DOUGLAS COUNTY
COLORADO

Wastewater Collection & Treatment

US Highway 85 Corridor

Prepared by:

TETRA TECH, Inc.

in association with

Icenogle Norton Smith Gilida and Pogue

and

First Southwest Company

JUNE 30, 2009

TETRA TECH

June 30, 2009

Board of County Commissioners
Douglas County Government
Director, Community Services
100 Third Street
Castle Rock, CO 80104

Subject: ***"Wastewater Collection and Treatment – US Highway 85 Corridor"***

Dear County Commissioners:

Tetra Tech, in association with Icenogle, Norton, Gilida and Pogue and First Southwest Company, is pleased to provide you the report titled "*Wastewater Collection and Treatment – US Highway 85 Corridor*". This report is the culmination of a sixteen month work effort that was guided by the advice and support of the appointed Technical Committee and Douglas County staff. The report fulfills Douglas County Resolution No. R-008-042 (adopted February 26, 2008). As described in the document, alternatives for centralized treatment along the US Highway 85 corridor exist and those solutions are viable from a technical, environmental, financial and management standpoint.

We appreciate the opportunity to serve Douglas County on this important project. Please do not hesitate to call me with any questions.

Sincerely,

TETRA TECH

Julie A Vlier

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Project Manager

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Douglas County, Board of County Commissioners

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Steven A.Boand, Commissioner, District 2
Jill Rapella, Commissioner, District 3

US 85 Technical Committee

Larry Moore, Committee Chair, Roxborough Water and Sanitation District and Chatfield Watershed Authority
Diana Miller, Louviers Water and Sanitation District
Robert Estes, Sedalia Water and Sanitation District
Candace Wickstrom, South Santa Fe Metropolitan District
Bernie Baron, Titan Road Industrial Park
Warren Brown, Tri-County Health Department
Martha Hahn, Plum Creek Wastewater Authority
Harold Smethills, Dominion Water and Sanitation District
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Section 1

Executive Summary

Executive Summary

EX.1 Purpose of Study

Properties along the U.S. Highway 85 (US 85) corridor lack centralized and adequate wastewater treatment. The vast majority of residences and businesses along the corridor use individual sewage disposal systems (ISDS) to treat wastewater. In February 2008, the Douglas County Board of County Commissioners adopted a resolution to evaluate long term wastewater utility needs in and along the study area and to identify preferred alternatives for a wastewater collection and treatment system that addresses water quality in the Chatfield Reservoir watershed. A technical committee comprised of area wastewater providers and County staff members (Technical Committee) was formed and directed by the Board of County Commissioners to help evaluate technical options for collecting and treating wastewater along the US 85 Corridor. Technical Committee members and their representation are summarized in Table EX-1.

Table EX-1. US 85 Technical Committee

Larry Moore, Committee Chairman	Roxborough Water and Sanitation District & Chatfield Watershed Authority
Martha Hahn	Plum Creek Wastewater Authority
Harold Smethills	Dominion Water and Sanitation District
Diana Miller	Louviers Water and Sanitation District
Candace Wickstrom	South Santa Fe Metropolitan District
Warren Brown	Tri-County Health Department
Bernie Baron	Titan Road Industrial Park Water Association
Robert Estes	Sedalia Water and Sanitation District
Paul Grundemann	Centennial Water and Sanitation District
Meme Martin	Douglas County, Economic Development Department
Jeffrey Watson	Douglas County, Community Development Department

The preferred alternatives brought forth by the Technical Committee recognize that the optimum solution for wastewater treatment must not only be technically feasible, but must also address wastewater reuse, environmental, management and governance, political, and financial issues.

Recognizing the importance of water resources in the Chatfield Watershed and the reliance on surface water and alluvial groundwater, this study's goal is to improve water quality along the Corridor thru the elimination of Individual Sewage and Disposal Systems (ISDS) with consideration of centralized wastewater collection and treatment solutions to enhance water quality and promote reuse.

EX.2 Study Area and Wastewater Service Needs

The US 85 Corridor study area extends generally along US 85 from Highlands Ranch Parkway on the north to Daniels Park Road on the south as depicted on Figure EX-1. The area includes a combination of zoning; general industrial, agricultural, and rural residential. Wastewater projections from the study area are summarized in Table EX-2. Long-term wastewater projections assume a twenty year planning horizon and potential re-zoning, particularly agriculture zoned parcels. Industrial/commercial zoned areas assume ranges of 400 – 1000 gallons/acre, depending on growth scenario in the watershed. As part of this study, wastewater infrastructure along the US 85 Corridor was conceptually aligned and designed to convey wastewater flows to existing publicly owned treatment works (POTWs) or a new publicly or privately held wastewater treatment facility (WWTF). The selected criteria for any potential wastewater collection and treatment solution require long-term solutions (collection and treatment of 3 million gallons per day (MGD) of wastewater), high quality effluent that meets regulatory requirements, reliable treatment, and reuse capability that recognizes the significance of this water resource and the importance of being able to keep reusable effluent in Douglas County.

Table EX-2. Estimated Wastewater Projections from US 85 Corridor Study Area

- Short-term: 0.5 MGD (approximately 1000 SFE)
- Mid-term: 1.0 – 1.5 MGD (up to approximately 4200 SFE)
- Long-term: 3 MGD (approximately 8400 SFE)

SFE – Single Family Equivalent

EX.3 Preliminary Costs and Preferred Wastewater Collection and Treatment Alternatives

Ten potential wastewater solutions were considered by the Technical Committee for collection and treatment of 3 MGD of wastewater from the study area. Of the ten configuration alternatives, three alternatives were determined to be preferred alternatives recommended by the Technical Committee (Figure EX-2). Each alternative can be readily permitted and allow for alignment options that minimize environmental constraints and lift stations, while maximizing water quality and reuse. The three preferred alternatives are:

Figure EX-1. US 85 Corridor Study Area

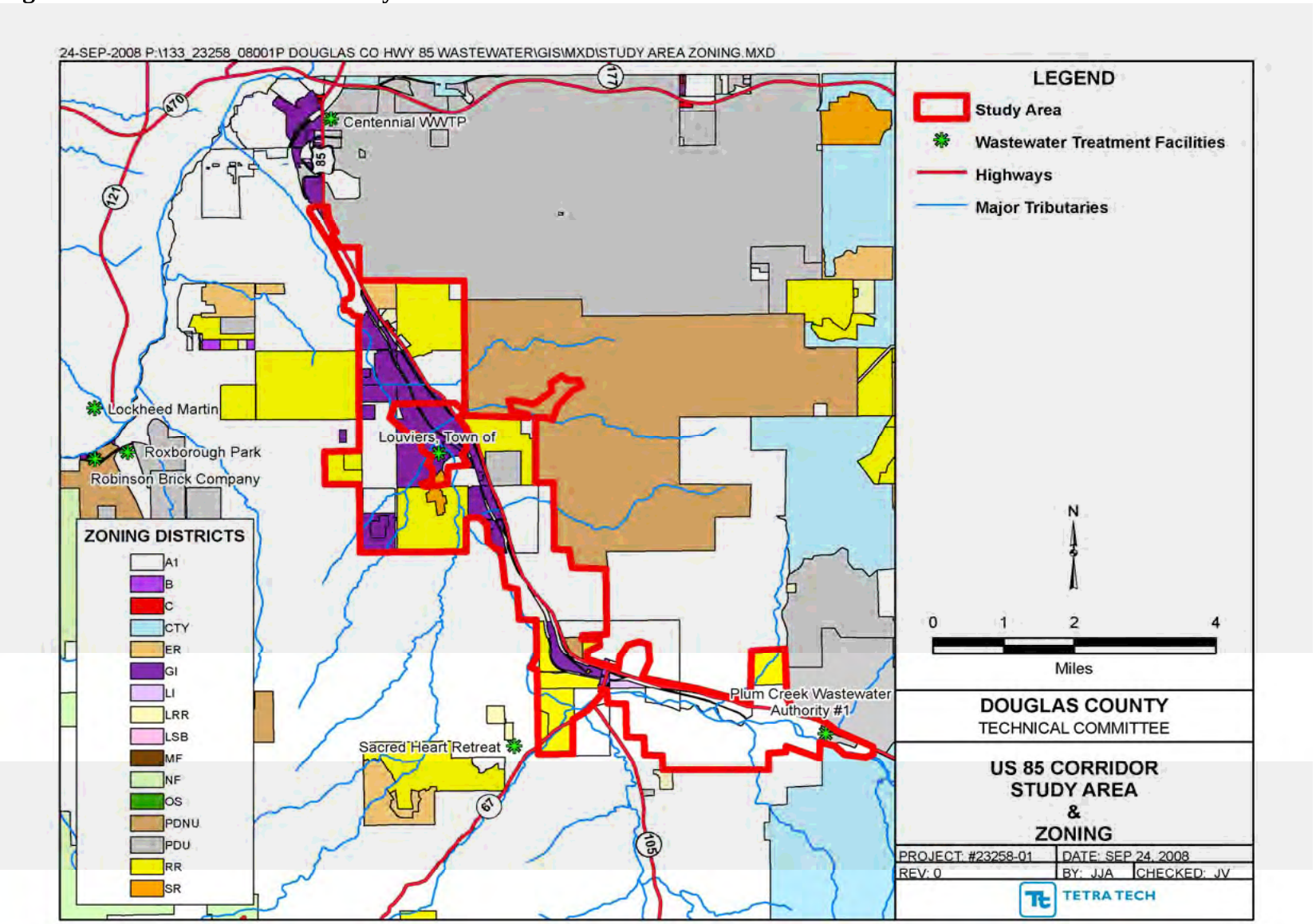
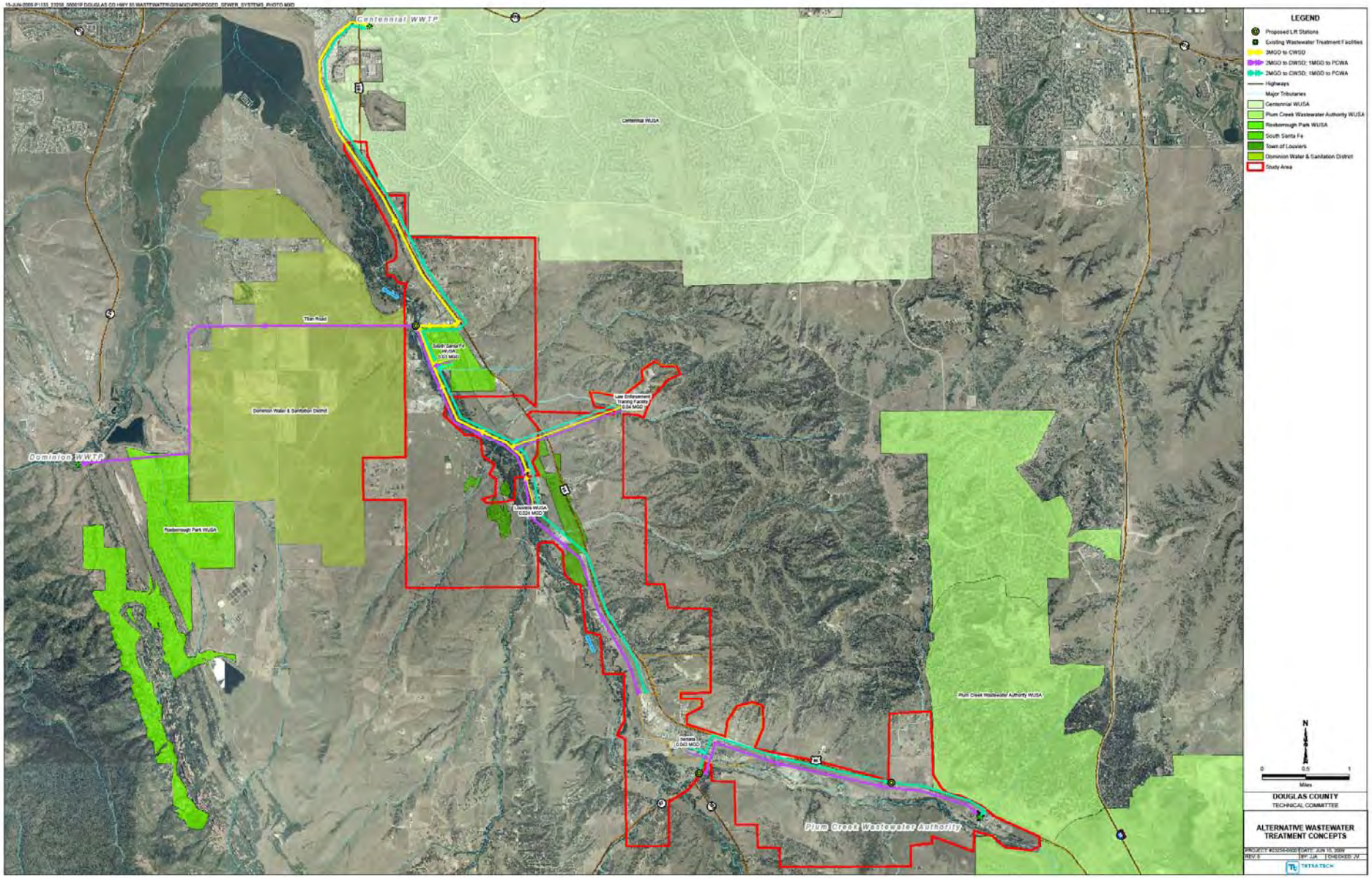


Figure EX-2. Preferred Wastewater Treatment Alternatives



1. Collect wastewater flows from the study area and treat at Centennial Water and Sanitation District (WSD) wastewater treatment facility,
2. Collect wastewater flows from Louviers, South Santa Fe Metro District, and Titan Road Industrial Park and treat at Centennial WSD; Collect wastewater from Sedalia south and treat at Plum Creek Wastewater Authority (PCWA), and
3. Collect wastewater flows from Louviers, South Santa Fe Metro District, and Titan Road Industrial Park and treat at Dominion WSD; and collect wastewater from Sedalia south and treat at PCWA.

Planning level costs for these preferred alternatives are summarized on Table EX-3. Capital costs for the preferred alternatives range from $38.6 million to $55.8 million, including the cost for treatment, interceptor sewer, and lift stations. Annual operation and maintenance costs range from $2.7 million to $4.6 million.

Table EX-3. Estimated Costs of Preferred Wastewater Collection and Treatment Alternatives

Preferred Alternative	Sewer and Lift Stations ($ million)	Tap Fees and Treatment ($ million)	Capital Costs ($ million)	Annual Operation and Maintenance ($ million)	Total Present Worth ($ million, 4%, 20 years)
3 MGD gravity flow to Centennial WSD	15.3	23.6	38.9	2.7	76.1
2 MGD gravity flow to Centennial WSD and 1 MGD lifted to PCWA	13.0	25.5	38.6	4.4	98.9
2 MGD to Dominion WSD via gravity and lift station and 1 MGD lifted to PCWA.	10.2	45.6	55.8	4.6	114.0

EX.4 Financing Options

The magnitude of any of the preferred technical options to bring centralized wastewater treatment to the US 85 Corridor, combined with a long duration over which capital costs to fund the technical options would be recovered, requires some innovative financial thinking relative to bringing the project to fruition. A spectrum of financing options could be realized ranging from low interest financing via the State Revolving Fund to interfacing with the public and private sectors through public-private partnerships or public-public partnerships.

Project funding must minimize the financial burden on citizens. The ideal financial scenarios recognize that debt for construction of the project improvements will be funded by future growth

and require money more patient than bond financing. In any funding scenario, the value of reclaimed water should be accounted for in reducing overall users' costs. Funding opportunities for wastewater collection and treatment along the US 85 Corridor include:

- Public-private partnerships,
- Public-public partnerships,
- Issuance of revenue bonds; taxable, tax-exempt or some combination thereof; and
- Low interest financing via State Revolving Fund.

As will be further discussed in later sections of this report, private participation in the collection and treatment of wastewater along the US 85 Corridor, in conjunction with public partnerships, is an integral component of financial feasibility of the technical alternatives. Private participation in the funding and operation of public infrastructure is commonly referred to as a "Public/Private Partnership," "3P" or "PPP." The theory behind allowing the private sector to participate in traditionally public infrastructure finance and operations is that such participation presents governmental entities with a greater range of financial options and flexibility in addressing public infrastructure needs.

A rate supported permutation of public-public and public-private partnerships offer other potential outcomes and collaborative funding approaches with existing wastewater treatment providers, such as:

1. Existing wastewater treatment providers form a public-public partnership with the "US 85 Water Reclamation Authority" and fund the construction of the interceptor sewer and lift stations to serve the broader study area.

2. A public-private/public partnership approach may support creation of a regional wastewater authority that is established through the acquisition and/or merger of existing treatment providers within the "US 85 Corridor Water Reclamation Authority". The acquisition of existing treatment providers by the Authority could defer capital investment over a greater rate base, promoting more operational flexibility and efficiencies, while keeping wastewater service rates lower. Such discussions have the potential to develop further into a privatization of existing wastewater treatment facilities, with their acquisition by a private sector partner.

These funding approaches are potentially viable but need to be assessed more thoughtfully and vetted with key players in the study area.

EX.5 Public Governance Approaches for Wastewater Improvements

The US 85 Technical Committee evaluated various governance structures and entities that could be utilized to provide and operate the wastewater improvements in the US 85 study area. These entities included separate governmental entities such as Title 32 special districts, limited purpose improvement districts and authorities, standing alone or in combination.

The various governance structures were considered in order to give life to a single governmental entity, comprised of wastewater providers and possibly the County to facilitate the centralization of wastewater provision in the US 85 Corridor.

The Technical Committee recommends a single purpose authority to meet the needs of the project, the public and the wastewater providers involved. The Technical Committee recommends formation of a separate Authority that creates a forum in a public group recognizing there are more advantages from a management and financing standpoint in operating as an Authority. The Technical Committee also recognizes that the formation of a "US 85 Corridor Water Reclamation Authority" will provide the governance structure and promote the mutual benefits of wastewater collection, treatment and reuse in the study area, while promoting water quality goals, cost efficiencies and realizing funding opportunities. A copy of the draft "Establishing Contract for the Formation of the US 85 Corridor Water Reclamation Authority" is provided in Appendix A.

EX.6 Conclusions, Recommendations and Next Steps

The conclusions of this study are based on analysis of the ten wastewater alternatives, financing options, and public governance and management of wastewater improvements. Based on the study findings three wastewater collection and treatment alternatives are preferred to enhance water quality and promote reuse of wastewater in the study area;

- 3 MGD to Centennial WSD
- 2 MGD to Centennial WSD and 1 MGD to PCWA
- 2 MGD to Dominion WSD and 1 MGD to PCWA

Because funding options must minimize financial burden on citizens, a variety of financing options have been identified that need to be assessed and vetted with key entities. Public-public and public-private partnerships offer intriguing funding approaches that require additional assessment. The formation of the "US 85 Water Reclamation Authority" will support financing discussions, outcomes and project implementation.

With a set of preferred alternatives, financing options and public governance recommendations in hand, Douglas County is now in a position to take a strategic approach towards implementing next steps to support the study goal *"to improve water quality along the corridor thru the*

elimination of ISDS with consideration of centralized wastewater collection and treatment solutions that will enhance water quality, promote reuse and utilize precious water resources by adding reuse to water sustainability."

Implementing plan recommendations will address the current wastewater infrastructure deficiency, while enabling the County to realize long term water quality protection and reuse of the water resources within the study area. Important next steps involve honing in on special financial and engineering approaches, organization of a governmental entity to facilitate the project and institutional issues, political considerations, and public outreach; all recognizing opportunities in the study area and potential limitations. Based on the conclusions, the following recommendations and next steps support the study goals, objectives, and plan implementation:

- **Form a water reclamation authority for the study area. Finalize and execute the draft establishing contract for the "US 85 Corridor Water Reclamation Authority".**

  Through the newly formed governance structure, continue to compile more information, assess options, and implement recommendations to bring wastewater service to the whole study area.

- **Engage a dialogue on financing options with key entities and potential treatment providers. Gauge interest of project concepts with respective treatment provider boards, management, and community leaders.**

  Conceptually there is an interest from public and private entities and a willingness to consider various funding options, however there needs to be more information developed to facilitate overarching negotiations and transactions for wastewater service, including water quality improvement and water reclamation. Some of the additional information needs include:

- **Conduct ongoing assessment of funding options and financial considerations.**

  As various funding scenarios are contemplated, financial considerations will require further evaluation to better determine capital outlay, rates, and user fees, etc. More information may be required on the funding alternatives being considered, such as:

  - Authority issues revenue bonds
  - True privatization where a third party provide for the collection and treatment of wastewater
  - Public-private partnerships
  - Public-public partnerships
  - A rate supported permutations of public-public and public-private, where wastewater treatment facilities are in contract with the Authority to provide wastewater service.

Also, through the newly formed Authority, coordination with CDPHE may intensify funding towards the conversion of ISDS' in the study area to conventional treatment. Of particular interest may be the funding support for design and construction of collection systems within the Town of Sedalia, Titan Road Industrial Park, and South Santa Fe Metropolitan District.

- **Quantify reusable component of wastewater effluent and its estimated value.**

  Estimate reusable percentage of wastewater in study area from existing ISDS' and wastewater treatment processes. Conduct a review of water rights to determine the reusable component of wastewater and its value.

- **Develop preliminary (30%) design for the collection of wastewater along the US 85 Corridor.**

  The 30% design will provide sufficient information for interested financial partners to evaluate and understand the merits of the project and determine their interest in the project. The 30% design will include: design criteria, calculations, assumptions, and references for preparing the site design. The narrative will also address environmental protection, compliance, and permits needed for the project from a local, state, and federal level. AutoCAD drawings, base mapping, geotechnical investigation, structural materials used, detail on alignment, land ownership information, utility conflicts, and refined cost estimates will also be provided. The drawings will include plans and profiles, details, schedules and diagrams necessary to illustrate the design at a 30% level of completion. Site application approval documentation will be developed, in anticipation of review and approval by water quality management agencies, including the Chatfield Watershed Authority, Denver Regional Council of Governments (DRCOG), and Colorado Department of Public Health and Environment (CDPHE).

- **Conduct a thorough public outreach program on the preferred wastewater collection and treatment options and funding scenarios.**

  Initiate positive involvement of County and "US 85 Water Reclamation Authority" members prior to initiating the formal public process. An intensive and thorough public outreach effort will be conducted to provide numerous opportunities to solicit input and articulate the project benefits, including funding and cost saving opportunities, and environmental benefits. Public outreach will be coordinated with other existing stakeholder groups in the watershed, such as the Chatfield Conservation Network, Chatfield Watershed Authority, homeowner associations, businesses, IREA, etc. Public outreach methods and approaches will be reviewed and approved by Authority members to ensure outreach opportunities and timing are thoughtful, as all US 85 Corridor stakeholders should have opportunities to provide input. Collaboration with water quality entities like the Chatfield Watershed Authority will offer alternative public outreach methods through news articles and the upcoming Chatfield Summit meeting.

- **Work in coordination with the Chatfield Watershed Authority to evaluate regulatory mechanisms to address location of ISDS', inspection, maintenance and enforcement.**

  Through the Chatfield Watershed Authority and in coordination with the Tri-County Health Department (TCHD), CDPHE and Water Quality Control Commission (Commission), address restrictions and maintenance requirements for ISDS located in the Plum Creek floodplain. Evaluate developing a "Septage Management District" that addresses funding for monitoring, maintenance and inspection of existing ISDS in the Chatfield Reservoir watershed. Consider proposed modifications of the Chatfield Control Regulation No. 73 that support these water quality goals.

Section 2

General Overview

General Overview

2.1 Purpose of Study

The US Highway 85 (US 85) Corridor, generally extending from West Highlands Ranch Parkway on the north to Daniels Park Road on the south, lacks centralized and adequate wastewater treatment. Most of the residences and businesses in the study area use ISDS to treat wastewater. Recognizing the wastewater infrastructure deficiencies, the purpose of this study is to evaluate long-term wastewater utility needs in and along the US 85 Corridor and to identify preferred alternatives for a wastewater collection and treatment system that addresses water quality in the Chatfield Reservoir watershed. The preferred alternatives recognize that the optimum solution for wastewater treatment must not only be technically feasible, but must also address organizational, environmental, governance and management, political and financial issues.

Recognizing the importance of water resources in the Chatfield Watershed and the reliance on surface water and alluvial groundwater, this study goal is to improve water quality along the Corridor thru the elimination of Individual Sewage and Disposal Systems (ISDS) with consideration of centralized wastewater collection and treatment solutions to enhance water quality and promote reuse.

2.2 Background and History

At the suggestion of the Chatfield Watershed Authority, the entity responsible for promoting protection of water quality in the Chatfield watershed, Douglas County embarked on a study to evaluate collection and treatment of wastewater along the Highway 85 corridor to improve water quality along this study area in the Chatfield Reservoir watershed. In late 2007 the County retained Icenogle, Norton, Smith, Gilida & Pogue, as special legal counsel with expertise and experience advising public entities on public governance, public-private partnerships, and public-public partnerships. In February 2008, Douglas County convened a Technical Committee to consider potential means to bring centralized wastewater collection and treatment to the US 85 corridor in Northwest Douglas County to improve water quality. As summarized in Table 2-1, the Technical Committee is comprised of representatives from various service providers in the project area and County staff. This technical group of water and wastewater providers and special districts recognizes the significance of water resources in Douglas County and the importance of protecting the quality of drinking water supplies. A common goal is shared by

Technical Committee members: *"Improving water quality along the corridor thru the elimination of ISDS with consideration of centralized wastewater collection and treatment solutions that will enhance water quality, promote reuse and utilize precious water resources by adding reuse to water sustainability."*

Table 2-1. US Highway 85 Corridor Technical Committee

Larry Moore	Roxborough Water and Sanitation District & Chatfield Watershed Authority
Martha Hahn	Plum Creek Wastewater Authority
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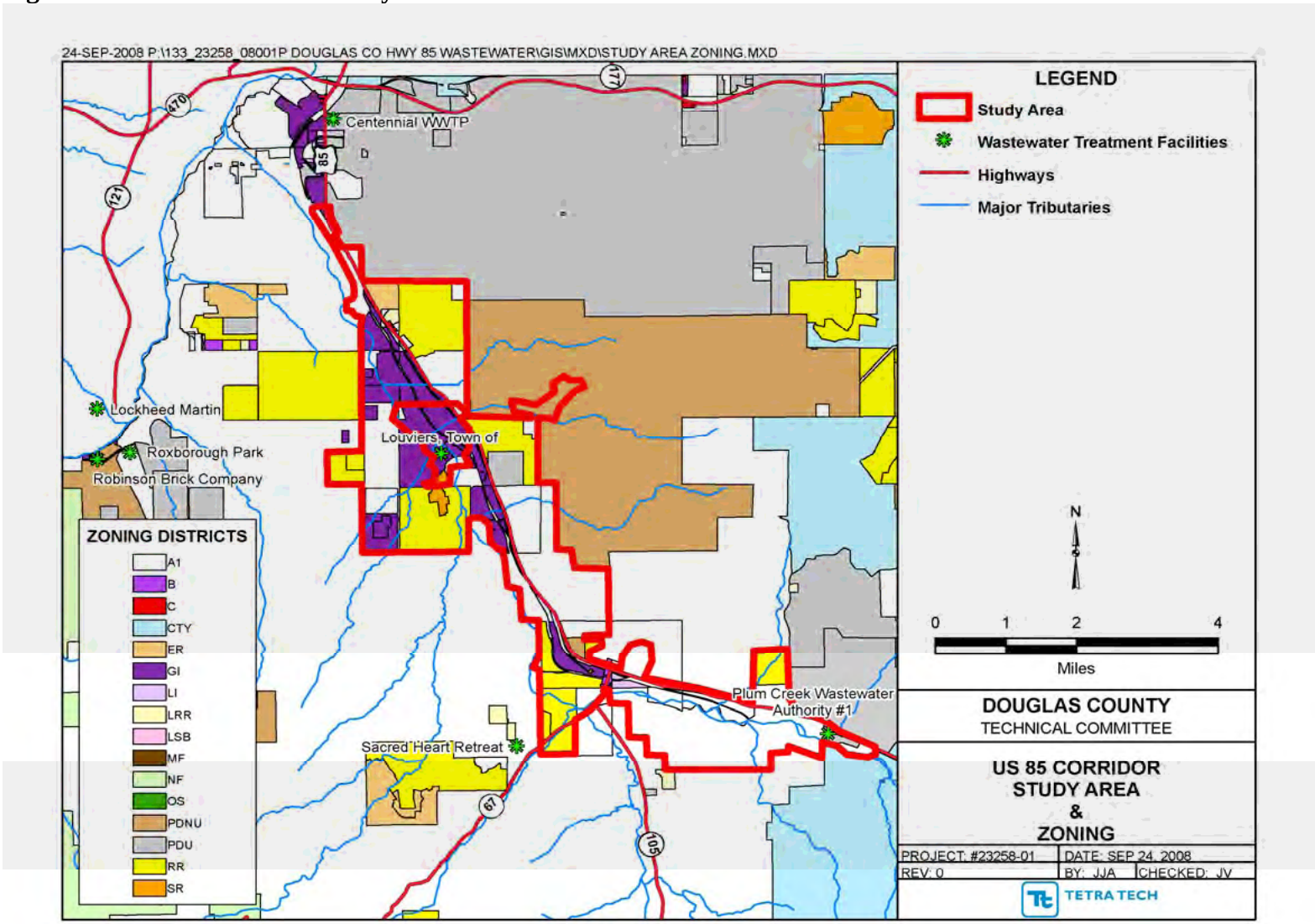
Robert Estes	Sedalia Water and Sanitation District
Paul Grundemann	Centennial Water and Sanitation District
Meme Martin	Douglas County, Economic Development Department
Jeffrey Watson	Douglas County, Community Development Department

The US 85 Technical Committee was directed by the Douglas County Board of County Commissioners (BOCC) to identity alternatives for a wastewater collection and treatment system including technical, governance and management, and financial considerations. In July 2008, at the recommendation of the Technical Committee, Douglas County entered into contract with Tetra Tech, Inc., an engineering firm with expertise in the planning, design and construction of water and wastewater infrastructure, to conduct an engineering study that evaluates long term utility and water quality planning opportunities from a technical standpoint and to identify recommended alternatives to address centralized wastewater treatment in this region. In May 2009, First Southwest, a company that specializes in finance, integration of public and private initiatives, and cost saving determinations was retained to provide financial advisory services to the County. Collaboratively, the Technical Committee and its Consultant Team have worked together to bring forth preferred wastewater treatment alternatives for consideration by the Board of County Commissioners.

2.3 Study Area

The US 85 Corridor project study area is defined by an irregular red boundary that roughly straddles US Highway 85 and Plum Creek from the Plum Creek Wastewater Authority (PCWA) Treatment Plant on the south to Centennial WSD to the north (Figure 2-1). The study area boundary provides the basis for this wastewater planning study, recognizing the potential of phasing in of other areas with future considerations.

Figure 2-1. US 85 Corridor Study Area



There is only minimal centralized wastewater service within the study area. This is limited to the Town of Louviers and areas at the southernmost end of the study area served by PCWA. All other portions of the study area are currently served by ISDS, or are undeveloped and without infrastructure. Sedalia has central water, but no central sewer. The same is true for the Titan Road Industrial Park and the Reynolds Industrial Park. There are several residential subdivisions in the area served by individual wells and ISDS.

The primary source of water supply in the study area is tributary groundwater from the shallow Plum Creek alluvium or deeper bedrock groundwater from the Denver Basin aquifers. Figure 2-2 depicts the alluvium as mapped by USGS and shallow wells (less than 100 feet deep) permitted for municipal, domestic, industrial, commercial, and agricultural purposes (Colorado Division of Water Resources, Office of the State Engineer, 2008). The alluvium is more environmentally sensitive than surrounding upland areas due to its permeable sandy composition, use as a water supply and proximity to Plum Creek. The Plum Creek alluvium also supports riparian habitat and endangered species.

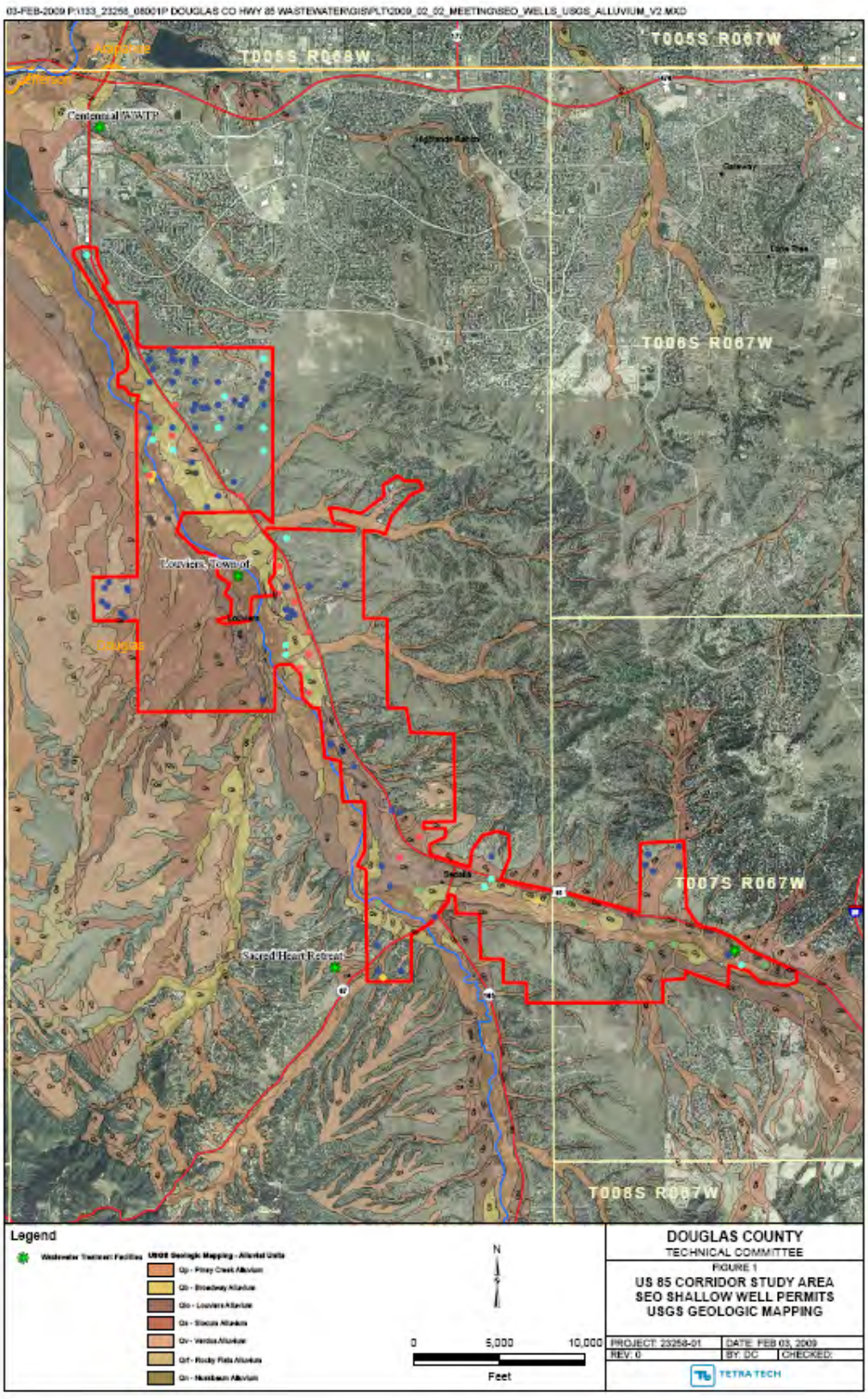
2.3.1 Federal Issues in Study Area Require Compliance

The study area includes rich habitat that provides for a federally listed species, inventoried wetlands, and 100-and 500-year floodplain areas.

Threatened and Endangered Species. The Preble's Meadow Jumping Mouse (PMJM), federally listed by the US Fish and Wildlife Service (USFWS) as threatened and endangered, is generally located within the study area. The PMJM habitat generally occurs in riparian areas which contain specific types of vegetation. As part of the 2006 Habitat Conservation Plan (HCP) for Douglas County (ERO, 2006) a riparian conservation zone (RCZ) was established that incorporates land form and vegetation to delineate potential PMJM habitat in Douglas County (Figure 2-3). Typically, activities outside the RCZ are considered to have no direct effects on Preble's, and ground-disturbing activities within the RCZ are considered to have direct effects on Preble's and its habitat. Such activities within the RCZ require compliance with the Endangered Species Act for effects to the PMJM and its habitat. The RCZ generally defines the PMJM habitat as extending outward 300-feet from the 100-year floodplain of rivers and streams, including Plum Creek.

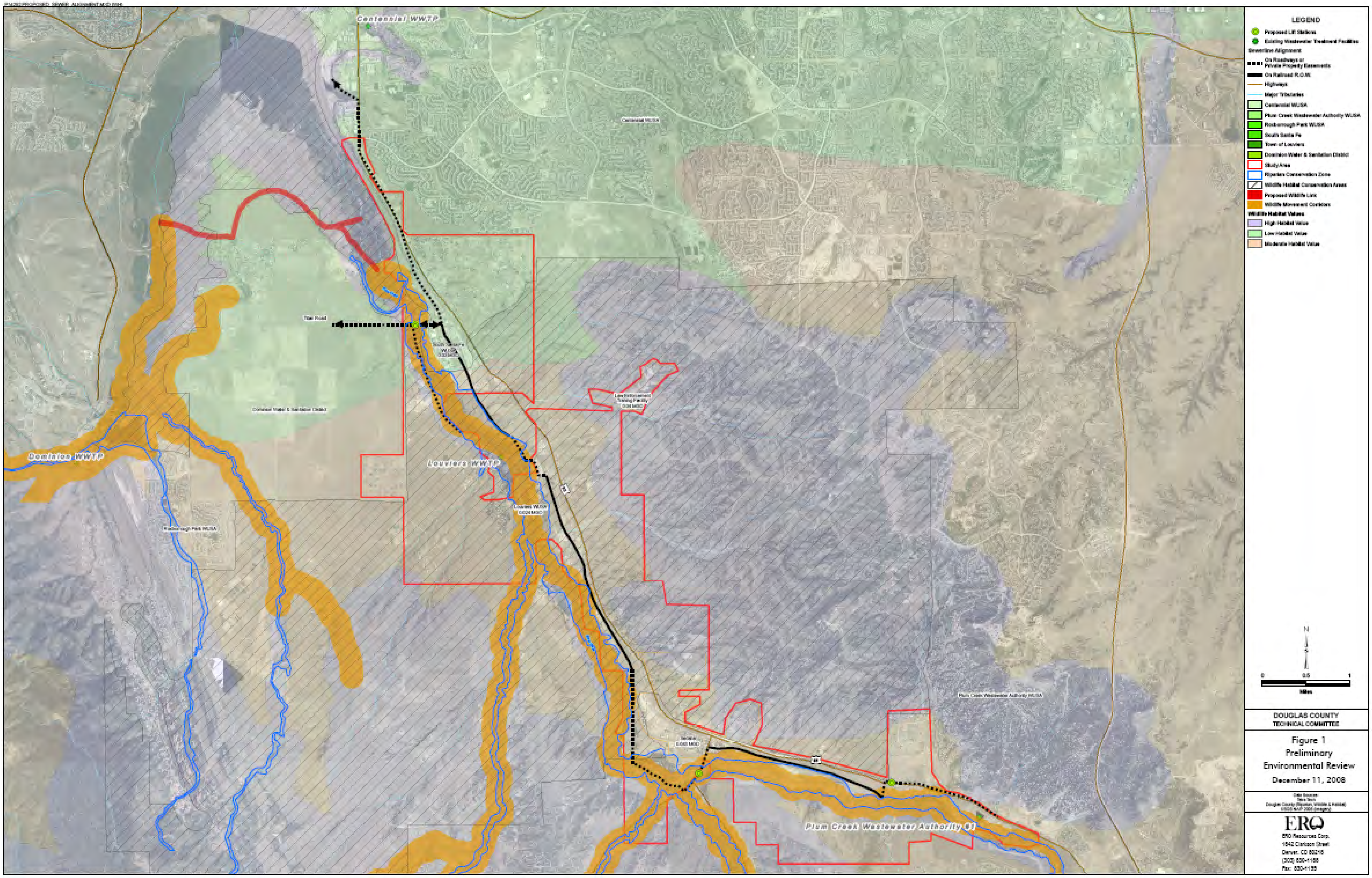
Wetlands. Various types of wetlands have been identified within the study area by the USFWS National Wetlands Inventory. Plum Creek, its tributary drainages, and their adjacent wetlands are considered by the U.S. Army Corps of Engineers (Corps) to be waters of the U.S. subject to Corps jurisdiction under Section 404 of the Clean Water Act. Any construction in jurisdictional wetlands would require Corps authorization, mitigation and permit approval.

