farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yield of a specific crop, when treated and managed according to acceptable farming methods. Two areas in Colorado are considered Unique Farmlands of National Importance--the fruit orchards in the Grand Valley and the Delta-Montrose areas, and the seed potato and fruit and vegetable producing areas of the San Luis Valley.

Gunnison County is identified as an area of Colorado that contains Farmland of Statewide Importance. These are irrigated lands which for one or more reasons, do not meet the requirements for Prime Farmlands. However, lands in this category are important to the agricultural economy in Colorado. Certain areas of Farmland of Statewide Importance produce specific crops that have special significance to the agriculture of the state. Although these crops could be grown in many other parts of Colorado, they should receive special consideration when planning and evaluating the agricultural resources of the State. These areas have a combination of soils, climate, historic land use and/or geographical location which contribute to the growing of specific crops. One example would be mountain hay meadows that contribute to the viability of local livestock industries.

Ranching is one of the three major economies in the 201 area, among recreation and education, and is a valued heritage of the region. The Town of Crested Butte includes the following policies regarding agricultural issues in their Three Mile Plan (Ref. 7):

> "When a ranch is proposed for residential development, the agriculture ditches that will no longer be used for agriculture purposes should be converted for public and private lawn watering rather than using treated water for these purposes. Agricultural ditches that support large trees and shrubs should be maintained by the development so that they can continue to flow and provide water for the trees and shrubs dependent upon the ditch water.
>
> Protect agricultural ditches and stock drive routes, encourage land use change which will retain the agricultural productivity of the land and discourage land use change which will adversely affect agricultural operations on lands not owned by the applicant. Land use change which encourages retention of the agricultural productivity of the Three Mile Plan area, including stock routes, and which does not discourage, interfere with or create negative impacts to adjacent or nearby agricultural operations, is encouraged. It is not intended that this policy should prevent conversion of agriculture land to other uses."

Wild, Scenic and Recreational Rivers

None of the rivers or creeks in the 201 Planning area are designated as wild and scenic rivers. However, according to the Colorado Division of Wildlife, rivers of the Upper East River Valley Region attract limited sport fishing, camping, rafting and kayaking. Hard numbers are not available for recreational use in the area, but the East River area has become a popular destination for summer tourism, primarily northwest of the 201 area in the Oh-Be-Joyful Wilderness Area.

Cultural Resources

The State Historical Society has been consulted in regard to areas presently included or eligible for inclusion on the National Register of Historical Places within the 201 Planning Area (Ref. 13). Figure 2-5 identifies general locations of sites that are either listed historic sites, historic sites under consideration, or potential historic/archaeological sites. Specific locations are not available and should be verified if

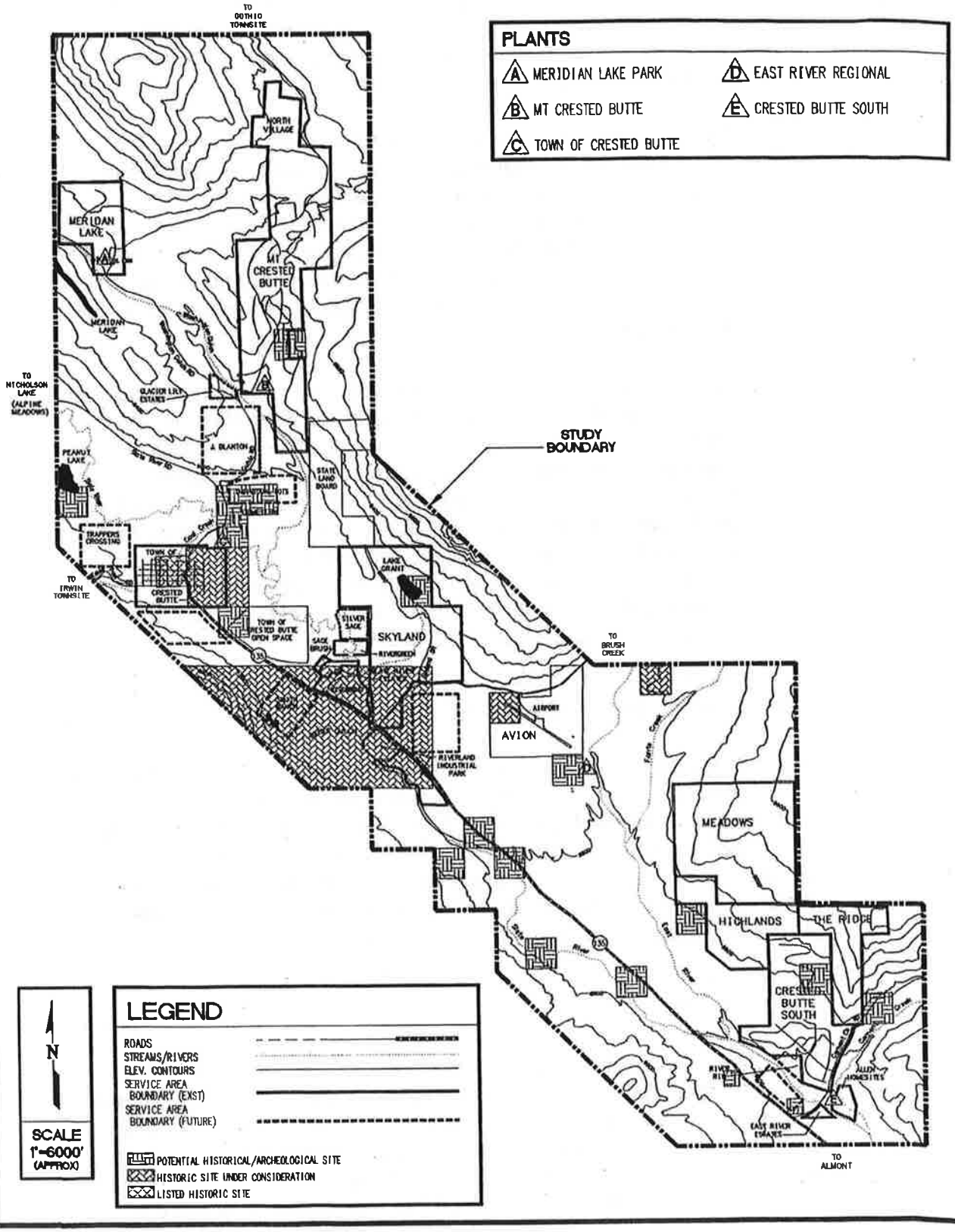

FIGURE 2-5 Upper East River Valley - 201 Study Area - Cultural Resources

wastewater management alternates are sited in the general vicinity of historic or potentially historic sites. In addition, downtown Crested Butte is a designated National Historic District. A sample of buildings and historic sites in Crested Butte are given below.

The Old Town Hall was built in 1883 and served as the town government seat until 1952. Sections of this structure were accidentally destroyed when dynamite charges were set off to stop a fire. The building now houses the Crested Butte Mountain Theatre, the Paragon Art Gallery, and the bus stop. Town meetings including the public meetings for this study are held there.

A two-story outhouse is located in the alley between Third and Fourth streets. The primitive bathroom's two levels were offset to allow dual use. Also, the railroad depot once was a stop on the Denver and Rio Grande Railroad, which transported supplies, gold ore, and coal during the 1880's mining era. Today, the building serves as a community center and is operated by the Crested Butte Society.

Indigenous Wildlife and Endangered Species

Botanical

No threatened or endangered plant species are known to exist in the Upper East River planning area, however, several distinct vegetative communities exist in the region. Their distribution is determined by slope, aspect, altitude, soil type, and moisture availability. The community types vary from riparian zones along the river bottoms to mixed coniferous/deciduous forests and occasional rangelands. Wetlands are present, mostly in the valley floor adjacent to the Slate River. These areas have been previously described in the wetlands section of this chapter.

Dominant trees in the general vicinity include Ponderosa Pine, Lodgepole Pine, Douglas Fir, Subalpine Fir, and Englemann Spruce. Other common plants range from willows in lower elevations to grasses, forbs and shrubs in open ranges, to Quaking Aspen in higher elevations. Plants that may occur in the 201 Planning area are identified on Table 2-4.

The Colorado Natural Heritage Program conducted a search of its Biological and Conservation Data system for natural heritage resource occurrences and discovered several records in the study

area and surrounding areas that are under consideration (Ref. 15). Natural heritage resources are defined as occurrences of significant natural communities and rare, threatened or endangered plants and animals. In the northern section of the 201 Planning area there is a record of *Penstemon mensarum* (Grand Mesa penstemon) near Meridian Lake. This species is considered globally rare, state rare, and is a candidate for Federal listing. In the southern section of the 201 area, there is record of the globally uncommon and state uncommon natural association *Populus angustifolia-Picea pungens/Alnus* (Montain reparian forest) along the banks of the East River. Although these species are rare or uncommon and should be seriously reviewed if impacted by wastewater plans, they are currently not considered threatened or endangered.

Table 2-4 Grasses, Forbs & Shrubs in the 201 Planning Area

Grasses	
Arizona Fescue	Western wheatgrass
Nodding brome	Mountain brome
Bearded wheatgrass	Slender wheatgrass
Junegrass	Mountain muhly
Muttongrass	Squirreltail
Elk sedge	Pine needlegrass
Needle-and-thread	Indian ricegrass
Sandberg Bluegrass	Slimstem muhly
Mountain Muhly	Blue grama
Letterman Needlegrass	Tufted hairgrass
Nebraska sedge	Baltic rush
Ovalhead sedge	Reedgrass
Foxtail barley	Basin wildrye
Thurber fescue	Parry oatgrass
Columbia needlegrass	Kobresia
Spike trisetum	
Forbs	
American vetch	Indian paintbrush
Silvery lupine	Showy cinquefoil
Sulfur buckwheat	Western yarrow
Harry goldaster	Hoods phlox
Fremont geranium	Rose pussytoes
American bistart	Wild celery
Cow parsnip	Rocky Mountain iris
Elephanthead Lousewort	Greenleaf bluebells
Arrowleaf balsamroot	Mulesears wyethia

Forbs		
	Aspen peavine	Aspen fleabane
	Sidebells pentemon	Alpine clover
	Alpine bluebells	
Shrubs		
	Big sagebrush	Snowberry
	Douglas rabbitbrush	Willow (s)
	Shrubby cinquefoil	Serviceberry
	Parry rabbitbrush	Silver sagebrush
	Antelope bitterbrush	Fringed sagebrush
	Wax currant	Winterfat
	Mountain snowberry	Nootka rose
	Alpine willow	

Fish

No threatened or endangered fish species are known to exist in the 201 Planning area. Although past mining activities have had adverse impacts on water quality and fish populations, today the river and stream drainages in the region support fish habitats. The trout species that are known in the drainages within the study area include brown, rainbow, brook and cutthroat. Brown and brook trout populations are generally self-sustaining, but stocking of these two species may take place to re-establish populations as water conditions change. Coal Creek, in and above the Town of Crested Butte, was restocked with brook trout after a treatment plant was constructed by Amax on the effluent mine releases into Coal Creek. Catchable rainbow are now stocked into all of the drainages in the planning area that are open to public fishing, usually on Forest Service lands, but stocking also takes place if signed agreements are in effect that allow public fishing if permission from the landowner is obtained. The East River is also valuable for the Kokanee salmon from Blue Mesa Reservoir to the Roaring Judy Fish Hatchery; however it is unknown whether Kokanee migrate further north of the Roaring Judy and into the 201 planning area.

Wildlife

Wildlife species present in the area are typical of those occurring in mountainous regions of southwestern Colorado. Mule deer

and elk are the major big game animals that migrate through the general area, but there are also black bear and mountain lions in these areas. Mule deer are probably the widest spread in their use of the river bottoms all year. Other mammals that are likely present in the Crested Butte region include coyote, beaver, marmots, badgers, fox, muskrat, raccoon, marten, and prairie dogs. Bats have been known to occur in areas of beaver ponds where good insect populations exist. Big horn mountain sheep may be seen in the very highest part of the 201 planning area. A more complete listing of mammal species is presented in Table 2-5.

Table 2-5 Mammal Species That May Occur in the 201 Planning Area

Masked shrew	Porcupine
Dusky shrew	Red fox
Dwarf shrew	Black bear
Water shrew	Raccoon
Nuttall's cottontail	Marten
Snowshoe hare	Mink
Least chipmunk	Mountain lion
Uinta chipmunk	Bobcat
Yellow-bellied marmot	Elk
Wyoming ground squirrel	Mule deer
Rock squirrel	Beaver
Golden-mantled ground squirrel	Heather vole
Red squirrel	Meadow vole
Northern pocket gopher	Montaine vole
Brush mouse	Long-tailed vole
Bushy-tailed woodrat	Western jumping mouse
Southern red-backed vole	

Source: Colorado Mammal Distribution Latilong Study (Colorado Division of Wildlife, 1993)

Over 60 species of birds occur in the general vicinity and are listed in Table 2-6. This variety is due to the diversity of terrestrial and aquatic habitat in the area that could be used as a breeding, migratory, or resident basis. The East River provides habitat for many important birds, including both blue and black crowned night heron, redtail hawk, many owl species, Canadian goose, and other ducks and waterfowl.

The bird species of most interest listed in Table 2-6 is the Peregrine Falcon which is listed as endangered by the Federal government. Anecdotal reports of Bald Eagles following salmon up from Blue Mesa Reservoir to the Roaring Judy Fish Hatchery and all along the East River have been mentioned, yet bald eagles do not appear on the list provided by the Department of Wildlife. A representative from the Division of Wildlife reported that a pair of bald eagles nesting on the East River north of the Roaring Judy Hatchery reared a young eagle this year. It is unclear whether this reported family is within the 201 Planning area boundaries. Since the Division of Wildlife reports that there are about 20 to 50 bald eagles that winter near Blue Mesa Reservoir and tributaries any proposed sites for treatment facilities and interceptor sewers should be thoroughly examined for threatened or endangered bird species.

Table 2-6 Bird Species That May Occur In the 201 Planning Area

Ring-necked duck	Solitary vireo
Northern goshawk	Warbling vireo
Swainson's hawk	Orange-crowned warbler
Peregrine falcon	Virginia's warbler
Mourning dove	Yellow warbler
Flammulated owl	Yellow-rumped warbler
Long-eared owl	Black-throated gray warbler
Northern saw-whet owl	Macgillivray's warbler
Common nighthawk	Wilson's warbler
Common poorwill	Yellow-breasted chat
Broad-tailed hummingbird	Western tanager
Williamson's sapsucker	Black-headed grosbeak
Olive-sided flycatcher	Green-tailed towhee
Western wood-pewee	Chipping sparrow
Willow flycatcher	Brewer's sparrow
Hammond's flycatcher	Fox sparrow
Dusky flycatcher	Lincoln's sparrow
Western flycatcher	White-crowned sparrow
Say's Phoebe	Brewer's blackbird
Western kingbird	Great-tailed grackle
Tree swallow	Common grackle
Violet-green swallow	Brown-headed cowbird
Northern rough-winged swallow	Northern oriole
Cliff swallow	House finch

Barn swallow	Evening grosbeak
Pygmy nuthatch	Loggerhead Shrike
House wren	Swainson's thrush
Ruby-crowned kinglet	Hermit thrush
Blue-gray gnatcatcher	Gray catbird
Western bluebird	Northern mockingbird
Mountain bluebird	Sage thrasher

Source: Colorado Bird Distribution Latilong Study (Colorado Division of Wildlife, 1993)

Several species of reptiles and amphibians might occur in the Crested Butte region and are listed in Table 2-7. The list includes the Boreal toad which was just listed as threatened by the Wildlife Commission in July 1993. The Boreal toad has been reportedly found in the Brush Creek drainage beyond the northern boundary of the 201 Planning area.

Table 2-7 Amphibian and Reptile Species that may Occur in the 201 Planning Area

Bullsnake	Boreal Chorus frog
Gopher snake	Bullfrog
Wandering garter snake	Northern leopard frog
Tiger salamander	

Source: Colorado Amphibian and Reptile Distribution Latilong Study (Colorado Division of Wildlife, 1993)

Endangered Species and Critical Habitats

The federally listed endangered Peregrine Falcon is a visitor to the general area but the planning area is not regarded as critical Peregrine Falcon habitat. There have also been Bald Eagle sitings along the East River as far north as the Roaring Judy Fish Hatchery (south of the Planning area), but reports of bald eagles are most common further south near Blue Mesa Reservoir. In addition, the federally listed threatened Boreal toad has been sited in the Brush Creek area adjoining the 201 boundary. No other threatened or endangered species of wildlife, fish or plants or their critical habitat are known to exist near the Upper East River 201 planning area.

Land Use

Development Trend

Ute Indians hunted the territory in and around Gunnison County for hundreds of years before Europeans explored the land. Two early explorers to visit the area of Gunnison County were Captain Juan Maria de Rivera (1775) and Padre Francisco Escalante (1776). They were both Spanish explorers from Santa Fe. Escalante claimed the land for Spain. Western Colorado became a part of Mexico in 1821 and the 1848 Treaty of Guadalupe-Hidalgo granted the territory to the United States. Traders and trappers flocked to the area, setting up trading posts, and established commerce with the Utes.

To avoid the unchartered terrain of the Colorado Rockies, pioneers traveled the Oregon and Santa Fe Trails. As a result, European settlement to the area did not occur until the late 1800's. Captain John Gunnison lead a party of U.S. War Department topographical engineers through the area in 1853, seeking a central route for a railroad from the Mississippi River to the Pacific Ocean. In 1863, the U.S. government established a reservation for the Ute tribe, and attempted to change the Indians from warriors to farmers. Several years later, the land was opened for settlement.

Stockmen and farmers came in 1872. In 1878 the discovery of gold near what is now Tin Cup, and bituminous coal near Crested Butte, started the major influx of people. Numerous narrow gauge railroads were built in difficult terrain in the early days to serve the mining industry. Old railroad grades are still noticeable, but all railroads have disappeared.

Ranching followed mining and large herds of cattle were grazing in the area by 1900. Ranches have increased in number and size over the years, and now include nearly all the usable agricultural land. Cow/calf ranching has been the result of these changes. The present trend, generally by non-resident land owners, is toward consolidating ranches into larger, more efficient enterprises. Meadow grass, clover and hay fields are irrigated. Livestock graze the meadow and public lands in summer, and are marketed after they are removed from the range in fall. Sheep graze the range in summer but are normally wintered at lower elevations. Many ranchers are also incorporating recreation into regular ranching. Horses are often kept for use on the range and for recreation.

Today, land uses within the planning area are by and large seasonal and include recreation and aesthetic enjoyment. Mt. Crested Butte Ski Area offers downhill skiing to enthusiasts. Other winter recreation includes snowmobiling and cross country skiing. Chairlift rides at Mt. Crested Butte are available during the summer, as well as the winter, where passengers can be conveyed to the 12,162 foot summit where there are magnificent views of the Rocky Mountains, along with hiking opportunities. Mountain biking has created an increased tourist draw to area in summer months. Jeep trails and old mining trails provide not only vehicular access, but also support mountain bikes and hiking in wilderness areas. Rafting and kayaking along the major rivers also occurs, but is marginal due to difficult runs and short seasons. Camping and fishing are also popular in certain areas, along with big game hunting. The Colorado Department of Wildlife reports migration of deer, elk and possibly bear through the Region as animals leave and return to winter ranges.

Housing

Specific information available regarding housing is limited to three housing studies conducted in 1992 and 1993. The first housing study was sponsored by all the local governments in Gunnison County, excluding Marble but including Western State College. The second was conducted by Crested Butte and the last was a project for a class at Western State College (Ref. 7).

1992 Local Government Study

Highlights of the early 1992 local government study entitled "Crested Butte/Gunnison Area Housing Needs Assessment" by RRC Associates of Boulder, Colorado are as follows:

- Approximately 41% of the employees who responded were in Gunnison and 18.6% of the employees were in Crested Butte and Mt. Crested Butte.
- 834 employees responded.
- Average household incomes were are follows:

Crested Butte	$26,904
Crested Butte renters	$26,076
North of Almont	$33,096

- The average household size was 2.66 persons.
- Almost 21% of Crested Butte respondents held multiple jobs.
- On average, homeowners pay 21.4% of their income for mortgages and renters pay 28.9% of their income for rent.

The following findings are for those living north of Almont:

- 56% felt housing was one of the more serious problems,
  25% felt housing was a problem but there are other problems,
  15% felt housing was the most critical problem,
  2% felt housing was not a problem or a lesser problem.
- 33% are paying too much,
  21% are getting a bargain.
- 26% are very satisfied,
  18% are not satisfied,
  4% are very dissatisfied with their residence.
- The primary reasons people are dissatisfied are:

  45% too expensive,
  15% overcrowded,
  6% poor maintenance,
  3% too far from work,
  3% not available year round,
  3% short term rentals in complex,
  24% other.
- Experience during the last two years finding housing: (1 to 5 scale)

  1 14% no problem
  2 7%
  3 15%
  4 30%
  5 33% very difficult
- The average Crested Butte monthly household rent is $487.
- 3% prefer to live in the Crested Butte area.

- Respondents go to work by the following means out of five days per week:

  1.85 drive alone,
  1.69 walk,
  1.04 ride Mt. Express,
  0.56 ride bike,
  0.48 car pool,
  0.26 hitchhike
  0.14 other.

  Residents use means other than automobiles to go to work on an average of 3.29 days of 5.

The RRC study summarized the report by saying "Rental housing, which is more affordable, is needed for year-round residents. The cost of rental housing is high as a percentage of renter income. This makes it difficult for the many renters who wish to purchase homes to save necessary down payments."

1993 Town of Crested Butte Study

A "Housing Survey by the Town of Crested Butte of Renters in the Community" was conducted at the beginning of 1993 because one of the findings from the RRC study was that 72% of the respondents preferred to live in single family homes which are difficult to build and meet affordable needs. The other reason for the study was to determine more about incomes so housing could be planned around income. The study contacted only Crested Butte renters and the results were as follows:

1. When asked if renters would live in the various housing types, the responses were:

high density rental	43% yes
vacant lot for a duplex	64% yes
renting or purchasing a townhouse	75% yes.

2. Which do you most prefer:

high density rental,	7%
lot for a duplex,	37%
rent a townhouse,	27%
purchase a townhouse.	29%.

3. Affordable housing is:
   the most critical problem 33%
   one of the more serious problems 59%.

4. Reasons for moving in the last three years:

   rent was raised 19%
   residence sold 16%

5. Spending more than 40% of their income on rent: 23%

6. Average monthly rent: $530.

7. Average monthly rent per paying resident: $219.87.

8. Renters all say they can afford to pay the following for rent: (all residents in the unit): (responses are in percentages)

Price	Rent	Mortgage
<$200	2%	2%
201-300	20	7
301-400	11	11
401-500	17	12
501-600	24	21
601-700	12	19
701-800	8	14
801-900	3	9
Total	97%	95%

1993 Western State College Study

The third study was conducted by a class at Western State College in the spring of 1993. Businesses in Crested Butte and Mt. Crested Butte were contacted and two employees from each business were contacted. There were a total of 21 respondents.

Findings about the employees include the following:

1. 67% of the respondents were from Crested Butte.
2. 43% own and 57% rent.
3. 66% live in houses and condos and 24% live in rooms or other forms of shelter.
4. 57% have moved 1-3 times in the last two years. 5% have moved eight times.

5. 43% have lived here 1 to 3 years.
6. The 25-34 age group has the maximum number of persons living in the households. This is also the average age group in Crested Butte.
7. There is an average of three to four persons paying rent per household.
8. The total monthly rent/mortgage is $500.
9. 80% of the households are 2 and 3 bedroom units.
10. 80% of the respondents are satisfied with their housing.
11. The average monthly income is $2,379 but this figure was weighted since one individual makes $12,000 per month.
12. There is a high correlation between the length of time a person has lived in Crested Butte and the rent the person pays. Longer time residents pay less and short term residents pay more.

No findings were presented about employers.

The magnitude of the problem can be assessed in three ways when analyzing the information generated by the studies. First, 6% of the Crested Butte residents were very dissatisfied with their residence. 16% were dissatisfied. 48% of those who were dissatisfied or very dissatisfied were dissatisfied because their units are too expensive or overcrowded, a result of being too expensive to be affordable by the number of residents the units were designed for.

Second, 23% of the Crested Butte respondents pay more than 40% of their income for rent. Mortgage companies consider 28 to 30% of a person's income for a mortgage to be the maximum they will allow. Therefore, at least 23% of the 611 Crested Butte renters were paying 10% or more than what is generally considered practical for a mortgage.

The examples above demonstrate that there is a clear need for additional affordable housing. The precise percentage of need is probably somewhere between 22 and 34 percent of residents in Crested Butte.

Transportation

The major arterial roads in the Crested Butte 201 area are State Highway 135 that begins in Gunnison and ends at Elk Avenue in Crested Butte, and Gothic Road that begins at Elk Avenue and serves

Mt. Crested Butte along with the Slate River Road, Washington Gulch, Gothic and other areas to the north. Kebler Pass Road is another major road, used only during the summer for access to the west and areas such as Somerset and Paonia.

Most county roads are gravel, including Slate River Road, Washington Gulch Road, Kebler Pass and Brush Creek Road. Skyland subdivision roads are paved or chip sealed. Streets in Crested Butte South are also gravel, two lane roads. Speed limits of 25 MPH are maintained within developed urban areas. Crested Butte streets are paved, with curb and gutter.

Planned improvements to major roads are the current bridge and realignment project on Kebler Pass, outside the 201 planning area and a State Highway 135 improvement project starting in 1995. This project will widen the road and add eight foot shoulders for bicycles from the north terminus in Town to Crested Butte South. The Town of Mt. Crested Butte has discussed eliminating the hairpin turn nearest to the town of Mt. Crested Butte on the Gothic Road, but no projects are planned at this time. A pedestrian/bike path is however under construction along Gothic Road and will limit future road projects. Future road improvements or a new access may be required if the 3,166 un-built but zoned-for units in Mt. Crested Butte are built and there is no alternative transportation system to Mt. Crested Butte.

According to the Town of Crested Butte's Three Mile Plan, the current average daily traffic on Gothic Road in the summer is about 5,000 and in the winter it is about 4,000. The Three Mile Plan predicts that if 3,166 more units are built, the Gothic Road may need to handle 11,611 vehicles per day during peak winter months, and 15,513 vehicles per day during summer months. Since the number of day skiers driving to the ski area will probably remain fairly constant, these figures are inflated. When the Snodgrass Ski Area is built, the percentage of inflation will decrease unless alternative transportation is required.

A major problem identified by the Crested Butte Fire Protection District is one that affects their ability to successfully protect life and property. In Mt. Crested Butte, there are a number of private roads with hairpin turns and road surfaces that are either too tight or too narrow to allow fire fighting equipment to access many of the home sites. This problem highlights the need to communicate with the fire district when reviewing development proposals and to require road standards that allow fire fighting equipment to protect developments.

Public Transportation

Mountain Express is a public bus system founded in 1978 and operated by a board comprised of Crested Butte, Mt. Crested Butte and Crested Butte Mountain Resort (CBMR) representatives. The system is funded by a 1% sales tax in both towns and a grant from the federal government. CBMR purchases some of the buses. It is the opinion of the Mt. Express Director that the revenues barely cover existing operating expenses.

The primary purpose of the system is to move people between Crested Butte and Mt. Crested Butte in the winter. Summer routes and off season routes are also operated and "condo loops" are offered in the Town of Mt. Crested Butte. Over the past seven years, ridership has increased from under 300,000 riders per year to 755,000 riders in 1993. New loops can be added but additional equipment and staff would be needed.

Air Transportation

A 4,500 foot air strip exists southeast of Crested Butte at the Avion subdivision. The subdivision lots are being marketed as fly-in, fly-out and homes are proposed adjacent to the runway. Although there have been commercial flights from Avion to Aspen and Telluride in the past, none are proposed at this time.

Helicopters were proposed for moving skiers in the National Forest and a one year trial permit was applied for to the Gunnison National Forest. There is no identified base area for the helicopters and the developer of the Avion airstrip has stated at public meetings that he does not want helicopters at the air strip. In October, 1993, the application for a one year trial permit was denied by the Forest Service.

Pedestrian Trails and Mountain Biking

A system of trails exists in the Gunnison National Forest. In addition, the upper loop on private and State lands connects Mt. Crested Butte and Skyland, and the lower loop takes people north out of Crested Butte but dead ends at the Jucha property north of Peanut Lake. Another trail is the Green Lake trail in

Trappers Crossing. The last major trail is on the ski area land, both private and public, including the Gunnison National Forest, and is maintained by CBMR. None of the subdivisions in the 201 area have trails despite many studies, conducted nationwide, indicating that property values are higher when they are adjacent to trails.

The Crested Butte Mountain Bike Association (CBMBA) maintains the upper loop and other trails and sponsors a series of trail reconstruction projects each year. The Town of Mt. Crested Butte has been working on a trail between the two towns for at least two years and has begun construction in 1995.

There are no active railroads in the 201 area but the abandoned railroad beds are relatively flat and make ideal bike and pedestrian paths. Most of the railroad beds are on private property. If the land is developed, the railroad beds could become the basis for a trail system.

Most trails in the area are very steep and beyond the abilities of the average bicycle rider and many walkers. Many of the trails are dead-end trails that go up to the top of mountains or ridges or are blocked by land owners who do not care to have the trails cross their land.

Ski Trails

As a result of negotiations between Crested Butte and the Trappers Crossing developers at the time Trappers Crossing was being proposed, there are two nordic ski areas crossing private lots in the subdivisions at Tappers Crossing at Crested Butte and Trappers Crossing South. Trails in these areas are maintained by the non-profit Nordic Ski Center.

Undeveloped and Vacant Land

There are 3,238 square miles or 2,072,320 acres in Gunnison County. Of these, the Crested Butte 201 Planning Area incorporates approximately 27½ square miles. In all of Gunnison County, about 79% of the land is owned by the Federal government and 1% is owned by the State. Private citizens own the remaining 20%, of which 63% are out-of-state owners.

A list of residential subdivisions in the general 201 area is also summarized in the Crested Butte Three Mile Plan. The numbers summarized above vary slightly from those in Section 2.2, mainly because of dates the information was documented and also the information source.

Recreation and Open Spaces

The majority of the 201 Planning area boundary is adjacent to or within National Forest Land. There are approximately 240 acres of State Public Land situated between Mt. Crested Butte and the Skyland area. National Forest Land within the 201 area includes:

Meridian Lake vicinity	120 acres
Mt. Crested Butte vicinity	2040 acres
Skyland/Lake Grant vicinity	700 acres
Crested Butte South vicinity	40 acres
Total Federal Land	2900 acres

Other public land in the Upper East River Valley includes about 240 acres of State-owned land between Mt. Crested Butte and Lake Grant. This State land was originally set aside for schools. Figure 2-6 shows locations of Public Lands in the 201 area.

Land Use Controls

Land use, zoning and planning are controlled by governing bodies of incorporated areas and by the Gunnison County Planning Department in unincorporated areas. In addition, natural features such as steep terrain, wetlands, and floodplains either preclude development, require mitigation if developed, or result in major construction costs to protect roads and buildings against potential natural hazards. Gunnison County has established zoning and land use policies along with development standards. In addition, the Town of Crested Butte recently adopted a Three Mile Plan which addresses a number of development policies for the Crested Butte area. It has also been the unwritten policy of the Town to limit growth with wastewater treatment capacity.

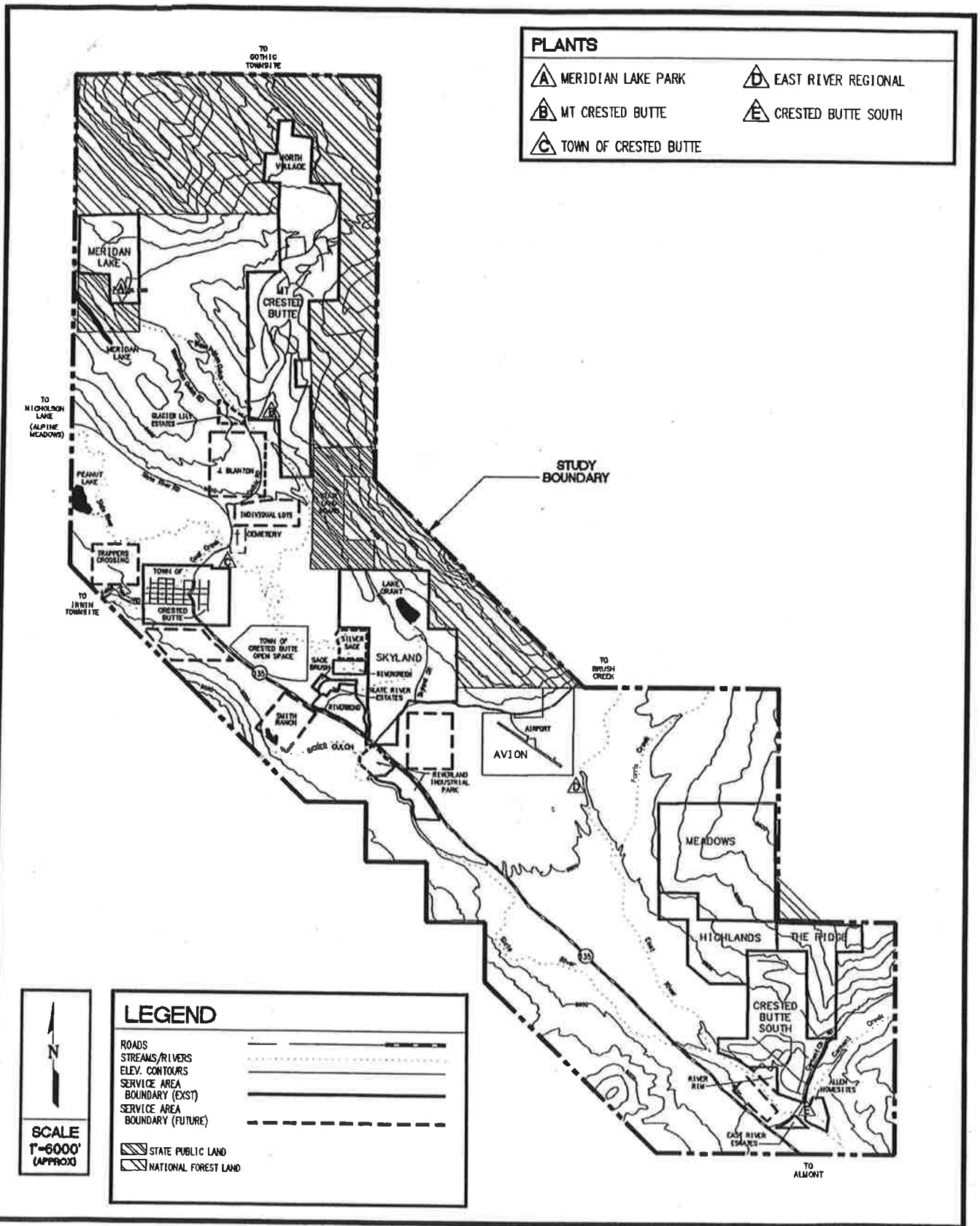

FIGURE 2-6 Upper East River Valley - 201 Study Area - Public Lands

Air Quality

Colorado's air quality is currently affected by four major pollutants: carbon monoxide (CO), fine particulates (PM10), ozone (O3), and hazardous air pollutants (HAPs). Major sources of air pollution include:

Woodburning; which produces carbon monoxide, particulate matter, hazardous air pollutants and visual matter.

Motor vehicles; which give off carbon monoxide, particulate matter, ozone, hazardous air pollutants and oxides of nitrogen.

Industry; which could increase ozone, air odors, particulate matter, hazardous air pollutant, oxides of nitrogen and sulfur dioxide and may cause visible releases, depending on the nature of industry.

The 201 Planning area is among many mountain areas of the state which have a reputation for some of the best visual air quality in the state. Views of scenic vistas in mountain areas are a prized resource that residents and visitors identify with Colorado.

The Colorado Department of Health operated an air quality monitoring station in the Town of Crested Butte during the mid to late 1980's to evaluate ambient air quality and the impact of wood burning stoves (Ref. 16). The Town was originally rated as Group I air quality, i.e. 90% probable to violate the PM10 standard of 150 ug/m3. The air monitoring study identified a maximum PM10 level of 127 in 1986. Since then, PM10 have reportedly been reduced to annual maximum levels of 121, 76, 77, and 72. Two major reasons for the lower levels reported include state and federal emissions standards for new woodburning stoves along with aggressive local control measures such as no-burn and woodburning conversions. Air quality is highly rated by CDPHE in the 201 Planning area. In addition, residents surveyed as a part of the Crested Butte Three Mile Plan identify clean air as a highly valued resource of the area.

Water Quality Assessment

Water Quality

Water quality of streams in the Crested Butte 201 region is generally very good, good and/or improving. However, there are mine drainage impacts in the Upper Slate River upstream of Crested Butte from the Peanut Mill near Peanut Lake. There is a problem with mill tailings runoff to the stream. From Coal Creek to the East River confluence, the Slate River exceeds the basic standards for the protection of aquatic life. Copper, gold, cadmium, lead, zinc and mercury are the metals of concern.

Keystone Mine, for many years, was a source of metals to Coal Creek. A treatment plant has been constructed to treat this source of abandoned mine drainage. As a result, much of the stream's capacity to support beneficial uses has been restored to this portion of Coal Creek, and has also improved the quality to the Slate River to which it is tributary. An average trout fishery now exists in the Slate River and Coal Creek.

The East and Slate Rivers were listed in the past by the CDPHE Water Quality Control Division as potentially threatened by ammonia levels which were expected due to permanent and seasonal population growth. Recreational growth of the early 1980's, particularly the high occupancies associated with the skiing season, caused concern as to the potential impacts on the environment and water quality in the area.

Early management plans attempted to establish ammonia wasteload allocations based on the ammonia carrying capacity of receiving streams; however, insufficient information was available to adequately assess site specific ammonia loadings and stream carrying capacities. Additionally, considerable disagreements existed as to how the total amount of ammonia allowed to be discharged should be distributed among the various wastewater treatment facilities. Wasteload allocation has since been replaced by the Colorado Ammonia Model, which is a much-advanced method for determining non-toxic discharge limits based on long term in-stream monitoring.

In the absence of long-term and site specific stream data, effluent from wastewater treatment plants of the planning area are currently water quality limited, with the exception of Mt. Crested Butte, which is effluent limited for both ammonia and chlorine. This is due to low

flows of Woods Creek and limited dilution of the toxic effect of ammonia and chlorine on aquatic life.

