DOCUMENTATION IN SUPPORT OF THE ELIMINATION OF ALTERNATIVES

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT

Prepared for

City of Santa Rosa

and

U.S. Army Corps of Engineers

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Prepared by

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INTRODUCTION

The City of Santa Rosa (City) proposes a reclaimed water reuse project that could involve one or more of the following components that potentially would result in fill of waters of the United States:

- Construction of embankment(s) to create a reclaimed water storage reservoir
- Construction of a new discharge location at the Russian River
- Construction of pipelines and associated facilities to distribute reclaimed water
- Construction of irrigation drainage facilities

The purpose of the project is to manage reclaimed water to comply with federal, state, and regional water quality regulations through reuse or disposal of the reclaimed water in an environmentally appropriate manner. The project purpose includes maximizing reuse to provide environmental and agricultural benefits.

The purpose of this report is to provide a preliminary evaluation of the proposed project according to National Environmental Policy Act (NEPA) and Section 404 requirements. The City is evaluating five project alternatives, which incorporate a variety of components. During development of the project alternatives, a number of components and alternatives have been evaluated and dropped from further consideration. This report provides the rationale for eliminating from further consideration those components and alternatives that are not proposed to be evaluated in the Draft EIR/EIS.

NEPA

The Council on Environmental Quality (CEQ) has established regulations governing the preparation of Environmental Impact Statements. Evaluation of alternatives is addressed in 40 CFR 1502.14, Alternatives including the proposed action, which states:

"This section is the heart of the environmental impact statement. Based on the information and analysis presented in the Sections on the Affected Environment (1502.15) and the Environmental Consequences (1502.16), it should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public. In this section agencies shall:

(a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.

(b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.

(c) Include reasonable alternatives not within the jurisdiction of the lead agency.

(d) Include the alternative of no action.

(e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.

(f) Include appropriate mitigation measures not already included in the proposed action or alternatives."

Section 404

Section 404 of the Clean Water Act regulates placement of dredged or filled material into waters of the United States. Section 404(b)(1) specified that guidelines be developed regulating such activity. Those guidelines were published in 40 CFR 230. Requirements for alternatives analyses are contained in 40 CFR 230.10 and are excerpted below.

"230.10 Restrictions on discharge

... (a) ... no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

(1) For the purposes of this requirement, practicable alternatives include, but are not limited to:

(i) Activities which do not involve a discharge of dredged or fill material into the waters of the United States or ocean waters;

(ii) Discharges of dredged or fill materials at other locations in waters of the United States or ocean waters;

(2) An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.

(3) Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in Subpart E) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not "water dependent"),

practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic sites are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise...

(b) No discharge of dredged or fill material shall be permitted if it:

(1) Causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standard;

(2) Violates any applicable toxic effluent standard or prohibition under Section 307 of the Act;

(3) Jeopardizes the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or results in likelihood of the destruction or adverse modifications of habitat which is determined by the Secretary of Interior or Commerce, as appropriate, to be a critical habitat under the Endangered Species Act of 1973, as amended. If an exemption has been granted by the Endangered Species Committee, the terms of such exemption shall apply in lieu of this subparagraph;

(4) Violates any requirements imposed by the Secretary of Commerce to protect any marine sanctuary designated under Title III of the Marine Protection, Research, and Sanctuaries Act of 1972.

(c) no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United States...

(d no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem."

Subpart E provides definitions of special aquatic sites, which include sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, and riffle and pool complexes.

Scope Of Analysis

This report has been prepared to document activities in the alternatives screening process and to ensure that these activities meet NEPA and Section 404(b)(1) requirements. Portions of this analysis are drawn from an earlier 404(b)(1) analysis presented in the City's previous Draft EIR for the Long-Term Wastewater Project (December 1990).

Two levels of alternatives analysis are contained in this report, the first level addresses the general screening of components that was performed to develop project alternatives. The second level of analysis addresses screening of reservoir sites and irrigation areas to meet the storage and irrigation requirements identified for various alternatives.

Project Background

Purpose and Need Statement

Need for the Project

The City of Santa Rosa (City) is developing a long-term wastewater project for disposal of reclaimed water from the Laguna Wastewater Treatment Plant (“Laguna Plant”) through the year 2010. The project will also include expansion of plant headworks capacity (pumping of effluent from the plant intake to the treatment facilities).

The Laguna Plant is part of the Subregional Water Reclamation System (“Subregional System”) that is operated by the City and treats wastewater collected from the cities of Santa Rosa, Rohnert Park, Cotati, and Sebastopol and from the South Park County Sanitation District. The Laguna Plant also treats septic waste from most of Sonoma County. The Laguna Plant is a tertiary treatment plant and is currently permitted to treat 18 million gallons per day (mgd) average dry weather flow (ADWF).

The Subregional System currently uses a combination of irrigation, wetlands and river discharge for disposal of the reclaimed water. A distribution system carries reclaimed water from the Laguna Plant to users for agricultural irrigation on over 5,300 acres of land located primarily in the Santa Rosa Plain, golf course irrigation, and urban landscape irrigation. A portion of the reclaimed water is also used for the management of two created wetlands in the Santa Rosa Plain. The Subregional System is supported by storage facilities which hold the reclaimed water until it can be used for irrigation or discharged. Discharge from the Laguna Plant is to the Laguna de Santa Rosa and Santa Rosa Creek, which eventually flow into the Russian River approximately 10 miles north of the plant.

The existing disposal system does not reliably dispose of current reclaimed water flows under all weather conditions. Ordinarily, the permitted discharge to the Russian River is limited to a maximum of 1 percent of river flow (up to 5 percent with the permission of the Regional Water Quality Control Board) and storage is provided to hold reclaimed water so that the maximum legal discharge is not exceeded. However, due to a combination of weather conditions which may occur during the October 1 - May 14 discharge season, discharge to the Russian River has the potential to exceed the legal maximum. These conditions occur during winters characterized by periodic light rain, but overall drier-than-normal conditions. These weather conditions produce low flow in the Russian River, severely limiting both discharge to the river and winter irrigation opportunities. As a result, the current Subregional System can fail under certain weather conditions, leaving it without a reliable, legally sanctioned, wastewater disposal option.

The Santa Rosa Subregional Long-Term Wastewater Project is intended to provide for disposal of existing flows plus the increased wastewater flows expected at buildout of the presently adopted General Plans of the communities making up the Subregional System. With conservation, wastewater flows through the Laguna Plant are projected to increase to about 21 mgd ADWF at buildout of the general plans, approximately by the year 2010. Annual average wastewater generation would reach 10,050 million gallons (MG), which after reductions of 1,830 MG due to water conservation results in an annual average flow of 8,220 MG. This is an increase of 17 percent over the current annual average flow of 7,000 MG. The existing reliable capacity for disposal is actually much lower, at about 3,800 MG per year. The City currently requires an exception to its Russian River discharge permit almost every year, allowing a maximum of 5 percent river discharge instead of the standard permitted Basin Plan level of 1 percent. By general plan buildout, the annual disposal capacity short-fall would be over 4,400 MG.

The North Coast Regional Water Quality Control Board requires that, by 1999, the Subregional System must put in place a disposal solution that operates reliably and meets future capacity needs no matter what weather conditions occur. The Santa Rosa Subregional Long-Term Wastewater Project is intended to provide that solution.

Project Objectives

The Santa Rosa Board of Public Utilities (BPU), as the governing body of the Subregional System, adopted the following project objectives on December 16, 1993, and reaffirmed them on May 27, 1994.

Overall project objectives are:

- Provide wastewater treatment and disposal for the Santa Rosa Subregional Wastewater System to accommodate projected growth as indicated in the currently adopted General Plans of each of the Subregional entities

- Develop and operate the wastewater treatment and disposal system in ways that protect public health and safety and promote wise use of water resources.

Supporting project objectives are:

- Maximize reclamation, recycling, and reuse of advanced treated wastewater to the greatest extent feasible

- Reclaimed water that is not reused will be recycled or disposed of in a manner that protects beneficial uses of receiving waters

- Optimize water resource conservation where practical

- Operate the wastewater treatment plant and disposal system successfully under all foreseeable weather conditions

- Satisfy applicable regulatory agency and institutional guidelines and requirements

- Develop a disposal system that is manageable and reliable

- Develop a program that can be successfully financed and is economically feasible.

