

South Fork Sewer System
Facilities Plan

County of Madera

June 16, 2010

Revised November 27, 2012

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Prepared for:

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South For Sewer System Facilities Plan

Part 1 Operations Evaluation and Feasibility Report

1. Introduction
2. Background
3. Operations Evaluation
4. Wastewater Flows for North Fork and South Fork
5. Description of Alternatives
6. Selected Alternative
7. Public Information Process

Part 2 Initial Study and Ne ative Declaration

1. Project Description
2. Environmental Setting
3. Primary and Secondary Impacts
4. Environmental Checklist and Determination

Part Revenue Pro ram

1. Revenue Program

Part 1
Operations Evaluation and Feasibility Report

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS

(Continued)

APPENDI

1.0 INTRODUCTION

Blair, Church & Flynn Consulting Engineers (BCF) has been retained by the County of Madera (County) to develop a Feasibility Report for the proposed wastewater system improvements for the unincorporated community of South Fork. This report evaluates the existing South Fork wastewater facilities, violations and problems with the wastewater facilities, water quality issues and how they can be improved, proposed wastewater system improvements and their associated cost. This report will, in part, satisfy requirements outlined in the Small Community Wastewater Grant (SCWG) Program and will help to secure grant money for design and construction of the proposed improvements.

2.0 BACKGROUND

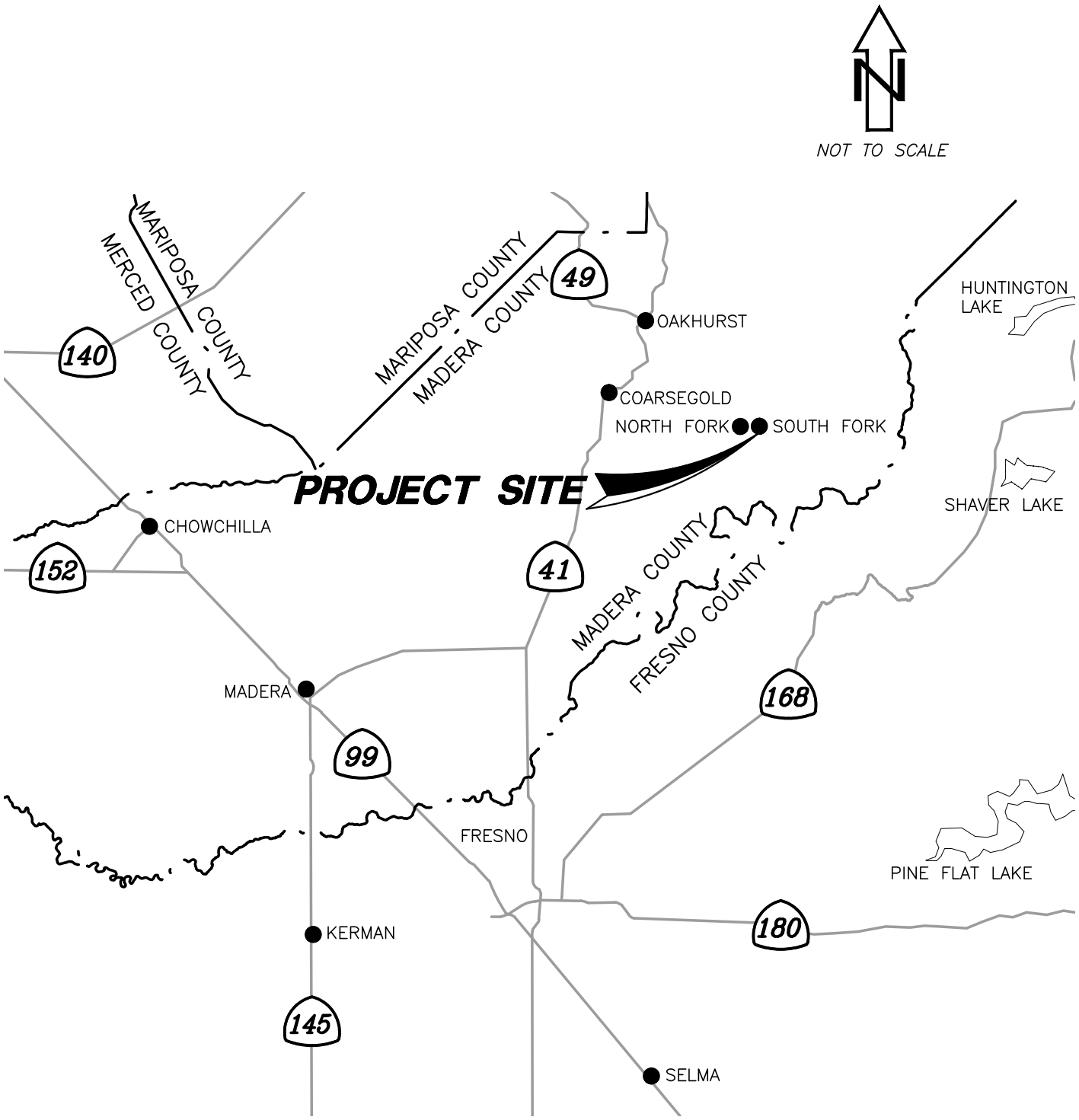
The unincorporated community of South Fork is located in Madera County, California approximately 50 miles northeast of Fresno, California as shown in Figure 1. South Fork lies within Madera County Maintenance District 8 (MCMD8) as shown on Figure 2. South Fork currently relies on individual septic tanks for wastewater disposal, with the exception of a single private wastewater system. The North Fork Mill Housing Facility's private wastewater system serves a residential neighborhood of approximately 24 residential structures. The residential neighborhood is known as the North Fork Mill Housing Facility and is also shown on Figure 2. The North Fork Mill Housing Facility private wastewater system is subject to Waste Discharge Requirements Order No. 90-051, and Cleanup and Abatement Order No. 99-729, as issued by the Regional Water Quality Control Board (RWQCB). It has a long history of chronic non-compliance with RWQCB regulations, dating from 1986.

In official actions related to the North Fork Mill Housing Facility private wastewater system, the Madera County Board of Supervisors on November 14, 2006 adopted Resolution No. 2006-234, "*A Resolution Proclaiming Existence of a Public Health Hazard; Use of New Sewage Disposal Systems; Prohibiting New Septic Tanks in the Health Hazard Area; Granting Final Authority Regarding Exemptions to Regional Water Quality Control Board.*" Subsequently, on January 25, 2007, the RWQCB adopted Resolution No. R5-2007-0007, "*Approving and Accepting the County of Madera's Proclamation of the Existence of a Public Health Hazard and Time Schedule for Compliance for the North Fork Mill Housing Facility, Madera County*."

The County desires to plan, design and construct a wastewater collection and conveyance system for the South Fork community to allow many of the existing septic tanks and the failing North Fork Mill Housing Facility private wastewater system to be taken out of service, and to make provisions for planned growth. The system is expected to consist of a gravity wastewater collection system, a wastewater pump station, and a sewer force main. The gravity wastewater collection system would convey wastewater from the properties served to the pump station, where it would be pumped via the force main to another gravity wastewater collection system and then discharge to the existing wastewater treatment system for the community of North Fork, Madera County Maintenance District 8A (MCMD8A), see Figure 2. Wastewater from South Fork would be treated and disposed of along with wastewater from North Fork.

The planning phase for the proposed South Fork wastewater system is funded by the State Water Resources Control Board (SWRCB) through the SCWG Program. SCWG Program Guidelines prescribe a project process that involves the following steps:

- Preliminary Planning
- Facilities Planning
- Design
- Construction
- Project Operation



Blair, Church & Flynn CONSULTING ENGINEERS	CONSULTANT Blair, Church & Flynn Consulting Engineers 481 Clovis Avenue, Suite 200 Clovis, California 93612 Tel (559) 326-1400 Fax (559) 326-1500	COUNTY OF MADERA SOUTH FORK PROJECT FEASIBILITY REPORT FIGURE 1 – VICINITY MAP	DR. BY JCA CH. BY LMG DATE 06-16-10 SCALE: AS NOTED	SHEET NO. 2 OF 14 SHEETS

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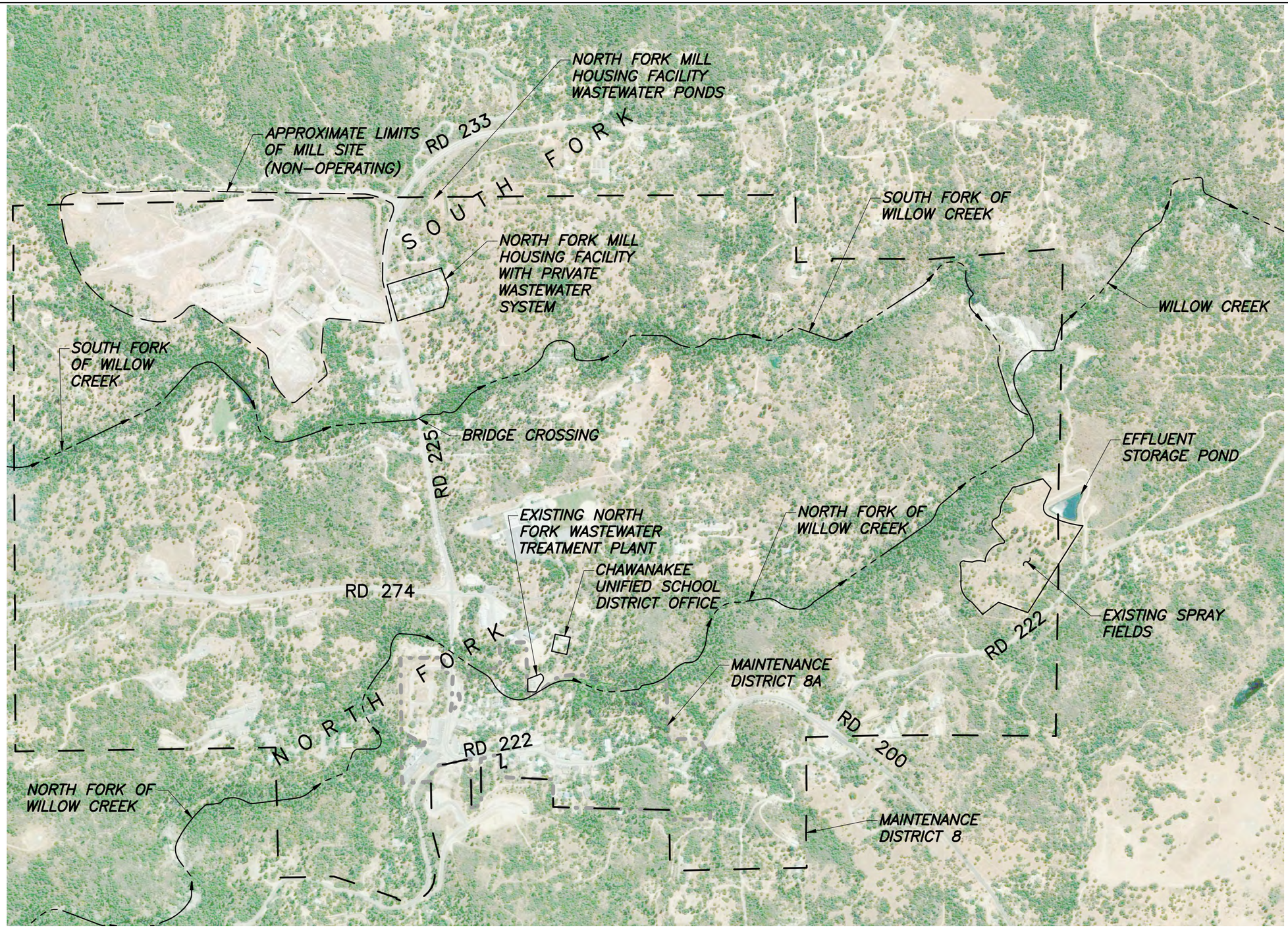

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COUNTY OF MADERA

SOUTH FORK
PROJECT FEASIBILITY REPORT
FIGURE 2 – LOCATION MAP

DR. BY JCA
CH. BY LMG
DATE 06-16-10
SCALE: AS NOTED

SHEET NO. 3
OF 14 SHEETS

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Preliminary Planning has been completed, as documented in the February 2008 preliminary engineering report "*Status of MD 8-A, North Fork and South Fork Wastewater Treatment Facility Report*," (2008 Report) prepared for Madera County by Provost & Pritchard Engineering Group. The next step is Facilities Planning, which includes an operations evaluation, project feasibility report, environmental documents and a draft revenue program. This report will satisfy the operations evaluation and project feasibility report requirements outlined in the SCWG Program Guidelines.