Figure 2-2. Alluvium and SEO Permitted Shallow Wells in Study Area



Floodplains. The 100 and 500-year floodplains within the proposed project area were defined by the Federal Emergency Management Agency (FEMA) in 1987. According to the FEMA floodplain map, many portions of the study area are included within the 100 and/or 500-year floodplain. In addition to FEMA floodplain definitions, a Flood Hazard Area Delineation Report (WRC Engineering, Inc., April, 2000) for the Plum Creek watershed and has been accepted by Douglas County. The report presents an updated 100-year floodplain boundary and indicates an area of shallow flooding in various areas within the study area. FEMA has processes and procedures for proposed projects located within floodplains.

Figure 2-3. Environmentally Sensitive Areas within the Study Area



Section 3

General Planning

General Planning

This section details general planning information pertinent to wastewater collection and treatment along the US 85 Corridor, namely; consolidation of wastewater treatment facilities, water reuse, environmental issues, and population projections. The study is based on County land use planning and wastewater flow projections with a planning horizon to 2030.

3.1 Potential for Consolidation

There are many forms of wastewater collection and treatment within or near the project area. These range from ISDS consisting of septic tanks and leach fields (Sedalia, Titan Road Industrial Park, South Santa Fe Commerce Center, and the Law Enforcement Center), to facultative lagoons (Louviers) and fully-mechanical advanced wastewater treatment facilities (Plum Creek Wastewater Authority (PCWA), Roxborough/Dominion Water and Sanitation District (WSD), Littleton/Englewood WSD, and Centennial WSD). Many entities within the study area have evaluated their wastewater needs. For example, the South Santa Fe Metropolitan District (South Santa Fe) has developed a wastewater utility plan and has a wastewater utility service area (WUSA) approved by the Denver Regional Council of Governments (DRCOG) and site application approval for construction of a new wastewater treatment facility. Louviers has a designated WUSA and provides wastewater service within its designated area. Other areas adjacent to the study area, Centennial WSD, Roxborough/Dominion WSD, PCWA, and Littleton/Englewood have designated WUSA's and also provide wastewater service within their service area. Figure 3-1 shows the location of wastewater treatment facilities and WUSAs in the study area vicinity. Those entities with fully mechanical advanced wastewater treatment, namely PCWA, Centennial WSD, Roxborough/Dominion WSD, and Littleton/Englewood have additional hydraulic capacity available. As such, there appears to be several opportunities for consolidation of treatment facilities or use of existing regional facilities.

Colorado encourages consolidation of wastewater facilities through the Colorado Department of Public Health and Environment (CDPHE) Site Application Regulations (Regulation 22, "Regulations for the Site Application Process" last amended April 30, 2008). Paragraph 22.3(1)(c) states:

(1) "In evaluating the suitability of a proposal to construct or expand a domestic wastewater treatment works, the Division shall:

> Encourage the consolidation of wastewater treatment works whenever feasible with consideration for such issues as water conservation, water rights utilization, stream flow, water quality and economics"

CDPHE has also issued a Staff Guidance Document (CDPHE, 2001) that identifies factors CDPHE expects wastewater utilities to consider when evaluating the feasibility of consolidation. The expectation is that consolidation be considered at any time a site application for plant expansion is submitted.

Consolidation can take several forms, depending on the needs, resources and constraints the service providers are facing. Examples of different forms of consolidation are given below with a brief description.

- Full consolidation: This would involve sending flows from all of the service area to one treatment system. For example, all of the flow generated in the planning area could be collected and sent to the treatment facility operated by one wastewater provider. If this were to occur, the existing wastewater treatment plants (WWTPs) and ISDSs would eventually be taken out of service and the wastewater treatment facility would be upgraded, as needed, to accept the additional flows and loads.

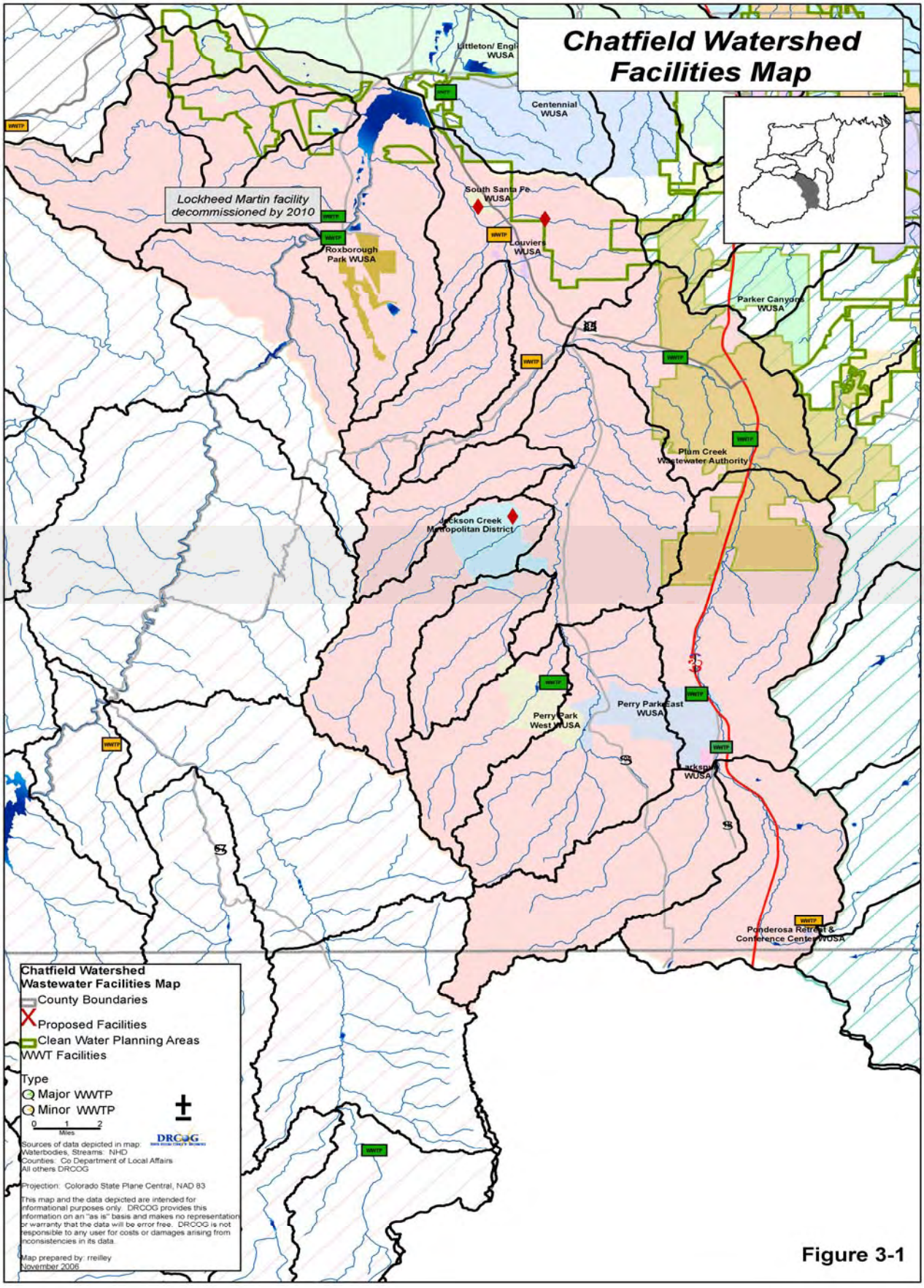
- Partial consolidation: Merging of portions of one service provider with a second, with both providers remaining. This can be a logical move if flow from one utility would require pumping and a force main, then flow by gravity to the second. In this instance the providers might agree to a service area change. Another example would be that one provider sends a portion of its flow to a joint/shared nutrient removal facility. Several area wastewater service providers could share such a facility and its main function would be to remove adequate amounts of nutrients from the region's wastewater stream, and still allow the existing secondary removal facilities to operate. This type of arrangement may be more challenging from a legal/regulatory standpoint.

- Joint facilities: In this situation, two or more providers would agree to joint use of a treatment facility. Recently, this was evaluated in the North Front Range Water Quality Planning Association (NFRWQPA) Area Wide Facility Plan between two providers. The evaluation looked at a joint facility that would be capable of receiving flow by gravity from future developments that would be downstream of their existing facilities.

- Treatment-only consolidation/satellite collection: If several service providers within an area each have their own treatment facility, it can sometimes be advantageous to construct one larger (i.e., regional) facility and each existing provider continue to operate as a satellite collection system. An example of this would be if the one entity agreed with another to send all its wastewater flow to a wastewater treatment facility yet retain ownership and control of its collection system.

The wastewater improvements needed to serve the US 85 Corridor differ from entity to entity in the study area. For example, Louviers has an existing pipeline capable of connecting to a main interceptor while Sedalia's community is mostly on ISDS. South Santa Fe, with recent site application approval, is poised to commence construction of a new wastewater treatment facility with the possibility of serving Titan Road or consider regional options if timing and cost issues are addressed. Sections 6 through 8 provide more details on selected alternatives and options to support the goals of improved wastewater service and water quality, including management and financial considerations.

Figure 3-1. Wastewater Treatment Facilities and WUSA in the Study Area Vicinity



3.2 Water Reuse and Water Rights Opportunities

Several entities currently have water reuse programs in effect. All Technical Committee members believe that water reuse should be a primary factor in any potential wastewater solution for this area. Water reuse as a water resource will continue to be an important component for any preferred wastewater treatment alternative. If wastewater is conveyed via a collection system and treated in the area, there is a benefit in terms of reuse. Water reuse is evaluated in terms of water rights obligations, the cost to produce reusable water and convey it upstream to the Chatfield Watershed, and in the context of the administrative requirements necessary to implement such a program. While this study is not intended to serve as a reuse plan, it does promote production of reusable water resources and identifies options for keeping reusable effluent in the county. Keeping reusable water resources in the county will continue as a top priority. Many of the existing wastewater treatment facilities are strategically located to enhance reuse potential.

3.3 Environmental Considerations

From an environmental and water quality standpoint, the Chatfield Watershed has water quality requirements, including a phosphorus total maximum annual load (TMAL), restricted phosphorus wasteload allocations for each point source discharger in the watershed and nonpoint source controls which promote implementation of best management practices (BMPs) to reduce sediment and nutrient loads from being conveyed to Chatfield Reservoir. Section 5 addresses important water quality planning considerations.

The Plum Creek corridor also supports many different uses, including habitat for threatened and endangered species such as the Preble's Meadow Jumping Mouse (PMJM), riparian habitat, and wetlands. Depending on the preferred wastewater solution selected, more detailed site assessments will be needed to address the unique environmental issues pertaining to the area. Section 6 addresses more specific environmental considerations for the preferred alternatives.

3.4 Land Use and Population Projections

The study area contains a diverse mix of land uses and levels of infrastructure. Land uses include residential, open space, industrial, commercial, and agriculture areas (Section 2, Figure 2-1). Douglas County projections show county-wide population growing to 315,297 by 2010 and to 444,784 persons in the year 2030, which is a 41% increase over 20 years. The number of jobs in the County is expected to increase 98% over the same time period (Douglas County, 2008). Approximately ninety percent of the population lives in urban designated areas, which is only 16.38% of County land area. The 4,300 acre Chatfield Urban Area, located northwest of the study area, was recently designated by the County to promote future residential and retail development in the Chatfield Reservoir watershed.

From a population and customer basis, the plan projects wastewater needs for a future 2030 condition. According to the Douglas County 2030 Comprehensive Plan the land uses, including rural residential, agricultural, industrial, planned development urban and planned development non urban, will continue to grow and potentially be rezoned. Given current service areas, land uses and zoning, it is possible to determine "build-out" service populations. These represent the estimated population if all available land is developed at the densities allowed now or in the future. Time is the unknown key factor in planning for build-out conditions. Historic overall growth in the County has been approximately 2% per year. However, some events, such as industrial development can create double digit growth rates. To address this longer term future need, this study looks at growth rates of approximately 1%, 2.5% and 5% per year. Generally these can be classified as slow, moderate and robust growth rates. The estimated populations can also change if service areas are revised or density of development changes.

Section 4

Existing and Future Conditions Along the US 85 Corridor

Existing and Future Conditions along the US 85 Corridor

There are many forms of wastewater collection and treatment within or near the service area. These range from ISDS consisting of septic tanks and leach fields, to facultative lagoons and fully-mechanical advanced wastewater treatment facilities.

This section looks at current and future conditions, in and around the study area as it relates to wastewater service. Descriptions of existing facilities, wastewater flows, hydraulic capacity, wastewater characterization, and wastewater service area are summarized. Looking ahead to 2030, the future condition of the US 85 corridor is also projected with estimates of wastewater flows in the study area. The future condition of the study corridor acknowledges that a critical component to growth is a viable source of water supply. This key resource and its availability are essential to the area realizing its full growth potential.

4.1 Wastewater Needs in Study Area

The study area encompasses the following special districts and areas each with its own wastewater service issues and needs:

- Louviers Water and Sanitation District
- Sedalia Water and Sanitation District
- South Santa Fe Metropolitan District,
- Titan Road Industrial Park,
- Law Enforcement Training Center, and
- Other Future Growth Areas Identified in the Comprehensive Plan

A brief description of each of these entities is provided below. Each area is broken down with a detailed explanation of its projected growth rates, wastewater character and flow.

4.1.1 Louviers Water and Sanitation District

The Louviers Water and Sanitation District (LWSD) own and operate a facultative lagoon and slow rate land application system for treatment of domestic wastewater generated by the Town of Louviers. The LWSD wastewater service area includes 65 acres, and 101 lots, 100 of which are currently developed. The service area consists of primarily residential and commercial land uses (TST Infrastructure, 2005). As shown in Table 4-1, Louviers wastewater flow of 0.02 MGD is projected to increase slightly to 0.024 MGD. An original wastewater treatment lagoon provided service since the early 1970's, and was recently upgraded by adding a slow rate land application system to provide the required treatment for ammonia and phosphorus. The lagoon provides for the removal of Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). A pump station, located adjacent to the lagoon, pumps effluent from the lagoon to the land application site, located on open space owned by Douglas County. The land application site was historically overgrazed, and the irrigation water and nutrients provided by the land application system promote restoration of vegetation while reducing nutrient loads. The land application system provides for removal of ammonia and phosphorus by plant uptake, monitored by wells installed at the site. The land application treatment is a short-term solution for Louviers, who is looking forward to regional wastewater treatment opportunities becoming a reality as part of this study effort.

Table 4-1. Louviers Wastewater Treatment Projections

Louviers Mutual Service Company	Treatment Technology	Flow (MGD)	Design Capacity (MGD)	BOD (mg/l)	TSS (mg/l)	TP (mg/l)	Peak Factor	Peak Flow (MGD)	Water Reuse	Phosphorus Wasteload Allocation
Current	Facultative Lagoon	0.02	0.024	265	198	8	5	0.06	No	122
Estimated Future (2030)	Facultative Lagoon + Land Application	0.024	0.024	265	198	8	5	0.12	Yes	122

4.1.2 Sedalia Water and Sanitation District

The unincorporated Town of Sedalia is served by the Sedalia Water and Sanitation District (SWSD). Other subdivisions and industrial sites located outside of SWSD include Indian Hills, Pine Cliff Ranch, the Sedalia Business Park, Intermountain Rural Electric Association and the Sedalia Industrial Park. SWSD currently provides water service to about 90 taps (215 people.) Sedalia's water sources include two alluvial wells from Plum Creek and one additional well in the Arapahoe aquifer. Wastewater is treated via ISDS.

In 1995, wastewater treatment and collection system planning was conducted. At that time, the study identified ISDS as the preferred wastewater treatment alternative for Sedalia, noting every home and business in Sedalia is on ISDS. Sedalia sits on a sandy hill, allowing seepage or

leaching of the sewage into the ground (URS Corporation, 1995). According to the study and Tri-County Health Department data, some leach fields have been failing and needing replacement. Current wastewater projections of 0.029 MGD are projected to increase ever slightly in the 20 year planning horizon, to 0.039 MGD (Table 4-2).

Table 4-2. Sedalia Wastewater Treatment Projections

Sedalia Water and Sanitation District	Treatment Technology	Flow (MGD)	Design Capacity (MGD)	BOD (mg/l)	TSS (mg/l)	TP (mg/l)	Peak Factor	Peak Flow (MGD)	Water Reuse	Phosphorus Wasteload Allocation
Current	ISDS	0.029	N/A	217	263	8	2.5	0.07	No	0
Estimated Future (2030)	ISDS	0.039	N/A	215	257	8	2.5	0.10	Yes	Trading Pool?

4.1.3 South Santa Fe Metropolitan District (SSFMD)

The SSFMD consists of 80 acres approximately bisected by the Burlington Northern Santa Fe (BNSF) railroad. The western portion consists of approximately 40 acres that will be used for an aggregate operation (concrete and asphalt). The eastern portion is earmarked for subdivision into 1 to 2 acre lots for industrial use. SSFMD evaluated regionalization in August, 2006, as part of their wastewater facility planning process for site approval of their WWTP (TST Infrastructure, 2006). The Titan Road Industrial Park is potentially in their service area, and if so, water and sewer could be provided by SSFMD to their service area. SSFMD currently uses ISDS for wastewater treatment. As summarized in Table 4-3, the planned wastewater treatment capacity is 0.03 MGD with proposed treatment using sequencing batch reactor (SBR) wastewater technology which provides a high quality effluent that meets the more restrictive phosphorus and ammonia limits in the watershed. To date, the wastewater treatment facility contemplated is temporarily on hold to evaluate the broader wastewater collection and treatment options afforded by this study effort. The proposed site for the SSFMD wastewater treatment plant has limited ability to expand and become a more "regional" facility, although the site could probably accommodate flows up to approximately 0.2 MGD if additional land was acquired.

Table 4-3. South Santa Fe Metropolitan District Wastewater Treatment Projections

South Santa Fe Commerce Center	Treatment Technology	Flow (MGD)	Design Capacity (MGD)	BOD (mg/l)	TSS (mg/l)	TP (mg/l)	Peak Factor	Peak Flow (MGD)	Water Reuse	Phosphorus Wasteload Allocation
Current	ISDS	0.015	-	350	200	8	5	0.08	No	0
Estimated Future (2030)	SBR	0.03	0.03	350	200	-	5	0.15	Yes	21

4.1.4 Titan Road Industrial Park

Titan Road Industrial Park is located to the north of the SSFMD, between Titan Road and the proposed South Santa Fe Commerce Center. It is comprised of 34 industrial lots currently served by ISDS which generate approximately 0.015 MGD of wastewater annually (Table 4-4). The SSFMD service plan contemplated that Titan Road Industrial Park could be included into their District, receiving collection and treatment service (TST Infrastructure, 2006). A potential wasteload allocation for the future condition could be derived from trade credits for the conversion of ISDS to conventional wastewater treatment.

Table 4-4 Titan Road Industrial Park Wastewater Treatment Projections

Titan Road Industrial Park	Treatment Technology	Flow (MGD)	Design Capacity (MGD)	BOD (mg/l)	TSS (mg/l)	TP (mg/l)	Peak Factor	Peak Flow (MGD)	Water Reuse	Phosphorus Wasteload Allocation
Current	ISDS	0.015	-	300	330	8	5	0.04	No	0
Estimated Future (2030)	SBR via So Santa Fe Metro District	0.015	0.03	350	200	-	5	0.04	Yes	Trading?

4.1.5 Highlands Ranch Law Enforcement Training Facility

The Law Enforcement Training Facility (HRLETF) is located 2 ¼ miles east of Louviers across Plum Creek and US 85. The HRLETF utilizes ISDS for wastewater treatment; however, through initial wastewater planning, has evaluated an onsite mechanical wastewater treatment facility as a part of a large expansion to their campus which is broadly used by Douglas County and Arapahoe County law enforcement officers. Reuse was a key component of the proposed wastewater treatment alternative which consisted of a non-discharging sequencing batch reactor (SBR) system using all effluent for irrigation. Plans for construction are on hold due to funding issues and less growth than anticipated. In the meantime, ISDS are still being utilized. CWSD serves as a co-management agency for the water system and has provided the HRLETF with an adequate wasteload allocation from its 50 pound wasteload allocation. Table 4-5 summarizes current and future wastewater information.

Table 4-5 Law Enforcement Training Center Wastewater Treatment Projections

Law Enforcement Training Center	Treatment Technology	Flow (MGD)	Design Capacity (MGD)	BOD (mg/l)	TSS (mg/l)	TP (mg/l)	Peak Factor	Peak Flow (MGD)	Water Reuse	Phosphorus Wasteload Allocation
Current	ISDS	0.01	-	-	-	8	-	-	No	0
Estimated Future (2030)	SBR + Land Application	0.034	0.04	10		1	-	-	Yes	See CWSD (Table 4-7)

4.1.6 Other Future Growth Areas

Over 9,250 acres of land is in the study area. Approximately 87%, or 8100 acres, are not within the aforementioned special districts. According to the Douglas County 2030 Comprehensive Plan the land uses, including rural residential, agricultural, industrial, planned development urban and planned development non urban, will continue to grow and potentially be rezoned. Current treatment technology utilized in this area is ISDS. In the future, as this area continues to grow, it is estimated that flows of 2.8 MGD will be generated from these future growth areas located within the study area.

4.2 Existing Wastewater Treatment Facilities Located Near Study Area

Four wastewater providers are ideally located in the vicinity of the study area and potentially have additional capacity to treat wastewater flows from the study area;

- Plum Creek Wastewater Authority (PCWA)
- Centennial Water and Sanitation District (Centennial WSD)
- Roxborough/Dominion Water and Sanitation District (Roxborough/Dominion WSD)
- Littleton/Englewood Wastewater Treatment Facility (Littleton/Englewood)

Individual WUSAs for potential wastewater providers in the vicinity of the study area are shown in Section 3 (Figure 3-1). A brief description of the existing wastewater treatment facilities is provided below.

4.2.1 Plum Creek Wastewater Authority

Plum Creek Wastewater Authority (PCWA) owns and operates the wastewater treatment plant located north of Castle Rock and south of US 85. PCWA was established in January 1990 to serve the wastewater treatment needs of the Town of Castle Rock, the Castle Pines Metropolitan District, and the Castle Pines North Metropolitan District. The general purpose for establishment of PCWA was "for the purposes of owning, leasing, acquiring, constructing, expanding, operating, managing and maintaining wastewater treatment facilities for the benefit of the Members..." In order to carry out one or more of the purposes for which PCWA is established, PCWA may enter into one or more leases (as lessor or lessee) or other contracts with one or more of the Members or other entities.

PCWA service area is comprised of mostly residential and commercial development. The existing facilities consist of headworks, two oxidation ditches and two secondary clarifiers, tertiary filters, UV disinfection, aerobic digesters, and bios lids processing facility. The plant has a permitted maximum 30-day average capacity of 4.87 MGD, and is seeking a capacity re-rating

of 6.44 MGD. PCWA currently treats an estimated 3.9 MGD. Concrete basins for a third oxidation ditch and secondary clarifier are constructed. Equipping this third treatment train could increase the plant capacity to 9.66 MGD. PCWA's facility promotes reuse and has available capacity to treat wastewater flows and has expressed a willingness to provide wastewater treatment within the study area, as feasible. Table 4-6 summarizes current and future wastewater projections.

Table 4-6 Plum Creek Wastewater Authority Wastewater Treatment Projections

Plum Creek Wastewater Authority	Treatment Technology	Flow (MGD)	Design Capacity (MGD)	BOD (mg/l)	TSS (mg/l)	Phosphorus (mg/l)	Peak Factor	Peak Flow (MGD)	Water Reuse	Phosphorus Waste load Allocations
Current	BNR Oxidation Ditch Activated Sludge System + UV	3.9	4.87	276	265	7.5	3	9.66	Yes	4256
Estimated Future (2030)	BNR Oxidation Ditch Activated Sludge System + UV	10.1	13	300	291	13	2.5	25.25	Yes	4256

4.2.2 Centennial Water and Sanitation District

The Centennial WSD is a governmental entity of the State of Colorado that provides water and sewer services. The District's service area boundary includes the Highlands Ranch community, and provides collection, treatment, and facilities operation and maintenance within this boundary. The Plum Creek parcel located west of the Highland Ranch development and south of Chatfield State Park is included in the District's WUSA. The Plum Creek parcel forms the northernmost part of what Douglas County's Comprehensive Master Plan calls out as the "Chatfield Urban Area." Centennial WSD is also providing wastewater service to the southeastern campground area of the Chatfield State Park. A sewage lagoon was replaced by a lift station, which is operated by State Parks.

The Centennial WSD treatment facility is located east of US 85 and south of Highway C-470. The treatment process consists of an activated sludge process with ultraviolet treatment. As summarized in Table 4-7, the plant has an estimated treatment capacity of 8.5 MGD and is currently treating an estimated 6.8 MGD. Future flows in 2025 are projected at 7.6 MGD. Effluent is discharged to Marcy Gulch which is a tributary to the South Platte River. Reuse is a key component to the Centennial WSD master plan. More recent discussions with Castle Rock have supported concepts of conveying reusable effluent upstream to the Castle Rock area for aquifer recharge and recovery opportunities. Centennial has entertained discussions for potential

expansion of services such as the area along US 85 Corridor (CWSD Wastewater Utility Plan, 2007).

Table 4-7 Centennial Water and Sanitation District Wastewater Treatment Projections

Centennial Water & Sanitation District	Treatment Technology	Flow (MGD)	Design Capacity (MGD)	BOD (mg/l)	TSS (mg/l)	Phosphorus (mg/l)	Peak Factor	Peak Flow (MGD)	Water Reuse	Phosphorus Waste load Allocations
Current	Activated Sludge Process + UV treatment	6.75	8.48	320	243	8	2.5	16.88	Yes	50
Estimated Future (2030)	Activated Sludge Process + UV treatment	7.6	8.48	320	243	8	2.5	19.00	Yes	50

4.2.3 Dominion Water and Sanitation District

Dominion WSD proposes to upgrade the existing Roxborough wastewater treatment plant in phases, and based on demand, to serve the Sterling Ranch development. Sterling Ranch is projected to contain about 10,000 single family equivalents (SFE). The planned capacity includes about 750 SFE from areas outside of Sterling Ranch and also about 0.5 MGD of industrial contribution possibly from the South Santa Fe Metro District area. A lift station will be needed on the northeast side of the Sterling Ranch development regardless of whether service to the US 85 Corridor is provided. The corridor's wastewater flows could connect to this lift station if it is located east of the planned development.

Title to the wastewater facility will be transferred from Roxborough WSD to Dominion WSD at the time the plant goes back into service. The existing plant has a treatment capacity of about 0.6 MGD. As flows begin to increase, the treatment facility will be upgraded to a membrane treatment system. The proposed plant is slated to have a capacity of 4.0 MGD. Depending upon influent wastewater strength, this could increase to about 5.5 MGD. As proposed, Dominion will provide wastewater service through intergovernmental agreements. The wastewater facility is in proximity to the lift station that Roxborough uses to send its wastewater flows to the Littleton/Englewood WWTP. There is currently extra capacity in this pipeline also.

Dominion WSD has expressed interest in providing wastewater service to the US 85 Corridor. Dominion WSD will keep Douglas County water in Douglas County, and similar to PCWA and Centennial WSD, promote reuse.

4.2.4 Roxborough Water and Sanitation District

Roxborough Water and Sanitation District (RWSD) is located in Douglas and Jefferson Counties, south of Kassler Water Treatment Plant. With the inclusion of Lockheed Martin the District boundary is 9,782 acres. The expanded RWSD wastewater service area consists of residential with commercial development and a small amount open space. RWSD stopped operating their wastewater treatment plant and now sends wastewater flows to the Littleton/Englewood wastewater treatment plant. The RWSD sewer line to the Littleton/Englewood (L/E) WWTP includes a force main and gravity flow system. Roxborough now serves Lockheed Martin; Lockheed pumps their flows to the Roxborough pump station and the combined average daily flow to L/E is designed for 1.75 MGD. Capacities allocated are as follows;

- Roxborough WSD – 1.2 MGD
- Lockheed Martin – 0.55 MGD

The connection point to the L/E system is near the South Platte River and Belleview Avenue. Roxborough constructed the 14 mile sewer to tie into the 36" existing line near Belleview Avenue. RWSD has excess capacity in their transmission line to L/E and has suggested a willingness to explore selling or leasing capacity, as feasible. Available capacity ranges between 0.25 MGD and could be 0.75 MGD. There is a potential that the RWSD pump station and pipelines could be enlarged and paralleled to provide even more capacity. Future connections will be via intergovernmental agreements.

Table 4-8. Roxborough Water and Sanitation District Wastewater Treatment Projections

Roxborough Water & San. District	Treatment Technology	Flow (MGD)	Design Capacity (MGD)	BOD (mg/l)	TSS (mg/l)	Phosphorus (mg/l)	Peak Factor	Peak Flow (MGD)	Water Reuse	Phosphorus Waste load allocations
Current	Connected To L/E	1.05	-	300	330	8	3.3	3.49	No	1218
Estimated Future (2030)	-	1.75	-	300	330	8	3.3	5.81	Yes	Transferred to Dominion WSD

4.2.5 Littleton/Englewood Wastewater Treatment Facility

The L/E WWTP has undergone significant recent upgrades exceeding $86 million. Most notable, the treatment facility has increased in size from a capacity of 36 MGD to 50 MGD. As part of the upgrade, a new denitrification treatment process was added to reduce nitrates in the plant's effluent discharge. The increased treatment capacity, with the addition of the denitrification treatment process and improvements to the disinfection system, will continue to ensure that the plant's effluent meets all discharge permit requirements needed to maintain the water quality objectives and uses for the South Platte River. The Littleton/Englewood WWTP

not only treats flows from RWSD and Lockheed Martin, but recent discussions with the City of Littleton confirm a willingness to treat wastewater from the US 85 Corridor wastewater study area. There is more than adequate available capacity at this treatment facility to treat wastewater flows generated from the study area.

4.3 Wastewater Flow Projections

As described in Section 3, the study area includes a combination of zone districts; general industrial, agricultural, rural residential, and planned development urban. Because of the corridor's proximity to residential and business areas, access to the railway corridor, and the amenity of the foothills and Chatfield Reservoir, more significant development throughout the study area is anticipated. For wastewater planning purposes three different build out scenarios were initially analyzed to evaluate and estimate the number of taps and wastewater flow projections in the 2030 future condition: low, medium, and high. Based on the evaluation results and input from the Technical Committee, a wastewater projection was established for the study area totaling 3 MGD. The current flows generated in the service area are very low, based on the present land use zoning and conservative assumptions. However, recognizing the demand for general industrial and commercial zoned lands, coupled with future water supply availability and wastewater service, there will be a potential for significant development along the corridor and increased wastewater flows.

In order to assess wastewater collection and treatment needs from a wastewater planning standpoint, higher density development was investigated within the study area, but only outside of Sedalia, Louviers, South Santa Fe Metropolitan District, and Titan Road Industrial Park. Based on input from Technical Committee representation from Sedalia, Louviers, South Santa Fe Metropolitan District and Titan Road Industrial Park wastewater flow projections were to remain unchanged for all projection scenarios and based on current taps and/or wastewater flows. However, in other areas outside the utility service areas but within the study area ("Other Areas") it is contemplated that rezoning of agricultural land uses may occur, and the densities and wastewater flow projections will likely increase. In the future, the A-1 zone district within Other Areas may have residential development due to the nature of the existing land uses and the potential changes from rural to a moderate density residential. Similarly, as the general industrial areas include different industry and development, densities and flow projections will change significantly based on the industrial uses.

Assumed density for the low wastewater flow projection scenario in Other Areas was 1 tap per 35 acres. For medium and high flow scenarios in Other Areas, A-1 density was increased to 1 tap per acre and 4 taps per acre, respectively. Industrial/commercial zoned areas assume ranges of 400 – 1200 gallons/acre, depending on the projection scenario in the watershed. The moderate projection in the study area, totaling approximately 4,100 single family equivalents (SFE) results in an estimated flow of 1.5 MGD. Higher scenarios project flows generated from approximately 13,700 taps, or 4 MGD. Table 4-9 summarizes wastewater flow estimates under these wastewater scenarios.

Growth in the study area will depend on a number of factors including economic growth and development, water supply, and services. The Technical Committee considered the

aforementioned growth scenarios and planning considerations. For planning purposes of future conditions for the US 85 wastewater study area, the Technical Committee suggested the long term wastewater service projections for the study area are between the medium and high flow projection estimates, or 3 MGD (8200 taps).

For future planning purposes, new water supplies in this study area will need to be identified to support additional growth in and along the US 85 Corridor. Water reuse will continue to be an important component for any preferred wastewater treatment alternative to promote water sustainability and responsible use of scarce water resources. If the water supply is conveyed via a collection system and treated in the area, there is a benefit in terms of reuse. Keeping reusable water in the county will continue as a top priority. Many of the existing wastewater treatment facilities are strategically located to enhance reuse potential.

Table 4.9 Wastewater Flow Projection Summary of Study Area

Portion of Study Area	**Low**		**Medium**		**Estimated Future Condition**		**High**	
	Flow (MGD)	Taps	Flow (MGD)	Taps	Flow (MGD)	Taps	Flow (MGD)	Taps
Sedalia	0.039	90	0.039	90	0.039	90	0.039	90
Louviers	0.024	111	0.024	111	0.024	111	0.024	111
Law Enforcement Training Center	0.034	2	0.034	2	0.034	2	0.034	2
South Santa Fe Metro District	0.015	70	0.015	70	0.015	70	0.015	70
Titan Road Industrial Park	0.015	34	0.015	34	0.015	34	0.015	34
Other areas outside utility service areas but within study area	0.393	700	1.366	3800	2.8	7900	3.897	13400
Total	**0.5**	**1000**	**1.5**	**4100**	**3.0**	**8200**	**4.0**	**13700**

Section 5

Water Quality Planning

Water Quality Planning

Water quality planning in the study area is led by the Chatfield Watershed Authority (Authority), the designated water quality management agency. Authority membership includes similar representation as the US 85 Technical Committee, but also includes Chatfield watershed entities such as Jefferson County, Lockheed Martin, additional special districts, Denver Water, City of Littleton, Army Corps of Engineers, State Parks, Division of Wildlife and the Colorado Department of Public Health and Environment. The Authority promotes protection of water quality in the Chatfield Watershed for recreation, fisheries, drinking water supplies, and other beneficial uses. To protect these beneficial uses, the Colorado Water Quality Control Commission (Commission), adopted Chatfield Control Regulation #73. This regulation includes limits on the amount of phosphorus that can be discharged into the reservoir.

5.1 Chatfield Watershed Issues and Phosphorus TMAL

A phosphorus Total Maximum Annual Load (TMAL) was adopted by the Commission to protect the beneficial uses of the reservoir. The number one source of phosphorus to Chatfield Reservoir is from nonpoint sources (NPS). Nonpoint sources of nutrients, such as phosphorus, come from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, and even our underground sources of drinking water. Approximately 90% of the nutrients in the Chatfield watershed come from nonpoint sources like stormwater runoff, ISDS, and agricultural activities which are very difficult to regulate and control Point sources, discernible permitted outfalls, currently result in less than 10% of the phosphorus load in the watershed. Wastewater treatment plants are a point source in the watershed. All point source dischargers are responsible for monitoring their effluent discharges for compliance with their individual permits and compliance with the Chatfield Control Regulation #73. In 2008 point sources were well below the wasteload allocation of 7,533 pound limit at 3,111 pounds of phosphorus (Table 5-1).

The Chatfield Control Regulation #73 was revisited by the Commission at a recent hearing in January 2009. A total phosphorus standard of 30 µg/L and chlorophyll standard of 10 µg/L was adopted by the Commission with the intent of maintaining water quality in Chatfield Reservoir. The total phosphorus standard and chlorophyll standard applies during the growing season defined as July through September. The standard was based on a growing season average as measured throughout the water column. The phosphorus TMAL, which includes point, nonpoint and background sources, was reduced by 67% to 19,600 pounds per year at median flow of

Table 5-1. Summary of 2008 Phosphorus Wasteload Contribution

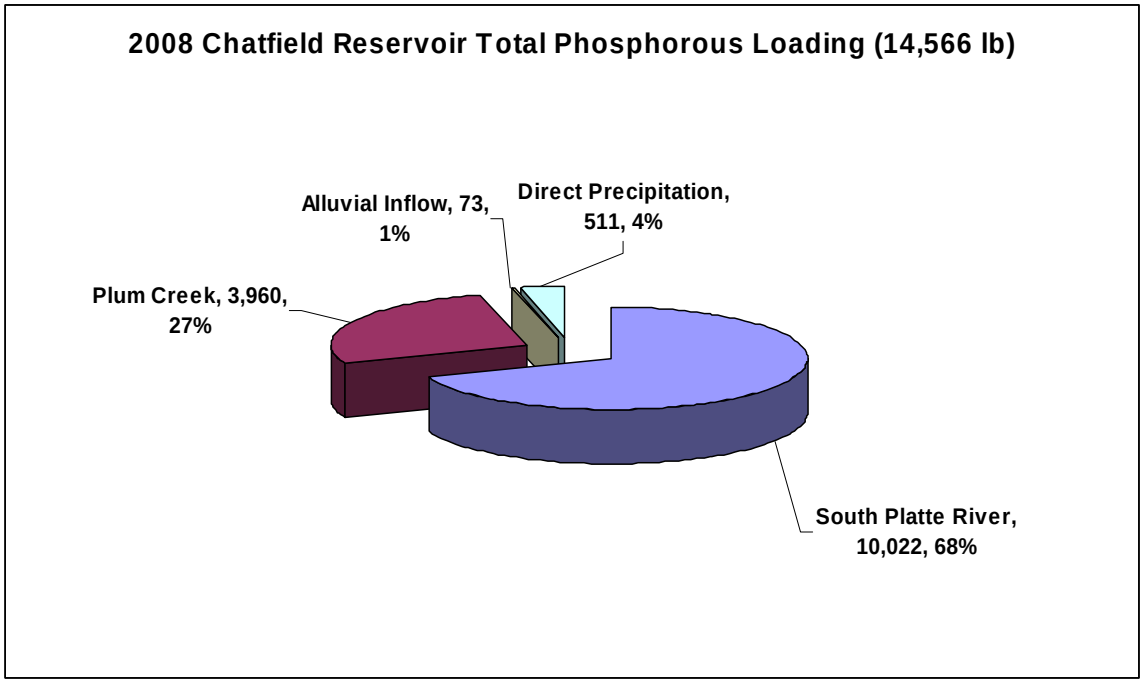
Allocation Sources	Wasteload Allocation (Pounds per Year)	2008 Point Source Total Pounds
Plum Creek Wastewater Authority	4,256	2,750
Perry Park Water and Sanitation District: Waucondah	365	207.98
Lockheed Martin Space Systems Company	1,005	75.4
Perry Park Water and Sanitation District: Sageport	73	61.10
Town of Larkspur	231	11.30
Sacred Heart Retreat	15[2]	0.70
Ponderosa Center	75[3]	4.10
Louviers Mutual Service Company	122	No Discharge[1]
Roxborough Park Water and Sanitation District	1,218	No Discharge[1]
Jackson Creek Metropolitan District	50[4]	No Discharge[1]
Centennial Law Enforcement Foundation	50[5]	No Discharge[1]
South Santa Fe Metro District	21[6]	No Discharge[1]
Reserve/Emergency Pool	52	Not Used
Total Phosphorus Wasteload	**7,533**	**3,111**

1. No Discharge
2. Jackson Creek Ranch has point source allocations pending through trades pursuant to the Authority Trading Guidelines.
3. Ponderosa Center has point source allocations pending through trades pursuant to the Authority Trading Guidelines.
4. Temporary five-year phosphorus allocation of 15 pounds for inclusion in discharge permit; obtained from the Reserve/Emergency.
5. Centennial Law Enforcement Center has point source allocations pending through trade pursuant to the Authority Trading Guidelines.
6. South Santa Fe Metropolitan District has a point source allocation of 21 pounds pending through trade pursuant to the Authority Trading Guidelines.

100,860 acre-feet (ac-ft/year). Allocations for point, nonpoint and background sources will be re-defined over the upcoming years to meet the new TMAL and it is anticipated that point and nonpoint sources will be reduced significantly, particularly since the new TMAL is 33% of the original one.