The supporting objectives are intended to further define the overall project objectives and to provide guidance in the development and evaluation of project alternatives.

Purpose of the Project

The project objectives elucidate the project purpose: disposal of 10,050 MG of wastewater (preconservation flows) in a reliable, practicable manner that provides the best use of water resources, while protecting public health and the environment. The City's purpose for the Long-Term Wastewater Project is not only to dispose of wastewater, but to do so in a manner that maximizes reclamation, recycling, and reuse and optimizes water conservation. Although the need for the project is driven by wastewater disposal requirements, project elements that provide conservation and reuse of water resources are necessary to serve the purpose and need of the project.

The City's purpose in maximizing water reclamation, recycling, and reuse is consistent with the State of California's Water Recycling Act of 1991 (California Water Code, Division 7 - Water Quality, Chapters 1-10: California Porter-Cologne Water Quality Act) which specifies as follows:

13576. Findings and declarations

The Legislature hereby makes the following findings and declarations:

(a) The State of California is in a fifth year of drought, with three of the past four years being critically dry.

(b) The development of traditional water resources in California has not kept pace with the state's population, which is growing at the rate of over 700,000 per year and which is anticipated to reach 36 million by the year 2010.

(c) There is a need for a reliable source of water for uses not related to the supply of potable water to protect investments in agriculture, greenbelts, and recreation and to protect and enhance fisheries, wildlife habitat, and riparian areas.

(d) The environmental benefits of recycled water include a reduced demand for water in the Sacramento-San Joaquin Delta which is otherwise needed to maintain water quality, reduced discharge of waste into the ocean, and the enhancement of recreation, fisheries, and wetlands.

(e) The use of recycled water has proven to be safe from a public health standpoint, and the State Department of Health Services is updating regulations for the use of recycled water.

(f) The use of recycled water is a cost-effective, reliable method of helping to meet California's water supply needs.

(g) The development of infrastructure to distribute recycled water will provide jobs and enhance the economy of the state.

13577. This chapter establishes a statewide goal to recycle a total of 700,000 acre-feet of water per year by the year 2000 and 1,000,000 acre-feet of water per year by the year 2010.

Thus, an important purpose of the project is to provide reclaimed water, an acknowledged valuable resource, to benefit agriculture, greenbelts, and recreation and to protect and enhance fisheries, wildlife habitat, and riparian areas. The combined purposes of achieving reliable wastewater disposal while maximizing water reclamation and optimizing conservation have determined the project alternatives under consideration. Project alternatives include various forms of reuse such as agricultural and urban irrigation, and recharge of the geysers steamfield. Discharge to the Russian River is also evaluated as an opportunity to enhance riparian areas both in the river and along the Laguna de Santa Rosa, by increasing wetted area during low flow conditions.

Project Location

The four project alternatives encompass a large part of Sonoma County and a portion of northern Marin County. This area is focused on the areas which are adjacent to the cities of Santa Rosa, Rohnert Park, Cotati and Sebastopol, but also extends from the Geysers area north of Healdsburg to the San Pablo Bay Flats located southeast of Petaluma, and to the Bloomfield/ Valley Ford area west of Petaluma.

Development of Alternatives

A two-step approach is being used for the preparation of the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to evaluate the preliminary range of alternatives for the Santa Rosa Subregional Long-Term Wastewater Project.

The Step I Scoping Phase included:

- Identification of alternative components
- Identification of alternatives
- Pre-evaluation of alternatives
- Selection of alternatives to be evaluated in the EIR/EIS
- Determination of analysis to be conducted in the EIR/EIS

Step II is the design and pre-engineering of the project alternatives, preparation of related scientific and engineering studies, and preparation of the EIR/EIS.

To ensure that an appropriate range of alternatives would be considered, the BPU directed screening of alternatives which represent a wide spectrum of potential solutions to the Subregional System's need to dispose of wastewater. This screening process considered alternatives that included a 20 percent discharge rate to the Russian River, construction of large and small reservoirs in South County and/or West County, and expanded conservation practices.

The alternatives for screening were developed through the review of alternatives previously considered by the BPU. Input from the public was obtained at four workshops held in September 1993 and two workshops held in November 1993, and from communications with individuals and groups in interviews, written correspondence, and meetings. The BPU considered 75 alternatives suggested prior to March 1993, and an additional 79 alternative components that have been recommended by the public, Santa Rosa City staff, and individuals and agencies consulted between March 1993 and January 1994.

The proposed alternatives were carefully reviewed to develop a manageable list of alternatives for evaluation and screening. The two main objectives in developing alternatives were:

- To include all practicable components suggested by the public in the September and November 1993 workshops in at least one alternative

- To include all reasonable alternatives (40 CFR 1502.14(a)) that would meet CEQA, NEPA, and Section 404 requirements for alternatives analysis in the EIR/EIS and within the Section 404 process.

A suggested list of 20 alternatives was published on December 29, 1993, and was distributed to the public for review and comment to ensure that all alternative components that were nominated for consideration were represented. The list of alternatives was then presented to the BPU at a meeting held on January 13, 1994. To allow time for further public comment, the BPU continued the discussion of alternatives to the following week. During the public review period, an additional 10 alternatives were suggested and were presented to the BPU at their meeting on January 20, 1994. At that meeting, the BPU directed that all 30 alternatives be screened. Two additional alternatives were developed to address the request from the public that multiple small reservoirs be evaluated as an option.

The Draft Screening Report evaluated all 32 alternatives according to criteria adopted by the BPU and was completed and distributed for review in March 1994. Five public workshops were conducted in April and May 1994 to assist in the selection of alternatives to be studied in the EIR/EIS. The Policy Advisory Committee (PAC), Technical Advisory Committee (TAC), and Technical Review Group (TRG) each advised the BPU and reviewed and provided comment on the Screening Report. The PAC and TAC consist of representatives of the members of the Subregional System (Santa Rosa, Sebastopol, Rohnert Park, Cotati and Sonoma County), while the TRG is comprised of representatives of regulatory agencies and environmental groups. A joint BPU/City Council study session on the Screening Report was held, and public and agency comments were received orally and in writing on which of the alternatives should be carried forward for review in the EIR/EIS. A second joint BPU/City Council study session was held on May 27, 1994 to discuss the potential alternatives.

Based upon the Screening Report and comments from the public and agencies, the BPU at its May 27, 1994 meeting, determined which potential project alternatives and components for the Santa Rosa Subregional Long-Term Wastewater Project were either to be retained or eliminated from further review in the EIR/EIS process. The BPU selected six primary alternatives including the No Action/No Project Alternative to be carried forward in the preparation of the EIR/EIS. One alternative, Community Separator/South County Reclamation, was dropped by the BPU on April 6, 1995, as discussed in the "Alternatives Considered and Rejected" section below. After further consideration of the alternatives and comments from interested parties, on April 18, 1995, the Santa Rosa City Council confirmed that four primary alternatives along with the No Project/No Action Alternative were to be considered equally as the project for the purposes of the EIR/EIS.

This report provides documentation for the elimination of those alternatives and components which have not been carried forward.

PROJECT COMPONENTS ALTERNATIVES ANALYSIS

During development of alternatives, a wide range of options were considered to develop a practicable project which could reliably manage reclaimed water. The selected alternatives include conservation, reclaimed water storage, agricultural irrigation, urban reuse, reuse at the geysers, and discharge to the Russian River. In developing the proposed alternatives, an extensive screening of components was performed. The results of this screening were presented in the *Santa Rosa Subregional Long-Term Wastewater Screening Report* (Harland Bartholomew & Associates, April 1994), hereinafter referred to as the *Screening Report*, and are summarized here.

Most of the components suggested for evaluation during the public review process were incorporated in some fashion in one or more alternatives. Relatively few components were determined to be impractical. The discussion below presents an evaluation of each component that was considered for inclusion in an alternative, but determined not to be practicable. Some components could function independently as a complete project alternative, but most would have to be used in combination with other components to achieve the project purpose.