.0 OPERATIONS EVALUATION

The SCWG Program Guidelines require that the feasibility report include an operations evaluation. The purpose of the operations evaluation is to review current and past operation practices and evaluate the degree to which changes in the operation and maintenance practices can improve water quality.

As described in the County resolution, a public health hazard exists due to multiple failures of the inadequately designed, constructed and maintained North Fork Mill Housing Facility wastewater system, resulting in sewage discharges to the ground surface and to a nearby seasonal drainage that is tributary to the South Fork of Willow Creek. The resolution also describes a depth to groundwater of approximately 30 feet, and potential groundwater pollution by the system.

Effluent produced by the numerous individual septic systems and the private system serving the North Fork Mill Housing Facility, when those systems are operating correctly, can at best be considered comparable to undisinfected primary effluent. When those systems are not operating correctly, or during historical periods of non-compliance by the North Fork Mill Housing Facility private wastewater system, effluent is of lower quality. During failures of those systems, effluent may be nothing more than untreated raw sewage.

The proposed South Fork Wastewater Collection system will replace many of the individual septic systems and the North Fork Mill Housing Facility system. It will convey wastewater to the North Fork wastewater treatment plant, which produces disinfected secondary effluent. Therefore, effluent quality will be improved from the level of undisinfected primary effluent (or worse) to the level of disinfected secondary effluent.

For the North Fork Mill Housing Facility private wastewater system, it is clear from its long history of non-compliance with RWQCB regulations that efforts to improve the operations and maintenance of the private system during the past 23 years have been unsuccessful. For the private individual septic tanks and leach fields, only limited information is available.

The County provided BCF with information which included Waste Discharge Requirement (WDR) orders, memos, reports and plans for the existing North Fork WWTP and for the North Fork Mill Housing Facility private wastewater system. In addition, a site visit was conducted by BCF personnel to examine the existing South Fork wastewater system and North Fork WWTP. An onsite interview was also conducted with Chawanakee Unified School District personnel due to their close proximity to the North Fork WWTP. A summary of South Fork and North Fork is detailed below based on the information gathered from the County and during the onsite interview.

3.1 South Fork Wastewater Facilities

Wastewater generated by the North Fork Mill Housing Facility private wastewater system is discharged to multiple septic tanks and three concrete settling tanks. Wastewater is then conveyed to a sump tank and periodically pumped one-quarter mile to four evaporation/percolation ponds. A leach field is located just south of the settling tanks and receives wastewater overflows only during emergencies. Those

residences and businesses that rely on individual septic tanks include 15 mobile homes, three apartments, a rest home, a bed and breakfast, a motel and commercial buildings. Since these individual septic systems are all private, no documented O&M procedures were discovered and likely do not exist.

The North Fork Mill Housing Facility private wastewater system serves a residential neighborhood of approximately 24 residential structures occupied by low-income residents. The private wastewater system is subject to Waste Discharge Requirements Order No. 90-051, and Cleanup and Abatement Order No. 99-729, as issued by the RWQCB. A Facility Inspection Report dated February 7, 2005 from the Central Valley RWQCB details severe violations of the WDR Orders by the North Fork Mill Housing Facility private wastewater system such as raw sewage spilling from the settling tanks and wastewater entering into a seasonal drainage which flows to the South Fork of Willow Creek. Based on this Facility Inspection Report and what is described, it is evident that the private wastewater system has no formal O&M procedures.

3.2 North Fork Wastewater Facilities

The WWTP has a capacity of 60,000 gallons per day (gpd), and the existing effluent disposal spray field facility (spray field) is permitted for 38,000 gpd as mandated by Waste Discharge Requirements Order No. 94-353. The County filed a preliminary application in January 1994 with the RWQCB to upgrade the disposal facility to 60,000 gpd but the application was denied in December of that year.

4.0 WASTEWATER FLOWS FOR NORTH FORK AND SOUTH FORK

4.1 South Fork Wastewater Flows

This section discusses current and future wastewater flow conditions for South Fork. Wastewater flow projections are usually calculated by estimating equivalent population or equivalent dwelling units (EDU). Since independent agency population data appears to be unavailable for these small communities, EDU's were selected.

4.1.1 Existing South Fork Flow Estimates

A report entitled, *"Madera County Maintenance District 8A, Wastewater Treatment and Disposal Systems, Preliminary Engineering Report,"* dated April 1999 (1999 Report) by Provost & Pritchard Engineering Group estimates the South Fork existing flows at 15,875 gpd. Another report entitled *"Preliminary Engineering Report Wastewater Upgrade,"* dated December 2003 (2003 Report) by Wallace Swanson International estimates the South Fork existing flows at 12,700 gpd. The 1999 Report used a 250 gallon per unit (gal/unit) flow factor and the 2003 Report used 200 gal/unit flow factor as shown in Table A, "Summary of Wastewater Flow Calculations," in the Appendix. Both reports used the same EDU's for the calculations. The difference in flow factor is the reason for the difference between the existing flow estimates from the 1999 and 2003 Reports. It appears that little to no change in the EDU count has occurred in South Fork between 1999 and 2009. BCF used the 1999 Report's existing flow estimate for sizing the South Fork wastewater collection system because it was a more conservative value than was provided in the 2003 Report.

There is no infiltration/inflow because South Fork does not have an existing sewer collection system. The proposed sewer system for South Fork will be new construction designed to prevent infiltration/inflow. Therefore, there is no existing or future infiltration/inflow to account for in the South Fork flow projections.

4.1.2 Future South Fork Flow Projections

The South Fork community consists of mostly residential area with some commercial area. There is a Mill Site that is no longer in operation and it is not expected to resume operation. The 2008 Report estimates

that a cost of $17,500,000 would be required to prepare approximately 50 acres identified as Area F on the North Fork Mill Tributary Area Map in the Appendix for future development. The 2008 Report concluded this by reviewing various reports and the findings of the Preliminary Geotechnical Investigation Report in November 2004 (Soils Report) by BSK. The 2008 Report determined that Area F on the Mill Site has 20 or more feet of fill with a very high content of wood chips and organics, estimated at 23%. The total fill volume is estimated at approximately 700,000 cubic yards. The estimated cost includes excavation of the fill material, removal of organics, and compaction of the material. The 2008 Report states that the cost to prepare the site for development would make it financially impractical for Area F to be used for future development. For these reasons, no estimated future flows from the Mill Site will be used in sizing or designing the South Fork wastewater collection system.

Both the 1999 and 2003 Reports estimated 20 year wastewater flows based on a two percent growth rate for future residential. The 1999 Report estimated some future commercial growth and the 2003 Report excluded commercial growth. BCF researched current population growth rates and determined that two percent is a high growth factor especially for a small unincorporated town. The U.S. Census Bureau states that despite the growing US population, the rate of population growth, referred to as the average annual percent change, is projected to decrease during the next six decades by about 50 percent, from 1.10 percent to 0.54 percent. The decrease in the rate of growth is predominantly due to the aging of the population and consequently a dramatic increase in the number of deaths. From 2030 to 2050, the United States would grow more slowly than ever before in its history. Based on this research, BCF calculated future flows for 20 and 40 year projections with a growth factor of one percent. This results in 20 and 40 year wastewater flows of 4,500 and 6,250 gpd, respectively. The combined wastewater flow estimate from the 1999 Report and the projected 40 year future flow for South Fork is 26,625 gpd.

4.1.3 Peaking Factor

Since the County has no set policy for determining peaking factors, a design peaking factor was determined from a comparison with public works policies from other jurisdictional authorities within the Central Valley and accepted technical publications relating to the design of sewer systems.

Information contained within the City of Fresno's Memorandum for Sanitary Sewer Force Mains and Lift Stations designates the minimum peaking factor for sewer lift stations to be 2.5, or higher if determined by the Director. The Sewer System Design Standards of the County of San Benito (located to the west of Madera County) sets the peaking factor for sewer pipelines with an average daily flow less than 45 gallons per minute (gpm) at 3.3. An investigation of technical information relating to the estimation of peak sewer flows in "Wastewater Engineering", by Metcalf and Eddy, calculates a peaking factor of 5.0 for sewer pipelines with a tributary population less than 1,000. Based on the above mentioned information, a peaking factor of 4.0 was selected for design purposes.

The projected peak 40 year wastewater flow was estimated at 106,500 gpd (74 gpm) for the South Fork community. The gravity wastewater collection system would convey wastewater from the properties served to the pump station, where it would be pumped via the force main to a gravity wastewater collection system and then discharge to the existing North Fork WWTP.

4.2 North Fork Wastewater Flows

This section documents the wastewater flow for current and future conditions of North Fork. The North Fork WWTP serves the residents of North Fork, several small businesses, Forest Service district office, North Fork Elementary School and the Continuation High School.

4.2.1 Existing North Fork Flow Estimates

The 1999 and 2003 Reports estimate the North Fork existing wastewater flows at 31,550 gpd and 31,012 gpd, respectively. Although the reports differed in the EDU's and flow factors, their total existing flow calculations resulted in nearly the same total quantity. This is illustrated in Table A, "Summary of Wastewater Flow Calculations," in the Appendix. The County provided BCF with 2008 – 2009 wastewater flow data from the North Fork WWTP. The recorded wastewater flow data has an overall average daily flow of 17,611 gpd as shown on Table B, "Wastewater Flows for Madera County Maintenance District No. 8A," in the Appendix. BCF used this average daily flow for the existing North Fork flow to evaluate the future North Fork WWTP capacity discussed later in this report.

4.2.2 Future North Fork Flow Projections

The one percent growth factor was again used to project future wastewater flows for North Fork based on the existing EDU's from 1999 Report. The calculated future flows for 20 and 40 year projections results in future flows of 8,000 gpd and 10,500 gpd, respectively. The combined North Fork record data existing flow and the projected 40 year future flows is 34,111 gpd.

4.3 Analysis of Calculated Flow and Metered Flow

Both calculated and metered wastewater flow data exists for the existing wastewater flows from North Fork. The metered wastewater flow for North Fork is approximately 56 percent of the calculated wastewater flow. As a result, the future wastewater flows for North Fork and existing and future wastewater flows for South Fork could also be approximately 56 percent of the calculated wastewater flows. Careful flow metering of the North Fork and South Fork wastewater flows into the North Fork WWTP should be done to help verify wastewater flows. A summary of calculated wastewater flows and adjusted wastewater flows are included in Table 1.

4.4 North Fork and South Fork Wastewater Flow Summary

Table 1 provides a summary of wastewater flows for North Fork and South Fork.