Water quality impacts from Plum Creek continue to be an issue. Based on 23 years of data collected by the Chatfield Watershed Authority, the annual inflow to Chatfield Reservoir is historically 85% to 90% South Platte River and 10% to 15% Plum Creek; however, the percentage of phosphorus load from Plum Creek is typically much higher than the inflow contribution. For example, in 2008 while Plum Creek comprised approximately 12% of the inflow to the reservoir, it contributed an estimated 27% of the phosphorus load to the reservoir (Figure 5-1). Snowmelt and stormwater runoff from land uses, including poorly functioning ISDS, are all considered nonpoint sources in the basin that contribute a large portion of the total annual phosphorus load. As such, pollutant reduction of nonpoint source nutrients will continue to be a main focus of the Authority, as funding allows, to protect water quality of Chatfield Reservoir and meet the more restrictive TMAL.

Figure 5-1 Percent Phosphorus Loading from Plum Creek and South Platte River



5.1.1 Nutrient Limitations for Point Sources

During an interim period, until the new TMAL is developed, the wasteload allocations for point sources totaling 7,533 pounds are still in effect. However, it is likely that wasteload allocations will get reduced in the future, as the new TMAL allocations are determined and reduced from 59,000 pounds to 19,600 pounds. In the future, wastewater dischargers in the Chatfield basin will likely be required to further reduce phosphorus loads to the watershed so this new TMAL can be achieved.

The expected level of treatment may require that advanced wastewater treatment be implemented to further reduce phosphorus concentrations and phosphorus loads to simply meet a more restrictive wasteload allocation. Historically, effluent limits have been established such that no municipal, domestic, or industrial wastewater discharge in the Chatfield Watershed shall exceed 1.0 mg/l total phosphorus as a 30-day average concentration. Due to the reduced TMAL, phosphorus effluent limits may be lowered to meet more stringent wasteload allocations in the Chatfield Watershed.

5.1.2 Potential Water Quality Impacts from ISDS in Study Area

As growth has led to a rapid proliferation of ISDS in portions of Colorado, issues have been raised by the Authority and other water quality agencies regarding potential water quality impacts from such systems and the adequacy of current efforts to minimize such impacts.

Because of potential water quality impacts, many ISDS serving special districts and subdivisions are slated for elimination and conversion to conventional wastewater collection and treatment as funding becomes available through the State Revolving Loan Program (CDPHE, State Revolving Fund, 2009 Eligibility List).

In 2001, an "ISDS Technical Steering Committee" was established by Jane Norton, Executive Director of the Colorado Department of Public Health and Environment. According to the findings, over 600,000 ISDS were then in the state with roughly 7,000 to 8,000 new permits issued each year. Approximately one-fourth of the state population is served by such systems, rather than by centralized wastewater treatment (CDPHE, 2001). The findings from the ISDS Technical Steering Committee are provided in Appendix B. According to the study, potential impacts from ISDS include:

- Elevated nitrate and/or bacteria levels in ground water used for drinking water, and nutrient loadings adversely affecting surface waters.

- There are areas of known nitrate contamination and increased nitrate levels in ground water in areas of high density (lots less than one acre) and a significant number of homes.

- In some surface water basins, such as the Chatfield Watershed, phosphorus loadings from onsite wastewater systems (ISDS) are a potentially significant water quality factor.

According to the ISDS Technical Steering Committee findings, the potential risk posed by ISDS varies greatly depending on a number of factors. The ISDS pose relatively greater water quality risks when:

a. They are present in high numbers and high density;

b. They are present in areas served by private drinking water wells that are shallow or poorly constructed, such as within flood plains and/or the alluvium of a waterbody.

c. They are improperly sited, particularly in sensitive environments such as the 100-year floodplain and within the alluvium;

d. They were installed prior to 1973, when uniform design and siting standards were first established; and/or

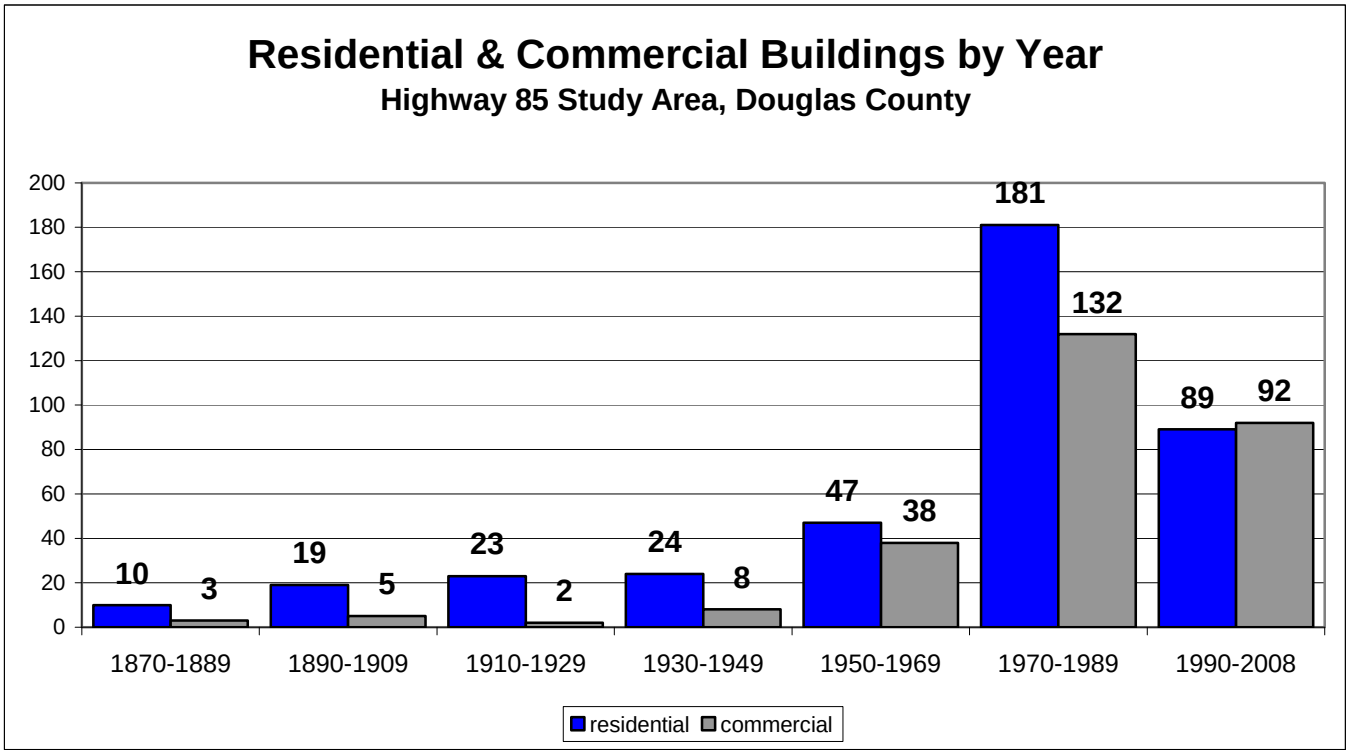
e. When they are not properly designed, installed, operated and/or maintained.

In the study area, many of these water quality risks exist. Except for homes and buildings located within the Louviers service area, all others use ISDS to treat wastewater. A significant portion of the study area includes the Plum Creek alluvium. The alluvium under Plum Creek is more environmentally sensitive than surrounding upland areas because it is composed of permeable sand and gravel soils and relied upon as a drinking water supply. This general area is heavily regulated for nutrients by the WQCC (Regulation #73), is comprised of riparian vegetation, and is habitat for the federally listed Preble's Meadow Jumping Mouse. Figure 2-2

(Section 2) depicts shallow wells (less than 100 feet deep) permitted by the Colorado Division of Water Resources, Office of the State Engineer, for domestic, commercial, agricultural and municipal purposes in the study area along with the USGS geologic mapping indicating alluvial composition. Because of the environmentally sensitive nature of the area and the relatively greater water quality risk, it is an area that may require ISDS restrictions.

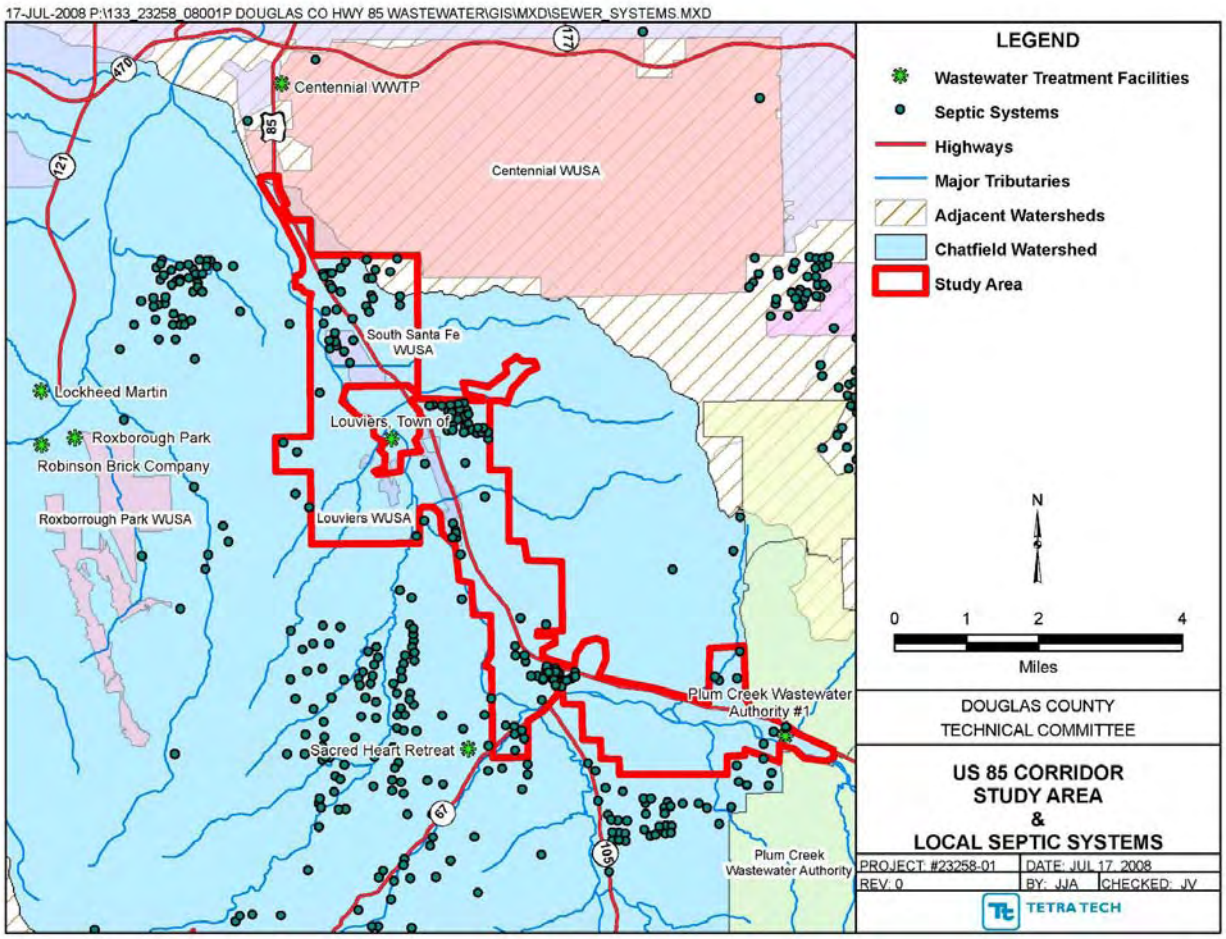
Because ISDS records are not comprehensively included in the Tri-County Health Department (TCHD) database for the study area, TCHD suggests estimating the number of ISDS' using building permit records from Douglas County. As habitable buildings are indicative of ISDS usage, noting ISDS installation is typically concurrent with building construction, the estimated number of ISDS for single family residences and commercial buildings is estimated at 673. Of the total 393 single family residences and 280 commercial buildings, some buildings were constructed in the late 1800s and early 1900s, likely when the railroad was built and homes were initially constructed in the area (Figure 5-2) (Douglas County Community Development Department, January 2009). According to TCHD, while the overall scope and extent of water quality impacts from ISDS in most areas is unknown, of the annual 80 to100 identified ISDS failures in the tri-county region, most systems are older than 20 years. It is also noted that additional ISDS impacts are occurring that have not yet been identified likely due to being "out of sight" and not evident from physical observation or failure. Figure 5-3 depicts ISDS in the study area, as identified in the TCHD ISDS database.

Figure 5-2. Number of Homes and Commercial Buildings and Year Built in Study Area



Prepared by the Information Resource Group, Douglas County Community Development Department, January 30, 2009

Figure 5-3. Tri-County Health Department Database of ISDS in the Study Area



Note: Tri-County Health Department database is not comprehensive and does not include all ISDS

5.1.2.1 Restrictions on ISDS Usage in Colorado

ISDS are unsuitable and prohibited in some areas within Colorado. For example, within the Cherry Creek Watershed in Arapahoe and Douglas counties, no new ISDS are allowed to be constructed within the 100-year floodplain as designated by the Urban Drainage and Flood Control District, or the Federal Emergency Management Agency if no Urban Drainage and Flood Control District designation exists (Water Quality Control Commission, Regulation No. 72). This restriction does not apply to the replacement of, or improvements to the operation of, existing ISDS located within the 100-year floodplain.

In 2006, authority was transferred from the Board of Health to the Commission to consider the prohibition of permits for ISDS in the 100-year floodplain areas or in defined areas which

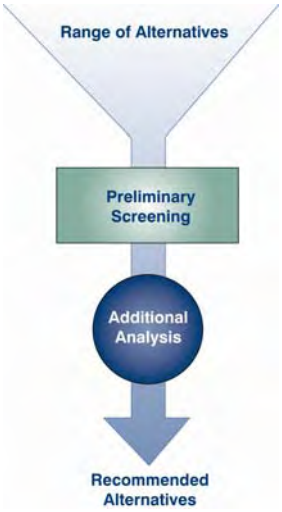
contain or are subdivided for a density of more than two dwelling units per acre. Pursuant to §25-10-110, CRS, the Commission may order such prohibition upon a finding that the construction and use of additional ISDS in the defined area will constitute a hazard to the public health or the environment. In such a hearing, the Commission may request affected property owners to submit engineering and geological reports concerning the defined area and provide a study of the economic feasibility of constructing a sewage treatment works (Appendix C).

Section 6

Alternative Analysis

Alternatives Analysis

A range of wastewater collection and treatment alternatives were identified and evaluated by the Technical Committee. Based on an alternatives identification work session with the Technical Committee, a series of US 85 wastewater alternatives were identified and further screened to a list of three preferred options. All potential alternatives were evaluated using a transparent matrix analysis approach which supported the decision support tool for alternative selection. Initially the process started out as a qualitative/non-monetary screening of alternatives. As the project proceeded and more detailed information was developed, the evaluation became quantitative using a similar matrix analysis. This section describes the alternative screening and analysis process and results.



6.1 Preliminary Alternatives

The Technical Committee identified an initial list of potential alternatives as summarized in Table 6-1. This large set of possible solutions was placed in two categories:

1. Possible alternatives that could meet the long term 3 MGD wastewater flow projection (the "grand solution").

2. Phased approaches that considered interim wastewater flows and gradual wastewater collection and treatment based on demand and resources.

Table 6-1. Preliminary Alternatives and Approaches

Long Term Wastewater Planning Approaches (to serve up to 3 MGD)
Collection, transmission and treatment at the Centennial Water and Sanitation District WWTF
Construct a new Regional WWTF to serve the corridor (i.e. located near South Santa Fe Metro District)
Convey wastewater flows to existing pipeline from Roxborough to Littleton/Englewood WWTP
Collection, transmission and treatment at the new Dominion WWTF site
Collection, transmission and treatment to the Plum Creek Wastewater Authority
Collection, transmission and treatment to a combination of providers (including SSFMD); Split flows to different locations depending on wastewater flow locations, gravity, conveyance, etc.
Phased Approaches (to provide wastewater service in a gradual interim fashion (service up to 0.5 – 1.0 MGD)
Short Term – split flows until final centralized WWTP is built
Use of package plants during interim as needed
Implement new ISDS technologies in study area during interim. Suggest more stringent requirements be established and regulated by TCHD for ISDS.
Use a "cafeteria" approach to wastewater treatment; using various treatment facilities to collect and treat smaller flows.

The Technical Committee preferred alternatives aimed towards a long-term approach to wastewater collection and treatment as those would provide the most meaningful, environmental, and responsive approach for the study area. Table 6-2 summarizes the ten long-term preliminary alternatives considered, along with benefits and constraints.

Table 6-2. US 85 Corridor Wastewater Study
Summary of Alternatives

Alt	Description	Details	Benefits*	Constraints*
1	**All wastewater to a new WWTF**	Major interceptor sewer predominately located along BNSF easement; gravity flow to new WWTF generally located in vicinity of SSFMD.	All flows treated by the new regional facility	Permitting and water quality planning constraints; TMAL/ wasteload allocation issues; construction of new facility in environmentally sensitive area along Plum Creek not currently covered by the Habitat Conservation Plan will require considerable mitigation. Existing WWTFs have sufficient wastewater capacity to treat flows from the study area.
2a	**All wastewater flows from study area to Centennial WSD**	Major interceptor sewer predominately located along BNSF easement; gravity flow with small lift station from TRIP/SSFMD area; connects to CWSD at manhole near southern edge of district.	Existing operating WWTF with approximately 0.5 - 1 MGD capacity available. Supports regionalization and improved water quality. Supports reuse.	No immediate capacity to serve 3 MGD (0.5 to 1 MGD capacity available); upgrades required to treat additional 2 MGD.
2b	**All wastewater flows from study area to Dominion WSD**	Major interceptor sewer predominately located along BNSF easement; gravity flow until Titan Rd. A 3 MGD lift station will convey WW flow to Dominion WSD from the study area	Existing facility has potential capacity of 0.6 MGD. Construction of phased modules could potentially increase capacity up to 4 MGD. Supports reuse	Dominion's WWTF does not have immediate capacity to serve 3 MGD. Larger lift station required.
2c	**All wastewater to Littleton-Englewood via Roxborough interceptor sewer.**	Convey all wastewater flows from the US 85 corridor to the Littleton/Englewood WWTP using a combination of new major interceptor along the US 85 corridor and existing pipeline from Roxborough to Littleton. All wastewater flows from study area to Roxborough/Littleton-Englewood. 3 MGD lift station located near Titan Rd. divide to convey WW to Roxborough/LE interceptor.	Littleton Englewood has existing capacity; new state of the art WWTF; no wasteload allocation needed	Two service providers; Roxborough interceptor has insufficient capacity for build out condition of 3 MGD. Reuse scenarios based on water rights/exchange opportunities. Larger lift station required - increased O&M costs

Table 6-2. US 85 Corridor Wastewater Study
Summary of Alternatives

Alt	Description	Details	Benefits*	Constraints*
2d	**All wastewater flows to Littleton-Englewood WWTF via Southwest Metro WSD sewer interceptor**	Convey all wastewater flows from the US 85 corridor to the Littleton/Englewood WWTP using a combination of new major interceptor along the US 85 corridor and existing sewer from Southwest Metro WSD (near Blakeland) to Littleton - Englewood.	Littleton Englewood has existing capacity; new state of the art WWTF; no wasteload allocation needed	Two service providers; Rehabilitated sewer will be needed along portions of southwest metro WSD sewer to convey build-out flows of 3 mgd from the study area to L/E. Out of basin treatment limits reuse and exchange opportunities.
3	**Wastewater flows from north of Sedalia to New WWTF; all other WW from Sedalia south to PCWA**	A major interceptor sewer line along the US 85 Corridor conveys WW flows from Louviers, South Santa Fe Metro District, and Titan Rd Industrial Park via gravity to a new centralized WWTF located somewhere near TRIP or SSFMD. WW flows from Sedalia south would be conveyed to PCWA via lift station.	All wastewater flows within the northern portion of study area could be treated by the new regional facility.	Permitting and water quality planning constraints for new WWTF; no wasteload allocation available; construction of new facility in environmentally sensitive area along Plum Creek not currently covered by the Habitat Conservation Plan will require considerable mitigation. Existing WWTFs have sufficient wastewater capacity to treat flows from the study area.
4a	**Wastewater flows from north of Sedalia to Centennial WSD; Wastewater from south of Sedalia to PCWA**	Install a major interceptor sewer line that receives wastewater flows along the US 85 Corridor beginning at Louviers and heading north. Flows would be transported via gravity to CWSD. WW flows from TRIP and SSFMD would require a lift station to interceptor sewer. WW flows from Sedalia south would be conveyed to PCWA via lift station(s).	Conversion of ISDS in industrial areas to conventional WW treatment. An existing operating WWTF with approximately 0.5 - 1 MGD capacity potentially available at Centennial WWTF. Supports regionalization and improved water quality. Can support reuse and water rights considerations.	Two separate sewer providers; lift station/forcemain to convey flows to from Sedalia to PCWA

Table 6-2. US 85 Corridor Wastewater Study
Summary of Alternatives

Alt	Description	Details	Benefits*	Constraints*
4b	**Wastewater flows from north of Sedalia to Dominion WSD; Wastewater from Sedalia south to PCWA**	Install a major interceptor sewer line that receives wastewater flows along the US 85 Corridor beginning at Louviers and heading north, picking up wastewater flows from SSFMD and TRIP. All WW flows would be transported via gravity to a lift station near Titan Road, where the WW would be delivered to the Dominion WWTF for treatment. Flows from Sedalia south would be conveyed, via 2 lift stations, to PCWA for treatment.	Conversion of ISDS in industrial areas to membrane treatment. Existing facility has potential capacity of 0.6 MGD. Construction of phased modules could potentially increase capacity up to 4 MGD. Supports reuse and water rights considerations.	Two separate sewer providers; lift station/force main to convey flows to from Sedalia to PCWA
4c	**Wastewater flows from north of Sedalia to Roxborough/Littleton-Englewood; WW from Sedalia south to PCWA**	Install a major interceptor sewer line that receives wastewater flows along the US 85 Corridor beginning at Louviers and heading north, picking up wastewater flows from SSFMD and TRIP. Flows would be transported via gravity to a lift station near Titan Road, where the flows would be delivered to the Roxborough Interceptor Sewer and directed to Littleton-Englewood WWTF. Wastewater flows from Sedalia conveyed to the Plum Creek Wastewater Authority (PCWA) via a force main. This system includes two lift stations to transport flows up gradient to PCWA.	Littleton Englewood has existing capacity available; new state of the art WWTF; no phosphorus wasteload allocation needed	Three separate sewer providers; lift station/force main to convey flows to from Sedalia to PCWA; potential reuse constraints depending on water rights scenarios; sewer capacity limitations from Roxborough to L/E - will need parallel sewer to meet 2 MGD flow requirement.

Table 6-2. US 85 Corridor Wastewater Study
Summary of Alternatives

Alt	Description	Details	Benefits*	Constraints*
4d	**Wastewater flows from north of Sedalia to Southwest Metro WSD/Littleton-Englewood; WW from Sedalia south to PCWA**	Install a major interceptor sewer line that receives wastewater flows along the US 85 Corridor beginning at Louviers and heading north, picking up wastewater flows from SSFMD and TRIP via a lift station. Flows would be transported via gravity to existing Southwest Metro WSD sewer located near Blakeland (South of C470). WW flows from this northern portion of the study area are conveyed to the Littleton-Englewood WWTF. Wastewater flows from the southern portion of study area (Sedalia south) conveyed to the Plum Creek Wastewater Authority (PCWA) via a force main. This system includes two lift stations to transport flows up gradient to PCWA.	Littleton Englewood has existing capacity; new state of the art WWTF; no wasteload allocation needed	Three separate sewer providers; lift station/force main to convey flows from Sedalia to PCWA; Additional sewer rehab needed on SWMSD sewer line in some locations to accommodate 2 MGD flows to L/E. Potential reuse constraints depending on water rights scenarios.

* Benefits and Constraints do not address economic feasibility, institutional feasibility, or management issues. These factors were considered and evaluated later in the process.

6.1.1 Non-Monetary Considerations

Non-monetary criteria were used to address those issues and concerns about the project that may be difficult to assign monetary value. The following criteria in Table 6-3 were developed and used in the screening of alternatives. These criteria address the non-monetary aspects of providing wastewater collection and treatment in the study area. These criteria were later used in conjunction with quantitative parameters, including capital and operating costs, to assess various aspects of the alternatives and to recommend a suite of preferred alternatives that should be considered further. Weighting factors were assigned to each criteria based on the importance to the Technical Committee. The higher the weight assigned (on a scale of 1 to 5), the more important the criterion. As shown, the criterion deemed most important by the Technical Committee, were "Reliability/Redundancy/ Flexibility of Collection and Treatment System" and "Wastewater as a Reusable Water Resource".

Table 6-3. Non-Monetary Criteria and Weighting Factors

Criterion	Description	Weighting Factor
Engineering and Technical Criteria		
Reliability/Redundancy/Flexibility Adaptability	This criterion is used to evaluate the reliability of the collection and treatment facilities to consistently meet project requirements. It encompasses issues such as mechanical reliability, planned downtime, and consistent operation of equipment. It also addresses potential operational limitations out of the owner's control such as weather and security-related issues. Finally, it addresses the ability of the alternative to adapt to changed conditions, such as regulations, service areas, or similar issues.	5
Complexity	The criterion applies to the overall complexity of the plan (or plans) as they relate to mechanical complexity, number of different sites and processes needed. It includes the amount of training needed to operate the facilities, the number and complexity of parts and mechanical equipment.	2.25
Labor/Maintenance Requirements	This criterion addresses the amount of time required for operations and maintenance personnel to keep the system running properly and efficiently. It includes regular preventive maintenance, as well as unscheduled, emergency efforts. It also addresses the relative complexity of the maintenance, in the terms of the number and distribution of facilities, specialized training needed, and time commitment.	3
Operating Experience	This addresses the operating "track record" of the mechanical systems that are needed to implement the project.	2.75
Land Area Requirements	This criterion addresses the overall size of the ultimate collection and treatment facilities, including the need for pipeline easements and pumping/treatment facility site(s).	3.25
Energy Requirements/Carbon Footprint	This criterion is used to evaluate the amount of energy needed to operate the collection, transport and treatment facilities. It is measured somewhat by the cost of fuel, electricity, natural gas and other energy resources sources, but also addresses the long- and short-term availability of the energy sources, and the sustainability of these sources. It is also used to address the overall impact of the systems on emissions of "greenhouse gases".	3

Criterion	Description	Weighting Factor
Environmental/Legal		
Potential Noise and Visual	This criterion addresses the level of noises generated and how frequently they are generated by the facilities. It includes the noises generated by the equipment at facilities and those associated with rolling equipment such as trucks and similar equipment. It is also used to evaluate the aesthetic appearance of the facilities, as viewed from the public's perspective. Specifically for the treatment facilities, it addresses the number, and size of vessels and the proximity to neighbors who can observe the facilities.	3.25
Known or Potential Development	For alternatives that involve properties (such as pipeline right of way or treatment sites) that are near existing planned or future development, this criterion is applied to compare the general impact of these types of facilities on the development or the potential for development.	3.75
Agricultural Uses	This criterion specifically addresses the impacts on farms and agricultural properties that result from siting facilities.	2
Odor/Air Pollution Generation	This criterion applies to the evaluation of odor and air pollutant emissions on the general public, especially for receptors that may be located near proposed facilities.	3.75
Liability/Risk Management	This criterion is used to evaluate factors that could result in personal injury, damage to public or private property or the environment. Not only could damages result from operations of interceptors, pump stations, and treatment system the operating entity could be exposed to lawsuits or fines due to unforeseen issues.	3.25
Archaeological/Historical	This criterion applies to the impacts on significant historical or archaeological areas, such as those that might be encountered along interceptor routes or on facility sites.	2.25
Plant and Animal Habitats	For new facilities that may be constructed in areas of biological significance in terms of both flora and fauna, this criteria is used to compare the over impacts. It is especially applicable to habitats that support threatened or endangered species, like the Prebles Meadow Jumping Mouse.	3
Environmental	This criterion applies to such items as known hazardous waste areas, geological hazards, and factors not addressed by the other criteria.	3
Political	This criterion is used to evaluate the administrative issues and potential for generating disputes between different governmental entities, including state, local and federal entities.	4
Water Resources, including Wastewater as a Resource	This factor is used to address the impacts of relocating and changing the quantity or quality of wastewater discharges on the water rights in the receiving stream(s), including groundwater. This criterion supports wastewater as a reusable water resource in Douglas County.	5
Phosphorus TMAL and Wasteload Allocations	Since phosphorus wasteload allocations are essential for any point source discharge in the Chatfield Watershed, this criterion is used to assess the various alternatives in terms of managing these loads and meeting the Chatfield Control Regulation.	4
Phosphorus Credits	Similar to the previous criterion, this factor is used to assess the potential for managing water quality through an incentive based approach that allows capacity and capabilities of different systems to be optimized through credit trading. Watershed-based trading is promoted in the Chatfield basin, and is a way which phosphorus credits can be derived to support a wasteload allocation.	3.75

6.1.2 Cost Considerations

The project team developed planning level costs for each of the ten alternatives. The economic evaluation included estimating total capital project costs, including annual operation and maintenance, on a present worth basis. It is important to consider all of these cost components since some alternatives may be capital cost intensive, yet may require minimal annual operation and maintenance (O&M) expenditures, and other alternatives may be less capital cost intensive but require high O&M expenditures. Planning level costs for these alternatives were derived using a variety of technical sources and information including:

- Information from wastewater providers in the region,
- Tetra Tech experience on similar construction projects,
- Project data from professional journals,
- Quotes from local and regional suppliers, manufacturers, and contractors, and
- Actual costs and annual budgets from similar wastewater collection and treatment projects.

In general, master planning reports include a contingency of 20 to 40 percent; whereas a design development document only includes a contingency of 10 to 20 percent. The American Association of Cost Engineers has developed three levels of accuracy for a construction cost estimate.

Type of Estimate	**Anticipated Accuracy**
Order of Magnitude	+50 to -30 percent
Budget Estimate	+30 to -15 percent
Definitive Estimate	+15 to -5 percent

Based on the level of unknowns associated with this planning level project, a budget estimate with anticipated accuracy of +30 to -15 percent is appropriate. Capital costs include cost data on wastewater treatment process equipment, various plant wide improvements, and sewer, tap fees, and lift stations. The operation and maintenance cost estimates reflect the cost of labor, power, miscellaneous materials, administrative, clerical, and laboratory services required to operate and maintain the proposed wastewater treatment facility as well as biosolids handling. Additional information on the economic evaluation along with opinions of probable costs for equipment, sewer, lift stations, power supply and maintenance are provided in Appendix D.

For comparison purposes, Table 6-4 summarizes project cost in terms of total capital costs and total present worth (capital costs plus annual O&M) using a 4-percent interest rate for a 20-, 40-,

and 60-year amortization period. As the ten project alternatives are preliminary and are subject to modification as studies and discussions progress, these costs are also subject to change. Because the same basis for developing the costs was used for all alternatives, the cost analysis is appropriate for comparison.

As shown, capital costs for the collection and treatment of 3 MGD of wastewater from the study area ranges from $38.6 million to $73.5 million. In addition to these capital costs, SSFMD and Sedalia have an estimated capital cost for design and construction of collection systems, estimated at $1.7 million and $1.8 million, respectively. Alternative 4-A (2 MGD of wastewater flows from Louviers north to Centennial WSD, and 1 MGD of wastewater flows from Sedalia south to PCWA) and Alternative 2-A (all wastewater flows to Centennial WSD) are the most economically feasible alternatives with planning level costs of $38.6 million and $38.9 million, respectively. Taking annual O&M costs into account for the 20-year scenario, the total present worth cost per year (20 year) ranges between $3.8 million and $7.6 million. Alternative 2-A, all wastewater flows to Centennial WSD, is the most economically feasible from a total present worth cost perspective.

Table 6-4 Cost Comparison of Long Term Wastewater Collection and Treatment Alternatives

Alternative	Alternative	Capital Costs					Annual O&M Cost			
		Treatment	Tap Fee*	Sewer	Lift Station	Total	Annual O&M	20 yr. PW of Annual O&M	40 yr. PW of Annual O&M	60 yr. PW of Annual O&M
1	**New Northern WWTP - 3 mgd**	$32,400,000		$9,880,000		$42,280,000	$5,040,000	$68,500,000	$99,760,000	$114,020,000
2-A	**Centennial - 3 mgd**	$21,000,000	$2,560,000	$15,000,000	$300,000	$38,860,000	$2,740,000	$37,240,000	$54,230,000	$61,990,000
2-B	**Dominion - 3 mgd**		$51,600,000	$11,390,000	$1,290,000	$64,280,000	$6,450,000	$87,660,000	$127,660,000	$145,920,000
2-C	**L/E via Roxborough - 3 mgd**		$50,620,000	$21,560,000	$1,290,000	$73,460,000	$5,380,000	$73,120,000	$106,490,000	$121,710,000
2-D	**L/E via SWMW&SD - 3 mgd**		$50,620,000	$21,680,000	$300,000	$72,600,000	$1,250,000	$16,990,000	$24,740,000	$28,280,000
3	**New Northern - 2 mgd/PCWA -1mgd**	$24,000,000	$11,050,000	$7,600,000	$300,000	$42,940,000	$3,680,000	$50,010,000	$72,840,000	$83,250,000
4-A	**Centennial - 2 mg/PCWA - 1 mgd**	$12,600,000	$12,980,000	$12,330,000	$680,000	$38,590,000	$4,440,000	$60,340,000	$87,880,000	$100,450,000
4-B	**Dominion - 2 mgd/PCWA - 1 mgd**		$45,620,000	$8,970,000	$1,200,000	$55,790,000	$4,280,000	$58,170,000	$84,710,000	$96,830,000
4-C	**L/E via Rox - 2 mgd/PCWA - 1 mgd**		$51,790,000	$17,770,000	$1,200,000	$70,760,000	$5,970,000	$81,130,000	$118,160,000	$135,060,000
4-D	**L/E via SW - 2 mgd/PCWA - 1 mgd**		$51,790,000	$16,320,000	$1,080,000	$69,180,000	$2,890,000	$39,280,000	$57,200,000	$65,380,000

Alternative	Alternative	Total Present Worth			Yearly Present Worth Cost		
		Capital + 20 yr O&M	Capital + 40 yr O&M	Capital + 60 yr O&M	Total PW Cost per year (20yr)	Total PW Cost per year (40yr)	Total PW Cost per year (60yr)
1	**New Northern WWTP - 3 mgd**	$110,780,000	$142,040,000	$156,300,000	$5,539,000	$3,551,000	$2,610,000
2-A	**Centennial - 3 mgd**	$76,100,000	$93,090,000	$100,850,000	$3,805,000	$2,327,250	$1,680,000
2-B	**Dominion - 3 mgd**	$151,940,000	$191,940,000	$210,200,000	$7,597,000	$4,798,500	$3,500,000
2-C	**L/E via Roxborough - 3 mgd**	$146,580,000	$179,950,000	$195,170,000	$7,329,000	$4,498,750	$3,250,000
2-D	**L/E via SWMW&SD - 3 mgd**	$89,590,000	$97,340,000	$100,880,000	$4,479,500	$2,433,500	$1,680,000
3	**New Northern - 2 mgd/PCWA -1mgd**	$92,950,000	$115,780,000	$126,190,000	$4,647,500	$2,894,500	$2,100,000
4-A	**Centennial - 2 mg/PCWA - 1 mgd**	$98,930,000	$126,470,000	$139,040,000	$4,946,500	$3,161,750	$2,320,000
4-B	**Dominion - 2 mgd/PCWA - 1 mgd**	$113,960,000	$140,500,000	$152,620,000	$5,698,000	$3,512,500	$2,540,000
4-C	**L/E via Rox - 2 mgd/PCWA - 1 mgd**	$151,890,000	$188,920,000	$205,820,000	$7,594,500	$4,723,000	$3,430,000
4-D	**L/E via SW - 2 mgd/PCWA - 1 mgd**	$108,460,000	$126,380,000	$134,560,000	$5,423,000	$3,159,500	$2,240,000

* Tap Fee Based on Provider current information
Lift Station Operating Cost = $15000/yr/mgd capacity
Maintenance = 2% of capacity

Discount Rate	4%
Years	20
	40
	60

6.2 Preferred Alternatives

Of the ten configuration alternatives addressing the long-term wastewater collection and treatment requirements for the US 85 Corridor study area, three alternatives were selected as preferred alternatives (Figure 6-1) as follows:

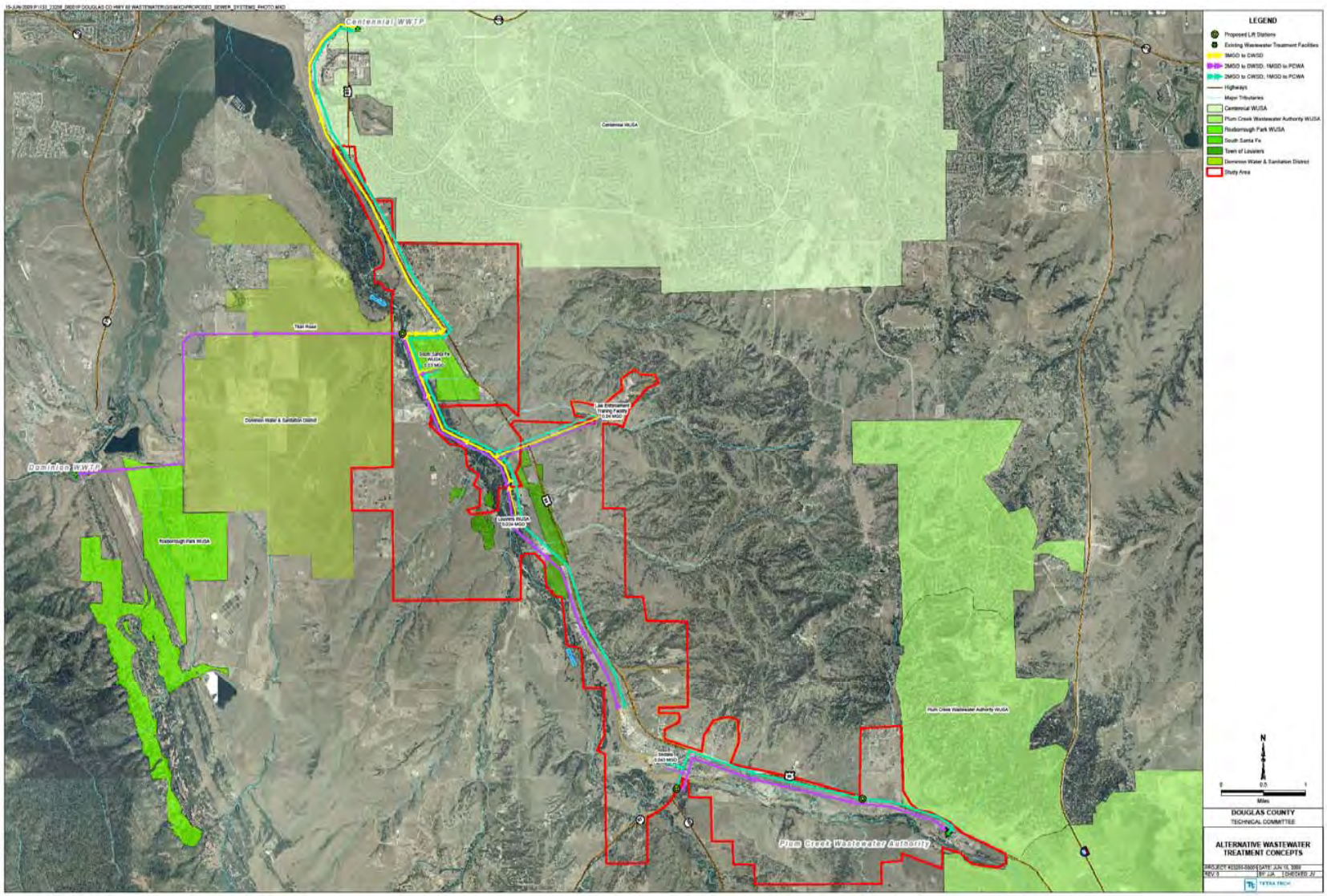
1. Wastewater flows (3 MGD) from study area, conveyed and treated at the Centennial WWTP
2. Wastewater flows generally from Sedalia and north (2 MGD) conveyed and treated at Centennial WWTP; Wastewater from Sedalia south force main and treated at PCWA (1 MGD)
3. Wastewater flows from Sedalia and north (2 MGD) conveyed and treated at Roxborough/Dominion WSD; Wastewater from Sedalia south force main and treated at PCWA (1 MGD)

The preliminary total present worth costs, or life cycle costs, (assuming 20 year amortization schedule) of the three preferred alternatives range from $76.1 million to $113.9 million; however these alternatives were selected based on not only economic considerations, but non-monetary issues like reuse capabilities in Douglas County, consolidation with existing facilities, and operational reliability.