Evaluation Criteria For Screening of Components

Alternatives must accomplish the purpose and need of the project. Once a project was determined to achieve the project's purpose and need, practicability was evaluated. As noted in 40 CFR 230.10(a), "An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes". All three of these factors are evaluated to the extent possible, but if a component clearly did not satisfy one of the criteria, a less detailed evaluation of other criteria was sometimes conducted.

Purpose and Need

Project components were evaluated in terms of their ability to provide reliable wastewater disposal in a manner that maximizes reclamation and reuse and optimizes water conservation.

Cost

The costs of project components and alternatives were summarized in Volume I and presented in detail in Volume IV of the *Screening Report*, which also reviewed financing options for the project. Both capital costs and operations and maintenance costs were estimated, to the extent possible. For project components that were carried forward for evaluation in the EIR/EIS, costs were refined in the process of completing facilities plan designs. Components that were dropped, however, were not evaluated further in terms of cost. The costs presented here are thus much more preliminary and have a higher degree of uncertainty than do the costs for the alternatives and components selected for evaluation in the EIR/EIS. In some cases numeric cost estimates were not developed at all; costs that could not be reasonably or reliably developed are discussed only from a relative perspective.

Technology

The evaluation considers the technology to construct and operate the new components of the Subregional System. To ensure reliability of the system it is critical that the technology be well proven and readily manageable.

Logistics

Logistical factors include physical constraints on project implementation such as site suitability and location.

Components Not Carried Forward

"Maximum" Conservation

The project alternatives carried forward in the EIR/EIS include conservation to the extent that it would be feasible and reliable. The City is implementing an extensive retrofit program and exploring technologies that can reliably reduce wastewater flows. "Maximum" conservation goes beyond these proven technologies to include greywater use for residences, composting toilets, electric toilets, and other social and behavioral changes to reduce wastewater production.

Purpose and Need

The additional measures evaluated under the heading of maximum conservation could reduce wastewater flows, and are in keeping with the City's purpose of wise use of water resources. The optimum amount of conservation is that level of conservation that can be reliably sustained. These measures were determined to exceed an optimum amount of conservation, because the measures can not be relied upon for long-term flow reductions. Because the project purpose requires reliable long-term measures, these maximum conservation measures do not achieve the project purpose and need.

Cost

Cost figures for maximum conservation could not be readily developed because many of the measures cannot be centrally implemented. Costs to encourage social and behavioral changes could not be determined.

Technology

The technologies for greywater, composting toilets, and electric toilets are relatively new and have mostly been used in rural and recreational areas. Use in urban areas may be problematic and is as yet unproven. Other conservation methods are not technology-based, but rely on changing behavior (e.g., shorter showers, reduced toilet flushing, reduction in water use in kitchen and bathroom sinks). Behavioral-based conservation efforts do not provide adequate reliability of flow reduction. The system must operate reliably under all conditions and can thus not rely on behavioral changes to guarantee reductions in wastewater flow.

Logistics

There are physical constraints to the use of some technologies in urban areas. Small lots and multifamily dwellings have inadequate land area for greywater systems. Soils in the Santa Rosa area are not amenable to construction of greywater systems. Because of these constraints the City of Santa Rosa voted on May 23, 1995, not to adopt the proposed state regulations for greywater systems and have prohibited the construction of such systems in the City. Composting toilets would not be feasible in an urban environment and are not currently approved by the Sonoma County Health Department for unincorporated areas.

Summary

Maximum conservation was not carried forward because the suggested conservation methods cannot be guaranteed to manage wastewater flows, and thus do not achieve the project purpose and need. Both technology and logistics problems render this component impracticable.

Stream Flow Augmentation

This component would include summer discharges to creeks to augment dry season flows at a level of about 400 MG annually. Americano and Stemple Creeks in the West County, as well as various South County streams including the Petaluma River, Lichau Creek, and Adobe Creek were considered for possible augmentation.

Purpose and Need

Although flow augmentation could provide a beneficial reuse of water, it makes a relatively small contribution to the central purpose of wastewater disposal, using only 400 MG annually (as compared to the 4,400 MG of additional disposal capacity that is required).

Cost

Construction cost would be expected to be minor, but costs of studying flow augmentation streams before and after implementation of a flow augmentation program could be excessive compared to the minor benefit associated with this type of disposal/reuse. Long-term monitoring requirements might entail substantial costs, which have not been precisely estimated. Costs could be on the order of $150,000 per year, which over a 20-year project life would amount to $3,000,000, or $7,500 per MG. This does not compare favorably with the average construction cost of $2,850/MG for agricultural irrigation components.

Technology

Flow augmentation is feasible, and does not require complex technology.

Logistics

The creeks are located in proximity to West County and South County storage and irrigation areas and would be feasible from a physical perspective.

Summary

Flow augmentation was not carried forward because it does not meet project capacity needs and it is not a cost-effective method of wastewater disposal.

Decentralized Treatment Systems

This component includes construction of new wastewater treatment systems by the various subregional entities: Cotati, Rohnert Park, Sebastopol, and Southpark Sanitation District. This would take the place of expansion of the Laguna Wastewater Treatment Plant.

Purpose and Need

Construction of decentralized systems would do nothing to meet the project's central need of wastewater disposal, and would not improve water conservation or provide additional reuse capability.

Cost

Because this component would not accomplish the purpose and need of the project, descriptions of decentralized treatment systems were not developed sufficiently to be able to estimate costs. Costs could vary considerably depending on the site of the plant, which would control land acquisition costs and costs of modifications to piping and pump stations to convey wastewater to a new treatment site. Thus, cost of construction of new treatment plants has not been estimated, but would be substantial, and would certainly be much greater than the cost of expansion of the existing treatment plant headworks. Additional facilities for wastewater disposal and reuse would still have to be designed and built, so these costs would have to be added to the cost of new wastewater treatment capacity. In addition, duplication of staff and other resources would significantly increase operations and maintenance costs.

Technology

The technology exists for developing small treatment systems for the subregional communities.

Logistics

The subregional entities were asked if they would be willing to design, construct, and manage their own decentralized treatment systems, and none indicated that they are willing or able to undertake this.

Summary

Decentralized treatment systems were dropped from further consideration because they will not solve the wastewater disposal problem and thus do not achieve the project purpose and need. Costs would be excessive, and subregional members are not willing or able to construct their own treatment systems, making this option logistically impracticable.

Central Valley Irrigation/Storage

This component includes construction of a pipeline to transport treated wastewater to the Central Valley for irrigation. Construction of a storage reservoir and distribution system in the irrigation area would also be necessary.

Purpose and Need

This component would meet the need for wastewater disposal and would also achieve purpose of maximizing water reclamation.

Cost

The cost to construct a Central Valley project would be about $230 million; annual operations and maintenance cost is about $5 million. Construction cost does not include construction of a distribution system within the Central Valley reuse area, a cost of at least $25 million. These costs made this component one of the most expensive at about $100 million more than comparable local alternatives. (Comparison is based on preliminary costs determined during screening - more detailed current cost estimates determined that costs for all alternatives are higher than preliminary estimates.)

Technology

The technology for developing a Central Valley irrigation project is available.

Logistics

While it would be possible to construct and operate a Central Valley irrigation system, the logistics of managing 60 miles of transmission pipeline and operating a remotely-located reclamation system would be problematic. A less distant project location would present fewer logistic difficulties.

Summary

Central Valley irrigation and storage are not being considered further because of the high cost and questionable logistics. This option is not a reasonable alternative given that costs and logistical barriers are much higher than a substantially equivalent alternative, local storage and irrigation.

San Pablo Bay Discharge

This component includes a variety of potential locations for discharge to San Pablo Bay, either through a deep or shallow bay outfall or through the Petaluma River. All of these options would be associated with a South County irrigation alternative. Bay discharge would constitute a significant method of wastewater disposal, but to avoid conversion of salt marsh to freshwater marsh during the summer months, the discharge would be limited to the rainy season.

Purpose and Need

Although this project does provide wastewater disposal, it does not achieve the purposes of maximizing reclamation or optimizing water conservation.