Table 1: North Fork and South Fork Wastewater Flow Summary

Description	Calculated Avera e Daily Flow (pd)	Ad usted Avera e Daily Flow (pd)	Notes
North For			
Existing	17,611**	17,611**	Per Record Data from WWTP (2008-2009)
Projected 20 yr Growth	8,000	4,466	Projected Flow for years 2009-2029
Year 2029 Total	**25, 11**	**22,077**	
Projected 40 yr Growth	10,500	5,861	Projected Flow for years 2029-2049
Year 2049 Total	**,111**	**27,9 8**	
South For			
Existing	15,875	8,861	Estimated (From 1999 Report)
Projected 20 yr Growth	4,500	2,512	Projected Flow for years 2009-2029
Year 2029 Total	**20, 75**	**11, 7**	
Projected 40 yr Growth	6,250	3,489	Projected Flow for years 2029-2049
Year 2049 Total	**2 , 25**	**14,8 2**	
North For South For Combined Flows			
Existing	33,486	26,472	
Projected 20 yr Growth	12,500	6,978	Projected Flow for years 2009-2029
Year 2029 Total	**45,98**	**,450**	
Projected 40 yr Growth	14,750	9,350	Projected Flow for years 2029-2049
Year 2049 Total	**2,7**	**42,800**	

*Flows reduced by 44.2% to account for differences between calculated and measured flows, see Section 4.3
**Average measured daily flow at North Fork Wastewater Treatment Plant

5.0 DESCRIPTION OF ALTERNATIVES

The County has previously authorized two different engineering firms to evaluate several alternatives to eliminate the need for private septic systems in South Fork and to establish a modernized wastewater collection system. The 1999 Report by Provost & Pritchard Engineering Group described four alternatives listed below:

- Construct a new collection system in South Fork and pipe the wastewater to the existing treatment plant and spray field in North Fork.
- Construct a new collection system in South Fork and pipe the wastewater to a new treatment plant and leach field in South Fork on the saw mill property.
- Construct a new collection system in South Fork and pipe the wastewater to a new treatment plant and spray field located on the saw mill property.
- Construct a new collection system in South Fork and pipe the wastewater to a new treatment plant located on the Mill Site and spray field on Forest Service Property.

Additionally, the 2003 Report by Wallace Swanson International described several alternatives for wastewater collection for North Fork and South Fork alone as well as several alternatives for combining wastewater facilities between North Fork and South Fork. Those alternatives are listed below:

North Fork Alone:

- N1: Maintain existing WWTP, expand effluent storage, maintain existing spray field. Evaluate expansion of spray field and/or addition of leach field or eco-chamber field.
- N2: Provide new Advanced Integrated Pond System (AIPS) plant.
- Same as Alternative N1 or N2 above, tertiary treatment by conventional filtration/disinfection, and stream discharge.

South Fork Alone:

- S1: Provide conventional mechanical package WWTP, install small diameter collection system, or conventional collection system. Consider three methods of effluent disposal: 1) leach field disposal; 2) spray field disposal; and 3) eco-chamber disposal.
- S2: Same as Alternative S1, but providing AIPS pond system for secondary treatment.
- S3: Same as Alternative S1, but providing wetlands for secondary treatment.
- S4: Same as Alternative S1, S2 or S3, but adding tertiary treatment by sand filtration/disinfection, stream disposal and reuse.

North and South Fork Combined:

- NS1: Maintain and expand existing WWTP, expand effluent storage and spray field, develop new spray field for future capacity. Consider combinations of effluent disposal by spray field, leach field and eco-chambers.
- NS2: Same as NS1, tertiary treatment by conventional filtration/disinfection, and stream discharge.
- NS3: Pump raw wastewater from North Fork to South Fork, and develop AIPS pond system in conjunction with land disposal to treat North and South Fork wastewater combined.

The advantages and disadvantages were weighed for each alternative and estimated cost for each alternative was considered. In the end, the County decided on a project that would construct a new collection system in South Fork and pipe the wastewater to the existing North Fork WWTP and spray field.

.0 SELECTED ALTERNATIVE

The Preliminary Planning has been completed as documented in the 2008 Report. Figures 3 and 4 show a conceptual design of the selected alternative and the following is a summary of the major components for the selected alternative:

- 8-inch gravity sewer collection system with connection to existing South Fork users.
- Pump station with submersible wastewater pumps.
- 4-inch sewer force main.

The size of the sewer collection system, pump station and force main were all based on a 40-year build out projection for South Fork. The County intends to minimize excavation within the existing pavement area to the greatest extent possible. Therefore, the gravity sewer main and sewer force main will be designed to be outside the pavement limits in Road 225. A bore and jack of the gravity sewer system will be utilized to limit trench resurfacing for street crossings across Road 225. Construction in Road 228 will be by open cut methods and will require resurfacing. The capital construction cost for this project is estimated at $1,069,000. A complete breakdown of the estimated capital construction cost is provided in the Appendix along with a preliminary project schedule. Funding for this project will be through a grant from the California State Water Resources Control Board (CSWRCB) through the SCWG Program.

This project will allow South Fork to eliminate existing septic tanks and leach fields and the North Fork Mill Housing Facility private wastewater system, which have been under many violations from the RWQCB. Any sewage overflowing from the existing sewage collection system which discharges into seasonal drainages or to the North Fork of Willow Creek will be eliminated by connection to a gravity sewer collection system.

The proposed South Fork Wastewater Collection System will be compatible with the resolutions adopted by the County and the RWQCB. It will also be designed to accommodate wastewater flows generated by planned development in conformance with the Madera County General Plan and the North Fork Area Plan.

6.1 Gravity Sewer Collection System

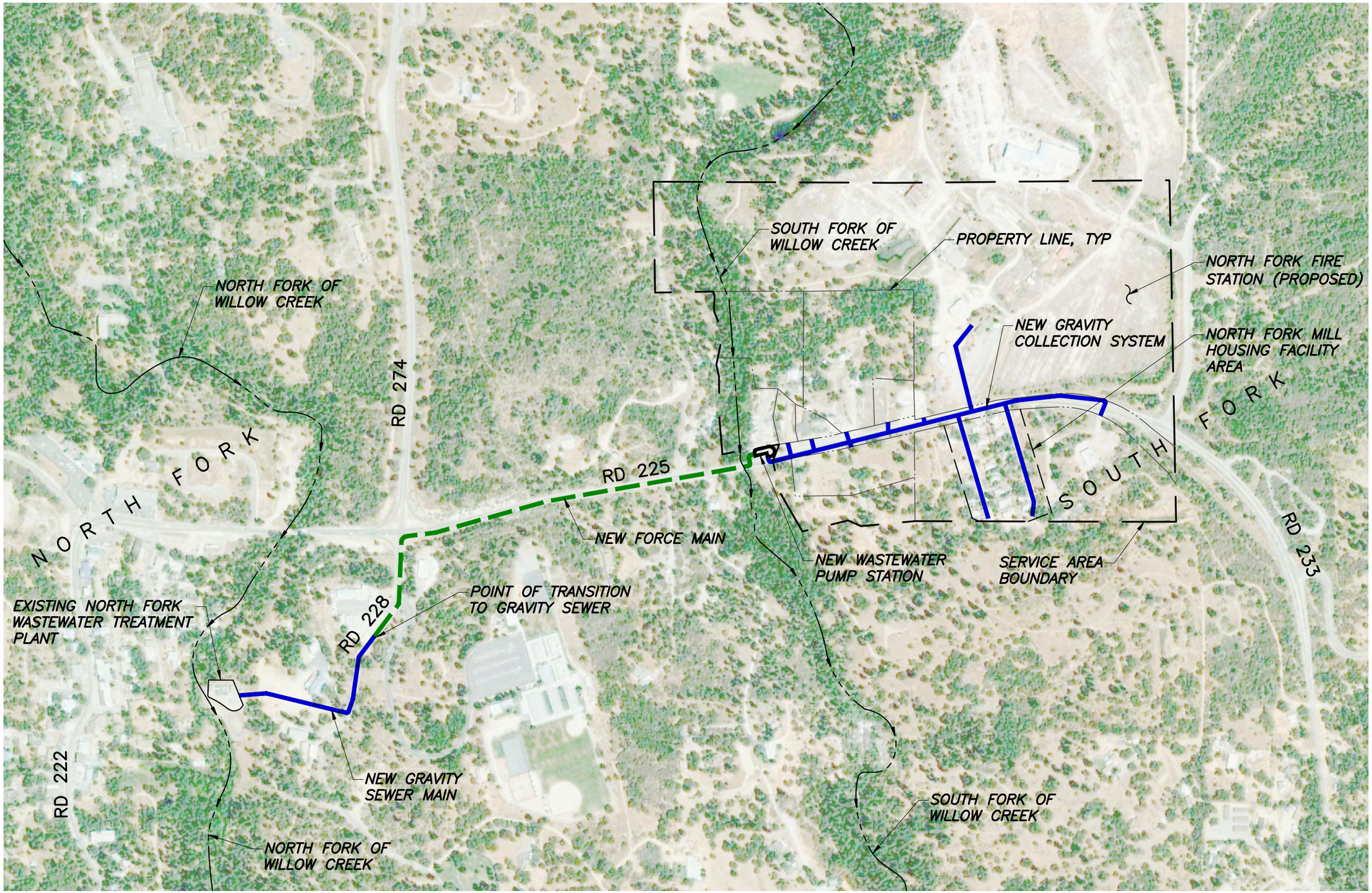
The proposed gravity sewer collection system for South Fork is shown on Figures 3 and 4. Wastewater will be collected from residential and commercial properties including, but not limited to, the North Fork Mill Housing Facility residential neighborhood, single family homes, a mobile home park, apartment complex, rest home, bed and breakfast, motel and the future North Fork Fire Station. The wastewater collection system is sized for a projected 40-year build out condition and will consist of 8-inch sewer mains with smaller sewer service laterals. All construction will be in accordance with the County of Madera Standard Drawings and Specifications. The gravity sewer system will generally flow west on Road 225 to a sewer pump station located immediately east of the South Fork of Willow Creek.

6.2 Pump Selection and Force Main Size

The sewer pump station will pump approximately 2,500 linear feet to the west where it will discharge into a sewer manhole. From this manhole, a gravity system will be installed which continues south on Road 228. The gravity system will continue south, adjacent to Chawanakee Unified School District Offices, and will cross the School District's property and finally discharge into the existing North Fork WWTP headworks structure. Coordination between the County and the School District will be required to secure an easement for the proposed sewer line.

In order to cross the South Fork of Willow Creek, the sewer force main will need to be anchored to the Willow Creek Bridge. Special design consideration will be required for pipeline materials, anchorage of the force main to the bridge structure and a transition from the buried force main system to the bridge.

For the 40-year build out condition of South Fork, the estimated average day and peak hour flow from South Fork into the sewer pump station are 18 gpm and 74 gpm, respectively. In order to help eliminate clogging in the force main and facilitate cleaning, we recommend a 4 inch force main size. For a 4 inch force main, it is desirable to maintain a flow velocity of no less than 3.5 feet per second to help ensure that settled solids can be re-suspended. As a result, the minimum pump flow rate is 140 gpm. The increased force main size and pump capacity will also give a greater degree of flexibility for the system in case the actual growth varies from the projected growth estimate presented in this report.



SCALE: 1"=500'±

LEGEND:

SOUTH FORK SERVICE AREA BOUNDARY

PROPERTY LINE

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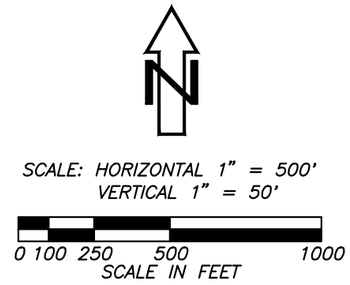
COUNTY OF MADERA