CDPHE calculated preliminary ammonia effluent limitations based on state wide in-stream averages in December, 1992. Preliminary calculations typically result in slightly more stringent effluent limits than final calculations, since final numbers are based on at least four years of in-stream monitoring data in lieu of state wide averages. Table 2-8 preliminary calculations identified effluent ammonia limitations (in mg/L) for treatment plants in the study area:

Table 2-8 Existing Ammonia Discharge Limits

Month	C.B. South	East River	Town C.B.	Mt. C.B.	Meridian Lake
January	21	45	8.7	4.2	80
February	46	39	7.5	3.6	69
March	36	26	5.0	2.4	46
April	400	26	5.9	2.8	55
May	273	34	12.9	3.3	68
June	304	28	32.1	5.8	127
July	92	21	7.0	2.8	60
August	126	21	4.4	2.0	42
September	76.5	23	3.2	1.8	37
October	115	22	2.7	1.7	34
November	156	30	3.7	2.3	45
December	182	41	6.2	3.3	64

Typical values for ammonia in raw wastewater are around 20-30 mg/L. Aerated lagoon systems typically do not efficiently remove ammonia, whereas extended aeration and oxidation ditch type of treatment systems can achieve a high level of ammonia removal. As a result of preliminary effluent ammonia calculations, CDPHE suggested in-stream monitoring for the East River and Mt. Crested Butte systems. In addition, the calculations for Mt. Crested Butte effluent could not accurately account for impacts the Meridian Lake facility would have on background ammonia concentrations unless additional information is collected. CDPHE has also recently updated projections for expanded treatment plants. This is included in Section 5 of this study.

Classifications of streams and rivers within the 201 Planning area are listed in Table 2-9. These will be up for reclassification in 1995, and several segments may receive higher standards.

Table 2-9 Stream Classification in the 201 Planning Area

Stream Segment	Classification	Point Source NH_3 Limit
Mainstream of the East River above the confluence with Slate River, including all tributaries, lakes & reservoirs	Aquatic Life Cold 1 Recreation 2 Water Supply Agriculture	21 mg/L - 45 mg/L *(Preliminary)
Mainstream of the East River between the confluence with Gunnison River and Slate River, including all tributaries, lakes and reservoirs	Aquatic Life Cold 1 Recreation 2 Water Supply Agriculture	None
Cement Creek and all its tributaries, lakes and reservoirs in the Est River Drainage tributary to the East River	Aquatic Life Cold 1 Recreation 2 Water Supply Agriculture	No Point Source
Mainstream of the Slate River between the confluence with Coal Creek and Oh-be Joyful Creek	Aquatic Life Cold 1 Recreation 2 Water Supply Agriculture	No Point Source
Mainstream of the Slate River between the confluence with East River and Coal Creek	Aquatic Life Cold 1 Recreation 2 Agriculture	Monitor Only
Mainstream of Coal Creek, including all tributaries from a point immediately below the Crested Butte Water Supply intake to the confluence with the Slate River, with the exception of Wildcat Creek.	Aquatic Life Cold 1 Recreation 2 Agriculture	No Point Source
Mainstream of Woods Creek from the source to the confluence with Washington Gulch	Recreation 2 Agriculture	Nov-Apr 79.4 lb/day May-Jul 75.4 lb/day Aug-Oct Monitor only
All tributaries, including lakes and reservoirs to the Slate River except for Coal Creek, Oh-Be-Joyful Creek, but including Washington Gulch	Aquatic Life Cold 1 Recreation 2 Water Supply Agriculture	None

* East River Regional Sanitation District is currently conducting an ammonia study on the East River in order for CDPHE to verify future discharge limits.

In accordance with the Colorado Water Quality Control Act, "Recreation - Class 2" is applied to those stream segments where primary contact recreation does not exist and cannot be reasonably expected to exist in the future, regardless of water quality. The mountain streams classified as Recreation 2 are generally unsuitable for

primary contact recreation because of low water temperature and low stream flows.

East River Ammonia Study

As a part of the discharge permit renewal for the East River Regional Sanitation District, CDPHE has required the District to conduct an ammonia study of the East River, Segment 5 of the Upper Gunnison River Basin. The study began collecting weekly data in September, 1991. Although the study is on-going, CDPHE has calculated preliminary ammonia limits based on recently obtained data. Test results have been reviewed and average values are summarized in Table 2-10.

Table 2-10 East River Ammonia Study

Month	Actual East River (In-Stream)			Historical ERRSD WWTP Effluent Quality		
	pH	°C	*NH_3	pH	°C	*NH_3
January	8.57	1.5	0.04	8.02	3.5	<0.1
February	8.33	1.9	0.08	ND**	ND	ND
March	8.62	2.2	0.08	7.43	2.3	<0.1
April	8.53	4.1	0.10	8.43	5.7	0.60
May	8.38	4.9	0.05	7.51	5.5	0.05
June	8.51	7.6	0.08	8.72	12.1	0.05
July	8.48	10.0	0.10	9.60	17.5	0.10
August	8.36	11.3	0.06	8.69	18.4	0.18
September	7.61	10.6	0.61	7.87	15.8	<0.1
October	8.30	6.5	1.27	8.11	11.4	1.55
November	8.15	2.6	0.17	7.6	9.5	0.1
December	8.22	1.4	0.42	ND**	ND	ND

* NH_3 in mg/L
** ND = No Discharge

Ammonia values for wastewater effluent for the East River plant, as reported by the laboratory test results, are questionably low since lagoons do not efficiently remove ammonia. This may however be due to very high detention times in the treatment system.

Low Flows

There is little current stream gaging information available for the sections of the Slate and East Rivers within the study area. The US Geologic Survey had gaging stations in place in the 1940's and early 50's that provided sufficient data to determine the chronic low flows in these rivers. The chronic low flow ($Q_{7,10}$) is defined as the lowest average flow, in cubic feet per second (cfs), for a seven day period within a 10 year period of record. Although the data for these rivers is outdated, this chronic low flow is considered by CDPHE to be still relevant for wasteload allocations calculations and effluent limits. The chronic low flows are as follows for the two critical streams in this study area:

Slate River	8.0 cfs
East River	13.0 cfs

The relation of the in-stream low flows to the plant discharges for treatment alternatives is covered in Section 6.

Major Beneficial Uses

Domestic water supply and irrigation are the primary beneficial uses of the water taken from wells, streams and rivers in the 201 planning area.

Surface water diverted for domestic purposes is as follows:

Town of Crested Butte	Coal Creek Water Treatment Capacity 0.8 MGD intake located west of 201 boundary
Town of Mt. Crested Butte	East River Water Treatment Capacity 0.99 MGD Intake located east of 201 boundary

The Meridian Lake Resort water supply is claimed to be springs; however, the collection galleries are near the ground surface in alluvial and glacial till material. It has been reported that precipitation accounts for much of the aquifer recharge. In addition, CDPHE classifies the water supply as surface water based on particulate analysis results.

Skyland, Riverbend and the East River developments primarily use springs as the domestic water source, but a significant number of private wells are in the area. A engineering study of the capacity of the springs

is currently being accomplished by others, and augmentation for water supply in Lake Grant is proposed.

Two water wells supply Crested Butte South with raw water. Well #1 has a rated capacity of 0.1238 MGD and the second well is rated at 0.3312 MGD.

Smaller water supply systems, such as the Riverland Industrial Park and single family residences located in unincorporated areas primarily use groundwater from individual wells for domestic water. Figure 2-7 shows approximate locations of the domestic water sources from wells as provided by the State Engineer's Office. There are many wells on the list from the State Engineer's Office that may not be currently used for domestic purposes or may be abandoned and not used at all.

Water Rights

Agriculture and ranching in the 201 area relies on irrigation water. An inventory of irrigation ditches of the East River and Slate River was compiled for the Gunnison Soil Conservation District, the Colorado Division of Water Resources and the Gunnison County Agricultural Stabilization and Conservation Service. The need for the inventories first arose during the 1977 irrigation season when irrigation water shortages were expected throughout the Gunnison Basin. Approximate location of irrigation diversions are shown on Figure 2-8, including decreed flow rates. Further study of irrigation rights have also been made separately and are available for reference.

In addition, instream flow appropriations documented by the Colorado Water Conservation Board for rivers and creeks in the 201 planning area are listed in Table 2-11.

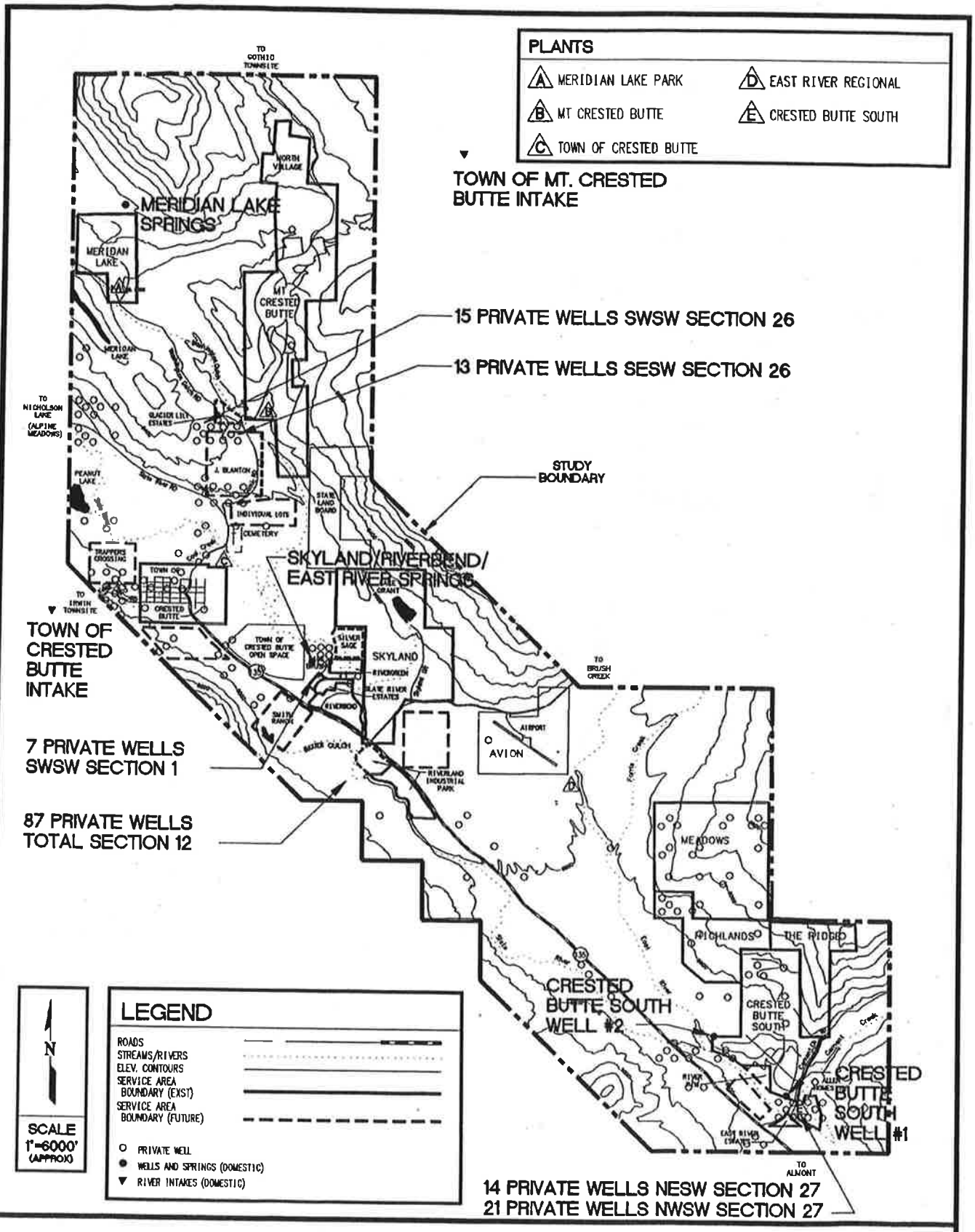

FIGURE 2-7 Upper East River Valley - 201 Study Area - Beneficial Water Usage

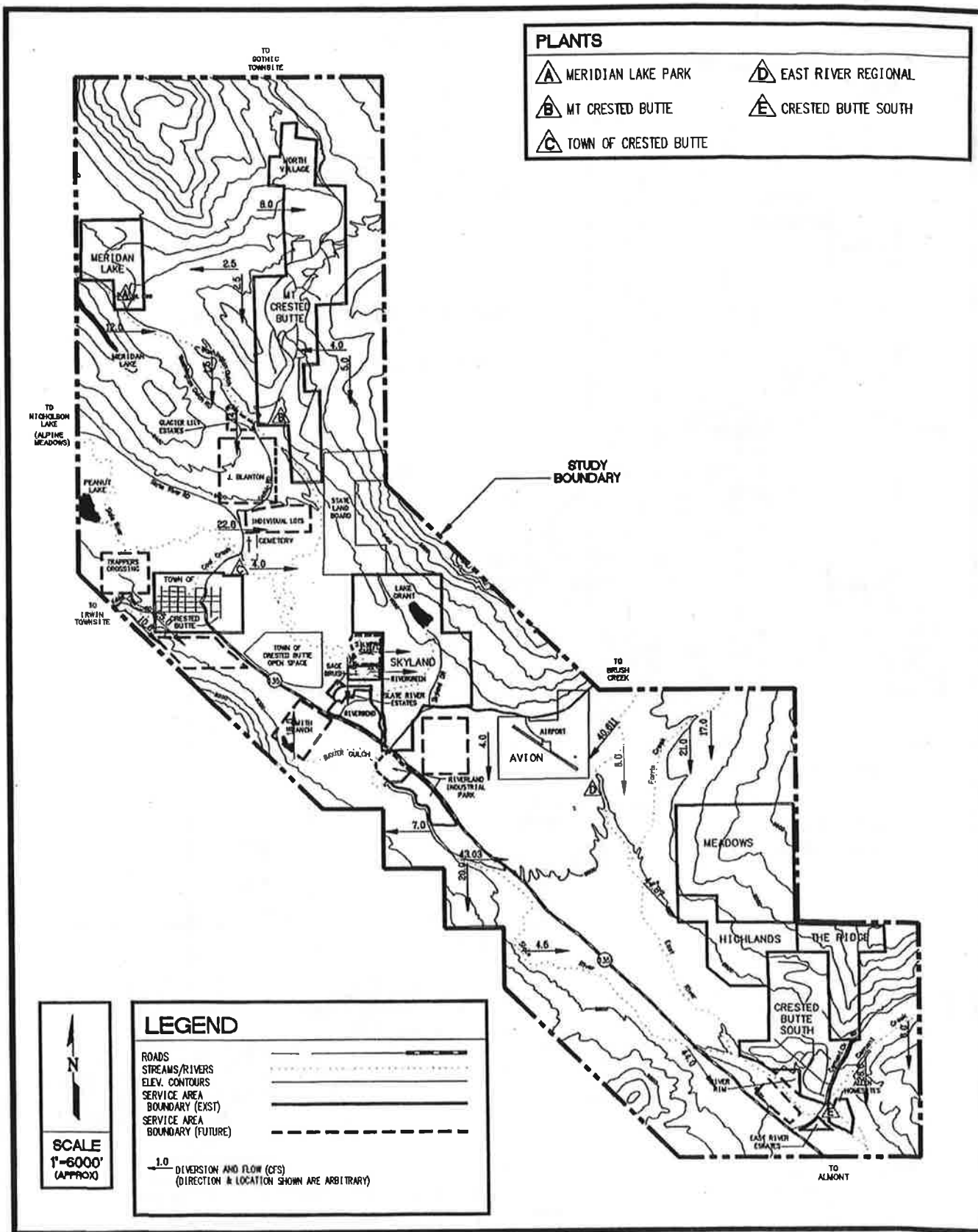

FIGURE 2-8 Upper East River Valley – 201 Study Area – Agricultural Diversions

WestWater Engineering — Rothberg, Tamburini & Winsor, Inc.

Table 2-11 Instream Flow Appropriations for Rivers and Creeks in the 201 Planning Area

Stream	Stream Segment	Amount
Cement Creek	Headwaters to confluence at East River	10 cfs
Coal Creek	Robinson Creek to confluence at East River	2 cfs
East River	Copper Creek to Brush Creek (NE corner of 201 Area)	40 cfs
East River	Brush Creek to Alkali Creek (through eastern 201 Area)	10 cfs
Slate River	Oh-Be-Joyful Creek to confluence at Coal Creek	30 cfs
Slate River	Coal Creek to confluence at East River	35 cfs
Washington Gulch	Headwaters to confluence at Slate River	2.5 cfs

To date, there have been no documented filings on wastewater treatment plant effluent flows. It should be noted that Mt. Crested Butte diverts most peak season water supply from the East River upstream from the 201 planning area and transfers the wastewater to Wood's Creek, a tributary to Washington Gulch and the Slate River. The Town of Crested Butte diverts raw water from Coal Creek, west of the planning area, and discharges treated effluent to the Slate River below the confluence of Coal Creek. All developments in the East River Regional Sanitation District are diverting domestic wastewater return flows from the Slate River basin into the East River.

Additionally, the Mt. Crested Butte Ski Area presently diverts water from the East River for snowmaking purposes. Initial inquiries regarding this use of water have found that volumes used vary significantly from season to season, based on the actual need to supplement natural snowfall, but average diversions are about 40 MG, mostly in the early ski season. Approximately half of the runoff from the ski area drains back to the East River while other areas drain to Woods Creek then to the Slate River. This makes it very difficult to quantify recharge and/or transfer of water from one drainage basin to the next, but significant water is presently diverted from the East River basin into the Slate with little returned by other uses.

SECTION 3

Existing Facility Evaluations

Mechanical Plants

Introduction

The wastewater treatment facilities for the Towns of Mt. Crested Butte and Crested Butte and the Crested Butte South Metropolitan District were evaluated for performance by RTW. These facilities use mechanical systems for treatment while lagoon systems are utilized at both the Meridian Lake and East River Regional plants. The lagoon facilities are evaluated later in this section. As requested by the advisory group the evaluations for the Mt. Crested Butte and Crested Butte facilities were based on the previously completed data compilation and recent facilities planning reports completed in early 1993 and updated in 1995 (Refs. 22 & 23). Additional facility evaluations were also performed on the CB South plant (Ref. 24).

Each of the mechanical facilities studied here uses the activated sludge process for secondary treatment. There are variations of the process, but all use the same basic treatment mode. The wastewater is screened and discharged to an aeration tank where it mixes with microorganisms and air. The microorganisms use the sewage constituents for food and use the oxygen in the air to oxidize the food. This converts the sewage materials into energy for the microorganisms to use to live and energy for growth and reproduction. The microorganisms group together into flocculent masses which become heavier than water. When discharged from the aeration tank to a clarifier, the flocculent masses settle to the bottom, are collected and sent back to the aeration tank to enter the process again. The clarified effluent is then disinfected and discharged to the receiving stream.

As with any biological system, microorganism mass will accumulate until it completely fills the system. Therefore, some of the mass is continually wasted to an aerobic digester where the waste sludge is aerated and the microorganisms are starved. The digestion process reduces the

microorganism mass and also causes most pathogenic microorganisms to die-out, leaving a stabilized sludge that has very low pathogen levels. This sludge then requires off-site disposal or land application.

The conventional activated sludge process has higher organic loading rates and processes the waste at a faster rate. The extended aeration variation has lower organic loading rates and processes the waste more slowly. The conventional activated sludge process is usually harder to control than the extended aeration process, because of shorter treatment time and the sludge production rates are higher.

Mt. Crested Butte

The Mt. Crested Butte wastewater treatment plant uses the extended aeration variation of the activated sludge wastewater treatment process. The wastewater travels first through a bar screen to remove trash and a grit chamber to remove sand and other gritty material. Degritted wastewater then flows through a comminutor to a circular equalization tank which is split into two equal sections. A flow control valve allows equalized hydraulic flows to discharge to the two aeration tanks where air is mixed with the wastewater. Both diffused aeration and surface mechanical aeration are available. The aerated wastewater is discharged to a clarifier where solids settle, leaving the treated wastewater to be disinfected via chlorination prior to discharge to Woods Creek which then flows into Washington Gulch. Settled sludge or return activated sludge (RAS) is pumped back to the aeration tank to serve as the source of microorganisms used to treat the wastewater.

Excess sludge generated in the aeration system is sent to a storage tank for initial digestion and to an old clarifier which has been converted to a gravity thickener. The thickened sludge is then aerobically digested further and is presently stored until summer months and disposed via land application. Figure 3-1 shows the plant processes at Mt. CB in a graphical format.

The following Table 3-1 lists the various unit processes presently used, their sizes and their estimated capacities. Capacities for the bar screen, grit chamber, comminutor, influent flow measuring and flow equalization units were taken from the RBD report and compared to the Colorado Department of Health NPDES Permit. Except for flow equalization, the capacity of each is much greater than even the future flow rate expected. Therefore, no further evaluation was required of these processes. Independent evaluation was completed on the aeration basins, aeration equipment, secondary clarifier, chlorination system and

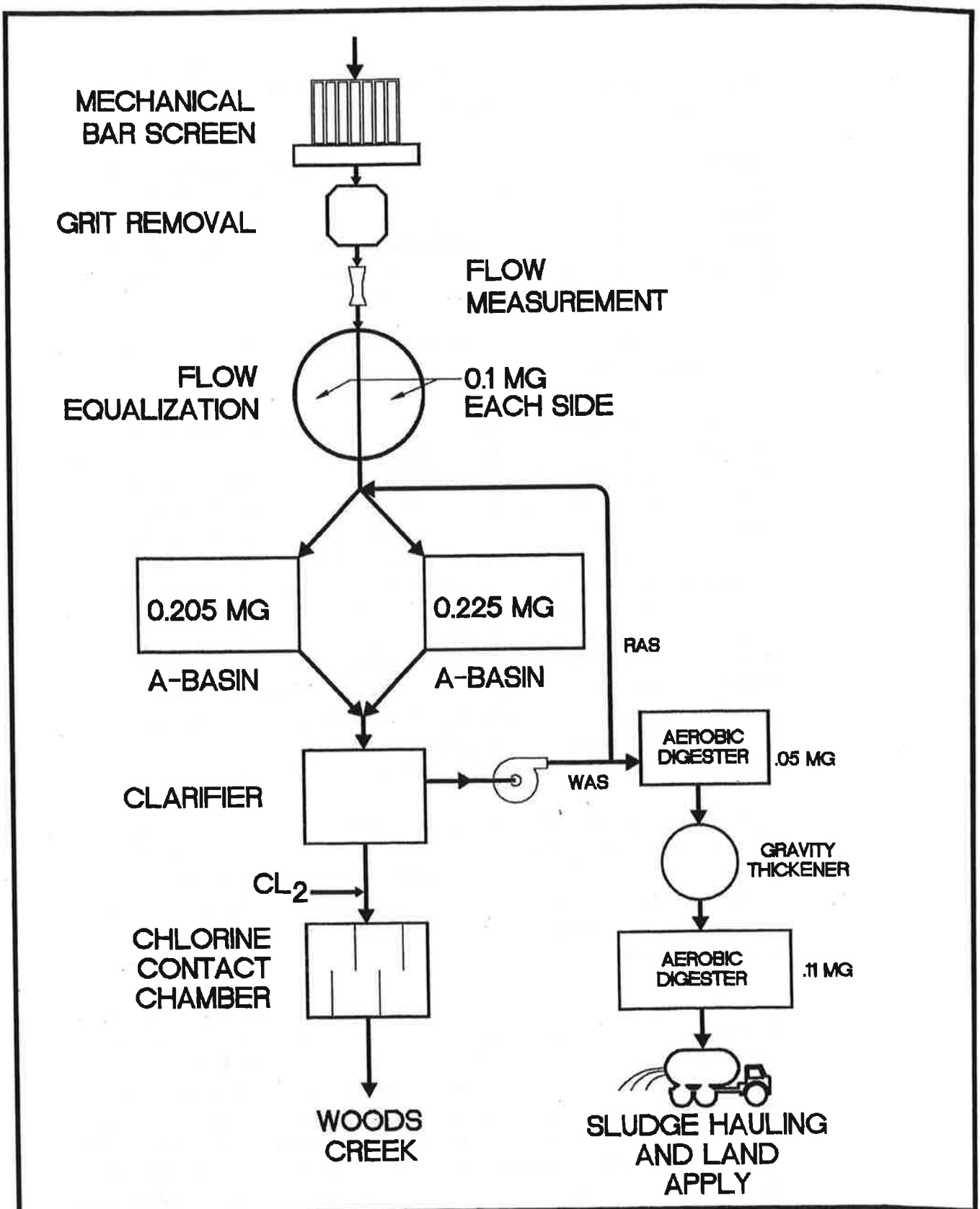

FIGURE 3-1 Mt. Crested Butte Existing Treatment Schematic

sludge digestion because their capacities are much closer to present flow rates, limiting the effective size of the plant.

The aerator capacity calculation was based on the highest monthly average BOD in January, 1992, on an estimated Total Kjeldahl Nitrogen value of 50 mg/L and an effluent ammonia limit of 23.8 mg/L. It could be argued that the peak weekly BOD value of 533 mg/L for the first week in January should have been used. However, the capacity for flow equalization and a knowledgeable operating staff provides the capability to meet effluent standards.

Summary of Findings

Analysis of Table 3-1 shows that 0.4 MGD is the maximum plant capacity without modifications. Both the existing aerators and clarifier limit capacity at 0.4 MGD and the return activated sludge system, rated at 0.44 MGD, is also limiting. The equalization tank at 0.4 MGD was not considered effective as the aeration evaluations were based on non-equalizable considerations.

Table 3-1 Mt. Crested Butte Unit Process Capacities

Process	Description	Capacity
Bar Screen	Mechanical	2.5 MGD Peak (CDPHE) 3.0 MGD Peak (RBD)
Grit Chamber	Non-aerated, centrifugal	2.5 MGD Peak (CDPHE, RBD)
Comminutor	N/A	2.5 MGD Peak (CDPHE)
Influent flow Meas.	3" Parshall recorded	.018-1.2 MGD range
Flow Equalization	100,000 gal	0.4 MGD (RBD, CDPHE)
Aeration tanks	430,000 gal	0.43 MGD @ 24 hr. DT 0.6 MGD @ 17.2 hr. DT
Aerators	2-40 hp blowers 1-40 hp mechanical	1912 lbs O_2/day trans. Standby, 998 lb/day trans. 0.4 MGD @ BODi=478 mg/L and 26 mg/L TKN removal
Clarifier	Rectangular, traveling bridge, 27'x58'x12.5'	0.4 MGD (RBD, CDPHE) Ineffective surface area. Too small sludge collector.
Return sludge (RASE)	2 @ 55-305 gpm	0.44 MGD
Sludge digestion	0.2 MG volume	386,000 lb BOD removed per year at 40 days DT, 0.6 MGD @ 226 mg/L

Process	Description	Capacity
BODi		
Chlorinator	30 lb/day max.	0.6 MGD @ 6 mg/L
Chlorine Contact	12,575 gal	0.6 MGD @ 0.5 hr DT

Much of the treatment system is rated at 0.6 MGD or more and it appears that fairly simple modifications could allow the entire plant to be rated at 0.6 MGD. The following recommendations, previously made by RBD, have been constructed at the plant and are capable of increasing the plant capacity to 0.6 MGD.

- Flow equalization - New meter and control valve, revised piping.
- Aerator - add a 40 HP blower with automatic DO control and pH/alkalinity monitoring.
- Clarifier - Revised influent distribution and effluent collection, and new sludge collector mechanism.
- Sludge Return (RAS) - Increased pumping capacity to 200% of influent.
- Dechlorination - Add dechlorination to meet chlorine limits.
- System - Other minor items such as additional process control equipment.

This system also requires additional sludge treatment and a disposal facility to meet the new EPA 503 Regulations. Agreements have been reached with the Town of Crested Butte for a regional facility for sludge processing, located at the Town's plant site, where treatment will produce a Class A sludge for land application. This system will be discussed in later sections of this study and is detailed in the Joint Sludge Action Plan (Ref. 21).

Town of Crested Butte

The Town's wastewater treatment facility consists of an uncovered headworks facility followed by an extended aeration activated sludge process. The treatment process schematic is shown in Figure 3-2. The headworks consists of two manually cleaned bar screens in series which remove rags, sticks, etc., and a Parshall flume for flow measurement. This flume does not appear to flow freely at its discharge, therefore, the reported flow rates are questionable at high flow. No grit removal is provided, therefore, the aeration basin and aerobic digester probably

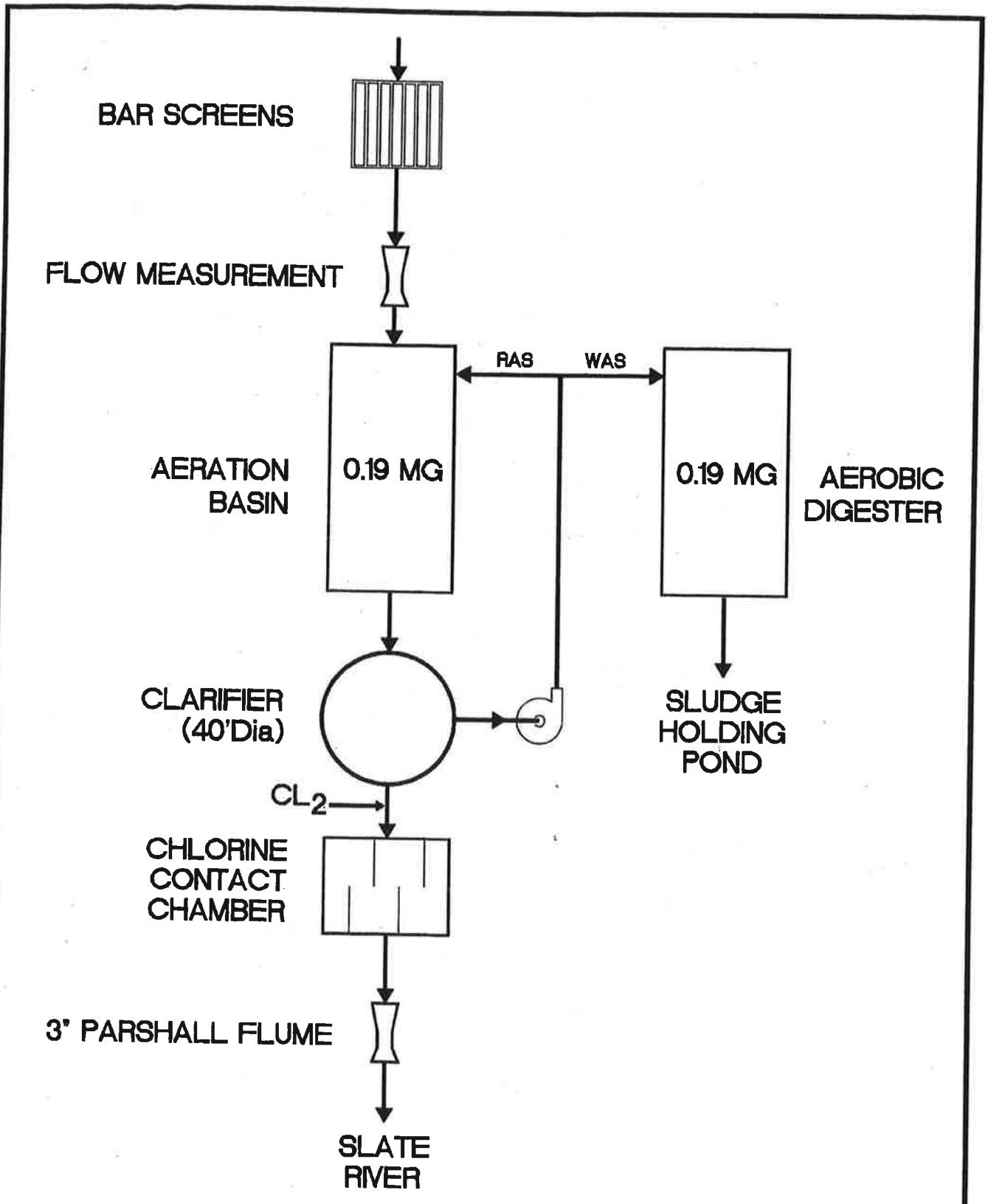

FIGURE 3-2 Town of Crested Butte Treatment Schematic

contain appreciable amounts of accumulated grit. The entire headworks facility is in poor condition.

The sewage then flows to an uncovered aeration tank for treatment prior to clarification in a covered clarifier. Aeration is provided by a submerged turbine and sparger system. Waste sludge is digested in an uncovered aerobic digester of the same size as the aeration tank. Digested sludge is presently discharged into the old lagoon system for storage and has not been removed since the plant's construction. Disinfection is provided by a temporary chlorination system where chlorine is injected into the treated flow at the end of the clarifier basin, using the length of piping ahead of the normal chlorine contact basin for additional contact time. The treated sewage discharges to the Slate River after effluent flow measurement.

Air is provided by two blowers, one for the aeration tank and one for the digester. Because of water level differences in the two tanks, both blowers have to be used at one time. This does not allow for back-up blower capability.

Both the aeration and digester tanks were constructed with sloping wall slabs which have settled to different levels; thus, there is the possibility that sewage constituents are migrating into the groundwater. The bottom of the old lagoon may also be below the water table providing a direct connection to the groundwater. If either of these conditions exist, a groundwater permit will have to be obtained and further groundwater monitoring provided.

Summary of Findings

Analysis of Table 3-2 shows that the aeration capacity is limited to a practical capacity of less than 0.2 MGD at an influent BOD of 270 mg/L and 25 mg/L removal of Total Kjeldahl Nitrogen (TKN). This BOD value was experienced in October 1992 and January of 1993.

Table 3-2 Town of Crested Butte Unit Process Capacities

Process	Description	Capacity
Bar Screen	Manual	2.5 MGD Peak (CDPHE)
Influent flow Meas.	6" Parshall recorded	Submerged at high flow
Aeration tanks	190,000 gal	0.19 MGD @ 24hr.DT 0.4 MGD @ 11.4 hr. DT
Aerators	1-40 hp blowers 2-15 hp mechanical	561 lbs O_2/day trans. @ 4°C, winter critical 0.24 MGD @ BODi=270 mg/L 0.18 MGD @ BODi=270 mg/L and 25 mg/L TKN removal
Clarifier	Circular, 40' diam	0.76 MGD, 600 gpdpsf 0.88 MGD, 700 gpdpsf
Return sludge (RAS)	3 @ 420 gpm	0.8 MGD @ 1.5Q
Sludge digestion	0.19 MG volume	270,000 lb BOD removed per year at 40 days DT, 0.6 MGD+, but no back-up blower
Chlorinator	4 lb/day max.	0.8 MGD @ 6 mg/L
Chlorine Contact	24,000 gal with pipe submerged	1.15 MGD peak (RBD) 0.66 MGD, 1.75 peak/ave.
Dechlorination	None provided	0.0 MGD

In theory, since there is no back-up aerator available, aerator capacity would be zero, but practically, if the aerator went out, the blower for the digester could be used for treatment and sludge hauled away for digestion elsewhere. Therefore, the practical capacity is approximately 0.2 MGD at 270 mg/L BOD and 25 mg/L TKN loadings. This is much less than the presently permitted capacity.

We also observed that the reported chlorinator capacity is only 0.08 MGD. This is based on an expected required dose of approximately 6.0 mg/L. Practical capacity of the chlorinator is considered to be 0.4 MGD since only about one pound of chlorine per day is presently used.

A problem with lack of dechlorination is also noted. The discharge permit requires an effluent total residual chlorine value of either 0.03 or 0.22 mg/L depending on the season This can not be achieved with present facilities. Therefore, the Town will have to write a letter to the Colorado Department of Health, Water Quality Control Division requesting a modification in its permit. The Division will then develop a compliance schedule for the Town to meet.

Lastly, the leaky aeration tank and unlined sludge disposal lagoon may have direct connections with the groundwater as defined Under the July 1993 Groundwater Regulation promulgated by the Colorado Water Quality Control Commission. These regulations require that the Town apply for a groundwater discharge permit. If the disposal lagoon is disallowed by this permit review, then the Town will have to develop another method of sludge disposal. A combined sludge treatment facility with Mt. Crested Butte is presently planned for the Town's plant site and will process sludge to the Class A level.

In summary, the present capacity of the Town treatment plant should be placed at 0.2 MGD, based on firm aeration capacity for the organic load that has presently been experienced.

Crested Butte South Metropolitan District (CB South)

The CB South facility was designed to originally operate in the extended aeration activated sludge mode, but as the load is increased, operation was expected to move toward the conventional activated sludge mode. The evaluation by the CDPHE was based on parameters in the conventional activated sludge range, but operator preference is for extended aeration due to the process stability and low sludge production and we have looked at this plant for this mode of operation.

The treatment process is shown schematically in Figure 3-3. Raw sewage travels through dual bar screens and is manually cleaned to remove rags, sticks, etc. Influent then discharges to a 12,500 gallon in-line equalization tank which equalizes the flow through the plant. Since CB South's population has turned out to be relatively permanent and most work out of the development, flow peaks have been common and the equalization is beneficial. The equalized flow is pumped to the aeration tank where the waste is aerated for about 14 hours based on design flow (actual time is approximately 16 hours). Mixed liquor discharged from the aeration tank is clarified in a 12' diameter clarifier before disinfection in a 4000 gallon effective volume chlorine contact chamber and discharge to the East River. Excess sludge is wasted from the clarifier to two aerobic digesters with total volume of 37,400 gallons. Thickening is achieved by decanting the digesters to the aeration basins.

The following Table 3-3 lists the capacity of each unit process as calculated by RTW, unless otherwise noted.