Cost

Costs for bay discharge would vary depending on the location of the outfall. All costs assume that costs of a pipeline to Petaluma are included in construction of a South County irrigation project. A deep outfall would cost about $70 million, while a shallow outfall would cost about $50 million. Discharge to the upper Petaluma River would have negligible costs if associated with a South County irrigation alternative because this would essentially eliminate the cost of outfall and diffuser construction.

Technology

Technology for outfall construction is readily available.

Logistics

There are no major physical constraints to construction of a bay discharge.

Summary

San Pablo Bay discharge is not being considered for disposal of large quantities of wastewater because it does not achieve the purpose of wastewater reclamation.

Ocean Discharge

This component would construct a pipeline to an outfall discharging wastewater directly to the ocean near Salmon Creek. This area is just north of the Gulf of the Farallones National Marine Sanctuary, an Area of Special Biological Significance (ASBS). The nature of an ocean outfall is such that this component could stand alone as a project because it could meet the entire discharge capacity requirement without any ancillary facilities. An ocean outfall would allow year-round disposal of wastewater and would meet all of the disposal requirements of the Subregional System.

Purpose and Need

Although this project does provide wastewater disposal, it does not achieve the purpose of maximizing reclamation or optimizing water conservation.

Cost

The project cost for a pipeline and ocean outfall at Salmon Creek would be about $75 million.

Technology

The technology for ocean outfalls is readily available.

Logistics

There are some physical constraints to locating an outfall and pipeline alignment to the ocean. These constraints include: 1) the location of the outfall within the San Andreas fault zone, 2) substantial construction-period impacts to the town of Bodega Bay, where access to all businesses on Highway 1 would be blocked, and 3) a difficult crossing of Salmon Creek. These constraints present some difficult design challenges, but are not likely insurmountable.

Summary

Ocean discharge is not being carried forward as an alternative because it does not achieve the purpose of wastewater reclamation.

Lake Sonoma Discharge

This component would pipe all of the reclaimed water not currently used for irrigation or wetlands to Lake Sonoma for discharge. Because the lake empties into the Russian River, it would effectively be equal to a 20% Russian River discharge, although the location of the discharge would be different. Reclaimed water would mix in the reservoir and would therefore be released from the dam year-round.

Purpose and Need

This project does provide wastewater disposal and provides for beneficial reuse of reclaimed water by returning water to the Russian River.

Cost

Cost of constructing a project to pipe wastewater to Lake Sonoma would be about $70 million. Because of pumping costs, annual operations and maintenance costs for this options would be relatively high, at about $5 million per year. These costs are considerably higher than a 20% discharge direct to the Russian River, which has a $6 million capital cost and a relatively small operational cost of about $100,000 per year.

Technology

The technology for pipelines and pump stations is readily available.

Logistics

A pipeline and pump station could feasibly be located; however, this option would require long-term management of 26 miles of pipeline with 675 feet of lift. A closer discharge location would certainly be logistically preferable.

Summary

Lake Sonoma discharge is not being considered further because it is essentially equivalent to direct discharge to the Russian River, but costs are significantly higher. Two subalternatives for direct discharge to the Russian River are being evaluated: continued discharge through the Laguna, and a new pipeline direct to the river. Although other discharge locations such as Lake Sonoma might be possible, it is not feasible to evaluate every potential discharge point along the entire length of the river. Given the extreme difference in costs and logistics, this is not a reasonable alternative.

Community Separator Wetlands

This component was proposed during public workshops as a method for storing reclaimed water while providing a separation between Santa Rosa and surrounding communities. Although wetlands would not provide significant amounts of storage, it was agreed to evaluate this component in one of the project alternatives because wetlands consume wastewater, provide a land use benefit, and may also be used for polishing of wastewater.

Purpose and Need

This project component does provide wastewater disposal of up to 650 MG of reclaimed water in 600 acres of wetland and provides for beneficial reuse of reclaimed water by creating wetlands.

Cost

Wetland creation costs about $50,000 per acre, for a capital cost of about $30 million, and may use up to 4 acre-feet per acre of wetland.. This compares to a cost of about $10,000 per acre for development of new irrigation lands for use of reclaimed water. Because wetlands can use more reclaimed water than irrigation, the cost is more appropriately expressed in terms of cost per million gallons (MG). Irrigation costs $15,000/MG, while wetlands reuse costs $19,000/MG. We can also compare the cost of wetlands in terms of ability to remove nitrogen from reclaimed water. However, it should be noted that the extent to which nitrogen removal would be needed is uncertain. As a treatment technology, wetlands are comparable to other treatment facilities, with an approximate wetlands creation cost of $30,000,000 (net present value) as compared to a cost of $32,000,000 for construction of additional nitrogen removal facilities at the treatment plant.

Technology

The technology for construction of created wetlands is available. However, there is limited evidence of long-term operational success at meeting treatment criteria.

Logistics

After extensive search it was determined that suitable sites for community separator wetlands were not available. To achieve the necessary acreage for water consumption and polishing, between 500 and 1,200 acres of wetlands would be needed. The criteria for acceptable sites included no oak woodland or vernal pool habitat. Sites within the City's existing irrigation program were also not considered suitable because they are already consuming wastewater and are not available, because most are operated by property owners with long-term contracts with the City. The search for appropriate sites was confined to parcels of 20 acres or larger because of the substantial acreage of wetlands required and the desire to create larger areas of contiguous wetlands. No suitable land was found within the community separator area suggested by the public during project workshops. The search was extended beyond this area, and the only suitable land that was found was a parcel east of Rohnert Park that is currently in active agriculture. The property owner is actively pursuing obtaining reclaimed water for irrigation, and creation of wetlands on that site was therefore not deemed appropriate.

Summary

Community Separator is not being carried forward. It was not practicable due to logistics, because suitable wetlands sites were not found.

Rapid Infiltration

Rapid infiltration was originally proposed as a method for disposal to the Russian River, using infiltration through gravel beds along the river banks in place of discharge directly into the river. A pipeline would be constructed directly to the discharge location on the banks of the Russian River, but instead of a direct outlet to the river, the reclaimed water would be discharged to infiltration basins. The reclaimed water would percolate through the gravel beds into the river.

Purpose and Need

This project does provide wastewater disposal and provides for beneficial reuse of reclaimed water by returning water to the Russian River.

Cost

Many of the costs of rapid infiltration would be the same as the option of constructing a pipeline directly to the river. The additional costs would be for acquiring land and constructing rapid infiltration basins. Construction of basins would cost about $7 million. Land acquisition would cost about $7.5 million, assuming that about 500 acres might be required, using a combination of Cortina and Yolo soils for infiltration basins. Thus, rapid infiltration is more expensive than a direct outlet to the river.

Technology

The technology for rapid infiltration is proven and available.

Logistics

Adequate sites for rapid infiltration were determined not to be available. Suitable areas are composed of Cortina soils (sand and gravel). To accommodate the Santa Rosa discharge it is estimated that about 120 acres of these soils are needed, but only 40 acres of suitable soils are available on the east bank of the Russian River in the appropriate area for discharge. Should less permeable Yolo soils also be used, 730 acres of infiltration basins would be required to dispose of the remaining flows. Only 300 acres of such soils are available.

Summary

Rapid Infiltration is not being pursued because it is not practicable due to logistics. Sufficient acreage of land suitable for infiltration basins is not available.

Analysis of Requirement for Reservoir Storage

Of the four project alternatives to be evaluated in the EIR/EIS, two require construction of significant additional storage: Alternative 2 - South County Reclamation and Alternative 3 - West County Reclamation. No storage is proposed for Alternative 4 - Geysers Recharge, and none would be needed for Alternative 5 - 20% Russian River Discharge.

For the alternatives requiring storage, four types of storage were considered during screening: conventional large reservoir storage, aquifer storage, tank storage, and on-farm storage in multiple small ponds. Only large reservoir storage has been adopted as part of the alternatives for consideration in the EIR/EIS. Tank storage and multiple pond on-farm storage were evaluated during the preparation of the *Screening Report*, and the results of the evaluation are summarized below. Aquifer storage was carried forward after the screening report, but was dropped after further technical evaluation, which is discussed below.