6.2.1 Environmental Review of Preferred Alternatives

ERO Resources, Inc. conducted a preliminary review of potential environmental issues based on existing information (Appendix E). For purposes of this environmental review, it was assumed that no federal monies would be involved for the project including loans (e.g., State Drinking Water or Water Pollution Revolving Loan Fund). This assumption was made, since the use of federal funds would likely trigger the need for an environmental assessment (EA). The planning level environmental review is depicted on Figure 2-3 (Section 2) and focuses on natural resource issues and environmental permitting. As currently proposed, the preferred wastewater collection and treatment options would require authorization from the US Army Corps of Engineers (Corps) for potential impacts to wetlands and US Fish and Wildlife Service (USFWS) regarding Endangered Species Act (ESA) compliance for the PMJM. The Corps' authorization would likely occur under Nationwide Permit (NWP) 12, and ESA compliance would likely occur through Section 7 consultation between the Corps and the USFWS. Authorization from the Corps and the USFWS would likely take three to twelve months.

Figure 6-1. Preferred Wastewater Treatment Alternatives



Section 7

Financing Options

Financial Considerations

A spectrum of financing options were considered to cost effectively finance the preferred wastewater alternatives without creating a tax burden on citizens. As described below, a variety of financing mechanisms are possible, and while not mutually exclusive, could range from issuance of revenue bonds to entering into a public-private partnership or public-public partnership. This section describes the financial considerations, options, and financial feasibility of public-private partnership approaches for the US 85 Corridor. A detailed evaluation of financial feasibility prepared by First Southwest Company is provided in Appendix F.

7.1 Types of Project Financing

The magnitude of any of the preferred technical options to bring centralized wastewater treatment to the US 85 Corridor, combined with a long duration over which capital costs to fund the technical options would be recovered, requires some innovative financial thinking relative to bringing the project to fruition.

Although the current economic climate and financial markets provide challenges, there are viable financing options for the wastewater collection and treatment improvements along the US 85 Corridor, including:

- Public-private partnerships,
- Public-public partnerships,
- Issuance of revenue bonds; taxable, tax-exempt or some combination thereof; and
- Low interest financing via State Revolving Fund.

Privatization is a concept that covers a wide variety of approaches to involving both the public and private sector in the delivery of services and the development of projects intended to benefit the general public. This concept can include the following:

- Transferring ownership of government assets to the private sector,
- Contracting with private sector firms to provide services previously provided by the public sector with public sector oversight,
- Managing competition between the government and private sector, public sector entities, and private sector entities, and

- Public-Private Partnerships whereby the private sector is involved in the financing and development of the capital project as a substitute for purely public financing of the project.

Private participation in the collection and treatment of wastewater along the US 85 Corridor, in conjunction with public partnerships, is an integral component of financial feasibility of the technical alternatives. The theory behind allowing the private sector to participate in traditionally public infrastructure finance and operations is that such participation presents governmental entities with a greater range of financial options and flexibility in addressing public infrastructure needs.

7.2 Considerations for Financial Feasibility

There are a number of factors which need to be considered in evaluating the financial feasibility of a Public/Private-Public Partnership for a wastewater collection and treatment system along the US 85 Corridor. The following considerations are factored into the financial feasibility evaluation for this project:

- Water supply availability
  The volume of wastewater flow in the corridor is dependent, among other factors, on water resources availability and water supplies in the study area.

- Current and projected wastewater flows
  Current wastewater flows from the study area are approximately 0.5 MGD; projected wastewater flows assume a 20-year planning horizon and are estimated at 3.0 MGD, based on existing and future land uses, growth and development.

- Timing and magnitude of growth and development
  Wastewater projections are based on assumptions of population, growth, and potential land use and zoning issues. The timing and magnitude of growth and development are unknown factors in planning for future conditions.

- Economic development
  The availability and need for land in the County for economic development will impact the rate of development within the US 85 Corridor, as will residents' desire for such development in the US 85 Corridor. As development occurs, it will provide economies of scale to a wastewater collection and treatment system, and expand the tax base of the public sector.

- Competition
  Wastewater generated in and collected from the US 85 Corridor will require treatment prior to discharge. The provision of treatment may be done by a newly constructed wastewater treatment facility, or existing wastewater treatment facilities. While the trend in the State of Colorado to consolidation and regionalization of wastewater

treatment facilities reduces competition to the Project, ISDS and their proliferation represents a competitive threat to the Project.

- Permitting, land acquisition and right of way
  Construction of the sewer interceptor and/or new WWTF will require land acquisition and potential permits and authorizations from federal (Corps and USFWS), state (WQCD and Colorado Department of Transportation) and local jurisdictions (Douglas County), special districts (Sedalia WSD, SSFMD, and Louviers WSD), and private companies (BNSF).

- Reclaimed water
  There is a shortage of water resources in the State of Colorado, including the County. Consequently, the ability to treat and reuse effluent creates economic value, in the form of reclaimed water, for the entity holding the rights to such reclaimed water.

- Wastewater and environmental regulations
  Relevant regulations, which are subject to change, include stringent phosphorus controls and the encouragement of consolidation of wastewater facilities by the State through the CDPHE. Environmental regulations affect point source discharges and nonpoint source controls which impact capital investment requirements.

- Availability and cost of financing
  Financing availability is a function of the general economic market and the credit rating and collateral of the entity seeking financing.

- Rate of return
  A private sector entity typically expects a rate of return on investment of 10% to 15% to participate in a public-private partnership, with projects having greater risk requiring a higher rate of return. Based on initial it appears the operator of the proposed wastewater system will not be under the supervision of the Public Utility Commission, which among other things, regulates utilities' rates of return on capital.

- Number of contracting parties
  The number of parties the owner or operator of a wastewater collection and treatment system must negotiate with impacts the attractiveness of the opportunity to provide such services.

7.3 Market Feasibility

The general financial feasibility of a wastewater collection and treatment system in the US 85 Corridor is principally based upon the following:

1. The amount of wastewater produced within the US 85 Corridor,

2. The ability of the wastewater system to generate sufficient cash flow on a timely basis to satisfy the debt service on funds borrowed to construct the system, and

3. The ability of the Project to provide the owner, or concessionaire, with their required rate of return on the investment.

There is sufficient existing capacity at existing WWTFs to treat the currently produced amount of wastewater and a portion of projected future wastewater flows, however, no interceptor sewer or collection system exists to convey the wastewater to the existing WWTFs. The excess wastewater treatment capacity available at existing WWTFs means a new WWTF or expansion of an existing WWTF will be dependent upon development within the US 85 Corridor to generate additional wastewater thereby creating the need for such additional capacity.

7.3.1 Constructing a New WWTF

Construction of a new WWTF is not financially feasible. The key factor affecting financial feasibility of constructing a new WWTF is the timing and magnitude of future development in the study area. As a result of the uncertainty of the cash flow associated with the installation of a new WWTF, absent the provision of Availability Payments (which are not favored by local government), the project is difficult to finance, not to mention finance at interest rates that yield the required return on investment to the owner or concessionaire. Other aforementioned factors affecting financial feasibility, such as environmental regulation and competition from existing wastewater providers with capacity, create additional uncertainty. Due to this additional risk and uncertainty, potential financiers of the Project will seek a higher return on investment. As a result, construction of a new WWTF in the US 85 Corridor is not feasible at this time.

7.3.2 Constructing a Sewer Interceptor with Treatment at Existing WWTF(s)

Construction of a sewer interceptor to serve the US 85 Corridor sufficient to collect 3.0 MGD, with such wastewater being treated at existing WWTF(s), is financially feasible and will achieve the goals of enhanced water quality and the promotion of the reuse of water. This alternative would require an investment of approximately $15 million for the construction of the interceptor sewer and lift stations and rely on use of existing available wastewater treatment capacity pending further investment in and expansion of capacity as and when necessitated by development, as opposed to approximately $42 million for a new wastewater collection and treatment system that will treat up to 3.0 MGD absent the current need for such capacity.

The financial viability of this more modest project would be significantly less reliant on future development to generate sufficient timely cash flow to satisfy the debt service on borrowed funds, and (b) provide the owner or concessionaire, with the required rate of return on investment given the significantly reduced risk. If and when such development

were to occur within the US 85 Corridor, the existing WWTFs could increase their capacity in accordance with the increased volume of wastewater, and spread the cost of such investment over a larger rate base, with all parties benefiting from improved economies of scale. This plan to bring a wastewater collection and treatment system to the US 85 Corridor would also be consistent with the desire for consolidation and regionalization by the CDPHE.

Under current conditions, the provision of a wastewater collection and treatment system in the US 85 Corridor through construction of a wastewater interceptor and use of existing WWTFs could be provided by (a) a consortium consisting of an existing wastewater treatment provider(s) and a private sector entity to design, build, own and operate the wastewater interceptor, and (b) on a public-public partnership basis with the wastewater treatment providers sharing the cost to design, build, own and operate the sewer interceptor thereby further reducing the cost and risk to each party of constructing the interceptor.

7.4 Feasibility for Public-Private and Public-Public Partnership Approaches

A rate supported permutation of public-public and public-private partnerships offer other potential outcomes and collaborative funding approaches with construction of sewer infrastructure with treatment by existing wastewater providers. These funding approaches are potentially viable but need to be assessed more thoughtfully and vetted with key players in the study area.

7.4.1 Public-Private/Public Partnership

The "Public-Private/Public Partnership" is a feasible financial approach because this unique partnership;

- Utilizes the existing public sector WWTFs which currently have excess wastewater treatment capacity, thereby allowing the expansion in treatment capacity in accordance with, as opposed to in advance of, growth in demand for treatment of wastewater,
- Draws upon the financial resources of the private sector to finance the sewer interceptor, and
- Supports regulation and regionalization of wastewater collection and treatment.

Such an approach also has the potential to develop further into a privatization of existing wastewater treatment facilities, with their acquisition by their private sector partner.

7.4.2 Public-Public Partnership

A public-public partnership is another potentially viable means of developing the Project. For example, existing wastewater treatment providers could form a public-public partnership with the "US 85 Water Reclamation Authority" and fund the construction of the interceptor sewer and lift stations to serve the study area.

Section 8

Management and Governance

Management and Governance

In order to bring about a project in magnitude of that required to collect and treat wastewater along the US 85 Corridor, setting up an appropriate entity or entities to manage, own and operate the project will be critical to the project's success. This section describes the forms of public entities which might serve this organization and a preferred approach for management and governance.

8.1 Forms of Public Governance

The Technical Committee focused consideration on three forms of public entities which might serve as the public sector manager, owner and/or operator for the US 85 wastewater improvements in the study area. These public entities were:

- A Title 32, C.R.S., Special District – Organization of a large title 32 metropolitan district along the entire study area was considered. Such a district was attractive because its statutory powers are well-tailored to the project's wastewater components. However, this option was ultimately rejected by the Technical Committee given political sensitivities and the need for an election within the district's boundaries in order to organize the district and to authorize it to incur debt.

- A "Chain of Entities" approach – This approach would have involved the interested wastewater providers in the study area entering into an intergovernmental agreement (IGA) agreeing to jointly undertake construction and operation of the project. This approach's shortcoming is that private entities interested in participating in PPP projects, will generally demand one governmental entity with whom they are in contract. This approach would also complicate the public-side, if any, of the project's financing.

- Formation of a separate Authority under Colo.Const., Article XIV, §18, § 29-1-201, *et seq.*, C.R.S. – In Colorado, governments such as the wastewater providers along US 85 are constitutionally and statutorily empowered to cooperate or contract (intergovernmental agreements) with one another to establish separate legal entities for the purpose of jointly providing functions, services or facilities authorized to each cooperating government. These legal entities are most commonly called "authorities". They are established by contract (IGA) commonly known as an establishing contract, entered into among their members who address the authority's powers, limitations and relations among member jurisdictions.

By intergovernmental agreement, existing and/or newly-established local governments, including the existing governments, with wastewater or water powers may establish a regional authority to jointly exercise their powers and address centralized wastewater solutions in the corridor. The County has flexibility here to cooperate with the authority by contract or to join the authority as a member.

Authorities formed pursuant to the general empowerment contained in Article XIV, §18 and §29-1-201 *et seq.*, C.R.S. don't require significant public process and input in organization or governance. However, they allow a pooling of resources among governmental entities to acquit projects. In Colorado there is precedent for the organization of such Authorities. They are similar to the Colorado's public highway authorities, including E470 Highway Authority, which is comprised of 3 counties and 5 municipalities who pooled their powers to bring about 47 miles of tolled road. The Rocky Mountain Rail Authority is another Colorado authority with evolving membership comprised of nearly 50 of Colorado's political subdivisions, including Douglas County.

Given the relative ease of organization, attractiveness in terms of attracting private investment, and creation of a public partnership with a common goal, the Technical Committee selected formation of an authority as its preferred approach for governance relating to the US 85 wastewater project.

A draft "Executing Contract for Formation of the US 85 Water Reclamation Authority" is provided in Appendix F for consideration.

Section 9

Conclusions and Next Steps

Conclusions and Next Steps

9.1 Conclusions

The conclusions and recommendations presented herein by the Technical Committee are based on a fifteen-month evaluation and analysis of the feasibility of bringing centralized wastewater treatment to the US 85 Corridor in the study area. Underlying the Board of County Commissioners' decision to convene the Technical Committee, were the long term wastewater utility needs along US 85, and serious public health issues and risks of the current ISDS. Factors considered in evaluating centralized wastewater treatment in the US 85 Corridor included feasibility from engineering, legal and financial perspectives, which in turn included analysis of preferred engineering alternatives, preferred public governance and management structures, and study of available public-private financing options.

The preferred engineering and organizational alternatives brought forth by the Technical Committee recognize that the optimum solution for wastewater treatment must not only be technically feasible, but must also address wastewater reuse, environmental, governance and management, political, and financial issues.

The conclusions of this study are based on an analysis of wastewater alternatives, public governance and management structure, and financing options for wastewater improvements in the study area.

9.1.1 Wastewater Collection and Treatment

The Technical Committee identified three preferred long-term engineering solutions which would effectively collect and provide high quality treatment for up to 3 MGD of wastewater from the study area. The three engineering solutions recommended for the Board of County Commissioners' consideration are as follows:

- All wastewater flows from the study area (3 MGD) conveyed via gravity and treated at Centennial WSD
- Wastewater flows from Sedalia and north conveyed via gravity and treated at Centennial WSD (approximately 2 MGD); Wastewater from Sedalia and south pumped and treated at PCWA (approximately 1 MGD)
- Wastewater flows from Sedalia and north conveyed and treated at the upgraded Roxborough/Dominion WSD treatment facility (approximately 2 MGD);

Wastewater from Sedalia and south conveyed and treated at PCWA (approximately 1 MGD)

The reasons these three alternatives were chosen from a greater number of engineering alternatives considered by the Technical Committee relate to common themes among the three preferred alternatives including:

- Elimination of ISDS in the study area will enhance water quality and protect precious water resources in the Plum Creek watershed and Chatfield basin.
- Any selected wastewater alternative must promote reuse of wastewater.
- Wastewater treatment solutions must be proven, reliable, and have a track record of meeting water quality and operational objectives.
- Implementation of long-term solutions to collect and treat 3 MGD of wastewater is preferable to a phased, short-term approach.

As shown on Table 9-1, the planning level capital cost estimates for the three preferred alternatives range from $38.6 million to $55.8 million, including the cost for treatment, interceptor sewer, and lift stations. Annual operation and maintenance costs, including the cost of labor, power, miscellaneous materials, administrative, and laboratory services range from $2.7 million to $4.6 million. Total present worth costs were developed assuming a 4-percent interest rate for various amortization scenarios (20-, 40-, and 60-year amortization period).

Table 9-1. Estimated Costs of Wastewater Collection and Treatment Alternatives

Preferred Alternative	Sewer and Lift Stations ($ million)	Tap Fees and Treatment ($ million)	Capital Costs ($ million)	Annual Operation and Maintenance ($ million)	Total Present Worth ($ million, 4%, 20 years)
3 MGD gravity flow to Centennial WSD	15.3	23.6	38.9	2.7	76.1
2 MGD gravity flow to Centennial WSD and 1 MGD lifted to PCWA	13.0	25.5	38.6	4.4	98.9
2 MGD to Dominion WSD via gravity and lift station and 1 MGD lifted to PCWA.	10.2	45.6	55.8	4.6	114.0

9.1.2 Governance Structure

The US 85 project is of sufficient size and scope that it makes sense for all of the public entities charged with responsibility for wastewater within the study area to participate in the project. This unified participation legitimizes the project from a managerial and governance perspective by giving the projects goals a coherent and unified forum for expression.

As previous sections of this Report discussed in detail, a number of structures and entities were considered by the Technical Committee. The Technical Committee recommends formation of a distinct authority to serve as the government whose mission is to facilitate implementation of wastewater collection and treatment along the US 85 Corridor. The recommended authority has been given the working name of the "US 85 Corridor Water Reclamation Authority."

An authority is preferred among various governance alternatives by the Technical Committee for the followings reasons:

- Public and private sector participants in the PPP transaction favor a single entity with whom to contract, thus the authority increases the likelihood of attracting participants in a public-private partnership;

- Public and private sector participation is critical to the success of the US 85 project;

- An authority provides a forum wherein entities with common interests may pool their legal and political resources into a common force with a stronger voice;

- Formation of an authority of the type proposed is relatively simple, requiring only execution of an intergovernmental agreement among the authority members, commonly called an "establishing contract:"

The US 85 Corridor Water Reclamation Authority would be composed of those members of the Technical Committee who are political subdivisions of the state of Colorado, and, should the County so choose, Douglas County. An open issue regarding the proposed authority's membership is how the Technical Committee participants who are not political subdivisions may participate meaningfully in the authority (whose membership is legally limited to public entities). It is possible that the County might contract with these private entities to participate on their behalf, but this would require County approval of such a role. A draft establishing contract for the US 85 Corridor Water Reclamation Authority has been drafted and is an attachment to this report for the Commissioners' consideration (Appendix G).

9.1.3 Funding the Improvements

The ideal financial scenarios recognize that debt for construction of the project improvements will be funded by future growth and financial burden on citizens is minimized. In any funding scenario, the value of reclaimed water should be accounted for in reducing overall users' costs. As identified in the study and in a more detailed report provided in Appendix F, there are several funding opportunities for wastewater collection and treatment along the US 85 Corridor including;

- Public-private partnerships,
- Public-public partnerships,
- Issuance of revenue bonds, taxable, tax-exempt or some combination thereof; and
- Low interest financing via State Revolving Fund.

A rate supported permutation of public-public and public-private partnerships could bring a consortium of existing wastewater treatment providers together in contract with the Authority. This collaborative funding approach with existing wastewater treatment providers include:

1. Existing wastewater treatment providers form a public-public partnership with the "US 85 Water Reclamation Authority" and fund the construction of the interceptor sewer to serve the broader study area.

2. A regional wastewater authority is created through the acquisition and/or merger of existing treatment providers with the "US 85 Corridor Water Reclamation Authority". The acquisition of existing treatment providers by the Authority could defer capital investment over a greater rate base, promote more operational flexibility and efficiencies, while keeping rates lower.

These funding approaches are potentially viable but need to be assessed more thoughtfully and vetted with key players in the study area.

9.2 Recommendations and Next Steps

With a set of preferred alternatives, financing options and public governance recommendations in hand, Douglas County is now in a position to take a strategic approach towards implementing next steps to support the study goal *"to improve water quality along the corridor thru the elimination of ISDS with consideration of centralized wastewater collection and treatment solutions that will enhance water quality, promote reuse and utilize precious water resources by adding reuse to water sustainability."*

Important next steps involve honing in on special financial and engineering approaches, organization of a governmental entity to acquit the project and institutional issues, political considerations, and public outreach; all recognizing opportunities in the study

area and potential limitations. Based on the conclusions, the following recommendations and next steps support the study goals, objectives, and plan implementation:

- **Form a water reclamation authority for the study area. Finalize and execute the draft establishing contract for the "US 85 Corridor Water Reclamation Authority".**

  Through the newly formed governance structure, continue to compile more information, assess options, and implement recommendations to bring wastewater service to the whole study area.

- **Engage a dialogue on financing options with key entities and potential treatment providers. Gauge interest of project concepts with respective treatment provider boards, management, and community leaders.**

  Conceptually there is an interest from public and private entities and a willingness to consider various funding options, however there needs to be more information developed to facilitate overarching negotiations and transactions for wastewater service, including water quality improvement and water reclamation. Some of the additional information needs include:

- **Conduct ongoing assessment of funding options and financial considerations.**

  As various funding scenarios are contemplated, financial considerations will require further evaluation to better determine capital outlay, rates, and user fees, etc. More information may be required on the funding alternatives being considered, such as:

  - Authority issues revenue bonds
  - True privatization where a third party provide for the collection and treatment of wastewater
  - Public-private partnerships
  - Public-public partnerships
  - A rate supported permutations of public-public and public-private, where wastewater treatment facilities are in contract with the Authority to provide wastewater service.

    Also, through the newly formed Authority, coordination with CDPHE may intensify funding towards the conversion of ISDS' in the study area to conventional treatment. Of particular interest may be the funding support for design and construction of collection systems within the Town of Sedalia, Titan Road Industrial Park, and South Santa Fe Metropolitan District.

- **Quantify reusable component of wastewater effluent and its estimated value.**

  Estimate reusable percentage of wastewater in study area from existing ISDS' and wastewater treatment processes. Conduct a review of water rights to determine the reusable component of wastewater and its value.

- **Develop preliminary (30%) design for the collection of wastewater along the US 85 Corridor.**

  The 30% design will provide sufficient information for interested financial partners to evaluate and understand the merits of the project and determine their interest in the project. The 30% design will include: design criteria, calculations, assumptions, and references for preparing the site design. The narrative will also address environmental protection, compliance, and permits needed for the project from a local, state, and federal level. AutoCAD drawings, base mapping, geotechnical investigation, structural materials used, detail on alignment, land ownership information, utility conflicts, and refined cost estimates will also be provided. The drawings will include plans and profiles, details, schedules and diagrams necessary to illustrate the design at a 30% level of completion. Site application approval documentation will be developed, in anticipation of review and approval by water quality management agencies, including the Chatfield Watershed Authority, Denver Regional Council of Governments (DRCOG), and Colorado Department of Public Health and Environment (CDPHE).

- **Conduct a thorough public outreach program on the preferred wastewater collection and treatment options and funding scenarios.**

  Initiate positive involvement of County and "US 85 Water Reclamation Authority" members prior to initiating the formal public process. An intensive and thorough public outreach effort will be conducted to provide numerous opportunities to solicit input and articulate the project benefits, including funding and cost saving opportunities, and environmental benefits. Public outreach will be coordinated with other existing stakeholder groups in the watershed, such as the Chatfield Conservation Network, Chatfield Watershed Authority, homeowner associations, businesses, IREA, etc. Public outreach methods and approaches will be reviewed and approved by Authority members to ensure outreach opportunities and timing are thoughtful, as all US 85 Corridor stakeholders should have opportunities to provide input. Collaboration with water quality entities like the Chatfield Watershed Authority will offer alternative public outreach methods through news articles and the upcoming Chatfield Summit meeting.

- **Work in coordination with the Chatfield Watershed Authority to evaluate regulatory mechanisms to address location of ISDS', inspection, maintenance and enforcement.**

  Through the Chatfield Watershed Authority and in coordination with the Tri-County Health Department (TCHD), CDPHE and Water Quality Control Commission (Commission), address restrictions and maintenance requirements for ISDS located in the Plum Creek floodplain. Evaluate developing a "Septage Management District" that addresses funding for monitoring, maintenance and inspection of existing ISDS in the Chatfield Reservoir watershed. Consider proposed modifications of the Chatfield Control Regulation No. 73 that support these water quality goals.

Section 10

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Appendix A

Draft Establishing Contract for the Formation of the US 85 Water Reclamation Authority (Icenogle, Norton, Pogue, and Gilida)

Confidential; draft for discussion purposes only / May 8, 2009

ESTABLISHING CONTRACT
FOR THE
HIGHWAY 85 CORRIDOR WATER RECLAMATION AUTHORITY

RECITALS

WHEREAS, the real property located in proximity to State Highway 85 between the Plum Creek Wastewater Treatment Plant on the south, and Highlands Ranch Parkway on the north, currently lacks any form of centralized wastewater treatment; and

WHEREAS, because the Highway 85 Corridor lacks centralized wastewater treatment, area businesses and homeowners currently receive sanitary sewer service via a collection of aging, antiquated and outdated septic systems; and

WHEREAS, the proliferation of septic systems in the Highway 85 Corridor presents present and prospective health, safety, welfare and water quality issues for businesses and residents in the Corridor; and

WHEREAS, in 2008, the County of Douglas, Colorado and various wastewater providers in the Highway 85 Corridor formed the Highway 85 Technical Committee to study the Corridor's issues; and

WHEREAS, the Technical Committee determined that the establishment of a wastewater authority for the Highway 85 Corridor would be in the best interests of the inhabitants of the Corridor; and

WHEREAS, Article XIV Section 18(2)(a) and (2)(b) of the Colorado Constitution and Sections 29-1-201 *et seq.*, C.R.S. authorizes local governments to cooperate or contract with one another to make the most efficient and effective use of their powers and responsibilities, and to form separate governmental authorities; and

WHEREAS, the parties executing this Contract desire to establish a cooperative mechanism among themselves, other governmental entities and others interested in developing a centralized wastewater treatment system for the Highway 85 Corridor; and

WHEREAS, it is the intent of the parties executing this Contract to hereby create and establish a wastewater authority for the purposes recited and enumerated herein.

NOW, THEREFORE, in consideration of the mutual promises and benefits herein expressed, and for other good and valuable consideration, the receipt and sufficiency of which is hereby freely acknowledged, the parties executing this Contract hereby covenant and agree as follows:

COVENANTS AND AGREEMENTS

1. DEFINITIONS. As used in this Contract, unless the context otherwise requires:

1.1 "Advisory Committee" means any advisory committee established from time to time by the Board as described in Section 5.11 of this Contract.

1.2 "Alternate Director" means a person selected to serve on the Board in lieu of a Director pursuant to Section 5.3.

1.3 "Authority" means the Highway 85 Corridor Water Reclamation Authority created pursuant to this Contract.

1.4 "Board" means the Board of Directors of the Authority.

1.5 "Bylaws" means those bylaws adopted by the Board, as may be amended from time to time.

1.6 "Contract" means this Establishing Contract for the Authority, as may be amended from time to time.

1.7 "Corridor" means Highway 85 Corridor.

1.8 "County" means the County of Douglas, Colorado.

1.9 "Director" means a voting member of the Board and shall include a qualified Alternate Director.

1.10 "Effective Date" means the date this Contract shall be in full force and effect, which shall occur upon the execution of this Contract by two or more Originating Governmental Parties.

1.11 "Highway 85 Corridor" means the real property located in proximity to State Highway 85 between the Plum Creek Wastewater Treatment Plan on the south, and Highlands Ranch Parkway on the north.

1.12 "Member" means a county, municipality, special district or any other political subdivision of the State that has executed this Contract and, in the case of am additional member, has met the requirements of Section 7.2.

1.13 "Originating Governmental Parties" mean the initial parties, consisting of two or more Members, that executed this Contract, whose names are set forth in **Exhibit A** attached hereto.

1.14 "Person" means any natural person, corporation, limited liability company, partnership, association, joint venture, the United States of America, the State, any Member, or any other political subdivision of the State.

1.15 "Revenues" means any fees, rates, charges, assessments, contributions, or other income and revenues received by the Authority.

1.16 "State" means the State of Colorado.

2. ESTABLISHMENT OF WATER RECLAMATION AUTHORITY. The Originating Governmental Parties hereby create and establish a wastewater authority known as the "Highway 85 Corridor Water Reclamation Authority."

3. PURPOSE. The purpose of the Authority shall be to develop a centralized water reclamation system, including the collection, treatment, reuse and disposal of wastewater, as deemed appropriate by the Board, through the acquisition, construction, use, operation, and maintenance of wastewater and related systems, facilities, and improvements and the financing thereof, in whole or in part, for the benefit of the Members and their inhabitants located within the Highway 85 Corridor. It is the Authority's intent to serve as an enterprise, as such term is defined in the Colorado Constitution, Article X, Sec 20(2)(d), and in furtherance thereof, to serve as a government-owned business, engaged in the business of collecting, treating, reusing and disposing of wastewater and related activities thereof in exchange for the payment of fees, rates, charges, and assessments for the use of the Authority's functions, facilities or other improvements related to the collection, treatment, reuse and disposal of wastewater.

4. POWERS. Except as otherwise provided herein, the Authority, acting by and through its Board, shall possess all of the following powers, privileges, and duties:

4.1 To acquire, construct, manage, maintain, operate and/or finance reclamation collection and treatment facilities, systems, and improvements for water, including wastewater, or to acquire or convey a leasehold or any other interest therein.

4.2 To conduct its business and affairs for the benefit of the Members and their inhabitants and others, in the discretion of the Board.

4.3 To enter into, make and perform contracts of every kind with any Person with the capacity to contract for any of the purposes contemplated under this Contract.

4.4 To hire and retain agents, employees, engineers, attorneys, and financial and other consultants and to provide for the powers, duties, qualifications and terms of tenure thereof.

4.5 To incur debts, liabilities, or obligations to the extent and in the manner permitted by law and as provided herein, and to borrow money, and from time to time, to make, accept, endorse execute, issue and deliver bonds, notes and other obligations of the Authority for monies borrowed or in payment for the property acquired, or for any of the other authorized purposes of the Authority and as provided by law, and to the extent permitted by law to secure the payment

of any such obligations by mortgage, pledge, deed, indenture, agreement, or other collateral instrument, or by other lien upon assignment of, or agreement, in regard to, all or any part of the properties, rights, assets, contracts, easements, revenues and privileges of the Authority.

4.6 To buy, lease, construct, appropriate, contract for, invest in, and otherwise acquire, and to own, hold, maintain, equip, operate manage, improve develop, and deal in and with, and to sell, lease, place into long-term concession, exchange, transfer, convey and otherwise dispose of and to mortgage, pledge, hypothecate and otherwise encumber real and personal property of every kind, tangible, and intangible, utilized for the purposes of the Authority. [Verify Members' power to lease.]

4.7 To fix, maintain, and revise fees, rates, and charges for the use of the Authority's functions, facilities or other improvements related to the reclamation, collection, treatment, and disposal of water, and to adopt, by resolution, reasonable regulations for the public welfare and pertaining to such facilities and improvements, including without limitation, the use and protection of such facilities and improvements. The provisions of Articles 10.5 and 47 of Title 11, C.R.S., shall apply to moneys of the Authority.

4.8 To sue and be sued in the name of the Authority and to participate in all manner of legal and administrative proceedings.

4.9 To have and use a corporate seal.

4.10 To exercise any other powers which are essential to the provision of services, facilities or other improvements related to the reclamation, collection, treatment, and disposal of water by the Authority and which are specified in this Contract and in Section 18 of Article XIV, Colorado Constitution.

4.11 To permit other municipalities, special districts, or political subdivisions of this State that are authorized to provide for the reclamation, collection, treatment and disposal of water, and/or authorized to provide for the financing, construction, use, operation and maintenance of such facilities and improvements used in the reclamation, collection, treatment and disposal of water, to enter into and become a Member of this Contract at the discretion of the Board, subject to fulfilling any and all conditions or requirements of this Contract.

4.12 To adopt, by resolution, regulations respecting the exercise of the Authority's powers and the carrying out of the Authority's purposes, including without limitation water reclamation and water quality enhancement compliance with state and federal law relating to water quality.

4.13 To enact or amend Bylaws of the Board in order to efficiently conduct the affairs of the Authority, and to adopt, by resolution, regulations respecting the exercise of the Authority's powers and purposes.

4.14 To provide for the rehabilitation of any surfaces adversely affected by the construction of water reclamation, collection, treatment and disposal pipelines, facilities, systems

or other improvements related thereto, through the rehabilitation of plant cover, soil stability, and other measures appropriate to the subsequent beneficial use of such lands.

4.15 To cooperate and coordinate with necessary Persons to provide for the provision of water necessary in the reclamation of water; provided, however, the Authority shall have no power to operate or maintain any potable water distribution facilities, systems or improvements, and any reuse credits received for the treatment of wastewater shall pass back to the appropriate Member.

4.16 To establish Advisory Committees to gather, research, compare and evaluate information, and advise the Board regarding matters pertaining to the collection, treatment, reuse and disposal of wastewater and the financing, construction, use, operation, and maintenance of wastewater facilities and improvements that may be provided by the Authority, as directed by the Board.

4.17 The Authority shall have no power of taxation of any type or kind.

5. ESTABLISHMENT AND OPERATION OF BOARD OF DIRECTORS.

5.1 Board of Directors. There is hereby established a Board of Directors in which all power of the Authority shall be vested.

5.2 Appointment of Directors. Each Member, including the Originating Governmental Parties and each Member added to this Contract pursuant to Section 7.2 hereof, shall have the right to appoint one Director to the Board, who shall be, at the time of the appointment and throughout such Director's tenure on the Board, a member of the governing body of the Member. Each Director may only be removed or replaced by the Member that appointed such Director.

5.3 Alternate Director. Each Member may, from time to time, designate, in writing, an Alternate Director, who shall, in the absence of that Member's Director, be entitled to exercise the voting power of that Director. Such Alternate Director may be a senior administrative official, in lieu of an being a member of the Member's governing body. The Alternate Director, in the absence of that Member's Director, shall have the same authority as other Directors appointed to the Board and shall otherwise participate fully in all matters that come before the Authority.

5.4 Vacancies. A vacancy on the Board shall occur upon a Director's resignation from the Board, death, removal by the governing body of the Member that appointed the Director, failure of the Director to remain on the governing body of the Member, or disability. Within sixty (60) days of the vacancy, the appropriate Member shall appoint a new Director to serve on the Board to the Authority pursuant to Section 5.2 of this Contract. The newly appointed Director shall serve on the Board and may only be removed or replaced by the Member that appointed such Director in accordance with Section 5.2 of this Contract.

5.5 Voting. Each Director shall be entitled to cast one vote at a meeting of the Board on any action taken by the Board. Except as otherwise provided in this Contract, a majority of the votes cast at any meeting shall be required to authorize and adopt any action to be taken by the Board. Proxy voting is not permitted.

5.6 Quorum. The attendance of a majority of then-serving Directors of the Members at a regular or special meeting of the Board shall constitute a quorum and shall be necessary for any action taken by the Board.

5.7 Compensation. Directors may receive compensation for their services as may be determined by resolution of the Board. The Board shall provide by resolution for the reimbursement of Directors for their actual and reasonable expenses incurred on behalf of the Authority, which reimbursements shall not be considered to be compensation. No Director shall be paid any additional compensation by the Authority except as authorized by this provision.

5.8 Duties of the Board. The Board shall collectively act as is necessary and as authorized by law and by the Bylaws of the Authority, if any, to carry out the provisions of this Contract, to advance the goals and objectives of the Authority, and to fulfill the Authority's purpose as set forth in Section 3 of this Contract.

5.9 Meetings of the Board. Regular meetings of the Board shall be held at such time, on such day, and at such hour as the Board shall from time to time establish. Special meetings of the Board may be held at any time at any place within Douglas County, either upon 24 hours written notice delivered to the home or place of employment of each Director, unless such notice is waived in writing by the Director. All formal actions of the Board, whether taken at regular or special meetings, shall be recorded in such manner as the Authority shall direct, and shall be incorporated into the formal records of the Authority.

5.10 Officers. The Board shall elect a chairman, vice chairman and treasurer, each of whom must also be a Director, who shall have such powers and responsibilities as provided in the Bylaws and shall serve at the pleasure of the Board. The Board shall also select a secretary, who may be but need not be a Director, who shall maintain the records and files of the Board and the Authority. All officers shall serve for terms of one year at the pleasure of the Board. Vacancies in any office may be filled at any meeting of the Board by a majority of affirmative votes cast. Notwithstanding any dates for appointment, reappointment, or election, officers shall hold office until their successors are appointed. Alternate Directors shall not assume the offices of their Directors in the Directors' absence.

5.11 Advisory Committees. There is hereby established an Advisory Committee to be known as the "Technical Committee" to advise the Board on technical issues related to the collection, treatment, and disposal of wastewater and shall consist of qualified Persons to advise the Board on such matters as approved by the Board. The Board may establish additional Advisory Committees as it deems necessary to advise the Board regarding matters pertaining to the development of a centralized wastewater system for the Highway 85 Corridor, including the financing, construction, use, operation, and maintenance of wastewater facilities, systems and improvements to be provided by the Authority. Advisory Committees shall consist of qualified

Persons as approved by the Board. Each Advisory Committee shall report its findings at each meeting of the Board. Members of an Advisory Committee shall select a chairperson who shall speak to the Board on behalf of the Advisory Committee. Advisory Committees shall meet as often as deemed necessary by such Advisory Committees to fulfill its obligations to the Board. The Board shall take under advisement the report, findings and recommendations of any Advisory Committee; provided, however, the Board shall be under no obligation to implement the recommendations of any Advisory Committee.

6. BOUNDARIES OF THE AUTHORITY. For purposes of the Authority, the boundaries of the Authority are within the Highway 85 Corridor and comprise that certain real property located in proximity to State Highway 85 (also known as South Santa Fe) between the Plum Creek Wastewater Treatment Plan on the south, and Highlands Ranch Parkway on the north as more particularly described and depicted on **Exhibit B** attached hereto and incorporated herein by reference. The boundaries may be changed from time to time in the sole discretion of the Board. [Shall Exhibit B be a legal description which incorporates all affected land or a depiction of a conglomerate of the Members, in which case the boundaries will automatically following the combined areas of the Members?]

7. MEMBERSHIP.

7.1 Initial Members. The initial Members of the Authority shall consist of the Originating Governmental Parties.

7.2 Additional Members. Any other municipality, special district or political subdivision of the State of Colorado may become a party to this Contract and obtain membership in the Authority upon its execution of this Contract as it may have been previously amended, and upon two-thirds approval, via resolution, of the Members, and subject to fulfilling any and all conditions or requirements as may be established by the Board. An original copy of this Contract so executed by an additional Member shall be affixed to the original of this Contract.

7.3 Withdrawal of Membership. Prior to the further agreement(s) of the Members assuring financial and water reclamation flow participation of Members in the system(s) of the Authority, any Originating Governmental Party may withdraw from this Contract at anytime without permission of the other remaining Originating Governmental Parties, and any Member may withdraw from participation in the Authority by notifying the Board in writing of its intent to do so; provided, however, that no Member shall be permitted to withdraw if the Authority has taken such action as to financially commit and/or obligate the Authority to provide for the acquisition, construction, use, operation and/or maintenance of any water reclamation, collection, treatment and disposal facilities, systems and improvements, until and unless satisfactory provisions have been made to discharge all of the obligations of the Authority, including any lease made and any bonds issued or assumed thereby, in a manner that will protect the rights and interest of the holders of such obligations and the remaining Members of the Authority, and any withdrawing Member shall remain liable for the performance of any financial commitments made to the Authority prior to the time of such withdrawal. Written notice of intent to withdraw from the Authority shall be submitted to the Board with a copy of the duly adopted ordinance or resolution by the governing body of the Member seeking to withdraw from

the Authority. If a permitted withdrawal results in one or no remaining Originating Governmental Parties, this Contract shall terminate in accordance with Section 10 hereof. [Shall there be a repayment of pro rata share of costs to date of withdrawal by a withdrawing Member?] [Shall there be an initial buy-in?]

7.4 Private Representatives. The Board, on behalf of the Authority, may enter into separate contracts, similar in form as provided in **Exhibit C** attached hereto and incorporated herein by reference, with private entities ("Private Representatives") to assist the Authority in fulfilling the purposes of the Authority set forth in Section 3 of this Contract. Such Private Representatives shall be entitled to attend all meetings of the Board, to become members of any Advisory Committee established by the Board, and to provide such input on any actions to be considered by the Board; provided, however, Private Representatives shall have no voting rights or privileges and the Board shall not be obligated to take any such action in favor of the Private Representatives.

7.5 Uniform Charges. Rates, fees, tolls and charges of the Authority for its services shall be uniform for classes of services and types of services, among the Authority's Members and their customers.