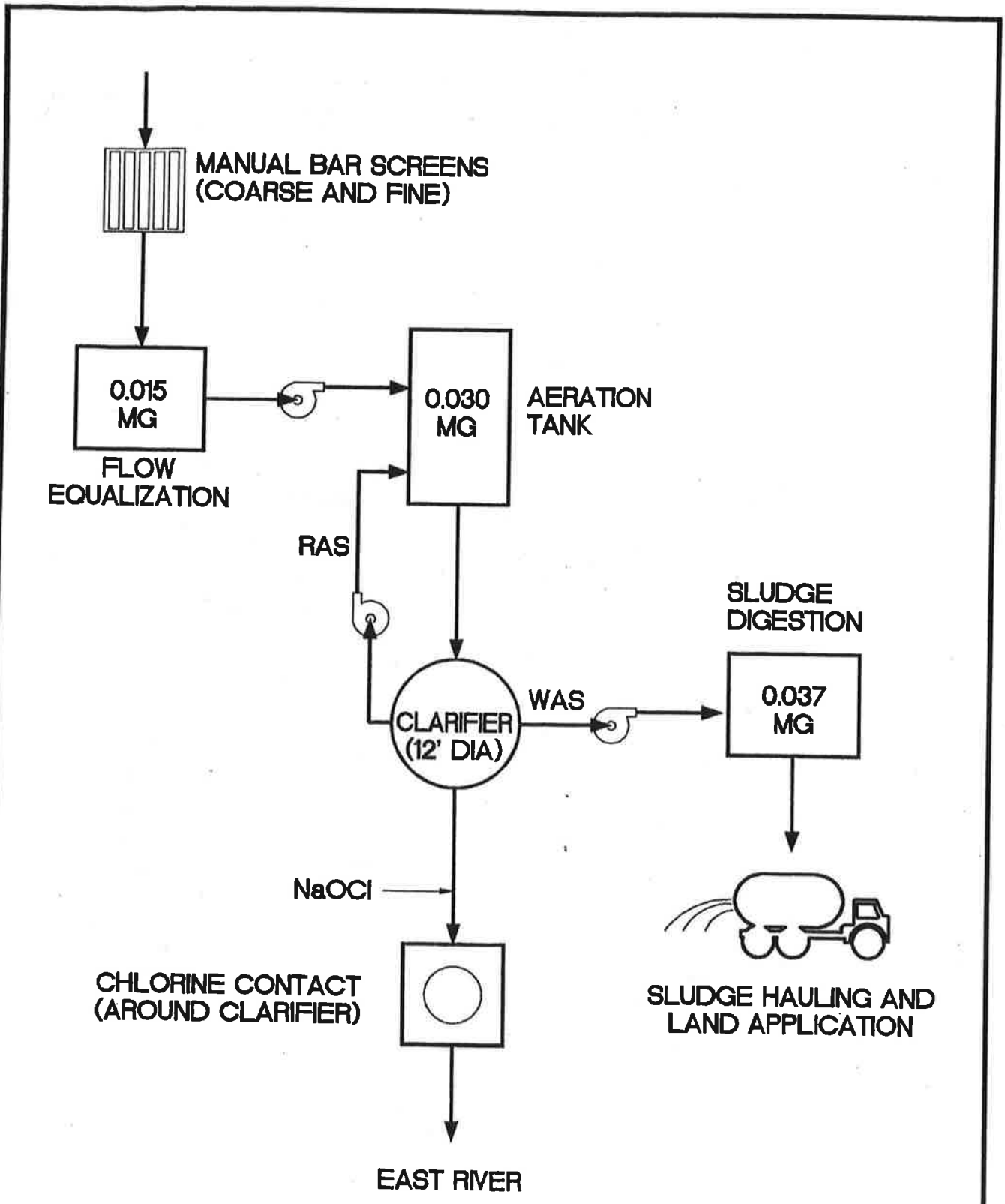

FIGURE 3-3 Crested Butte South Existing Treatment Schematic

Table 3-3 Crested Butte South Unit Process Capacities

Process	Description	Capacity
Bar Screen	Two-hand cleaned	0.05 MGD+ (CDPHE)
Flow Measurement	Time clocks on equalized flow	N/A
Flow Equalization	12,500 gal, DT 6 hr	0.05 MGD
Aeration tanks	29,600 gal	0.05 MGD @ 14hr.DT 0.06 MGD @ 12 hr. DT
Aerators	3-5 hp blowers, one is standby for aeration and digestion	194 lbs O_2/day trans. 0.088 MGD @ 264 mg/L BODi
Clarifier	Circular, 12' diameter	0.05 MGD @ 442 SOR 0.06 MGD @ 500 SOR
Sludge digestion	0.37 MG volume	26,500 lb BOD removed per year at 40 days DT, 0.5 MGD @ 264 mg/L BODi
Chlorinator	Sodium Hypochlorite	0.05 MGD
Chlorine Contact	4,000 gal	0.16 MGD@ 0.5 hr DT

Summary of Findings

Even though the original design value was set at 50,000 gpd, the Crested Butte South plant is more adequately run at 40,000 gpd with the longer detention times of the extended aeration activated sludge mode of operation. Good process control techniques will probably allow the plant to treat up to 60,000 gpd without effluent quality problems. Sludge storage is no longer a problem since the present land application sites have been significantly expanded to areas that are not restricted to application during spring and summer months. Performance monitoring and process control testing are other limiting factors. Plant safety issues due to lack of railings and grating also must to be addressed.

Aerated Lagoons

Introduction

The wastewater treatment facilities at Meridian Lake Park and East River Regional Sanitation District use the aerated lagoon process and were evaluated for performance by Westwater. The East River plant

provides additional treatment by the facultative process that allows for some anaerobic conditions to occur in the deep lagoon cells.

The aerated lagoon process uses either a single pond divided into sections or a series of separate ponds to provide aeration and effluent polishing. Lagoon plants are theoretically capable of achieving secondary treatment (reduction of BOD to less than 30 mg/L and TSS to less than 75 mg/L). The treatment processes which take place in these plants include biological decomposition and settling in the aeration basin(s) and polishing pond, and disinfection in a chlorine contact system. Present day design standards include a minimum of two aeration cells, a polishing pond, an adequate diffused air system or other aeration system, a well-designed layout for the inlet and outlet pipes, and a proper disinfection system.

Calculations were made to determine the theoretical capacity of the aeration cells using the method recommended by the Environmental Protection Agency (EPA, 1983). The Colorado Department of Health uses a different method for determining capacity in discharge permits. The CDPHE method was developed by one of their staff engineers and tends to result in a lower theoretical detention time than the EPA method.

The EPA method is preferred, since it appears to be based upon a more conservative approach and tends to be more widely accepted.
In calculating treatment capacity, the volume of the polishing pond is not included, since its theoretical function is to intercept any overloads or upsets and provide additional settling.

The limiting period for lagoon operation is in winter time, when water temperatures are lowest. During this period, bacterial action slows and the rate of BOD consumption is much less. Water temperature in both lagoons was estimated to be a minimum of 1°C in winter. The deep snows in winter interfere with operation of the aerators and access to the site. If ice cover can be maintained over the lagoon, this is generally helpful in the winter since it allows higher water temperatures to be maintained. Another disadvantage to a lagoon system is there is very little process control and minor modifications to the system are often major expenses.

One significant advantage of the aerated lagoon system is that it can handle variable daily flows because of long detention times. This flow equalization could be very important in a resort area. They are also relatively simple systems to operate.

Meridian Lake Park

The Meridian Lake aerated lagoon has a square configuration and dimensions at the inside top of the berm of approximately 90 ft. x 90 ft. A process schematic of the plant is shown in Figure 3-4. Maximum water depth is about 9 feet and total storage volume is about 358,000 gallons. This is based on rough field measurements made by Del-Mont Consultants of Montrose. Sludge depth appeared to be about 1 foot. The lagoon is divided into an aeration cell and polishing pond by a floating baffle, which is placed in an east-west direction across the pond, about 2/3 of the way along the north-south berm. The top of the berm around the lagoon is uneven with respect to elevation and width. Average width on the built-up portions appear to be about 8 to 10 feet.

A PVC liner was installed in the lagoon when it was constructed in 1974. The liner was apparently covered with 6 to 12 inches of natural soil, however portions of the liner are visible on the berm above water level. Those areas that have been exposed to the atmosphere have deteriorated and ripped. No information was available on the condition of the undisturbed portion of the PVC liner. The liner appeared to have a thickness of about 10 to 20 mils.

The lagoon still has the original diffused air system which was installed in 1974. The aeration system is known as a Dorr-Oliver "Inka Grid" aerator and consists of a blower, an underwater diffuser, and a series of baffle plates rated at 320 scfm. The air blower is a Spencer Turbine-Blower, Model No. 1507, rated at 700 scfm. It is powered by a 7½ hp, 230V, 3-phase motor, and is located in a 6 ft. x 6 ft. building on the north bank of the lagoons. A 6 inch steel pipe, suspended above the water level on 6 inch pipe supports, carries compressed air to the diffuser system, located approximately 40 feet from the bank. The diffuser consists of a grid of perforated pipes suspended about 5 to 6 feet off the bottom of the lagoon. Perforated holes are located the bottom of the pipe grid and compressed air is directed downward and outward into the water column. An essential part of the aeration system is a baffle system. The air jets set up currents in the water which causes it to circulate through the baffle system, and theoretically throughout the aerated pond.

The headworks facility is located on the sewage outfall just north of the tennis courts. Equipment includes a manually- cleaned bar rack, a trapezoidal flume used for flow measurement, and an ISCO bubbler-type flow recorder. The bar rack and flume are located in a four foot diameter manhole with a steel cover. The recorder

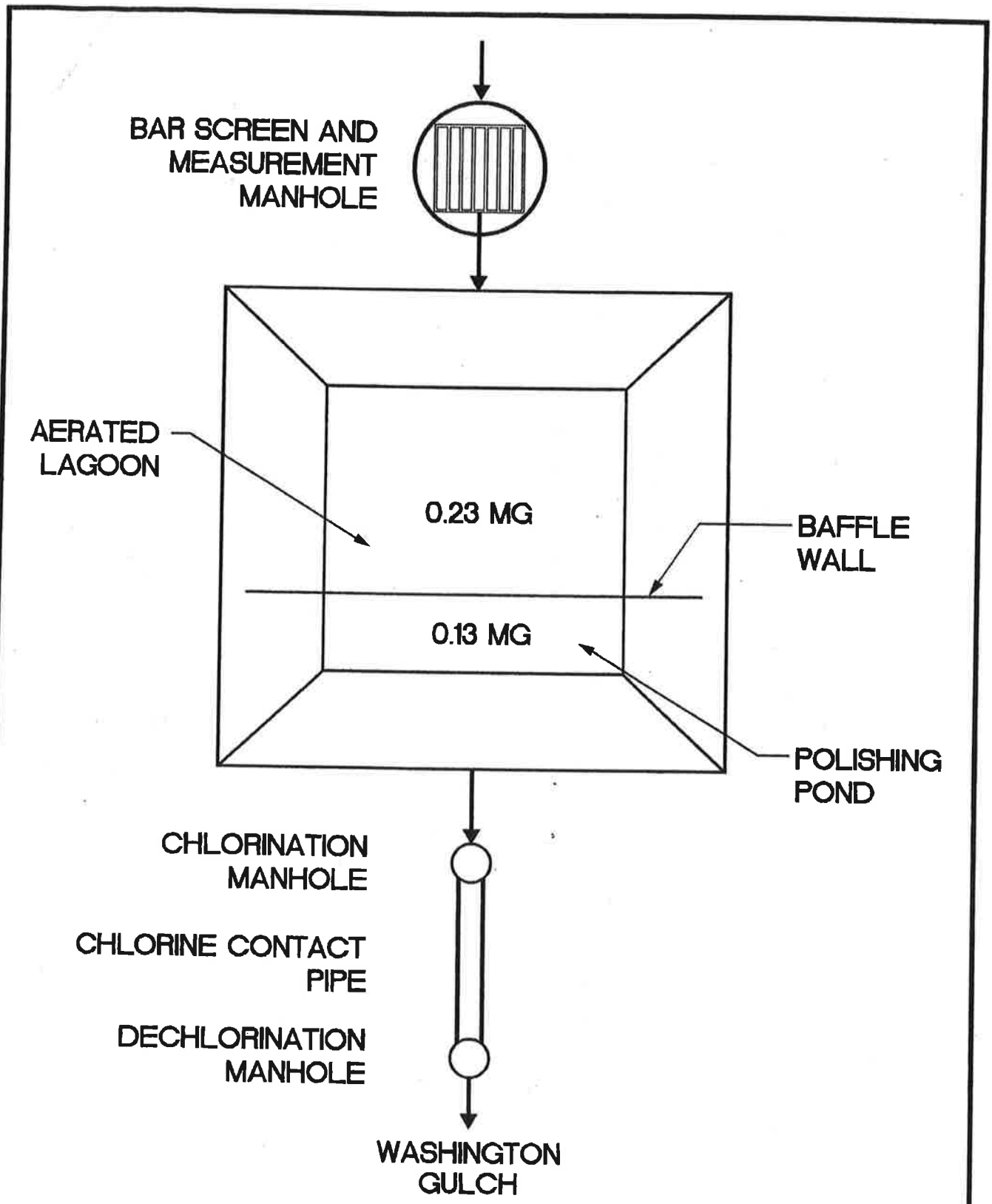

FIGURE 3-4 Meridian Lake Treatment Schematic

equipment is located in a 3x3 ft wooden enclosure sitting approximately 3 ft above the ground, on 4 inch posts. The raw sewage distribution system consists of a single pipe which enters the lagoon on the northwest corner, but the exact location is not known.

The lagoon effluent pipe system consists of a single outlet pipe located in the southwest corner of the polishing pond, with a vertical riser which terminates at the water surface. This apparently controls the lagoon water level, in addition to taking water off at the water surface. This pipe runs from the polishing pond directly to the discharge point on Washington Gulch, about 100 yards to the west.

A new chlorination/dechlorination system was installed in 1991, using a design prepared by Del-Mont Consultants. It consists of two 4 ft diameter manhole barrels, 130 feet apart, and connected by an 18 inch PVC pipe. The first manhole, which is located about 10 feet east of the pond, contains the chlorination system; the second manhole contains the dechlorination system. The new chlorination/dechlorination system is offset about 10 feet south of the 8 inch outfall pipe. The outfall pipe was cut and elbows were inserted to divert all effluent to the new chlorination/dechlorination system.

Both the chlorination and dechlorination system use tablet dispensers. The tablets dispense in the chlorination manhole that is tied directly to the inlet of the 8 inch effluent pipe. After contact with the chlorine, the chlorinated water flows through the 18 inch pipe to the dechlorination manhole. This has a concrete wall approximately 3 to 4 feet high, which backs water up into the 18 inch pipe. This allows for the required 30 minute contact time. The tablet dechlorinator is located on the downstream side of the baffle wall. An 8 inch pipe passes through this wall into and through the dechlorinator. The dechlorinated water is then discharged back into the old effluent pipe and into Washington Gulch. Each of the tablet chlorinators has a V-notch weir which can be used for effluent flow measurement.

The following Table 3-4 is a summary of the capacity calculations made by CDPHE and included in the plant's NPDES permit rationale.

Table 3-4 Meridian Lake Park Unit Process Capacities

Process	Description	Capacity
Bar Screen	12" wide, 3/8" bars, 1.0" spacing	0.13 MGD (peak flow)
Influent flow measuring	Large 60° V trapezoidal flume with recorder	0.006 to 0.128 MGD (recommended range)
Lagoon No.1	Volume=225,00 gal Depth=9', DT=16 days	0.014 MGD (CDPHE) 0.0125 MGD
Aeration	One 7.5 hp blower fan @ 700 cfm and one Inca grid @ 320	170 lbs BOD5/day (CDPHE)
Polishing cell	Volume=130,00 gal Depth=9', DT=9.3 days	0.014 MGD
Chlorination	Tablet feed chlorinator	0.014 MGD
Chlorination contact chamber	130' of 18" pipe, Volume=1,700 gal, DT=30 min.	0.08 MGD (peak flow)
Dechlorination	Tablet feed dechlorinator	0.014 MGD
Effluent flow measuring	V-notch weir in chlorinator	N/A

Theoretical Calculation of Plant Capacity

Two approaches were used to calculate the theoretical hydraulic capacity in this analysis. The first (EPA) assumes that the plant consists of an aeration basin and a polishing pond and all treatment must occur in the aeration basin. The polishing pond's function is primarily to provide additional treatment and to intercept any overloads or upsets. The second approach (CDPHE) assumes that there are two aeration basins separated by the baffle. This would require aeration to be added in the polishing pond portion of the present lagoon system. In this case, there would be no polishing pond which is theoretically in violation of State regulations. However, a variance might be possible for a smaller lagoon system, or it may be possible to add a polishing pond at relatively low cost.

The calculations were based upon wintertime operation, when bacterial action slows down and the rate of BOD composition is slowest. Del-Mont Consultants calculated an approximate volume of 355,000 gallons, based on rough field measurements. This volume, less 10% for ice cover, was used to determine the theoretical capacity. The sludge storage was already considered in the Del-Mont calculations. Detention time required to reduce to BOD from 250 to 30 mg/L as well as

detention time required for 85% removal, were calculated. Water temperature in the lagoons was estimated to be 1° Centigrade. This assumes that the Inka grid system provides sufficient mixing so there is no layering of densities and temperature in the pond.

The detention time and allowable flow for each operational scenario is shown in Table 3-5. The organic capacity of the lagoon is limited by the air available for BOD removal. This system is limited by the capacity of the Inka grid system to supply 302 lbs of oxygen and remove 173 lbs of BOD. This number is almost identical to the value used by CDPHE in the permit rationale. The air supply system could be modified, therefore the limit on the lagoon capacity is hydraulic not organic.

Table 3-5 Meridian Lake Park Corporation Theoretical Capacity

	One Cell (202,500)		Two Cell (320,000 gal)	
Standard	Required DT	Allow. Capacity	Required DT	Allow. Capacity
30 mg/L	52 d	3900 gpd	30 d	10,620 gpd
85% removal	40.1 d	5050 gpd	25.5 d	12,550 gpd

For one cell, the allowable maximum monthly flow is 3,900 gpd. For two cells in series, the allowable flow is 10,620 gpd. The 30 mg/L standard is the limiting factor in both cases. This compares with the 14,000 gpd capacity allowed by the discharge permit and maximum month flows of 12,000 gpd reported at the plant.

The lagoons have actually been treating higher flows than 10,600 gpd and achieving 30 mg/L; however, the measured influent BOD's are less than the 250 mg/L used in the theoretical capacity calculations. The existing system also functions as a two cell system for all practical purposes. Water temperatures may also be higher in the lagoons (than 1°C) during the winter because of ice and snow cover which insulates the water from the air temperature.

The conclusion can be made that the lagoons are above hydraulic capacity under the present wastewater flow.

Summary of Findings

The discharge permit shows that the plant had several effluent violations in the period from August, 1990 through July, 1992. This problem was primarily due to violation of the 85% removal regulation, where twelve

violations occurred. The DMR data analyzed in this study, extends from March, 1991 to July, 1993, showing four violations of the 85% regulation. All four occurred in the spring when influent BOD was low and infiltration was high. There were six violations of the fecal coliform regulation; however all of these occurred before the chlorination system had been installed.

Meridian Lake Park was issued a Cease and Desist Order by the Colorado Department of Health on August 6, 1991. The Order listed 12 violations of the 85% removal regulation and violations of the 30 mg/L BOD standard, and 5 violations of the fecal coliform standard. The Order included a compliance schedule for installing disinfection equipment, a flow recorder and bar screen, and repair of the pond liner. It also included a requirement for an I/I study. If violations continued, a third cell was to be constructed. The disinfection and flow measuring equipment has been installed, but the Cease and Desist Order is still in effect, since all requirements have not been addressed.

The existing aeration system has adequate horsepower for oxygen dispersion and mixing. It is a diffused air system, which is generally the most appropriate for cold weather areas. Its main deficiencies are its age and the fact that there is no backup blower or diffuser. The system is presently at capacity and no addition flow or loading is acceptable. The panels which create the mixing motion in the pond have also deteriorated and should be replaced if this aeration system is continued in use.

The main deficiency with the lagoon itself is inadequate volume to properly treat the wastewater (based on theoretical capacity calculations). A second deficiency is that there is only one lagoon separated into two sections with a baffle. It would be desirable to have a second lagoon in order to take the first lagoon out of service for cleaning and repairs. State regulations also require a minimum of two aeration cells and one polishing pond. Separate earthen basins would be a more acceptable long range alternative.

The liner has deteriorated at the surface, however, it may still be in acceptable condition below the water level, although there have been requests for its replacement. The existing baffle, while necessary for providing a separate polishing pond, is subject to damage by ice in winter. The lagoons appear to be structurally sound, although some of the side slopes appear to be steeper than the recommended 3:1 slope, and the top of the berm is uneven.

A aerated lagoon system cannot achieve a consistently high level of ammonia removal. At the present time the strictest limit calculated by the State is 34 mg/L in October. However, there are no ammonia restrictions on the discharge at the present time. If ammonia removal becomes necessary in the future, it should be possible for the lagoon to achieve this during the restrictive month of October. This limit may change, once more accurate background data is available and if plant capacity is increased to accommodate future growth and buildout in the subdivision.

East River Regional Plant

The wastewater treatment plant for the East River Regional Sanitation District (ERRSD) uses the facultative aerated lagoon treatment process. Unit treatment processes include two aeration cells, a polishing pond, and chlorination/dechlorination gas feed equipment and contact chamber. Other facilities include a control building with laboratory, a flow measurement and recording device for the plant effluent, distribution piping, control manholes, fencing and access roads. The plant is located southeast of the Avion development, adjacent to the East River and several irrigation ditches. Discharge of the treated effluent is to the East River. This plant was designed by Camp Dresser McKee of Denver, Colorado, and was constructed in 1985. The following Figure 3-5 shows the major plant processes in schematic format.

The plant is designed to achieve secondary treatment (reduction of BOD to less than 30 mg/L and TSS to less than 75 mg/L). Treatment processes employed include biological decomposition and settling in the aeration basins and polishing pond, and disinfection in the chlorination system. Lagoon systems are not designed to remove influent ammonia. The following Table 3-6 is a more detailed description of the various unit processes and support facilities of the plant as calculated by CDPHE for the discharge permit and checked by the consultant team.

Table 3-6 East River Regional Unit Process Capacities

Unit Process	Description	Capacity
Lagoon No. 1	Volume = 2.24 million gallons, Theoretical DT = 15.7 Treatment DT = 10.8 days*	0.143 MGD (CDPHE)
Aerators	Five 3 hp aspirating surface units FTR = 1.28 lb O_2 /hp-hr, summer FTR = 1.49 lb O_2 /hp-hr, winter	170 lb BOD/day (CDPHE)
Lagon No. 2	Volume = 2.62 million gallons, Theoretical DT = 18.3 days Treatment DT = 12.6 days*	0.143 MGD (CDPHE)
Aerators	Five 2 hp aspirating surface units FTR = 1.28 lb O_2 /hp-hr, summer FTR = 1.49 lb O_2 /hp-hr, winter	115 lb BOD/day (CDPHE)
Polishing pond	Volume = 0.49 million gallons, Theoretical DT = 3.4 days Treatment DT = 1.8 days*	0.143 MGD (CDPHE)
Chlorination	150 lb gas cylinders feeding 0-50 lb/day assume 10 mg/L dosage	0.60 MGD (CDPHE)
Chlorine contact basin	Volume - 13,800 gallons, length to width ratio = 40:1, DT = 30 min.	0.66 MGD-peak (CDPHE)
Dechlorination	150 lb gas cylinders feeding 0-50 lb/day assume 10 mg/L dosage	0.60 MGD (CDPHE)
Effluent flow	90° V-notch weir, 1 ft. tall	0.029 to 1.6 MGD Recommended range

* Design assumed that some volume is lost to sludge storage and/or ice cover.

Wastewater from the gravity collection system in Skyland Resort and Riverbend is conveyed to a sewage pump station located adjacent to the Slate River. The pump station consists of a rectangular wet well housing two submersible, centrifugal pumps. Each pump has a pumping capacity of 730 gpm at 172 feet of total dynamic head (TDH). The pumps are Clow Model 4x4x15x3, with 60 HP motors. Pump operation is controlled by float switches. The wet well is 10 ft. square, and has a total depth of 23 feet. Operating depth is about 5 feet (based on original float switch settings), which represents a volume of about 3700 gallons. An emergency backup generator has been provided at the pump station site in case of intermittent power failures.

The pumps discharge into a common header arrangement which conveys raw wastewater into a 10-inch force main. The force main conveys

wastewater to a gravity sewer that flows to the wastewater treatment facility. The gravity outfall line consists of 4500 ft of 12 inch PVC pipe, 1360 ft of 15 inch PVC pipe, and 280 ft of 16 in ductile iron pipe. The plant has no headworks (flow measurement or bar rack) and wastewater is conveyed directly to the first control manhole structure at the treatment plant. As a result, most of the wastewater enters the plant in short term surges.

The two aeration cells and the polishing pond were constructed of natural, on-site earthen materials. Figure 3-5 depicts the process schematic of the facility. Each pond has 3:1 side slopes with a freeboard of 3 ft at normal water level and are lined with a 30 mil Hypalon liner. Outside berms are 10 ft wide; inside berms are 12 ft wide.

The two aeration cells have a net treatment volume of 3.34 MG (assumes 1 ft ice cover). The aeration cells were initially equipped with self-contained floating aspirator aerators (Aeration Industries, Inc.). Cell No.1 had five - 2 HP units and Cell No.2 had five - 3 HP units. The aspirator aerators operate by creating a vacuum at a submerged propeller. This draws air down a tube where it is expelled into the water at the propeller.

Apparently due to operating problems with the aerator motors, the ERRSD has initiated a program to install a diffused air system and eventually replace the floating aerators. The diffused air system in Cell No.1 uses two 1 1/4 HP blowers and has two diffusers located near the center of the pond. A second diffused air system is proposed for the second cell in 1993.

Piping is arranged to allow operation of the cells in series and also to allow bypass of any one of the three ponds. The pipe carrying raw sewage passes beneath the control building and into the first control manhole. Raw sewage can be diverted to Cells No.1 or No.2. Control manholes are also located between Cells No.1 and No.2, and between Cells No.2 and No.3. The distribution piping is all 14 inch ductile iron pipe.

Effluent from the polishing pond enters the chlorine contact tank. It then passes through a flow measurement device and is discharged through the outfall pipe to the East River. The chlorine contact tank is a concrete structure buried below ground with the control building located on top of the tank. It has a volume of 13,800 gallons, with 5 concrete baffles dividing the tank into 6 channels, with a length to width ratio of 40:1. The chlorination system consists of a cylinder-mounted gas chlorination unit which operates off a vacuum. Vacuum is created

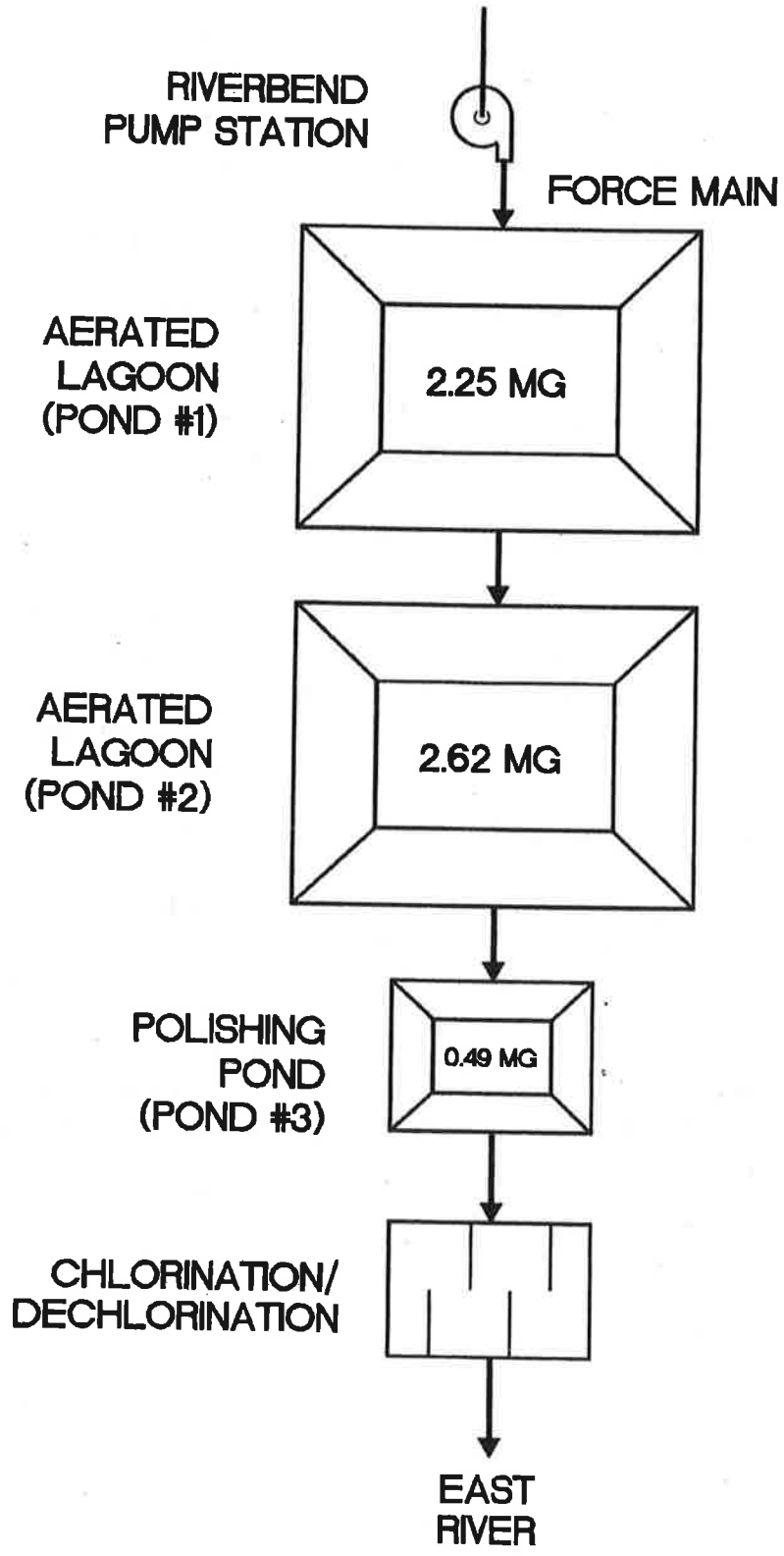

FIGURE 3-5 East River Regional Treatment Plant Schematic

by pumping wastewater from the chlorine contact tank through an ejector that is then discharged into the inlet of the contact tank. The pump is a 1½ HP submersible centrifugal pump and is located in the contact tank. A two-cylinder scale is provided for the cylinders.

Dechlorination equipment consists of a similar system, which feeds sulfur dioxide at the outlet of the contact tank. Sulfur dioxide contact takes place in the outfall pipe leading to the East River.

A flow measurement system at the outlet consists of a Drexelbrook level indicator and recorder. A circular chart is located in the control building. A 90 degree V-notch weir is used for flow measurement.

Theoretical Calculation of Plant Capacity

The capacity of the individual unit processes as calculated by CDPHE is shown in Table 3-7. The most critical unit process affecting capacity is the aeration cells. The bulk of the treatment occurs in this unit process and it is also the most difficult to expand. Thus, it is usually used to define the capacity of the lagoon system.

The design drawings show gross volume of 4.86 MG for the two aeration cells. This was reduced to allow for sludge storage and volume occupied by ice. The net treatment volume was determined to be 3.86 MG. The required detention time to achieve 30 mg/L and also 85% removal was calculated for an influent BOD conservatively estimated to be 250 mg/L.

The detention time to meet the effluent standard of 30 mg/L was calculated to be 27 days, and 22 days for the 85% removal requirement. At the present volume, the allowable flows would be 143,000 gpd (for 30 mg/L) and 176,000 gpd (for 85% removal). Thus, the 30 mg/L standard governs capacity. The 143,000 gpd limit is exactly the same as that calculated by CDPHE, using a different method.

Summary of Findings

Due to low contributing population and flows, the East River plant is operated so it discharges only intermittently. In 1991, it discharged 3 out of 12 months; in 1992, 5 out of 12 months; and in 1993, two of the 5 months from January through May. This is accomplished by lowering the effluent weir to about 2 feet below normal high water level. Discharge is controlled at a gate valve that is opened until water reaches a specified low level. The valve is then closed for 1 to 2 months until

water reaches a specified high level. The data from the DMR reports show no violations for 85% percent removal or TSS. There has been one violation for fecal coliforms, which occurred when the disinfection system malfunctioned. Overall, the plant appears to be operating very well.

The raw sewage pump station and outfall line appear to be well designed and in good condition. The main problem is that the pump station and outfall line are greatly over-sized for existing flows. In the six years that the pump station has been in operation, it has operated only about 340 hours. This is less than 50 hours per year, or about 8 minutes per day. The main disadvantages of the over-sized system are long detention times for raw sewage in both the wetwell and force main that produces anaerobic conditions and greater operation costs related to the high horsepower motors.

The 10 inch force main has a length of approximately 5,200 feet, that has a capacity of over 20,000 gallons when full. During low flow periods, raw sewage may be held in the pipeline for up to 3 days. The treatment plant appears to be capable of treating these sudden surges of anaerobic wastewater.

The initial aeration system, as designed, had adequate horsepower to provide proper oxygen transfer and mixing. Since the original system consisted of floating surface aerators, it was subject to problems with icing and heavy snowfall. In addition, the zone of influence for the aspirator aerators generally extends 5 to 6 feet below the surface. Since the lagoons are 15 feet deep, much of the lower area is not mixed and does not receive oxygen.

A diffused air system is more appropriate for the configuration of the East River lagoons. The District has installed a diffused air system with 2½ hp blower capacity in Cells No.1 and No.2. Using general guidelines of approximately 10 hp/MG for diffused air for partial mixing, this system is greatly under-sized. It may be adequate for the present situation with the diffused air diffusers placed directly under the aspirator aerators, which keeps the water surface in that location open during the winter. The aspirator aerators assist in mixing throughout the winter. The combination of the two types of aeration systems may be an ideal situation for the present low flows. A greater investment in an aeration system may not be justified at this time. For the long range however, a larger diffused air system covering the entire pond is suggested.

An aerated lagoon cannot consistently achieve a high level of ammonia removal. At present, the strictest limit calculated by CDPHE is 21 mg/L, which occurs in October, however, no ammonia limits have been established for the ERRSD plant at this time. It may be possible for the lagoon to achieve the October ammonia limits if restrictions are implemented. This value was based upon design flows, rather than present flows and treatment of ammonia will be much higher with longer detention times that occur at the presently lower flows.

Infiltration/Inflow of Collection Systems

Definition of Infiltration/Inflow

Infiltration/inflow (I/I) is extraneous (non sewage) flow which enters the sewage system and causes hydraulic overloading of sewer lines and treatment facilities. According to the Colorado Department of Health, a total flow (sewage plus I/I) of 120 gallons per capita per day is considered excessive. In determining I/I, flows are measured between 2:00 am and 5:00 am when the majority of flows are considered to be I/I and not human waste. It is important to differentiate between infiltration and inflow since they have different sources and methods of control. The following definitions have been used to differentiate between the two:

Infiltration - The flow rate or volume of water which enters sewer mains and house service connections through defective pipe, broken or cracked pipes, improperly made service connections, and manholes. Infiltration generally comes from natural sources and is usually due to poor construction or design, or a deteriorated condition of sewers.

Inflow - The flow rate or volume of any kind of water discharged into the sewer from such sources as roof gutters, cellar and yard area drains, foundation drains, running faucets and leaky fixtures, etc. Generally inflow results from deliberate and/or manmade connections.

Effects of I/I on Treatment Facilities

The most obvious impact I/I has on wastewater treatment facilities is that it utilizes hydraulic capacity that could otherwise be utilized by users of the system. As a result, it is sometimes necessary to implement expensive capital improvements for treatment plant expansions to

increase hydraulic capacity that would not otherwise be required if I/I was minimal or nonexistent. Since I/I causes higher flows, treatment efficiency is also compromised due to decreased detention times.

Another adverse impact that results from excessive I/I is the inability of treatment facilities to meet 85% removal requirements of influent BOD_5 and TSS. This is a result of I/I diluting the influent wastewater. A variance to the 85% removal requirement is an option in all discharge permits, if it can be shown that it is more cost effective to treat I/I versus curing I/I by rehabilitating the collection system.

A third impact I/I has on treatment facilities is the increased salinity or total dissolved solids (TDS) that result in the effluent. For treatment facilities located in the Colorado River Stream System, salinity standards require that the maximum incremental increase between the raw water supply and wastewater treatment plant effluent be less than 400 mg/L. Increases in TDS occur in areas of very alkaline soils through which groundwater passes and enters the sewer collection system as I/I. Because of the low alkalinity in the subsurface soils within the 201 Planning Area, TDS increases at treatment plant effluents are relatively small and are well within the 400 mg/L incremental increase limit. By example, the Town of Crested Butte's raw water TDS averages approximately 90 mg/L and the effluent at the wastewater treatment plant averages approximately 230 mg/L. This is well below the allowable TDS of approximately 490 mg/L. These results are also consistent with those shown for Mt. Crested Butte Sanitation District, that has an average treatment plant effluent of approximately 290 mg/L and a raw water TDS level of 97 mg/L. If treatment facilities surpass the allowable TDS incremental increase, some form of desalination process is required at the treatment plant, or rehabilitation of the sewer collection system is required to reduce I/I that is causing the increase in TDS.

The effects I/I has on treatment facilities has been described herein, since I/I changes both the quantity and characteristics of influent wastewater. This has a direct effect on the selection of wastewater treatment alternatives in the 201 Planning Area.

Collection System Identification

Five separate independent collection systems provide service within the 201 Planning Area and are either owned and maintained by municipalities, special districts, or homeowner associations. The five collection systems listed in Table 4-1 were analyzed separately to

determine the quantity of I/I and the effects I/I has on each of the five separate treatment facilities:

Table 4-1 Summary of Collection Systems

Collection Systems	Structure of Ownership
Town of Crested Butte	Municipality
Town of Mt. Crested Butte	Sanitation District
Meridian Lake Park Subdivision	Meridian Park Corporation
Crested Butte South Metropolitan District	Homeowners Association
East River Regional Sanitation District	Sanitation District

Previous Studies of Collection Systems

Both the Town of Crested Butte and Mt. Crested Butte Sanitation District have previously conducted I/I studies in an attempt to isolate and quantify I/I sources within each of their respective collection systems. The need for identifying I/I became a necessity as a result of both treatment facilities either exceeding or nearing their permitted hydraulic capacity. The Town of Crested Butte has previously conducted two separate analyses to identify I/I. The first report was completed by Wright McLaughlin Engineers in August of 1979. The second report was completed by RBD Engineering Consultants in 1993.

An I/I analysis of the Mt. Crested Butte collection system was also conducted by RBD Engineering Consultants as part of the 1993 study that was jointly conducted by both the Mt. Crested Butte Sanitation District and Town of Crested Butte. Previous to this study, the Sanitation District also televised more than 3,000 feet of the sewer collection system in 1990, and smoke-tested approximately 5,500 feet of sewer main and approximately 40 manholes in 1992.

The results of these previous I/I analyses were extensively used for the East River 201 Facility Plan. No other previous studies on the other three collection systems are known to exist.

Infiltration/Inflow Analysis For Collection Systems

Town of Crested Butte

Description of Existing Collection System

The Town of Crested Butte collection system consists of approximately 38,000 lineal feet of 6, 8, 10 and 12 inch pipe. The majority of the system was constructed in 1969 with asbestos cement (AC) pipe, with system upgrades made in 1979, 1992 and 1993. A new 10 inch and 8 inch PVC interceptor was installed along Butte Avenue in 1979 with connections made to the sewer lines along Teocalli, Gothic, Maroon, and Elk Avenues via the new interceptor extension along Sixth Street that connected to the new interceptor on Butte Avenue. Also in 1979, a new 8 inch PVC sewer line was installed south of Belleview Avenue and connects to the sewage lift station near Belleview Avenue and Eighth Street.

In 1992, the clay line in First Street at Whiterock Avenue was sliplined with a 7¼ inch polyethylene liner. Sewer line extensions to the west also occurred in 1992 along Gothic and Maroon Avenues to service new development and were constructed of 8 inch PVC pipe. Also in 1992, sewer line extensions were installed in the alley between Whiterock Avenue and Belleview Avenue west of First Street, and along Belleview Avenue. In 1993, the Town replaced the Eighth Street interceptor with a 12 inch PVC pipe to replace the existing 8 inch AC pipe that had been previously sliplined with a 7¼ inch polyethylene liner. A pipe and manhole summary of the Town of Crested Butte's sewer collection system is given in Table 4-2. The sewer collection system serves the entire incorporated areas of the Town, and at the present time there are no areas outside of the town limits that receive service.

Table 4-2 Pipe Summary of Town of Crested Butte Sewer Collection System

Pipe Diameter	Type of Pipe	Pipe Length	Remarks
12 inches	PVC	2,300 ft.	Installed in 1993 improvement project
10 inches	PVC	1,720 ft.	Installed in 1979 improvement project
8 inches	PVC	8,220 ft.	Installed as part of 1979 improvement project & 1992 sewer line extensions
8 inches	AC	23,000 ft.	Original Town system
8 inches	PE	180 ft.	Sliplined VCP w/7.25" PE pipe in 1992
8 inches	VCP	430 ft.	Original Town system
6 inches	AC	2,040 ft.	Original Town system
Manhole and Cleanout Summary			
Manhole/Cleanout		Type of Construction	# of Manhole
48" MH		Concrete	100
Cleanouts		Unknown	10

All of the information in Table 4-2 was based upon the Town of Crested Butte's master plan sewer drawings. All quantities should be considered estimates.