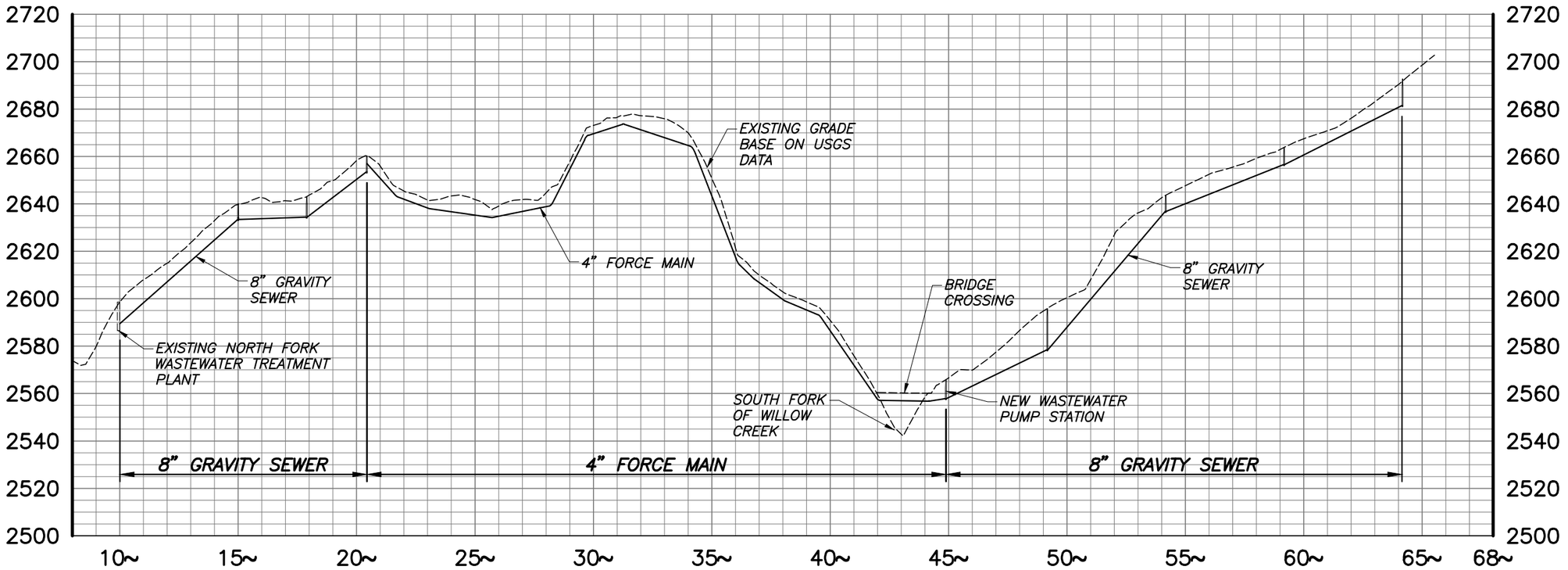
SOUTH FORK
PROJECT FEASIBILITY REPORT
FIGURE 3 – CONCEPTUAL SEWER PLAN

DR. BY JCA
CH. BY FVM
DATE 06-16-10
SCALE: AS NOTED

SHEET NO. 11
OF 14 SHEETS

Drawing: P:\208-0414\dwg-site\dwg\208414_FIG_3.dwg; Layout 1 Plot by: francisco Jun 16, 2010 - 10:39am





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COUNTY OF MADERA

SOUTH FORK
PROJECT FEASIBILITY REPORT
FIGURE 4 – CONCEPTUAL PLAN AND PROFILE

DR. BY JCA
CH. BY LMG
DATE 06-16-10
SCALE: AS NOTED

SHEET NO. 12
OF 14 SHEETS

Drawing: P:\208-0414\dwg-site\dwg\208414_FIG_4.dwg; Layout1 Plot by: francisco Jun 16, 2010 - 10:38am

We propose a typical duplex submersible wastewater pump station. The wastewater pump station will consist of two 30-horsepower submersible pumps, a concrete wet well, standard electrical and telemetry equipment, odor control equipment and provisions for connection to a portable generator. It also may be advantageous to install an automatic make-up water system to help flush the wet well and cycle the pumps during times of low flow. Cut sheets for the submersible sewer pumps are included in the Appendix.

6.3 North Fork WWTP Operation

The North Fork WWTP's current treatment capacity is 60,000 gpd. Once the South Fork wastewater collection system is fully operational, the North Fork WWTP can expect wastewater flows as high as 33,486 gpd based on calculated average daily flow or as low as 26,472 gpd based on adjusted average daily flow from South Fork and North Fork combined. The projected 40 year flow into the North Fork WWTP from South Fork and North Fork combined could potentially be as high as 62,736 gpd based on calculated average daily flow or as low as 42,800 gpd based on the adjusted average daily flow. This value will depend on the actual growth and development of North Fork and South Fork. Based on the calculated average daily flow of 62,736 gpd, it would be necessary for the County to upgrade the North Fork WWTP.

The current spray field capacity is 38,000 gpd. As mentioned in the 2008 Report, the existing effluent spray fields need to be evaluated for the projected 40 year flow into the North Fork WWTP. The County can increase discharge capacity to the spray fields as long as evidence is provided that the spray field has runoff controls and effluent return systems for discharges greater than 38,000 gpd and that spray field percolation rates will allow for a 60,000 gpd effluent disposal capacity. Both of these requirements are outlined in WDR Order No. 94-343.

6.4 Annual O&M Costs

We have estimated that the monthly O&M costs for the South Fork sewer improvements would be on the order of $2,000 per month, which includes bi-weekly inspection of the wastewater pump station, pump station electrical costs, repair and replacement of wastewater infrastructure, periodic cleaning of sewer lines and other general maintenance.

6.5 User Charges

The current North Fork user fee rates are $82 per month for residential properties and $87 per month for commercial properties according to the County. It is expected that the new user fee charges for South Fork residents will be similar to the current North Fork rates. The rates are subject to change and may be higher or lower based on the total capital cost of the project and the amount of grant money received for construction from the SCWG Program.

6.6 Legal, Institutional, Managerial and Financial Capability

The County of Madera currently operates nine wastewater collection systems and wastewater treatment plants for Madera County Service Areas. Wastewater treatment plant capacities for those facilities range up to 600,000 gallons per day (gpd), or 0.6 MGD. The systems include 18 wastewater pumping stations. County of Madera personnel charged with the operation and maintenance of those facilities include one Grade V and two Grade II wastewater treatment plant operators. Madera County Service Area MD-8S includes the North Fork sewer system. The proposed South Fork Wastewater Collection System is planned to be tributary to the North Fork wastewater treatment plant.

The County's successful history of constructing, operating and maintaining wastewater collection systems, pumping stations and treatment plants for Madera County Service Areas demonstrates that it has the legal, institutional, managerial and financial capability to ensure adequate construction, operation and maintenance of the proposed South Fork Wastewater Collection System.

7.0 PUBLIC INFORMATION PROCESS

The County of Madera will schedule a meeting with the residents of North Fork and South Fork as required by the California Environmental Quality Act (CEQA). The meeting will be a forum to allow the public to provide their input and to discuss environmental and other factors related to the project.