8. CONNECTING TOWATER RECLAMATION, COLLECTION, TREATMENT AND DISPOSAL SYSTEM(S). The Members hereby acknowledge and agree to ensure that the Authority will serve all Members and that the costs for any Member to connect to the centralized water reclamation, collection, treatment and disposal system(s) to be developed by the Authority shall be cost efficient, fair and equitable to all Members. [Shall Members be asked to oblige themselves to adopt uniform rules and regulations relation to water reclamation and quality?]

9. TERM. This Contract shall commence on the date of its full execution by the Originating Governmental Parties. Prior to the further agreement(s) of the Members assuring financial and water reclamation flow participation of Members in the system(s) of the Authority and prior to the inclusion of any additional Members to this Contract as permitted in Section 7.2 hereof and prior to the issuance of any debt or concession lease by the Authority, the Originating Governmental Parties may terminate this Contract at any time with no further obligation to fulfill the purposes established for the Authority by this Contract. If terminated, the fixed and/or liquid assets of the Authority shall be distributed as set forth in Section 10 of this Contract. Prior to the further agreement(s) of the Members assuring financial and water reclamation flow participation of Members in the system(s) of the Authority and prior to the issuance of any debt or concession lease by the Authority. After the inclusion of any additional this Contract may be terminated by the affirmative vote of two-thirds of the Member; provided, however, that such Contract may not be rescinded or terminated so long as the Authority has any debt or lease obligations outstanding, unless provision for full payment of such obligations, by escrow or otherwise, has been made pursuant to the terms of such obligations. If not so terminated, this Contract shall continue in perpetuity.

10. DISPOSITION, DIVISION AND DISTRIBUTION OF ASSETS. Subject to the provisions of this Section 10 and without other limitation of the powers of the Board established in law or this Contract, the Board may at the time of dissolution of the Authority make such

decisions as it deems appropriate in connection with the distribution, disposition or division assets of the Authority; provided, however, in all cases, the Authority shall continue to meet its contractual and service obligations; and, provided, however, any fixed assets of the Authority shall be distributed to the Member that contributed the fixed asset to the Authority, and if more than one Member contributed to the fixed assets of the Authority, the fixed assets shall, upon agreement of the Members that contributed to the fixed assets, be distributed to one of the Members with fair and just compensation paid by said Member to the other Members that contributed to the fixed assets; and provided, however, liquid assets of the Authority, net of any obligations of the Authority, shall be equitably distributed to the Members.

11. RELIANCE. The Members acknowledge and agree that each is relying on the performance of the other(s) under this Contract, and that all actions or changes of positions undertaken pursuant thereto are made in such reliance.

12. INDEMNIFICATION. The Authority shall, to the extent permitted and within the limitations of the Colorado Governmental Immunity Act, indemnify and defend each Member, Director, Alternate Director, officer and employee of the Authority in connection with any claim or actual or threatened suit, action, proceeding (civil, criminal, or other, including appeals) in which he or she may be involved in his or her official capacity by reason of his or her being or having been such a Director, Alternate Director, officer or employee, or by reason of any action or omission by him or her in any such capacity, and shall pay any judgment resulting therefrom, except any liability arising out of criminal offenses or willful and wanton misconduct of any Director, Alternate Director, officer and employee of the Authority. Such indemnification and duty to defend shall be further subject to and limited by the resources of the Authority available for such purposes, including available insurance coverage, which the Authority shall act in good faith to obtain and maintain. This indemnification shall not apply to any suit brought by the Authority as plaintiff or third-party plaintiff, or to any suit brought by a Member to enforce the terms of this Contract, excepting a suit brought solely to enforce this indemnification according to its terms.

13. NO OBLIGATION. The debts, liabilities, or obligations of the Authority shall not be the debts, liabilities, or obligations of any Member.

14. AMENDMENT. This Contract may not be amended or modified unless otherwise agreed to in writing by all Members.

15. ASSIGNMENT. No Member may assign or transfer any of its rights or obligations hereunder without the prior written consent of the Member(s) that is a nonassigning party(ies) to this Contract.

16. NO THIRD PARTY RIGHTS. This Agreement does not and shall not be deemed to confer upon or grant to any third party any right enforceable at law or equity arising out of any term, covenant, or condition herein or the breach thereof.

17. ENFORCEMENT. The Members agree and acknowledge that this Contract may be enforced in law or equity, by decree of specific performance. In the event of final judgment that

a Member acted arbitrarily and capriciously or in bad faith in breach of this Contract, the Court shall award attorneys fees to the other Members.

18. GOVERNING LAW AND VENUE. This Agreement shall be governed by and construed in accordance with the laws of the State of Colorado. Venue and jurisdiction for any dispute arising from or out of this Agreement shall lie with the District Court of Douglas County.

19. SEVERABILITY. If a provision or any part of a provision of this Contract or the application thereof to any Person, entity or circumstances, is held invalid, such invalidity shall not affect other provisions or applications of this Contract, which can be given effect without the invalid provision or application, and to this end the provisions of this Contract, and each and every provisions thereof, are declared to be severable.

20. BINDING AGREEMENT. The provisions of this Contract shall bind and inure to the benefit of each Member and their respective successors and permitted assigns, if any.

21. ENTIRE AGREEMENT. This Contract constitutes and represents the entire, integrated agreement among the Members with respect to the matters set forth herein, and hereby supersedes any and all prior negotiations, representations, agreements or arrangements of any kind with respect to those matters, whether written or oral.

22. AUTHORITY TO ENTER CONTRACT. The signatures of those representatives of the Originating Governmental Parties to this Contract affirm that they are authorized to enter into and execute this Contract and that all necessary actions, notices, meetings and/or hearings pursuant to any law required to authorize the execution of this Contract have been made.

23. COUNTERPART EXECUTION. This Contract may be executed in several counterparts, each of which shall be deemed an original, and all of which together shall constitute one and the same instrument.

[REMAINDER OF PAGE LEFT INTENTIONALLY BLANK]

IN WITNESS WHEREOF, the undersigned parties have executed this Contract on the _____ day of _____, 20___, the Effective Date of this Contract.

_____
By: _____
Its: _____

_____
By: _____
Its: _____

EXHIBIT A

ORIGINATING GOVERNMENTAL PARTIES

EXHIBIT B

BOUNDARY OF THE AUTHORITY

EXHIBIT C

SAMPLE CONTRACT WITH PRIVATE REPRESENTATIVES

Appendix B

ISDS Technical Steering Committee Study Results

Recommendations of the

Individual Sewage Disposal System Steering Committee

February 14, 2002

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Executive Summary

An "individual sewage disposal system" or "ISDS" provides wastewater treatment and disposal, primarily for individual homes (as well as some commercial and business establishments) in areas not served by central sewer systems and wastewater treatment plants. [Terminology note: consistent with Recommendation #1 set forth below, the term "onsite wastewater system" is used instead of "ISDS" in the remainder of this document.]

Particularly as growth has led to a rapid proliferation of onsite wastewater systems in some portions of Colorado, issues have been raised regarding potential water quality impacts from such systems and the adequacy of current efforts to minimize such impacts. The ISDS Steering Committee was established in early 2001 by Jane Norton, Executive Director of the Colorado Department of Public Health and Environment. The Steering Committee members represent a wide range of expertise and interests related to onsite wastewater systems.

At its initial meetings, the Steering Committee members agreed that an important first step in their efforts would be to arrive at a consensus regarding the current status quo with respect to the potential water quality impacts of onsite wastewater systems. This effort led to the development of a Summary Characterization of Onsite Wastewater System Impacts, which is set forth in Appendix B to these recommendations. Based on its assessment of options to address the principal risk factors identified in the Summary Characterization, the Steering Committee developed the recommendations listed below.

The Steering Committee strongly supports the continuation of the current system under which local governments have the primary responsibility for regulatory oversight of onsite wastewater systems. Recommendation #2 addresses steps recommended to be taken by local governments to enhance current onsite wastewater system management. However, to expect the local public and private sectors to bear the sole responsibility for improvement to the overall state onsite wastewater system management program is unrealistic in view of the statewide nature of these issues.

In many ways, Recommendation #3 set forth below is the linchpin for the overall set of recommendations offered by the Steering Committee. In recommending that a new full-time state position be established, the Steering Committee wishes to emphasize that it is not proposing to shift responsibilities for onsite wastewater system management or to change the respective roles of state and local government. Rather, the Steering Committee believes that it is important to establish a meaningful state presence that can provide leadership and help advance the efforts by multiple jurisdictions to address the challenging issues related to onsite wastewater system management. Although the Steering Committee recognizes that the addition of any new FTE to state government poses a significant issue at this time, it believes that one full-time state position to address onsite wastewater system issues represents a very modest commitment to this area in comparison to the state resources devoted to management of wastewater treatment plants. This is particularly true since approximately one-fourth of the state population is served by such systems, rather than by centralized wastewater treatment.

Recommendation #1:
At the first opportunity, based on the need for other revisions to the current state legislation, the terminology used in statute and regulations addressing this program should be changed from "individual sewage disposal system" to "onsite wastewater system".

Recommendation #2:
Local governments should review their existing onsite wastewater system programs relative to the risk factors listed in the Summary Characterization of Onsite Wastewater System Impacts set forth above and assess the potential for enhancements to their existing programs to assure that the primary risk factors are adequately addressed. These reviews should seek to assure that those resources that are currently available, or can be made available, to address onsite wastewater systems are utilized in the most effective manner possible.

Recommendation #3:
The Department of Public Health and Environment should develop a high priority proposal for the authorization of resources to fund a minimum of one full-time position at the Department of Public Health and Environment, either through cash funds or a combination of cash and general funds. This position would provide state-level leadership to support local government oversight of onsite wastewater systems by addressing the priority issues and needs identified below.

Recommendation #4:
Colorado should strive toward the development of a performance-based approach to onsite wastewater system management that includes mechanisms for the verification of system performance. The approach should take into account varying local resources and needs, and should include adequate education and training, research and funding to support these efforts.

Recommendation #5:
The Department of Public Health and Environment should convene a focused process, with local governments and other interested stakeholders, to develop an appropriate set of performance criteria for onsite wastewater systems in Colorado, tailored to differing receiving environments. It is important that this process also explore options and develop recommendations regarding how to utilize these criteria to transition to a performance-based management system, including consideration of the appropriate state and local roles. For example, once such performance criteria are developed, consideration should be given to the appropriate role of prescriptive requirements for onsite wastewater systems (e.g. specific design and siting requirements) in relation to the performance criteria, and the current variance system regarding prescriptive requirements.

Recommendation #6:
The Department of Public Health and Environment, with input from local governments,

should review and evaluate available information regarding potential onsite wastewater system management options and make available to counties information about model systems that can be tailored to local needs.

Recommendation #7:
Three steps should be taken regarding renewable permits: (1) the Board of Health should adopt a regulation clearly authorizing local governments to issue renewable permits for onsite wastewater systems; (2) a focused process should be convened, with a full range of interested stakeholders, to develop models for renewable permit systems that address factors such as the appropriate triggering event and the appropriate length of permits; and (3) the stakeholder process should assess whether there are some circumstances in which the state should proactively encourage or require renewal permit systems or alternative mechanisms to assure ongoing maintenance and proper functioning of systems.

Recommendation #8:
The Department of Public Health and Environment, working with local governments and other stakeholders, should develop strategies and programs for education and training of persons involved with onsite wastewater system use, regulation, design, installation, maintenance or inspection. These efforts should include development of an appropriate, consistent certification system for professionals in the field, unless an alternative mechanism can be identified to assure that adequate training occurs.

Recommendation #9:
The General Assembly should identify a continuing source of funding to support onsite wastewater system research efforts in Colorado. The Department of Public Health and Environment, working with academic leaders, as well as local governments and other interested stakeholders, should develop a specific proposal regarding ongoing research needs.

Recommendation #10:
The Department of Public Health and Environment should work with local governments and other interested stakeholders to review available options for financing onsite wastewater systems, including single systems and cluster systems in high density areas. This review should also address both new systems and repair or rehabilitation of existing systems.

Recommendation #11:
The Department of Public Health and Environment should work with local governments and other interested stakeholders, including representatives of wastewater treatment facilities, to examine current septage management options and develop a strategy for assuring environmentally sound and economical management alternatives throughout the state.

Recommendation #12:
The Department of Public Health and Environment, working with interested stakeholders, should assure that the expertise of both the Board of Health and the Water Quality Control

Commission are utilized in regulating onsite wastewater systems to protect public health and the environment. In addition, there should be further clarification or refinement of their respective authorities toward this end.

Recommendation #13:
This Steering Committee should reconvene one year after the finalization and submission of this report to assess the progress that has occurred toward implementation of the above recommendations, and report back to the Board of Health and the Water Quality Control Commission at that time regarding its conclusions.

I. Background

A. Formation of the Steering Committee

An "individual sewage disposal system" or "ISDS" provides wastewater treatment and disposal, primarily for individual homes (as well as some commercial and business establishments) in areas not served by central sewer systems and wastewater treatment plants. [Terminology note: consistent with Recommendation #1 set forth below, the term "onsite wastewater system" is used instead of "ISDS" in the remainder of this document.]

Particularly as growth has led to a rapid proliferation of onsite wastewater systems in some portions of Colorado, issues have been raised regarding potential water quality impacts from such systems and the adequacy of current efforts to minimize such impacts. Since 1995, efforts have been underway to heighten awareness of potential weaknesses in the current Colorado onsite wastewater system program and to identify potential solutions. These efforts, led by local regulators, professional associations, private sector professionals, and academia, have resulted in revisions of the Colorado ISDS statute and regulatory guidelines, development of professional training opportunities and creation of the ISDS Technical Advisory Committee. In 1999, a broad-based work group effort generated a Preliminary Risk Assessment, which attempted to clarify what we currently know – and do not know – regarding potential water quality risks from such systems. In May, 2000, the Colorado Board of Health and the Water Quality Control Commission held a joint meeting to discuss these issues. That meeting resulted in a consensus that a steering committee should be established to further explore the issues raised.

The ISDS Steering Committee was established in early 2001 by Jane Norton, Executive Director of the Colorado Department of Public Health and Environment. The Steering Committee members represent a wide range of expertise and interests related to onsite wastewater systems. A list of the Steering Committee members is attached as Appendix A to these recommendations. The Steering Committee was co-chaired by Dr. Chris Wiant, member of the Water Quality Control Commission and President of the Caring for Colorado Foundation, and Kim Cook, member of the Colorado Board of Health and Rio Blanco County Commissioner. The Steering Committee met approximately monthly over the course of the past year. All meetings were open to the public, and a number of other individuals participated from time to time.

Jane Norton requested that the steering committee transmit its responses and recommendations regarding a list of questions (set forth below) no later than March, 2002. She stated her intent that once submitted the Steering Committee's recommendations would be made available for public review and be presented to the Board and the Commission with an opportunity for public comment.

B. Questions Addressed to the Steering Committee

Jane Norton's initial letter to Steering Committee members requested that the following questions be addressed:

- What, if any, information currently exists beyond that set forth in the Individual Sewage Disposal System Preliminary Risk Assessment developed by the Department work group to better characterize the potential public health and water quality risks in Colorado from individual sewage disposal systems?

- What should, and realistically can, be done to develop additional information regarding the potential public health and water quality risks in Colorado from individual sewage disposal systems?

- What can be done to improve education of each of the following groups regarding individual sewage disposal systems and their potential impacts, including providing appropriate management tools: homeowners, contractors, engineers, regulators, land use planners and elected officials?

    - Are the current regulatory structure and available resources adequate to control potential individual sewage disposal system impacts? If not, what should be done? This would include consideration of the following principal issues identified in the Department work group's June, 1999 Preliminary Summary of Individual Sewage Disposal System Issues:

    (1) Are current performance standards adequate to address both public health and cumulative water quality concerns?
    (2) Is the current permit approval process adequate?
    (3) Is the current system adequate to assure proper ongoing operation and maintenance of individual sewage disposal systems?
    (4) Does the current system provide adequate training and/or certification of designers, installers, site evaluators and inspectors?

The results of the Steering Committee's consideration of the first question are set forth in the Summary Characterization of Onsite Wastewater System Impacts, which is described in the following section of this document. The Steering Committee's responses to the remaining questions are incorporated into the discussion of Issues and Recommendations set forth in the remainder of this document.

C. Summary Characterization of Onsite Wastewater System Impacts

At its initial meetings, the Steering Committee members agreed that an important first step in their efforts would be to arrive at a consensus regarding the current status quo with respect to the potential water quality impacts of onsite wastewater systems. This effort led to the development of a Summary Characterization of Onsite Wastewater System Impacts. The full version of this document, including footnotes, is attached as Appendix B to these recommendations.

The Summary Characterization states that, from the available information, it appears that:

1. Water quality impacts are occurring from onsite wastewater systems in a number of specific areas in Colorado. However, the presence and nature of these problems often has not been verified or rigorously documented. In fact, few well-documented studies have been done in Colorado that directly link water quality or health risks with onsite wastewater systems. Examples of identified impacts include elevated nitrate and/or bacteria levels in ground water used for drinking water, and nutrient loadings adversely affecting surface waters.

2. The overall scope and extent of water quality impacts from onsite wastewater systems in most areas of Colorado is unknown. It is possible that additional impacts that have not yet been identified are occurring.

3. Although few site-specific studies have been completed, it appears that substantial cumulative loadings of nutrients to state waters are likely occurring in some areas where there are a significant total number and density of onsite wastewater systems;

    a. There are areas of known nitrate contamination and increased nitrate levels in ground water in areas of high density (lots less than one acre) and a significant number of homes.

    b. In some surface water basins, phosphorus loadings from onsite wastewater systems are a potentially significant water quality factor.

4. The potential risk posed by onsite wastewater systems varies greatly depending on a number of factors. Onsite wastewater systems pose relatively greater water quality risks when:

    a. They are present in high numbers and high density;

    b. They are present in areas served by private drinking water wells that are shallow or poorly constructed;

    c. They are improperly sited, particularly in sensitive environments;

    d. They were installed prior to 1973, when uniform design and siting standards were first established; and/or

    e. When they are not properly designed, installed, operated and/or maintained.

5. Growth trends in Colorado are likely to result in the installation of substantially greater numbers of onsite wastewater systems in the years to come. In some areas of Colorado, it will continue to be necessary and appropriate to serve homes and/or businesses with onsite wastewater systems, rather than centralized wastewater systems.

> Properly sited, designed, installed, operated and maintained onsite wastewater systems can function without resulting in adverse water quality impacts.

Following completion of the Summary Characterization of Onsite Wastewater System Impacts, the Steering Committee turned its attention to identifying options to address the identified risk factors. Based on its review of available options, the Steering Committee has developed the recommendations set forth below for improvements to the management of onsite wastewater systems in Colorado.

D. Overview of Current Onsite Wastewater System Management in Colorado

As background for the discussion of potential improvements to the management of onsite wastewater systems in Colorado, the Steering Committee provides the following summary of the current management structure. To provide some context, it is estimated that there are currently over 600,000 onsite wastewater systems in the state, with roughly 7,000 to 8,000 new permits issued each year. Approximately one-fourth of the state population is served by such systems, rather than by centralized wastewater treatment.

Pursuant to state statute, the State Board of Health adopts Guidelines on Individual Sewage Disposal Systems. These Guidelines establish minimum standards for the location, construction, performance, installation, alteration and use of individual sewage disposal systems (referred to in these recommendations as onsite wastewater systems). These Guidelines are implemented principally through rules and regulations adopted by local Boards of Health. The state role is limited to establishing the Guidelines and reviewing local regulations for consistency with the minimum standards contained in the Guidelines. The Water Quality Control Division currently devotes a total of less than one full-time equivalent (FTE) to efforts related to onsite wastewater systems (if you add up the fractional time of central office staff and 12 district engineers). By comparison, the Division devotes over 35 FTE to management of centralized wastewater treatment plants.

Local governments have the primary governmental oversight role for onsite wastewater systems. In addition to adopting requirements consistent with the state Guidelines, they have responsibility for issuing permits for the construction of such systems, including ensuring that a final inspection of each permitted facility is performed. Local programs are also responsible for the inspection of operating systems to determine if they are in conformance with established requirements, and for taking enforcement action where necessary. Local governments are also authorized to establish maintenance and cleaning schedules and practices for onsite wastewater systems and to implement programs for the licensing of both systems contractors and systems cleaners.

II. Issues and Recommendations

Issue #1: Terminology

An initial issue discussed by the Steering Committee concerns terminology. The term "individual sewage disposal system" is used in the current Colorado statute and regulations

addressing these systems. However, there is a consensus among Steering Committee members that this terminology is misleading, since the purpose and function of these systems is not solely "disposal". Although it is difficult to identify a simple, single term that accurately describes all such systems, the Steering Committee agrees that "onsite wastewater system" is the phrase in most common use in the industry today and is an improvement over the "ISDS" terminology.

Recommendation #1:
At the first opportunity, based on the need for other revisions to the current state legislation, the terminology used in statute and regulations addressing this program should be changed from "individual sewage disposal system" to "onsite wastewater system".

Issue #2: Need for Enhanced Local Programs

As described in the Background section above, management of onsite wastewater systems in Colorado to date has principally been the responsibility of local governments. The Steering Committee supports this structure, in view of the widely varying circumstances and needs in different counties and communities across the state. The primary onsite wastewater system oversight and regulatory role should remain at the local level. Therefore, in looking toward potential improvements to existing efforts, it is appropriate to look first at opportunities for enhancement of the local role.

At present there is great diversity in local regulatory programs across the state. Regulatory efforts range from highly developed, progressively analytical programs to minimal permitting and inspection only. Whatever the scope and extent of local programs, as addressed in the following recommendation, the Steering Committee believes the primary risk factors identified above in the Summary Characterization of Onsite Wastewater System Impacts can be used to review opportunities for program enhancement.

The Steering Committee believes that, to the extent feasible according to local circumstances, all local onsite wastewater system regulatory programs should include the following minimum elements:

- Permitting of all new, upgraded and repaired onsite wastewater systems;
- Inspection of all work conducted under permits issued by a regulatory agency;
- Tracking inventory and location of all onsite wastewater systems in a jurisdiction;
- Appropriate and timely enforcement for all failing or otherwise non-compliant systems;
- Education of and information sharing among users, installers, engineers, inspection and maintenance professionals, and regulatory officials involved with onsite wastewater system management;
- Identification of locally sensitive environments that may be negatively impacted by use of onsite wastewater systems; and
- A process to address and respond to any local public health and water quality

impacts related to onsite wastewater systems.

Recommendation #2:
Local governments should review their existing onsite wastewater system programs relative to the risk factors listed in the Summary Characterization of Onsite Wastewater System Impacts set forth above and assess the potential for enhancements to their existing programs to assure that the primary risk factors are adequately addressed. These reviews should seek to assure that those resources that are currently available, or can be made available, to address onsite wastewater systems are utilized in the most effective manner possible.

Issue #3: Need for an Enhanced State Leadership Role

As noted above, the Steering Committee strongly supports the continuation of the current system under which local governments have the primary responsibility for regulatory oversight of onsite wastewater systems. However, to expect the local public and private sectors to bear the sole responsibility for improvement to the overall state onsite wastewater system management program is unrealistic in view of the statewide nature of these issues. Moreover, local agencies with responsibilities for onsite wastewater systems typically are addressing this area as one of many responsibilities, making it difficult to devote substantial resources to this one area. Therefore, there is a strong consensus on the Steering Committee that an enhanced state leadership role is needed to support local government to assure an effective overall management program. Some of the specific challenges with respect to which leadership is needed are fleshed out through the remaining issues and recommendations set forth below.

In many ways, Recommendation #3 that is set forth below is the linchpin for the overall set of recommendations offered by the Steering Committee. In recommending that a new full-time state position be established, the Steering Committee wishes to emphasize that it is not proposing to shift responsibilities for onsite wastewater system management or to change the respective roles of state and local government. Rather, the Steering Committee believes that it is important to establish a meaningful state presence that can provide leadership and help advance the efforts by multiple jurisdictions to address the challenging issues related to onsite wastewater system management. Although the Steering Committee recognizes that the addition of any new FTE to state government poses a significant issue at this time, it believes that one full-time state position to address onsite wastewater system issues represents a very modest commitment to this area in comparison to the state resources devoted to management of wastewater treatment plants, as noted above.

The subsequent issues and recommendations set forth below propose a number of actions to be taken by the Department of Public Health and Environment – i.e. by the person in the recommended new state position. The recommendations identify multiple issues and efforts that the Steering Committee believes could usefully be addressed to improve onsite wastewater system management. The state role that is envisioned is not one of imposing new, top-down requirements in these areas, but rather providing leadership by facilitating a

multiple-stakeholder effort – with local government representatives as key players – to address the identified issues. Clearly, much more is identified than could be addressed by one full-time state employee in a short amount of time. Rather, the Steering Committee envisions a need for the new state FTE to prioritize and work with local governments and other stakeholders to decide how best to address these issues over time.

As addressed in the Summary Characterization, onsite wastewater systems pose a water quality risk if not properly sited, designed, installed, operated and maintained. In view of the numbers of existing onsite wastewater systems in the state (estimated to exceed 600,000 systems), and the likelihood that growth trends will result in the installation of substantially greater numbers of such systems in the years to come, onsite wastewater systems need to be addressed as an important and integral element of the overall, long-term water quality picture in Colorado.

Recommendation #3:
The Department of Public Health and Environment should develop a high priority proposal for the authorization of resources to fund a minimum of one full-time position at the Department of Public Health and Environment, either through cash funds or a combination of cash and general funds. This position would provide state-level leadership to support local government oversight of onsite wastewater systems by addressing the priority issues and needs identified below.

Note: Appendix C to these recommendations sets forth a preliminary fiscal analysis of the options for funding such a position.

Issue #4: Need for a Performance-Based Program

The Steering Committee believes that an effective onsite wastewater system program needs to be performance-based. That is, there is a need to identify the levels of performance that onsite wastewater systems should be expected to achieve in order to provide adequate protection of public health and water quality. In contrast, the existing Colorado program is based on specific design requirements that are focused primarily on disposal of wastewater, rather than treatment. Onsite wastewater systems need to provide viable long-term solutions to wastewater management in those areas where they are, and will continue to be, relied upon. Therefore, in recent years there has been a growing recognition nationally, by local governments and others involved with management and oversight of these systems, that programs are likely to be more effective if they are focused on performance criteria that reflect long-term needs, rather than on prescriptive codes.

Appropriate performance criteria may vary by location, depending on differing receiving environments. However, the overall management system needs to define such criteria to provide a target or reference point for formulating the other elements of a program and assessing their success.

After establishing appropriate performance criteria, to be effective an onsite wastewater

system management program must include an adequate mechanism to verify the performance of systems. Verification needs to involve a strategy for ongoing system maintenance and assurance of system performance.

In order to assure success, adequate performance-based onsite wastewater system management needs to provide education and training for homeowners, regulators, and those designing, installing, inspecting and maintaining such systems.

There is a need to develop information regarding regional environmental conditions to support development of appropriate performance criteria for differing receiving environments. The program also needs to include a research component, to support the development of appropriate performance criteria and to address issues regarding the design of onsite systems. The research efforts would also support education and training programs.

Finally, there is a need to provide for adequate funding of an onsite wastewater system management program. This includes both a need for adequate resources for state and local agencies involved with implementing the program and a need for realistic financing options for communities or individuals responsible for maintaining onsite systems.

These aspects of an adequate performance-based program are addressed further by the issues and recommendations that follow.

Recommendation #4:
Colorado should strive toward the development of a performance-based approach to onsite wastewater system management that includes mechanisms for the verification of system performance. The approach should take into account varying local resources and needs, and should include adequate education and training, research and funding to support these efforts.

Issue #5: Performance Criteria

As noted above, there is a need to identify the levels of performance that onsite wastewater systems should be expected to achieve in order to provide adequate protection of public health and water quality. Performance criteria provide the necessary reference point for other aspects of the onsite wastewater system management program. For example, new technology can potentially allow an increase in development density and still achieve an acceptable environmental result. There is a need to establish a system for performance criteria to provide an identifiable and consistent measure of what constitutes an acceptable result.

Appropriate performance criteria will vary in different locations, depending on differing receiving environments. For example, the Steering Committee believes that it is appropriate to require a higher level of performance from onsite systems in sensitive environments. Of course, this would require developing a definition of sensitive

environments, as well as performance criteria applicable to each of those environments.

Recommendation #5:
The Department of Public Health and Environment should convene a focused process, with local governments and other interested stakeholders, to develop an appropriate set of performance criteria for onsite wastewater systems in Colorado, tailored to differing receiving environments. It is important that this process also explore options and develop recommendations regarding how to utilize these criteria to transition to a performance-based management system, including consideration of the appropriate state and local roles. For example, once such performance criteria are developed, consideration should be given to the appropriate role of prescriptive requirements for onsite wastewater systems (e.g. specific design and siting requirements) in relation to the performance criteria, and the current variance system regarding prescriptive requirements.

Issue #6: Management Strategies

As noted above, the Steering Committee believes that the principal governmental role for onsite wastewater systems should remain at the local level. A wide variety of management strategies are available, ranging from minimal oversight to more comprehensive programs. For example, EPA's Guidelines for Management of Onsite/Decentralized Wastewater Systems identify the following five management models:

- "System Inventory and Awareness of Maintenance Needs";
- "Management Through Maintenance Contracts";
- "Management Through Operating Permits";
- "Utility Operation and Maintenance"; and
- "Utility Ownership and Management".

Clearly the onsite wastewater system management needs will vary widely within different counties and communities in Colorado. An urbanizing county experiencing substantial growth may have very different needs than a rural county with smaller densities and minimal growth.

Recommendation #6:
The Department of Public Health and Environment, with input from local governments, should review and evaluate available information regarding potential onsite wastewater system management options and make available to counties information about model systems that can be tailored to local needs.

Issue #7: Renewable Permits

One management tool that came up frequently in the Steering Committee's discussions is renewable permits. Much concern has been expressed that once an onsite system is installed, there is no mechanism to assure that it remains functional and is being properly maintained over time. The Steering Committee believes that the best option for providing

such assurance is renewable permits. Issuance and renewal of permits would be based on evidence of acceptable performance and adequate maintenance of the system in question. A renewable permit system may require regulatory and/or statutory changes.

Several variations on a renewable permit system are possible, particularly with respect to identifying the triggering event that would require a permit to be obtained. For example, a requirement could be established to require that all new, expanded, repaired or replacement systems after a specified date obtain a renewable permit. Other options would include: (1) requiring that permits be obtained or renewed at the time of property transfer, (2) requiring permits only for systems within identified problem areas, or (3) requiring that all existing systems obtain a permit by a specified date.

Recommendation #7:
Three steps should be taken regarding renewable permits: (1) the Board of Health should adopt a regulation clearly authorizing local governments to issue renewable permits for onsite wastewater systems; (2) a focused process should be convened, with a full range of interested stakeholders, to develop models for renewable permit systems that address factors such as the appropriate triggering event and the appropriate length of permits; and (3) the stakeholder process should assess whether there are some circumstances in which the state should proactively encourage or require renewal permit systems or alternative mechanisms to assure ongoing maintenance and proper functioning of systems.

Issue #8: Education and Training

The Steering Committee believes that there is a definite need for additional education and training of persons with a role regarding onsite wastewater systems. First, there is a need for additional education of homeowners and owners of small commercial systems regarding the importance of ongoing maintenance of these systems. Informational literature and communication strategies for getting information to system owners need to be developed.

Second, there is a need to provide adequate training of those involved with the regulation and oversight of onsite wastewater systems, the design and installation of such systems, and those involved with inspection and/or maintenance of such systems. The Steering Committee believes that the only proven mechanism for assuring that such training occurs is a certification program. Therefore, development of a certification program for professionals in the onsite wastewater system management field should be explored. Of course, any such certification program could be tailored in terms of its applicability or the scope of requirements based on varying regional circumstances, including, e.g., differences in receiving environments. The state already has in place a certification program for operators of domestic wastewater treatment plants. Certification of professionals involved with onsite wastewater systems would assure a consistent level of qualifications whether such wastes are handled in centralized treatment plants or decentralized, onsite systems. Moreover, experience indicates that without a certification requirement adequate training does not occur.

Recommendation #8:
The Department of Public Health and Environment, working with local governments and other stakeholders, should develop strategies and programs for education and training of persons involved with onsite wastewater system use, regulation, design, installation, maintenance or inspection. These efforts should include development of an appropriate, consistent certification system for professionals in the field, unless an alternative mechanism can be identified to assure that adequate training occurs.

Issue #9: Applied Research

The Steering Committee believes that there is a need for a long-term program of research in Colorado that supports onsite wastewater system science and engineering in the state. Fundamental and applied research is needed to advance the science and engineering of soil-based and alternative onsite and small flows treatment technologies and to enhance the long-term viability of decentralized wastewater system approaches in Colorado. A multidisciplinary program should be designed to quantify and model key hydraulic and purification processes in natural and engineered systems at the single lot to subdivision scales, as well as all the way up to the watershed scale. Research should result in information that can be used for effective system siting, design, installation, operation and evaluation to ensure the cost-effective protection of public health and environmental quality in Colorado. To that end, a research program should also result in materials and facilities that could foster effective education and training of regulators, practitioners, and consumers.

Recommendation #9:
The General Assembly should identify a continuing source of funding to support onsite wastewater system research efforts in Colorado. The Department of Public Health and Environment, working with academic leaders, as well as local governments and other interested stakeholders, should develop a specific proposal regarding ongoing research needs.

Issue #10: Financing

Development and maintenance of an adequate onsite wastewater system program requires adequate financial resources. There is a need for realistic financing options for communities or individuals responsible for maintaining onsite systems, including for repair or replacement of inadequate or improperly functioning systems. Potential options for both low-cost loans and grants should be examined.

Recommendation #10:
The Department of Public Health and Environment should work with local governments and other interested stakeholders to review available options for financing onsite wastewater systems, including single systems and cluster systems in high density areas.

This review should also address both new systems and repair or rehabilitation of existing systems.

Issue #11: Septage Management

"Septage" refers to the liquid and/or solid material removed from a septic tank or other onsite wastewater system that receives only domestic or domestic-type wastes. Concern has been expressed that options for proper septage management in Colorado have been diminishing in recent years. Fewer domestic wastewater treatment plants are accepting such wastes, due to capacity constraints and/or concerns about their ability to meet effluent limitations in their discharge permits. The lack of convenient and economical septage management options discourages appropriate maintenance of onsite wastewater systems and also contributes to increased direct application of septage to rural lands. While legally acceptable if done in conformance with the requirements of the EPA biosolids regulations, this practice often results in nuisance complaints from neighboring property owners.

Recommendation #11:
The Department of Public Health and Environment should work with local governments and other interested stakeholders, including representatives of wastewater treatment facilities, to examine current septage management options and develop a strategy for assuring environmentally sound and economical management alternatives throughout the state.

Issue #12: State Authority

The Colorado Water Quality Control Commission has primary responsibility for the development of a water quality management system in Colorado. However, the State Board of Health is responsible for the adoption of guidelines and rules governing onsite wastewater systems. The Board's focus has historically been on public health concerns associated with onsite wastewater systems, rather than with potential water quality impacts. While the Board and the Commission have cooperated informally in the creation of this Steering Committee, there has been no effort to examine the optimal long-term integration of the roles of these two bodies regarding onsite wastewater systems.

Recommendation #12:
The Department of Public Health and Environment, working with interested stakeholders, should assure that the expertise of both the Board of Health and the Water Quality Control Commission are utilized in regulating onsite wastewater systems to protect public health and the environment. In addition, there should be further clarification or refinement of their respective authorities toward this end.

Issue #13: Follow-up

The Steering Committee believes that it will be important to assure that follow-up occurs to assess progress in addressing the issues and recommendations set forth above.

Recommendation #13:
This Steering Committee should reconvene one year after the finalization and submission of this report to assess the progress that has occurred toward implementation of the above recommendations, and report back to the Board of Health and the Water Quality Control Commission at that time regarding its conclusions.

III. Conclusions and Next Steps

The Steering Committee believes that more can and must be done to facilitate proper utilization of onsite wastewater systems in Colorado to assure protection of public health and water quality, particularly in view of recent and continuing growth and development. A well-considered program to address onsite wastewater systems is an important component of an overall water quality management strategy for the state.

As enumerated above, the Steering Committee is recommending several specific actions to address the issues that have been raised. The critical starting point to facilitate such efforts is the authorization of adequate resources to provide state leadership to address the specific issues described above and thereby assist local governments in Colorado with the implementation of onsite wastewater system management efforts. The feasibility of the remaining Steering Committee recommendations is directly dependent on the procurement of the additional state level resources recommended. Therefore, the Steering Committee believes that implementation of Recommendation #3 is the highest priority and should be completed at the earliest feasible date, but no later than 12 months after the finalization and submission of this report.

The Steering Committee also urges that substantial progress occur with respect to Recommendations #4 through #8 within one year after the creation of the new state-level leadership position. Specifically, the Steering Committee urges that the goals of the first year's efforts include:

- The establishment of new performance criteria;
- The development of model management strategies;
- Authorization for local governments to implement renewable permits, development of renewable permit models and recommendations regarding further renewable permit implementation efforts;
- Initial efforts to advance education and training, including recommendations regarding certification of professionals; and
- The development of a proposal to address ongoing research needs.

The concern about potential impacts of onsite wastewater systems is not unique to Colorado. In recent years there has been increasing recognition nationally of the need to

develop sound programs regarding such systems. The Steering Committee believes that there is a need for Colorado to address this issue proactively and to develop an approach that is tailored to our needs and circumstances. Toward that goal, the Steering Committee urges expeditious implementation of the recommendations set forth above.

Appendix A
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Appendix B
Summary Characterization of Onsite Wastewater System Impacts

The ISDS Steering Committee has agreed on the following summary characterization of the status quo regarding the potential water quality impacts of onsite/decentralized wastewater systems[1], commonly referred to as individual sewage disposal systems (ISDS).

From the available information, it appears that:

1. Water quality impacts are occurring from onsite wastewater systems in a number of specific areas in Colorado. However, the presence and nature of these problems often has not been verified or rigorously documented. In fact, few well-documented studies have been done in Colorado that directly link water quality or health risks with onsite wastewater systems. Examples of identified impacts include elevated nitrate and/or bacteria levels in ground water used for drinking water, and nutrient loadings adversely affecting surface waters. [2]

2. The overall scope and extent of water quality impacts from onsite wastewater systems in most areas of Colorado is unknown. It is possible that additional impacts that have not yet been identified are occurring.

3. Although few site-specific studies have been completed, it appears that substantial cumulative loadings of nutrients to state waters are likely occurring in some areas where there are a significant total number and density of onsite wastewater systems;

    a. There are areas of known nitrate contamination and increased nitrate levels in ground water in areas of high density (lots less than one acre) and a significant number of homes.[3]

    b. In some surface water basins, phosphorus loadings from onsite wastewater systems are a potentially significant water quality factor.[4]

4. The potential risk posed by onsite wastewater systems varies greatly depending on a number of factors. Onsite wastewater systems pose relatively greater water quality risks when:[5]

    a. They are present in high numbers and high density;

    b. They are present in areas served by private drinking water wells that are shallow or poorly constructed;

    c. They are improperly sited, particularly in sensitive environments;

    d. They were installed prior to 1973, when uniform design and siting standards were first established[6]; and/or

    e. When they are not properly designed, installed, operated and/or maintained.

5. Growth trends in Colorado are likely to result in the installation of substantially greater numbers of onsite wastewater systems in the years to come.[7] In some areas of Colorado, it

will continue to be necessary and appropriate to serve homes and/or businesses with onsite wastewater systems, rather than centralized wastewater systems.[8]

6. Properly sited, designed, installed, operated and maintained onsite wastewater systems can function without resulting in adverse water quality impacts.[9]

Footnotes

1. "Onsite wastewater systems" as defined for the purposes of this document consist of pretreatment using a septic tank followed by discharge into aggregate- or chamber-filled trenches or beds from which infiltration and percolation occurs and advanced treatment can be achieved prior to groundwater recharge. It is recognized there are major differences in system siting, design, installation and operation based on a system's geographic location and date of installation. Moreover, there are a variety of new and emerging approaches (e.g. centralized management) as well as devices and technologies (e.g., intermittent sand, foam, or textile filters) that are increasingly being used for onsite wastewater treatment and disposal/reuse.

2. The *Pueblo County Septic Tank Nitrate Study* (Pueblo Regional Planning Commission 1982) documented elevated levels of nitrate-nitrogen in nine areas around Pueblo. Boulder County identified 12 subdivisions with ground water and surface water contaminated by nitrates as reported by the Denver Regional Council of Governments in the *Operation and Maintenance of Sewage Disposal Systems- An Analysis of Alternatives for Shannon Estates in Boulder County, Colorado* (DRCOG 1984). Researchers from Colorado State University identified many mountain homes potentially using bacterial laden well water caused by misplacement of leach fields *(How Safe Is Mountain Well Water,* CSU 1972). Other studies done by the Colorado State University and local health departments document elevated nitrates in groundwater for specific locations. Colorado State University, 1978, 3rd Workshop on Home Sewage Disposal in Colorado Community Management. (July 1978); Colorado State University, 1980, Groundwater Monitoring Strategies to Support Community management of Onsite Home Sewage Disposal Systems. (June 1980); Peterson, T.C. and R.C. Ward. 1987. Bacterial Transport in Coarse Soils Beneath On-Site Wastewater Treatment Systems, Colorado State University.