Infiltration/Inflow Measurements

From the Town's treatment plant influent flow recorder, total flows have been reported as exceeding 400,000 gallons per day (gpd) during the spring runoff. Two separate peaks in wastewater flows occur caused by I/I. The first peak occurs near the end of April when snow melting throughout the Town occurs. The second peak occurs during May and June and is believed to be the result of high water levels in Coal Creek and Slate River that occur during snowmelt runoff from higher elevations. The Eighth Street interceptor was considered to be a major contributor of I/I during the first peak flow season that may have been reduced as a result of the Eighth Street interceptor sewer replacement project in 1993. The Whiterock sewer near First Street is considered subject to excessive I/I during the second peak because of its proximity to Coal Creek. During wet years such as 1993, the two distinguishable

peaks usually seen during dry years are poorly distinguished and become one long period of severe I/I. The 1993 study indicated that I/I during this time was approximately 35% of the permitted capacity, or approximately 140,000 gpd.

Instantaneous flow measurements were also taken at 4:00 am on February 23, 1994 at the sewage treatment plant 6 inch Parshall flume. The depth of flow at the flume was reported at 0.2 feet that equates to approximately 105,000 gpd of I/I. Because of the cold temperatures that were occurring during the instantaneous flow measurement, the Town of Crested Butte had advertised for residents to run their water during the night to prevent water services from freezing. As a result, the flow measurements taken are not a true indication of the integrity of the collection system or the amount of infiltration entering the collection system during the winter months. The clear water from running water services is considered inflow and has the same effect of utilizing treatment plant capacity, but is not a reflection of the collection system's condition. The treatment plant operator, Mr. Larry Adams, indicated that early morning flows during the fall and winter months when residents are not encouraged to run their water services are very minimal. Flow measurements taken by the plant operator at 4:00 am on January 28 and February 1, 1994 substantiates this conclusion. The depth of flow reported by the plant operator during this time was ¼ inch at the Parshall flume, that equates to approximately 2800 gpd.

The Town also has reported that all of the AC and clay pipes in the system was contributing I/I based upon visual inspections of manholes. Previous attempts to cure I/I in these pipes has been fruitless. All of the PVC pipes recently installed were dry upon visual inspection by the Town, and were contributing no I/I.

As a part of the I/I assessment, instantaneous flow measurements were also taken during early morning hours on May 20 and 21, 1994. Total early morning influent to the treatment plant, as measured through the 6 inch Parshall flume at the headworks, averaged 0.268 MGD. Influent flow was clear water typical of infiltration characteristics. Several manholes in town were also monitored during early morning hours using pipe weirs in inlet pipes from the west. Recorded flows were as follows:

1) 6th and Maroon (MH-C2) 31,520 gpd.
   Remarks: There was evidence of paper and debris to indicate a small portion of the flow was sewage.

2) 5th and Elk Avenue (MH-D3) 31,520 to 40,710 gpd.
Remarks: Clear water assessed I/I flow. The depth of flow fluctuated for unknown reasons.

3) 8th and Sopris (MH-O6) 5,473 gpd.
Remarks: Characteristics of groundwater.

4) 8th and White Rock Avenue (MH-O7) 28,640 gpd from White Rock
Remarks: It was noticed that the 12" inlet pipe form the south along 8th Street was flowing about ½ full with clear, cold water from basins upstream.

I/I Correction of the Crested Butte Collection System

The 1993 report concluded that corrective work for curing I/I could begin almost immediately and show significant improvement in the Town's treatment facility performance during the spring runoff months. To cure the majority of I/I in the Town's collection system, replacement of the clay and AC sewers and service lines will most likely be required. The 1993 report estimated the cost for replacing the AC and clay sewer mains and service lines to be approximately 1.4 million dollars. A replacement program of this nature, if properly implemented over several years, would significantly reduce the majority of I/I in the Town's collection system.

Conclusions and Recommendations

It is assumed that I/I is prevalent throughout the original AC and clay pipe system installed in 1969. This indicates that total replacement of the AC and clay sewer mains and sewer services would be the most effective method of curing I/I in the Town's collection system. This was based in part on the Town's previous experience of attempting specific or isolated in-line repairs to the AC and clay pipe system, that has not reduced I/I volumes. What has been seen in the past when performing specific line repairs for this type of pipe, is that curing I/I at one specific location may result in I/I occurring in other areas as subsurface water pressures increase as a result of the repaired section of sewer line. The most effective method for curing I/I in this type of situation is some form of total line repair by in-line repair methods (i.e., sliplining, Insituform), or total line replacement. One problem with total sewer line replacement is that the Town has just recently overlaid their streets, thus in-line repair may be a more acceptable alternative.

Because of the ineffectiveness of previous attempts to rehabilitate the AC and clay pipe, and the substantial capital cost that would be incurred for replacing the existing AC and clay sewer mains (estimated at $1.4 million), it is concluded that either a new treatment facility or an expanded existing treatment facility be sized to treat maximum I/I flows during the spring runoff months. This will most likely require an 85% removal variance during the months of high I/I when influent BOD and TSS levels are low due to dilution caused by I/I. If a regional treatment facility is selected as the preferred alternative or constructed in the future, the Town may want to consider a capital improvement plan to eventually reduce the majority of I/I in the collection system. This will result in lower costs for treatment that are usually based on a per thousand gallon volume charge.

Mt. Crested Butte Sanitation District

Description of Existing Collection System

The Mt. Crested Butte collection system consists of approximately 51,000 feet of 6, 8, 10 and 12 inch pipe. All wastewater is by gravity flow with the exception of the Chalet Village Addition #10 that is serviced by a lift station and force main that discharges to the sewer main on Gothic County Road. The sewer collection system provides sewer service to developments within the District boundaries, and presently no outside District customers are serviced by the collection system. The majority of the system was developer installed under the supervision of the Mt. Crested Butte Water and Sanitation District. The initial collection system and treatment facility was installed in 1963 when the District was formed and sewerline extensions funded by new development have continued up to the present time. The majority of the collection system is either vitrified clay pipe (VCP) or PVC with the earlier portions of the collection system being constructed with VCP. The District has not undertaken any major improvements to the collection system, although the District is considering a plan to replace approximately 25% of the VCP, either by sliplining or total replacement. A pipe and manhole summary of the Mt. Crested Butte sewer collection system is given in Table 4-3.

Table 4-3 Pipe Summary of Mt. Crested Butte Sewer Collection System

Pipe Diameter	Type of Pipe	Pipe Length	Remarks
12 inches	PVC	220 ft.	Developer installed, District approved
12 inches	VCP	1,010 ft.	Developer installed , District approved
10 inches	VCP	3,000 ft.	Developer installed, District approved
8 inches	PVC	30,700 ft.	Developer installed , District approved
8 inches	VCP	14,650 ft.	Developer installed , District approved
8 inches	DIP	50 ft.	Developer installed , District approved
6 inches	PVC	1,000 ft.	Developer installed , District approved
4 inches	DIP	560 ft.	Force Main
Manhole and Cleanout Summary			
Manhole/Cleano ut		Type of Construction	# of Manholes
48" MH		Concrete	100
Cleanouts		Unknown	10

All of the information in the pipe and manhole summary tables was based upon the Mt. Crested Butte Water and Sanitation District's map of the entire sewage collection system prepared by Merrick & Company of Denver, Colorado. All of the quantities should be considered estimates.

Infiltration/Inflow Measurements

From treatment plant flow records, the 1993 RBD report concluded that I/I increases significantly in the collection system between mid-March and mid-June when snowmelt runoff creates excessive surface water and increases the groundwater table elevation. Information obtained from the District also indicates that there is a direct correlation between the snowpack depth and I/I that results in the spring. The 1993 report determined that I/I reached as high as 190 gallons per capita per day (gpcd) during the spring runoff months. Assuming a per capita sewage flow of 80 gpd, the total wastewater flow (sewage flow plus I/I) equates

to approximately 270 gpcd, that could be considered very excessive when compared to the Colorado Department of Health's excessive I/I parameter of 120 gpcd.

From the treatment plant flow charts, the winter time flows in late November are very minimal and would indicate that there is minimal I/I in the collection system during the fall and winter months. During the winter months of January through March, residents often run their water services at night to prevent them from freezing. Although this is not an indication of the collection system condition as it relates to I/I, it is considered an inflow source and utilizes hydraulic capacity at the treatment plant. This was evidenced during the instantaneous flow measurement taken at 4:25 am on February 23, 1994 at the treatment plant influent. A depth of flow of 0.19 feet was recorded on the flume staff, that equates to approximately 155,000 gpd (for a 9 inch Parshall flume), and represents approximately 40% of the treatment facility's hydraulic capacity. During the time when instantaneous flow measurements were taken, the area was experiencing a cold spell and the Town of Crested Butte was advertising that people should be running their water services at night. This may have influenced the residents in the Town of Mt. Crested Butte to also run their water services at night. This was evidenced by the fact that the District's manager, Mr. Frank Glick, reported that a week after the instantaneous flow measurement, they were notified of faucets in several vacant units having been left wide open and have since turned these faucets down.

Treatment plant instantaneous flows were also taken between 3:45 and 4:00 a.m. on May 20, 1994, to ascertain the springtime I/I conditions. Flow rates fluctuated between 0.30 to 0.46 MGD at the 9 inch Parshall flume, with the average being 0.38 MGD from 6 measurements. Influent flow was observed to be clear water characteristic of groundwater infiltration. Further investigation relative to isolating and quantifying the sources of this recorded I/I was not made.

A television analysis conducted in 1990 on 3,000 feet of the District's sewer mains supports the assumption that the majority of I/I in the District's system is occurring in the VCP sections. The television analysis was conducted in July and August of 1988 and September of 1990 when I/I is not as severe, but the TV logs did indicate evidence of I/I in some of the lines. A summary of the overall condition of the lines that were televised is given in Table 4-4.

Table 4-4 Mt. Crested Butte Collection System Summary of Line Condition From Television Analysis

MH to MH	Pipe	Location	Condition
MH-9/5 to	8" VCP	Along Gothic Co. Rd.	Partially under water indication MH-14 bellies. I/I was evidenced at several joints (approx. 670 L.F.)
MH-9/5 to MH 9/6	8" VCP	Along Castle Rd. in Chalet Village #3	Several deflections are in the line, but no report of I/I (approx. 264 L.F.)
MH-20 to MH-21	10" VCP	Adjacent to Gothic Co. Rd.	Evidence of high I/I (approx. 400 L.F.)
MH-21 to MH-21/1	10" VCP	Along Emmons Rd.	Evidence of high I/I & line (approx. 400 L.F.)
MH-17 to MH-17/4	8" VCP	Tin Cup Cafe/Gothic Bldg.	Evidence of I/I, offset joints, rocks in pipe (approx.825 L.F.)
MH-17 to MH-17A/1	10" VCP	Crossing of Gothic Co. Rd.	Line very low w/belly; Camera under water, line needs frequent maintenance (approx. 120 L.F.)
Lift Station to MH-28/7	8" VCP	W. of Paradise Rd. in Chalet Village #10	Several sections of cracked pipe were reported and I/I reported for entire length (approx. 1250 ft.)
Lift Station to MH-28/2/1	8" VCP	W. of Paradise Rd. in Chalet Village #10	Some I/I was evidenced (approx. 100 L.F.)
MH-31 to MH-34	8" PVC	Along Gothic Co. Rd.	Very poor construction reported; holes reported in pipe between MH-33 & MH-34 (approx. 860 L.F.)
MH-31/5 to MH-31/7	8" PVC	East of Datsy Circle in Chalet Village #11	Lines in good condition (approx. 480 L.F.)
MH-31/12 to MH-31/12/2	8" PVC	Along Aspen Lane Timberland	Line in good condition (approx. 205 ft.)
MH-31/16 to MH-31/17	8" PVC	East of Anthracite in Timberland	Line in good condition (approx. 130 L.F.)
MH-31/16/2 MH-31/16/3	8" PVC	Adjacent to Anthracite Drive in Timberland	Line in good condition (approx. 180 L.F.)

As can be seen from the table, most of the VCP lines either have evidence of I/I or were experiencing I/I with some sections reported to be in poor condition, versus the PVC lines that were in relatively good condition. The exception to this is the PVC line between MH-31 and

MH- 34 along Gothic County Road that was indicated to be in poor condition as a result of substandard construction methods, and may be contributing I/I.

I/I Correction of Mt. Crested Butte Collection System

The 1993 report recommended that the District commence on a phased capital improvement plan to replace the VCP sewers in areas subject to the most severe I/I problems. Replacement of the VCP could be accomplished by either total replacement or in-line repair methods (i.e., sliplining or Insituform). The 1993 report further recommended that approximately 1500 feet of clay pipe be scheduled for replacement in each of the next 3 years that would replace approximately 25% of the VCP in the District. Upon completion of the 3 year capital improvement plan, I/I flows would be re- evaluated to determine the effectiveness of the 3 year replacement program. The estimated cost for the 3 year capital improvement plan is approximately $900,000 ($300,000 of improvements for each year).

If the initial rehabilitation project is successful in eliminating I/I, the District could consider replacement of all VCP in the collection system and conduct isolated repairs identified by television analysis on the PVC sewer lines. This should substantially reduce the majority of I/I in the District's collection system. The clay service lines would also need to be replaced since they are probably contributing I/I as well, although there was no video inspection done to support this.

According to the 1993 report, the total estimated cost for replacing the District's approximate 18,500 feet of VCP would be approximately $2.5 million.

Conclusions and Recommendations

The excessive I/I during the spring runoff months hydraulically overloads the treatment facility and inhibits its ability to meet the 85% removal requirement due to low influent BOD and TSS concentrations.

It is assumed that I/I is prevalent throughout the majority of VCP lines and that some method of total line repair or replacement would be required for not only the sewer main but sewer services as well to reduce cure the majority of I/I. For the District's collection system installed with PVC pipe, the limited television analysis indicates that these lines are in good condition. There may be sections of the PVC

pipe that are contributing I/I due to faulty construction methods, that could most likely be cured by isolated repairs identified by television analysis; however, the majority of any I/I rehabilitation work should be concentrated within the VCP system where the majority of I/I is occurring.

The treatment plant is also near capacity during the peak skier months of January, February and March when I/I is minimal. Because of the substantial capital cost in replacing the existing VCP sewer mains and the fact that a plant expansion is eminent due to peak sewage flows during the ski season, it is concluded that it is more cost effective to treat the I/I at any new treatment facility that would be sized to accommodate the peak sewage flow months during the ski season (ski season flows range between 0.30 to 0.40 mgd and flows for the months during spring runoff average the same).

The basis for this conclusion is that if the treatment facility will require expansion to treat base sewage flows during peak skier months, then the facility can hydraulically treat the peak I/I flows of March through May utilizing the treatment plant capacity designed for the peak skier months. This does not support previous recommendations to cure I/I, but to initially expand the facility to treat peak month sewage flows as Phase I of any capital improvement plan. As development and growth occurs within the District, it may become necessary to cure a portion of the I/I to provide hydraulic capacity to future users that is presently being utilized by I/I. For the months of March, April and May, when influent BOD and TSS levels are low due to dilution caused by I/I, an 85% removal variance will probably be required. The basis for the variance request is that the treatment facility will require expansion to treat peak skier month sewage flows, and it is more cost effective to treat the I/I during the initial plant expansion phase, since plant expansion would be required regardless if I/I is reduced or cured.

If a regional treatment facility is selected and constructed in the future, the District may want to consider continuing with the capital improvement plan to eventually reduce the majority of I/I in the collection system. This would result in lower treatment costs based on a per thousand gallon volume charge.

Meridian Lake Park Subdivision

Description of Existing Collection System

The Meridian Lake Park collection system was originally proposed to provide service for 187 single-family lots and 180 condominium townhome units that incorporated four filings of the subdivision. In the early 1970's, the collection system for Filings #1 and #2 was constructed and consisted of approximately 19,500 feet of 8 inch PVC pipe. To date, the collection system for Filings #3 and #4 has not been constructed. All sewage is by gravity flow and no lift stations exist within either Filing #1 or #2. A pipe and manhole summary of the Meridian Lake Park sewer collection system that services Filings #1 and #2 is given in Table 4-5.

Table 4-5 Pipe Summary of Meridian Lake Park Sewer

Pipe Diameter	Type of Pipe	Pipe Length	Remarks
8 inches	PVC	19,000 ft.	Original system installed in early 1970's for Filings #1 & #2
Manhole and Cleanout Summary			
Manhole/Cleano ut		Type of Construction	# of Manhole
48" MH		Concrete	100
Cleanouts		Unknown	10

All of the information on pipe footages and number of manholes was based upon Merrick Engineering's sewer system plan prepared in 1973 for Filings #1, #2 and #3 of the Meridian Lake Park Development.

Infiltration/Inflow Measurements

The chart recorder on the influent flow measurement to the treatment facility was used to determine I/I flows occurring during the 2:00 am to 5:00 am period. The influent flow recorder was installed in October of 1992 and I/I flows were determined for the period between November 1992 to December 1993 to ascertain the effect the spring runoff has on I/I flows. Table 4-6 summarizes the flow data, and also lists the total flows recorded as a comparison to I/I.

Table 4-6 Flow Data

Period	Season	Flows - GPD	
		Total	I/I (2-5am)
11/6 - 11/28/92	Fall	4000	1,400
11/28 - 12/10/92	Thanksgiving	13500	3,500
12/10 - 12/20/92	Early Ski	5,000	1,400
12/20 - 12/30/92	Christmas	22,000	8,400
1/11 - 1/21/93	Mid Winter	4,700	1,100
2/2 - 3/22/93	Late Winter	7,800	3,600
3/22 - 4/1/93	Spring Break	16,500	10,500
4/1 - 4/17/93	Early Spring	2,250	16,600
4/17 - 5/1/93	Early Spring	46,300	42,400
5/1 - 5/31/93	Runoff	48,000	6,700
5/31 - 6/28/93	Early Summer	35,800	3,100
6/28 - 8/1/93	July	7,800	2,600
8/1 - 9/2/93	August	5,500	700
9/2 - 10/2/93	September	5,000	800
10/2 - 10/20/93	Mid Fall	7,000	2,700
10/20 - 11/23/93	Late Fall	6,400	2,400
11/23 - 12/1/93	Thanksgiving	20,600	5,800
12/1 - 12/13/93	Early Ski	9,300	3,300

Peak I/I flows occur during the month of May, with total average day flows exceeding 75,000 gpd. I/I flows of 65,000 gpd were recorded for the same month, representing approximately 90% of the total flow. On two separate days during the month of May, total flows exceeded 100,000 gpd. Per capita flows during the peak I/I runoff season were estimated to be in excess of 500 gpcd, and are considered to be extremely excessive. The influent wastewater strength also dropped significantly during this period, with BOD influent averaging 35 mg/L. This is significantly less than the average influent BOD strength reported during the winter months of approximately 250 mg/L.

Peak month I/I flows were confirmed at 4:30 a.m. on May 20, 1994, by measuring depth of flow at the influent 60° V-notch flume. Depth of flow measured 0.35 feet for an instantaneous flow rate of 62,000 gpd.

Flow entering the treatment plant was cold and clear, indicating that infiltration was the source of the water. At the time I/I was measured at the treatment plant inlet, precise location of individual manholes within the development remained unknown and no additional investigation to isolate I/I sources was conducted.

Winter time I/I flows measured at the flow recorder are minimal and reduce significantly in July, and remain relatively low until the beginning of the runoff period in April.

I/I Correction of Meridian Lake Park Collection System

Collection systems installed with PVC pipe after 1970 are not usually conducive to excessive amounts of I/I if properly installed. I/I in these type of systems is usually isolated to specific locations, and total replacement of the system is usually not required. A potential source of I/I is the service lines that may have been stubbed into unbuilt lots. In these instances, end of service line caps may not have been installed or properly secured and are a potential source of I/I. Once identified, I/I sources of this type are relatively easy to remedy.

For the Meridian Lake Park collection system, television analysis of the collection system and visual inspection of the manholes should be conducted during the peak I/I month of May to ensure that all I/I sources are identified. Isolated repairs could then be made to the collection system to cure I/I sources identified by the television analysis. The estimated cost for televising the collection system during the peak I/I month is approximately $12,000. The estimated cost to complete isolated repairs is $50,000. This should be considered a rough estimate since the magnitude of repairs would not be known until completion of the television analysis.

Conclusions and Recommendations

If I/I is entering the collection system through service taps, manholes, uncapped service lines or other isolated areas, rather than the integrity of the main having been compromised, the majority of I/I can be cured through isolated repairs identified by television analysis. This conclusion is supported by the fact that PVC pipe installations, if installed properly, are not conducive to widespread I/I, and is usually seen to be occurring at isolated locations. This is a relatively cost- effective method of I/I repair versus total line replacement that is usually required for systems with wide spread I/I.

Without curing I/I, the treatment facility will have to be expanded to approximately 0.10 mgd to handle I/I flows that are nearly 8 times the flows experienced during the peak sewage flow month (with minimal I/I) of December. Curing I/I in the collection system may become even more beneficial if the Meridian Lake Park development connects to the Mt. Crested Butte treatment facility that is presently being discussed between the two Boards. The 75,000 gpd flows during the month of May also coincide with peak I/I flows experienced at the Mt. Crested Butte facility. This would require an expansion at Mt. Crested Butte beyond what would normally be anticipated if the Meridian Lake Park I/I was not eliminated. Curing I/I in the Meridian Lake Park system may also become more of an incentive if the development is treated as a wholesale customer by Mt. Crested Butte or a future regional plant and charged on a volume basis.

Regardless of I/I flows, Meridian Lake Park has a significant problem with the collection system in that accurate mapping is not available and manholes are buried below gravel roads making access for inspection or maintenance purposes very difficult. As a minimum, Meridian Lake Park should locate all manholes within the collection system and raise the manhole ring and covers to grade. Accurate "as-built" maps should then be developed for future reference, which identifies manholes and pipe locations, distance and slope between manholes, direction of flow, elevation of manholes' rims and inverts, along with pipe size and material. As-built mapping could be completed in conjunction with a TV inspection to assess whether I/I is entering the system in isolated areas or if the problem is system wide. Isolated I/I sources are generally inexpensive to repair and repairs can result in major reduction in flows, thereby relieving the hydraulic loading at treatment facilities.

Crested Butte South Metropolitan District

Description of Existing Collection System

Much of the Crested Butte South collection system was installed by the District in the late 1970's after the District was established in 1977, and has been continuously extended to serve development areas since that time. The system consists of approximately 18,500 feet of 8 and 10 inch PVC pipe. The majority of flow is by gravity with the exception of one lift station which services about six single family homes within the present collection system. New sewer extensions are accomplished by the District through a sewer extension agreement funded by developers or home builders.

The collection system provides service to the development basically south of Haverly Street and Blackstock Drive. Areas to the north have been platted, but do not have sewer service. No outside District customers are presently served through the collection system.

A pipe and manhole summary of the Crested Butte South sewer collection system is given in Table 4-7.

Table 4-7 Pipe Summary of Crested Butte South Sewer Collection System

Pipe Diameter	Type of Pipe	Pipe Length	Remarks
10 inches	PVC	970 ft.	Installed as part of original system
8 inches	PVC	17,700 ft.	Installed as part of original system
Manhole and Cleanout Summary			
Manhole/Cleano ut		Type of Construction	# of Manholes
48" MH		Concrete	51
Cleanouts		8" PVC	10

Information on pipe distances and manholes for the Crested Butte South collection system was based on the District's overall sewer system layout and should be considered estimates.

Infiltration/Inflow Measurements

The Crested Butte South treatment facility has flow equalization basins that require pumping to the plant. As a result, no accurate night time flow measurements entering the treatment facility were available on a long-term basis. In discussions with the District's manager, Mr. Jack Dietrich, he indicated that I/I has been minimal through the past several years with the exception of May 1993 when high runoff increased I/I to approximately 15,000 gpd. Mr. Dietrich felt this was an isolated case, and has since repaired the section of collection system that was a major source of I/I. This included repairing a few manholes and capping manhole stub-outs that were leaking.

Total flows at the wastewater treatment plant substantiate Mr. Dietrich's claim that basically show a consistent average daily flow through the year of approximately 18,000 gpd. Instantaneous flows of 2440 gpd were

also measured at the inlet to the wastewater treatment plant utilizing a 6 inch pipe weir at 2:00 am on February 23, 1994. This is not considered to be an excessive amount of I/I and further substantiates Mr. Dietrich's conclusion that the system is in relatively good condition and has minimal amounts of I/I.

Instantaneous flow measurements at the plant inlet were repeated at 2:00 a.m. on May 21, 1994, in order to quantify the effectiveness of last year's repair and to identify the amount of I/I remaining in the collection system during the spring runoff season. Plant inlet I/I flows in May wee recorded to be 8,800 gpd. The repair apparently removed about 6,000 gpd of I/I flows. Mr. Dietrich has been investigating probably sources of infiltration and identified two isolated problem areas for the May monitoring period. The first is a leak between the inlet pipe and manhole invert in Elcho Avenue located approximately 650 feet north of Teocalli Road. An instantaneous flow measurement taken at the outlet pipe of this manhole at 2:15 a.m. May 21, 1994, identified the leak to contribute 3,032 gpd of the total I/I in the collection system. The second known source of infiltration is at a service connection east of Cascadilla Street in Haverly Street. Although the service tap could not be seen the sound of water dropping into the sewer main was quite apparent. Infiltration measured at the manhole inlet pipe downstream from the questionable service connection was 3,689 gpd (from the west). The east inlet pipe had no flow. Remaining areas of the collection system that were inspected had either no flow or only a trickle that could not be measured by pipe weirs (i.e., less than 60 gpd) as follows:

Elcho at Cascadilla:	Trickle from NW; 0 from SE
Shavano at Teocalli:	Trickle from SW; trickle from NW
Packer at Teocalli:	Trickle from NE; trickle from NW
Escallante at Teocalli:	Trickle from NW; 0 from NE; 0 from SW
Haverly and Shavano at Teocalli:	Trickle from NW; 0 from Shavano; 0 from Haverly

I/I Correction of Crested Butte South Collection System

Since the system has minimal amounts of I/I, no correction of I/I is necessary, however, two isolated repairs could greatly reduce total I/I flows. The District should consider TV inspection of the service tap to

determine whether the tap is leaking or if the service line is the problem.

Conclusions and Recommendations

The District should continue to visually inspect manholes to determine if any I/I begins to occur in the future, and make any necessary repairs to minimize the impacts of any future I/I.

East River Regional Sanitation District

Description of Existing Collection System

The East River Regional Sanitation District (ERRSD) owns and maintains the sewer collection system that provides service to the Skyland, Avion, Rivergreen and Silversage developments that are all within the District boundaries. The original collection system was installed in 1982 and provides sewer collection services to the Skyland development. At the present time, no sewer collection facilities are available at the Avion, Silversage or Rivergreen developments. The Skyland collection system consists of approximately 34,000 feet of 8, 10, 12, and 15 inch DIP and PVC pipe. All flow from the Skyland development is by gravity that discharges to a centralized lift station. The lift station pumps wastewater via a 10 inch force main that discharges to a sewer outfall line that then conveys wastewater directly to the aerated lagoon treatment facility.

The East River Regional Sanitation District also provides services on a wholesale basis to the developments known as Riverbend and Slate River Estates. No information was available on either of these collection systems that discharge directly to the lift station. A Palmer-Bowlus flume has been installed in the manhole just upstream of the lift station that is utilized to measure flows from the Riverbend and Slate River Estates development.

Table 4-8 is a pipe and manhole summary of the Skyland development collection system that is the only development presently served in the district.

Table 4-8 Pipe and Manhole Summary of the ERRSD Sewer Collection System

Pipe Diameter	Type of Pipe	Pipe Length	Remarks
16 inches	DIP	280 ft.	Part of original outfall line from force main discharge to WWTP
15 inches	PVC	1,360 ft.	Part of original outfall line from force main discharge to WWTP
12 inches	PVC	4,500 ft.	Part of original outfall line from force main discharge to WWTP
12 inches	PVC	2,020 ft.	Installed as part of original collection system
10 inches	PVC	1,710 ft.	Installed as part of original collection system
10 inches	DIP	10,000 ft.	Pump station force main
8 inches	PVC	14,050 ft.	Installed as part of original collection system
8 inches	DIP	760 ft.	Installed as part of original collection system
Manhole and Cleanout Summary			
Manhole/Cleano ut		Type of Construction	# of Manholes
48" MH		Concrete	109

No information was available on the existing collection systems for the Riverbend and Slate River Estate developments. Information on the Skyland collection system was based upon the 1982 design plans prepared by Nielson Dragos Engineers of Buena Vista, Colorado.

Infiltration/Inflow Measurements

The East River Regional Sanitation District treatment facility does not have a continuous flow recorder and treatment plant flows are measured by estimating pump cycles at the lift station. From the flow data derived at the pump station, I/I increases during the spring runoff between April and May, and total flows have reportedly been as high as 90,000 gpd. This represents approximately 75,000 gpd of I/I. In discussions with the District's manager, Mr. Jim Murry, he indicated during high runoff years, several of the manholes near the Slate River become inundated, and he believes this to be a major source of I/I during the runoff season.

Average daily flows during the winter and fall months average 14,000 gpd, with minimal amounts of I/I reported during these months. Instantaneous flow measurements taken between 3:00 am and 4:00 am on February 23, 1994 on both the Riverbend manhole (last manhole for the Riverbend/Slate River Estates wholesale customer) and the last outfall manhole for the Skyland collection system confirmed this. Both of these flow measurements indicated negligible amounts of I/I that were not measurable with the V-notch pipe weirs and the Palmer-Bowlus flume at the Riverbend manhole. The flow sensing and recording equipment for the Palmer-Bowlus flume has had frequent malfunctions and no flow data was available.

A follow-up investigation conducted between 3:00 and 6:00 p.m. May 20, 1994, and between 1:30 and 6:00 a.m. May 21, 1994, discovered several major I/I problems. Mr. Murry estimated the resident population of Skyland to be around 30 people, most of whom worked and were not at home during the day. Daytime inspection of manholes identified a number of leaking manholes and service stub-outs, including MH A30, AC3, A13, A12, and A11. In addition, stub-outs at MH A11 and A12 had clear water running into the manholes, however, the northwest stub-out in both MH A11 and A12 provide service to existing dwellings and cannot be plugged. The southeast stub-out of MH A11 could be plugged to eliminate approximately 1,910 gpd of I/I flows. It should be noted that I/I flows measured on May 20 and 21, 1994 may not represent peak I/I, as Jim Murry indicated that total plant influent flows were about 50,000 gpd higher 1 to 2 weeks prior to the inspection.

Manholes along the 12 inch gravity flow line at the airport between the lift station and treatment plant were also inspected during the afternoon of May 20, 1994. This investigation was fairly inconclusive of evidence of I/I, as one downstream manhole had about ½ inch of flow while two manholes directly upstream were surcharged. The pumps were not running during the observations. Surcharge is assumed to be a direct result of grade problems with piping between manholes, yet there is a remote possibility that grit may be blocking the pipelines.

Early morning flow measurements taken at key locations of the collection system on May 21, 1994, are listed in Table 4-9.

Table 4-9 Flow Measurements at Key Locations 5/21/94

Location	Flow
Riverbend MH at pump station	46,100 gpd
Skyland MH A1 at pump station	40,710 gpd
Skyland MH A7 at Eagle Lane and Slate River Road	0 gpd
Skyland MH A11 in Slate River Road	1,910 gpd from NW stub-out
	1,458-1,910 gpd from SE stub-out
Skyland MH A20	10,000-10,095 gpd from 10" W
	7,301 gpd from 8" N
Skyland MH A28	7,301 gpd
Skyland MH A29	0 gpd from Country Club Drive
Skyland MH A33	0 gpd from NE
	0 gpd from SW

I/I Correction of ERRSD Collection System

As with the Meridian Lake collection system, collection systems installed with PVC pipe after 1970 usually do not exhibit large amounts of I/I. Usually I/I is isolated at specific locations and can be cured through isolated repairs and total replacement of the system is not usually required. From discussions with Mr. Murry, the manholes located within the Slate River floodplain should be rehabilitated with watertight gasketed ring and covers bolted to the concrete manholes. This will prevent surface water inflow from entering these manholes when inundated by the Slate River. Infiltration observed flowing through manhole joints shows that it may also be necessary to coat the inside of these manholes. These manholes appear to be the major source of I/I; the method of repair can be accomplished at relatively little expense. Other areas of the collection system contributing to I/I include service stub-outs to vacant lots and two stub-outs in active service. Television analysis should be conducted during the peak I/I month of May to isolate other yet unknown I/I sources. Isolated repairs could then be accomplished to cure these I/I sources.

Another potential source of I/I in collection systems that provide service to a large number of unbuilt lots such as the Skyland development are service lines that have been stubbed into unbuilt lots. The end of service line caps may not have been installed or not properly secured

and could be contributing I/I during the peak runoff season. The television analysis would identify these potential I/I sources.

Conclusions and Recommendations

Further I/I flow measurements were taken during the peak runoff month of May to determine if a section of the collection system is the main contributing source of I/I. As a result, it was noted that the major contributing factor to I/I is through manhole walls and through several service stub-outs to vacant property. These isolated areas should be repaired and the unused service stub-outs should be plugged until they are needed in the future. Because the treatment facility is hydraulically underloaded, the excessive I/I during the spring runoff has not had any adverse effects on the treatment facility that has continued to meet discharge permit standards and is still within the hydraulic permit capacity. As development occurs and future users connect to the system, the peak I/I may begin to affect the operation of the treatment facility and exceed the hydraulic capacity. Because curing I/I may not constitute a large capital investment, the District should commence on trying to identify and isolate the I/I sources that could then be scheduled for repair. This would ultimately increase the available capacity for future growth and reduce user charges for wastewater treatment based on a volume charge, if the District were to become a wholesale user of a regional facility.

The District should also upgrade or make the necessary repairs to the flow meter and recorder at the Riverbend outfall manhole and implement a wholesale user charge based on per thousand gallons of wastewater discharged to the lift station. It may be the case that the Riverbend and Slate River Estates wholesale users are the main contributors of I/I to the system, and these developments should be charged accordingly for what they use in treatment and pumping capacity of the District's facilities.

Future Conditions

Population Projections

In order to forecast the wide fluctuations in population for a recreational area such as the Crested Butte area and this 201 Planning area, there had to be significant investigation into existing and anticipated growth rates as well as the seasonal peak population ratios. Accurate population forecasting requires a highly specialized level of expertise and for facility planning, it is usually left to state and area wide planning agencies. Gunnison County has made projections, but there are little specifics for the 201 Planning area. This study team spent significant effort in compiling existing housing and population data, then projecting the growth became a public and municipal issue.

Given that historical growth trends in this region do not conform to typical projection techniques, Gunnison County Planning has compiled the maximum number of housing units in all platted subdivisions in the area. The study team estimated the buildout of these platted subdivisions will occur in the future horizon, with some areas outside the limits of present service areas developing and contributing to the wastewater flows balancing some internal areas that will not build out. The 20-year planning horizon is termed the future in this analysis, bringing us to the year 2015. Representatives of the individual Towns and Districts were consulted first as to the likely rate of growth in their service area and both public input and further study have resulted in modifications over the study period.

Limitations to growth are largely environmental and topographic. There are significant areas of floodplain and wetlands along the Slate River valley and the surrounding terrain have significant steep slopes that will limit access and buildable land. Figures 5-1 through 5-3 depict the coverage of these growth areas over the land available for development after various limitations are considered. Notice large ranch areas between Meridian Lake and Mt. Crested Butte and to the south of the East River Regional plant. These areas have been added to the development projections at relatively low density. If large sections of

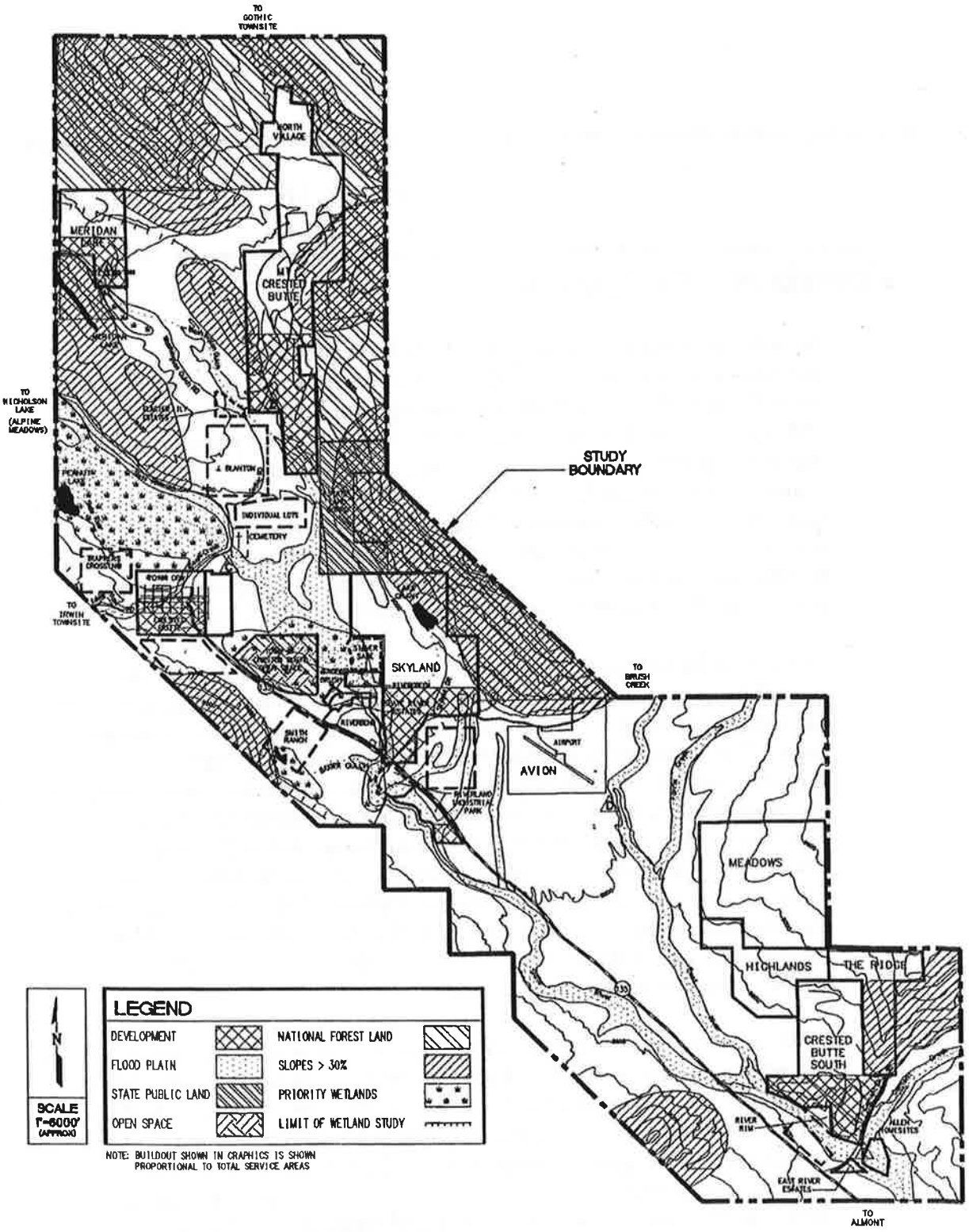

FIGURE 5-1 Upper East River Valley – 201 Study Area – Stages of Buildout Existing – Buildout to Date (November, 1993)

WestWater Engineering ——— Rothberg, Tamburini & Winsor, Inc.