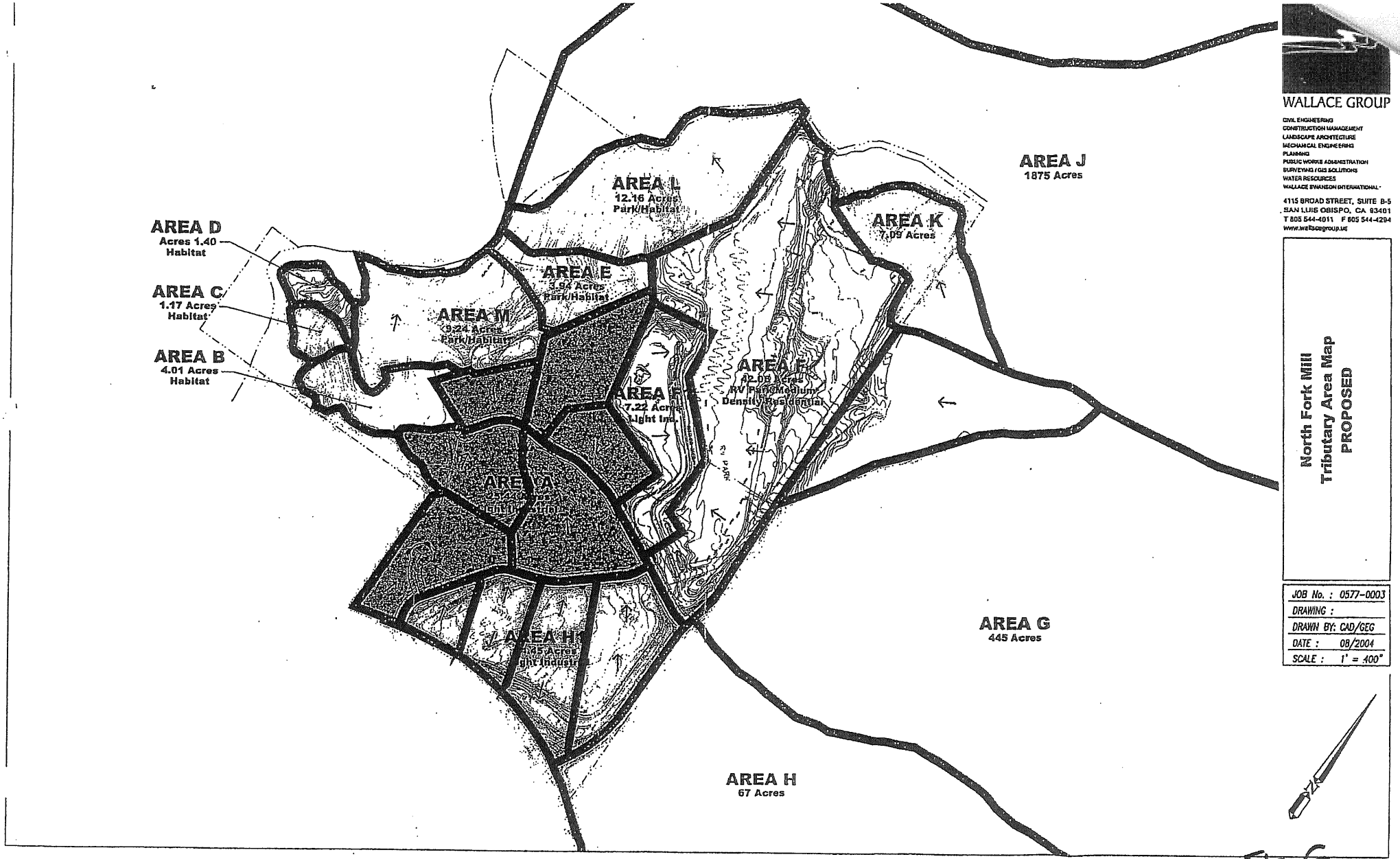
APPENDIX

Table A Summary of Wastewater Flow Calculations

Area	Description	Provost & Pritchard - 1999 Report				Wallace Swanson Int. - 2003 Report				Blair, Church & Flynn				
		EDU'S	Flow (Gal/Unit)	Flow (gpd)	Notes	EDU'S	Flow (Gal/Unit)	Flow (gpd)	Notes	EDU'S	Flow (Gal/Unit)	Flow (gpd)	Adjusted* Flow (gpd)	Notes
North For				**E istin**				**E istin**				**E istin per Record Data for 2008 2009**		
	Residential	64.0	250	16,000		43.1	200	8,620						
	Commercial	27.0	250	6,750		65.5	200	13,092						
	Forest Service	6.4	250	1,600		24.0	200	4,800						
	Schools (16 gal/student)	28.8	450	7,200	450 Students	23.0	10	4,500	450 Students					
	Subtotal	**12 .2**		**1,550**	**Ave. Daily Flow**	**155.**		**1,012**	**Ave. Daily Flow**			**17, 11**	**17, 11**	**Ave. Daily Flow**
		Pro ected 20 yr Growth				**Pro ected 20 yr Growth**				**Pro ected 20 yr Growth** (From 1999 Report)				
	Future Residential	40.0	250	10,000	2% Growth	7.0	250	1,750	2% Growth	27.0	250	6,750	3,768	1% Growth
	Future Residential					17.0	250	4,250	Indian Housing			n/a		
	Future Residential					33.0	250	8,250	Indian Housing			n/a		
	Future Commercial	5.0	250	1,250	Estimate	5.0	200	1,000	Estimate	5.0	250	1,250	698	Estimate
	Subtotal	**45.0**		**11,250**	**Ave. Daily Flow**	**2.0**		**15,250**	**Ave. Daily Flow**	**2.0**		**8,000**	**4,4**	**Ave. Daily Flow**
	Total Pro ected (20 yr)	**171.2**		**42,800**	**Ave. Daily Flow**	**217.**		**4 ,2 2**	**Ave. Daily Flow**	**n a**		**25, 11**	**22,077**	**Ave. Daily Flow**
		Pro ected 40 yr Growth				**Pro ected 40 yr Growth**				**Pro ected 40 yr Growth**				
	Future Residential									34.0	250	8,500	4,745	1% Growth
	Future Commercial									8.0	250	2,000	1,116	Estimate
	Subtotal									**4.0**		**10,500**	**5,8 1**	**Ave. Daily Flow**
	Total Pro ected (40 yr)	**n a**		**n a**		**n a**		**n a**		**n a**		**,111**	**27,9 8**	**Ave. Daily Flow**
South For				**E istin**				**E istin**				**E istin** (From 1999 Report)		
	Mobile Home Park	12.0	250	3,000	15 Trailers	12.0	200	2,400	15 Trailers	12.0	250	3,000	1,675	15 Trailers
	Mill Site	2.5	250	625	8,000 Sq. Ft.	2.5	200	500	8,000 Sq. Ft.	2.5	250	625	349	8,000 Sq. Ft.
	Rental Housing	20.0	250	5,000	Mill Compound	20.0	200	4,000	Mill Compound	20.0	250	5,000	2,791	Mill Compound
	Rest Home	3.8	250	950	8 Unit Beds	3.8	200	760	8 Unit Beds	3.8	250	950	530	8 Unit Beds
	Single Family Dwellings	10.0	250	2,500		10.0	200	2,000		10.0	250	2,500	1,395	
	Apartments	3.0	250	750		3.0	200	600		3.0	250	750	419	
	Bed and Breakfast	4.8	250	1,200	8 Rooms	4.8	200	960	8 Rooms	4.8	250	1,200	670	8 Rooms
	Motel	2.4	250	600	4 Rooms	2.4	200	480	4 Rooms	2.4	250	600	335	4 Rooms
	Commercial	5.0	250	1,250	Estimate	5.0	200	1,000	Estimate	5.0	250	1,250	698	Estimate
	Subtotal	**.5**		**15,875**	**Ave. Daily Flow**	**.5**		**12,700**		**.5**		**15,875**	**8,8 1**	**Ave. Daily Flow**
		Pro ected 20 yr Growth				**Pro ected 20 yr Growth**				**Pro ected 20 yr Growth**				
	Future Residential	35.0	250	8,750	2% Growth	24.0	250	6,000	2% Growth	13.0	250	3,250	1,814	1% Growth
	Future Commercial	5.0	250	1,250	Estimate			n/a		5.0	250	1,250	698	Estimate
	Subtotal	**40.0**		**10,000**	**Ave. Daily Flow**	**24.0**		**,000**	**Ave. Daily Flow**	**18.0**		**4,500**	**2,512**	**Ave. Daily Flow**
	Total Pro ected (20 yr)	**10 .5**		**25,875**	**Ave. Daily Flow**	**87.5**		**18,700**	**Ave. Daily Flow**	**81.5**		**20, 75**	**11, 7**	**Ave. Daily Flow**
		Pro ected 40 yr Growth				**Pro ected 40 yr Growth**				**Pro ected 40 yr Growth**				
	Future Residential									17.0	250	4,250	2,372	1% Growth
	Future Commercial	5.0	250	1,250	Estimate					8.0	250	2,000	1,116	Estimate
	Subtotal									**17.0**		**,250**	**,489**	**Ave. Daily Flow**
	Total Pro ected (40 yr)	**n a**		**n a**		**n a**		**n a**		**98.5**		**2 , 25**	**14,8 2**	**Ave. Daily Flow**
North South For Total (20 yr)				**8, 75**	**Ave. Daily Flow**			**4,9 2**	**Ave. Daily Flow**			**45,98**	**,450**	**Ave. Daily Flow**
North South For Total (40 yr)				**n a**				**n a**				**2,7**	**42,800**	**Ave. Daily Flow**

* Flows reduced by 44.2% to account for difference between calculated flow versus measured flow in North Fork.

** Average measured daily flow at North Fork Wastewater Treatment Plant.



WALLACE GROUP
CIVIL ENGINEERING
CONSTRUCTION MANAGEMENT
LANDSCAPE ARCHITECTURE
MECHANICAL ENGINEERING
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PUBLIC WORKS ADMINISTRATION
SURVEYING / GIS SOLUTIONS
WATER RESOURCES
WALLACE SWANSON INTERNATIONAL
4115 BROAD STREET, SUITE B-5
SAN LUIS OBISPO, CA 93401
T 805 544-4011 F 805 544-4294
www.wallacegroup.us

North Fork Mill
Tributary Area Map
PROPOSED

JOB No. :	0577-0003
DRAWING :	
DRAWN BY:	CAD/GEG
DATE :	08/2004
SCALE :	1" = 400'

Fig 6

Table B Wastewater Flows for Madera County Maintenance District No. 8A

Year	Month	Avera e Daily Flow (pd)	Ma imum Daily Flow in Month (pd)
2008	January	24,000	77,000
	February	22,000	38,000
	March	18,000	28,000
	April	17,000	22,000
	May	17,000	22,000
	June	17,000	32,000
	July	14,000	21,000
	August	16,000	23,000
	September	17,000	24,000
	October	17,000	23,000
	November	16,000	22,000
	December	16,000	22,000
2009	January	16,000	24,000
	February	19,000	27,000
	March	19,000	28,000
	April	17,000	22,000
	May	18,000	24,000
	June	17,000	27,000
	Avera e	17,611	

North For South For Sewer System Facility Plan
Madera County Resources Mana ement A ency

En ineer s Opinion of Probable Construction Cost Conceptual Desi n Submittal

June 16, 2010

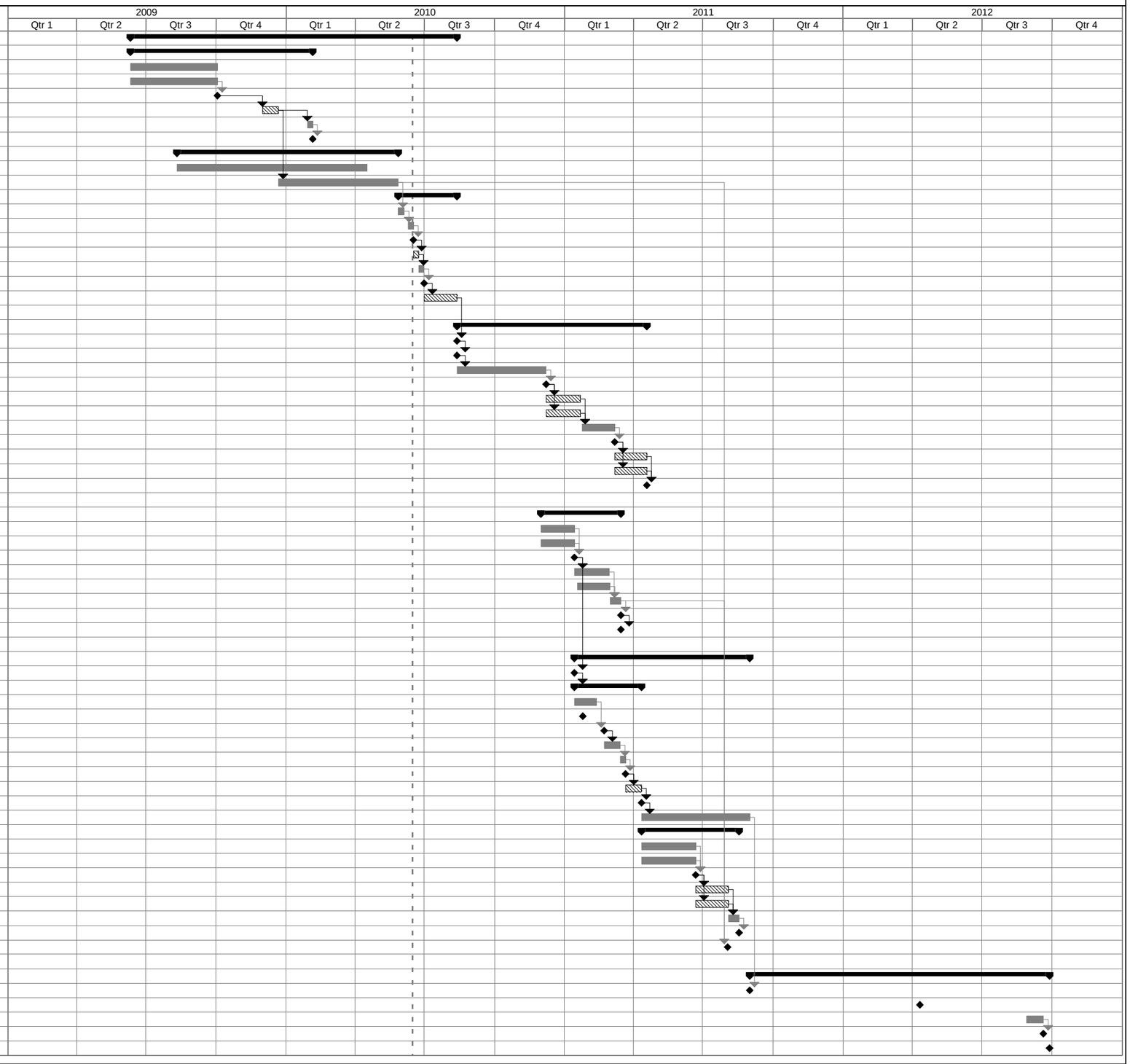
Item No.	Description	Quantity	Unit	Unit Cost	E tension
1	Mobilization	lump sum		$ 31,000.00	$ 31,000.00
2	Clearing and Grubbing	lump sum		$ 35,000.00	$ 35,000.00
3	Traffic Control, Detours, and Access	lump sum		$ 30,000.00	$ 30,000.00
4	Dust Control	lump sum		$ 10,000.00	$ 10,000.00
5	Worker Protection from the Hazard of Caving Ground	lump sum		$ 30,000.00	$ 30,000.00
6	Temporary Handling of Wastewater Flows	lump sum		$ 20,000.00	$ 20,000.00
7	4-inch Sewer Force Main	4,300	ln ft	$ 30.00	$ 129,000.00
8	8-inch Gravity Sewer Main	5,000	ln ft	$ 50.00	$ 250,000.00
9	Bore and Jack Sewer Main	150	ln ft	$ 125.00	$ 18,750.00
10	48-inch Sewer Manhole	20	ea	$ 4,000.00	$ 80,000.00
11	Pump Station	lump sum		$ 100,000.00	$ 100,000.00
12	Sewer Force Main Bridge Crossing	lump sum		$ 25,000.00	$ 25,000.00
13	Wastewater Treatment Plant Connection	lump sum		$ 10,000.00	$ 10,000.00
14	Trench Resurfacing	1,500	ln ft	$ 40.00	$ 60,000.00
15	PG&E Rule 16	lump sum		$ 10,000.00	$ 10,000.00
16	SWPPP	lump sum		$ 10,000.00	$ 10,000.00
17	Misc. Facilities and Operations	lump sum		$ 42,250.00	$ 42,250.00
				Subtotal Amount	$ 891,000.00
				Contingencies (approx. 20%):	$ 178,000.00
				Total Construction Cost	**1,0 9,000.00**