3. See, e.g., the Pueblo County study referenced in footnote 1, and "Ground-water Quality, West Jefferson County, Colorado. Hydraulic Engineering and the Environment Proceedings, 1973, Biesecker, Hofstra and Hall.

4. Phosphorus loading into several Colorado reservoirs – Dillon, Cherry Creek, Chatfield, and Bear Creek – has caused adverse water quality impacts that have led to the development of Control Regulations to control phosphorus loadings. For example, water quality monitoring in the Bear Creek Watershed over a 15-year period has shown that there is a phosphorus-loading problem in Bear Creek Reservoir. Screening surveys completed by the Bear Creek Watershed Association show elevated levels of phosphorus in areas with a higher density of on-site wastewater systems, such as Idledale. Bear Creek Watershed Association, 1998, 1997 Bear Creek Watershed Association Annual Report. Prepared by Denver Regional Council of Governments, May, 1998; Bear Creek Watershed Association, 1997a, Management Program Review and 1990-1995 Water Quality Summary. Prepared by Denver Regional Council of Governments, January 16, 1998.

5. The potential risk posed by onsite wastewater systems is very dependent on the environmental setting and potential receptors therein as well as the system design and performance. Unacceptable adverse impacts could occur in some settings if wastewater constituents of concern (e.g., nitrogen, bacteria) are not treated to a degree that the percolate from the system(s) reaches a receiving water and the residual pollutant concentrations and/or mass loadings are still high. Information describing the design and performance of onsite wastewater systems and risk-based decision-making may be found in recent publications. Siegrist, R.L., E.J. Tyler, and P.D. Jenssen, 2001, Design and Performance of Onsite Wastewater Soil Absorption Systems, EPRI report no. 1001446, Electric Power Research Institute, Palo Alto, CA; Jones, D.A., A.Q. Armstrong, M.D. Multheim, and B.V. Sorensen, 2001, Integrated Risk Assessment/Risk Management as Applied to Decentralized Wastewater Treatment, EPRI report no. 1001446, Electric Power Research Institute, Palo Alto, CA.

6. In 1973, the Colorado Clean Ground Water Act was adopted, which directed the Board of Health to develop and adopt guidelines regarding onsite wastewater system types, siting restrictions, and local process requirements. Prior to this, there was no uniform basis for the design, siting or installation of these systems.

7. In the four years in which the Colorado Environmental Health Association ISDS Committee has requested information – 1997 through 2000 – the number of new permits issued from reporting agencies has increased from 6,918 permits in 1997 to 8,123 permits in 2001, or a 5% to 6.3% increase per year.

8. USEPA 1997, Response to Congress on Use of Decentralized Wastewater Treatment Systems, USEPA Office of Water, Washington, D.C.

9. Use of onsite wastewater systems without adverse effects on environmental quality or public health has been demonstrated through decades of basic and applied research including field monitoring of single systems at isolated homesites as well as large subdivision-scale applications. Further information on this may be found in Siegrist, et al., 2001 and USEPA, 1997, cited above; USEPA 1978, Management of Small Waste Flows, Report of Small Scale Waste Management Project, University of Wisconsin, Madison, WI, USEPA Municipal Environmental Res. Lab., EPA-600/2-78-173, Cincinnati, Ohio; USEPA1980, Design Manual for Onsite Wastewater Treatment and Disposal Systems, USEPA Municipal Environmental Res. Lab., Cincinnati, Ohio; and Van Cuyk, S., R.L. Siegrist, A. Logan, S. Masson, E. Fischer, and L. Figueroa, 2001, Hydraulic and Purification Behaviors and their Interactions During Wastewater Treatment in Soil Infiltration Systems, *Water Research*, 35(4):953-964.

Appendix C
Preliminary Fiscal Analysis Regarding Proposed New State Position

Steering Committee Recommendation #3 states: *The Department of Public Health and Environment should develop a high priority proposal for the authorization of resources to fund a minimum of one full-time position at the Department of Public Health and Environment, either through cash funds or a combination of cash and general funds. This position would provide state-level leadership to support local government oversight of onsite wastewater systems by addressing the priority issues and needs identified below.*

This Appendix provides a preliminary fiscal analysis regarding the potential establishment of a new full-time position within the Department of Public Health and Environment. This analysis is based on the following assumptions:

- The new position would be either a Professional Engineer I or an Environmental Protection Specialist II. While further analysis of the duties and appropriate classification of this position would be necessary, these two classifications appear to be the most likely options.
- There are currently approximately 7,000 to 8,000 individual sewage disposal system permits issued each year by local governments in Colorado for new onsite wastewater systems. In addition, 1,000 to 3,000 permits are issued each year for repair and replacement of existing onsite wastewater systems. It is assumed that future permit issuance will continue in this same range.

The following two pages of this Appendix provide an initial estimate of position costs over the next two years for a Professional Engineer I or an Environmental Protection Specialist II. These costs range from approximately $83,300 to $91,000 per year.

One option identified by the Steering Committee to provide cash funding for the new position that is recommended would be a surcharge on new onsite wastewater system permits issued by local governments. Based on the above assumptions, the range in size of such a surcharge would be from roughly $8.30 per permit (assuming an EPS II and 10,000 permits issued annually) to $11.40 per permit (assuming a Professional Engineer I and 8,000 permits issued annually). These surcharge levels assume that the new position would be totally cash-funded from this source. Of course, if general funds were available to cover a portion of the cost, the amount of the surcharge would be reduced proportionately.

The Steering Committee offers this preliminary analysis to begin to frame the options for funding a new position. It recommends that other options also be explored. For example, there may be other cash funding options, including, e.g. (1) new development impact fees, and (2) new septage hauling fees. Also, note that if a decision were made to require renewable permits for onsite wastewater systems, the number of permits issued each year would increase and therefore the necessary surcharge to fund a new position would decrease. These and other options warrant further analysis and discussion, including in particular additional input from local governments.

Request 1 FTE - Environmental Protection Specialist II

	FY03 - 7/1/02	FY04 - 7/1/03
Salary	$53,040	$55,798
Fringe	$10,041	$10,563
Total Position Costs	**$63,081**	**$66,362**
Operating*	$3,946	$517
Travel	$1,000	$1,034
Total Direct Costs	**$68,027**	**$67,913**
Indirect Costs	$15,306	$15,280
Total Estimated Costs	**$83,333**	**$83,193**

Assumptions -

*1st year operating costs include, purchase of new computer, desk and start-up supplies ($3,946), 2nd year decreases to $500 plus 3.4% CPI increase.

Salary and fringe costs increased year to year by estimated 5.2 salary survey increase.

Travel costs increased year to year by 3.4% CPI estimate.

Current cash funds indirect rate is 22.5%.

Proposal for ISDS Specialist

Request 1 FTE - Professional Engineer I

	FY03 - 7/1/02	**FY04 - 7/1/03**
Salary	$58,474	$61,515
Fringe	$10,687	$11,243
Total Position Costs	**$69,161**	**$72,757**
Operating*	$3,946	$517
Travel	$1,000	$1,034
Total Direct Costs	**$74,107**	**$74,308**
Indirect Costs	$16,674	$16,719
Total Estimated Costs	**$90,781**	**$91,028**

Assumptions -

*1st year operating costs include, purchase of new computer, desk and start-up supplies ($3,946), 2nd year decreases to $500 plus 3.4% CPI increase.

Salary and fringe costs increased year to year by estimated 5.2 salary survey increase.

Travel costs increased year to year by 3.4% CPI estimate.

Current cash funds indirect rate is 22.5%.

Appendix C

Section 25-10-110, Colorado Revised Statutes, ISDS Restrictions

Colorado Department
of Public Health
and Environment

DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Water Quality Control Division

5 CCR 1003-6

STATE BOARD OF HEALTH
GUIDELINES ON INDIVIDUAL SEWAGE DISPOSAL SYSTEMS

Amended September 20, 2000, effective October 30, 2000
Section IV.K. amended September 15, 2004, effective November 30, 2004

DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Water Quality Control Division

5 CCR 1003-6

STATE BOARD OF HEALTH
GUIDELINES ON INDIVIDUAL SEWAGE DISPOSAL SYSTEMS

TABLE OF CONTENTS

I. Scope and Applicability

A. Declaration:

In order to preserve the environment and protect the public health; to eliminate and control causes of disease, infection, and aerosol contamination; and to reduce and control the pollution of the air, land and water, it is declared to be in the public interest to establish minimum standards, rules and regulations for individual sewage disposal systems in the state of Colorado and to provide the authority for the administration and enforcement of such minimum standards, rules, and regulations.

B. Purpose:

The purpose of these guidelines as authorized and required by Article 10 Title 25, C.R.S. is to provide guidance and establish minimum standards for the location, construction, performance, installation, alteration and use of individual sewage disposal systems within the state of Colorado, and shall constitute the basis for the adoption of detailed rules and regulations by local boards of health concerning the application for and issuance of permits, the inspection, testing, and supervision of installed systems, the issuance of cease and desist orders, the maintenance and cleaning of systems, and the disposal of waste material.

These guidelines shall apply to individual sewage disposal systems.

C. Situations Where Local Health Departments Have Jurisdiction to Adopt Regulations:

1. In a county which is not part of a district or regional health department and which has, by resolution of its board of county commissioners, established and maintains a county health department or an environmental health department, pursuant to Part 5, Article 1 of Title 25, C.R.S., the board of health in said department shall have jurisdiction over the unincorporated portion of the county and over the territory of all municipalities within the county unless any such municipal corporation therein, having a population in excess of 40,000, maintains its own health department and employs a supervising health officer and has not by agreement of its governing body with the board of county commissioners merged with the latter. (25-1-501 and 504).

2. A county which has, pursuant to said Part 5, Article 1 of Title 25, joined

with other counties in establishing a district health department, and all municipal corporations within the territorial limits of the counties in said district with a population of 40,000 or less, together with any such municipality over 40,000 which has agreed, pursuant to Section 25-1-504(1)(a), to merge and has merged into said district, shall all be subject to the jurisdiction of the board of health of the district health department.

3. Each county health department and each district health department created pursuant to said Part 5 of Article 1 of Title 25, and each county which has not established a county health department or become a part of a district health department pursuant to said Part 5 but which has joined with other counties, by action of their respective boards of county commissions to so organize, and all municipalities within the territorial limits of the counties comprising the region except municipalities of over 40,000 population which have not by merger agreement subjected themselves to the jurisdiction of the local county or local district health department pursuant to said Part 5, may be organized pursuant to Part 7 of Article 1 of Title 25 into a regional health department and become subject to the jurisdiction of the regional board of health, which board has authority to adopt local ordinances, rules and regulations pursuant to C.R.S., Section 25-1-706, but may not exercise executive or administrative functions, which latter functions must be exercised by local boards of health as provided by law or as provided by said regional board of health in its delineation of responsibilities under said ordinances, rules and regulations.

4. If a county has not adopted a resolution creating a county health department and is not part of a district health department, in both cases pursuant to said Part 5, and is not part of a regional health department established pursuant to said Part 7, then the board of county commissioners of the county shall function as the board of health of said county (25-1-608) and shall have jurisdiction over all the unincorporated part of said county and over all parts of each county not represented by town or city organizations.

5. In incorporated towns the board of trustees and in incorporated cities the mayor and council shall act and have jurisdiction as boards of health in counties wherein the boards of county commissioners have not established their respective counties within a county or district health department pursuant to said Part 5 or within a regional health department pursuant to said Part 7.

II. Regulations Adopted by/for Local Boards of Health

A. Regulation Coverage:

Regulations adopted by local boards of health or by the state board pursuant to current guidelines of the state board and adopted in compliance with Section 25-10-104(2), (3), and (4) C.R.S., shall govern all aspects of permits, performance, location, construction, alteration, installation, and use of individual sewage disposal systems of less than 2,000 gallon per day design capacity. (Site approval and a discharge permit from the Department are required for a system with design capacity greater than or equal to 2,000 gallons per day, but local Individual Sewage Disposal System Regulations then govern all other aspects of permits, performance, construction, alteration and installation.)

B. Local boards of health shall have one year from the effective date of these guidelines within which to amend their existing regulations or to adopt rules and regulations which shall be no less stringent than these guidelines, unless their existing rules and regulations are found upon timely submission to and approval by the Department to satisfy the stringency requirements of these guidelines, in which case they shall remain in effect.

If at the expiration of said one year period a local board of health has not obtained approval by the department of the rules and regulations pursuant to these guidelines, these guidelines shall then become the rules and regulations within that jurisdiction and shall be effective until such time as the local board of health adopts its own rules and regulations and they are found by the department to be in compliance with Sections 25-10-105 and 25-10-106, C.R.S. and are no less stringent than these guidelines promulgated by the state board.

C. Procedures to adopt rules and regulations by the local board of health shall be as follows:

1. A preliminary draft of proposed rules and regulations, or amendments thereto, shall be transmitted to the Department for preliminary review at least 30 days prior to a public hearing before a local board of health.

2. Before finally adopting rules and regulations or any amendments thereto, the local board of health shall hold a public hearing on the proposed rules and regulations or amendments thereto.

3. Notice of the time and place of such hearing shall be given at least once, at least 20 days in advance thereof in a newspaper of general circulation within its area of jurisdiction.

4. The local board of health may make changes or revisions in the proposed rules and regulations, or amendments thereto, after the public hearing and prior to final adoption, and no further public hearing shall be required regarding such changes or revisions.

5. All such rules and regulations, and amendments thereto, shall be transmitted to the Department not later than five days after final adoption and shall become effective 45 days after final adoption unless the Department has sooner notified the local board of health that the rules and regulations or amendments thereto or any portions thereof are not in compliance with Sections 25-10-105 and 25-10-106, C.R.S. or with these or later State Board guidelines, or are less stringent than those promulgated by the state board. Any such portions determined by the Department not to be in compliance with said Sections 25-10-105 and 25-10-106 and these guidelines, shall not take effect or be published as rules and regulations of the local board of health and, until made to comply with and be no less stringent than said sections and current guidelines or rules and regulations promulgated by the State Board, said guidelines or rules and regulations of the State Board shall be effective and control such matters and shall be included as part of the rules and regulations of said local board. Such determination by the Department concerning the matters of non-compliance and less stringency shall be provided by written notification received no later than the commencement of business on the 45th day following the date of final adoption, except that if such date falls on a weekend or state holiday, the notice shall have been received not later than the business day next preceding said 45th day.

III. Definitions

Absorption System - waste water disposal field or a leaching field and adjacent soils or other system for the treatment of sewage in an individual sewage disposal system by means of absorption into the ground and may include evapotranspiration.

Absorption Trench - one or more trenches not over three feet in width in which sewage effluent is percolated into the soil.

Aerobic Sewage Treatment System - an individual sewage disposal system employing

application for a type system not otherwise provided for in paragraphs (e) to (j) of subsection (1) of C.R.S. 25-10-105 only if the system has been designed by a registered professional engineer, and only if the application provides for the timely installation of a backup system of a type described in said paragraphs in the event of a failure of the experimental system. A local board of health shall not arbitrarily deny any person the right to consideration of an application for such a system and shall apply reasonable performance standards in determining whether to approve such an application. (25-10-107 (2)).

K. Prohibition of Individual Sewage Disposal Systems in Unsuitable Areas:

1. The local board of health may conduct a public hearing, after written notice to all affected property owners as shown in the records of the county assessor and publication of notice in a newspaper of general circulation at least ten days prior to the hearing, to consider the prohibition of permits for individual sewage disposal systems in areas defined in paragraph 2 below, or in defined areas which contain or are subdivided for a density of more than two dwelling units per acre. The local board of health may order such prohibition upon a finding that the construction and use of additional individual sewage disposal systems in the defined area will constitute a hazard to the public health or the environment. In such a hearing, the local board of health may request affected property owners to submit engineering and geological reports concerning the defined area and provide a study of the economic feasibility of constructing a sewage treatment works (§25-10-110, CRS).

2. Within the Cherry Creek watershed in Arapahoe and Douglas counties, no new individual sewage disposal systems shall be constructed within the 100-year flood plain as designated by the Urban Drainage and Flood Control District, or the Federal Emergency Management Agency if no Urban Drainage and Flood Control District designation exists. This restriction shall not apply to the replacement of, or improvements to the operation of, existing individual sewage disposal systems located within the 100-year flood plain.

L. Fees:

Fees authorized in these guidelines shall be set at such amounts as are deemed necessary to cover the operational expense of the several agencies but shall not exceed the maximum amounts specified in these guidelines.

Section;

(f) Willfully fails to submit proof of proper maintenance and cleaning of a system as required by rules and regulations adopted pursuant to Section 25-10-106, C.R.S.

XVI Statement of Basis and Purpose – September 20, 2000

The Individual Sewage Disposal System Guidelines mandated by Article 10 of Title 25, Section 25-10-104 (1) C.R.S., were first adopted in October of 1973 as temporary emergency guidelines. The State Board of Health then adopted those Guidelines, with minor revisions, in 1974.

As more experience was gained in the field, many questions were directed to the Water Quality Control Division for resolution. Based on the subsequent discussions held with local health agencies, the General Services Section of this Division conducted a limited investigation into the various causes of the ISDS failures throughout the State during the summer of 1977.

The Office of the Attorney General advised the Division of the need to review the 1974 Guidelines. The Division's experience had shown that some local jurisdictions had not adopted their own ISDS regulations as required by Section 25-10-104 (2). This made monitoring and enforcement difficult for this Division. Therefore, the Guidelines, which were adopted in May of 1979, contained a provision that the Guidelines became the local ISDS regulations for any jurisdiction, which failed to adopt its own regulations within one year.

The advent of alternatives in on-site treatment and disposal technology and the 1983 passage of HB 1400, which redefined an individual sewage disposal system, necessitated the revision of the 1979 Guidelines. The Department notified all local boards of health of the opportunity to participate in this revision and accepted all that attended the first two meetings as committee members.
The Colorado Court of Appeals ruled on June 9, 1988 that Language in Section IX of the 1984 Guidelines, providing that systems must "consistently meet" certain standards, is unconstitutionally vague. The 1988 Guidelines identified effluent sampling frequencies and defined the allowable amount and frequency of exceedances of those standards in response to the Court of Appeals ruling.

Further advances in on-site treatment and disposal technologies, as well as a need for general housekeeping review of the regulations, necessitated a revision of the 1988 Guidelines in 1994. This process was initiated by members of the Western Colorado Association of Environmental Health Officers who authored the initial draft of the revised Guidelines. Input was then solicited from all local health agencies. The resulting revisions were then referred back to all local health agencies and to those individuals who had expressed interest in the process.

The main objectives in the 1994 Guidelines were to incorporate new treatment and disposal alternatives, to generally improve the readability of the document, and to correct

a long-standing error in the formula for sizing of evapo-transpiration systems.

In 1997 the Colorado General Assembly made significant revisions to the Individual Sewage Disposal Systems Act. Among the revisions to the ISDS Act was a provision allowing the local board of health "to grant variances to ISDS rules in accordance with the guidelines for rules adopted and revised by the state board" (Section 25-10-105 (2) (a)). On January 19, 2000 the State Board of Health adopted Section XVIII Variance Procedure. This addition to the Guidelines established the framework for that local variance process. All other elements of the Guidelines remained as adopted in 1994.

A review of the newly adopted Section XVIII by the staff of the Office of Legislative Legal Services commenced a discussion of the respective roles of local boards of health and staff regarding the hearing and issuance of variances. The concern centered on the compatibility of the delegation of authority by the board of health to the health officer, environmental health specialist, or similarly qualified individual with the legislative provision granting the authority to grant variances to the local board of health. Ultimately, it was the opinion of the staff of the Office of Legislative Legal Services that the provisions of paragraph B.2.b., providing that "the board may delegate the authority to approve or deny variance requests to the health officer, environmental health specialist, or similarly qualified individual, as designated" to impose requirements and conditions on an approved variance, conflict with the ISDS Act. The ISDS Act, in Paragraph (2) (a) of 25-10-105 provides that "a local board of health shall have authority to grant variances to ISDS rules".

The purpose for adoption of these Guidelines is to bring the variance procedure into compliance with the provisions for such a process as defined in the enabling statute.

In these revised 2000 Guidelines, changes are made to delete provisions related to the delegation of authority from the local board of health to the health officer, environmental health specialist, or other similarly qualified individual with respect to the variance process. The remaining changes proposed are for the purpose of readopting changes made at the previous rulemaking hearing so that the rule as published in CRS is consistent with that adopted by the Board. Language related to liability on the part of local boards of health, which grant variances, is also deleted. The description of the ISDS permit fee is expanded to cover permits with variances. Examples are provided describing conditions, which might exist, or actions, which might be taken to justify the granting of a variance. The prohibition on the granting of variances to mitigate construction errors is expanded to cover issues other than the ISDS itself.

All other element of the Guidelines remain as adopted in 1994 and all other provisions of Section XVIII establishing minimum procedural requirements regarding the application for, review of, and decision making regarding variances from elements of the ISDS Guidelines remain as adopted in January of 2000.

This statement of basis and purpose applies only to the current Guidelines and not to any previous version.

The above statements are intended to comply with 24-10-103 C.R.S.

Appendix D

Alternative Cost Estimates

3 MGD scenario

Alternative1

	Construction	Lenghth of pipe	Unit Cost*	Total Cost	
Gravity	Pipe (in)	L	Unit ($/LF)	$	New Regional WWTF located in the vicinity of SSFMD
	10	8,500	$125	$ 1,064,194	
	12	19,020	$136	$ 2,588,359	
	15	12,200	$150	$ 1,826,277	
	18	15,000	$167	$ 2,510,790	
	24	9,600	$197	$ 1,894,320	
	Pipe Lengths	64,320	TOTAL	$ 9,883,939	

Alternative 2-A

	Construction	Lenghth of pipe	Unit Cost*	Total Cost	
Gravity	Pipe (in)	L	Unit ($/LF)	$	Northern Regional All flows to Centennial
	10	8,500	$125	$ 1,064,194	
	12	19,020	$136	$ 2,588,359	
	15	12,200	$150	$ 1,826,277	
	18	15,000	$167	$ 2,510,790	
	24	9,600	$197	$ 1,894,320	
	33	18,600	$259	$ 4,809,286	
Force main	10	2,640	$116	$ 305,377	
	Pipe Lengths	85,560	TOTAL	$ 14,998,603	0.7 MGD

Alternative 2-B

	Construction Cost	Lenghth of pipe (ft)	Unit Cost*	Total Cost	
	Pipe (in)	L	Unit ($/LF)	$	Northern Regional All flows to Dominion
	10	8,500	$125	$ 1,064,194	
	12	19,020	$136	$ 2,588,359	
	15	12,200	$150	$ 1,826,277	
	18	15,000	$167	$ 2,510,790	
	24	12,240	$197	$ 2,415,258	
	20	5,800	$170	$ 986,625	
	Pipe Lengths	72,760	TOTAL	$ 11,391,502	3 MGD

Alternative 2-C

Construction Cost	Lenghth of pipe (ft)	Unit Cost*	Total Cost	
Pipe (in)	L	Unit ($/LF)	$	Northern Regional All flows to Littleton/Englewood via Roxborough
10	8,500	$125	$ 1,064,194	
12	19,020	$136	$ 2,588,359	
15	12,200	$150	$ 1,826,277	
18	15,000	$167	$ 2,510,790	
24	33,360	$197	$ 6,582,761	
20	5,800	$170	$ 986,625	
		Rox Sewer Upgrade	$ 6,000,000	
Pipe Lengths	93,880	TOTAL	$ 21,559,005	3 MGD

Alternative 2-D

	Construction	Lenghth of pipe	Unit Cost*	Total Cost	
	Pipe (in)	L	Unit ($/LF)	$	Northern Regional All flows to Littleton/Englewood via manhole connection
	10	8,500	$125	$ 1,064,194	
	12	19,020	$136	$ 2,588,359	
	15	12,200	$150	$ 1,826,277	
	18	15,000	$167	$ 2,510,790	
	24	9,600	$197	$ 1,894,320	
	33	27,800	$259	$ 7,188,072	
	10	2,640	$116	$ 305,377	0.7 MGD
		SWMWSD upgrade		$ 4,305,000	

Alternative 3

	Pipe Diameter (in)	Lenghth of pipe (ft)	Unit Cost*	Total Cost	
	Pipe (in)	L	Unit ($/LF)	$	Split Flow- 2 mgd to new Regional WWTF in the vacinity of SSFMD. 1 mgd pumped to Plum Creek.
	12	7,920	$136	$ 1,077,803	
	15	15,000	$150	$ 2,245,422	
	18	9,600	$167	$ 1,606,906	
Force main	12	21,290	$125	$ 2,665,493	1 MGD
	Pipe Lengths	53,810	TOTAL	$ 7,595,623	

Alternative 4-A

	Pipe Diameter (in)	Lenghth of pipe (ft)	Unit Cost*	Total Cost	
	Pipe (in)	L	Unit ($/LF)	$	Split Flow- 2 mgd via gravity to Centennial. 1 mgd pumped to Plum Creek.
	12	7,920	$136	$ 1,077,803	
	15	15,000	$150	$ 2,245,422	
	18	9,600	$167	$ 1,606,906	
	30	18,580	$238	$ 4,424,842	
Force main	10	2,640	$116	$ 305,377	0.7 MGD
Force main	12	21,290	$125	$ 2,665,493	1 MGD
	Pipe Lengths	75,030	TOTAL	$ 12,325,843	

Alternative 4-B

	Pipe Diameter (in)	Lenghth of pipe (ft)	Unit Cost*	Total Cost	
	Pipe (in)	L	Unit ($/LF)	$	Split Flow- 2 mgd via gravity to Dominion. 1 mgd pumped to Plum Creek.
	12	7,920	$136	$ 1,077,803	
	15	15,000	$150	$ 2,245,422	
	18	12,240	$167	$ 2,048,805	
Force main	18	5,800	$161	$ 931,374	2 MGD
Force main	12	21,290	$125	$ 2,665,493	1 MGD
	Pipe Lengths	62,250	TOTAL	$ 8,968,896	

Alternative 4-C

	Pipe Diameter (in)	Lenghth of pipe (ft)	Unit Cost*	Total Cost	
	Pipe (in)	L	Unit ($/LF)	$	Split Flow- 2 mgd via gravity to Littleton/Englewood via Roxborough. 1 mgd pumped to Plum Creek.
	12	7,920	$136		
	15	15,000	$150	$ 2,245,422	
	18	12,240	$167	$ 2,048,805	
	21	21,120	$184	$ 3,880,089	
Force main	18	5,800	$161	$ 931,374	2 MGD
Force main	12	21,290	$125	$ 2,665,493	1 MGD
			Rox Sewer Upgrade	$ 6,000,000	
	Pipe Lengths	75,450	TOTAL	$ 17,771,183	

Alternative 4-D

	Pipe Diameter (in)	Lenghth of pipe	Unit Cost*	Total Cost	
	Pipe (in)	L	Unit ($/LF)	$	Split Flow- 2 mgd via gravity to Littleton/Englewood via manhole connection. 1 mgd pumped to Plum Creek.
	12	7,920	$136		
	15	15,000	$150	$ 2,245,422	
	18	9,600	$167	$ 1,606,906	
	30	27,820	$238	$ 6,625,356	
Force main	10	2,640	$116	$ 305,377	0.7 MGD
Force main	12	21,290	$125	$ 2,665,493	1.0 MGD

	Pipe Lengths	94,760	TOTAL	$ 21,682,389

			SWMWSD Upgrade	$ 2,870,000
	Pipe Lengths	84,270	TOTAL	$ 16,318,554

Note: pipe costs varied by depth

Diameter (IN)	2001 Gravity ($/LF)	2008 Gravity ($/LF)	2001 Force Mains ($/LF)	2008 Force Mains ($/LF)		in/dia
6	74	$101	74	$101		16.8
8	85	$116	80	$109	Estimated for gravity	14.5
10	92	$125	85	$116	Estimated for gravity	12.5
12	100	$136	92	$125		11.3
15	110	$150	102	$139		10.0
18	123	$167	118	$161		9.3
21	135	$184	125	$170		8.7
24	145	$197	135	$184		8.2
27	160	$218	150	$204		8.1
30	175	$238	160	$218		7.9
33	190	$259	170	$231		7.8

Inflation Rate 4.50%

values are based on 2001 cost plus inflation at 4.5%/year

0.32

NOTE:

Gravity sewer costs include manholes, as well as excavation, pipe materials, bedding installation, backfill, and surface restoration.

Average depth of installation assumed 15-18 feet

US 85 Wastewater Treatment Study

Sanitary Sewer Collection System Lengths

Town	Length (LF)	Size (in)
Sedalia	14700	8
Cost 8" dia	$116	per lf
	$1,700,397	2008 dollars
No. taps	90	
	$5,000	per tap
	$450,000	2008 dollars
Total	**$2,150,397**	
SSFMD	15700	8
Cost 8" dia	$116	per lf
	$1,816,070	2008 dollars
No. taps	70	
	$5,000	per tap
	$350,000	2008 dollars
Total	**$2,166,070**	

WWTF Cost Estimates 6/18/2009 17:07

Costs for New Construction of

New WWTF located in northern portion of study area -all flows				
Alternative 1	Flow (mgd)	Max Month Flow (mgd)	$/gpd	Total Cost Million $'s
3 MGD	3	3.6	$9	$32

Areas North of Sedalia will go to New WWTF				
Alternative 3	Flow (mgd)	Max Month Flow (mgd)	$/gpd	Total Cost Million $'s
2 MGD	2	2.4	$10	$24

Areas North of Sedalia will go to New WWTF					
Alternative 2-A	Flow (mgd)	Max Month Flow (mgd)	$/gpd	Total Cost Million $'s	
2.5 MGD	2.5	3.0	$7	$21	Assume that 7,167 taps

Areas North of Sedalia will go to Centennial					
Alternative 4-A	Flow (mgd)	Max Month Flow (mgd)	$/gpd	Total Cost Million $'s	
1.5 MGD	1.5	1.8	$7	$13	New Treatment upgrades

Lift Station Cost estimates

Northern Regional WWTF-all flows to New WWTF				
Alternative 1	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
New WWTF	0	0	0	$0

Northern Regional WWTF-all flows to Existing Centennial				
Alternative 2-A	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
Centennial	0.7	2.1	0.43	$301,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$6,020.00		$6,020
				$16,520

Northern Regional WWTF-all flows to Existing Dominion				
Alternative 2-B	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
Dominion	3	9	0.43	$1,290,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$25,800.00		$25,800
				$36,300

Northern Regional WWTF-all flows to Littleton/Englewood via Roxborough interceptor sewer				
Alternative 2-C	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
Littleton/Englewood	3	9	0.43	$1,290,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$25,800.00		$25,800
				$36,300

Northern Regional WWTF-all flows to Littleton/Englewood via Southwest Metro WSD sewer interceptor (located near Blakeland, south of C470)				
Alternative 2-D	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
Littleton/Englewood	0.7	2.1	0.43	$301,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$6,020.00		$6,020
				$16,520

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to New WWTF; all other WW from Sedalia south to PCWA				
Alternative 3	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
PCWA	1	3	0.3	$300,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$6,000.00		$6,000
				$16,500

Flows from Sedalia and south will be pumped to Plum Creek. Areas North of Sedalia will go to New WWTF				
Alternative 3	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
New WWTF	0	0	0	$0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Centennial WSD; WW from Sedalia south to PCWA				
Alternative 4-A	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
PCWA	0.7	2.1	0.4	$280,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500

oper.	0.7	$5,600.00		$5,600
				$16,100
Alternative 4-A	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
Centennial	1	3	0.4	$400,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$8,000.00		$8,000
				$34,600

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Dominion WSD; WW from Sedalia south to PCWA				
Alternative 4-B	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
PCWA	1	3	0.4	$400,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$8,000.00		$8,000
Alternative 4-B	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
Dominion	2	6	0.4	$800,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$16,000.00		$16,000
				$45,000

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Roxborough/Littleton-Englewood WSD; WW from Sedalia south to PCWA				
Alternative 4-C	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
PCWA	1	3	0.4	$400,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$8,000.00		$8,000
Alternative 4-C	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
North	2	6	0.4	$800,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$16,000.00		$16,000
				$45,000

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Soutwest Metro/Littleton-Englewood WSD; WW from Sedalia south to PCWA				
Alternative 4-D	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
PCWA	0.7	2.1	0.4	$280,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$5,600.00		$5,600
Alternative 4-D	Flow (mgd)	Peak Flow (mgd)	$/gpd	Total Cost $'s
SWMSD	2	6	0.4	$800,000
	Flow (mgd)	2% capital Cost	$/yr/MGD	
maintenance	0.7		15,000	$10,500
oper.	0.7	$16,000.00		$16,000
				$42,600

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O&M Costs

Northern Regional WWTF-all flows to New WWTF				
Alternative 1	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	3	3.6	$4.6	$5,037,000.0

Northern Regional WWTF-all flows to Existing Centennial				
Alternative 2-A	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	3	3.6	$0.0	$0.0

Northern Regional WWTF-all flows to Existing Dominion				
Alternative 2-B	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	3	3.6	$0.0	$0.0

Northern Regional WWTF-all flows to Littleton/Englewood via Roxborough interceptor sewer				
Alternative 2-C	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	3	3.6	$0.0	$0.0

Northern Regional WWTF-all flows to Littleton/Englewood via Southwest Metro WSD sewer interceptor (located near Blakeland, south of C470)				
Alternative 2-D	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	3	3.6	$0.0	$0.0

Flows from Sedalia and south will be pumped to Plum Creek. Areas North of Sedalia will go to New WWTF				
Alternative 3	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	2	2.4	$4.6	$3,358,000.0
Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to New WWTF; all other WW from Sedalia south to PCWA				
Alternative 3	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	1	1.2	$0.0	$0.0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Centennial WSD; WW from Sedalia south to PCWA				
Alternative 4-A	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	1	1.2	$0.0	$0.0
Alternative 4-A	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	2	2.4	$0.0	$0.0

Monthly Fees Includes Treatment Costs

Yearly Fees

Northern Regional WWTF-all flows to New WWTF				
Alternative 1	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	3	5600.0	$0	$0.0

Northern Regional WWTF-all flows to Existing Centennial				
Alternative 2-A	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	3	8600.0	$53	$2,722,276.7

Northern Regional WWTF-all flows to Existing Dominion				
Alternative 2-B	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	3	8600.0	$62	$6,410,268.0

Northern Regional WWTF-all flows to Littleton/Englewood via Roxborough interceptor sewer				
Alternative 2-C	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	3	8600.0	$52	$5,340,600.0

Northern Regional WWTF-all flows to Littleton/Englewood via Southwest Metro WSD sewer interceptor (located near Blakeland, south of C470)				
Alternative 2-D	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	3	8600.0	$12	$1,238,400.0

Flows from Sedalia and south will be pumped to Plum Creek. Areas North of Sedalia will go to New WWTF				
Alternative 3	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	2	6450.0	$0	$0.0
Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to New WWTF; all other WW from Sedalia south to PCWA				
Alternative 3	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	1	2150.0	$12	$309,600.0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Centennial WSD; WW from Sedalia south to PCWA				
Alternative 4-A	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	1	2150.0	$74	$1,916,821.3
Alternative 4-A	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	2	6450.0	$32	$2,485,701.0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Dominion WSD; WW from Sedalia south to PCWA

Alternative 4-B	Flow (mgd)	Max Month Flow	$/1000 gpd	Total Cost
	1	1.2	$0.0	$0.0
Alternative 4-B	Flow (mgd)	Max Month Flow	$/1000 gpd	Total Cost
	2	2.4	$0.0	$0.0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Roxborough/Littleton-Englewood WSD; WW from Sedalia south to PCWA

Alternative 4-C	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	1	1.2	$0.0	$0.0
Alternative 4-C	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	2	2.4	$0.0	$0.0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Soutwest Metro/Littleton-Englewood WSD; WW from Sedalia south to PCWA

Alternative 4-D	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	1	1.2	$0.0	$0.0
Alternative 4-D	Flow (mgd)	Max Month Flow (mgd)	$/1000 gpd	Total Cost $'s
	2	2.4	$0.0	$0.0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Dominion WSD; WW from Sedalia south to PCWA

Alternative 4-B	Flow (mgd)	Taps	Monthly	Total Yearly Cost
	1	2150.0	$74	$1,916,821.3
Alternative 4-B	Flow (mgd)	Taps	Monthly	Total Yearly Cost
	2	6450.0	$30	$2,322,000.0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Roxborough/Littleton-Englewood WSD; WW from Sedalia south to PCWA

Alternative 4-C	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	1	2150.0	$74	$1,916,821.3
Alternative 4-C	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	2	6450.0	$52	$4,005,450.0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Soutwest Metro/Littleton-Englewood WSD; WW from Sedalia south to PCWA

Alternative 4-D	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	1	2150.0	$74	$1,916,821.3
Alternative 4-D	Flow (mgd)	Taps	Monthly $/Tap	Total Yearly Cost $'s
	2	6450.0	$12	$928,800.0

3MGD/6500Taps*30d/M13846gal/tap/month

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Tap Fees

All flows (0.5 MGD) to Existing Centennial					
Alternative 2-A	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
85% of the 1433 T **Residential**	0.425	$1,250	1218	$1,522,917	
15% of the 1433 T **Non-Residential**	0.075	$4,810	215	$1,034,150	$2,557,066.7

All flows to Existing Dominion				
Alternative 2-B	Flow (mgd)	Tap Fee	Taps	Total Cost $'s
Residential		?		
Non-Residential	3	$6,000	8600	$51,600,000

All flows to Littleton/Englewood via Roxborough interceptor sewer					
Alternative 2-C	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
Based on Julie Tap E **Residential**	2.877	$5,656	8251	$46,667,656	
Based on Julie Tap E **Non-Residential**	0.12	$11,312	349	$3,947,888	$50,615,544.0

All flows to Littleton/Englewood via Southwest Metro WSD sewer interceptor (located near Blakeland, south of C470)					
Alternative 2-D	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
Based on Julie Tap E **Residential**	2.877	$5,656	8251	$46,667,656	
Based on Julie Tap E **Non-Residential**	0.12	$11,312	349	$3,947,888	$50,615,544.0

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Centennial WSD; WW from Sedalia south to PCWA					
Alternative 4-A	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
Centennial **Residential**	0.49	$1,250	1433	$1,790,950	
Non-Residential	0.01	$4,810	29	$140,644	$1,931,594.4
Alternative 4-A	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
PCWA 33% c **Residential**	1	$3,893	2838	$11,048,334	$12,979,928.4
Non-Residential	0	$0	2838	$0	

Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Dominion WSD; WW from Sedalia south to PCWA					
Alternative 4-B	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
PCWA 33% c	1	$3,893	2838	$11,048,334	
Alternative 4-B	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
Dominion **Residential**					
Non-Residential	2	$6,000	5762	$34,572,000	$45,620,334.0

	Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Roxborough/Littleton-Englewood WSD; WW from Sedalia south to PCWA					
	Alternative 4-C	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
L/E	**Residential**	1.5	$5,656	4322	$24,442,404	
	Non-Residential	0.5	$11,312	1441	$16,294,936	$40,737,340.0
	Alternative 4-C	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
PCWA 33% c	**Residential**					
	Non-Residential	1	$3,893	2838	$11,048,334	$51,785,674.0

	Wastewater flows from Louviers, South Santa Fe, and Titan Road Industrial Park to Soutwest Metro/Littleton-Englewood WSD; WW from Sedalia south to PCWA					
	Alternative 4-D	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
L/E	**Residential**	1.5	$5,656	4322	$24,442,404	
	Non-Residential	0.5	$11,312	1441	$16,294,936	$40,737,340.0
	Alternative 4-D	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
PCWA 33% c	**Residential**	1	$3,893	2838	$11,048,334	$51,785,674.0
	Non-Residential					

	- 2 mgd/PCWA -1mgd					
	Alternative 3	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
New Northern	**Residential**	1.5	$0	4322	$0	
	Non-Residential	0.5	$0	1440	$0	
	Alternative 3	Flow (mgd)	Tap Fee	Taps	Total Cost $'s	
PCWA 33% c	**Residential**	1	$3,893	2838	$11,048,334	$11,048,334.0
	Non-Residential					