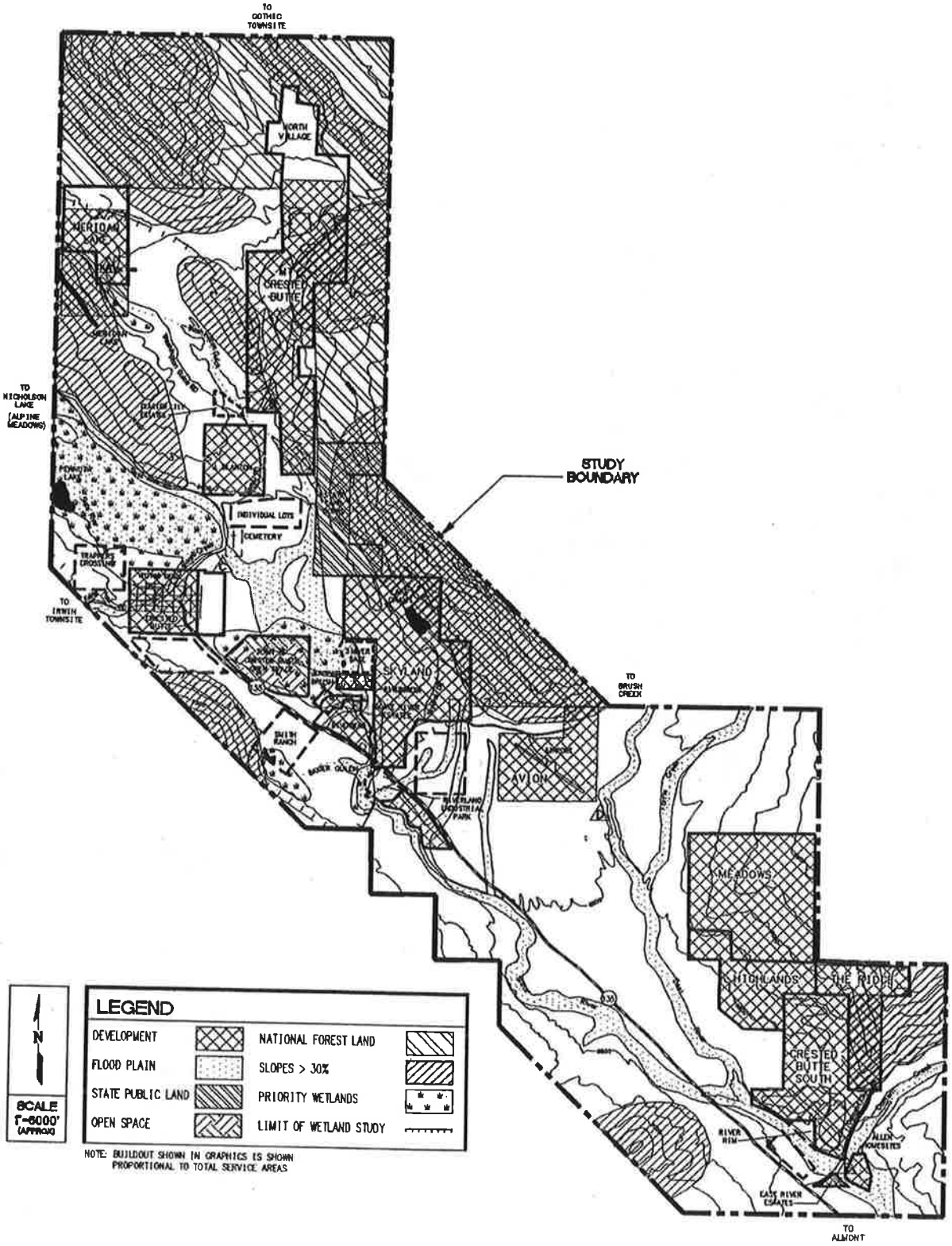

FIGURE 5-2 Upper East River Valley – 201 Study Area – Stages of Buildout
Future – Buildout of Platted Subdivisions – 20 Years

WestWater Engineering ——— Rothberg, Tamburini & Winsor, Inc.

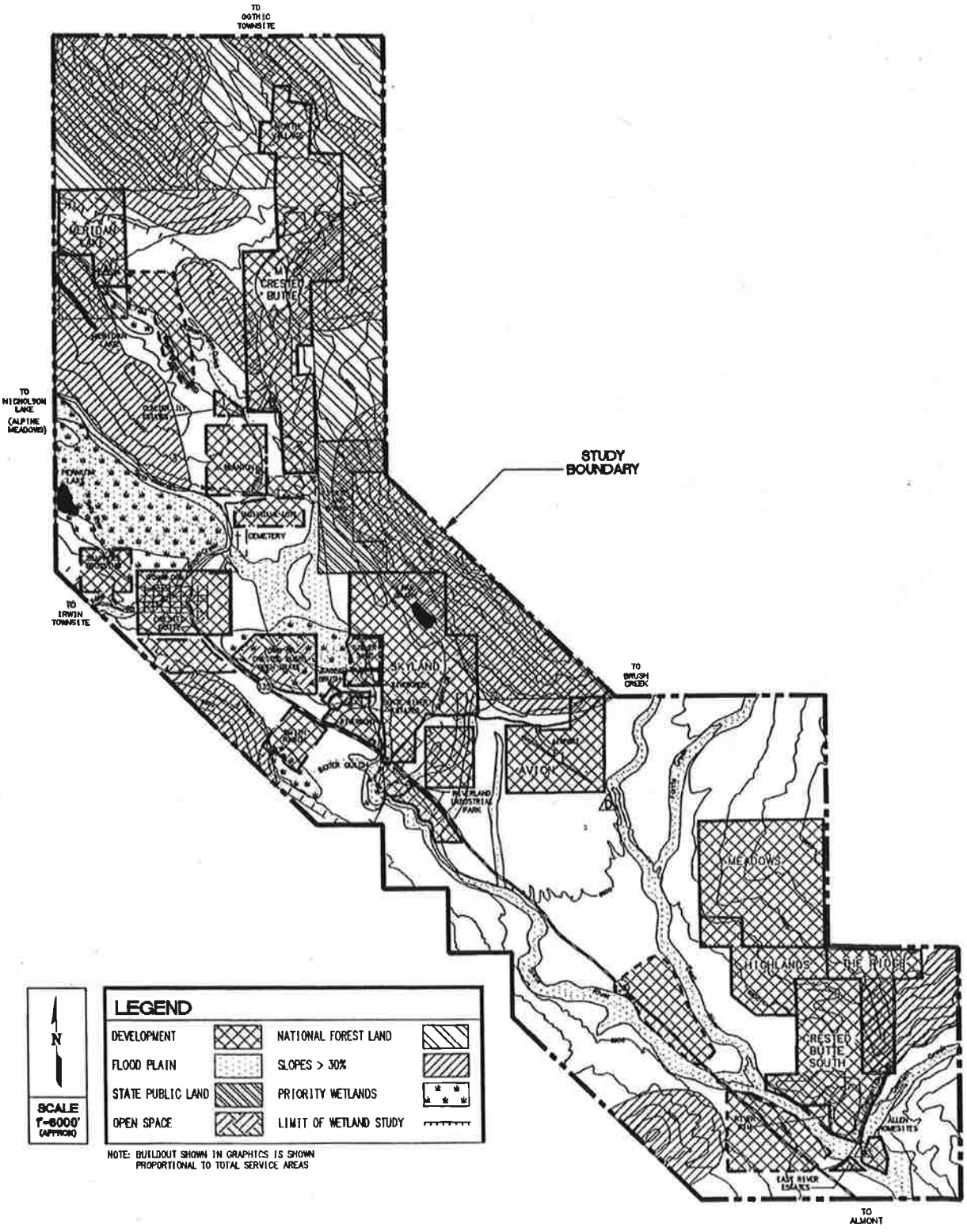

FIGURE 5-3 Upper East River Valley – 201 Study Area – Stages of Buildout
Ultimate – Buildout of Proposed and Potential Areas

these areas develop in dense clusters, the current housing projections may be low. Also if the ski area expansion results in Mt. CB growth projections beyond the current estimates, then the wastewater flows and plant capacities will need revision. We have shown the anticipated housing that will be in place within the 20 year planning horizon, and have labeled this as future housing.

The ultimate housing figure adds such areas outside the existing service areas that may be included in a more distant planning horizon. An example is the Verzuh Ranch and other properties in the Gothic Road corridor which the "Three Mile Plan" for the Town and recent discussions have designated for possible annexation into the Town and its wastewater service area. We expect that some future buildout of platted subdivisions will not occur in the 20-year time frame, but some of the ultimate housing estimated will probably enter into the existing service areas in the shorter term, thus balancing the projected growth rate for the future.

There are significant numbers of hotel rooms and other lodging units available in the area. These units were added to the single family housing figures at an equivalent housing rate of 0.7 times the number of rooms available. The condominiums in the area experience a peak wastewater flows equivalent to a single family home and were therefore not reduced by a factor for the projections.

The Upper Gunnison Water Conservancy District has compiled the housing and growth figures accepted at the public meeting and made projected population figures from these numbers and the accepted peak season occupancy rates for use in the water resources study. Their population estimates assume full occupancy of hotels, condominiums, and houses. The low and high population figures depict the range of population that would be expected to be occupying housing units during a period of peak seasonal use.

The peak season population estimates for the Towns of Crested Butte, and Mt. Crested Butte are derived from information provided by each town. They use and equivalent residential unit (EQR) value for estimating population and wastewater flow from a housing unit. The Town's EQR is significantly lower than Mt. CB due to the type of housing available. The low and high population estimates for developed areas outside these two Town's are based upon an occupancy of 2.8 and 3.5 persons per housing unit respectively. This figure is commonly used for unincorporated Gunnison County. Crested Butte South has a lower occupancy rate based on a more permanent population with less transient units and seasonal peaks. The result of this investigation has

shown that growth in this area is likely to exceed both the Regional Water Quality Management (208) Plan and the County planning figures.

The current housing boom in the Crested Butte area is due mainly to tourism and agri-business combined with favorable interest rates. The ever-changing economy and employment market will continue to impact future populations in cycles and must be considered as a balancing factor in the future and ultimate buildout horizons.

Wastewater Projections

In order to arrive at a reasonable estimate of projected high flows to be experienced at the treatment plants, the discharge monitoring reports (DMR) data from each existing plant was studied from the last three years to determine the highest monthly average flow. In order to compensate for a high runoff year in 1993, the three highest monthly flows were averaged.

In order to derive wastewater projections from housing projections there had to be a correlation established between persons and flow. Flow projections for these areas are greatly influenced by the peak population found during holidays and "Ski Free" weekends, where overnight stays present the peak loadings on the system. Although skier days have an impact on the flows experienced at the Mt. CB plant, we found that much of the load from skier usage is taken by the on-mountain facilities that are served by septic tanks and associated leach fields. This would therefore lessen the impact of growth in the number of "day trippers" on the loadings to the wastewater treatment system. We have therefore taken the existing reported flows and related them to the existing number of domestic and commercial taps to the system. By taking the flow per tap number in each service area, we were then able to estimate flows based on the projected growth of taps for that service area.

The infiltration and inflow into the collection systems also influences the peak flows to the treatment plants. Some areas in the existing collection systems experience higher groundwater during the spring runoff and increased flow to the plant can be expected even from new sewers built for expanded areas. This is particularly evident for the Town of Crested Butte, Mt. CB and Meridian Lake. An detailed discussion of the I/I situation has been presented in Section 4.

We found the peak influent flows balancing the peak population will result in the most conservative value for future flows to the plants. As a

check, we also determined the wastewater flows per person. The State and Federal guidelines have a variety of expected flows contributed per person per day, the most common ranging from 70 gallons to 100 gallons. Only the Town with its flow over 120 gpcd shows infiltration to be excessive, and Crested Butte South shows some abnormally low flow values. These values were adjusted to more appropriate levels for the future and ultimate projections.

Expanded Service Areas

The five existing wastewater treatment systems and their managing entities will be greatly impacted by the growth of the population in their own service areas. Projections show that, in the 20-year future, treatment capacities of each existing plant will be exceeded by growth within their existing service area, thus requiring some level of expansion. Area residents along with the County and State, however, are also greatly concerned about properly handling wastewater flows generated by growth outside the existing districts' service areas. This concern has been addressed in the alternatives discussed in Section 6 and in the ultimate population projections that set future plant capacities. In discussions with the 201 Advisory Committee and outside consultants, there were estimates made as to the level of growth and potential housing units built outside existing service areas that will have the oppourtunity to connect to one of the existing treatment providers.

There are specific areas in the valley that all agreed should be covered by an existing treatment provider so that the proliferation of ISDS and of small wastewater treatment plants is limited. The Gothic Road corridor between Mt. Crested Butte and Crested Butte has significant planned development and the two entities are willing to provide wastewater treatment for this area with expanded service areas. Another development corridor is the Highway 135 between Crested butte and CB South. This area will be covered by expanding the service areas of the Town of Crested Butte along with the East River Regional and CB South plants.

The implementation of expanding service areas is an intergovermental issue between Gunnison County and the entities in this valley. The proposed agreement language and other issues are discussed in more detail in Section 8.

Summary of Growth and Flow Projections

The initial public meeting, held in December 1993, addressed the issue of growth in the 201 Planning area with interested public officials and residents. These numbers were considered at that time to be excessive and were later modified by each entity to more plausible values. Table 5.1 is a summary of the population growth and wastewater flow projections for the five existing plants in the region. The growth rates correspond to the 20-year future and the additional time required at that rate of growth to achieve the ultimate level of housing buildout.

Table 5-1 Summary of Growth and Flow Projections

Facility	Existing Rated Capacity (MGD)	Housing Units (EA)	Peak Season Population (Persons)		Peak Month Flow (MGD)	Avg Daily Flow (gpcd)	Growth Rate (%)	Planning Period (YRS)
			Low	High				
Meridian Lake Park								
Existing	0.014	40	112	140	0.014	100.0		
Future		106	297	371	0.028	80.0	5.0	20
Buildout		140	392	490	0.036	74.0	5.0	26
Town of Mt. Crested Butte								
Existing	0.40	1513	4236	5295	0.480	90.6		
Future		2793	7820	9775	0.723	74.0	3.0	20
Buildout		3369	9433	11791	0.872	74.0	3.0	29
Town of Crested Butte								
Existing	0.40	1026	1539	2052	0.510	248.5		
Future		1596	2440	3192	0.638	188.0	2.0	20
Buildout		2161	3241	4322	0.820	188.0	2.0	39
East River Regional Sanitation District								
Existing	0.143	131	367	459	0.036	78.4		
Future		463	1295	1620	0.119	73.5	6.5	20
Buildout		630	1764	2205	0.165	75.0	6.5	25
Crested Butte South Metropolitan District								
Existing	0.05	175	438	525	0.036	68.6		
Future		900	2250	2700	0.203	75.0	9.0	20
Buildout		1200	3000	3600	0.270	75.0	9.0	25

Discharge Permit Requirements

The Colorado Department of Public Health and Environment, Water Quality Control Division, Permits and Enforcement Section was contacted and asked to provide the projected effluent limits for the future of both the existing facilities and the regional alternatives that will be discussed in the next Section. They were provided with the stream monitoring data available from the individual Districts, with only small periods of data for the Slate River and much more for the East River. There was also some flow data available from a new USGS gaging station located in the Slate River, just below the confluence with Washington Gulch, and new water quality data obtained by BioEnvirons Inc., funded by several local sources.

Secondary Treatment Requirements

Secondary treatment refers to the removal of both suspended solids and organic contaminants to reduce the biochemical oxygen demand (BOD) of the wastewater on the receiving stream. Secondary treatment is defined by CDPHE as removal of pollutants to 30 milligram per liter (mg/L) of BOD and 30 mg/L of suspended solids. Aerated lagoon systems are given a State designated variance on suspended solids removal to 75 mg/L to account for algae growth in the treatment ponds. Further, a minimum of 85% BOD removal from influent concentration to effluent concentration is also required. Presently the treatment methods used to remove these pollutants in the area are strictly biological methods, not chemical. These processes have been described in detail in Section 3 for the existing facilities.

Tertiary Treatment Requirements

CDPHE considers nitrification of ammonia as an important biological process for treatment plants in the area. About 75 percent of the ammonia in normal biologically treated effluent is in the ionized form (NH_4^+). Both the ammonium ion (NH_4^+) and unionized ammonia (NH_3), when found in streams are indicators of potential sewage pollution. The unionized form is highly toxic to aquatic life.
As the pH of water increases, the fraction of unionized ammonia also increases. To the contrary, as the water temperature increases as the fraction of unionized ammonia decreases. However, the pH effect is, by far, the greatest on the toxicity.

The maximum acceptable unionized ammonia concentration in streams is 0.02 mg/L, and permitted discharge concentrations are based on this maintaining this value. Ammonia may combine with other substances, such as phenols and chlorine, to form toxic compounds. Due to the low pH and temperatures of these mountain streams, the unionized portion of the total ammonia content should normally be less than 10 percent.

Oxidation of ammonia to nitrite (NO_2^-) and nitrate (NO_3^-) occurs in the receiving stream if it has not already occurred in the treatment process. Nitrate concentrations in streams provide nutrients for the growth of algae and other aquatic plants, and may contribute to eutrophication.

The future ammonia limits that have been estimated by CDPHE for the expanded area plants are given in ranges only for the projected size and the stream data available. They expect that the permit limits for all regional alternatives discussed in the following section will be in these ranges. These are summarized below in Table 5.2 and the letter from CDPHE is attached in Appendix C.

Table 5-2 Projected Ammonia Limits

Season	Total Ammonia NH_4^+ & NH_3
Winter	7 - 10 mg/L
Spring	4 - 7 mg/L
Summer	1.5 - 4 mg/L
Fall	4 - 7 mg/L

This level of treatment could be a problem for the East River and Meridian Lake lagoon plants to achieve without significant modifications. This will be discussed in the Section 6.

Sludge Regulations

The new EPA Part 503 Sewage Sludge regulations that have been in effect this year have place new restrictions on the use and disposal of sewage sludge and generally increase the level of sludge treatment required. All existing facilities in the East River 201 study area will be subject to this regulation and we have summarized their requirements below.

The regulations are concerned with limiting the use/disposal of sludge containing high levels of pollutants (mainly metals) and pathogens. Treatment at wastewater plant normally does little to control pollutant

concentrations in the sludge. However, pathogen concentrations are directly related to the degree of sludge stabilization provided in the treatment process.

Sludge Grade

The various pollutant concentrations must fall below specific limits before land application is allowed. Ten pollutants are evaluated for land application. If a sludge meets the more stringent pollutant requirements for land application, it is termed a "high quality" sludge under federal regulations and a "Grade I" sludge under Colorado state regulations. Low-pollutant sludges may be land applied without restrictions on site pollutant loading limits. Sludges which meet the state "Grade II" or federal pollutant ceiling limits may be land applied, but only up to annual and cumulative specific pollutant application limits over the life of the site. Sludges tested by the Town and Mount Crested Butte were Grade I which would mean most systems will produce a Grade I sludge.

Classification

Two sludge classes exist under Part 503 as a means to regulate the pathogen content of land-applied or surface-disposed sludges. These classes specify the degree of treatment the sludge must receive before land application. Only landfilled sludges and surface-disposed sludges which are covered with soil or an equivalent cover material each day are exempt from the pathogen requirements described here.
Class A sludge contains very low pathogen concentrations and is roughly equivalent in treatment intensity to the Processes to Further Reduce Pathogens (PFRPs). No sludge can qualify as Class A without testing to show that fecal coliform density is < 1000 MPN/gram of dry solids or the *Salmonella sp.* density is < 3 MPN/4 grams dry solids. The sludge must also meet one of these:

- Use of a treatment technology that is approved as a PFRP.
- Additional pathogen testing.
- High pH/temperature treatment followed by air drying to at least 50% dry solids, such as the patented N-Viro process.
- Use of high temperature treatment for specified periods of time depending on the solids concentration of the sludge being treated.

Class B is roughly equivalent in treatment intensity to the Processes to Significantly Reduce Pathogens (PSRPs). There are two primary ways to qualify sludge as Class B:

- Sludge may be tested to demonstrate low fecal coliform content. The geometric mean fecal concentration of seven samples must be < 2 million MPN or CFU/gram of dry solids.

- Without testing, sludge can qualify as Class B by using a treatment technology approved as a PSRP.

Class B sludges may not be used on home lawns or gardens nor in distribution and marketing programs, but can be surface applied to farms and rangelands with restrictions to access and provided that vector attraction limits are met.

Vector Attraction Reduction

The Part 503 regulations also includes requirements for reducing the tendency of sludges to attract disease vectors, such as rodents and insects, which may be achieved by eleven different means.

The first four methods relate to sludge digestion. To achieve vector attraction reduction by sludge digestion, volatile solids concentration must be reduced by at least 38%. Or, lab digestion of the sludge under specific conditions must result in < 17% and < 15% additional volatile reduction for anaerobically digested and aerobically digested sludges respectively. Alternatively, an oxygen uptake level of < 1.5 mg oxygen/hour/gram dry solids may be used to demonstrate compliance for aerobically digested sludge, this can be verified with the specific oxygen uptake test (SOUR).

The next three methods involve various forms of sludge treatment. Composted sludges require a composting period of at least 14 days with a minimum compost temperature of 40°C and an average compost temperature of 45°C. For chemically stabilized sludge, the pH must be raised to 12 or higher for 2 hours and must remain above pH 11.5 for another 22 hours without further alkali addition. Regardless of the stabilization procedure, any sludge without unstabilized primary solids may meet vector attraction reduction requirements by drying to a minimum of 75% solids, or to 90% solids if unstabilized primary solids are included.

The final two vector attraction reduction methods may be applied as part of the sludge utilization or disposal process. For land-applied sludges, either subsurface injection with no significant sludge at the surface after one hour or incorporation of surface-applied sludges within 6 hours of application qualifies for vector attraction reduction.

Surface Disposal

Surface disposal under Part 503 includes sludge monofilling, sludge lagooning and dedicated land application sites. Any sludge may be disposed in a lined surface disposal site with a leachate treatment system. Such operations are expensive to develop and require years of continued operation after closure. For surface disposal systems without liners, the sludge must meet the pollutant limits. For open surface disposal operations, the sludge must qualify as at least Class B and must meet one of the criteria for vector attraction reduction.

The sludge need not receive any treatment to reduce pathogens if covered with soil every day. Operations using unlined sites require a monitoring program to demonstrate that nitrogen from the sludge is not contaminating groundwater. Any surface disposal site requires monitoring for methane gas at the site boundaries and restricted public access for three years after site closure. Provisions exist for notifying future property owners of the site's past use for sludge disposal.

Land Application

Land application of sludge is by far the most common use/disposal practice presently used in the area. It has also been affected by the new regulations. Sludge pollutant levels (grade) and pathogen concentration (class) determine the type of land upon which it may be applied. It must be applied at rates less than the agronomic rate of nitrogen use for the crop or vegetation cultivated. Sludge may not be applied where it will affect a threatened or endangered species, or contaminate surface or ground waters.

If treated to Class A pathogen standards and according to one of the vector attraction reduction criteria, the sludge may be used for distribution and marketing programs and on home lawns and gardens, agricultural land, public contact sites (parks, golf courses, etc.) and reclamation sites. No restrictions to the site apply to Class A sludge uses.

Class B sludges may be used for agricultural, public contact site and reclamation sites. One of the vector attraction reduction means is also required. Public access to the site must be restricted for one year if the potential for public exposure is high, and for 30 days if the potential for exposure is low. Crops cannot be harvested nor can animals be allowed to graze for at least 30 days after Class B sludge application to agricultural land. More restrictive limits exist for turf farms and food crops where the harvested parts touch the ground or are below ground.

The Part 503 regulation and state regulations both require monitoring to demonstrate compliance with the applicable pollutant, pathogen, and vector attraction reduction limits. The quantity of sludge generated each year determines monitoring frequency. Recordkeeping for surface disposal and land application programs includes pollutant concentrations, statements certifying compliance with specific regulation requirements, and descriptions of how the class and vector attraction reduction requirements are met. This information must be retained for at least five years.

All sewage sludge generators in the 201 study area, including preparers and appliers are subject to the new regulations. There is no exemption for facilities treating less than 1 MGD of wastewater or removing sludge on an irregular basis. Even if you operate a lagoon-type treatment process with only long-term sludge removal, you need to understand the new sludge regulations to remain in compliance.

Development of Alternatives

Regional Facility Alternative Evaluation

Introduction

The previous Sections have identified the need for the upgrade of existing wastewater facilities and expanded treatment capacities to handle the projected growth in the 201 Planning area. This Section is intended as a summary of the treatment alternatives discussed with the advisory group and interested public, with a focus on regionalization of treatment plants and capacity to provide treatment to future development outside the existing service areas. A phased approach to all capital expenditures is also important so that facilities are not constructed so large that service providers have to rely on growth to pay off debt. A cost effective analysis was performed and each alternative was also evaluated for relevant environmental impacts. Alternative treatment methods, such as wetland treatment and ISDS districts with step tanks and future connections to collection systems, will also be discussed at the end of this section.

Due to the scale and magnitude of this study, the changes to the plants in the alternatives are only described in the written text. The preliminary routes of interceptor sewers however, have been shown in Figure 6-1 and the preferred alternative will be given more process details in Section 7.

Cost Estimates

The American Association of Cost Engineers divides cost estimates into three basic categories: Order-of-Magnitude Estimate, Budget Estimate, and Definitive Estimate. The cost estimates for this planning study are order-of-magnitude estimates. Accordingly, they are considered to reflect true costs within an accuracy range of about - 30 to +50%.

Note that the cost estimates for regional facility construction have concentrated on the facilities that are being improved and for clarity costa are not split among flow contributors to show funding from other Districts. Sharing the cost of combined facilities is usually based on flow proportions, but this must be work out among those entities that are working together. More detailed construction cost estimates should be developed after design details of the preferred alternative are established.

Comparative costs for the various treatment alternatives were developed using a present worth analysis. With this type of analysis, the present value of annual operation and maintenance (O&M) costs are added to the initial construction costs to estimate the life-cycle cost of a facility. Capital and O&M cost tables follow each alternative and an alternatives cost summary combining alternative costs into a comparative table is attached at the end of this Section.

Cost estimates for the evaluations were developed by the unit process approach. Preliminary sizing and other design information along with operating criteria were developed for the specific unit processes for which cost estimates were required. Based on this information, construction costs and annual O&M costs were estimated.

The present worth analysis was based on a planning period of 20 years. Both salvage value at the end of the 20-year period and replacement costs for minor equipment with less than a 20-year service life are typically omitted in this analysis unless special circumstances exist. A common approach in making present worth analyses is to assume different service periods for various categories of facilities (for example, typically 50 years for structures and 10 to 20 years for mechanical equipment, depending on the type and service conditions). In using that approach, basing the analysis on a 20-year service life would require calculation of both the salvage value of facilities with remaining useful life at the end of the 20-year service life. It is not necessary to provide this level of refinement in developing the comparative cost estimate for this study.

Cost estimating information was derived from available data on construction projects of similar size and complexity, and experience and knowledge of the construction industry. Cost information for improvements to the Mt. CB and Town plants were updated based on previous estimates in their 5-year facility plan reports, and the costs for CB South were updated from their recent master planning efforts. Other construction costs were developed using features and data from similar projects and as presented in EPA cost curves. Non-construction

costs include engineering, legal fees, and administrative costs are common costs to all alternatives and were omitted for this level of analysis. Interest costs which accrue during the construction period were also omitted from this comparative analysis.

O&M costs are constant values based on the existing and projected operating costs provided by each operating entity with additional adjustment for sludge management costs, and have been escalated to 20 year present worth based the current discount rate. Although bonding with the State Revolving Loan rate is presently much lower, the current discount rate used for 1994 planning is 7.08% for the 18 CFR 704.39 as determined by the Federal Department of the Treasury for plan formulation and repayment.

Growth in O&M costs over time are not considered unless the treatment facility is expanded during the planning period. If expanded in the short term, the added annual cost was considered to start from the present. If expansion is to occur at a future point in time, a new O&M cost is adjusted to present worth value by converting the shorter period of annual costs to their present value using a single payment present worth factor.

Alternative 1A - Modified No Action, Some Regional Facilities

There is not a literal "no action" alternative in this situation. There are discharge permit limits that can restrict effluent from plants to a level of non-compliance, and the Meridian Lake Park wasteload allocation upstream of the Mt. Crested Butte discharge has forced the issue of regionalization. Literal "no action" is not acceptable to either the residents or the regulatory agencies from a water quality and cost standpoint, therefore for this modified "no action" alternative, the Meridian Lake Park treatment plant will be abandoned for a sewer connection to Mt. CB. The four other existing plants will continue into the future with their present treatment plant operation and expand as necessary to meet only the population growth and future regulatory requirements of their service areas. These existing treatment plants, except for the East River Regional plant, will all require significant modifications in the near future to handle growth and flow projections.

We anticipate all the activated sludge mechanical plants will be at some point required to constantly nitrify and partially denitrify to meet future effluent limitations and meet revised stream quality standards. At its

projected capacity, the East River plant is not expected to have to modify its lagoon system in order to nitrify, but this may change.

Meridian Lake Park

The Meridian Lake Park homeowner's association's aerated lagoon system is presently overloaded and would require significant modifications or more likely full replacement to meet discharge standards. Recent studies had recommended a package extended aeration activated sludge plant or rotating biological contact (RBC) plant be installed to replace the lagoon. This would have required extensive capital expenditures and also significantly increase maintenance and operation costs. Due to the allowable wasteload allocation that would be given to this plant's discharge, and the background ammonia that would be introduced into Washington Gulch, the Mt. Crested Butte Water & Sanitation District plant would be required to remove ammonia to excessive levels, and would need to expand their system beyond its present site capacity. Now discussions are proceeding to annex Meridian Lake Park into the Mt. CB W&S District. Therefore a new mechanical package plant at meridian Lake Park will not be considered for this alternative, and instead a gravity sewer routed along Washington Gulch Road to a lift station that will also potentially serve developments on the Blanton Property and Glacier Lily Estates is being proposed.

Mt. Crested Butte

The existing extended aeration activated sludge plant has periods of seasonal hydraulic and organic overloading and will require expansion. An initial expansion to 0.6 MGD was recommended in all alternatives and has already be approved and constructed. This modification of the existing aeration and clarifier systems without constructing new tankage will still be included in the cost analysis for alternatives. At the projected growth rate for the District this modified plant will last for over five years. Continued growth and limited facility space would require a primary clarification system, that also includes chemical coagulation, more flow equalization capacity and an ultraviolet (UV) disinfection system to get the plant capacity up to 1.0 MGD. If the primary treatment tankage is constructed, there will be little space for additional capacity expansion, but at the projected growth rate, the plant will not have to treat beyond the 1.0 MGD capacity, but since sludge treatment is to performed offsite, there may be some room for additional capacity expansions if growth exceeds current projections.

The existing plant has limited sludge digestion capacity and plans to participate in a sludge treatment facility with the Town. They are presently trucking sludge to land application sites, and the sludge, with extended aeration has been tested to meet the necessary Class B standards for pathogen reduction and Grade 1 for metals. Under the new 503 regulations, Mt. CB will be allowed to dispose their sludge by land application, but only in areas where they can achieve the required vector attraction reduction. This would limit available sites for land application and operations may be limited to warm weather months. There can be no animal grazing or public access until 30 days after Class B land application. Because of the restrictions that this type of land application entails, Mt. CB and the Town are pursuing an autoheated thermophilic aerobic digestion (ATAD) system to produce a Class A sludge for unrestricted land application and distribution for private and public use.

Town of Crested Butte

The Town's existing extended aeration activated sludge plant is hydraulically overloaded during the spring runoff when high infiltration and inflow enter the collection system. The existing plant also has substandard disinfection with no dechlorination and ineffective pretreatment facilities. The aeration system is also considered to be inadequate because it has no backup capacity to the blowers that are split between sludge digestion in one tank and aeration for secondary treatment in the other.

The two aeration basins have also settled and cracked and may have influence on groundwater, but the Town has monitoring wells in place and there has been no evidence of groundwater contamination to date. The Town now plans to construct a new oxidation ditch aeration basin because the existing basins will require extensive structural repair and aeration modification to operate independently and will still be limited in the process flexibility. The new aeration basin will have anoxic zones for denitrification and can be mostly earth covered to minimize visual impact to the surrounding community. New blowers and sludge pumping will also be needed for the new treatment system.

The headworks at the Town plant will have to be completely replaced. Mechanical bar screen and grit collection and dewatering will be added in a headworks building. Also UV disinfection will be added prior to discharge from the plant.

Although the sludge from the Town's existing digester has been tested and shown to meet criteria for Class B, Grade 1 sludge treatment, the Town presently plans to participate in the construction of an ATAD sludge treatment facility on their plant site to achieve a Class A sludge for unrestricted land application. Costs will be shared with Mt. CB.

East River Regional

The existing facultative aerated lagoon plant is presently sized to handle the future flows for the expanded service area, even at optimistic growth rates. It has significant extra capacity in the present loading conditions and also significant debt service. This District can use additional users and customers from outside its present service area. If nitrification is not required, the only improvements needed to this plant is to continue to replace the inefficient floating surface aerators with a diffused air system. No sludge treatment facilities are required for the lagoons, but periodic removal is required and is needed for maintenance of effective treatment depth. When this removal occurs, the sludge will have to be tested and disposed according to the 503 regulations, but should have no problem meeting Class B for land application.

Crested Butte South

The existing plant operated in the extended aeration activated sludge mode has experienced hydraulic loadings close to its rated capacity and is approaching the need for facility expansion planning. With an additional clarifier, more flow equalization and expanded aeration tankage, the existing plant can increase capacity to 0.10 MGD, but for the future projected population this plant will have to be expanded further for a capacity of 0.27 MGD. In the future expansion, this facility will also install an additional clarifier, more aeration basin, a UV disinfection system, and upgraded headworks facilities. The entire plant will also have to be enclosed in a building for weather protection and to minimize visual impact.

The CB South sludge digestion facility presently holds the entire yearly sludge production and ultimately sludge is land applied. This highly digested sludge has been tested to be at a Class B level. When the plant expands, the sludge digestion will need expansion as well. Land application sites have recently been acquired that greatly increase the District's ability to land apply sludge throughout the year. Since this can occur it is not anticipated that CB South will join the regional sludge treatment operation at the Town site.

Capital Improvements	Capital Cost	Annual O&M Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
Sludge digestion imps.	200,000			
Building coverage for all facilities	250,000			
Electrical & controls	75,000			
Piping & mechanical	75,000			

Environmental Impact

The modified "no action" alternative improves the basin water quality as a result of the Meridian Lake plant combining with the Mt. CB plant, and removing a potentially high ammonia source from the stream. The sharing of sludge treatment facilities by the two Towns is also a regionalizing approach, but the odors associated with ATAD digestion will have to be effectively controlled at the Town site.

Alternative 1A also addresses the growth in the areas outside the existing service areas of existing plants and need to limit the proliferation of individual septic systems or small capacity wastewater facilities. Without the regional wastewater boundaries, there would be the likelihood of additional small plants built and operated by homeowners associations or developers. Experience within the State has shown this approach to result in a negative impact to water quality in both surface waters and groundwater.

Because there is little construction outside the present plant limits there would be few outside impacts to the surrounding environment beyond the water quality impact from discharges. Wetland boundaries will need to be checked for construction impact. The construction of a sewer line in Washington Gulch will have some minor impacts from stream crossings, but most construction impacts should be limited to the existing road easement.

Alternative 2 - Upper Basin Regional Plant

This alternative would combine the wastewater flows from all three plants of the Upper Basin (Meridian Lake, Mt. CB, and the Town) at a new Regional plant located at the Town of Crested Butte's existing plant site. The Middle and Lower Basins would continue using the present

plants at East River and Crested Butte South and the County would limit all new connections in these areas to these three regional plants.

The initial regionalization projects that we expect to occur within the next five years have been called Phase 1. This phase would involve the construction of a gravity interceptor sewer from the plant site, along Washington Gulch Road to a small lift station needed by the proposed Blanton subdivision to reach the Mt. Crested Butte plant site. The existing facility at Meridian Lake would continue to treat wastewater only until it can discharge to the lift station and Mt. CB. The Mt. Crested Butte facility would be expanded to 0.6 MGD in the short term to handle the increased flows from the new service areas and to handle the short term growth within the District.

The Town of Crested Butte's plant would also be expanded to 0.8 MGD and become the Phase 1 portion of a new Regional treatment facility. The expansion, including headworks, disinfection, and the new oxidation ditch aeration basin, would be built on the existing plant site utilizing the existing clarifier. The regional ATAD sludge facility would also be constructed on the site, on the site of existing lagoons. Aesthetic architectural treatments, including plant covering, and odor control facilities will be needed due to the close proximity to Town residents.

Also in Phase 1, a gravity interceptor, with an inverted siphon crossing of the Slate River, and possibly Washington Gulch as well, will be constructed to carry flows from the Mt. Crested Butte plant to the Regional plant site at the Town.

In Phase 2, which we have assumed will occur within the 10 year planning horizon, the Mt. CB plant would continue operation at capacity of 0.6 MGD with overflows sent to the Regional plant. The existing Mt. CB plant would provide at least primary treatment to wastewater prior to entering the interceptor. The flows from Meridian Lake park and the Blanton subdivision will be connected directly to the interceptor sewer for treatment at the Regional plant. The Regional plant would need to be expanded further to 1.2 MGD, to handle the flow from the north.

In Phase 3, over the 20 year horizon, the existing plant at Mt. Crested Butte will be abandoned while the Regional plant will be expanded to treat all wastewater in the Upper Basin. The Regional plant will be expanded to 1.8 MGD for the final phase of this planning period.

Both the East River and CB South plants would be expanded as growth in their service areas require, but both plants would also be considered

the respective regional plants for growth in unserviced areas of the Mid and Lower Basins as well.

Cost Summary

The following Table 6-2 summarizes the capital and O&M costs involved in Alternative 2 with comparative present worth cost values.