MADERA COUNTY RESOURCE MANAGEMENT AGENCY

PRELIMINARY PROJECT SCHEDULE

SEWER SYSTEM FACILITIES PLANNING REPORT FOR SOUTH FORK WASTEWATER TREATMENT AND COLLECTION FACILITIES

Task Name	Start	Duration	Finish
FACILITIES PLANNING	**Thu 11 09**	**29 d**	**Thu 8 12 10**
Part 1 Operations Evaluation and Feasibility Report	**Thu 11 09**	**1 4 d**	**Fri 2 5 10**
Operations Evaluation	Thu 6/11/09	80 d	Fri 10/2/09
Feasibility Report	Thu 6/11/09	80 d	Fri 10/2/09
Submit Draft Feasibility Report	Fri 10/2/09	0 d	Fri 10/2/09
County Review	*Tue 12/1/09*	*15 d*	*Mon 12/21/09*
Address Review Comments	Fri 1/29/10	5 d	Thu 2/4/10
Submit Final Feasibility Report for Approval (Phase 1)	Fri 2/5/10	0 d	Fri 2/5/10
Part 2 Environmental Documentation and Draft Revenue Pro ram	**Tue 8 11 09**	**201 d**	**Thu 5 27 10**
Environmental Documentation	Tue 8/11/09	172 d	Fri 4/16/10
Draft Revenue Program	Tue 12/22/09	109 d	Thu 5/27/10
Part Sewer System Facilities Plannin Report	**Fri 5 28 10**	**5 d**	**Thu 8 12 10**
Component Document Assembly	Fri 5/28/10	5 d	Fri 6/4/10
Prepare Draft SSFPR	Thu 6/10/10	5 d	Wed 6/16/10
Submit Draft SSFPR	Wed 6/16/10	0 d	Wed 6/16/10
County Review	*Thu 6/17/10*	*5 d*	*Wed 6/23/10*
Address Review Comments	Thu 6/24/10	5 d	Wed 6/30/10
Submit Final SSFPR for Approval (Phase 2)	Wed 6/30/10	0 d	Wed 6/30/10
Division of Financial Assistance Review	Thu 7/1/10	30 d	Thu 8/12/10
Desi n	**Thu 8 12 10**	**170 d**	**Mon 4 18 11**
Receive Facilities Plan Approval Letter	Thu 8/12/10	0 d	Thu 8/12/10
Receive Design Grant Approval & Sign	Thu 8/12/10	0 d	Thu 8/12/10
Prepare Initial Design Plans & Specifications	Fri 8/13/10	80 d	Tue 12/7/10
Submitt Initial Design Plans & Specifications	Tue 12/7/10	0 d	Tue 12/7/10
County Review	Wed 12/8/10	30 d	Fri 1/21/11
DFA Review	Wed 12/8/10	30 d	Fri 1/21/11
Address Review Comments	Mon 1/24/11	30 d	Mon 3/7/11
Submitt Final Design Plans & Specifications	Mon 3/7/11	0 d	Mon 3/7/11
County Review	Tue 3/8/11	30 d	Mon 4/18/11
Division of Financial Assistance Review	Tue 3/8/11	30 d	Mon 4/18/11
Receive Final Plans & Specifications Approval Letter	Mon 4/18/11	0 d	Mon 4/18/11
Sewer Ordinances	**Wed 12 1 10**	**71 d**	**Tue 15 11**
Prepare Draft Sewer Use Ordinance	Wed 12/1/10	30 d	Thu 1/13/11
Prepare Draft Sewer Rate Ordinance	Wed 12/1/10	30 d	Thu 1/13/11
Submitt Draft Sewer Use and Rate Ordinances	Thu 1/13/11	0 d	Thu 1/13/11
County Review	Fri 1/14/11	30 d	Mon 2/28/11
Division of Financial Assistance Review	Tue 1/18/11	30 d	Tue 3/1/11
Address Review Comments	Wed 3/2/11	10 d	Tue 3/15/11
Submitt Final Sewer Use and Rate Ordinances to County Board for Adoption	Tue 3/15/11	0 d	Tue 3/15/11
County Board Adoption of Sewer Ordinances	Tue 3/15/11	0 d	Tue 3/15/11
Construction	**Thu 1 1 11**	**1 0 d**	**Wed 8 1 11**
Receive Construction Grant & Sign	Thu 1/13/11	0 d	Thu 1/13/11
Pre Construction	**Fri 1 14 11**	**0 d**	**Mon 4 11 11**
Advertise for Construction Bids	Fri 1/14/11	20 d	Fri 2/11/11
Pre-Bid Conference	Tue 1/25/11	0 d	Tue 1/25/11
Receive Bids and Declare Apparent Low Bidder	Tue 2/22/11	0 d	Tue 2/22/11
Pre-Construction Conference	Tue 2/22/11	15 d	Mon 3/14/11
Prepare Approval To Award Package	Tue 3/15/11	5 d	Mon 3/21/11
Submitt Approval To Award Package	Mon 3/21/11	0 d	Mon 3/21/11
Division of Financial Assistance Review	Tue 3/22/11	15 d	Mon 4/11/11
Approve Award to Contractor	Mon 4/11/11	0 d	Mon 4/11/11
Pro ect Construction	Tue 4/12/11	100 d	Wed 8/31/11
Tas s Durin Construction	**Tue 4 12 11**	**90 d**	**Wed 8 17 11**
Prepare Draft O&M Manual	Tue 4/12/11	50 d	Tue 6/21/11
Prepare Operator Duty Statement	Tue 4/12/11	50 d	Tue 6/21/11
Submitt Draft O&M Manual & Operator Duty Statement	Tue 6/21/11	0 d	Tue 6/21/11
County Review	Wed 6/22/11	30 d	Wed 8/3/11
Division of Financial Assistance Review	Wed 6/22/11	30 d	Wed 8/3/11
Address Review Comments	Thu 8/4/11	10 d	Wed 8/17/11
Submitt Final O&M Manual	Wed 8/17/11	0 d	Wed 8/17/11
Submit Final Revenue Program, Adopted Sewer Use and Rate Ordinances	Wed 8/3/11	0 d	Wed 8/3/11
Pro ect Operation	**Wed 8 1 11**	**271 d**	**Fri 9 28 12**
Initiation of Operation	Wed 8/31/11	0 d	Wed 8/31/11
Final Project Inspection	Wed 4/11/12	0 d	Wed 4/11/12
Prepare Project Performance Report	Wed 8/29/12	15 d	Wed 9/19/12
Submitt Project Performance Report	Wed 9/19/12	0 d	Wed 9/19/12
Division of Financial Assistance Project Close-out	Fri 9/28/12	0 d	Fri 9/28/12



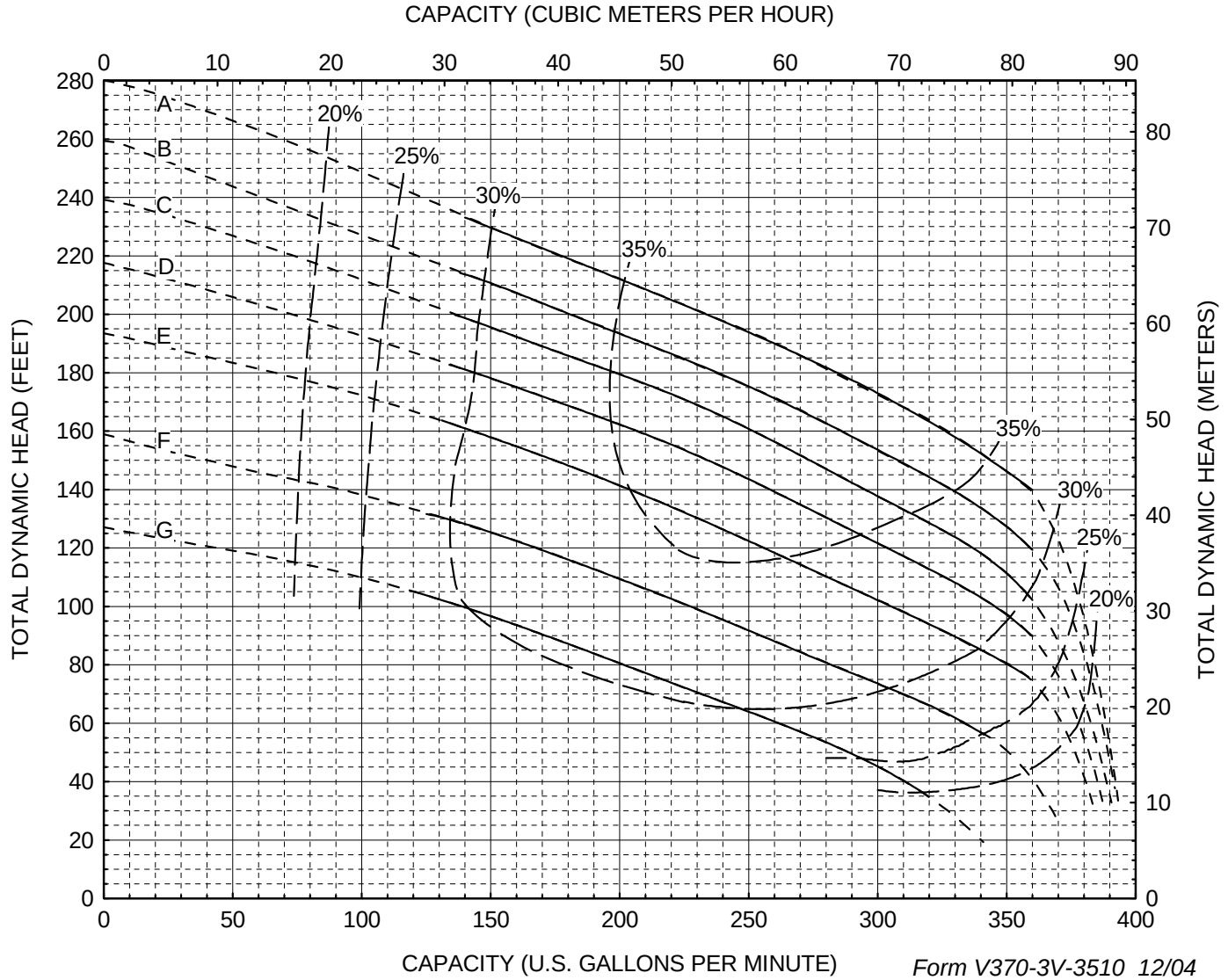
Vaughan E Series Chopper Pump PERFORMANCE CURVE

Models:
HE3V6
PE3V6
SE3V

Back-Pull-Out Casing
3-Blade Impeller
3” Discharge
6” Suction

CURVE	POWER (HP)	SPEED (RPM)	IMPELLER DIAMETER
A	40	3510	8.00” (203 mm)
B	40	3510	7.70” (196 mm)
C	40	3510	7.50” (190 mm)
D	30	3510	7.30” (185 mm)
E	30	3510	7.00” (178 mm)
F	25	3510	6.50” (165 mm)
G	20	3510	6.00” (152 mm)

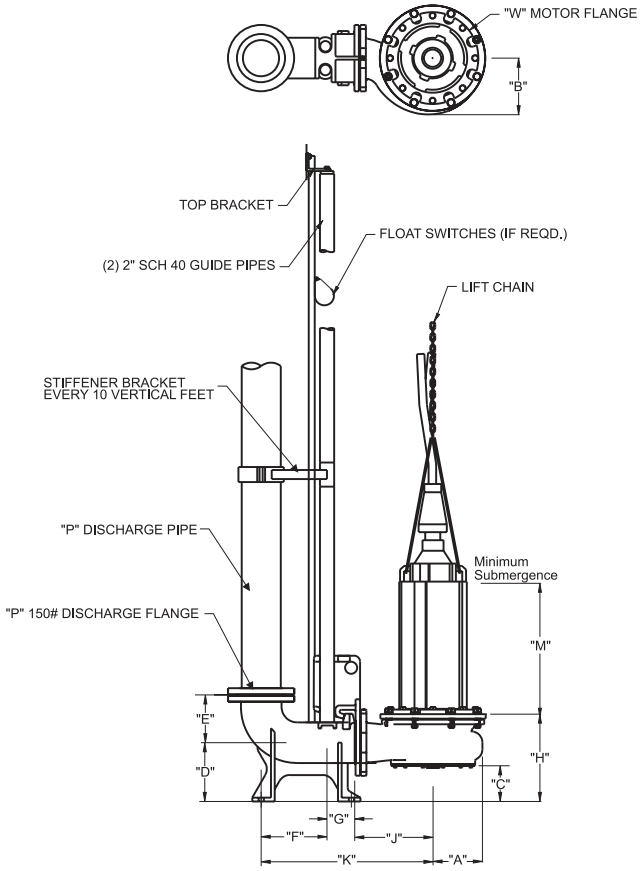
DO NOT OPERATE PUMP IN DOTTED PORTION OF CURVES. CURVES SUBJECT TO CHANGE WITHOUT NOTICE. EFFICIENCIES SHOWN ARE NOMINAL BOWL. GUARANTIED MINIMUM EFFICIENCIES PER H.I. LEVEL B.