Evaluation Criteria for Types of Storage

Criteria are essentially the same as described above for evaluation of components. For purposes of evaluation, Alternative 2D Multiple was selected as a baseline for comparison. This alternative is a west county irrigation project using multiple small reservoirs; it was evaluated in the *Screening Report* and is essentially a variation of the West County project that is being carried forward for further evaluation in the EIR/EIS. The cost and practicability of constructing the same project using small reservoirs, on-farm pond storage, and tank storage were compared.

Purpose and Need

Some type of reservoir storage is required for the two project alternatives that include increased irrigation. The City is currently irrigating all of the reclaimed water that can be produced and stored, so expansion of irrigation would require that more of the reclaimed water that is currently being discharged in the winter months be stored for use during the summer irrigation season. An expanded irrigation project could not meet the capacity requirements of the Subregional System without construction of additional storage. For a 1% discharge project about 4,000 MG of net storage would be required; 2,900 MG of storage is needed for a 5% project. Gross storage would have to be larger to accommodate run-off. For example, to achieve 4,000 MG of storage for reclaimed water, an average of about 4,500 MG of storage is required. Because all types of storage could be used to serve the need for storage, purpose and need are not discussed.

Cost

Conceptual costs were developed for both on-farm pond storage and for storage in steel tanks. These costs were compared to the cost of Alternative 2D Multiple. Preliminary costs, which have a higher level of accuracy than conceptual cost estimates, were developed for aquifer storage. Costs for storage are considered to be prohibitive if they exceed $5,000/acre-foot.

Technology

To ensure project reliability it is important that proven technology be used for all project components. The technology is available to construct and operate ponds, tanks and reservoirs. Because this is not a factor in the evaluation it is not considered further for these facilities. The technology for aquifer storage is discussed below.

Logistics

Logistical factors revolve around the necessity to develop a considerable amount of additional storage to serve the Subregional System. For purposes of comparison, a storage volume of about 4,500 MG was used. The logistics of using different types of storage to meet this need were evaluated in terms of physical constraints, effects on farm operations, and manageability of the system.

Storage Options Not Carried Forward

On-Farm Storage Ponds

This scenario assumes that all reclaimed water users would provide storage to meet irrigation demands for their own property. To reuse about 4,000 MG of reclaimed water through irrigation would require 6,000 acres of land (irrigation requires about 1.5 acres/MG annually; water consumption is about 2 feet per acre per year). If we assume a typical farm size of 200 acres, 30 farms would be required, with a pond on each farm providing storage.

Cost

The cost of constructing a pond on each of 30 farms is estimated at $138 million. This is only slightly higher than the $121 million construction cost for the nine small reservoirs included in Alt. 2D Multiple. This is, however, considerably higher than $25 to $46 million range of construction cost for a single 4,500 MG reservoir at sites in west county. It far exceeds the cost criterion of $5,000/AF, at a cost of almost $10,000/AF.

Logistics

To provide the required 4,500 MG of storage on 30 farms, each pond would have to be 150 MG. Assuming a typical pond constructed with embankments on all four sides would have a depth of about 10 feet, an area of about 46 acres per farm would be needed for pond construction. Thus about one-fourth of the total farm acreage would be needed to provide storage. This would drastically reduce the area of productive farmland, and would make on-farm storage unfeasible for typical agricultural users.

The logistics of water management under a multiple pond system are also problematic. Under the existing system central storage areas enable the efficient movement of water to meet demands as they arise. On-farm storage would require that each user manage storage and water demand, without the ability to draw water from other areas during times of high demand. Some users may run out of water before the end of the irrigation season, while others may be unable to use all the water in their ponds. These factors have made it extremely difficult to manage the existing small ponds within the Subregional System and argue against this approach for developing additional storage.

Storage Tanks

To achieve 4,500 MG of storage, construction of 900 5-MG tanks is assumed. A size of 5 MG is fairly typical, but tanks up to 10 MG could be constructed. Use of larger tanks would not materially change the analysis presented below.

Cost

Cost of constructing 900 tanks is estimated to be about $2,250 million dollars. At a cost of $162,500/AF, this is more than an order of magnitude increase in cost as compared to other options, and is well beyond the ability of the Subregional System to fund.

Logistics

The logistics of siting, constructing, and operating 900 storage tanks would be virtually impossible.

Aquifer Storage and Recovery

Two study areas were considered: Study Area 1 is located in the vicinity of the Laguna Treatment Plant, and Study Area 2 is located east of Rohnert Park. These study areas were selected based on proximity to existing facilities and reclaimed water lines, and suitable geohydrology. Based on evaluations of local aquifer characteristics, aquifer storage and recovery could not provide 4,500 MG of storage. The maximum available storage within the project study areas is about 2,000 MG.

Cost

Preliminary cost estimates show an approximate cost of $6 million for 14 ASR wells and the pipeline network to distribute water within the well fields. These costs will likely increase as further studies have shown that 25 wells would be required to provide 2,000 MG of storage. If we simply scale the cost estimate up to account for the greater number of wells, a total cost of $11 million could result. This is probably an upper boundary of possible costs. Cost per acre-foot would be about $1,800, well within the cost criterion of $5,000 per acre-foot.

Technology

ASR technology was developed originally as a method for storing potable water resources and has been used extensively only for potable water. However, there is no demonstrated experience with reclaimed water aquifer storage and recovery. Injection of reclaimed water for groundwater recharge has been practiced for some time (with notable projects in Gainesville, Florida, El Paso, Texas, and Orange County, California), but these projects have the aim of recharging groundwater. The groundwater is removed for use at wells at some distance from the original injection area. These projects operate under the principle that the groundwater is further treated by natural processes as it slowly moves through the ground from the original injection site to the point of removal. This concept is different than ASR, which uses the aquifer only for temporary storage, with the aim of injecting and removing reclaimed water at the same location, without affecting (or being affected by) the native groundwater.

Wastewater injection into a potable aquifer and recovery from that aquifer is thus clearly not yet proven technology. The concept of ASR for reclaimed water storage appears to be promising new technology, which, with further study, may ultimately provide a good option for storage. At present, however, the lack of demonstrated working projects showing long-term viability of ASR make it impossible to characterize ASR as "proven" technology.

Logistics

The primary logistic concern is suitability of the aquifer for use. The most important parameter determining suitability of the area is its specific capacity, which expresses how well water can be moved in and out of the aquifer. The minimum long-term injection specific capacity for a feasible ASR project is 5 gallons per minute per foot (gpm/ft). Studies by CH2M Hill have shown that Study Area 1 has a specific capacity of 6 gpm/ft, but Study Area 2 has a specific capacity of only 1.5 gpm/ft. This indicates that ASR would not be feasible in Study Area 2.

Specific capacity of Study Area 1 is marginal, and considerable additional testing would be required to determine whether ASR would work for the project area. Tests would need to include pump tests to further delineate aquifer characteristics, followed by trial injection of potable water to measure migration and recovery of the injected water. Finally, a pilot project for injection of reclaimed water would need to be conducted before a full-scale ASR project could be approved.

Even with this level of test, the regulatory framework for approval of an ASR project is uncertain. The California Department of Health Services (DHS) has draft guidelines for groundwater recharge with reclaimed water, but has not developed guidelines for permitting ASR projects. The DHS guidelines establish a 2,000-foot minimum distance between injection wells and nearest water supply well. This would require that at least 70 existing wells in the Llano Road area be taken out of service and provided an alternative water supply.

Given that the North Coast Regional Water Quality Control Board has mandated an aggressive schedule for completing selection of a long-term wastewater project, there is not enough time to fully investigate and demonstrate the applicability of ASR for the project area and to resolve the regulatory issues to allow permitting of a component of this scale.

Recently completed preliminary modeling efforts have shown that complete recovery of reclaimed water stored in the aquifer would not be possible without pumping out considerably more water than is injected. Operating the ASR component with equal amounts of injection and recovery would mean that a percentage of reclaimed water would remain in the groundwater. Logistic constraints of this nature suggest that development of ASR for storage in the Santa Rosa area is more likely to be suitable for smaller storage needs, as opposed to the large storage requirements of the long-term project.

Summary of Evaluation of Types of Storage

On-farm pond storage is not practicable because of logistics, i.e., the large amounts of land required on each farm.

Tank storage is not practicable because of the exorbitant cost and logistical constraints, namely the difficulties associated with constructing and operating 900 tanks.