Table 6-2 Alternative 2 (in dollars)

Capital Improvements	Capital Cost	Annual O&M Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
Meridian Lake Park - join with Mt. CB	580,000	14,000 (20)	147,000	727,000
Gravity interceptor to PS (9,000 LF)	350,000			
PS & force main to Mt. CB (2,000 LF)	200,000			
Easement acquisition	30,000			
Mt. Crested Butte - existing plant expands to 0.6 MGD, then joins with Regional Plant at Town	200,000	190,000 (10) 30,000 (10)	1,330,000 143,000	1,673,000
Addl blowers and minor modifications	100,000			
Clarifier modifications	100,000			
Town of Crested Butte -1.8 MGD Regional Facility in three phases	7,120,000	150,000 (10) 200,000 (10)	1,053,000 716,000	8,889,000
Gravity interceptor from Mt. CB (6000 LF)	400,000			
Easement acquisition ($4000 per acre)	20,000			
Headworks - screening& grit removal	800,000			
UV disinfection	400,000			
New oxidation ditch aeration basins (2)	1,800,000			
ATAD Sludge Treatment Facility	2,300,000			
Additional clarifier	500,000			
Covers & odor control	400,000			
Piping & mechanical	200,000			
Electrical & controls	300,000			
East River Regional	100,000	68,000 (20)	714,000	814,000
Aeration modifications	100,000			
Crested Butte South - new Regional plant at 0.27 MGD	725,000	58,000 (10) 100,000 (10)	409,000 360,000	1,494,000
Headworks	50,000			
Aeration basins	200,000			
Clarifiers	100,000			

Capital Improvements	Capital Cost	Annual O&M Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
Disinfection system modifications	50,000			
Sludge digester	200,000			
Building for all facilities	250,000			
Electrical & controls	75,000			
Piping & mechanical	75,000			

Environmental Impact

While this alternative eventually removes all wastewater discharges from Washington Gulch and covers development in currently unserviced areas, it will more than triple the size of the existing treatment plant at the Town site, and the 1.8 MGD (2.8 cfs) wastewater flows will be 35% of the 8.0 cfs chronic low flow in the Slate River. While on-site expansion may be feasible with the reclamation of land presently used for the sludge holding pond, it will locate increased wastewater treatment facilities at a heavily populated site with potential pressures for further development around the plant site. Odor control and visual treatments will be important to minimize this impact to residents. Effluent limits for the plant will be more restrictive at this flow and certain to include nitrification and possibly denitrification in the future.

There are two interceptor sewer lines that will disturb existing conditions. The first route along Washington Gulch Road will be contained almost entirely within existing easements, with little impact outside the roadway. The second route along Gothic Road will cross the Slate River and its adjacent wetland and floodplain areas. This crossing will be subject to Corps of Engineer review and approval, as well as some construction impacts and potential mitigation measures. Water rights in Washington Gulch will also be affected by the construction of the Regional plant. Although return flows from Meridian Lake units are negligible, there are several ditches in Washington Gulch below the confluence of Woods Creek that will be impacted by the loss of return flows from Mt. CB. Impacts to these Breen and Wilson Ditches can be mitigated in low flow years by increased water supply diversion from the East River, and less reliance on the springs in the Woods Creek drainage. Water rights below the Town plant site will not be affected by this alternative.

Alternative 3 - Mid - Basin Regional Plant

This alternative would expand the existing East River Regional plant to eventually handle all flows from both the Upper and Mid-Basin connectors. The Phase 1 construction will require the initial gravity interceptor and pump station for Meridian Lake, and the interim improvements to the Mt. Crested Butte plant as described in Phase 1 of Alternative 2. The Town of Crested Butte can forego most improvements by constructing a headworks facility with a pump station that can pump flows to the gravity interceptor to the Regional plant while allowing the existing facility to operate at the present capacity. Plant expansion during Phase 1 will not be required, if the State grants a compliance schedule to allow for construction of the facilities that will pump plant overflows to the Regional plant.

For this Phase 1 construction stage, the Town's sludge lagoon can accept and store sludge from both the Town and Mt. CB operation. After two years, this lagoon can be drained and covered for vector attraction reduction and would be considered a surface disposal site, without removing the sludge.

Also in Phase 1, a gravity interceptor sewer will be constructed through the State Land Board property and the Skyland development, to meet the gravity section of the existing interceptor to the East River plant. The first lagoon of the existing plant will be converted to an activated sludge basin with aeration modifications and construction of a new clarifier. The third lagoon of the East River plant would be converted to a sludge treatment facility accepting piped sludge from the clarifiers. The second lagoon would need to be split into a aerated section and a clarifying cell for the construction period. This would also require piping modifications. Winter access to the plant would need to be improved and payment of debt service for existing plant facilities is also included.

At the end of Phase 1, the East River plant will be established as the Regional plant. The initial stage of construction would provide a 1.0 MGD plant to allow the Town facility to close and only have a pump station and headworks facility remaining, while Mt. CB can send its overflow to the Regional plant, keeping its 0.6 MGD plant in operation. The effluent limits of the new regional plant will become more stringent, but the process capability of the earth basin activated sludge plant will achieve complete nitrification and will also denitrify, so the end result would give this plant better ability to meet stream standards in the long term.

Sludge treatment at the Regional plant would take place in an aerated lagoon converted for sludge treatment. Although the capital cost of conversion will be low, this pond will probably achieve only a Class B pathogen reduction level and it will cost more biannually to remove and land apply the sludge than the ATAD system proposed for the Town site in other alternatives. This additional hauling and land application cost was calculated from the Liquid Waste Management rate for hauling 50 miles to acceptable ranch and\or farm land in the Gunnison valley. This cost has been reflected below in additional O&M costs for this alternative.

In Phase 2, the 1.0 MGD Regional plant will continue to operate as described in Phase 1. In Phase 3, the Regional plant will be expanded to 2.0 MGD which will allow the Mt. CB plant also to cease operations and send all flows down the interceptor to the regional facility.

The CB South plant will become the Lower Regional plant and would continue to operate at its present site and would expand to handle any growth below the service area of the East River Regional plant. It would probably separately digest sludge to Class B levels and land apply.

Cost Summary

The following Table 6-3 summarizes the capital and O&M costs involved in Alternative 3 with comparative present worth cost values.

Table 6-3 Alternative 3 (in dollars)

Capital Improvements	Capital Cost	Annual O&M Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
Meridian Lake Park - joins with Mt. CB	580,000	14,000 (20)	147,000	727,000
Gravity interceptor to PS (9,000 LF)	350,000			
PS & force main to Mt. CB (2,000 LF)	200,000			
Easement acquisition	30,000			
Mt. Crested Butte - exst plant expands to 0.6 MGD then joins Regional Facility	200,000	190,000 (10) 40,000 (10)	1,330,000 143,000	1,673,000
Addl blowers and minor modifications	100,000			
Clarifier modifications	100,000			
Town of Crested Butte -construct pump station and join Regional Facility	470,000	150,000 (5) 40,000 (15)	615,000 133,000	1,218,000
Pump station with headworks	450,000			
Disinfection -temporary dechlorination	20,000			

Capital Improvements	Capital Cost	Annual O&M Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
East River Regional - 2.0 MGD Regional Facility	5,550,000	110,000 (5) 200,000 (15)	451,000 659,000	6,660,000
Gravity intercepter from Mt. CB (17,000 LF)	850,000			
Force main from Town to intercepter (5000 LF)	300,000			
Water rights applications & court	200,000			
Easement acquisition ($8000 per acre)	100,000			
Share of existing debt service	500,000			
Plant access improvements	200,000			
Headworks - expand on site	400,000			
Lagoon mods. for aeration	700,000			
Lagoon mods. for sludge treatment	400,000			
Clarifiers with covers	500,000			
Sludge pumping	100,000			
Pump, Blower & Operations Bldg.	150,000			
UV disinfection	200,000			
Electrical & controls	450,000			
Piping & mechanical	300,000			
Crested Butte South - Lower basin regional plant at 0.27 MGD	1,000,000	58,000 (10) 100,000 (10)	409,000 360,000	1,769,000
Headworks	50,000			
Aeration basins	200,000			
Clarifiers	100,000			
Disinfection mods.	50,000			
Sludge digestion imps.	200,000			
Building additions	250,000			
Electrical & controls	75,000			
Piping & mechanical	75,000			

Environmental Impact

This alternative moves the wastewater discharge of the three Slate River treatment plants out of the Slate and into the East River Basin. This

effectively removes all point sources of wastewater from the Slate River. This also decreases the proportion of treated flows to the chronic low flows in the receiving stream. A 2.0 MGD (3.1 cfs) discharge is only 24% of the winter's chronic low flows of 13 cfs in the East River, compared to 35% discharged into the Slate River in Alternatives 1 and 2. This alternative also removes the majority of wastewater treatment facilities from heavily populated, high growth areas to a low population, low growth area.

Water rights is an important issue with this alternative. Transfer of domestic wastewater discharge from the current discharges on the Slate River and Woods Creek to the East River will impact mostly the water users between the plants and the confluence of the Slate and East Rivers. Most uses of the water are for irrigation during the growing season and for the augmentation plans of minor users with junior rights. It is our understanding that the Town's water rights are the most senior in the valley and therefore should not have calls placed on their return flows in dry water years. Mt. CB diverts most of its flows from the East River, with exception of seasonal springs, and would have to rely on East River diversions more heavily during dry years. The majority of minor water users in the Slate basin below the Town's plant discharge are in the service area of the existing East River Regional Sanitation District and their domestic wastewater flows are already being diverted to the East River.

Another factor to be noted here is the low proportion of in-stream flows contributed by domestic wastewater discharges. In the 20-year future projected buildout, the peak seasonal wastewater flows of 3.1 cfs will occur in the winter months or with the high stream flows in runoff periods. Transfers during the late summer months will be less than 2.0 cfs which is only 6% of low flows in the Slate River during this time.

The water supply system for Mt. Crested Butte is currently diverting the majority of its flows from the East River during the months of December through April when the highest contributions are made to domestic wastewater due to population load. During the low stream flow months of July through October, the water supply is mostly used for irrigation, not domestic use. With increased population and irrigation demand, the amount drawn from the East River will be even larger, because the spring source in Woods Creek is already limited. The return of these flows back to the East River will still be considered a negative impact, because it will return flows to the East River downstream of this stream's major water rights including most major irrigation ditches.

This alternative has several routes for interceptor sewers that will disturb existing conditions. The first pipeline along Washington Gulch Road is of minimal impact as described in Alternative 2. The second route is the force main for the Town's pump station discharge. This will also cross the Slate River and will require COE permitting. Preliminary routing of this line shows it avoiding the historical site at the Town cemetery. The route of the third interceptor from Mt. CB to East River will require construction through mostly grassed slopes at the base of Crested Butte mountain. Construction and maintenance vehicle access would require some permanent grading, but long term impact will be minimal. This route could become a logical bike route between developments. In both the Mt. CB and Skyland developments this sewer can be routed in existing and proposed road and sewer easements except for a few short sections.

Another impact of this alternative is the potential for some short term problems with the Town plant, where the existing facility will be operated without headworks until the pump station is constructed. Short term dechlorination facilities can be installed at low cost and will not be a problem. Sludge treatment will not be a problem if the sludge pond use continues until upgraded facilities are constructed, but if this is problematic with regulators, sludge can be trucked to the Regional plant until pipelines are in place. CDPHE can place the Town on a compliance schedule to assure that these facilities are constructed in a timely manner.

Alternative 4 - Lower Basin Regional Plant

This alternative would expand the existing Crested Butte South plant to handle all of the wastewater flows from the entire study area. A six-mile gravity interceptor sewer would be constructed along Highway 135 and would collect flows from the Upper Basin and Mid-Basin connectors. This interceptor will have to cross both the Slate and East Rivers and may require a lift station near the far reaches of the sewer to reach the new plant. We assume that all sewage flows would be treated at CB South and all sludge would be treated to a Class A level and disposed from there. Since there is little room for this size facility there would also have to be land purchased for this alternative and site improvements associated with a new plant site.

Cost Summary

The following Table 6-4 summarizes the capital and O&M costs involved in Alternative 4 with comparative present worth cost values.

Table 6-4 Alternative 4 (in dollars)

Capital Improvements	Capital Cost	Annual O&M Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
Meridian Lake Park - join with Mt. CB	580,000	14,000 (20)	147,000	727,000
Gravity interceptor to PS (9,000 LF)	350,000			
PS & force main to Mt. CB (2,000 LF)	200,000			
Easement acqusition	30,000			
Mt. Crested Butte - exst plant expands to 0.6 MGD then joins Regional Facility	200,000	190,000 (5) 30,000 (15)	779,000 100,000	1,079,000
Addl blowers and minor modifications	100,000			
Clarifier modifications	100,000			
Town of Crested Butte -joins Regional Facility after interceptor sewer construction	320,000	150,000 (5) 20,000 (15)	615,000 66,000	1,001,000
Headworks - lesser	300,000			
Disinfection -temporary dechlorination	20,000			
East River Regional - joins Regional Facility after interceptor construction	0	68,000 (5) 15,000 (15)	279,000 50,000	329,000
Crested Butte South - 2.2 MGD Regional Facility	8,360,000	58,000 (5) 200,000 (15)	238,000 664,000	9,262,000
Gravity interceptor from Mt. CB (6000')	400,000			
Gravity interceptor from Town (37,000')	2,000,000			
Gravity interceptor from East River (8000')	360,000			
Land and easement acquisition ($5000 per acre)	200,000			
Site improvements	100,000			
Headworks - others in place, lesser size	200,000			
Aeration basins	1,000,000			
Clarifiers	500,000			
Disinfection system	200,000			
Electrical & controls	500,000			
Piping & mechanical	400,000			
ATAD sludge treatment - Class A	2,500,000			

Environmental Impact

This alternative would require extensive interceptor sewer routing with easements and river crossings and is the only alternative that requires land acquisition for a new plant site. This will be difficult in the area of the existing plant and would therefore require new siting probably downstream. This regional plant is also considered the most politically sensitive and would encourage the growth impacts along the State Highway 135 corridor. Water rights issues would also be negative because major and minor users in both the Slate and East Rivers will be adversely affected. It was therefore was not weighted heavily in the alternative selection process.

Alternative 5 - Mid-Basin Regional Plant without Town of Crested Butte

In this Alternative, Mt. Crested Butte will accept flows from Meridian Lake and will also expand to a 0.8 MGD capacity with additional primary clarifiers to handle the next ten years of projected growth. They would participate in a regional Class A sludge treatment facility at the Town plant site. When this plant expansion reaches 80% capacity, Mt. Crested Butte would construct the interceptor sewer to the East River plant and participate in that plant's expansion to a earth basin activated sludge plant of 1.4 MGD capacity. The Regional facility would then only treat sludge to Class B levels and would either require additional treatment at the Town facility or additional disposal cost. For comparative purposes, we considered the former.

The Town of Crested Butte, in Phase 1, would replace most of their existing facilities and expand to 0.6 MGD capacity and also construct the regional sludge facility. Although present growth projections show this capacity to be sufficient for close to the 20 year horizon, if growth within the area requires annexation of surrounding developments into the existing service area, the Town would have expand beyond the 0.6 MGD capacity. This would require significant another oxidation ditch for aeration, another clarifier and expansion of most other process facilities.

The CB South plant would still become the Lower Regional plant and would continue to operate at its present site, expanding as necessary to handle any growth below the service area of the Mid-Basin Regional plant. It would continue to separately land apply sludge with its present sites.

Cost Summary

The following Table 6-5 summarizes the capital and O&M costs involved in Alternative 5 with comparative present worth cost values.

Table 6-5 Alternative 5 (in dollars)

Capital Improvements	Capital Cost	Annual O&M Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
Meridian Lake Park - join with Mt. CB	580,000	14,000 (20)	147,000	727,000
Gravity interceptor to PS (9,000 LF)	350,000			
PS & force main to Mt. CB (2,000 LF)	200,000			
Easement acqusition	30,000			
Mt. Crested Butte - exst plant expands to 0.8 MGD then joins Regional Facility	1,420,000	190,000 (15) 40,000 (5)	1,729,000 116,000	3,265,000
Addl blowers and minor modifications	70,000			
Clarifier modifications	100,000			
Primary clarifiers w/o chemical coagulation	350,000			
Electric & control mods.	100,000			
Sludge Treatment Facility (shared with Town)	800,000			
Town of Crested Butte -does not join Regional Facility, contains Class A sludge treatment, 0.6 MGD	2,100,000	150,000 (20)	1,575,000	3,675,000
Headworks - screen & grit removal	550,000			
New disinfection facility	350,000			
New digester & aeration basin mods	400,000			
Covers & odor control	200,000			
Sludge Treatment Facility (shared with Mt CB)	600,000			
East River Regional - 1.4 MGD Regional Facility	3,670,000	68,000 (15) 180,000 (5)	619,000 527,000	4,816,000
Gravity interceptor from Mt. CB (17,000 LF)	850,000			
Easement acquisition ($8,000 per acre)	100,000			
Plant access improvements	200,000			
Headworks - expand on site	400,000			
Lagoon mods. for aeration	500,000			
Lagoon mods. for sludge treatment	300,000			

Capital Improvements	Capital Cost	Annual O&M Cost (Duration)	Present Worth of O&M	Total 20 YR Present Worth Cost
Clarifiers with covers	500,000			
Sludge pumping	70,000			
Pump & Blower Bldg.	100,000			
UV disinfection system	150,000			
Electrical & controls	300,000			
Piping & mechanical	200,000			
Crested Butte South - new plant at 0.27 MGD for Lower Basin Regional facility	1,000,000	58,000 (10) 100,000 (10)	409,0003 60,000	1,769,000
Headworks	50,000			
Aeration basins	200,000			
Clarifiers	100,000			
Disinfection system mods.	50,000			
Sludge digester	200,000			
Building for all facilities	250,000			
Electrical & controls	75,000			
Piping & mechanical	75,000			

Environmental Impact

This alternative both removes the Meridian Lake discharge from Washington Gulch and eventually removes Mt. Crested Butte discharge as well. Only the Town plant will continue to discharge into the Slate River and will bring the proportion of discharge to in-stream flows down. It also eventually returns much of the water taken for the Mt. CB supply system back to the East River. Water rights issues will be minimal.

This alternative does however allow both the Town and Mt. CB to expand their treatment plants in populated areas. It will effectively limit the proliferation of small plants by establishing regional facilities for the entire study area.

This Alternative does not involve the Alternative 3 force main from the Town that has river crossings and greater environmental impact, but it does have the same interceptor corridor through State Land Board lands and Skyland developments. It allows for increased capacity at both the

Mt. CB and Town plants, but this longer time frame seemed to be desired to pay off existing debt service.

There is less impact to water rights because most of the Mt. CB water supply has an East River source most of the year and it will be returned to the proper basin in the eventual scenario, while the Town's discharge remains in the Slate.

Alternative Treatment Systems

Municipal Systems

The alternative technology treatment system that makes some sense in municipal wastewater treatment this region is wetland treatment. The technology is widespread and even the designation of "innovative" may no longer apply. The topography of the Slate River basin near the Town of Crested Butte's plant is suitable for the created wetlands needed for polishing the treatment plant effluent and eliminating the hydraulic spike caused by high infiltration, where the biological load is low but the flows into the system are high. If wetland treatment techniques were applied, the peak flow could be treated to acceptable levels.

There are several areas of marginal wetland in the Town's open space that can be converted to constructed wetland and used to polish the effluent of the plant. There are also sites around the East River Regional plant that could be converted to the subsurface wetland systems used with success in other parts of the State.

Current design standards require about 23 acres of constructed or modified wetland to provide six days retention for each million gallons per day of wastewater treated. Capital costs would be very high because of the extensive areas required for subsurface preparation and gravel bedding for wetland treatment, but maintenance costs would be relatively low. The price of available land has increased tremendously in the area and the significant acreage required for wetland treatment could make this an expensive option, but there are quality benefits that can enhance the value of adjacent land by improving habitat and wildlife areas.

The climate in the study area is not conducive to ammonia removal during the cold winter months. Wetland treatment loses effectiveness in waters under 42°F. Water temperatures in the discharges are on the

border of effectiveness level in wetland microbes and influence from surface and groundwater will decrease this even further. This is also the time of year when the biological loading on the resort communities in the area is the highest. Other wetland treatment site in the State have had marginal nitrification in the higher altitudes and colder temperatures. If the stream standards are not to be compromised, periodic ammonia levels released from wetland treatment effluent will not be acceptable. We therefore would not recommend a complete wastewater treatment system using wetlands due to this factor.

The best use of wetland treatment is for effluent polishing, after the conventional treatment methods have been used. This additional treatment could only be performed by existing wetlands if the discharge meets effluent standards at the discharge point. No further treatment can be credited to the plant for using existing wetlands as treatment. If however, the discharge from the Town of Crested Butte's plant is extended and distributed over a large marginal wetland area contained mostly within the Town's recently acquired open space land, there may be treatment and water quality benefits. In addition, a smaller wetland could be constructed within the existing sludge lagoon at the Town plant site, if it's use is abandoned by the ATAD sludge digestion system.

The East River Regional plant has some potential for constructed wetland treatment, but its close proximity to the airport would discourage the attraction of waterfowl to the area. All other treatment plants except the East River Regional have little available land for created wetlands and/or not enough surrounding wetlands.

Individual Sewage Disposal Systems (ISDS)

The application of constructed wetlands for individual systems is also encouraging. This technology can improve the effluent water quality from a septic system to close to secondary treatment levels. These constructed wetland systems have proven effective with both steep slopes and poor soils. In areas of low density development, outside the existing or potential service areas in the region, this method of treatment has merit and should be analyzed for potential application.

Other methods of ISDS are being encouraged by the County, including ISDS districts where combined operation and regular maintenance improve the effluent quality. Also there is encouragement in the new County regulation for connection of ISDS to collection systems, even if it means construction of dry sewers and/or step tanks to facilitate future connections.

Plan Selection

Cost Effective Analysis

The following Table 7-1 summarizes the 20-year present worth cost analysis performed for the five principal alternatives as discussed in detail in Section 6. These costs have been totaled for all the plant construction in the entire 201 Planning area in order to compare the overall cost of each alternative.

Table 7-1 Summary of Estimated Costs (in dollars)

Alternatives	Total Capital Cost	Total Annual O&M (initial \ final)	Total 20 YR Present Worth
Alternative 1A - No Regional Facility (Modified No Action)	7,270,000	480,000 \ 542,000	12,561,000
Alternative 2 - Upper Basin Regional Plant	8,970,000	480,000 \ 370,000	13,842,000
Alternative 3 - Mid-Basin Regional Plant	7,600,000	522,000 \ 312,000	11,847,000
Alternative 4 - Lower Basin Regional Plant	8,960,000	480,000 \ 279,000	12,398,000
Alternative 5 - Mid-Basin Regional Plant without Town of Crested Butte	7,945,000	480,000 \ 484,000	14,252,000

If this evaluation were performed strictly on a present worth cost basis, the recommended alternative would be Alternative 3. Since the "no action" Alternative 1 was not considered viable due to water quality and plant proliferation issues, it has been replaced by Alternative 1A, which addresses some of the critical issues of regionalization, but the four existing plants remain and it does not establish a regional plant for the area. The capital costs of Alternative 1A are the lowest, but the costs of operating four plants over 20 years compared to operating only two plants after ten years drops the present worth cost of Alternative 3 below 1A. Extensive interceptor piping costs, easement acquisition, purchase of existing facility debt, and plant access improvements were added to the capital costs of Alternative 3. Significant costs for water rights impacts and water court work were also added, however, the

lower cost of operating two wastewater treatment plants instead of four still results in a present worth savings.

If alternatives are within ten percent of the comparable present worth cost of each other, the State recommends a matrix of other comparative factors is set up to find the recommended alternative. There is less than a 6% difference in cost between Alternatives 1A and 3, and significant weight has been placed on other concerns. Since there are strong public opinions and important environmental factors that will affect this recommendation, a matrix evaluation has resulted in a change to the recommended alternative. The main factors of the matrix evaluation will first be discussed below.

Views of Public Officials and Citizens on the Alternatives

The East River 201 Advisory Committee consists of representatives from all the existing wastewater districts and incorporated Towns in the study area. In addition there were representatives from Gunnison County, the Upper Gunnison Water Conservancy District and the High Country Citizens Alliance. Although there are several general differences in opinion on the issues of wastewater treatment and the use of such facilities to control growth, all entities agree that water quality is of the utmost concern.

Generally the existing developments providing wastewater treatment including Meridian Lake Park, Mt. Crested Butte, Skyland, Riverbend and Crested Butte South are generally receptive to growth and the buildout of their platted subdivisions. They would like to provide wastewater treatment capacity to their service area and areas beyond to cover debt service for facility construction. The Town of Crested Butte, with its Historic District designation, is opposed to rapid growth and would like to restrict growth in their service area. The Town does not want to lose it's ability to control growth and would therefore prefer the alternatives where they can continue to "shape their own destiny."

All existing Districts have the desire to phase the construction of any new facilities to maximize the beneficial use of their existing facilities and plant investment to date. Both the lagoon at Meridian Lake Park and, under some opinions, the Town of Crested Butte's facility are obsolete and substandard. The Towns of Mt. Crested Butte and Crested Butte and Crested Butte South all have expressed strong desire to expand their existing facilities to accommodate their present loadings

and to have required capacity for at least another ten years of operation so that they may have the return on current investments. The East River plant has the capacity to operate as presently designed almost into the 20 year future without major modification, but it has few contributing users and could use additional flow for efficient and cost effective operations. It will require some of its existing debt service to be purchased if it is used as a regional plant.

At the second public meeting, most entities expressed concern over the issue of funding improvements and the creation of a Regional Wastewater Treatment Authority. They questioned the ability of an Authority to pay off debt, especially if the growth projections do not materialize. The greatest concern of the public was that a regional facility on the East River would establish an autonomous outside authority that would indirectly encourage growth by providing service to anyone who would help pay off debt service. Also there was additional discussion of water rights impacts and other issues such as individual systems and impacts on groundwater quality.

It became clear during the later meetings that there were other concerns that have considerable importance to the public and public officials. Three Mile Plans had been produced for both Towns and considerable planning efforts were expended to achieve a balance between growth and the preservation of the quality of life in the valley. The 201 Plan has to be somewhat consistent with existing planning in order for a plan to be accepted and implemented.

Environmental Evaluation

There are environmental impacts from each Alternative, most of which have been summarized in the previous Section. Since there is no longer a "no action" alternative and each option removes the Meridian Lake point discharge from Washington Gulch, we can consider each alternative to have a positive impact on water quality. Some alternative do more to consolidate plants and discharge point than others, but all alternatives have addressed the need to expand service areas and have plant capacity to cover the potential development that will occur in areas outside the limits of the present service areas. This will help to limit ISDS and small wastewater systems located between the existing facilities. This also protects the existing facilities from taking wasteload allocations from the receiving streams and forcing excessive discharge limits.. Other issues that are of importance include maintenance of quality of life, wetland impacts with potential mitigation, odor generated

at treatment facilities near population centers, and water transference from one basin to another, with the related water rights impacts. Each environmental issue has a varying degree of importance to the evaluation of alternatives and will be compared below.

Evaluation Matrix

The five alternatives have been evaluated with the most relevant issues of cost, environmental factors and public concerns weighted and ranked among the group according to importance to the decision. Each issue is given a weight factor that indicates its importance to the final decision. Each alternative is given a ranking score on the ability to meet the concern as a portion of the total weight given to the item. The maximum total score in Table 7-2 shows the recommended alternative.

Table 7-2 Alternative Evaluation Matrix

Item	Weight	Alternative 1A Modified No Action	Alternative 2 Upper Basin Regional	Alternative 3 Mid Basin Regional	Alternative 4 Lower Basin Regional	Alternative 5 Mid Basin w\o Town
Present Worth Cost	50	45	40	50	20	15
Ease of Implementation	40	25	10	5	5	20
Water Quality	40	20	25	40	40	30
Consistent with Existing Planning	40	40	15	5	0	20
Maximum Use of Existing Facilities	30	30	25	15	5	20
Water Rights	30	30	20	5	0	20
Limit Proliferation of Small Systems	30	30	30	30	30	30
Wetland Impacts	20	20	0	5	0	20
Odor Control	10	3	1	10	5	2
Visual Impact	10	2	4	10	10	6
TOTAL	300	245	170	175	115	183

Selected Alternative

Alternative 1A, the modified "no action" alternative is recommended as the most favorable alternative for cost, public and environmental reasons as shown in the matrix above. This alternative is considered the preferred alternative because it offers some consolidation of treatment systems, it expands current service areas to limit more small systems and protects water quality, and it is consistent with current planning that is occurring in the area.

The proposed plant modifications to the plants at Mt. Crested Butte, the Town of Crested Butte and Crested Butte South are shown in schematic form in Figures 7-1 through 7-3. Modifications to the East River plant will be minor and does not require a revised figure from the existing schematic in Section 3. All expansion work will be performed in a phased approach to construction as described below.

The initial phase of construction calls for the existing plant at Meridian Lake to be abandoned and pipeline and pump station constructed to connect to the Mt. CB plant. The existing plant capacity at Mt. CB has already been expanded to 0.6 MGD with short term modifications that do not require additional tankage construction. The plant at the Town will replace existing facilities with new headworks, the oxidation ditch aeration basin, and UV disinfection to bring the facility to a 0.6 MGD capacity as well. The sludge facility for the two main plants will be constructed at the Town site during this expansion. The CB South plant will also be expanded to a 0.1 MGD capacity to cover growth and maintain extended aeration operations.

When growth continues, after the first ten years, the second stage of expansion at Mt. CB will commence. Primary clarifiers will be added to bring capacity to 0.75 MGD with adjustment to actual levels of growth occurring in the area. This plant can also be expanded to 1.0 MGD will chemical feed and other minor process modifications, if necessary. At a time beyond the 20 year planning horizon, additional treatment capacity may be added to the plant tankage because sludge treatment will be off the site at the Town plant.

The Town plant will grow to 0.9 MGD with more oxidation ditch capacity as growth dictates. This is not anticipated until well beyond the 20 year horizon. Crested Butte South will expand to the 0.27 MGD capacity as growth in the Lower Basin dictates, with headworks and UV disinfection potentially phased in prior to major expansion projects.

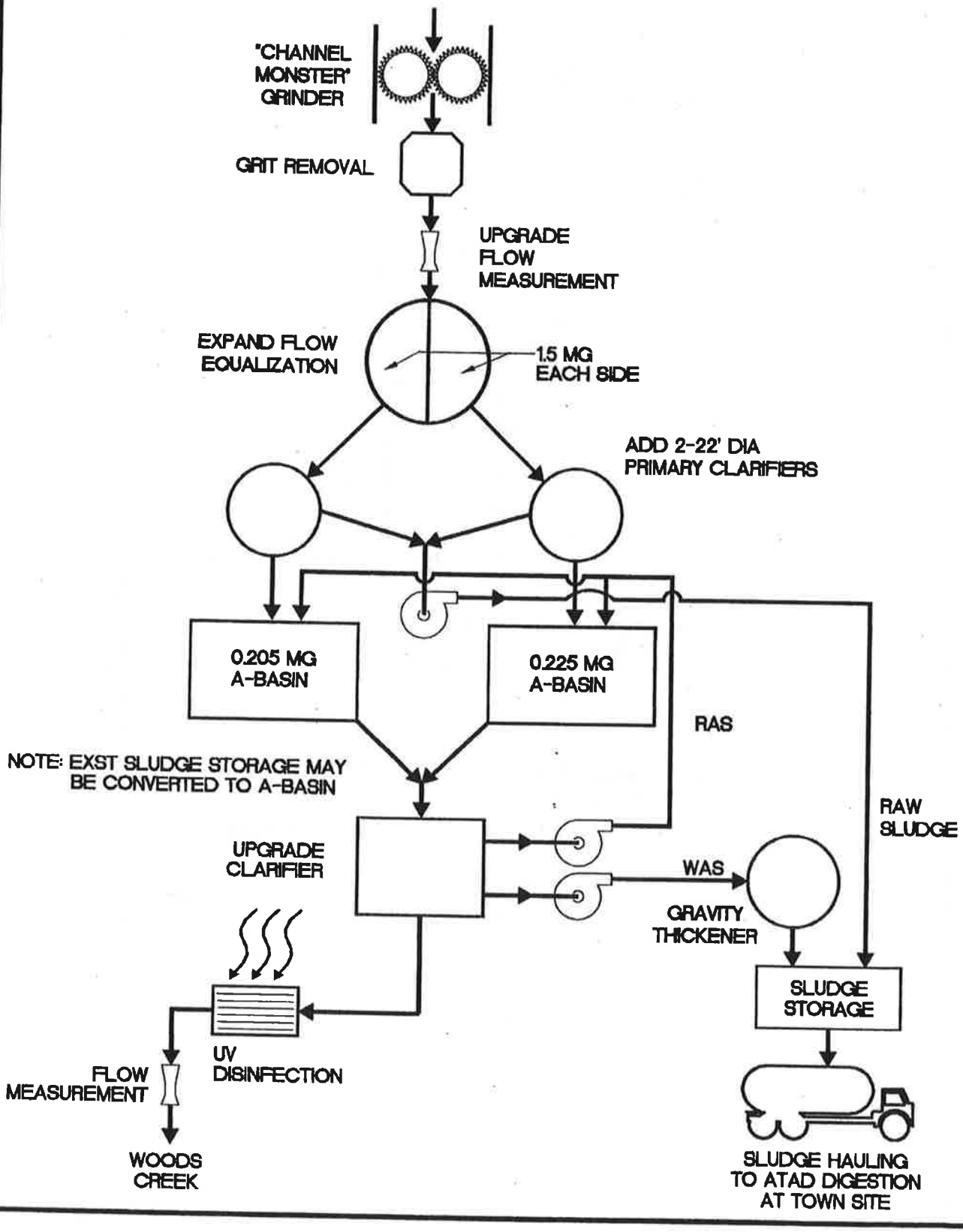

FIGURE 7-1 Mt. Crested Butte Future Expansion Treatment Schematic

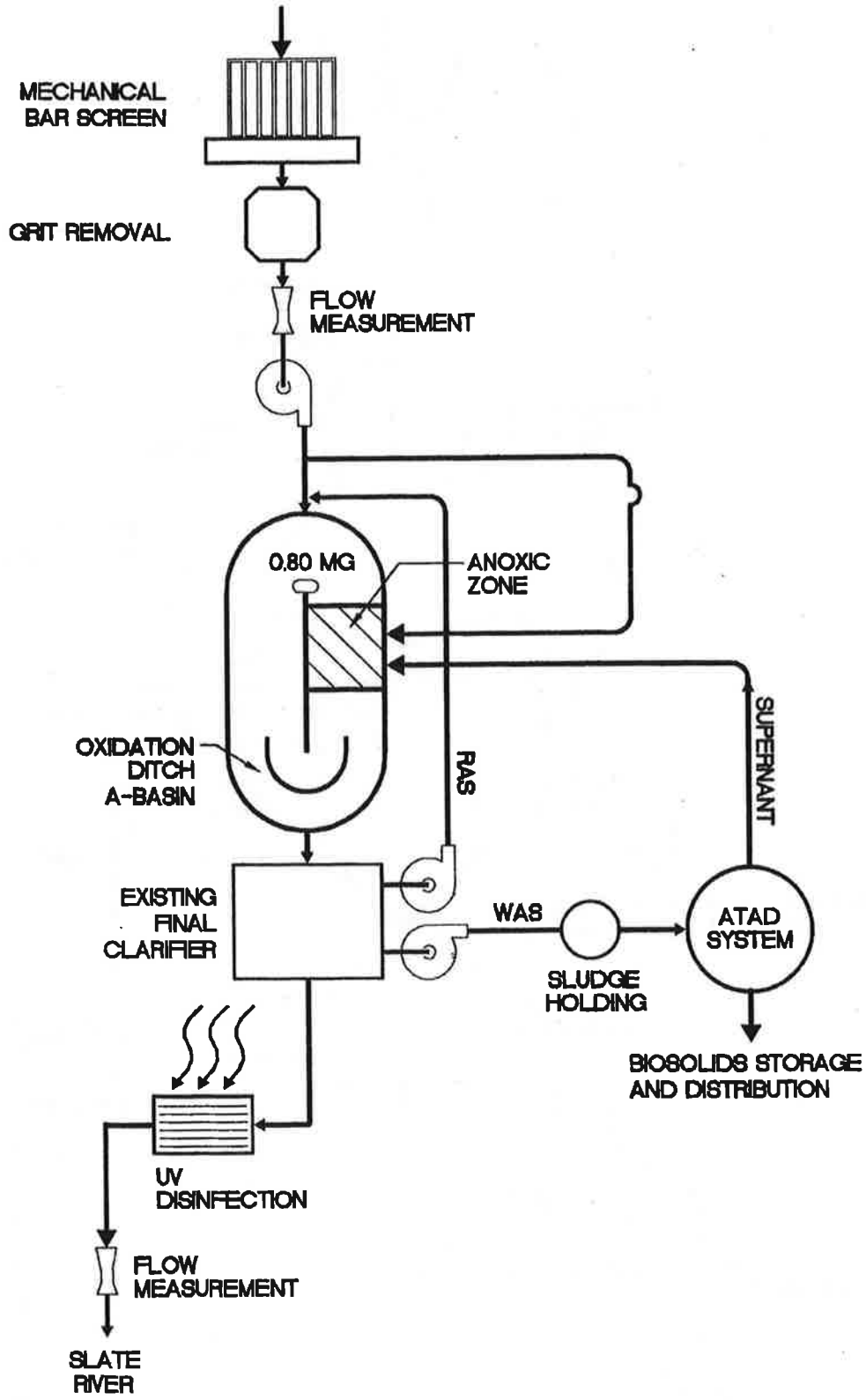

FIGURE 7-2 Town of Crested Butte Future Expansion Treatment Schematic

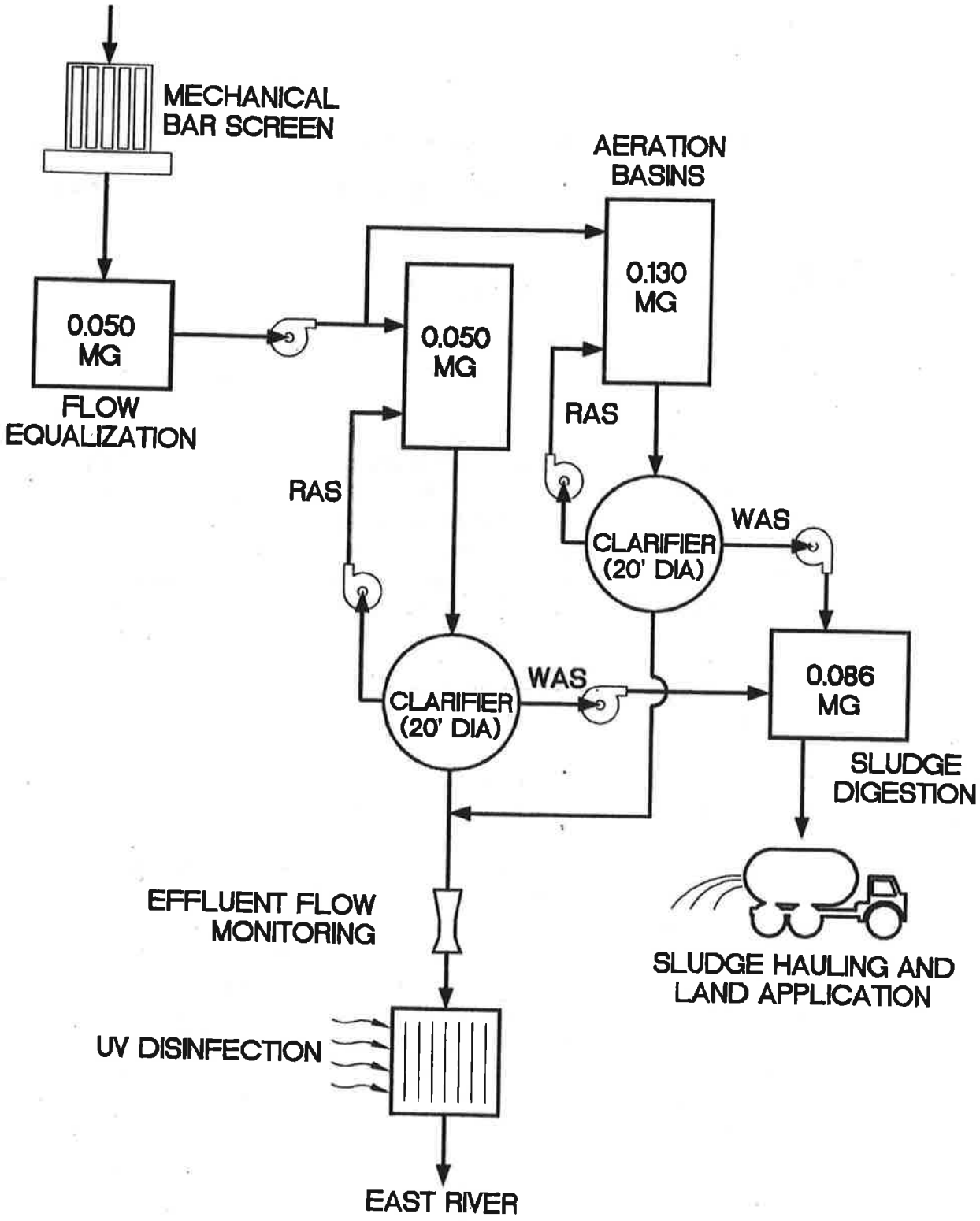

FIGURE 7-3 Crested Butte South Ultimate Expansion Treatment Schematic

SECTION 8

Arrangement for Implementation

Institutional Responsibilities

Funding Options

Presently all entities providing wastewater treatment, the Crested Butte South Metropolitan and East River Regional Districts, Towns of Crested Butte and Mt. Crested Butte and Meridian Lake Park Homeowners Association each have the legal authority and financial capability to construct and operate facilities in their present service areas. In addition, the Mt. Crested Butte Water and Sanitation District is the entity that provides services for their controlling municipality. Because there is not a regional plant proposed in the preferred alternative, any short and long term improvements to the four existing plants will be applied for and completely funded by only that entity where the work will take place.