3” - 6” E-Series Submersible Chopper Pumps

Materials of Construction:

Impeller/Upper Cutter/
Cutter Nut: ..... Cast Steel, heat treated to minimum Rockwell C 60.
Cutter Bar: ..... Plate Steel, heat treated to minimum 60 Rockwell C Hardness.
Casing/Back Pull-Out Plate/
Guide Bracket/Elbow: ..... Ductile Cast Iron.
Mechanical Seal: ..... Silicon carbide or tungsten carbide.
Flange: ..... 150 lb. ANSI rated.
Paint: ..... Stainless Epoxy.



DRAWINGS AND DIMENSIONS SUBJECT TO CHANGE WITHOUT NOTICE.
DO NOT USE FOR CONSTRUCTION PURPOSES.
CONTACT VAUGHAN FOR CERTIFIED CONSTRUCTION PRINTS.

MODEL	A	B	C	D	E	F	G	H	J	K	P
SE3F / SE3G	5	6 3/8	4 7/8	7 7/8	7 7/8	9 7/16	4 9/16	11 5/8	8 5/8	22 ¾	3
SE3L / SE3M	5 ½	6 3/8	5 7/8	7 7/8	7 7/8	9 7/16	4 9/16	10 7/8	9 5/8	23 ¾	3
SE3V / SE3W	5 1/8	6 3/8	5 11/16	7 7/8	7 7/8	9 7/16	4 9/16	10 7/8	9 5/8	23 ¾	3
SE4K / SE4L	6 5/8	7 5/8	4 ½	7 7/8	7 7/8	9 13/16	4 9/16	11 5/16	10 ½	24 7/8	4
SE4P / SE4R	8	9 ¼	4 5/8	7 7/8	7 7/8	9 13/16	4 9/16	12	12 ½	26 7/8	4
SE6U	8 ¼	9 5/8	6 1/8	9 7/8	7 7/8	11	4 9/16	14 5/8	13 ¼	28 13/16	6

15 MINUTE IN-AIR FRAME SIZES ONLY

HP	SPEED	FRAME SIZE	M	W	HP	SPEED	FRAME SIZE	M	W
5	1170	180TY	17 ¼	12 3/8	25	1170	250TY	25 1/8	17
5	1750				25	1750			
7.5	1750				25	3510			
7.5	1170	210TY	21 7/8	15 ¼	30	1750			
10	1170				30	3510			
10	1750				40	1750			
15	1750				40	3510			
15	3510				30	1170	320TY	25 ½	18 ¾
20	1750				50	1750			
20	3510				60	1750			
15	1170	250TY	25 1/8	17	75	1750			
20	1170								

FRAME	FITS PUMP MODELS
180TY	ALL 3” - 6” PUMPS
210TY	ALL 3” - 6” PUMPS
250TY	ALL 3” - 6” PUMPS
320TY	3V/3W/4K/4L/4P/4R/6U

Vaughan Co., Inc.
364 Monte Elma Road
Montesano, WA 98563
Phone: 360-249-4042, FAX: 360-249-6155
e-mail: info@chopperpumps.com

Part 2
Initial Study and Ne ative Declaration

TABLE OF CONTENTS

LIST OF FIGURES

TABLE OF CONTENTS

(Continued)

APPENDI

1.0 PROJECT DESCRIPTION

1.1 Existing Conditions

The unincorporated community of South Fork is located in Madera County, California approximately 50 miles northeast of Fresno, California in the Sierra Nevada foothills as shown in Figure 1. South Fork lies within Madera County Maintenance District 8 (MCMD8) as shown on Figure 2. South Fork community currently relies on individual septic tanks for wastewater disposal, with the exception of a single private wastewater system that serves the North Fork Mill Housing Facility, which is a residential neighborhood of approximately 24 residences. The North Fork Mill Housing Facility private wastewater system is subject to Waste Discharge Requirements Order No. 90-051, and Cleanup and Abatement Order No. 99-729, as issued by the Regional Water Quality Control Board (RWQCB). It has a long history of chronic non-compliance with RWQCB regulations, dating from 1986.

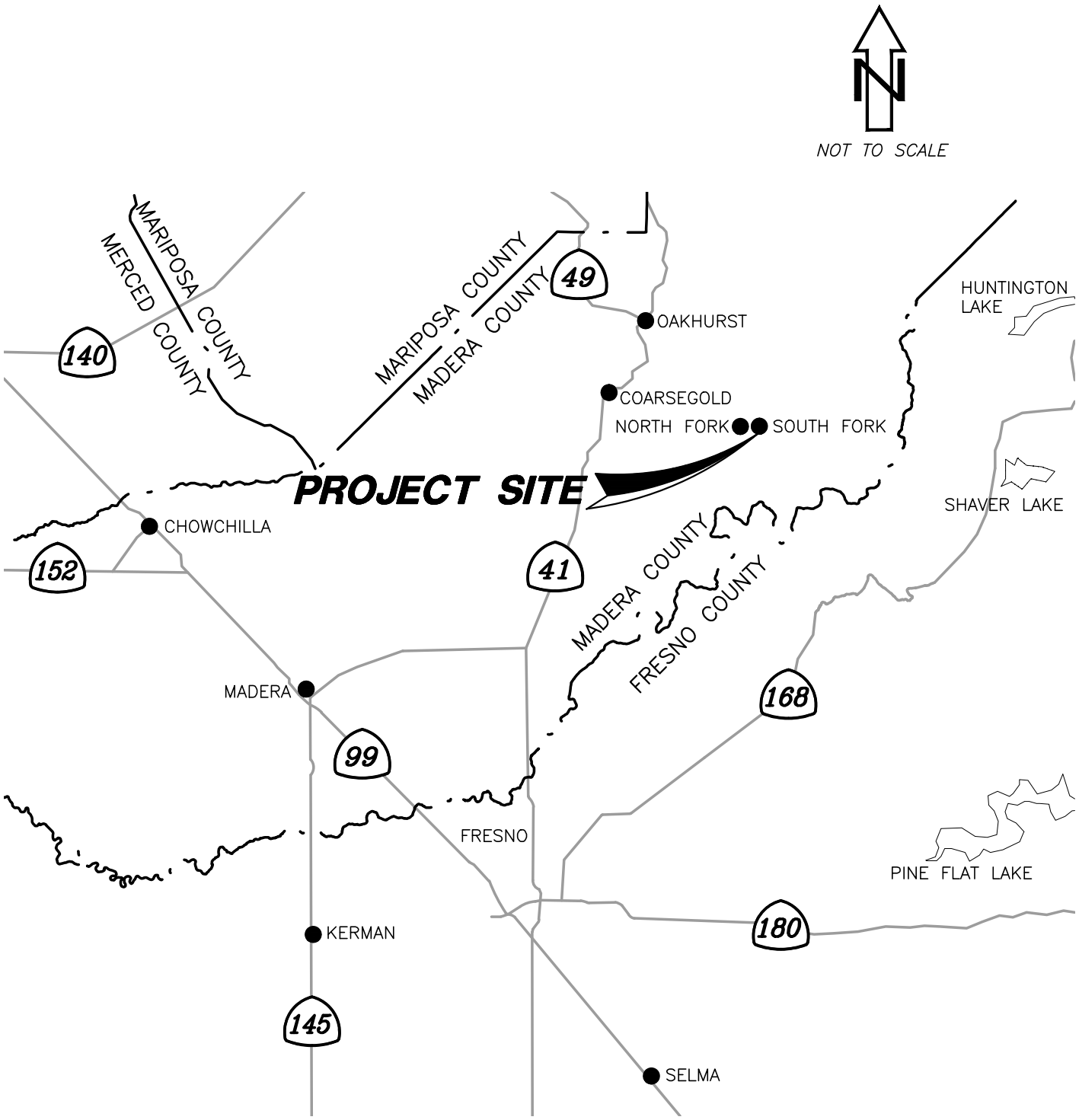
In official actions related to the North Fork Mill Housing Facility private wastewater system, the Madera County Board of Supervisors on November 14, 2006 adopted Resolution No. 2006-234, "*A Resolution Proclaiming Existence of a Public Health Hazard; Use of New Sewage Disposal Systems; Prohibiting New Septic Tanks in the Health Hazard Area; Granting Final Authority Regarding Exemptions to Regional Water Quality Control Board.*" Subsequently, on January 25, 2007, the RWQCB adopted Resolution No. R5-2007-0007, "*Approving and Accepting the County of Madera's Proclamation of the Existence of a Public Health Hazard and Time Schedule for Compliance for the North Fork Mill Housing Facility, Madera County*." This resolution effectively halts any new construction in the community of South Fork until the health hazard is mitigated.

The County desires to plan, design and construct a wastewater collection and conveyance system for the South Fork community to allow many of the existing septic tanks and the failing North Fork Mill Housing Facility private wastewater system to be taken out of service. The system is expected to consist of a gravity wastewater collection system, a wastewater pump station, and a sewer force main. The gravity wastewater collection system would convey wastewater from the properties served to the pump station, where it would be pumped via the force main to another gravity wastewater collection system and then discharge to the existing wastewater treatment system for the community of North Fork, Madera County Maintenance District 8A (MCMD8A). Wastewater from South Fork would be treated and disposed of along with wastewater from North Fork. There is no infiltration/inflow because South Fork does not have an existing sewer collection system. The proposed sewer system for South Fork will be new construction designed to prevent infiltration/inflow.

1.2 Existing Facilities

1.2.1 South Fork Wastewater Facilities

Wastewater generated by the North Fork Mill Housing Facility private wastewater system is discharged to multiple septic tanks and three concrete settling tanks. Effluent from the septic and settling tanks is then conveyed to a sump tank and periodically pumped one-quarter mile to four evaporation/percolation ponds. A leach field is located just south of the settling tanks and receives wastewater overflows only during emergencies. The North Fork Mill Housing Facility private wastewater system's treatment can be categorized as primary treatment with settling. Those residences and businesses that rely on individual septic tanks include 15 mobile homes, three apartments, 12 single family dwellings, the mill site, a bed and breakfast, a rest home, a motel and commercial buildings.



Blair, Church & Flynn
CONSULTING ENGINEERS

CONSULTANT

Blair, Church & Flynn
Consulting Engineers
461 Clovis Avenue,
Suite 200
Clovis, California 93612
Tel (559) 326-1400
Fax (559) 326-1500