Alternative	Alternative	Capital Costs					Annual O&M Cost				Total Present Worth			Yearly Present Worth Cost		
		Treatment	Tap Fee*	Sewer	Lift Station	Total	Annual O&M	20 yr. PW of Annual O&M	40 yr. PW of Annual O&M	60 yr. PW of Annual O&M	Capital + 20 yr O&M	Capital + 40 yr O&M	Capital + 60 yr O&M	Total PW Cost per year (20yr)	Total PW Cost per year (40yr)	Total PW Cost per year (60yr)
1	**New Northern WWTP - 3 mgd**	$32,400,000		$9,883,939		$42,283,939	$5,037,000	$68,454,474	$99,696,202	$113,954,519	$110,738,413	$141,980,142	$156,238,458	$5,536,921	$3,549,504	$2,603,974
2-A	**Centennial - 3 mgd**	$21,000,000	$2,557,067	$14,998,603	$301,000	$38,856,669	$2,738,797	$37,221,141	$54,208,383	$61,961,139	$76,077,810	$93,065,053	$100,817,808	$3,803,890	$2,326,626	$1,680,297
2-B	**Dominion - 3 mgd**		$51,600,000	$11,391,502	$1,290,000	$64,281,502	$6,446,568	$87,610,963	$127,595,463	$145,843,867	$151,892,465	$191,876,965	$210,125,369	$7,594,623	$4,796,924	$3,502,089
2-C	**L/E via Roxborough - 3 mgd**		$50,615,544	$21,559,005	$1,290,000	$73,464,549	$5,376,900	$73,073,826	$106,423,766	$121,644,243	$146,538,375	$179,888,315	$195,108,793	$7,326,919	$4,497,208	$3,251,813
2-D	**L/E via SWMW&SD - 3 mgd**		$50,615,544	$21,682,389	$301,000	$72,598,933	$1,254,920	$17,054,772	$24,838,348	$28,390,670	$89,653,705	$97,437,281	$100,989,603	$4,482,685	$2,435,932	$1,683,160
3	**New Northern - 2 mgd/PCWA -1mgd**	$24,000,000	$11,048,334	$7,595,623	$300,000	$42,943,957	$3,684,100	$50,068,121	$72,918,558	$83,347,199	$93,012,078	$115,862,515	$126,291,157	$4,650,604	$2,896,563	$2,104,853
4-A	**Centennial - 2 mg/PCWA - 1 mgd**	$12,600,000	$12,979,928	$12,325,843	$680,000	$38,585,771	$4,437,122	$60,301,940	$87,822,959	$100,383,192	$98,887,711	$126,408,730	$138,968,963	$4,944,386	$3,160,218	$2,316,149
4-B	**Dominion - 2 mgd/PCWA - 1 mgd**		$45,620,334	$8,968,896	$1,200,000	$55,789,230	$4,283,821	$58,218,530	$84,788,707	$96,914,989	$114,007,760	$140,577,937	$152,704,219	$5,700,388	$3,514,448	$2,545,070
4-C	**L/E via Rox - 2 mgd/PCWA - 1 mgd**		$51,785,674	$17,771,183	$1,200,000	$70,756,857	$5,967,271	$81,097,165	$118,108,852	$135,000,503	$151,854,021	$188,865,709	$205,757,360	$7,592,701	$4,721,643	$3,429,289
4-D	**L/E via SW - 2 mgd/PCWA - 1 mgd**		$51,785,674	$16,318,554	$1,080,000	$69,184,228	$2,888,221	$39,251,870	$57,165,912	$65,341,646	$108,436,098	$126,350,139	$134,525,874	$5,421,805	$3,158,753	$2,242,098

* Tap Fee Based on Provider current information

Lift Station Operating Cost = $15000/yr/mgd capacity

Maintenance = 2% of capacity

Discount Rate 4%

Years 20

40

60

NOTE:

Changes made to the spreadsheet

Corrected the annual O&M for Alternatives 4-A and 4-D (reading incorrect cells)

Confirmed Sewer cost for 2-C, 2-D, 4-C, 4-D do infact include the additional costs for upgrade

Deleted the costs upgrade for alternative 4-D on the collection cost spreadsheet since it was included in the Pipe Cost Estimate spreadsheet

Chnaged the Dominion monthly fee from 35$/month to 30$/month in the O&M tab

Changed the Dominion tap fee from 7,000$/SFE to 6,000$/SFE in the collection cost tab

In addition to capital costs, Sedalia and South Santa Fe Districts have the cost of a collection system, which are approximately $1.7M and $1.8M, respectively

Table 6-4 Cost Comparison of Long Term Wastewater Collection and Treatment Alternatives

Alternative	Alternative	Capital Costs					Annual O&M Cost			
		Treatment	Tap Fee*	Sewer	Lift Station	Total	Annual O&M	20 yr. PW of Annual O&M	40 yr. PW of Annual O&M	60 yr. PW of Annual O&M
1	**New Northern WWTP - 3 mgd**	$32,400,000		$9,880,000		$42,280,000	$5,040,000	$68,500,000	$99,760,000	$114,020,000
2-A	**Centennial - 3 mgd**	$21,000,000	$2,560,000	$15,000,000	$300,000	$38,860,000	$2,740,000	$37,240,000	$54,230,000	$61,990,000
2-B	**Dominion - 3 mgd**		$51,600,000	$11,390,000	$1,290,000	$64,280,000	$6,450,000	$87,660,000	$127,660,000	$145,920,000
2-C	**L/E via Roxborough - 3 mgd**		$50,620,000	$21,560,000	$1,290,000	$73,460,000	$5,380,000	$73,120,000	$106,490,000	$121,710,000
2-D	**L/E via SWMW&SD - 3 mgd**		$50,620,000	$21,680,000	$300,000	$72,600,000	$1,250,000	$16,990,000	$24,740,000	$28,280,000
3	**New Northern - 2 mgd/PCWA -1mgd**	$24,000,000	$11,050,000	$7,600,000	$300,000	$42,940,000	$3,680,000	$50,010,000	$72,840,000	$83,250,000
4-A	**Centennial - 2 mg/PCWA - 1 mgd**	$12,600,000	$12,980,000	$12,330,000	$680,000	$38,590,000	$4,440,000	$60,340,000	$87,880,000	$100,450,000
4-B	**Dominion - 2 mgd/PCWA - 1 mgd**		$45,620,000	$8,970,000	$1,200,000	$55,790,000	$4,280,000	$58,170,000	$84,710,000	$96,830,000
4-C	**L/E via Rox - 2 mgd/PCWA - 1 mgd**		$51,790,000	$17,770,000	$1,200,000	$70,760,000	$5,970,000	$81,130,000	$118,160,000	$135,060,000
4-D	**L/E via SW - 2 mgd/PCWA - 1 mgd**		$51,790,000	$16,320,000	$1,080,000	$69,180,000	$2,890,000	$39,280,000	$57,200,000	$65,380,000

Alternative	Alternative	Total Present Worth			Yearly Present Worth Cost		
		Capital + 20 yr O&M	Capital + 40 yr O&M	Capital + 60 yr O&M	Total PW Cost per year (20yr)	Total PW Cost per year (40yr)	Total PW Cost per year (60yr)
1	**New Northern WWTP - 3 mgd**	$110,780,000	$142,040,000	$156,300,000	$5,539,000	$3,551,000	$2,610,000
2-A	**Centennial - 3 mgd**	$76,100,000	$93,090,000	$100,850,000	$3,805,000	$2,327,250	$1,680,000
2-B	**Dominion - 3 mgd**	$151,940,000	$191,940,000	$210,200,000	$7,597,000	$4,798,500	$3,500,000
2-C	**L/E via Roxborough - 3 mgd**	$146,580,000	$179,950,000	$195,170,000	$7,329,000	$4,498,750	$3,250,000
2-D	**L/E via SWMW&SD - 3 mgd**	$89,590,000	$97,340,000	$100,880,000	$4,479,500	$2,433,500	$1,680,000
3	**New Northern - 2 mgd/PCWA -1mgd**	$92,950,000	$115,780,000	$126,190,000	$4,647,500	$2,894,500	$2,100,000
4-A	**Centennial - 2 mg/PCWA - 1 mgd**	$98,930,000	$126,470,000	$139,040,000	$4,946,500	$3,161,750	$2,320,000
4-B	**Dominion - 2 mgd/PCWA - 1 mgd**	$113,960,000	$140,500,000	$152,620,000	$5,698,000	$3,512,500	$2,540,000
4-C	**L/E via Rox - 2 mgd/PCWA - 1 mgd**	$151,890,000	$188,920,000	$205,820,000	$7,594,500	$4,723,000	$3,430,000
4-D	**L/E via SW - 2 mgd/PCWA - 1 mgd**	$108,460,000	$126,380,000	$134,560,000	$5,423,000	$3,159,500	$2,240,000

* Tap Fee Based on Provider current information
Lift Station Operating Cost = $15000/yr/mgd capacity
Maintenance = 2% of capacity

Discount Rate	4%
Years	20
	40
	60

NOTE:
In addition to capital costs, Sedalia and South Santa Fe Districts have the cost of a collection system, which are approximately $1.7M and $1.8M, respectively

Table 6-5. Summary of Capital Costs for Interim Wastewater Alternatives along the US 85 Corridor Sedalia and South Santa Fe Metro District

Alternative	Collection System	Sewer	Lift Station/Force	WW Trtmt	Tap Fees	Total
Sedalia						
0.04 MGD LS and Force Main from Sedalia to PCWA	$1,700,000		$2,130,000		$350,400	$4,180,400
Zenon Membrane Treatment, outfall to Plum Creek	$1,700,000			$1,200,000		$2,900,000
SSFMD/TRIP						
0.03 MGD to CWSD	$1,800,000	$1,700,000	$262,000		$500,200	$4,262,200
Zenon Membrane Treatment, outfall to Plum Creek	$1,800,000			$1,100,000		$2,900,000

Notes/Assumptions:

Sedalia WW Trtmt Alternative:
Estimated 40,000 gpd
Assumes 90 taps, $3893/tap (PCWA estimated tap fee)
21,290 feet of forcemain from Sedalia to PCWA
Lift Station costs used $.04/gpd and 0.04 MGD

SSFMD/TRIP WW Trtmt Alternative:
Estimated 30,000 gpd
Assumes 104 taps (34 TRIP/70 SSFMD), $4810/tap (CWSD, industrial tap fee)
14,520 feet of 8" gravity sewer from SSFMD to CWSD
Lift Station costs used $.04/gpd and 0.03 MGD

Sedalia

		Capital Cost	Annual O&M	20 yr. PW of Annual O&M	Capital + 20 yr O&M	Total PW Cost per year (yr)
	MBR	$2,900,000	$164,250	$2,232,211	$5,132,211	$256,611
		Discount Rate	4%			
		Years	20			
		$/1000 gal O&M	2.5			

SSFMD/TRIP

		Capital Cost	Annual O&M	20 yr. PW of Annual O&M	Capital + 20 yr O&M	Total PW Cost per year (yr)
	MBR	$2,900,000	$164,250	$2,232,211	$5,132,211	$256,611
		Discount Rate	4%			
		Years	20			
		$/1000 gal O&M	2.5			

Appendix E

Preliminary Review of Potential Environmental Issues (ERO Resources)

ERO Resources Corp.
1842 Clarkson Street
Denver, CO 80218
(303) 830-1188
Fax: 830-1199
www.eroresources.com
ero@eroresources.com

December 12, 2008

Memo

To: Julie Vlier

From: Steve Dougherty

Re: Douglas County Wastewater Treatment Facilities Project Environmental Review

Background

Tetratech has requested that ERO Resources Corporation (ERO) perform a preliminary review of environmental and permitting issues for proposed wastewater treatment facilities in Douglas County in the vicinity of Plum Creek south of Chatfield Reservoir. The potential alternative reviewed by ERO includes the construction of about 13.9 miles of sewer line parallel to the Plum Creek drainage and three lift stations (Figure 1). ERO's preliminary review of potential environmental issues is based on existing information (no field surveys or site reviews were performed). For this environmental review, we have assumed that no federal monies would be involved for the project including loans (e.g., State Drinking Water Revolving Loan Fund). If the project will involve the use of federal funds, then it is likely that an environmental assessment (EA) would need to be prepared with the Water Quality Control Division as the lead agency for preparation of the EA.

The review focuses on natural resource issues and environmental permitting and does not address the potential for encountering hazardous materials. The following information is suitable for a reconnaissance-level or planning-level study and this information is not intended for permit applications.

Environmental and Permitting Evaluation

The following information and opinions are based on existing information, regulations, and policies, which could change.

Wetlands and Waters

The sewer line appears to have multiple crossings of Plum Creek and its associated wetlands south of Sedalia over about 1 mile of the sewer line alignment. Open trench construction within Plum Creek and its adjacent wetlands would involve the discharge of dredge and/or fill material into wetlands and waters. Plum Creek and its perennial tributaries are perennial tributaries to the South Platte River, a traditional navigable water. East Plum Creek, West Plum Creek, and Jarre Creek all come together south of Sedalia to form Plum Creek. All of these drainages and their adjacent wetlands would

be considered by the U.S. Army Corps of Engineers (Corps) to be waters of the U.S. subject to Corps jurisdiction under Section 404 of the Clean Water Act (CWA).

Construction of the sewer line would likely be authorized by the Corps under Nationwide Permit (NWP) 12 Utility Lines (72 Fed. Reg. 11182 (March 12, 2007)). NWP 12 restrictions that would apply to construction of the sewer line include:

- The loss of wetlands or waters would not be greater than 0.5 acre.
- Material from excavation of the trench can be temporarily sidecast in wetlands or waters provided it is done in a manner that the sidecast material is not dispersed by currents or other forces.
- The temporary sidecast of material into wetlands or waters must use a horizontal marker to delineate the existing ground elevation.
- The top 6 to 12 inches of the trench should be backfilled with topsoil from the trench (i.e., salvaging and placement of topsoil).
- The trench cannot be constructed or backfilled in a manner that would drain wetlands or waters.
- Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including coffer dams, are necessary for construction activities.

Douglas County would need to provide a preconstruction notification (PCN) to the Corps. The Corps has 45 days to make a decision once they determine the PCN to be complete. NWP 12 can also be used to authorize access roads for construction of the sewer line and lift stations.

Endangered Species Act (ESA) Compliance

The majority of the sewer line alignment occurs outside of the riparian conservation zone (RCZ); however, portions of the sewer line alignment occur within the RCZ primarily south of Sedalia and south of Chatfield State Park (Figure 1). The RCZ incorporates land form and vegetation to delineate potential Preble's meadow jumping mouse (Preble's) habitat in Douglas County as part of the 2006 Habitat Conservation Plan (HCP) for Preble's in Douglas County. Typically, activities outside the RCZ are considered to have no direct effects on Preble's, and ground-disturbing activities within the RCZ are considered to have direct effects on Preble's and its habitat. Such activities within the RCZ require compliance with the ESA for effects to Preble's and its habitat.

Because there is a federal action (NWP 12) for construction of the sewer line, ESA compliance would be accomplished through the Section 7 consultation between the Corps and the U.S. Fish and Wildlife Service (Service). As part of this process, Douglas County would need to prepare a Biological Assessment (BA) on behalf of the Corps that addresses effects to Preble's and its habitat and proposed mitigation to compensate for the impacts. The BA would be prepared as part of the PCN. The

Service would render their decision on ESA compliance in a Biological Opinion (BO) to the Corps.

Many of Douglas County's activities within the RCZ are covered by the Douglas County HCP. However, this proposed wastewater treatment facility project is not included in the HCP. Negotiations with the Service regarding effects to Preble's and mitigation and the issuance of a BO could take 3 to 12 months.

Other federally listed species would need to be addressed in the BA including: Ute ladies'-tresses orchid (ULTO), Colorado butterfly plant (CBP), and bald eagle. There are no known occurrences of ULTO or CBP in Douglas County. Bald eagles could use large cottonwoods in the area for nesting and/or roosting; however, no such uses are known in the study area. These uses can be dynamic.

National Historic Preservation Act (NHPA) Compliance

As part of the NWP 12 process, the Corps is required to comply with the NHPA. The PCN submitted to the Corps will need to address any known cultural resources eligible for the National Register of Historic Places that could be affected by the project. This area was reviewed as part of the Douglas County HCP and there were no known eligible cultural resources in this area.

Wildlife

Douglas County has designated the Plum Creek corridor as a wildlife movement corridor, and most of the study area north of Sedalia has been designated as wildlife habitat conservation areas. The County Planning Department may have concerns with construction and habitat impacts within the wildlife movement corridor. However, with the exception of the lift stations and any needed tree removal, impacts to habitat should be temporary.

Conclusions

As currently proposed (Figure 1), the wastewater treatment facilities would require authorization from the Corps and ESA compliance regarding impacts to Preble's. The Corps' authorization would likely occur under NWP 12, and ESA compliance would likely occur through Section 7 consultation between the Corps and the Service. Authorization from the Corps and the Service would likely take 3 to 12 months.

STD

attachments

Appendix F

An Evaluation of Financial Feasibility
(First Southwest Company)

Douglas County Wastewater Study

Evaluation of the Financial Market Feasibility of a Public/Private Partnership and/or Concession Program

for a

Wastewater Collection and Treatment System in the U.S. Highway 85 Corridor Study Area in Northwest Douglas County, Colorado

June 2009

DOUGLAS COUNTY
COLORADO

Douglas County Wastewater Study

Evaluation of the Financial Market Feasibility of a Public/Private Partnership and/or Concession Program

for a

Wastewater Collection and Treatment System in the U.S. Highway 85 Corridor Study Area in Northwest Douglas County, Colorado

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EXECUTIVE SUMMARY

Project Background and Purpose of Evaluation

A study has been initiated at the direction of the County Commissioners to evaluate long-term wastewater utility needs in the Highway 85 Corridor and to identify preferred alternatives for a wastewater collection and treatment system that address water quality in the Chatfield Watershed. The preferred alternatives must not only be technically feasible, but also feasible from organizational, environmental, managerial and financial perspectives. The County has engaged First Southwest Company to evaluate the market feasibility of a Public-Private Partnership and/or Concession Program for a wastewater collection and treatment system in the Highway 85 Corridor. The attached report explores the considerations in determining the feasibility of entering into such a partnership to accomplish the County's goals and First Southwest's recommendations related thereto.

Market Feasibility of the Project

General Financial Feasibility

The general financial feasibility of a wastewater collection and treatment system in the Highway 85 Corridor is principally based upon (i) the amount of wastewater produced within the Highway 85 Corridor, and (ii) the ability of the wastewater system to (a) generate sufficient cash flow on a timely basis to satisfy the debt service on funds borrowed to construct the system, and (b) provide the owner or concessionaire, as appropriate with its required rate of return on investment. Absent additional development within the Highway 85 Corridor, existing WWTFs have sufficient existing capacity to treat the amount of wastewater currently produced; however, no interceptor sewer or collection system exists to convey the wastewater to the existing WWTFs.

The attached report discusses the feasibility of constructing a new wastewater collection and treatment system versus the feasibility of constructing a sewer interceptor and utilizing existing WWTFs.

Feasibility of New Construction: A number of factors contribute to First Southwest's opinion that constructing a new wastewater collection and treatment system, the approximate cost of which would be $42 million, is not a viable option. Specifically, the absence of Availability Payments to mitigate the risk associated the demand and timing of demand for an increased volume of wastewater treatment, which the County and Local Governments do not wish to make, and the challenging interest rate environment translate to financiers demanding higher returns on investment. Secondly, new construction likely will be met with opposition from the CDPHE. Finally, permitting and water quality planning constraints; waste load allocation issues; construction of a new WWTF potentially located in an environmentally sensitive area; and limited tracts of land of sufficient size in the Highway 85 Corridor for construction of a new wastewater system, make construction of a new WWTF unlikely.

Feasibility of Constructing a Sewer Interceptor and Utilizing Existing WWTFs: First Southwest concludes that constructing a sewer interceptor and utilizing available wastewater treatment capacity to serve the Highway 85 Corridor that is sufficient enough to transport the projected increase in wastewater volume is very feasible and will achieve the goals of enhanced water quality and the promotion of the reuse of water. This alternative requires an investment of approximately $15 million and is significantly less reliant on future development to generate sufficient timely cash flow to satisfy the debt service on borrowed funds.

Under current conditions, the alternative involving the construction of a wastewater interceptor and use of existing wastewater treatment facilities could be provided by (a) a consortium consisting of two existing wastewater treatment providers (the most likely candidates being Centennial Water and Sanitation District and Plum Creek Wastewater Authority) and a private sector entity to design, build, own and operate the wastewater interceptor, or (b) on a Public-Public Partnership basis with the wastewater treatment providers sharing the cost to design, build, own and operate the sewer interceptor, thereby further reducing the cost and risk to each party.

Feasibility for Public/Private Partnership/Concession Approach

Considering the current excess wastewater treatment capacity in the Highway 85 Corridor and uncertainty regarding increased demand for wastewater treatment and the timing of such, we do not believe a Public-Private Partnership/Concession is feasible with respect to the construction of a new wastewater collection and treatment system absent the provision of Availability Payments by the public sector.

However, we believe a Public-Private/Public Partnership with regards to constructing a sewer interceptor to be feasible in that the partnership can (i) utilize the existing public sector wastewater treatment authorities that currently have excess wastewater treatment capacity, thereby allowing the expansion in treatment capacity in accordance with, as opposed to in advance of, growth in demand for treatment of wastewater; (ii) draw upon the financial resources of the private sector to finance the sewer interceptor; and (iii) be formulated so as to be consistent with the regulatory movement towards regionalization of wastewater collection and treatment. Such discussions have the potential to develop further into a privatization of existing wastewater treatment facilities with their acquisition by their private sector partner.

Given the benefits afforded a partnership by existing wastewater treatment providers in proximity to the Highway 85 Corridor, and because of the relatively small cost of the sewer interceptor (estimated at approximately $15 million), a Public/Public Partnership is a very viable means for developing the Project. The County's legal consultant has advised that State law allows contracting and cooperating between local governments to accomplish common goals. This variety of Public-Public Partnership can include both an authority formed to contract with various private or public parties, as well as public parties who might provide the project's infrastructure. Therefore, we believe a Public-Public Partnership to be a likely participant in a Request for Proposal process and one that will bring a significant number of strengths to the Project. The coordination of existing WWTFs in developing their proposals and the provision of a "regional" wastewater collection system may initiate discussions regarding the development of a regional wastewater authority to serve the Highway 85 Corridor, as opposed to a number of small WWTFs.

The following summarizes deterrents to private sector participation and suggestions as to enhancing the financial viability of the Project.

A. Deterrents to Private Sector Participation

- Questions Regarding the Sufficiency of Clean Water Supply in the Study Area
- Current Excess Wastewater Treatment Capacity
- Questions Regarding Demand and Timing of Demand for an increased volume of Wastewater Treatment
- Current Reduced Availability and Cost of Credit
- Lack of Right-of-Way or Approvals for Sewer Interceptor Alignment
- Outstanding Permits and Approvals

B. Suggestions to Enhance Financial Viability of the Project

- Mitigate Risk and Timing of Demand
  1. Availability Payments to Mitigate Risk of Timing in Development of Demand. However, we understand the County and Local Governments do not want to make such payment.
  2. Economic Development Incentives to Enhance Rate of Development
     a. Obtain Right-of-Way or Similar Approvals and Project Permits and Approvals
     b. Reduce Individual Sewage and Disposal Systems as a Long-Term Viable Alternative

Conclusions and Recommendations

A. Lessons Learned and Best Practices

Privatization is a concept that encompasses a wide variety of approaches to involving both the public and private sector in the delivery of services and the development of projects intended to benefit the general public. The applications of privatization are countless: transferring ownership of government assets to the private sector; contracting with private firms to provide services previously provided by the public sector with public sector oversight; managing competition between the government and the private sector, public sector entities, and private sector entities; and forming Public-Private Partnerships whereby the private sector is involved in the financing and development of the capital project as a substitute for purely public financing of the project. Determining the most efficient method of privatization in a given scenario typically begins with performing a public-private performance analysis.

The philosophical argument for privatization is based on two main premises, with financial considerations being purely pragmatic in nature. The first premise is that the private sector offers benefits not found in the public sector, such as improved innovation, quicker decision-making, and improved efficiency resulting from market discipline. The second is that these benefits more than offset the dangers of fraud or predatory practices that may be found in the private sector. Financially, the public sector struggles at all levels of government with the demand to provide services without increasing taxes and fees.

- Public –Private Performance Analysis
  Three main factors to determine whether a function, task, operation or activity should undergo competition with the private sector are as follows:

  I. Analyze the potential for competition
  II. Estimate the cost of the activity to the public sector

III. Consider public policy issues

- Define Goals of Public-Private Partnership
- Develop Detailed Project Definition
- Accomplish an Effective Proposal Process
- Negotiate Contracts Strategically
- Ensure Successful Implementation
- Continuous Post-Implementation Review

B. Recommendations for Next Steps and a Process for Going Forward

We recommend that the Commissioners proceed and remain engaged in determining the ability to bring a wastewater treatment collection and treatment system to the Highway 85 Corridor on the basis of the following:

- The financial feasibility of the Project when bringing together construction of a sewer interceptor and use of existing wastewater treatment facilities.
- The need for a wastewater system in the Highway 85 Corridor to allow economic development to occur within the corridor, which, together with its positive impact on the value of land, will enhance the tax base of both Local Governments and the County.
- The ability to create an incentive to bring additional water resources to the County through enhanced reuse, which will have the additional benefit of reducing demand on groundwater, thereby extending the life of such resources.
- The ability to improve water quality along the Highway 85 Corridor through the elimination of individual sewage and disposal systems.
- The ability to enhance water quality and promote reuse, which will improve opportunities for development within the County.

Important next steps in developing the means and ability to provide wastewater collection and treatment to the Highway 85 Corridor include the following:

- Perform a Public-Private Partnership analysis to determine whether the provision of a wastewater system should involve the private sector from the perspective of the County and other key public sector entities.
- Engage a dialogue on financing options with key public and private entities and potential treatment providers; gage interest of project concepts with respective treatment provider boards, management, and community leaders.
- Form a water reclamation authority for the Chatfield valley; finalize and execute the draft establishing contract for the “US 85 Corridor Water Reclamation Authority.”

- Coordinate with CDPHE and the Commission to intensify funding towards the conversion of ISDS in the study area to conventional treatment, including, but not limited to, the provision of financial incentives.

- Coordinate with the CDPHE and Commission to address restrictions and maintenance requirements for ISDS located in the Plum Creek floodplain. Consider developing a "Septage Management District" to address funding for monitoring, maintenance and inspection of existing ISDS in the Chatfield basin. Address proposed modifications at an upcoming rulemaking hearing before the Commission to support implementing mechanisms with a regulatory foundation

- Assess the ability to make clean water available at an affordable cost within the Corridor to support development therein.

INTRODUCTION

Purpose of Evaluation

A study has been initiated at the direction of the County Commissioners to evaluate long-term wastewater utility needs in the Highway 85 Corridor and to identify preferred alternatives for a wastewater collection and treatment system that address water quality in the Chatfield Watershed. The preferred alternatives must not be feasible from only a technical perspective, but also feasible from organizational, environmental, managerial and financial perspectives.

The County has engaged First Southwest Company to evaluate the market feasibility of a Public-Private Partnership and/or Concession Program for a wastewater collection and treatment system in the Highway 85 Corridor. In performing its evaluation, representatives of First Southwest Company have (i) reviewed documentation pertinent to the evaluation, (ii) toured the Highway 85 Corridor with County staff, and (iii) attended meetings with the Technical Committee convened by the County to consider and study potential means by which to bring centralized wastewater collection and treatment to the Highway 85 Corridor.

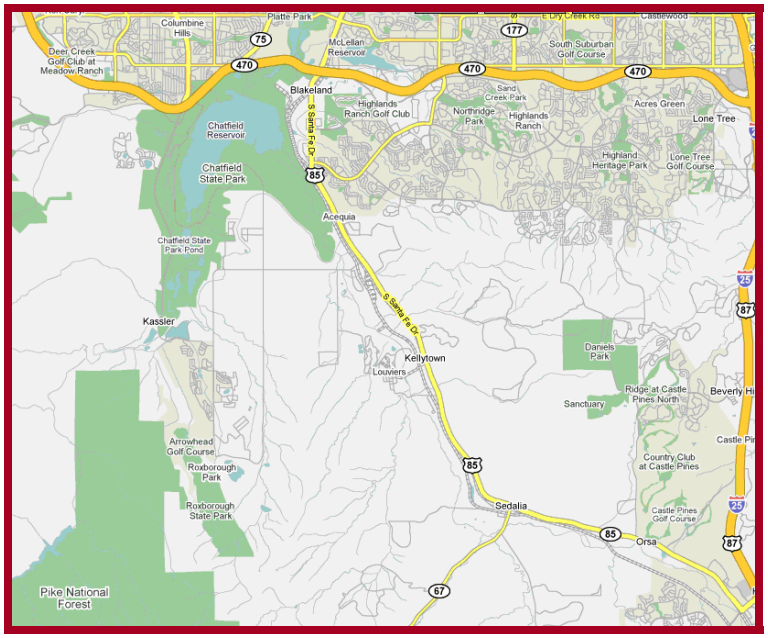
Project Background

The lack of adequate wastewater treatment in the Highway 85 Corridor means the vast majority of residences and businesses therein use ISDS to treat wastewater. In February 2008, the County convened a Technical Committee to consider potential means by which to bring centralized wastewater collection and treatment to the Highway 85 Corridor for the purpose of improving water quality and promoting economic development. The Technical Committee is comprised of representatives from County staff and various service providers in and around the Highway 85 Corridor.

Technical Committee	
Individual	***Organization***
Larry Moore	Roxborough Water and Sanitation District & Chatfield Watershed Authority
Martha Hahn	Plum Creek Wastewater Authority
Harold Smethills	Dominion Water and Sanitation District
Diana Miller	Louviers Mutual Service Company
Candace Wickstrom	South Santa Fe Commerce Center
Warren Brown	Tri-County Health Department
Bernie Baron	Titan Road Industrial Park Water Association
Robert Estes	Town of Sedalia
Paul Grundemann	Centennial Water and Sanitation District
Meme Martin	Douglas County
Jeffrey Watson	Douglas County

The County Commissioners directed the Technical Committee to identify alternatives for a wastewater collection and treatment system that address technical, organizational, managerial and financial considerations. In July 2008, at the recommendation of the Technical Committee, the County entered into a contract with Tetra Tech to conduct an engineering study evaluating long-term utility and water quality planning opportunities from a technical standpoint and to identify alternatives to address centralized wastewater treatment in the Highway 85 Corridor. The County also engaged the services of public infrastructure consultant Icenogle Norton, whose specific expertise lies in the selection, creation, governance and operation of entities for the funding, construction, and long-term management of public infrastructure, including entities that are traditional units of government, Public-Public Partnerships, and Public-Private Partnerships. In April 2009, First Southwest Company was engaged to evaluate the financial feasibility of a Public/Private Partnership and/or Concession Program for a Wastewater Collection and Treatment System in the Highway 85 Corridor.

The Highway 85 Corridor is defined by an irregular boundary that approximates Highway 85 and Plum Creek from the Plum Creek Wastewater Treatment Authority Treatment Plant on the south to approximately West Highlands Ranch Parkway on the north. The study area contains a diversity of land uses and levels of infrastructure. The land in the Highway 85 Corridor includes open space, but is also used for residential, industrial, commercial and agricultural purposes. The minimal existing centralized wastewater in the study area is confined to the Town of Louviers, with the balance of the study area currently served by ISDS or being undeveloped without infrastructure. While the Town of Sedalia, Titan Road Industrial Park, and the Reynolds Industrial Park have central water, none have central wastewater.



Key Considerations in Evaluating the Project

A number of considerations must be explored to thoroughly evaluate the financial feasibility of a Public/Private-Public Partnership and/or Concession Program for a wastewater collection and treatment system in the Highway 85 Corridor. The conclusions drawn from our assessment of such issues form the basis of our analysis, identify deterrents to private sector participation, and are the basis for our suggestions for enhancing the viability of the Project. We indentify the following as key considerations in evaluating the Project's financial feasibility and financiability.

- *Availability and Affordability of Clean Water*

  Pursuant to the direction of the County Commissioners, the Technical Committee and its consultants have assumed the availability and affordability of clean water in the Highway 85 Corridor in amounts sufficient to support the projected development and resulting growth in wastewater. A sufficient quantity of affordable clean water is an essential factor in the development of the Highway 85 Corridor, and consequently the viability of a wastewater collection and treatment system.

- *Current and Projected Amount of Wastewater*

  An estimated potential of 0.5 MGD of wastewater is projected based on current land use in the Highway 85 Corridor. When considering the development of currently unused and underused industrially zoned property, as well as the potential for rezoning and development of lands currently zoned for agriculture, the Highway 85 Corridor wastewater projections by 2030 are estimated to be 3.0 MGD.

- *Land Use and Population*

  Wastewater projections are based on assumptions regarding population, growth, and potential land use and zoning issues. The timing and magnitude of growth and development are unknown factors in planning for future conditions.

- *Economic Development*

  The availability and need for land for economic development in the County will impact the rate of development within the Highway 85 Corridor, as will residents' desire for such development therein. The rate of development will be impacted further by ease of access to areas within the Highway 85 Corridor and accessibility to electric and gas utilities. As development occurs, it will provide economies of scale to a wastewater collection and treatment system and expand the tax base of the public sector.

- *Competition*

  Prior to discharge, wastewater generated in and collected from the Highway 85 Corridor will require treatment, which may be accomplished via a newly constructed wastewater treatment facility or an existing wastewater treatment facility.

  While the trend to consolidate and regionalize wastewater treatment facilities in the State of Colorado reduces competition to the Project, ISDS and their proliferation represent a competitive threat to the Project.

- *Alignment of Sewer Interceptor*

  Construction of the sewer interceptor will require the acquisition of right of way or similar, and potentially a special use permit from the Colorado Department of Transportation and pipeline crossing permits from Burlington Northern Santa Fe Railway, the cost and time of assembling or receiving such approval impact the financial feasibility of the Project. Other Federal approvals or mitigation activities may be required due to potential impacts on wetlands or proximity to endangered species. To the extent such Federal approvals or

mitigation activities increase the cost of construction of the Project, these too are considerations in financial feasibility.

- *Reclaimed Water*

  There is a shortage of water resources in the State of Colorado, including the County. Consequently, treating and reusing effluent to reclaim water creates economic value for the entity holding the rights to such reclaimed water. This may be a key consideration for an entity, public or private, in providing wastewater treatment and collection services to the Highway 85 Corridor.

- *Wastewater and Environmental Regulations*

  Relevant regulations, which are subject to change, include the State's encouragement through the CDPHE to consolidate wastewater facilities and environmental regulations concerning, among other things, point source discharges and non-point source controls, which impact capital investment requirements.

- *Availability and Cost of Financing*

  The availability and cost of money to finance the Project has a direct impact on its financial feasibility.

- *Rate of Return*

  A private sector entity generally expects a rate of return on investment of approximately 10% to 15% to participate in a Public-Private Partnership, with projects that have greater risk requiring higher rates of return. Initial research by the legal consultants to the Technical Committee indicate that, unless the public sector partner retails water on a rate basis, the operator of the proposed wastewater system will not be under the supervision of the Public Utility Commission, which regulates, among other things, utilities' rates of return on capital.

- *Number of Contracting Parties*

  The number of parties with which the owner or operator of a wastewater collection and treatment system must negotiate impacts the attractiveness of the opportunity to provide such services.

Market Feasibility of the Project

General Financial Feasibility

The general financial feasibility of a wastewater collection and treatment system in the Highway 85 Corridor is principally based upon (i) the amount of wastewater produced within the Highway 85 Corridor, and (ii) the ability of the wastewater system to (a) generate sufficient cash flow on a timely basis to satisfy the debt service on funds borrowed to construct the system, and (b) provide the owner or concessionaire, as appropriate with its required rate of return on investment. Absent additional development within the Highway 85 Corridor, existing WWTFs have sufficient existing capacity to treat the amount of wastewater currently produced; however, no interceptor sewer or collection system exists to convey the wastewater to the existing WWTFs.

The existing excess wastewater treatment capacity means the feasibility of constructing a new WWTF or expanding an existing WWTF is dependent upon development within the Highway 85 Corridor to generate additional wastewater, thereby creating the need for such additional capacity. While the prospects of development within the Highway 85 Corridor are subject to debate, the timing of such development, if any, is unknown; furthermore, no means currently exists to accurately predict the timing of such development, if it were to occur in the future.

Feasibility of Constructing a New WWTF and Sewer Interceptor

As a result of the uncertainty of the cash flow associated with the installation of a new WWTF and absent the provision of Availability Payments, the Project is extremely difficult to finance, especially at interest rates to yield the required return on investment to the owner or concessionaire. While we reference the use of Availability Payments in connection with a new WWTF, we understand the County and Local Governments do not want to make such payments. As a result, we do not believe construction of a new WWTF in the Highway 85 Corridor is feasible at this time.

In addition to our belief that construction of a new WWTF in the Highway 85 Corridor is not financially feasible, we question its feasibility from a regulatory perspective, which uncertainty further reduces the financial feasibility of the project as the financiers of the Project will seek a higher return on investment as a result of such uncertainty. The construction of a relatively new small WWTF can reasonably be expected to be met by opposition from the CDPHE given its encouragement of consolidation of WWTFs and the fact that existing WWTFs have sufficient capacity to treat current flows.

Further, permitting and water quality planning constraints; waste load allocation issues; construction of a new WWTF potentially located in an environmentally sensitive area; and limited tracts of land of sufficient size in the Highway 85 Corridor for construction of a new wastewater system, make construction of a new WWTF unlikely.

Feasibility of Constructing a Sewer Interceptor and Utilizing Existing WWTFs

While we do not believe constructing a new WWTF is financially feasible, we believe constructing a sewer interceptor to serve the Highway 85 Corridor sufficient enough to transport up to 3.0MGD (with such wastewater being treated by existing WWTFs) is indeed feasible, is consistent with the treatment alternatives proposed by the Technical Committee, and will achieve the goals of enhanced water quality and the promotion of the reuse of water. This alternative requires an investment of approximately $15 million and relies on using existing available wastewater

treatment capacity, pending further investment in and expansion of capacity as and when necessitated by development, as opposed to an investment of approximately $42 million for a sewer interceptor and new construction that will treat up to 3.0 MGD absent the current need for such capacity.

The financial viability of this more modest alternative is significantly less reliant on future development to generate sufficient timely cash flow to satisfy the debt service on borrowed funds, and to provide the owner or concessionaire, as appropriate, with its required rate of return on investment, given the significantly reduced risk. If and when such development occurrs within the Highway 85 Corridor, the existing WWTFs can increase their capacities as needed and divide among a larger rate base the costs involved, with all parties benefitting from improved economies of scale. Furthermore, such plan satisfies the CDPHE's desire for consolidation and regionalization and avoids the issues confronting construction of a new WWTF, as discussed.

Under current conditions, the alternative involving the construction of a wastewater interceptor and use of existing wastewater treatment facilities could be provided by (a) a consortium consisting of two existing wastewater treatment providers (the most likely candidates being Centennial Water and Sanitation District and Plum Creek Wastewater Authority) and a private sector entity to design, build, own and operate the wastewater interceptor, or (b) on a Public-Public Partnership basis with the two existing wastewater treatment providers sharing the cost to design, build, own and operate the sewer interceptor, thereby further reducing the cost and risk to each party.

Discussions regarding the development of a proposal to provide wastewater collection and treatment within the Highway 85 Corridor may lead to conversations involving changes in control of the WWTFs. Specifically, the development of a consortium consisting of public sector WWTFs and a private sector entity, subject to the interest of the parties in such discussion, may be the impetus for discussions regarding a change in control, with such treatment facilities being purchased with cash by the private sector entity. A sale of the WWTFs to the private sector would allow the WWTFs' public sector owners to "unlock" or monetize their investments in the WWTFs. As a result, such sale potentially may redeploy capital to clean water related activities, among other ventures, and remove the potential need for investing in the expansion of water treatment facilities, should Highway 85 Corridor experience growth, all while ensuring the provision of an essential and regulated service to the populace.