The Gunnison County Sanitation District presently encompasses all unincorporated areas of the County and can also raise funds using bonds, warrants, tap fees and user charges. With the expanded service area agreements, they will not be required to fund projects in the planning area. There is, however, a State requirement currently enforced by the County, that all housing located within 400 feet of collection sewers will have to tap into that wastewater system. This presently provides some limitations to individual treatment systems, but is restricted in scope and enforcement potential. Recent adoption of an expanded ISDS regulation by the County adds to the limits on a new individual systems and also encourages innovative approaches to providing for future connections from ISDS to central wastewater treatment systems.

All the publicly owned wastewater treatment facilities are also eligible for State Revolving Fund loans, if the 201 Plan establishes them on the State Priority List and they conform to the recommendations of the Plan. These loans provide funding at interest rates calculated at only

80% of the lowest Class AAA bonding rate. This loan can produce significant savings over the life of the project. Only Meridian Lake Park, being privately owned, will not be eligible for these loans, but their interceptor work could be included in long term regional funding by Mt. CB. This option is discussed in detail later in this section.

Agreements for Expanded Service Areas

If order for a regional treatment alternative to be funded, and cooperation established between the five existing entities, a new intergovernmental arrangement for management will be required. Phasing of the capital expenditures for the Regional facilities is of paramount importance to the entities involved. Existing user charges can continue to pay for debt service of existing facilities while tap fees from growth can be appropriated for the regional improvements required. Growth will be used to fund regional improvements, where the additional plant capacity will be constructed for that purpose. Having actual growth establish the contributing portion to plant funding will allow for a more equitable distribution of costs.

Regional Authority

It is beyond the scope of this study to determine the ultimate requirements and the tenants of the inter-local agreement between the County and the wastewater service providers. The extension of wastewater services will be conditioned upon the development and approval of these inter-local agreements between the County and the owner/operator of the wastewater treatment facility.

Although the agreements are to be individually developed, the following outline will be used to guide the discussions:

- The delineation of a service area would not legally obligate the town/districts to provide service.
- The County would encourage the Town and Districts to develop annexation and/or utility extension policies which would be referenced in the agreement. If this is done, the County would use the policies in reviewing land use changes and building permit requests in these specific areas.

- Developments proposed within an expanded service area would have to meet several criteria in order to be served by that entity:

  - The development complies with the annexation, utility extension and/or development guidelines that may be adopted by the entity providing wastewater treatment services.

  - The treatment plant has the capacity to serve the proposed development.

  - The proposed extension of service can be reasonably engineered.

  - It is financially feasible to extend service to the area.

  Development proposed within the service areas would be required to conduct an engineering analysis that evaluated treatment options and costs. The County Planning Commission would work with the affected entity in selecting the preferred option for wastewater treatment.

  It is important that the engineering study consider, not only the feasibility of connecting to an existing treatment plant, but also a full range of other options. This is important because the development patterns and distances may make delivering service from an existing plant very expensive. However, we may be able to develop options that allow for future connections when it becomes economically feasible. There may be some opportunities in this area.

- Gunnison County, under the provisions of the newly adopted Individual Septic Disposal System Regulations could define Septic Districts in each of the four proposed service areas. Under the provisions of the new regulations, the County can define special regulations and requirements for these districts. These would be developed in a manner to encourage service by an existing central wastewater treatment system, rather than the development of new individual system or new small centralized systems.

- Growth should be responsible for paying the cost of extending wastewater collection and treatment services. It is important that the financing plan be considered along with the engineering feasibility.

Revolving Fund Loan Requirements

This section will be important each individual entity applying for low interest loans from the Water Pollution Control Revolving Fund, a financial assistance program run by the CDPHE and the Water & Power Development Authority. As a result of this study, each of the four plants will be placed on the "Needs List" for projects where these loans will be made available. Since this is a loan not a grant, there is no restrictions set on the order of priority or the specific ranking on this list. If there is not a desire to use these low interest loans, then the following discussion can be ignored.

FONSI and Environmental Impacts

In order for the individual plants to be expanded as described in the preferred alternative, and to receive the Revolving Fund loans, there are several additional requirements that have not been fulfilled by this document. This mostly deals with public participation and environmental assessment issues. The CDPHE Financial Assistance Program administrators will be required to publish a Finding of No Significant Impact (FONSI) for the individual project. The following requirements must be met prior to this occurring:

- Complete the environmental assessment checklist with enough detail as required to address the environmental impacts of the individual project.
- Hold a public hearing on the individual project that informs the affected public of increased tap fees and/or user charges and any environmental impacts of the project. A rate study may be required as part of this process. We expect that user fees and tap fees will be the main contributors to capital improvements.
- Submit enough preliminary engineering documentation to supplement this report for CDPHE review.
- The agency contacts in this study should be sufficient for most of the project work involved, but if individual plant expansions have potential impact on wetland or floodplain, the Corps of Engineers should be contacted for specific wetland delineation and 404 permitting if deemed necessary.

4. Obtain approval for construction by 4/1/96. Complete construction by 12/1/96 and begin treatment with expanded facilities.

5. Document preparation for additional plant improvements at each plant will commence as growth dictates. This work has not been scheduled at this time.

July 20, 1995
TN-2201-SC-M

PUBLIC RESPONSIVENESS SUMMARY

PROJECT:	Upper East River Valley Areawide 201 Facilities Plan
SUBJECT:	Presentation of Preferred Alternative 1A for Public Comment
DATE/TIME:	July 12, 1995 / 7:00 pm
LOCATION:	Town of Crested Butte Old Town Hall
RECORDED BY:	Joe Tamburini and Kevin Tone
ATTENDEES:	(See attached list)

During the RTW public presentation regarding Preferred Alternative 1A an the recommendations of this study, the following are the comments that were made by the general public and public officials, with responses by the consultant team:

Ralph Clark: Mentioned the population projection growth rates dropped now to 5%, county-wide have seen 20%. Concerned that he sees political difficulty in getting something agreed in time to serve large developments.

Is North Village (Snodgrass) included in estimates? Response: Yes, in future and ultimate numbers for Mt. CB. Also service area agreements will be proceeding immediately after this report is accepted.

Gary Tomsic: Discussion of County's new ISDS regulations - can have special districts for ISDS systems. Much discussion all about options that ISDS special districts can do. Monitoring of water quality. County needs to broaden

view not just standard ISDS or sanitary sewer. Look at options for connection to future sewer lines and more ISDS options.

Chuck Stearns: Does the RTW 201 need a FONSI? Response: No, but individual projects will need their own public hearing and FONSI if they plan to get a low interest revolving fund loan.

Dick Bowman & Peggy G.: Agreed with Kevin Tone's response.

R. Clark: Are we considering Rec 1 or Rec 2 for stream standards, these may change? Response: Plants as proposed can make Rec 1 limits, but classification up to WQCC.

D. Bowman Explained water quality issues - we're headed in right direction, great plan to protect water quality for state and individual rights. Bowman thinks a governor's award is in order for all participants.

Tyler Martineau: Board of Upper Gunnison WCD is disappointed in lack of regionalization and plant coverage of developing areas not covered by existing service areas. Response: Described the plans for expanded service areas in more detail.

G. Tomsic: In addition to the above, the CDPHE could require the service area agreement to be in place prior to expansion.

D. Bowman: Good first step to covering outside development.

Tyler M.: Would like to see process for agreement in the 201 Plan.

Marlene Zanitell: Would like to see all blank areas filled in. Also wants to see this planning effort continue so requirements could be worked out.

Steve Glaser: 201 has to acknowledge that these intergovernmental agreements will be executed and incorporated into plan.

G. Tomsic: K. Tone will acknowledge the agreements in the report plus add a list of those areas not covered in the study that need further effort.

R. Clark: Clarification of ISDS intention. G. Tomsic answered with more detail.

Ricky Santarella: Further clarified new County ISDS regulations, and the intention to encourage connection to centralized systems.

R. Clark: Wants a list of items not covered in 201 with a paragraph on each. Plus more detail on the loan program.

Discussion of trending of population say there is a difference, look at USFS ski area numbers. Also expressed a desire to continue to monitor growth and what triggers reconvening the group. Have to keep the group together, and continue planning.

John Hess: Limits of expanded service areas should not be cut in stone. Allow for service to be provided even further out.

END

FINAL PUBLIC MEETING
WEDNESDAY, JULY 12, 1995
EAST RIVER VALLEY 201 STUDY

ATTENDEES

Name	Affiliation	Phone no.
L. C. Adams	Town of Crested Butte	349-5338
Stewart Johnson	MCBWSD	344-2227
Richard H. Bowman	CDPHE	248-7150
Peggy Galligan	CDPHE	248-7151
Jim Dean	MCBWSD	349-5438/2345
Bill Crank	Town of Crested Butte	345-5338
Chuck Stearns	Town of Mt. Crested Butte	349-6632
Ralph Clark	self	641-2907
Marlene Zanitell	Gunnison County	641-0850
Frank Glick	MCBWSD	349-7575
Robert Drabicw	MCBWSD	349-7000
Charles Zeiter	self	349-1401
John Hess	Town of Crested Butte	349-5338
Jim Murray	ERRSD	349-7411
Gordon Crews	Crested Butte South Metro District	349-5126
Joanne Williams	Gunnison County	641-0360
Rikki Santarelli	Gunnison County	641-0244
David Baumgarten	Gunnison County	641-5000
Steve Glazer	HCCA	349-6646
Diana Graves	HCCA	349-6646
Will Sands	Mountain Sun	349-6424
Lauren Murray	ERRSD	349-6826
Tyler Martineau	UGRWCD	641-6065

WATER ISSUES

Public meeting outlines planned wastewater development

Will Sands
Mountain Sun Editor

The expansion of existing wastewater management facilities is rapidly becoming a vital issue for the upper East River Valley, with probable growth giving rise to the need for enhanced sewage treatment capabilities. A July 12 public meeting defined the proposed Area-Wide 201 Facilities Plan as a remedy and provided a forum for the public's primary concern that the plan is not comprehensive enough.

The engineering firm Rothberg, Tamburini, and Windsor (RTW) recently prepared the 201 Plan to serve as a guideline for future regional wastewater planning relative to forecasted growth.

Kevin Tone, Senior Engineer for RTW, presaged the meeting with a definition of the 201 Plan. He noted that the plan recommends that the area stretching from CB South to Mt. Crested Butte be divided into four service areas to be served by substantially expanded versions of the existing municipal plants.

This preferred alternative would discourage the proliferation of individual septic disposal systems (ISDS), while encouraging regional control of unincorporated growth in the outlying county. This option allows for the expansion of Crested Butte's, CB South's, and Mt. Crested Butte's treatment plants to handle numbers which are expected by the year 2015. The 201 Plan also recommends that the existing facility at Meridian Lake join with an expanded plant in Mt. Crested Butte.

> *'I truly think this is a great first step in controlling your own destiny.'*
> —Dick Bowman
> Colorado Dept. of Health

Tone stressed the advisory nature of the study, saying "the actual agreement does not have to be part of the 201 Plan. It can be worked out on an individual basis between the districts and the county."

These individual agreements will denote the terms under which each plant will extend its services to outlying developments and serve as the basis for future growth planning.

Gary Tomsic, Gunnison County Manager, said that he fully intends to ask the county to adopt the 201 Plan.

"We will take this plan to the Board of County Commissioners and ask them to adopt it," he said. "Our primary goal is to encourage growth in areas that won't negatively affect water quality."

Dick Bowman, of the Colorado Department of Health (CDH), stated his overwhelming approval of the proposal, both from a standpoint of area water-health and as a planning tool to compensate for future growth.

"I truly think this is a great first step in controlling your own destiny," he said. "We are going to be moving closer to a watershed or basin plan, and this makes a great first step toward that."

Following RTW's summary of the 201 Plan and comments by county and state officials, the floor was opened to public concerns which were primarily directed at perceived inadequacies in the document's depth.

Butch Clark, of Gunnison Basin POWER (People Opposing Water Export Raids), and Tyler Martineau, of the Upper Gunnison River Water Conservancy District, both expressed the need for the plan to more clearly address the specifics of wastewater management. In particular, they cited the need for timeliness, correct evaluation of water quality standards, accurate evaluation of growth potential, and the initiation of intergovernmental discussion as to the extension of services into the respective service areas.

"There are many topics which we have brought up tonight that need to be explained," Clark said.

Kevin Tone responded to these concerns, saying that the plan is by no means finalized, but can serve as an excellent planning tool and the beginning of fruitful discussions between the county and local municipalities.

"The final draft will be more complete," Tone said. "This plan will be the start of these discussions. We can take comments from this meeting and add to it."

Tomsic added that, with public concerns under consideration, the regional entities can move closer to finalizing the 201 Plan. At this point, the major stumbling block of reconciling county and municipal standards for wastewater management must be resolved. Tomsic urged that differences between regional communities' desire to manage growth by controlling their own utilities and the county's vested interest in the area's management are the only obstacle to the plan's adoption.

"We'll want some form of adoption of the 201 Plan back from the individual entities," he said.

The Town of Crested Butte is currently looking at the conditions for extending utility service to outlying subdivisions.

— NOTICE OF PUBLIC HEARING —

Upper East River Valley Areawide 201 Facilities Plan

The Upper East River Valley 201 Facilities Planning Committee, the Town of Crested Butte, the Town of Mt. Crested Butte, the Mt. Crested Butte Water and Sanitation District, the East River Regional Sanitation District, the Crested Butte South Metropolitan District and the County of Gunnison will conduct a public hearing on July 12 at 7 P.M. at Crested Butte's Old Town Hall.

The purpose of the hearing will be to review and receive public comment on the Upper East River Valley-Areawide 201 Facilities Plan. A copy of the Executive Summary of the conclusions of the plan are available from the County Manager's Office, the Town of Crested Butte and the Town of Mt. Crested Butte offices.

The public is encouraged to attend this meeting. If you are unable to attend, written comments can be sent C/O Gunnison County Manager, 200 East Virginia Avenue, Gunnison, CO. 81230.

Published in the *Chronicle & Pilot*
Issue of June 30 and July 7, 1995

NOTICE OF PUBLIC HEARING

UPPER EAST RIVER VALLEY AREAWIDE 201 FACILITIES PLAN

The Upper East River Valley 201 Facilities Planning Committee, the Town of Crested Butte, the Town of Mt. Crested Butte, the Mt. Crested Butte Water and Sanitation District, the East River Regional Sanitation District, the Crested Butte South Metropolitan District and the County of Gunnison will conduct a public hearing on July 12 at 7 P.M. at Crested Butte's Old Town Hall.

The purpose of the hearing will be to review and receive public comment on the *Upper East River Valley-Areawide 201 Facilities Plan*. A copy of the Executive Summary of the conclusions of the plan are available from the County Manager's Office, the Town of Crested Butte and the Town of Mt. Crested Butte offices.

The public is encouraged to attend this meeting. If you are unable to attend, written comments can be sent C/O Gunnison County Manager, 200 East Virginia Avenue, Gunnison, CO 81230.

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Publication date of July 5, 1995
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Crested Butte
MOUNTAIN SUN
June 29, 1995
Serving Crested Butte, Mt. Crested Butte and the Upper
Vol. 13 No. 16

"You can

Weather

Statistics provided by L.C. Adams at the National Weather Service Cooperative Station located at the Crested Butte Waste Water Treatment Facility.

Date	High	Low	Precipitation
6/23	69	31	0
6/24	66	31	0
6/25	66	30	0
6/26	69	32	0
6/27	71	31	0

Proposed wastewater expansion hinges on local/county cooperation

Will Sands
Mountain Sun Editor

According to a recent study, the upper East River valley is in need of a wastewater upgrade, and the relation between future utility planning and growth has local and county governments at odds.

The Areawide 201 Facilities Plan was prepared by a Denver engineering firm as a guide for future wastewater planning and plant expansions. It urges the expansion of the Crested Butte, Mt. Crested Butte, Crested Butte South, and East River plants as the most viable long-term solution to providing effective and efficient wastewater treatment for this end of the valley. This upgrade is based on a 20-year outlook and would carry a $7,270,000 price tag.

In contrast to centralizing treatment facilities, the 201 plan rates expansion of current plants as the best of five proposed solutions. The expansion proposal is the second most costly but is most consistent with the independent planning strategies of each town. It is also the option which is least conducive to regional growth. According to Gunnison County Manager Gary Tomsic, "From a political and institutional point of view, it's the best alternative."

The plan recommends that the forecasted growth in the county's unincorporated region be divided into four areas to be served by the existing but expanded municipal plants. This arrangement has spurred controversy between town and county governments as to who will control the potential growth with utility management policies.

Tomsic expressed the county's interest in the region's wastewater management. "The reason we got involved in the first place is the growth potential in that area," Tomsic says. "Most of the developable land is in the unincorporated county."

With the dichotomy between local and regional control setting the scene for potential disagreement, Tomsic urges the need for cooperation based on agreements. He acknowledged the desire for communities to manage growth by controlling their own utilities, but adds that the county has a vested interest in the area's management.

"We have to work out some agreements between the towns and the county as to how this will happen," Tomsic says. "I think that in order for this to work for both of us, there's got to be little bit of give and take."

Likewise, Crested Butte Town Manager Bill Crank expressed the town's desire to collaborate in the implementation of the plan. However, in light of the county's involvement, he asserted Crested Butte's need to define its own criteria for service and density requirements.

"I'm assuming that we can work out a necessary standard that will be agreeable to the county and the town to extend service into our service area," he says.

Although Crank ranks annexation of the unincorporated areas as the preferred alternative, he said that it would not be a requirement. However, he added that service would be granted on Crested Butte's terms. "If we are going to extend service, it is going to be according to our criteria," he said. Foremost among these criteria is that proposed developments extend their lines to Crested Butte's existing plant or sewage trunk lines rather than vice versa.

The county and Crested Butte and Mt. Crested Butte have not yet begun discussing these agreements, and Tomsic said that the county does not need them to adopt the plan.

A public hearing finalizing the 201 plan will take place on July 12 at 7 p.m. at Crested Butte's Old Town Hall.

Rothberg
Tamburini
Winsor

March 7, 1994
TN-2200-SC-C
SL#7028

MEETING MINUTES

PROJECT: Upper East River Valley- Areawide 201 Facilities Plan

SUBJECT: Public Information Meeting

DATE/TIME: March 2, 1994, 7 pm

LOCATION: Town Hall, Crested Butte

RECORDED BY: Kevin A. Tone KT

ATTENDEES: (See Attached List)

The meeting was opened by Gary Tomsic, Gunnison County Manager. He reviewed decisions made in the last public meeting regarding population estimates and the magnitude of growth. At that meeting the public agreed that RTW should use these numbers for wastewater planning. Gary then introduced the consultant team. Joe Tamburini, of RTW, described of the purpose of the meeting as an opportunity for the public to understand the alternatives and allow for comments on concerns and issues of the alternatives and the needs of region. A key purpose of the meeting was to explain the alternatives and allow the public to ask questions of the consultants on the alternatives. He stressed there would be no determinations on the alternatives at this time.

Dick Bowman, of the Colorado Department of Health, emphasized the State and Federal policy of encouraging consolidation of small systems and the need for a long-range comprehensive plan for wastewater treatment. He stated that the Department is not in the land use business and is mainly concerned with maintaining and improving water quality. The 201 plan is a Federally mandated study that identifies the most cost effective alternative for wastewater treatment and also the most

environmentally favorable. This 201 plan would be approved on a grantee (County) level then the State. If Federal funds or revolving loans are to be used for a plant expansion project, it must conform to the approved 201 plan.

Steve Glazer, of HCCA, asked if there can be a selected alternative which one entity will not approve. Bowman explained that this plan should meet approvals of the advisory committee. Bill Crank, of the Town of Crested Butte, asked if cost-effective was most important element in the decision. Basically, yes, he was told.

Jim Dean of Mt CB W&S asked if all costs such as bonded-indebtedness and easement acquisition are to be included in the cost-effectiveness analysis. RTW said they would include these items along with a salvage value for the existing plant equipment in the final analysis. Definition of cost-effectiveness is not just lowest capital cost but a combination of other factors such as operation costs, environmental acceptance, ease of implementation, etc.

A question was raised about the Three Mile Plans around entities vs. timing of wastewater plans. Gary T. answered that this study was 9 months into a 12 month process, then described the process of accepting study. His best guess is that planning will be a continuing process and this study will not be the end of it.

L.C. Adams, Town of Crested Butte, asked about the new 503 sludge regulations and present deficiencies, what about enforcement during regional work. Dick Bowman said there would probably be a compliance schedule set by the State for facility construction that would allow for construction of improvements.

Kevin Tone, of RTW, then described the four current alternatives and the costs associated with them. A fifth alternative had been added to the list that allows both the Mt. CB and Town of Crested Butte to expand their present plant to a level that would hold them for at least ten years and then allow for interceptors to take additional flows to a regional plant at East River.

A concern was raised about Meridian Lake lift station failure and potential contamination. RTW described the State requirements and good design included dual pumps, power or 24 hour holding pond would be provided. Steve G. said tap fees will have to be included in the Meridian Lake sewer cost but this issue was not yet decided by Mt. CB W&S.

RTW recorded a list of the main issues and concerns that the public raised as follows:

1. Consider trucking sludge from both the Town and Mt. CB plants to an East River regional sludge facility.

2. Can the Town use it's existing lagoon for sludge treatment?

3. Concern for the costs of easements for pipelines through land administered by the State School Land Board and USFS.

4. Time and cost associated with developing a regional wastewater treatment authority.

5. Capital cost and payment of debt by Authority if growth projections don't materialize.

6. Voting for indebtedness, will it carry?

7. Development of an umbrella District approach to Authority.

8. Water rights analysis for alternative that transfers discharge points from Slate River to East River Basin and the affect on major downstream water users.

9. Organizational structures.

10. Concern of additional infrastructure that follows development of sewer lines.

11. Existing indebtedness should be factored into the cost analysis.

The meeting adjourned at approximately 9:30 PM with RTW directed to proceed with producing the draft 201 report prior to meeting again.

END

KAT/lw

LIST OF ATTENDEES
MARCH 2, 1994
TOWN HALL, MT. CRESTED BUTTE

Name	From
Joe Tamburini	Rothberg, Tamburini & Winsor, Inc.
Kevin Tone	Rothberg, Tamburini & Winsor, Inc.
Ron Schuyler	Rothberg, Tamburini & Winsor, Inc.
Steve LaBonde	WestWater Engineering
Sego	Town of Crested Butte
Jim Starr	Town of Crested Butte
John Hess	Town of Crested Butte
Cath Sherrer	Town of Crested Butte
L. C. Adams	Town of Crested Butte
Scott Truex	Town of Crested Butte
Billy Joe Lacy	Meridian Lakes Park - 3
Daniel Dow	Meridian Lakes Park - 3
Dwain Watson	Colorado Department of Health
Dick Bowman	Colorado Department of Health
John Banker	HCCA
Ian Olgeirson	Mt. Sun
Steve Glazer	HCCA, Crested Butte
Tyler Martineau	UGRWCD
Robert A. Nowotny	Meridian Lake
Lynn Cudlip	self
Gary Spring	HCCA
Stan Westery	Citizen
Mark Reaman	self
Tim Schmidt	Town of Crested Butte
Marlene Zanetell	Gunnison County
Linda Hall	Mt. Crested Butte
Nick Lypps	self
Fritz Diether	Mt. Crested Butte
David Owen	Mt. Crested Butte
Victor Shepard	Crested Butte Town Council
Jim Murry	Skyland Metro/East River Sanitation
C.L. Saterwood	BRRSD
Bill Crank	Town of Crested Butte
Jim Dean	Mt. Crested Butte Water & Sanitation
Frank Glick	Mt. Crested Butte Water & Sanitation

Jeff Shipley	East River District Board
John Gupton	Meridian Lake
Sue Navy	HCCA
Laura Anderson	Chronicle & Pilot
Rikki Santarelli	Gunnison County
Joanne Williams	Gunnison County
Fred Holbrook	Gunnison County
Jack Dietrich	Crested Butte South Metro. District
Daniel Byron	Meridian Lake Park
Gary Tomsic	Gunnison County
R. J. Harrington, Jr.	Meridian Lake Park
Virginia Hamilton	Mt. Crested Butte
Vincent Rogalski	Mt. Crested Butte
Bill Trampe	UGRWCD

December 15, 1993
TN-2200-SC-C
SL#6671

MEETING MINUTES

PROJECT:	Upper East River Valley - Areawide 201 Facilities Plan
SUBJECT:	Public Information Meeting
DATE/TIME:	December 8, 1993, 7 pm
LOCATION:	Town Hall, Crested Butte
RECORDED BY:	Kevin A. Tone KT
ATTENDEES:	(See Attached List)

The meeting was held to update the public on the findings of the study team to date. Critical input was required for the population and growth projections for the region, and wastewater treatment alternatives identified to date and the focus of the meeting was on these issues.

Members of the consultant team were introduced by Gary Tomsic, Gunnison County Manager. Gary also introduced the scope of the project and the other members of the advisory group present.

Joe Tamburini of RTW presented the 201 Facilities plan rationale and background for the study. He also directed the public as to what the team needed the most input.

Kevin Tone of RTW presented the housing figures and growth rates anticipated for the 20 year future. He then presented an overview of the existing plant capacities and the alternatives for regional facilities.

Following the presentation by RTW, a question/answer discussion ensued. A summary of major topics and our interpretation of the public's position on them follows:

1. The population and growth estimates used by the consultants were considered to be high. Although, growth has been rapid during the past two years, the group does not expect it to continue or increase in the next 20 years. However, the group agreed that, for planning purposes, the future development numbers should be used as presented.

   Critical to the use of these numbers for planning is the desire to phase any plant expansion so that capital expenditures are not sunk into facilities prior to the need for them.

2. Nonpoint source pollution is a major concern of the public. The impacts of development, septic systems and mine tailings were all considered issues of water quality. Although this issue is not part of the 201 study, it should be addressed.

3. Water resource issues were also the subject of great concern. The transference of discharge points from the Slate River Basin to the East River Basin and their impacts on minimum flows necessary for streamlife, water quality and water rights should be studied. Irrigation ditch rights could be affected. Also, the ability of the basins to supply sufficient water for the growth projected.

4. However concluded that peak population figures cannot be derived from the housing figures without a discussion with the individual districts. Some areas, such as the Town, have very different peak population figures than the ski area for instance.

5. There is a need to get water quality data that correlates to flow data. This extra data collection will be initiated by the Upper Gunnison Water Conservancy District. The limits of this data collection are unknown at this time. Discussions with CDH have established parameters for testing and the additional data will be helpful for running their model that establishes effluent limits for the treatment facilities.

It was pointed out to the public that by EPA and State regulations, both the nonpoint source and water resource issues are topics that are beyond the present scope of the 201 plan. It is our opinion that in order for the public to stand behind the study's conclusions and recommendations, the County and advisory group should consider potential sources for funding additional study to include these issues.

The meeting adjourned at approximately 9:30 pm with the next advisory group meeting set for Thursday, January 6th at 1 pm.

END

KAT/ljs

PUBLIC MEETING
WEDNESDAY, DECEMBER 8, 1993
TOWN HALL, CRESTED BUTTE

Name	From
Joe Tamburini	RTW - Denver
Kevin Tone	RTW - Denver
Sherron Green	Crested Butte, Meridian Lake
Gary Tomsic	Gunnison County
Laura Anderson	Crested Butte, Chronicle and Pilot
JoAnne Williams	Gunnison County Planning
Virginia Hamilton	Mt. Crested Butte
Steve Glazer	HCCA, Crested Butte
Ken S. Goering	Gunnison County Times
Caren Carrall	Mt. Crested Butte
Judy McGill	Crested Butte/Gunnison County
Frank Glick	MCBWSD
Daniel Byron	Meridian Lake
Jim Schmidt	Town of Crested Butte
Gloria Wojtalik	Town of Crested Butte
Rikki Santarelli	Gunnison County
Marlene Zanetell	Gunnison County
Cathy Sherrer	Crested Butte
Greg Wrijjie	East River Regional San. District
Fred Holbrook	Gunnison County Planning Commission
Jim Murry	East River Regional District
Daniel Murphy	East River Regional District
Bryon C. Barrett	Crested Butte South
Tim Zimmermann	CB South Metro
Jack Dietrich	CB South Metro
Ralph Clark	Self
Dennis Shectel	Upper Gunnison River Water Conservancy District
John Hess	Town of Crested Butte
Bill Crank	Town of Crested Butte
Bill Trampe	UGRWCD
Lucy High	UGRWCD
Tyler Martineau	UGRWCD
Susan Lohr	UGRWCD
Peter Smith	UGRWCD
Winnee Preston	Crested Butte
L.C. Adams	Town of Crested Butte
R. J. Harrington, Jr.	Meridian Lake
J. Danielaison	President, Meridian Lake

APPENDIX B

Agency Contacts

STATE OF COLORADO

OFFICE OF THE STATE ENGINEER
Division of Water Resources
Department of Natural Resources

1313 Sherman Street, Room 818
Denver, Colorado 80203
Phone (303) 866-3581
FAX (303) 866-3589

July 19, 1994

Kevin Tone
Rothberg Tamburnini Windsor
1600 Stout Street, Suite 1800
Denver, Colorado 80202-3126

Re: Upper East River Valley Areawide 201 Facilities Plan

Dear Mr. Tone:

As requested, we have reviewed your draft report for the Upper East River Valley Areawide 201 Facilities Plan. We find this plan lacking the potential to cause material injury to water rights unless water is diverted from one stream and discharged into another stream.

The Office of the State Engineer is responsible for the administration of water rights in the state. As such, we expect all discharges into the stream to be measured and recorded in accordance with the water right decrees used in each facility. Permanent records of all discharges must be maintained and submitted to the Division Engineer upon request. Those water districts or municipalities that divert water from one stream and discharge into another stream should only operate under a court-approved plan for augmentation. Plans for augmentation are necessary to mitigate injury to other vested water rights. As for the quality of the discharged water, we foresee no problem as long as the plant operates under a valid permit issued pursuant to the Colorado Discharge Permit System.

Thank you for the opportunity to comment. If you have any questions, please contact Ken Knox, Division Engineer in Montrose at (303) 249-6622, or Bahman Hatami at (303) 866-3581.

Sincerely,

Hal D. Simpson
State Engineer

cc: Ken Knox, Division Engineer

bh\spproj\uerv201.pln

United States Department of the Interior

NATIONAL PARK SERVICE

ROCKY MOUNTAIN REGIONAL OFFICE
12795 W. ALAMEDA PARKWAY
P.O. BOX 25287
DENVER, COLORADO 80225-0287

IN REPLY REFER TO:

L58 (RMR-PPO)

JUL 14 [illegible]

Kevin A. Tone
Rothberg, Tamburini, and Winsor
1600 Stout Street, Suite 1800
Denver, Colorado 80202-3126

Dear Mr. Tone:

The East River from its source to the Gunnison River is listed in the Nationwide Rivers Inventory (NRI), a list of rivers potentially eligible for inclusion in the National Wild and Scenic Rivers system. As per Presidential directive of August, 1979, "each Federal agency shall . . . take care to avoid or mitigate adverse effects on rivers identified in the Nationwide Rivers Inventory." The National Park Service reviews and comments on proposals affecting rivers listed in the NRI, seeking to preserve those values for which the river might qualify for the national system.

The East River has outstanding scenic, fish, wildlife, and historic values. The fisheries resource has been rated of highest value by the Fish and Wildlife Service. Riparian habitat is excellent and important to many wildlife species, including wintering bald eagles, a federally listed species. And the town of Gothic is an historic mining area.

Given the insufficient capacity of existing treatment facilities to handle the region's current and anticipated growth, an improved regionalized wastewater treatment system will hopefully serve to protect and possibly improve existing water quality in the East River. Our comments therefore pertain to construction activities.

Any project facilities planned near the East River should be designed and constructed so as to minimize the following:

* Alteration of riverbanks;
* Disturbance of riparian vegetation;
* Extent of impervious surfaces;
* Siltation and other deleterious water quality effects;
* Visual impact of new construction.

Thank you for the opportunity to comment on your proposal.

Sincerely,

Gary Weiner
National Rivers Program Manager
Partnerships and Outreach
Professional Services

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Western Colorado Office
764 Horizon Drive, South Annex A
Grand Junction, Colorado 81506-3946

IN REPLY REFER TO:

ES/CO: Nonfederal Informal Consultation
MS 65412 GJ

July 5, 1994

Kevin A. Tone, Senior Engineer
Rothberg, Tamburini & Winsor Inc.
1600 Stout Street, Suite 1800
Denver, Colorado 80202-3126

Subject: Upper East River Valley Areawide 201 Facilities Plan, Crested Butte, Gunnison County

Dear Mr. Tone:

The Fish and Wildlife Service (Service) has reviewed the subject proposal for a waste treatment plant and has several concerns that should be addressed. The project may impact wetland areas and the U.S. Army Corps of Engineer's Grand Junction Office should be contacted for wetland determinations. All efforts should be taken to avoid wetland impacts before mitigation is explored. Contamination of the Gunnison River Basin is a concern to the Service. The most up to date technology should be used to eliminate contaminants from entering the Slate and East Rivers. Also, there are several threatened, endangered, proposed, and candidate species that may occur in the project area.

ENDANGERED SPECIES

Peregrine falcon	*Falco peregrinus*
Colorado squawfish	*Ptychocheilus lucius*
Razorback sucker	*Xyrauchen texanus*
Humpback chub	*Gila cypha*
Bonytail chub	*Gila elegans*

THREATENED SPECIES

Bald eagle	*Haliaeetus leucocephalus*

PROPOSED SPECIES

Southwestern willow flycatcher	*Empidomax traillii extimus*

We would like to bring to your attention species which are candidates for official listing as threatened or endangered species (Federal Register, Vol. 56, No. 225, November 21, 1991). While these species presently have no legal protection under the Endangered Species Act (Act), it is within the spirit of the Act to consider project impacts to potentially sensitive candidate species. Additionally, we wish to make you aware of the presence of Federal

candidates should any be proposed or listed prior to the time that all Federal actions related to the project are completed.

CANDIDATE SPECIES

North American lynx	*Felis lynx canadensis*
North American wolverine	*Gulo gulo luscus*
Northern goshawk	*Accipiter gentilis*
Loggerhead shrike	*Lanius ludovicianus*
White-faced ibis	*Plegadis chihi*
Roundtail chub	*Gila robusta*
Flannelmouth sucker	*Catostomus latipinnis*
Colorado cutthroat trout	*Salmo clarki pleuriticus*
Great Basin silverspot butterfly	*Speyeria nokomis nokomis*
Astragalus anisus	Gunnison milk-vetch
Astragalus brandegei	Brandegee milk-vetch
Astragalus microcymbus	Skiff milk-vetch
Astragalus molybdenus	Leadville milk-vetch
Penstemon mensarum	Grand Mesa penstemon

Peregrine falcons have been observed around Crested Butte and there is a known bald eagle nest on the East River near the Roaring Judy Fish Hatchery. If riparian areas are altered the southwestern willow flycatcher may be impacted. The endangered and candidate fishes (except possibly the Colorado River cutthroat trout) do not occur around the project area but water depletions to the Gunnison River may impact these fishes. Formal consultation under section 7 of the Endangered Species Act may be required if water depletions occur as a result of this project. The Service recommends that surveys be conducted for all the species that may be present in the vicinity of the project area prior to construction activities.

If the Service can be of further assistance, please contact Terry Ireland at the letterhead address or (303) 243-2778.

Sincerely,

Keith L. Rose
Assistant Field Supervisor, Colorado

cc: CDOW, Montrose
CDOH, Denver (Attn: Bob Owen)
COE, Grand Junction
EPA, Denver (Attn: Sarah Fowler)
FWS/ES, Golden

TIreland:GunSewr.ltr:070594

COLORADO
HISTORICAL
SOCIETY

The Colorado History Museum 1300 Broadway Denver, Colorado 80203-2137

June 10, 1994

Kevin A. Tone
Senior Engineer
Rothberg Tamburini Winsor
1600 Stout Street, Suite 1800
Denver, Colorado 80202-3126

Re: Upper East River Valley Areawide 201 Facilities Plan

Dear Mr. Tone:

This office has reviewed your correspondence of June 7, 1994 concerning the above proposed project.

Although no sites are located within the project area, surveys in the vicinity indicate that cultural resources may be present. In the areas where there have been no extensive land altering activities, we recommend that a cultural resource survey be undertaken to determine if eligible cultural resources will be impacted by construction activities. We note that portions of this project are on land managed by the U.S. Forest Service. Cultural resource compliance should be coordinated through the Gunnison Forest Service office. All work is done in accordance with the National Historic Preservation Act and its implementing regulations 36 CFR 800, in consultation with this office.

If we may be of further assistance please contact Jim Green at 866-4674.