Aquifer storage and recovery of reclaimed water is not practicable due to technology constraints. It is not yet proven technology, and the aquifer of the Santa Rosa Plain poses serious logistical constraints for the amount of storage required by the long-term project.

Analysis of Reservoir Locations

As discussed above, two of the alternatives that will be evaluated in the EIR/EIS require storage: Alternative 2 - South County Reclamation and Alternative 3 - West County Reclamation. These two alternatives are being designed to accommodate a 1% maximum Russian River discharge, and under this scenario Alternatives 2 and 3 require 4,000 MG of net storage. Depending on the size of the watershed, the total storage requirement is greater (typically about 4,500 MG) to accommodate runoff.

The existing Basin Plan allows a 1% maximum discharge, and the Subregional System is currently allowed to discharge at up to 5% of Russian River flow only with special permission from the Executive Officer of the North Coast Regional Water Quality Control Board. At this point in time it is uncertain whether a higher level of discharge will be allowed, so design of the system is based on 1% maximum discharge. For the purposes of this analysis it is assumed that the maximum discharge is no higher than 5%.

Candidate reservoir locations and information about each site are based on previous Technical Memoranda by Woodward-Clyde Consultants (Technical Memorandum R2 1988, Technical Memorandum R16 1990, and Technical Memorandum RA-3 1992) and are summarized in Table 1. This information has been supplemented by field reconnaissance. Several of the potential storage sites could be developed in different configurations, with different dam locations, resulting in different reservoir capacities. Different configurations are indicated as A,B,C. All identified configurations are shown in Table 1.

Evaluation Criteria For Storage Site Locations

Cost

Cost data were taken from Woodward-Clyde Consultants and are in 1989 dollars. Reservoirs were compared in terms of reasonableness of costs and cost-effectiveness. To keep the costs reasonable one approach was to use the fewest sites necessary. The cost of constructing multiple reservoir sites is excessive. In addition to the greater cost of constructing several reservoirs instead of one, there is also additional cost of constructing piping to convey water between the various reservoirs and reuse areas. To illustrate this, costs were developed for alternatives which were identical except for the number of reservoirs. The multiple reservoir alternatives used eight or nine reservoirs instead of one or two reservoirs. For example, Alternative 2D has a storage cost of $112 million, far greater than the cost of any single reservoir providing the same storage. The most expensive single reservoir site is $46 million.

Cost effectiveness of storage sites was determined by calculating cost per storage volume. Some storage reservoirs provide very little storage for relatively high cost. This typically is the case when it is necessary to create a large embankment for a small reservoir. It is preferable to use sites where topography lends itself to minimizing embankment volume while maximizing storage. In general, construction costs greater than $5,000 per acre-foot of storage were considered excessive because there are numerous reservoir sites (more than 30) with better cost effectiveness.

Table 1 indicates those sites which have been eliminated from consideration because of their poor cost effectiveness. Their cost per acre-foot ranges from $5,060 to $54,690. In general, costs of preferred reservoir sites range from about $1,100 to $3,700 per acre-foot.

Technology

Technology for reservoir construction at all sites is available and is not a factor in the evaluation.

Logistics

Multiple reservoirs present considerable management and maintenance difficulties. The City is already managing several reservoirs and experiences regular problems with moving water between reservoirs to meet demands. To avoid developing an unnecessarily complex system it would not be advisable to construct more than one or two additional reservoirs. Any reservoir smaller than 1,000 MG would require more than three reservoirs to serve either a 1% or 5% Russian River discharge alternative. Table 1 identifies those reservoir sites that are too small to provide the required storage without requiring construction of an excessive number of reservoirs.

Proximity of storage sites to the Laguna Plant, existing reclaimed water distribution system, and proposed reuse areas is also an important factor. Storage locations must be located to conveniently serve the proposed reuse areas with a minimum of length of piping and associated pumping costs. Hydraulic suitability is also a factor in siting reservoirs: storage sites should be located at an elevation that minimizes required pumping capacity and operating pumping costs.

Several sites were excluded from further consideration because of their location in the Bayflats area. They have geotechnical constraints because of unfavorable soil conditions (located on Bay Mud deposits). They are also likely to have construction problems associated with high groundwater. These sites are also located farthest from the Laguna Plant and are less hydraulically suitable. They would have considerable pumping costs to transport water to the reservoir and then pump it back up hill to serve South County reuse areas.

Availability of reservoir sites is a final factor that may have some effect on logistics. Some properties may be owned by willing sellers, while others may require condemnation. Members of the public have stated that the need for condemnation would adversely affect the acceptability of a project.

Summary of Evaluation of Reservoir Sites

Of the 51 reservoir sites considered, 10 sites would be practicable according to the established criteria of cost and logistics. The larger sites could be used alone to meet project storage needs, while smaller ones would be combined. Probably the most significant criterion affecting practicability is the size of the reservoir, and reservoirs less than 1,000 MG are simply not practicable, given the total amount of storage required.

Screening of Irrigation Areas

Screening of potential irrigation areas was necessary to determine those areas that would be suitable for irrigation with reclaimed water.

Evaluation Criteria for Irrigation Areas

Because irrigation with reclaimed water has been determined to accomplish the purpose and need of the project, individual reclamation areas were not screened according to that criterion. Technology for irrigation with reclaimed water is reliable and available, so this, too, was not a factor. Thus, the two primary factors considered were cost and logistics.

Cost

Although actual cost estimates were not prepared for screening of irrigation areas, the factor of cost was considered by evaluating irrigation areas according to their distance from the Laguna Plant, acreage of land with interested landowners, and their degree of isolation. (Landowner interest was determined in a preliminary survey.) It is not cost effective to construct a long pipeline to a small, isolated irrigation area located a great distance from the Laguna Plant.

Logistics

For irrigation areas the primary logistical considerations were the suitability of the area for irrigation with reclaimed water as determined by soil characteristics, including thickness and drainage, topography (areas with steep slopes are less suitable), and presence of other features that preclude or limit irrigation: jurisdictional wetlands, special status species, elevated groundwater levels.

The following two areas were considered for irrigation, but were eliminated from further study.

Chileno Valley

This area is located southeast of Petaluma, south of the Americano and Stemple Creek areas which form the majority of the agricultural areas of West County. A large portion of this area is within Marin County. The preliminary survey of landowner interest conducted by Harland Bartholomew & Associates only identified 220 acres of land with willing landowners (as compared to 525 acres in Sebastopol, 2,428 acres in South County, and 3,450 acres in the remainder of West County). It would be necessary to construct about four miles of pipeline to reach the Chileno Valley area, making it not cost effective. This area was therefore considered not practicable due to logistical constraints (lack of available land) and cost.

Schellville

This area within the Bayflats is the most distant of the potential South County irrigation areas, and is generally bounded by Route 37 on the south, Route 121 on the west, the U.S. Naval Reservation on the east, and the City of Sonoma on the north. It is traversed by the Napa Slough system. Preliminary surveys of the Schellville area found major logistical problems associated with the extensive wetlands within the area. A number of functioning wetland slough channels meander through the area. Large portions of the area are used for the Vallejo Sanitary District biosolids management program. It is estimated that about six additional miles of pipeline would be required to serve Schellville irrigation areas. Because of these logistical and cost concerns, the area was considered not practicable.

Alternatives Proposed After Completion of Screening Process

Two alternatives were proposed after screening was completed: the Stewart & Associates Geysers Proposal and Project 7. Both were considered by the City, but were not added to the EIR/EIS process. Evaluation of each option is documented in the attached memoranda.

TO: Ed Brauner
Dan Carlson
Marie Merdith

FROM: Anders Hauge
Robin Cort

DATE: March 12, 1996

RE: Evaluation of Project 7

During the public roundtables a proposal was submitted for "Project 7". This alternative included zero discharge, redwood forestation, earth ponds, treatment ponds, and use of solar, wind, or methane for pumping.

The components of Project 7 fit into three categories:

1) Those reviewed previously and dropped from further consideration (screened out);

2) options that can be included in the current project alternatives (screened out but could be implemented by individual property owners); and

3) items that are beyond the scope of the Long-Term project (beyond scope).