Similar to the discussions between public and private sector members of a consortium, a joint proposal by two public sector entities may lead to discussions involving a change in control through the establishment of a public sector regional wastewater treatment authority. Similar to the acquisition of the WWTFs by the private sector, a public sector regional wastewater authority could acquire the existing WWTFs for cash and, in doing so, provide its owners with benefits similar to those of a sale to the private sector while maintaining public control of an essential service and the potential for continued involvement in the governance of such facilities through representation on the Board of such an authority

Feasibility for Public/Private Partnership/Concession Approach

Considering the current excess wastewater treatment capacity in the Highway 85 Corridor and uncertainty regarding increased demand for wastewater treatment and the timing of such, additional discussion of which is provided in "Deterrents to Private Sector Participation" page 14, we do not believe a Public-Private Partnership/Concession is feasible with respect to the construction of a new wastewater collection and treatment system absent the provision of

Availability Payments by the public sector. Availability Payments merely transfer the risk involving increased demand for wastewater treatment and the timing of such to the public sector partner.

However, we believe a Public-Private/Public Partnership with regards to constructing a sewer interceptor to bring wastewater collection and treatment services to the Highway 85 Corridor to be feasible in that the partnership can (i) utilize the existing public sector wastewater treatment authorities that currently have excess wastewater treatment capacity, thereby allowing the expansion in treatment capacity in accordance with, as opposed to in advance of, growth in demand for treatment of wastewater; (ii) draw upon the financial resources of the private sector to finance the sewer interceptor; and (iii) be formulated so as to be consistent with the regulatory movement towards regionalization of wastewater collection and treatment. Such discussions may lead to the consideration of privatizing the existing wastewater treatment facilities with their acquisition by their private sector partner.

Given the benefits afforded a partnership by existing wastewater treatment providers in proximity to the Highway 85 Corridor, and because of the relatively small cost of the sewer interceptor (estimated at approximately $15 million), a Public/Public Partnership is a very viable means for developing the Project. The County's legal consultant has advised that State law allows contracting and cooperating between local governments to accomplish common goals. This variety of Public-Public Partnership can include both an authority formed to contract with various private or public parties, as well as public parties who might provide the project's infrastructure. Therefore, we believe a Public-Public Partnership to be a likely participant in a Request for Proposal process and one that will bring a significant number of strengths to the Project. The coordination of existing WWTFs in developing their proposals and the provision of a "regional" wastewater collection system may initiate discussions regarding the development of a regional wastewater authority to serve the Highway 85 Corridor, as opposed to a number of small WWTFs.

Deterrents to Private Sector Participation

1. Questions Regarding the Sufficiency of Clean Water Supply in the Study Area

   The availability and affordability of clean water are critical for the successful development of the Highway 85 Corridor. Pursuant to the direction of the County Commissioners, the Technical Committee and its consultants have assumed availability and affordability of clean water in the Highway 85 Corridor in amounts sufficient enough to support the projected development within the study area that causes the projected increase in wastewater. Because clean water is integral to the success of development and, ultimately, the wastewater treatment system, the lack of certainty regarding its availability and affordability will deter private sector interest or increase the cost of its involvement because of the greater risk caused by lack of information.

2. Current Excess Wastewater Treatment Capacity

   Absent additional development in the Highway 85 Corridor, there exists sufficient wastewater treatment capacity to serve residents and businesses. Therefore, demand for additional wastewater treatment capacity is dependent upon increased demand for wastewater treatment. Factors including the current availability of wastewater treatment capacity, construction of a new WWTF in an environmentally

sensitive area, and permitting and water quality constraints (with preference to regionalization of wastewater treatment) make constructing a new WWTF unlikely.

While excess wastewater treatment capacity exists, there is insufficient capacity if the potential 3.0 MGD of wastewater is realized at full build out of the Highway 85 Corridor. However, full build out likely will occur only with installation of a wastewater interceptor. To treat such increase in wastewater, either a new WWTF will be required, or the treatment capacity of the existing WWTFs will need to be expanded.

As the private sector partner in a Public-Private Partnership would hold no ownership interest in the existing WWTFs based upon the current ownership, the private sector party likely would not be willing to finance the expansion of such facilities. A private sector party would not embrace an arrangement involving reliance upon an unrelated party to invest in its facilities that may have different motivations. However, we note the potential to mitigate such risk through the negotiation of contractual obligations to invest in such facilities upon agreed terms and conditions.

3. Questions Regarding Demand and Timing of Demand for Wastewater Treatment

The County's projections show population increasing to 315,297 by 2010 and reaching 444,784 in 2030. During this period, the number of jobs in the County is expected to increase 98%. While 90% of the population lives in urban designated areas, this represents only 16.4% of the County. The 4,300 acre Chatfield urban area, located northwest of the Highway 85 Corridor, was recently designated by the County to promote future residential and retail development in the Chatfield Watershed. While estimating the population of the Highway 85 Corridor in the future is possible, given current service areas, land uses and zoning, time is the unknown factor in planning for future conditions.

With respect to economic development, County representatives have determined that the Highway 85 Corridor is best suited for light industry, as environmental issues, lack of residential development for support and opposition from the residents of Sterling Ranch make it unsuitable for commercial development. No study has been conducted nor is reliable information available to estimate if and when industrial development will occur following the installation of a wastewater treatment system in the Highway 85 Corridor. Likewise, no study has been conducted nor is reliable information currently available to provide an analysis of the County's competitive position relative to other areas in the greater Denver area to assist in the assessment of its ability to attract such development.

In addition to a wastewater treatment system to promote development, portions of Highway 85 may need to be widened and bridges developed due to all railroad crossings being at grade level. Limitations on the type of development as well as the need for infrastructure investment to support such development further enhance the risk and timing of development occurring, thereby increasing the risk of the Project's ability to generate sufficient predictable revenues to sustain itself.

Demand from existing businesses and residents in the Highway 85 Corridor for a wastewater system is reduced through their current permitted use of ISDS. Many of the businesses that have developed in the Highway 85 Corridor are oriented

towards providing services that are not labor intensive but rather based on the availability of inexpensive land such as storage facilities for recreational vehicles, construction equipment and building materials. Notwithstanding their legal obligations to utilize a wastewater system upon its implementation, the ability of businesses and residents to utilize ISDS to address their wastewater needs reduces their support for and interest in the development of a wastewater system.

4. Current Reduced Availability and Cost of Credit

   The availability and cost of raising funds to invest in a Public-Private Partnership has a direct and immediate impact on the profitability of the project and the ability of the private sector to advance a project. Since September 2008, the availability of credit has declined on a global basis while the costs of credit and the credit standards of lenders have increased. Within the past six weeks, the privatization of Midway Airport in Chicago, Illinois and two Public-Private Partnerships (concessions on Alligator Alley in Florida and a new Airport Toll Road in Jackson, Mississippi) have been cancelled or delayed as a result of the current difficulties in the credit markets. While the size of the Project ($15 million for only the sewer interceptor to $33.6 to $71.5 million for a complete wastewater collection and treatment system), reduces its exposure to the currently challenging credit markets, it does not immunize it from lenders' reduced appetite for risk or the adverse impact of increased debt service on the cash flow of the project, each of which diminishes the attractiveness of the project to the private sector.

5. Lack of Right-of-Way or Approvals for Sewer Interceptor Alignment

   The lack of right-of-way or similar approvals for the alignment of the sewer interceptor increases the risk of the project, thereby diminishing its appeal to the private sector. The lack of right-of-way or similar approvals requires the expenditure of funds towards the development of the sewer interceptor absent cost certainty and viability of the project and maintenance of larger contingencies by the private sector, reducing the economics of the partnership to the public sector.

6. Outstanding Permits and Approvals

   The greater the number of permits and/or approvals not yet obtained with respect to the Project increases its risk, thereby diminishing the attractiveness of the opportunity to the private sector. A lack of permits or approvals requires the expenditures of funds towards the development of the Project absent cost certainty and viability of the Project, as well as a larger contingency. Among the organizations from which permits or approvals, excluding those related to right-of-way, are required to be obtained for the Project to progress potentially include the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, Douglas County, Denver Regional Council of Governments, and the Colorado Department of Public Health and Environment.

B. Suggestions to Enhance Financial Viability of the Project

1. Mitigate Risk and Timing of Demand

The principal risk to the Project can be mitigated or reduced, thereby enhancing the financial viability of the Project, via the following means:

a. Availability Payments

The risk regarding demand for wastewater treatment and the timing of the demand for such can be mitigated through Availability Payments. Availability Payments contingent upon the construction and availability of a wastewater collection and treatment system may be provided through a public sector entity such as the County or a regional wastewater authority created within the Highway 85 Corridor. However, we understand the County and Local Governments do not want to make such payments.

ii. Economic Development Incentives

The County and Local Governments can provide economic development incentives, to the extent permitted by law, as a means of fostering development, and consequently increase the demand for wastewater treatment in the Highway 85 Corridor.

While the Denver Regional Council of Governments determines the aggregate amount of land available for development within the County, the County determines the type and location of such development. Through land use designation, the County can encourage development within the Highway 85 Corridor by designating such land as available for development while restricting development in other areas of the County, pending development within the Highway 85 Corridor.

2. Obtain Right-of-Way or Similar Approvals and Project Permits and Approvals

Securing right-of-way or similar approval for the alignment of the sewer interceptor, or arranging through contract negotiations for the public sector to retain such risk will enhance the attractiveness and financial viability of the Project by reducing its risk profile. While eliminating this issue is difficult, as the necessary right-of-way or approval is based upon the alignment of the sewer interceptor, the design of which will involve in-put from the owner or operator of the Project, it can be mitigated through the expenditure of funds to acquire a substantial percentage of the alignment. Such acquisition is possible because the three alignments most attractive for the proposed sewer interceptor significantly overlaps one another.

A reduction in the number of outstanding permits or approvals required for the Project increases the attractiveness of the Project by (i) reducing the expenditure of funds required to prepare for construction of the Project thereby reducing the risk to the viability of the Project, and (ii) reducing the risk to creditors providing financing for the Project. With the reduced uncertainty, the contingency in the budget for the Project can be reduced thereby enhancing the Project's financial performance.

3. Reduce Individual Sewage and Disposal Systems as a Long-Term Viable Alternative

The County can coordinate with the CDPHE and the Commission to intensify funding towards the conversion of ISDS in the Highway 85 Corridor to a wastewater treatment system. Of particular interest may be the funding support for design and construction of collection systems within the Town of Sedalia, Titan Road Industrial Park, and South Santa Fe Metropolitan District.

The County as well can address restrictions and maintenance requirements for ISDS located in the Plum Creek floodplain. Consider developing a "Septage Management District" to address funding for monitoring, maintenance and inspection of existing ISDS in the Chatfield basin. Address proposed modifications at an upcoming rulemaking hearing before the Commission to support implementing mechanisms with a regulatory foundation.

Conduct public outreach on the preferred wastewater collection and treatment options and funding scenarios. Initiate positive involvement of County and "US 85 Water Reclamation Authority" members prior to initiating the formal public process. The public outreach effort will articulate the project benefits to public, including funding and cost saving opportunities, and environmental benefits.

Through regulation, increase emphasis on improvement in water quality and reuse of water. Such increased emphasis will assist in increasing support for implementation of a wastewater treatment system while reducing the proliferation of ISDS.

Conclusions and Recommendations

A. Lessons Learned and Best Practices

Privatization is a concept that encompasses a wide variety of approaches to involving both the public and private sector in the delivery of services and the development of projects intended to benefit the general public. The applications of privatization are countless: transferring ownership of government assets to the private sector; contracting with private firms to provide services previously provided by the public sector with public sector oversight; managing competition between the government and the private sector, public sector entities, and private sector entities; and forming Public-Private Partnerships whereby the private sector is involved in the financing and development of the capital project as a substitute for purely public financing of the project. Determining the most efficient method of privatization in a given scenario typically begins with performing a public-private performance analysis.

The philosophical argument for privatization is based on two main premises, with financial considerations being purely pragmatic in nature. The first premise is that the private sector offers benefits not found in the public sector, such as improved innovation, quicker decision-making, and improved efficiency resulting from market discipline. The second is that these benefits more than offset the dangers of fraud or predatory practices that may be found in the private sector. Financially, the public sector struggles at all levels of government with the demand to provide services without increasing taxes and fees.

- *Public –Private Performance Analysis*

  Three main factors to determine whether a function, task, operation or activity should undergo competition with the private sector are as follows:

  I. <u>Analyze the potential for competition</u>

  Questions such as the following are helpful in analyzing the potential for competition:

  - Can the service be, or is it already available from the private sector?
  - Is more than one firm capable and interested in providing the activity to ensure competition?
  - Can the activity or function be specified in advance with clear objectives and outcomes?
  - Can the delivery and performance of the activity be adequately monitored?
  - Is economical delivery of the service more important than control or accountability?
  - Can the private sector implement and deliver the activity quicker?
  - Does the public sector have the ability and resources to manage/control/regulate the contract?
  - Is the function suitable for outsourcing by the public sector from a public policy perspective?
  - Are there legal or regulatory barriers to outsourcing the service?
  - Will the public sector submit a proposal to perform the service?

  II. <u>Estimate the cost of the activity to the public sector</u>

The following cost categories are applicable when analyzing the estimation, and if possible, elimination of project costs for projects transferred to the private sector, for the base contract term plus any option years, if applicable:

- Personnel Costs
- Operating Costs
- Capital Costs
- Insurance/Liability Costs
- Operations Overhead Costs
- General & Administrative Overhead Costs
- Any Additional Costs Not Otherwise Included

III. Consider public policy issues

The objective of this analysis is to determine if the service can be transferred to the private sector without public harm. The following questions are helpful in making such determination:

- Can the private sector entity be replaced relatively easily during the contract term?
- Is economical delivery of the service more important than control and/or accountability?
- Can the contract provide for the transfer of liability and/or risk?
- Is the public safety and/or welfare of the public protected in case of default?
- Is the proposed privatization consistent with State law and regulations?
- Is the function suitable for competition between the public and private sector?
- Has the service been successfully contracted out by other public sector entities?

- *Define Goals*

If the prospective public partner decides to proceed following completion of the public-private performance analysis, the first step is to define the goals and service outcomes it seeks to achieve through a Public-Private Partnership. Planning should include establishing performance targets and service outcomes the partnership is expected to achieve. The goals and outcomes should be consistent with the strategic plan of the public partner and provide for integrated planning with other public sector entities that may be impacted by the partnership

At this stage, the public partner also should identify opportunities to improve the performance of the existing infrastructure, and conduct a preliminary assessment of potential private and public sector interest in the anticipated partnership.

- *Detailed Project Definition*

The prospective public sector partner must develop well defined project objectives, project parameters and conditions under which the private and public sector may participate in a public partnership. The means of managing the evaluation process, and the evaluation criteria should be specified at this stage to ensure competitive neutrality throughout the procurement process.

At this point, (i) project timelines should be developed and necessary land use and environmental assessments identified, (ii) an economic analysis should be performed to determine if private and public sector funding is achievable, and if so, the cost, (iii) an

assessment should be conducted of fiscal impacts associated with any public sector support that may be required by a Private-Public or Public-Public Partnership, including any contingent liabilities that private financing could have on other public sector financial requirements, (iv) subject to the complexity of the project, a market analysis should be undertaken to predict probable responses to a competitive solicitation, (v) a preliminary risk management plan should be developed to assess the various risks associated with the proposed partnership and associated costs, and (vi) an economic development assessment should be performed to identify opportunities for local business development.

- *Proposal Process*

A two-step proposal process is recommended to solicit interest in the potential partnership: a Request for Qualifications ("RFQ") to determine the most suitable public and private sector entities from which solicit proposals, and then a Request for Proposal ("RFP") to elicit formal proposals from those selected to compete. The following outlines the recommended approach to the RFP/RFQ process.

Request for Qualifications

An RFQ states the objectives of the proposals. Objectives are expressed in terms of the desired output and performance requirements but do not identify any specific solution. A discussion of the decision-making process, evaluation criteria, and a realistic time line for the evaluation of the responses are included.

The responses to the RFQ should provide the public sector partner with the information needed to assess the market's ability to satisfy the project requirements. At a minimum, a RFQ should ask for the following information:

- Experience in successfully designing, constructing and financing major projects;
- Proposed approach and experience in addressing areas such as design, construction, operations and maintenance experience;
- Financial ability to meet the likely contractual obligations associated with the project;
- Design, construction, financing and operational resources;
- Approach to innovation;
- Proposed risk-sharing structure;
- Economic, social and community benefits proposed as part of the partnership; and
- Ability to undertake the specific project, including the ability to meet the specifications, technical aspects and quality requirements of the project.

A RFQ also addresses key issues, such as risk sharing; pricing of services; community benefits; the public sector's contribution to the partnership; and, if applicable, any regulatory issues. It includes all relevant background information, a preliminary market assessment and any available results of completed environmental and land use studies.

An evaluation committee reviews the responses to the RFQ to determine if they indicate an overall benefit to the public sector partner and the general public in terms of finance, economic and social factors. The receipt by the public sector partner of successful responses indicates preliminary viability and suitability for a private or public sector partnership financing and service delivery.

Subsequent to the review and evaluation of the responses to the RFQ, the committee may consider meeting with individual respondents to gain a greater understanding of the private sector's perspective of the project definition, its goals, areas of concern, and risks.

Request for Proposals

Based upon the responses to the RFQ, the evaluation committee selects a limited number of respondents whose qualifications and submission best meet the public sector partner's requirements to receive a RFP. The evaluation committee conducts a detailed review of the responses to the RFP and selects a firm with whom to enter into contract for negotiations.

- Contract Negotiations

The goal of contract negotiations is reaching an agreement on the numerous issues related to the proposed partnership. These include agreement on a detailed project description and all of the partnership's financial details. During this process the burden for project risks are negotiated and allocated between the public and private sector parties. In addition, the public sector should seek agreement on the following:

- Economic appraisal
- Financial feasibility
- Fiscal impacts
- Value & risk management plan
- Environment impacts
- Net benefits from private sector

Additional issues to be resolved during contract negotiations, include those relating to the partnership's balance sheet and income statement. These include:

- Valuation, treatment and timing of assets to be provided to the public sector at the end of the partnership.
- Treatment and timing of assets that the public sector may provide to the private sector.
- Valuation and treatment of liabilities and contingent liabilities.
- Treatment of payments made to the private sector during the contract period.
- Treatment of receipts received by the public sector from the private sector during the contract period.

- Implementation

The successful implementation of the partnership contributes to its long-term success. As part of the implementation process, the contract negotiated between the parties should be referenced to ensure its proper execution and allocation of risk, and the detailed project definition reviewed to ensure the implementation of the partnership is consistent with such definition. At this point in the process, it is appropriate to provide a summary of the partnership to local public sector entities impacted by the project, which also may serve as a means of managing public relations issues. The summary should include the following:

- Identity of Contractor
- Duration of Contract
- Details of future transfer of assets to the public sector at no or minimal cost
- Identification and timing of public sector assets to be transferred to private or public sector partner

- Price to be paid by the public, including the basis for future changes in price
- Project maintenance provisions
- Contract renegotiation provisions
- Results of cost benefits analysis performed by public sector partner
- Significant guarantees, including financial, that are part of the terms of the partnership contract
- Any key elements of the contract not covered above.

- Continuing Post-Implementation Review

As a result of contractual obligations between the parties and the service and performance measures, a Public-Private/Public Partnership requires a continuing post-implementation review. The post implementation review is in addition, not in place of, quality assurance oversight by the public sector. The reviews may serve as a valuable tool in refining the process used by the public sector in developing the Public-Private/Public Partnerships.

Commencing the initial review one year following the physical completion of project construction or service implementation is appropriate. An effective post-implementation review focuses on the following:

- Project formulation and objectives
- Approval process and conformance to the project implementation schedule
- Risk exposure and risk sharing
- Budget performance
- Project management and procedures
- Functionality of infrastructure
- Project operations and financing
- Economic and industrial development opportunities

From a policy perspective, the following issues should be considered as part of a post-implementation review:

1. Financial Independence of Project

   An important public sector objective in a Public-Private/Public Partnership is to obtain a new or additional source of funding for infrastructure projects. To what extent has such been achieved, and, if applicable, the public sector financial support provided to the partnership should be considered against the needs of the general public.

2. Project Size

   The practices outlined herein generally apply to larger projects with streamlined procedures appropriate for smaller projects. The time and cost of the procedures and the analysis and negotiations of entering into a Public-Private or a Public-Public Partnership should be considered against the cost and risk of the related project to assist in refining the procedures in determining the attractiveness and the process of entering into a Public-Private or a Public-Public Partnership.

3. Risk Sharing

   A key objective of the partnership is to capitalize on the strengths of both partners and mitigate their individual weaknesses. While it is appropriate for the public sector to consider

sharing risk on the basis of who is best able to assume the risk, it should not be assumed that the public sector should maintain risk against the project on an on-going basis. Risk transfer is a key objective of a Public-Private/Public Partnership, and the public sector must exercise due diligence to identify the risks associated with the partnership and implement appropriate risk management plans to minimize unexpected risks.

It is important that the public sector provide active oversight of a Public-Private Partnership to ensure the delivery of the contracted services in the manner and quality contractually agreed upon, and the achievement, to the fullest extent possible, of the goals and objectives expected to be realized through the Public-Private Partnership. Only through such oversight can the predatory practices of the private sector and their incentive to maximize profitability be controlled.

B. Recommendations for Next Steps and a Process for Going Forward

We recommend that the Commissioners proceed and remain engaged in determining the ability to bring a wastewater treatment collection and treatment system to the Highway 85 Corridor on the basis of the following:

- The financial feasibility of the Project when bringing together construction of a sewer interceptor and use of existing wastewater treatment facilities.

- The need for a wastewater system in the Highway 85 Corridor to allow economic development to occur within the corridor, which, together with its positive impact on the value of land, will enhance the tax base of both Local Governments and the County.

- The ability to create an incentive to bring additional water resources to the County through enhanced reuse, which will have the additional benefit of reducing demand on groundwater, thereby extending the life of such resources.

- The ability to improve water quality along the Highway 85 Corridor through the elimination of individual sewage and disposal systems.

- The ability to enhance water quality and promote reuse, which will improve opportunities for development within the County.

Important next steps in developing the means and ability to provide wastewater collection and treatment to the Highway 85 Corridor include the following:

- Perform a Public-Private Partnership analysis to determine whether the provision of a wastewater system should involve the private sector from the perspective of the County and other key public sector entities.

- Engage a dialogue on financing options with key public and private entities and potential treatment providers; gage interest of project concepts with respective treatment provider boards, management, and community leaders.

- Form a water reclamation authority for the Chatfield valley; finalize and execute the draft establishing contract for the “US 85 Corridor Water Reclamation Authority.”

- Coordinate with CDPHE and the Commission to intensify funding towards the conversion of ISDS in the study area to conventional treatment, including, but not limited to, the provision of financial incentives.

- Coordinate with the CDPHE and Commission to address restrictions and maintenance requirements for ISDS located in the Plum Creek floodplain. Consider developing a "Septage Management District" to address funding for monitoring, maintenance and inspection of existing ISDS in the Chatfield basin. Address proposed modifications at an upcoming rulemaking hearing before the Commission to support implementing mechanisms with a regulatory foundation

- Assess the ability to make clean water available at an affordable cost within the Corridor to support development therein.

Appendix A

Glossary

Availability Payments: Payments by governmental entities to supplement cash flow from a project that fails to generate sufficient cash flow from operations to satisfy the requirements of a private sector entity.

CDPHE: The Colorado Department of Public Health and Environment.

Commission: The Colorado Water Quality Control Commission.

County: The County of Douglas, Colorado.

County Commissioners: The Board of Commissioners of the County.

Highway 85 Corridor: The U.S. Highway 85 Corridor study area in Northwest Douglas County, Colorado; defined by an irregular boundary that approximates Highway 85 and Plum Creek from the Plum Creek Wastewater Treatment Authority Treatment Plant on the south to approximately West Highlands Ranch Parkway on the north

ISDS: Individual sewage disposal systems.

Local Governments: Local governments located within the Highway 85 Corridor.

Project: A wastewater collection and treatment system in the Highway 85 Corridor.

State: The State of Colorado.

WWTF: A wastewater treatment facility.

WWTFs: Wastewater treatment facilities.

Parties Involved

Icenogle Norton: Public infrastructure consultant whose specific expertise lies in the selection, creation, governance and operation of entities for the funding, construction, and long-term management of public infrastructure, including entities that are traditional units of government, Public-Public Partnerships, and Public-Private Partnerships.

First Southwest Company: Engaged by the County to evaluate the market feasibility of a Public-Private Partnership and/or Concession Program for a wastewater collection and treatment system in the Highway 85 Corridor

Technical Committee: Convened by the County in February 2008 to consider potential means by which to bring centralized wastewater collection and treatment to the Highway 85 Corridor for the purpose of improving water quality and promoting economic development; is comprised of representatives from various service providers in and around the Highway 85 Corridor and County staff.

Tetra Tech: Engaged by the County to conduct an engineering study evaluating long-term utility and water quality planning opportunities from a technical standpoint and to identify alternatives to address centralized wastewater treatment in the Highway 85 Corridor.

Appendix B

Case Studies

Gresham, Oregon Wastewater Treatment Plant

2008 NCPPP Innovation Service Award Winner
Project Location: Gresham, Oregon
Public Sector Partner: City of Gresham, Oregon
Contact Name: Guy Graham, Manager of Wastewater Services Division, guy.graham@ci.gresham.or.us
Private Sector Partner: Veolia Water North America
Contact Name: Shilen Patel, Marketing Communications Manager, shilen.patel@veoliawaterna.com

PROJECT SUMMARY

Built in 1936 as a WPA project, the Gresham Wastewater Treatment Plant has been contractually-managed and operated since 1980. The plant serves 106,000 people living within the City of Gresham and in surrounding suburbs.

Nearing the conclusion of the plant's then-current contract, Gresham staff evaluated the contractor's performance and the future needs of the City in 2004. Under consideration was plant efficiency, asset management and the EPA's National Pollutant Discharge Elimination System (NPDES) permit requirements.

After competitively bidding the project in 2004, the City chose Veolia Water for its innovative proposal and ability to provide technologically-advanced asset management. Further advancing the City's green initiatives was Veolia Water's addition of a cogeneration power plant, which converts byproduct greenhouse gas (methane) into energy to power the treatment plant.

PROJECT OBJECTIVES

Asset management was an important factor for the City as it considered proposals for the operation and management of the treatment plant. Veolia Water offered an advanced asset management system able to interface with all other Veolia Water-managed treatment plants. The system allows Veolia Water to benchmark the Gresham plant's performance to evaluate its efficiency. Ability to obtain compliance with the City's NPDES permit, which regulates point sources of water pollution, also affected the City's decision.

PROJECT DESCRIPTION

Partners

The public sector partner is the City of Gresham, Oregon. Located approximately 16 miles east of Portland, Gresham is the second largest city in the metropolitan area and the fourth largest city in the state. The City has experienced rapid growth over the past twenty years and has changed from a rural, farming community to a burgeoning urban area. Its population increased by 10 percent to 100,000 between 2001 and 2008. The City provides typical municipal services and is the seventh city in Oregon and the fourteenth city in the country to be designated by the EPA as a Green Power Community.

The private sector partner is Veolia Water North America. The firm is the leading provider of comprehensive water and wastewater services to municipal and industrial customers. It provides services including the design, construction and operation of water and wastewater treatment facilities and systems. Veolia Water North America was awarded the Gresham wastewater contract in 2005.

Implementation Environment–Legislative and Administrative

Private contracting is permitted under Chapter 279A of the Oregon Revised Statues in order to meet the goal of promoting "efficient use of state and local government resources, maximizing the economic investment in public contracting" (Ore. Rev. Statutes, ch. 297A, § 015 [2003]). Pursuant to the Gresham Revised Code, all contracting activities are conducted pursuant to Oregon statues and administrative rules.

Financial Agreement

The seven-year contract approved by the City Council includes a payment of $21 million to Veolia Water for the management and operation of the treatment plant. Veolia Water's improvements to the plant have saved the City $18,000 to $20,000 per month in utility payments.

Those served by the plant, including Gresham residents and those living in surrounding communities, pay a flat fee of $24.09 per month for wastewater services (March 2009 rate). In June 2008, the City Council passed an ordinance increasing wastewater rates by $0.95 per month throughout 2009. This rate is still one of the lowest in Oregon.

Contract Provisions

Approved in 2005, the contract has a seven-year term and includes the management and operation of a pre-existing wastewater treatment plant serving 106,000 people. The contract was expanded to include the development and long-term planning of a

cogeneration power system.

Veolia's contract with the City includes the following conditions: 1) operation and management of a 20 million gallons per day treatment plant; 2) management of a beneficial bio-solids program; 3) analysis of the industrial pretreatment program; 4) operation of a cogeneration plant; 5) provision of laboratory services; and 6) operation of nine lift stations.

Implementation Metrics

The addition of a cogeneration plant has significantly reduced energy consumption at the wastewater facility. Wastewater treatment facilities typically spend one third of their budgets on energy costs, so the use of methane as energy has saved the City a substantial amount of money.

Asset management has improved since Veolia Water took over the facility in 2005. The firm's ability to access records from its other wastewater treatment facilities has increased productivity based on those industry standards. Accidents have also been reduced. Cameras have been installed around the plant to reduce labor requirements and enhance response to chemical feed issues. Maintenance schedules have changed from a reactive to a proactive approach: repairs and preventative maintenance have been prioritized, and this prioritization will lower capital maintenance and replacement costs between 15 and 25 percent over the life of the contract.

COMMENTARY

Veolia Water's experience in asset management and performance benchmarking has lead to the success of this Public-Private Partnership. Its innovative preventative maintenance scheduling has increased overall efficiency. The cogeneration plant is able to produce enough energy that utility bills have decreased by almost $20,000 per month. Compliance with NPDES is at 99.8 percent. Through the partnership, the City of Gresham has continued to be one of Oregon's few Green Power Communities.

Indianapolis Wastewater Treatment and Storm Water Management Services

2008 NCPPP Service Award Winner
Project Location: Indianapolis, Indiana
Public Sector Partner: City of Indianapolis
Contact Name: Gregory Ballard, Mayor, 317-327-3601
Private Sector Partner: United Water Indianapolis
Contact Name: Robyn Ashment, Manager – Strategic Marketing, robyn.ashment@unitedwater.com

PROJECT SUMMARY

In 1994, the City of Indianapolis partnered with United Water Indianapolis for the operation, maintenance and long-term planning of the City's storm water and wastewater systems. In addition to providing these services, which have saved the City approximately $189 million over the past fourteen years, United Water has become a true community partner, sponsoring community events, scholarship programs and environmental education opportunities.

The contract, which has been extended through 2017, provides residents with excellent service with a high standard of water quality at an affordable price. With twelve consecutive Peak Performance Awards from the National Association of Clean Water Agencies and a 100 percent compliance rating for all conventional pollutants, United Water saved the City $46 million and decreased accidents by 85 percent in the first four years of the partnership.

United Water was awarded its first contract in 1994 to operate and maintain two advanced water treatment (AWT) facilities adjacent to the White River, which runs through the west side of Indianapolis. Two years later, United Water was awarded a contract for the operation and maintenance of the City's wastewater and storm water collection systems and the Eagle Creek Flood Control Dam, located in the far northwest corner of the City.

PROJECT OBJECTIVES

The scope of service for this contract includes the operation and maintenance of two AWT facilities, storm and wastewater collection services and laboratory, industrial pretreatment and program management services. This scope is meant to improve service, enhance productivity and strengthen a commitment to safety and training. United Water provides these services to 800,000 residents and 41,000 businesses in the Indianapolis-region.

PROJECT DESCRIPTION

Partners

The public sector partner for this project is the City of Indianapolis, Indiana. The City, located in central Indiana in Marion County, has a large urban center with numerous surrounding parks and recreation areas. The City, governed by an elected Mayor and the City-County Council, provides typical municipal services in addition to court services for Marion County.

The City partnered with United Water for the complete operation and maintenance of the City's wastewater management and treatment system. United Water specializes in water and wastewater treatment, municipal solutions and innovative treatment technology and serves seven million people nationwide.

Implementation Environment–Legislative and Administrative

Indiana state statute allows public entities to contract with private entities for the development, financing and/or operation of projects through a Public-Private Partnership with a private entity (Indiana Statutes, title 8, art. 15.7, ch. 3 § 1, [2006]).

Financial Agreement

The most recently negotiated contract (effective 2007) states that the City will pay United Water $28,310,524 each year of the contract plus an additional adjustment factor based on CPI and ECI changes for full operation and maintenance of the system.

Contract Provisions

For the full operation and maintenance of the Indianapolis wastewater and storm water systems, United Water is tasked with the collection, treatment, disposal and discharge of water to the City and surrounding region. This shall be conducted in compliance with all city, state and federal laws.

Implementation Metrics

In order to preserve the long-term reliability and conservation of the system, United Water was tasked with developing and implementing an operations strategy based on the formation of an operations leadership team (OLT) to ensure contract provisions are met. The OLT's main responsibility is addressing specific issues, develop alternatives and coordinate with the City on information, review, solutions and approval for associated activities.

COMMENTARY

United Water's improvements to the Indianapolis wastewater and storm water systems have saved over $189 million since 1994. The success of this partnership has allowed United Water to become a true community partner in its own right, sponsoring events and taking a lead role in the environmental education of Indianapolis youth.

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ATLANTA - FULTON COUNTY WATER RESOURCES COMMISSION AND VEOLIA WATER NORTH AMERICA (WATER INFRASTRUCTURE)

2006 NCPPP Service Award Winner
Project Location: Alpharetta, GA
Public Sector Partner: Atlanta - Fulton County Water Resources Commission
Contact Name: Kathy Crews, 678.942.2790, kcrews@afcwrc.com
Private Sector Partner: Veolia Water North America
Contact Name: Christie Kaluza, 281.985.5481, christie.kaluza@veoliawaterna.com

Project Summary: In November 1990, Veolia Water (then Environmental Operating Services) and Khafra Engineering, in a 50/50 joint venture, entered into a Public-Private Partnership with the Atlanta-Fulton County Water Resources Commission (AFCWRC) to provide startup and operations assistance services at the new Atlanta-Fulton County Water Treatment facility. The raw-water pumping station, raw-water main and the treatment plant owned by the AFCWRC supply drinking water to more than 500,000 people in the Fulton County and northern Atlanta. The partnership has been renewed three times, most recently in early 2006, and today, Veolia Water and Khafra operate and maintain the 90-MGD facility. The general manager of the AFCWRC works on site at the plant and is "hands on" in the day-to-day operations, making this a true, working Public-Private Partnership.

Over the course of more than 15 years, the Veolia Water/Khafra team has provided quality services, delivered significant costs savings and assisted in the plant capacity expansion from 30 MGD to 90-MGD without one change order. The team's innovative approaches have allowed for a continuous profitable operation. For example, the Veolia Water/Khafra team implemented a pilot program enabling the Georgia Environmental Protection Division (EPD) to approve increasing rated flow capacity from 30 to 45 MGD without any capital expenditures. Subsequent efforts increased capacity to 56 MGD. The demand for potable water then became so great that the AFCWRC upgraded the plant to 90 MGD and has been running at this flow capacity since May 1998.

The Public-Private Partnership has also generated significant cost savings for the public entity. A reduction in production costs, combined with the tremendous increase in finished water production, enabled the AFCWRC to realize more than $2.5 million in savings during the plant expansion from 30 to 90 MGD! In addition, with the latest contract renewal, Veolia Water/Khafra proposed even greater substantial annual savings by further reducing power, chemical and overall operations costs.

Another benefit of this partnership has been an outstanding record of safety and quality. The Veolia Water/Khafra team has received more than 50 operations, safety and staff awards from organizations such as the Georgia Water and Pollution Control Association (GW&PCA) and the U.S. EPA Region IV - many of which were won during plant expansions. Additionally, the partnership has been recommended for the OSHA Star Award, a prestigious mark never won by a municipal water treatment facility. Additionally, being a good corporate citizen is the cornerstone of the existence of Veolia Water and Khafra Engineering. The team has been a contributor of financial and time resources to numerous worthy Atlanta metropolitan causes throughout the partnership. Additionally, they have provided speakers, lecturers or conducted seminars for all metropolitan schools and colleges and have provided internships to local and national students.

Yet another partnership benefit has been value-added services at no additional cost to the AFCWRC. In addition to providing operations and maintenance services, Veolia Water/Khafra, at no extra cost, has provided solutions for dam erosion control; developed and maintained a Web site that promotes the AFCWRC, touts the plant capabilities and provides an educational forum; and implemented a pilot test program with the EPD and EPA for microfiltration treatment of backwash water.

The successful partnership between the AFCWRC and Veolia Water/Khafra indicates how public and private entities can develop long, mutually beneficial relationships that include high-quality service, no change orders and award-winning operations.

Originality: Several factors make this partnership original and unique.

- The ability to significantly reduce costs while tripling the size of the facility without change orders is a strong indicator of on-site innovation and originality.
- More than 30 percent of the vendors/contractors provided by the Veolia Water/Khafra team are equal business opportunity (EBO) suppliers. Due to the city of Atlanta and Fulton-County's strong commitment to minority business enterprise programs, Veolia Water teamed with Khafra back in 1990 to create a long-lasting partnership. When the partnership was renewed this year, a woman-owned business was brought into the Veolia Water/Khafra team to satisfy the commission's 34 percent EBO requirement.
- Not only is this a Public-Private Partnership, it is a partnership between a city and county. Seven members (three from the city, three from the county and one independent) manage the AFCWRC that has been vital to the success of the partnership.
- The final aspect for originality is the fact that the facility owner (AFCWRC) and operator (Veolia Water/Khafra) work closely onsite. This is rare and unique because in a partnership such as this, typically the facility owner is off site and not "hands on" in the day-to-day operations.

Quality: Veolia Water/Khafra is justifiably proud of its implemented and ongoing safety and quality program. After 15 years, the plant has an impeccable safety record, boasts profitable operations and has received more than 50 operations, safety, and staff awards from the GW&PCA and the U.S. EPA Region IV, including:

- Operator of the Year for District 3 (twice)
- Best Operated Plant in Georgia - Greater than 15 MGD by the GW&PCA (six times)
- Safe Drinking Water Excellence Award from U.S. EPA Region IV
- Best Tasting Water in Georgia and Water Taste Challenge Award (four recognitions)

Most notable is the partnership's recent nomination for the OSHA Star Award. This award recognizes exemplary occupational safety and health and marks the first time a municipal water treatment plant has ever been recognized.

Implementation: The initial permitted capacity of the water treatment plant was 30 MGD. After evaluation of the process, EPD approved increasing the permitted capacity to 45 MGD. During Spring 1994, facility water demands reached more than 40 MGD. The AFCWRC asked the EPD to approve a permitted capacity of 56 MGD for withdrawal and treatment. After reviewing past operational performance data, the EPD changed the permits (withdrawal and treatment) to allow for 56 MGD without any additional capital expansion requirements. Veolia Water/Khafra's operational expertise played a key role in the EPDs decision to increase the permit at this critical time in the growth of North Fulton County. Phase II construction saw the plant capacity expand to 90 MGD and was completed in early 1998. Summer 1998 marked the beginning of plant operation and maintenance at the full 90 MGD production.

With the partnership renewal of 2006, the Veolia/Khafra team continues to implement and expand on a proven maintenance program that focuses on predictive and preventive maintenance. The program minimizes corrective maintenance occurrences and ensures dependable and reliable treatment and delivery of potable water.

Economics: The partnership has yielded the AFCWRC more than $16 million in savings by reducing the per-unit cost of water and maximizing on the team's operational expertise and economies of scale. For example, Veolia Water/Khafra decreased the unit cost per 1,000 gallons from $34/1,000 gallons in 1994 to $29 in 1998. In May 1999, that cost dropped below $.20/1000 gallons. Today, the unit cost continues to be below the $37/1,000 gallon set by AFCWRC nearly 15 years ago. Additionally, the team monitors the Georgia Power projections of rates for the ensuing day to implement a water process control plan that utilizes the cheapest power options available. Finally, the team offers, at no cost, capital management to the AFCWRC. This activity generally would cost 10 percent of the capital cost.

Public-Private Partnership:

This is a true Public-Private Partnership in the sense that the facility is wholly owned by the AFCWRC and operated and maintained by the Veolia Water/Khafra joint venture. Veolia Water is part of Veolia Water North America Operating Services,the leading global provider of municipal and industrial and water and wastewater treatment systems, products and services. Khafra Engineering Consultants, Inc., is a privately owned, registered minority business enterprise with the city of Atlanta and Fulton County that provides extensive consulting services for municipal and industrial clients and has completed myriad environmental engineering projects for both the city of Atlanta and Fulton County.

The JV Team's financial contributions have exceeded more than $200,00 during our 15-year tenure.

Partnership Snapshot:

- Operation of a 90-MGD surface water treatment facility - one of the nation's largest drinking water plants
- Exceptional tasting water (U.S. EPA Regional Water Taste Test Winner recognitions)
- Excellent safety record
- Savings of approximately $16 million over the last 10 years
- 50-time award winner