Sincerely,

James E. Hartmann
State Historic Preservation Officer

JEH/WJG

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ROOM E200C
655 PARFET STREET
LAKEWOOD, CO 80215-5517 1

SUBJECT: Upper East River Valley
Areawide 201 Facilities Plan

DATE: June 21, 1994

TO: Rothberg Tamburini Winsor
Professional Engineers & Consultants
1600 Stout Street/Suite 1800
Denver, Colorado 80202-3126

Attention: Kevin A. Tone

We have reviewed the draft facilities plan for Gunnison County and the Colorado Department of Health.

Since except for interceptor drains all work will be carried out within existing plant areas we see no adverse impacts accruing due to the planned expansion or modification to the existing facilities.

Since the plan calls for quite an increase in population, we assume that an increase in the size of the existing ski areas is anticipated. Though not a part of the facilities plan, this could have a large bearing or impact on other areas. The impact of snowmaking water is very minimal.

We appreciate the opportunity to review this facility plan.

Very truly yours,

Flavio R. Gonzalez
State Conservation Engineer

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH
Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80222-1530
Phone (303) 692-2000

Laboratory Building
4210 E. 11th Avenue
Denver, Colorado 80220-3716
(303) 691-4700

Roy Romer
Governor

Patricia A. Nolan, MD, MPH
Executive Director

June 24, 1994

Kevin A. Tone
Senior Engineer
Rothberg, Tamburini & Winsor, Inc.
1600 Stout Street, Suite 1800
Denver, CO 80202-3126

Dear Mr. Tone:

This office recently received your request for an air quality determination on the Upper East River Valley Areawide 201 Facilities Plan.

It is not expected that this project will have an adverse, long term effect on ambient air quality. However, the Division's Stationary Source program may require permits or notices for this project, particularly if ground disturbance exceeds 25 acres or lasts longer than six months.

For more information on possible permit requirements, please contact the Stationary Source section at (303)692-3150.

Sincerely,

Vicky McLane

Vicky McLane
Senior Planner, A.P.C.D.

cc: Richard Halvey
Jim Geier

APPENDIX C

Other Relevant Correspondence

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH
Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80222-1530
Phone (303) 692-2000

Laboratory Building
4210 E. 11th Avenue
Denver, Colorado 80220-3716
(303) 691-4700

Roy Romer
Governor

Patricia A. Nolan, MD, MPH
Executive Director

April 14, 1994

Mr. Kevin A. Tone, P.E., Consulting Engineer
Upper East River Valley 201
1600 Stout Street, Suite 1800
Denver, Colorado 80202-3126

RE: Preliminary Effluent Limits
Upper East River Valley Wastewater Treatment Facilities
Gunnison County

Dear Mr. Tone:

We have received your request, on behalf of the Upper East River dischargers, for preliminary effluent limits for several discharge scenarios involvoing the five existing wastewater treatment facilities in the Crested Butte area.

We ran the Colorado Ammonia Model (CAM) using data which you provided that was collected by the various dischargers. We used the instream sampling data collected by Bio-Environs to estimate upstream ammonia concentrations. Low flows were taken from the permits for the appropriate facilities as the period of record of the USGS data that were provided was too short to conclusively show that winter flows are any different than those previously used. As we discussed, the period of record for some of the data sets is short and the results of the CAM runs for these facilities are considered to be preliminary at best. There are also antidegradation requirements that must be considered since all of the streams are classified for class 1 aquatic life.

After taking all of these factors into consideration it is our opinion that any of the proposed alternatives would have to be capable of meeting seasonal total ammonia limits of between 1.5 mg/l and 4mg/l during the summer, between 4 mg/l and 7 mg/l during the spring and fall, and between 7 mg/l and 10 mg/l during the winter. These limits are our best estimate at this time based on somewhat limited information. However, due to the larger amount of data provided for the East River, the limits for the East River Regional and Crested Butte South alternatives should be fairly close to the numbers that will be proven out after a substiantial amount of instream data has been collected. Future limits for Mt. Crested Butte and Crested Butte may vary somewhat more from our estimates as additional data are collected.

Based on our analysis we assume that each alternative would be required to include facilities that are capable of biologically nitrifying to some degree or another during the entire year. We do not expect that future effluent limits will increase to such a degree that biological nitrification would not be required nor do we expect that they would decrease to the point where biological nitrification could not meet the required total ammonia limits.

Please call me at 692-3591 if you have any questions.

Sincecely,

David Akers

David Akers
Senior Professional Engineer
Permits and Enforcement Section
WATER QUALITY CONTROL DIVISION

xc: Mark Templeton, Gunnison Co. Health Department
Dwain Watson, D.E., Field Support Section, WQCD
Tom Bennett,Groundwater and Standards Section, WQCD
Dick Bowman, Field Support Section, WQCD
MS-3 File

Rothberg
Tamburini
Winsor

Mr. Dave Akers - Permits & Enforcement
Colorado Department of Health WQCD
4300 Cherry Creek Drive South
Denver, CO 80222-1530

March 4, 1994
TN-2200-SC-C
SL #7029

Reference: Upper East River Valley - Areawide 201 Wastewater Facilities Plan
Effluent Limits for Regional Alternatives

Dear Dave:

RTW is preparing the 201 planning document for the Crested Butte area. Of the five existing plants, we expect all but Meridian Lakes Park to continue operation at some level into the future. Both the Mt. Crested Butte and the Town of Crested Butte plants will probably require some short term expansion and the Town plant and the East River Regional plants are being considered as regional alternatives. The Crested Butte South plant will also act as the regional plant for the lower basin and will require expansion in the near future. We have provided a updated plan showing the location and interceptor piping associated with each of the regional alternatives.

We have gathered the stream monitoring data from those entities whose permits presently require a monitoring program and have supplemented them with some recent stream quality study data. We also have some recent stream gage data for John Scherschligt's use.

We request that your Department review this information provided and establish the probable effluent limits, especially ammonia, for the following projected plant flows:

Mt. Crested Butte (to Woods Creek) - 0.6 MGD, 0.8 MGD, 1.0 MGD

Town of Crested Butte (to Slate River) - 0.6 MGD, 1.2 MGD, 1.8 MGD

East River Regional (to East River) - 1.0 MGD, 2.0 MGD

Crested Butte South (to East River) - 0.25 MGD

Please call me if you have questions or require anything else for your determinations.

Very truly yours,
Rothberg, Tamburini & Winsor, Inc.

Kevin A. Tone, P.E.
Senior Engineer

KAT/lw

Enclosures

cc: Gary Tomsic - Gunnison County

R3D Inc.

MEMORANDUM

TO: Frank Glick
Mt. Crested Butte Water & Sanitation District

FROM: Claudia Cummins

DATE: May 30, 1995

SUBJECT: Mount Crested Butte and Expanded Service Area
201 Facilities Plan 20-Year Population and Flow Projections

Since the 201 Facilities Plan was begun, Mount Crested Butte Water and Sanitation District ("MCB") has decided to include additional areas outside their existing service area. The expanded service area is shown on Figure 1 (attached). With the addition of the extended service area, population and flow projections have been updated for a 20-year planning period as follows:

AREA 1: Existing Service Area

As referenced in my memorandum to you dated May 19, 1995, plant historical records from 1975 to 1994 showed an average of 64 housing units/year were added to the system. Assuming 3.5 persons/unit and based on 74 gpcd (from the draft 201 Plan), projected wastewater flows of 0.33 mgd would be added to the current 0.48 mgd maximum average monthly flow (1994).

Current flows	0.48 mgd
Future flows	0.33 mgd
TOTAL FLOWS	**0.81 mgd**

AREA 2: Meridian Lake Park

Meridian Lake Park currently has 42 single family residences, with a total buildout of 140 single family residences. Once again, assuming 3.5 persons/unit and based on 74 gpcd, projected wastewater flows of 36,000 gallons/day would be added to the present system.

TOTAL FLOWS	**0.036 mgd**

AREA 3: Mt. Crested Butte Expanded Area

The area surrounding the existing MCB service area encompasses approximately 1,280 acres. A density of 40 single family residences per 150 acres was used to calculate the future population and flows. This density was based on past and current development proposed for the area, and takes into consideration that not all the acreage will be developable due to slopes, wetlands, open space and other restrictions. Based on 341 housing units at total buildout, 3.5 people per unit and 74 gpcd, projected wastewater flows of 88,000 gallons/day would be added to the present system.

TOTAL FLOWS 0.088 mgd

AREA 4: Glacier Lily

Glacier Lily is a 40-acre parcel consisting of 21 lots, with 7 single family residences currently built. Again, assuming 3.5 people per housing unit and 74 gpcd, projected wastewater flows of 5,000 gallons/day would be added to the present system.

TOTAL FLOWS 0.005 mgd

AREA 5: Mountain Highlands Estates

Mountain Highlands Estates consists of 154 acres, with a proposed 40 single family residences at buildout. With 3.5 persons/unit and 74 gpcd, projected wastewater flows of 10,000 gallons/day would be added to the present system.

TOTAL FLOWS 0.01 mgd

20-YEAR WASTEWATER FLOW PROJECTIONS

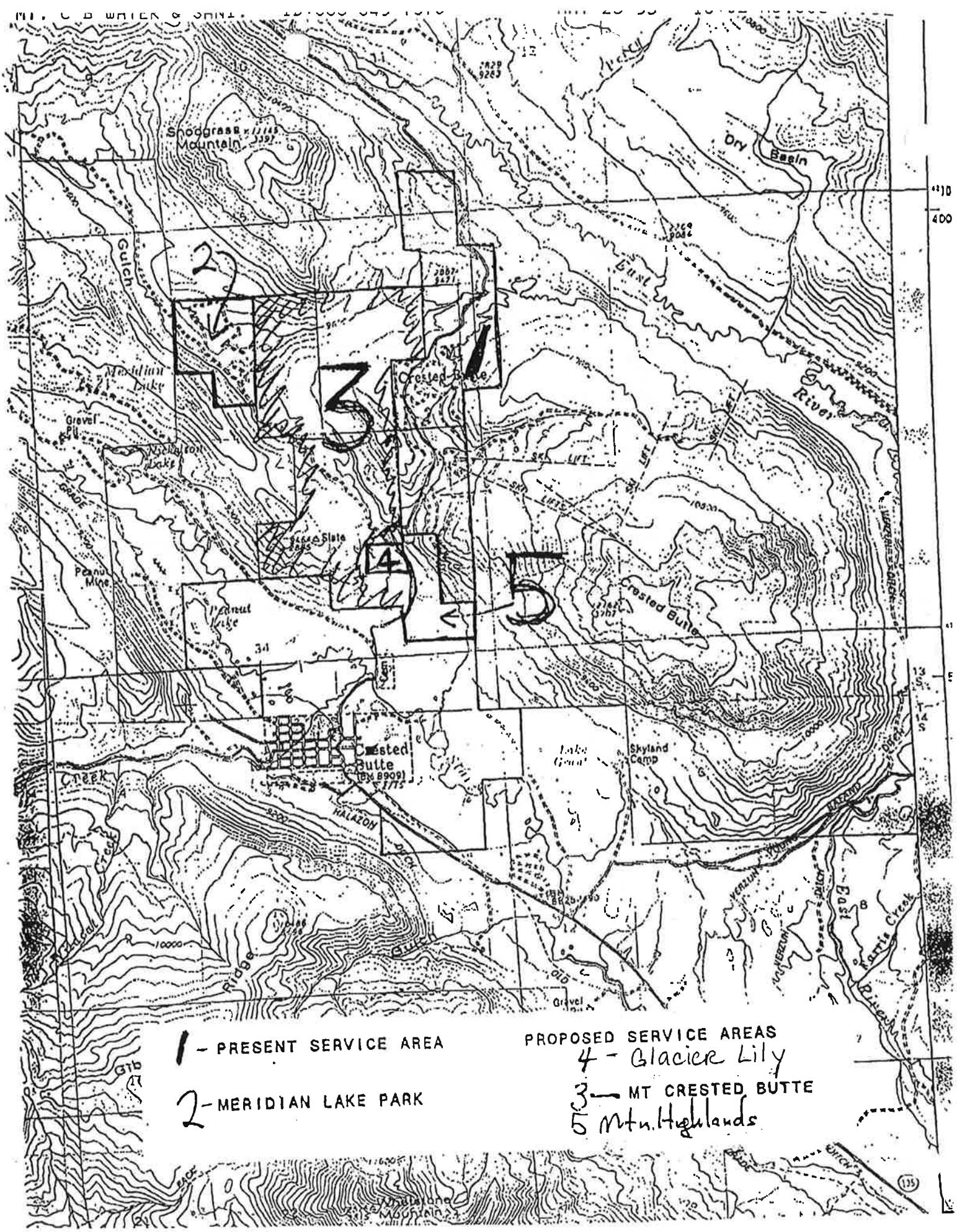
A total of approximately 542 housing units in the expanded service area and 1,280 housing units in the existing MCB service area would be added to the current wastewater system if total buildout is achieved. Assuming that 64 housing units/year are added to the system, it would take 29 years to total buildout of the current and expanded service areas. However, even assuming total buildout can be achieved in the 20-year planning period, wastewater flows would be estimated to reach 0.95 mgd, as presented in the table below:

MT. CRESTED BUTTE
WASTEWATER FLOW PROJECTIONS

FLOW DESCRIPTION	MGD
Present flows	0.480
Area 1	0.330
Area 2	0.036
Area 3	0.088
Area 4	0.010
Area 5	0.005
TOTAL BUILDOUT	**0.095**

Based on the above analysis, it appears that Mount Crested Butte may approach, but not exceed, the projected 1.0 mgd plant capacity. Please let me know if I can provide any further information or answer any questions regarding this memo. Also, I am providing a copy of this memorandum to Kevin Tone at RTW per your request.

cc: Brian Janonis
Kevin Tone, RTW


1 - PRESENT SERVICE AREA
2 - MERIDIAN LAKE PARK
PROPOSED SERVICE AREAS
4 - Glacier Lily
3 - MT CRESTED BUTTE
5 Mtn. Highlands
Crested Butte
Skyland Camp
Meridian Lake
Peanut Lake
Dry Basin
Gunnison River
Slate River
Whetstone Mountain

(1) SUT
(2) File

MCB W&SD MT. CRESTED BUTTE WATER & SANITATION DISTRICT

September 7, 1994

Rothberg, Tamburini, Winsor
Attn: Kevin Tone
1600 Stout Street, Suite 1800
Denver, CO. 80202-3126

Dear Mr. Tone,

Your understanding of the so called Alternative 1-A, as outlined in your letter to Bill Crank, is basically correct. This District has an immediate need to expand to 0.6 MGD. Sewage from Meridian Lake Park would be treated in this expanded facility. A pilot ATAD facility will also be constructed to handle all biosolids generated. Various thickening and odor control processes will be tried. This ATAD facility would later be moved to the Town of Crested Butte to become the first phase of a regional biosolids treatment plant. The District's wastewater treatment plant would later expand to 1.0 MGD.

We understand the next 201 meeting will be held Tuesday, September 13, 1994 at 3:00 PM.

Sincerely,

Frank L Glick

Frank L. Glick
District Manager

FLG/jak

100 Gothic Road • P.O. Drawer E • Mt. Crested Butte, Colorado 81225 • (303) 349-7575

File

Town of Crested Butte

P.O. Box 39
Crested Butte, Colorado 81224
—A National Historic District—

Phone: (303) 349-5338
FAX: (303) 349-6626

August 29, 1994

Mr. Kevin Tone
RTW Engineers
1600 Stout Street #1800
Denver CO 80202-3126

RE: 201 Facilities Plan
Gunnison County
Upper East River Valley

Dear Kevin,

The alternative now referred to as 1A and as outlined generally in your letter to me dated August 11, 1994, is acceptable to the Town of Crested Butte. I assume areas of service responsibilities will have to be identified and ground rules for service established. It is my understanding that the next committee meeting is:

Tuesday, 3:00 p.m.
September 3, 1994
Mt. Crested Butte Town Hall

See you there.

Sincerely,

William V. Crank
Town Manager

WVC:ljp

KAT
TN-2200 - SC
C

HIGH COUNTRY CITIZENS' ALLIANCE

MEMO

8/29/94

To: Gunnison County 201 Advisory Committee

From: Steve Glazer

Re: Upcoming Sept. meeting

Because of scheduling conflicts, I will not be able to attend a meeting the week of Sept. 12th. There are a number of issues that High Country Citizens' Alliance has concerns about. Since the Advisory Committee has been progressing by consensus, I offer our position on these issues in my absence for your consideration and discussion.

- At this time, we cannot support Alternative 1A. The population projections for this study were agreed to only after receiving significant input from the public. To modify them without first involving the public again would be improper. We support the county's position that analysis of this alternative would delay completion of the 201 Plan and cost more money and that Mt. CB W&SD should contribute to underwriting that cost since they are requesting its consideration.

- We have to question assumptions that would be the basis for modifying the projections of growth in this study. Alternative 1A suggests that, during the next 20 years, we will not have to regionalize. If we do have to regionalize and the 201 Plan does not recognize that need then a new 201 Plan will have to be prepared prematurely. Alternative 1A should not be considered unless its proponents agree, in advance, to underwrite the cost of a new 201 Plan if it is needed within twenty years.

- We do support Site Plan Applications that would allow Mt. CB and CB to expand their facilities to .6 MGD. We also support the consolidation of Meridian Lake Park into the Mt. CB W&SD so that sewage from MLP can be treated at the W&SD facility. We have yet to agree to supporting the W&SD facility expanding to 1 MGD. We still would like to see regionalization after Mt. CB reaches the planned capacity of .6 MGD.

P.O. BOX 1066, CRESTED BUTTE, COLORADO 81224, 303/349-7104

- We support the cooperation of all Dischargers in developing a coordinated joint sludge treatment plan and facility.

I would like to again pitch the Advisory Committee on the virtues of the modified Alternative 5 for your consideration. In doing so, though, it is important to recognize that "water availability" planning needs to be integrated with waste water treatment planning or we will be further impairing our streams instead of improving them.

Thank you

Rothberg
Tamburini
Winsor

Mr. William Crank
Town Offices, Box 39
308 Third Street
Crested Butte, CO 81224

August 11, 1994
TN-2201-SC-C
SL #7813

Reference: Upper East River Valley - Areawide 201 Facilities Plan
Alternative 1A - Consensus on the Preferred Alternative

Dear Bill:

RTW has received the documentation regarding the proposed modification to the 201 Plan, prepared by RBD for Mt. Crested Butte. We have received a request to document our understanding of this Alternative 1A as it has been presented to us. As we understand Mt. CB's desires, Alternative 1A includes the Town of Crested Butte expanding wastewater facilities on the existing site to a capacity of 0.75 MGD and Mt. CB expanding their existing plant to 1.0 MGD. This 20-year plan is similar to the 5-year facility plans previously prepared by each town, and will require modifications to the population projections agreed upon earlier in the 201 planning. This Alternative also includes the construction of a pump station, with force main across the Allen Ranch property connecting Meridian Lake Park to Mt. CB.

It is our understanding that the Town's plant site will also contain the regional sludge facility, with a pilot ATAD system first constructed at the Mt. CB site. The pilot system will be sized to treat the 0.6 MGD flows at Mt. CB and will test various pretreatment, thickening and odor control techniques. The Town will continue to use their sludge pond, with groundwater monitoring under the 503 Regulations, until the regional facility is constructed. The pilot facility will be relocated to the regional system when it is constructed.

Upon receiving authorization from the County for additional services, RTW will proceed with a review of this Alternative and will generate a new cost effective analysis and evaluation matrix for review by the Advisory Group. We would like to have a discussion of this Alternative 1A with the Group at some point during the upcoming WPCA Conference, to be held in Mt. CB the week of September 12th, either Tuesday late afternoon or Thursday morning. We have chosen this time frame, because the CDH reviewers will be in attendance and we can receive their input as well.

At this meeting, we hope to receive concurrence on a recommended alternative, so that we can proceed with the public hearing and the final report. Please call me if you have any questions and to verify your availability for a meeting.

Very truly yours,
Rothberg, Tamburini & Winsor, Inc.

Kevin A. Tone, P.E.
Senior Engineer

KAT/ljs

cc: Advisory Group Members

(1) ~~DLT~~
(2) ~~VRG~~ S
(3) File
TN 2200 S a C

RUSSELL & MULLINS, P.C.

ATTORNEYS AT LAW
120 NORTH TAYLOR STREET
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GUNNISON, COLORADO 81230

HARRISON F. RUSSELL
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OF COUNSEL
ROBERT E. WRIGHT, JR

TELEPHONE
(303) 641-3326
TELECOPIER
(303) 641-3024

September 23, 1994

Mr. Gary Tomsic, Chairman
201 Plan Advisory Group
200 East Virginia Avenue
Gunnison, Colorado 81230

Re: Upper East River Valley - Areawide 201 Facilities Plan
Our File No. 12,703

Dear Gary:

You will recall that at the Advisory Group meeting of September 13, 1994, there was considerable discussion as to whether the draft of the 201 Plan prepared by Rothberg, Tamburini and Winsor had given adequate consideration to the costs incident to water right considerations pertaining to the various alternatives. Specifically, I noted to the Advisory Group in my capacity as water counsel to the Mt. Crested Butte Water and Sanitation District that any alternative which entailed moving the District's effluent return flow point to a down-stream location would have extremely adverse water right consequences, and that the cost to remedy the same would be exorbitant if indeed a remedy is legally or physically available. ? need #

Kevin Tone responded to my concerns by indicating that $100,000.00 had been allocated for water right impacts incident to a change in the District's point of effluent discharge from it present location on Wood Creek just above Washington Gulch, to the East River discharge point of the East River Regional Sanitation District plant. He further indicated that he had discussed water right implications with the District's water right engineer, Scott Fifer, and quoted five potential means of water right impact mitigation set forth in Mr. Fifer's letter to District Manager Frank Glick of April 13, 1994.

Three items need to be pointed out with respect to Mr. Fifer's analysis.

First, Mr. Tone did not read to you Mr. Fifer's summary, being that "...the relocation could adversely affect some of your municipal water rights and will most likely require future water court application."

Second, Mr. Fifer's analysis was purely from a water right engineering perspective, and did not address the legal obstacles, and certainly not the costs, incident to implementation of the potential mitigating factors he mentioned.

Third, and most important, Mr. Tone was apparently unaware of a subsequent letter from Mr. Fifer to Mr. Glick dated May 18, 1994, in which Mr. Fifer commented "...it is our impression that the draft document understates the potential impact to the District's water rights as a result of constructing a new regional plant that discharges to the East River." and "A change in point of discharge as proposed in the 201 Plan could necessitate additional water right acquisition in the Slate River basin."

As indicated at the September 12, 1994 meeting, the potential mitigating measures all suffer from potentially fatal deficiencies, such as the inability to compel the required cooperation of third parties, the expenditure which may be required to obtain cooperation of otherwise un-willing third parties, and the inordinate cost to implement those alternatives which the District may undertake on a unilateral basis. Further, we are certain that the District's constituents would consider the District's expenditure to date in developing a comprehensive augmentation strategy which would be frustrated in substantial part by any down-stream relocation of its effluent return flow point, to be a cost which should have been factored into the alternative analysis.

One of the criteria for selection of a preferred alternative is a cost effective analysis. It is the position of the Mt. Crested Butte Water and Sanitation District that due to the cost, if not legal impossibility, of mitigating the water right impacts to the District, any of the alternatives involving a down-stream change in the District's point of discharge cannot possibly be considered as being cost effective or viable. Further, Alternative 1A, proposed by the District, is for the same reasons the only alternative which can reasonably be considered from a cost and practical criteria.

Yours very truly,

Robert E. Wright, Jr.

REW:ajs
cc: James C. Dean, Chairman, Mt. Crested Butte Water and Sanitation District
Frank L. Glick, Manager, Mt. Crested Butte Water and Sanitation District
R. Scott Fifer, Water Engineer, Mt. Crested Butte Water and Sanitation District
All members, 201 Plan Advisory Group
Kevin A. Tone, Senior Engineer, Rothberg, Tamburini and Winsor
Dick Bowman, West Slope Supervisor, Colorado Department of Health

WATER RESOURCES
MANAGEMENT COMPANY

Water Asset Management

June 15, 1994

Gary Tomsic
Gunnison County Manager
200 East Virginia
Gunnison, Colorado 81230

RE: Preliminary Investigation
201 Regional Alternatives - Water Rights Potentially Impacted

Dear Mr. Tomsic:

Pursuant to the County's request, we have made a preliminary investigation of the location and nature of water rights that may be affected by each of the five possible alternatives being studied.

It has been determined that if an alternative requires moving return flow and/or effluent from its historic location to a new location, there exists the possibility that the water users who divert water between the old location and the new location will be affected. Further, Alternatives 2 through 5 could affect the existing water right decrees of the entities potentially impacted by this study.

In this preliminary study, we analyzed the water right decrees of Meridian Lake Park Subdivision, the towns of Mt. Crested Butte and Crested Butte, and Skyland Metropolitan District. We have identified and set out below the key provisions in the respective decrees that would possibly restrict the transfer of return flow and/or effluent. In addition, we have listed third party water rights that potentially could be affected by a transfer.

P.O. Box 221 • Crested Butte, CO 81224 • (303) 349-1449

Meridian Lake Park Subdivision

Water Court Case No. W-2009 includes a provision requiring that water for residential use purposes be contained in a closed circuit and that the effluent will either be recycled for domestic use or placed in Meridian Lake Reservoir # 1. It also requires that the system place less burden on the stream system than the historic burden of the Jaklich Ditch.

Mt. Crested Butte

Water Court Case No. 91CW49, contains a provision requiring that the return flow from the municipal wastewater plant will be used as a substitute supply for downstream senior appropriations. The downstream senior appropriations are located from the confluence of the Slate River and the East River upstream to the present Meridian Lake Subdivision and Mt. Crested Butte present waste water return points.

Town of Crested Butte

It appears that the water rights owned by the town are not subject to any requirement providing that the effluent return to a certain location.

Skyland Metropolitan District

It is our understanding that Wright Water Engineers, Inc., Denver, Colorado is currently making an evaluation of the District's water rights. The District is currently operating under the provisions provided for in a 1975 decree. It is not known at this time if any provision in the decree requires the return flow to be in the Slate River Drainage.

Third Party Water Rights

The other third party water rights that would possibly be affected are listed below. We have limited these rights to the ones that are senior to the majority of The Town of Mt. Crested Butte's water rights and have at least 1 cubic feet per second decreed to them.

Ditch Name	Decreed Amount	Adjudication Year
Meridian Ditch	2.77 cfs	1924
	9.00 cfs	1957
Rozich Ditch	3.50 cfs	1906
	10.50 cfs	1957
Breem Ditch	5.45 cfs	1906
	17.35 cfs	1961
Willson Ditch	4.00 cfs	1906
Anna Rozman Alt.	3.00 cfs	1941
	8.00 cfs	1971
	3.50 cfs	1973
Anna Rozman Ditch	4.75 cfs	1971
Dillsworth Ditch	5.73 cfs	1904
	4.54 cfs	1921
	32.76 cfs	1941
Bocker Ditch	3.97 cfs	1906
	.25 cfs	1921
	4.75 cfs	1928
	30.68 cfs	1941
Total	154.50 cfs	

In conclusion, it is recommended that an attorney's opinion be obtained to determine the legal ramifications of moving the return flow and/or effluent of any water rights that the entities subject to this study are dependent upon. In addition to the referenced water rights, the following subdivisions and their respective decrees should be examined:

- River Green
- River Bend
- Silver Sage

If you have any questions or require any additional information please let us hear from you.

Sincerely,

Joe W. Knox

RESOURCE
ENGINEERING INC.

Mr. Frank Glick
Crested Butte Water & Sanitation District
PO Box E
Mt. Crested Butte, Colorado 81225

May 18, 1994

RE: 201 Facilities Plan, Draft Document

Dear Frank:

You have provided us with copies of pages 6-15 and 6-16 of the above referenced draft report and asked that we provide comment related to the discussion on "water right impact". Previous comments on this subject were provided to you in a letter dated April 13, 1994. This letter summarizes our review of the subject pages.

In general, it is our impression that the draft document understates the potential impact to the District's water rights as a result of constructing a new regional plant that discharges to the East River. As stated in our earlier letter, the relocation will probably result in water right calls being placed on the mountain springs thereby necessitating more reliance on East River supplies. Further, the District has spent considerable sums of money in acquiring key water rights that most efficiently help it's present pattern of water use. This pattern consists of diverting water from the upper East River and discharging treated effluent to the Slate River. A change in point of discharge as proposed in the 201 Plan could necessitate additional water rights acquisition in the Slate River basin.

Our specific comments to the draft document are as follows:

1st Full Paragraph, Page 6-16. The report down plays the potential impact to water rights by stating that the loss of treated effluent to the Slate River may only constitute 6% of the total flow in the Slate River. However, the loss constitutes a considerably higher percentage of Washington Gulch streamflows where senior water rights exist. These rights can place a call on the District's mountain springs without the continued discharge of treated effluent originating from the East River.

2nd Paragraph, Page 6-16. This paragraph suggests that irrigation return flow from District property will help augment Slate River flows thereby reducing potential calls. However, the District's irrigation return flows derived from East River sources are not anticipated to be of a magnitude such that they will eliminate water right calls originating from either Washington Gulch or the Slate River. Further, much of the return flow is delayed due to slower ground water mitigation and will not help augment streamflows during the critical summer irrigation season.

The treated effluent at the proposed new facility will discharge to the East River several miles <u>below</u> the Verzuh-Young-Bifano Ditch. The return flow will be at a location above certain key water rights on the East River which may provide some benefit to the District. We have not quantified this impact at this time.

May 18, 1994

3rd Paragraph, Page 6-16. The return flow associated with snowmaking operations will accrue to the stream well in advance of the critical late irrigation season. Thus, the water will be of no benefit to the District unless it can be stored for subsequent release. If the District constructs the North Village Reservoir, it may be possible to store snowmaking runoff. However, until the reservoir is constructed and appropriate water court decrees obtained, there is little benefit associated with the snowmaking water.

4th Paragraph, Page 6-16. The loss of treated effluent in the Slate River will mean less water available to the three described senior irrigation ditches. Thus, without the additional water it is possible that water right calls could be placed earlier in the season. This may not be a significant problem, however, if streamflows are naturally receding at a fairly quick rate. If streamflows are dropping rapidly, the three senior ditches would soon place a call on the river regardless of the upstream discharge of treated effluent.

We hope that our review of portions of the draft 201 Plan will be helpful to your continuing review of this matter. Please give me a call if you have any questions.

Sincerely,

RESOURCE ENGINEERING, INC.

R. Scott Fifer
Hydrologist

RSF/mmm
165-4.3 fg201plan.165

RESOURCE
ENGINEERING INC.

April 13, 1994

Mr. Frank Glick
Crested Butte Water & Sanitation District
PO Box E
Mt. Crested Butte, Colorado 81225

RE: 201 Facilities Plan, Relocation of Wastewater Treatment Facility

Dear Frank:

In response to your letter of April 6, 1994 we have reviewed the potential impact to the District's water rights that might result from relocating the wastewater treatment facility to a downstream location in vicinity of the airport. In summary, the relocation could adversely affect some of your municipal water rights and will most likely require future water court application. The applications might consist of one or more of the following; request for new water rights, change of existing water rights and amendment to the District's existing plan for augmentation. We believe these changes can be made however, there will be associated engineering and legal work necessary to process the applications.

Relocation of the water treatment plant would eliminate the discharge of treated effluent into Washington Gulch above key water rights that are senior to the District's Crested Butte Ltd. Pipeline, Vuds Ditch and Malensek Ditch water rights. These are the rights that divert from several springs located on the ski mountain. Presently these rights are protected from being placed on call by a decreed exchange that allows the depletions associated with municipal use to be replaced by the discharge of treated effluent, much of which will originates from diversions from the East River.

Without the discharge of treated water, it is probable that the Breen and Wilson Irrigation Ditches located in lower Washington Gulch would place a call on District rights during the late irrigation season of dry years. This potential impact could be mitigated by one or more of the following actions.

1. Purchase the Breen and Wilson Ditches.

2. Obtain an agreement with the owners of the two ditches not to place a call on upstream rights (for some consideration).

3. Purchase senior water rights in Washington Gulch and augment potential out-of-priority depletions associated with the District's springs.

4. Release additional water from the North Village Reservoir (if constructed) to off-set the municipal depletions.

5. Simply curtail water use from the springs and rely more heavily on East River diversions during critical dry periods.

onsulting Engineers and Hydrologists
802 Grand Avenue, Suite 302 ■ Glenwood Springs, CO 81601 ■ (303) 945-6777 ■ Fax 945-1137

Implementation of No. 5 above would be the easiest solution, however, it would involve added pumping costs. Further, much of the District's East River rights are junior to the State's instreamflow decrees and we would need to verify that water was available to the District.

*The relocation of the treatment plant could create some opportunity for increased diversions at the East River Pump Station during the summer period. This occurs because the discharge of treated effluent would be returned to the East River above senior calling rights on the upper East River. Presently, the District is limited to approximately 1.7 cfs of diversions under the decrees attributed to the Varzuh-Young-Bifano Ditch during periods of a call on the upper East River.

If the relocation of the treatment plant occurs, the District will probably want to make water court applications involving the return flow of treated water to the East River. This should be evaluated further if relocation becomes immanent.

In conclusion relocation of the wastewater treatment facility has potential to adversely effect some of the District's water rights tributary to Washington Gulch. We believe these impacts can be mitigated. The relocation also has potential to benefit the District's summer diversions from the East River. Please consider these findings preliminary as an in-depth evaluation of the potential effects was beyond the scope of this analysis.

If you or the Board have any questions concerning this letter, please do not hesitate to give me a call.

Sincerely,

RESOURCE ENGINEERING, INC.

R. Scott Fifer
Hydrologist

RSF/mmm
165-1.0 fgrelocat.165

APPENDIX D

References

14. Colorado Division of Wildlife - Database Information, Correspondence to Kellie Knowles, WestWater Engineering, October 5, 1993

15. Colorado Natural Heritage Program, Correspondence to Kellie Knowles, WestWater Engineering, November 15, 1993

16. Colorado Department of Public Health and Environment, Air Quality Control Commission "Report to the Public" 1992

17. Colorado Department of Public Health and Environment, Air Quality Control Commission "Report to the Public" July 1992 to June 1993

18. Jim Harvey, Nonpoint Source Unit Environmental Scientist "Memorandum Nonpoint Source Unit, Slate River Study" March 22, 1993

19. Joe Danni, Construction Technician "East River-Taylor River-Slate River Ditch Inventories"

20. RBD, Inc. Engineering Consultants "Floodplain Information Report for Coal Creek, Crested Butte, Colorado" September 18, 1992

21. RBD, Inc. Engineering Consultants "Joint Sludge Action Plan for Mt. Crested Butte Water and Sanitation District and Town of Crested Butte" May 10, 1994

22. RBD, Inc. Engineering Consultants "Mount Crested Butte Water and Sanitation District Wastewater Treatment Facility Expansion to 1.0 MGD Capacity Process Evaluation" July 9, 1994

23. RBD, Inc. Engineering Consultants "Town of Crested Butte Wastewater Treatment System Facilities Plan Update" March, 1995

24. Rothberg, Tamburini & Winsor, Inc. "Wastewater Treatment Facilities Master Plan for Crested Butte South Metropolitan District" June, 1995

25. RBD, Inc. Engineering Consultants "Mt. Crested Butte Water and Sanitation District Wastewater Treatment System Five-Year Facilities Plan" April 23, 1993

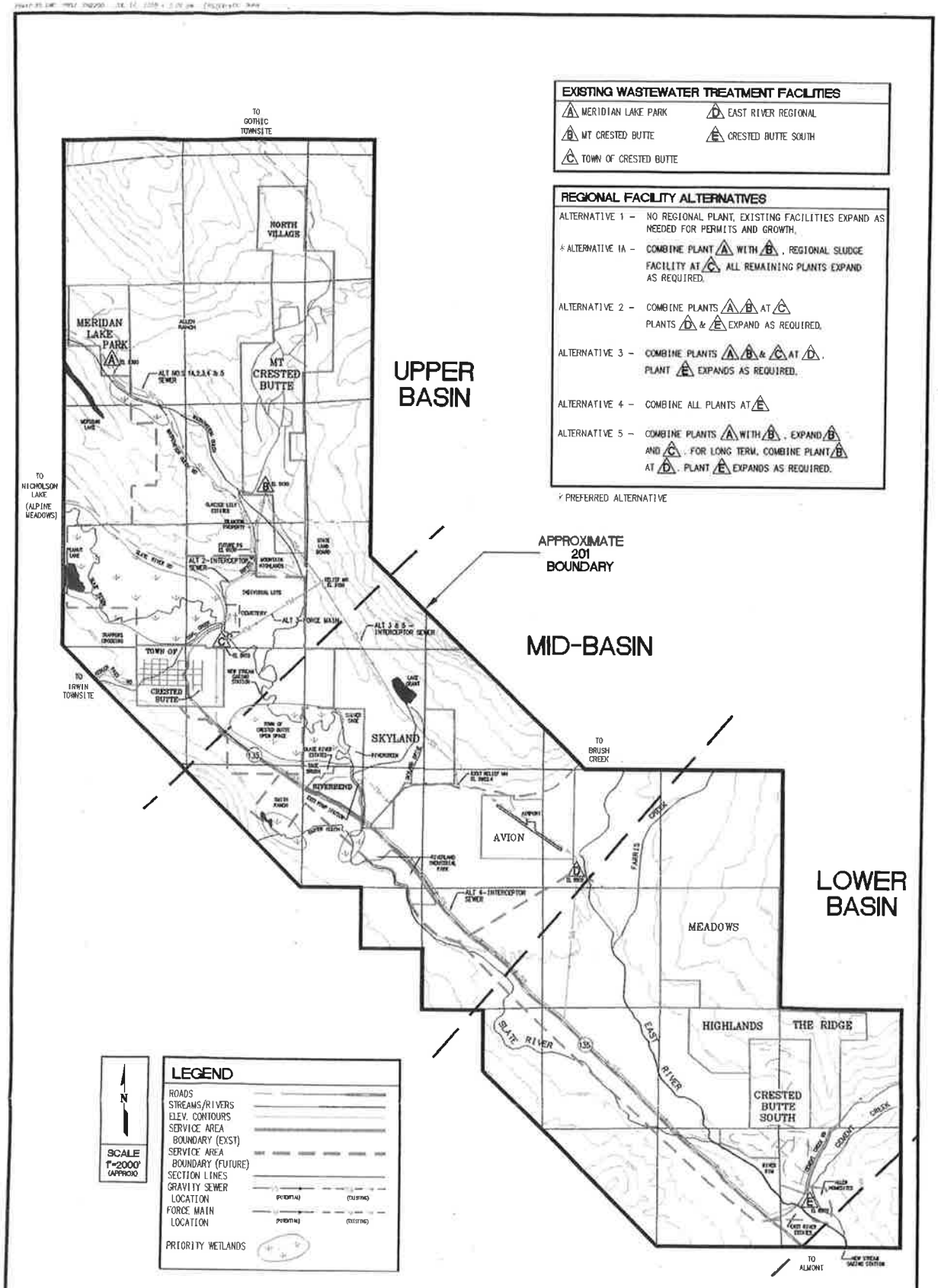

FIGURE 6-1 Upper East River Valley 201 Plan - Regional Alternatives

West Water Engineering

Rothberg, Tamburini & Winsor, Inc.