Screened Out

Zero discharge options were evaluated in the March 1994 Santa Rosa Subregional Long-Term Wastewater Project Screening Report and were found to be infeasible. The magnitude of storage and irrigation system needed to totally eliminate discharge is inordinately expensive. The geysers project provides the smallest feasible discharge: less than 1% discharge, with discharge occurring in high flow periods only.

Screened out but could be implemented by individual property owners

Use of reclaimed water for redwood forest was also considered during screening, but was not carried forward as a specific project component because water use of redwoods is considerably

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less than for pasture and forage crops. Forestry uses have not been found to be economically viable for the project area. However, the project description has not set limits on what irrigators can do with their property, as long as it is within the management practices prescribed in the Irrigation Management Plan. Irrigation of redwoods has not been specifically evaluated, but is by no means precluded.

Pond storage has been eliminated because it is not cost-effective or feasible in terms of the acreage required. For the amount of storage needed, large embankment type storage is the only reasonable option. Individuals are not precluded from constructing ponds for use of reclaimed water.

Beyond Scope

Changes in the City's treatment technology are not being evaluated as part of this project. The Long-Term project is focused on finding disposal capacity for the reclaimed water produced at the existing treatment facility. None of the proposals for alternative treatment methods are within the scope of the current project. The BPU Technology Review committee is evaluating potential alternatives for treatment.

It is beyond the scope of this project to evaluate alternative forms of providing energy for project needs. Power for pumping requirements would be supplied by PG&E, whose power sources include hydroelectric, solar, wind, and geothermal energy. The geysers project would generate energy by recharging the steamfields. Methane produced by the treatment plant is already in use to provide power for the treatment plant.

It is therefore recommended that no changes be made in the current description of projects and components.

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TO: Ed Brauner, Dan Carlson, Marie Meredith

FROM: Anders Hauge and Robin Cort

DATE: 18 December 1995

RE: Evaluation of Stewart & Associates Geysers Proposal

You have requested that we subject the Stewart & Associates proposal to the same alternatives screening previously performed for other project elements. Prior screening has included an evaluation of project's ability to meet the project objectives and purpose and need, and an evaluation of the practicability of the project. These screening factors are further defined below.

SCREENING CRITERIA

Project Objectives

Overall project objectives are:

- Provide wastewater treatment and disposal for the Santa Rosa Subregional Wastewater System to accommodate projected growth as indicated in the currently adopted General Plans of each of the Subregional entities
- Develop and operate the wastewater treatment and disposal system in ways that protect public health and safety and promote wise use of water resources.

Supporting project objectives are:

- Maximize reclamation, recycling, and reuse of advanced treated wastewater to the greatest extent feasible
- Reclaimed water that is not reused will be recycled or disposed of in a manner that protects beneficial uses of receiving waters
- Optimize water resource conservation where practical
- Operate the wastewater treatment plant and disposal system successfully under all foreseeable weather conditions
- Satisfy applicable regulatory agency and institutional guidelines and requirements
- Develop a disposal system that is manageable and reliable
- Develop a program that can be successfully financed and is economically feasible.

The supporting objectives are intended to further define the overall project objectives and to provide guidance in the development and evaluation of project alternatives.

Purpose of the Project

The project objectives elucidate the project purpose: disposal of 12,300 MG of wastewater in a reliable, practicable manner that provides the best use of water resources, while protecting public health and the environment. The City's purpose for the Long-Term Wastewater Project is not only to dispose of wastewater, but to do so in a manner that maximizes reclamation, recycling, and reuse and optimizes water conservation. Although the need for the project is driven by wastewater disposal requirements, project elements that provide conservation and reuse of water resources are necessary to serve the purpose and need of the project.

Once a project was determined to achieve the project's purpose and need, practicability and environmental effects were the primary considerations in development of alternatives. As noted in 40 CFR 230.10(a), "An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes".

Practicability of Project

The following factors were evaluated to determine project practicability:

Cost

Detailed cost estimates cannot be prepared for the Stewart proposal, so evaluation is made by comparison to the present Geysers Alternative.

Technology

The evaluation considers the technology to construct and operate the new components of the subregional system. To ensure reliability of the system it is critical that the technology be well proven and readily manageable.

Logistics

Logistical factors include physical, regulatory and political constraints on project implementation. Physical constraints include site suitability and location. Regulatory constraints include the feasibility of obtaining required permits or other regulatory actions (e.g. exception to Basin Plan discharge limitations) needed for the project. Political constraints include limits on the City's ability to implement a project which affects other jurisdictions. All projects under consideration affect areas outside the City of Santa Rosa, and the City must be able to work cooperatively with these other jurisdictions to successfully move forward with a project. A variety of other entities thus have effective "veto power" over the project through their ability to withhold use permits or bring law suits which could prevent project implementation. Lack of cooperation from other jurisdictions or agencies can remove a project from consideration.

Environmental Effects

Because detailed evaluation of the Stewart proposal has not been conducted, evaluation is again made in comparison to the current Geysers Alternative.

EVALUATION

Project Objectives

The Stewart proposal does seem capable of accommodating projected flows of the Subregional System. It is not, however, clear that ultimate use of the water for potable purposes could be done safely. Although heating of the water at the geysers would eliminate pathogens, other constituents would be unaffected by heating, and additional pollutants would be added by combining reclaimed water with water from the geysers. The geysers steamfield is not an aquifer used for drinking water purposes, it is a groundwater sink containing hot, poor quality water that would not be considered suitable for drinking water use.

Purpose of the Project

The Stewart alternative does dispose of wastewater and maximizes reclamation. However, the proposal may be proposing a level of reuse that jeopardizes the ability to dispose of wastewater. The current geysers proposal pumps water to the geysers, where it is injected in the steamfield to generate energy. The reclaimed water generates steam and energy, and is at that point effectively disposed of, with the City having no further responsibility for the water.

The Stewart proposal suggests using the water yet again, so that in fact the reclaimed water is not yet disposed of, but requires another large capital intensive system to be built and operated before it is ultimately "out of the City's hands". While this level of reuse may be admirable, there does not appear to be any benefit to the City to add on this additional level of wastewater management. Once the water is used at the geysers, there is no clear, compelling reason at this time to bring it back down the hill to be disposed of yet again.

Practicability of Project

Cost

There is a high degree of uncertainty regarding the cost to the City of the Stewart alternative. Mr. Stewart has previously stated that he would build the project at no cost to the City, but when questioned has indicated that he would then charge a fee (undisclosed) for the disposal of wastewater. The total capital cost of facilities would be a great deal more than the current geysers alternative. Additional costs would be incurred for construction of:

heat exchangers

pipeline and pumps to export "cooked" water

hydro electric power generation facilities

water treatment facilities (Mr. Stewart refers to filtration facilities, but it does not appear likely that a simple filtration plant would provide adequate water quality for drinking water purposes. Some form of desalination might be required to remove minerals and salts from the geysers steam).

distribution system to convey "cooked" water to users

Each of the above items is probably a multi-million dollar component (for example, capital costs of the recently constructed filters at the Laguna plant were more than $10 million), and it would not be unreasonable to assume that as much as $100 million in cost could be added. Mr. Stewart believes that the facilities have the potential to produce revenue, but the market for "cooked" water has yet to be determined. Energy generated by production of hydroelectric power would be marketable, but the energy required for pumping water up to the geysers would still exceed the energy generated.

Technology

The Stewart proposal includes some significant new technology for management of the geysers steamfield, that must be considered unproven at this time. The proposal for use of heat exchangers appears to have some existing applications, and may in fact work as proposed. The proposed "quenching" of the steamfield is the most speculative part of the alternative. Detailed evaluation of the feasibility of this approach for management of the geothermal resource would require evaluation of a specialist in geothermal resources. Unless Mr. Stewart can provide some evidence to the contrary, this technology cannot be considered as proven or reliable.

Logistics

The primary logistic difficulty appears to be the fact that Mr. Stewart has no ownership, lease or contract for use of lands at the geysers steamfield. We have no indication that the various entities which currently own and operate facilities at the geysers are willing to cooperate with the Stewart plan. In fact, considerable skepticism has been expressed by the staff of Unocal and PG&E. Arrangements between Mr. Stewart and one or more of the geysers operators should be more firm before the City pursues this option.

There may also be logistic difficulties surrounding the siting of the other facilities proposed for the Stewart alternative. Siting of a hydroelectric and water treatment facility in an appropriate area may be difficult given the terrain of the area, and public resistence to siting of facilities.

Environmental Effects

The additional facilities required for the Stewart alternative (pipeline, hydroelectric facilities, and water treatment plant) would have considerable environmental impacts, which would have to evaluated after the facilities are conceptually designed and sited.

Mr. Stewart projects the following environmental benefits: 1) elimination of air emissions at the geysers, resulting in elimination of existing impacts to soils and biota 2) reduction in noise, and 3) a decrease in seismic activity. The first two impacts are not deemed to be significant effects of the current geysers alternative. Air emissions are within allowable limits, and in keeping with existing operating permits. Noise at the geysers steamfield is contained within the existing industrial area, and does not affect sensitive receptors. We cannot verify that the proposed quenching would result in a decrease in seismic activity. Our geotechnical staff would need amounts and locations of injection to determine whether seismicity would be less. Even then, this analysis may be difficult.

The Stewart proposal does not avoid wetland impacts, and could have greater impacts than the current geysers alternative, which has only minimal wetland impacts associated with pipeline crossings. These impacts would still occur with the Stewart alternative, and additional wetland impacts could result from construction of the additional faciltities required for the Stewart proposal.

RECOMMENDATION

It is recommended that the City not pursue the Stewart alternative further as part of the Long-Term process. This would not preclude future consideration of this option, should additional information regarding its technological and logistic practicality be made available. At present, the undefined components and uncertainties do not allow this option to be incorporated into the current EIR/EIS process. From an environmental perspective, if a project avoided all wetland impacts, the Corps of Engineers would likely require that it be considered. Because this alternative does not avoid wetland impacts, we do not feel evaluation of this option is required as part of the environmental process.

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT

NEW ID NO.	RESERVOIRS: OLD ID NO.	LOCATION	TYPE	STORAGE: ACRE FEET	MILLION GALLONS	COST ($Million)	COST EFFEC-TIVENESS ($/Acre-Feet)	NO. OF PAR-CELS	TOO SMALL	POOR COST EFF.	POOR LOCA-TION	ENVIRONMENTAL CONSTRAINTS
RESERVOIR SITES NOT SELECTED FOR FURTHER CONSIDERATION												
S2	SP-2	SOUTH	POND	500	167	2	3,400	1	YES			38 ac. historic tidal marsh
S11	PH-1	SOUTH	DAM	300	100	1	3,340	NA	YES			0.5 ac. riparian woodland
S25	SC-1	SOUTH	POND	1,573	524	20	12,710	6	YES	YES		
S28A	AD-2A	SOUTH	DAM	1,400	467	4	2,860	4	YES			4 ac. riparian woodland
S28B	AD-2B	SOUTH	DAM	1,900	633	5	2,630	3	YES			4 ac. riparian woodland
S28C	AD-2C	SOUTH	DAM	600	200	2	3,330	3	YES			4 ac. riparian woodland
S30	L-1	SOUTH	DAM	900	300	19	18,890	3	YES	YES		37.5 ac. seasonal wetlands
S32	L-3	SOUTH	POND	450	150	4	8,890	3	YES	YES		13 ac.seasonal brackish marsh
S33	L-4	SOUTH	POND	1,400	467	5	3,570	4	YES		YES	BayFlats:soil problems;88ac.historic tidal marsh
S37	L-5	SOUTH	POND	3,000	1,000	11	3,670	2		YES	YES	BayFlats:wetlands/soil problems
S38	L-6	SOUTH	POND	1,000	333	7	7,000	9	YES	YES	YES	BayFlats:soil problems;64ac.historic tidal marsh
S1	S1	SEBASTOPOL	DAM	1,700	569	7	4,120	10	YES		YES	
S3	S3-A	SEBASTOPOL		166	55	2	12,050	NA	YES	YES		<1 ac. wetland
S3	S3-B	SEBASTOPOL		237	79	3	12,660	NA	YES	YES		<1 ac. wetland
S4	A	SEBASTOPOL	DAM	1,650	550	14	8,480	8	YES	YES	YES	
S5	H	SEBASTOPOL	POND	1,580	527	8	5,060	36	YES	YES		1-2 ac. wetland
S6	C (S2)	SEBASTOPOL	DAM	NA	NA	NA	NA	NA	YES			2 ac. riparian wetland
S7	G	SEBASTOPOL	POND	1,470	490	3	2,040	36	YES			>5ac. riparian woodland, wet meadows; sensitive habitat
S8	B	SEBASTOPOL	DAM	1,500	500	11	7,330	6	YES	YES		>5ac. riparian woodland, wet meadows; sensitive habitat
S9	D	SEBASTOPOL	DAM	1,420	473	7	4,930	21	YES			2 ac. riparian wetland
S10	E	SEBASTOPOL	DAM	1,500	500	8	5,330	12	YES	YES		
S12	WC-5	WEST	POND	1,661	554	18	10,840	4	YES	YES		<1 ac. wetland
S13	HARRISON CYN	SEBASTOPOL	DAM	9,640	3,213	46	4,770	NA			YES	
S14	F	SEBASTOPOL	DAM	1,500	500	10	6,670	1	YES	YES		>5ac. riparian woodland, wet meadows; sensitive habitat
S15	WC-1A	WEST	POND	385	128	3	7,790	NA	YES	YES		
S15	WC-1B	WEST	POND	801	267	12	14,980	NA	YES	YES		1 ac. wetland
S16	WC-2	WEST	POND	NA	NA	NA	NA	NA	YES			
S17	R-1 SM	WEST	DAM	1,191	397	11	9,240	1	YES	YES		1 ac. riparian wetland
S17	R-1 LG	WEST	DAM	2,122	707	20	9,430	1	YES	YES		1 ac. riparian wetland
S18A	T-3	WEST	DAM	1,800	600	14	7,780	2	YES	YES		1 ac. riparian wetland
S19	R-2	WEST	DAM	423	141	4	9,460	NA	YES	YES		2 ac. riparian wetland
S21A	WC-3	WEST	POND	128	43	7	54,690	6	YES	YES		
S21B	WC-4	WEST	POND	1,872	624	27	14,420	6	YES	YES		1 ac. riparian wetland
S22	T-3A	WEST	DAM	3,591	1,197							
S23A	WC-7A	WEST	POND	307	102	3	9,770	1	YES	YES		
S23B	WC-7B	WEST	POND	1,481	494	9	6,080	1	YES	YES		<1 ac.wetland
S24	WC-8	WEST	POND	694	231	14	20,170	NA	YES	YES		<1 ac. wetland
S26A	VO-1A	ROHNERT PARK	DAM	3,503	1,168	32	9,140	6		YES		2 ac. low value wetlands
S26B	VO-1B	ROHNERT PARK	DAM	2,194	731	15	6,840	6	YES	YES		2 ac. low value wetlands
S29	WC-6	WEST	POND	1,027	342	25	24,340	2	YES	YES		2 ac. wetland
S36	I	SEBASTOPOL	POND	1,450	483	3	2,070	23	YES			2 ac. riparian wetland
S45	T-2	WEST	DAM	1,900	633	5	2,630	NA	YES			
S48	T-8	WEST	DAM	9,900	3,300	NA	NA	NA (MARIN)			YES	
S49	T-9	WEST	DAM	4,200	1,400	NA	NA	NA (MARIN)			YES	
S50	V1	WEST	DAM	5,700	1,900	NA	NA	3			YES	
S51	V2	WEST	DAM	2,500	833	NA	NA	NA (MARIN)	YES			
S52	V3	WEST	DAM	2,700	900	NA	NA	2	YES			
S53A	V5	WEST	DAM	1,810	603	3	1,660	3	YES			
S55	V6	WEST	DAM	1,600	533	NA	NA	1	YES			

NA = Not Available

Note: Sites noted as having "POOR LOCATION" are located too far from all project alternatives. Sebastopol area reservoirs would only work with Sebastopol irrigation, which only takes place in Alternative 3.