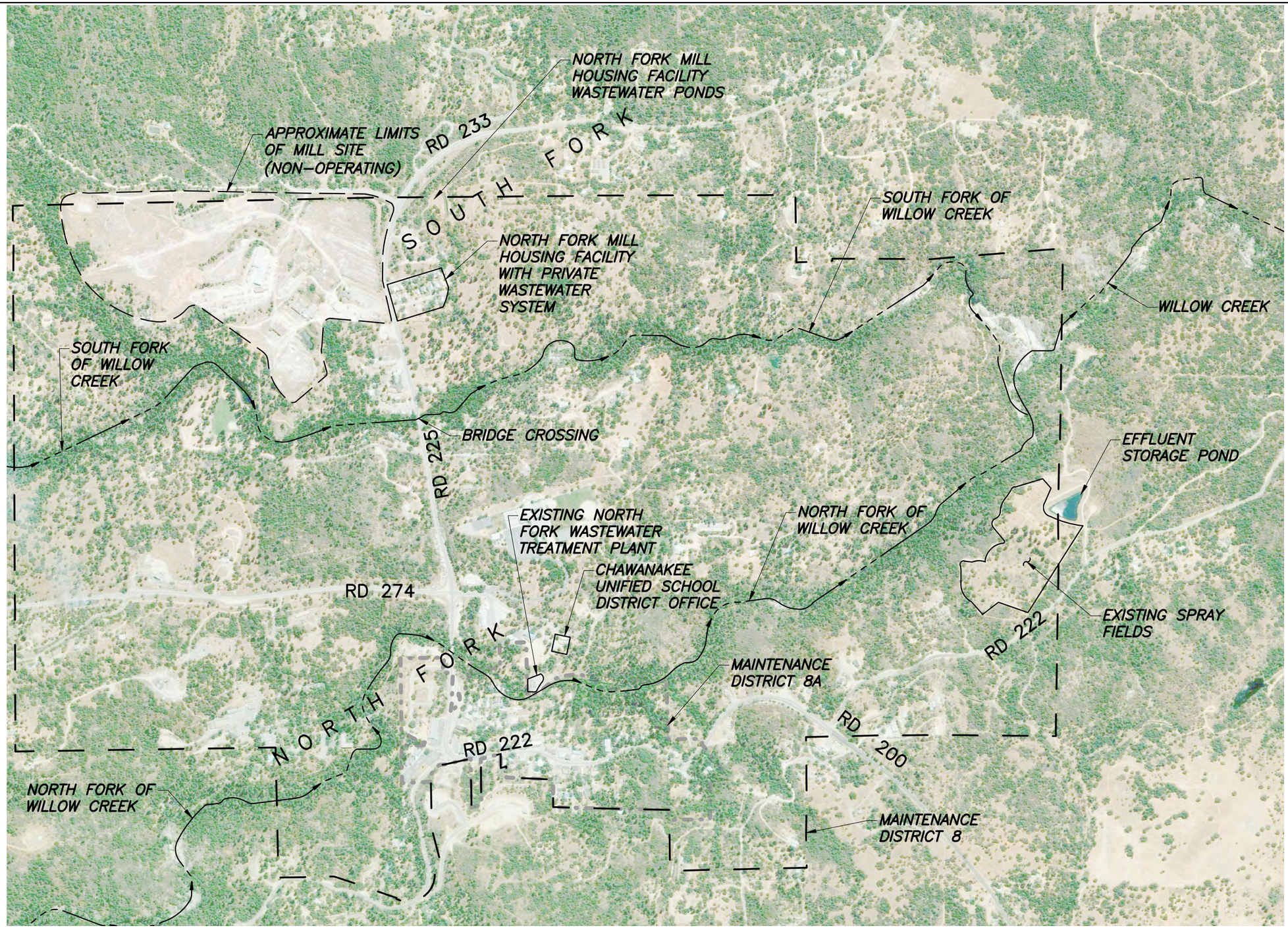
COUNTY OF MADERA

SOUTH FORK
INITIAL STUDY
FIGURE 1 – VICINITY MAP

DR. BY JCA
CH. BY LMG
DATE 06-16-10
SCALE: AS NOTED

SHEET NO. 2
OF 15 SHEETS

Drawing: P:\208-0414\dwg-site\dwg\208414_FIG_1_Initial Study.dwg; Layout1 – BCF.ctb Plot by: francisco Jun 16, 2010 – 10:41am



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COUNTY OF MADERA

SOUTH FORK
INITIAL STUDY
FIGURE 2 – LOCATION MAP

DR. BY JCA
CH. BY LMG
DATE 06-16-10
SCALE: AS NOTED

SHEET NO. 3
OF 15 SHEETS

Drawing: P:\208-0414\dwg-site\dwg\208414_FIG_2B_Initial Study.dwg; Layout 1 Plot by: francisco Jun 16, 2010 - 10:40am

The North Fork Mill Housing Facility private wastewater system serves a residential neighborhood of approximately 24 residential structures occupied by low-income residents. The private wastewater system is subject to Waste Discharge Requirements Order No. 90-051, and Cleanup and Abatement Order No. 99-729, as issued by the RWQCB. A Facility Inspection Report dated February 7, 2005 from the Central Valley RWQCB details severe violations of the WDR Orders by the North Fork Mill Housing Facility private wastewater system such as raw sewage spilling from the settling tanks and wastewater entering into a seasonal drainage which flows to the South Fork of Willow Creek.

1.2.2 North Fork Wastewater Facilities

The WWTP has a capacity of 60,000 gallons per day (gpd), and the existing effluent disposal spray field facility (spray field) is permitted for 38,000 gpd as mandated by Waste Discharge Requirements Order No. 94-353. North Fork's WWTP is in excellent operational condition and is monitored routinely by County personnel.

1.3 Wastewater Flows for North Fork and South Fork

1.3.1 Existing South Fork Flow Estimates

A report entitled, *"Madera County Maintenance District 8A, Wastewater Treatment and Disposal Systems, Preliminary Engineering Report,"* dated April 1999 (1999 Report) by Provost & Pritchard Engineering Group estimates the South Fork existing flows at 15,875 gpd. Another report entitled *"Preliminary Engineering Report Wastewater Upgrade,"* dated December 2003 (2003 Report) by Wallace Swanson International estimates the South Fork existing flows at 12,700 gpd. The 1999 Report used a 250 gallon per unit (gal/unit) flow factor and the 2003 Report used 200 gal/unit flow factor. Both reports used the same EDU's for the calculations. The difference in flow factor is the reason for the difference between the existing flow estimates from the 1999 and 2003 Reports. It appears that little to no change in the EDU count has occurred in South Fork between 1999 and 2010.

1.3.2 Existing North Fork Flow Estimates

The 1999 and 2003 Reports estimate the North Fork existing wastewater flows at 31,550 gpd and 31,012 gpd, respectively. Although the reports differed in the EDU's and flow factors, their total existing flow calculations resulted in nearly the same total quantity. The County provided BCF with 2008 – 2009 wastewater flow data from the North Fork WWTP. The recorded wastewater flow data has an overall average daily flow of 17,611 gpd.

1.4 Proposed Improvements

The planned improvements to the South Fork Community include the following:

- 8-inch gravity sewer collection system with connection to existing South Fork users.
- Pump station with submersible wastewater pumps.
- 4-inch sewer force main.

The size of the sewer collection system, pump station and force main were all based on a 40-year build out projection for South Fork. The County intends to minimize excavation within the existing pavement area to the greatest extent possible. Therefore, the gravity sewer main and sewer force main will be designed to be outside the pavement limits in Road 225 but still within existing right-of-way, streets, private drives, parking areas and other ruderal areas. A bore and jack of the gravity sewer system will be utilized to limit trench resurfacing for street crossings across Road 225. Construction in Road 228 will be by open cut methods and will require resurfacing. Funding for this project will be through a grant.

This project will allow South Fork to eliminate existing septic tanks and leach fields and the North Fork Mill Housing Facility private wastewater system, which have been under many violations from the RWQCB. Any sewage overflowing from the existing sewage collection system which discharges into seasonal drainages or to the South Fork of Willow Creek will be eliminated by the project.

The proposed South Fork Wastewater Collection System will be compatible with the resolutions adopted by the County and the RWQCB. It will also be designed to accommodate wastewater flows generated by planned development in conformance with the Madera County General Plan and the North Fork Area Plan.

1.4.1 Gravity Sewer Collection System

The proposed gravity sewer collection system for South Fork is shown on Figures 3 and 4. Wastewater will be collected from residential and commercial properties including, but not limited to, the North Fork Mill Housing Facility residential neighborhood, single family homes, a mobile home park, apartment complex, rest home, bed and breakfast, motel and the future North Fork Fire Station. The wastewater collection system is sized for a projected 40-year build out condition and will consist of 8-inch sewer mains with smaller sewer service laterals. All construction will be in accordance with the County of Madera Standard Drawings and Specifications. The gravity sewer system will generally flow west on Road 225 to a sewer pump station located immediately east of the South Fork of Willow Creek

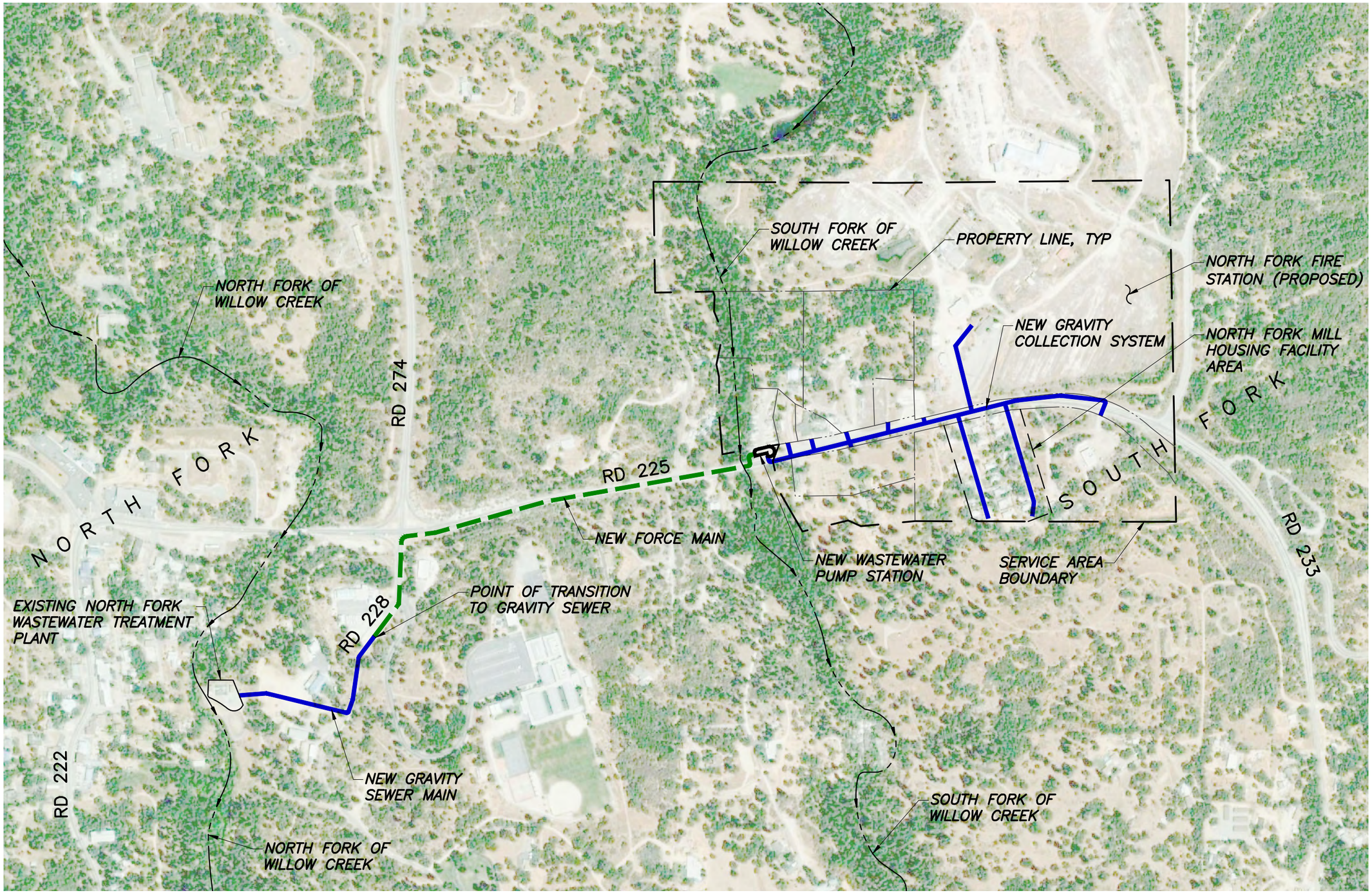
Construction of the gravity sewer collection system will generally include the excavation of a trench to the depth and width necessary to install the gravity sewer to the design slope and provide compaction. Spoil piles will be placed along the trench and will be covered. Lateral connections will be installed using prefabricated fittings. The trench will be backfilled and moisture conditioned and compacted in conformance with County standards and permanent asphalt concrete resurfacing will be placed to appropriate structural thickness. Typical construction equipment will include but not limited to an excavator, loader, paver and pneumatic roller.

1.4.2 Pump Selection and Force Main Size

The sewer pump station will pump approximately 2,500 linear feet to the west where it will discharge into a sewer manhole. From this manhole, a gravity system will be installed which continues south on Road 228. The gravity system will continue south, adjacent to Chawanakee Unified School District Offices, and will cross the School District's property and finally discharge into the existing North Fork WWTP headworks structure. Coordination between the County and the School District will be required to secure an easement for the proposed sewer line.

In order to cross the South Fork of Willow Creek, the sewer force main will need to be anchored to the Willow Creek Bridge. Special design consideration will be required for pipeline materials, anchorage of the force main to the bridge structure and a transition from the buried force main system to the bridge.

For the 40-year build out condition of South Fork, the estimated average day and peak hour flow from South Fork into the sewer pump station are 18 gpm and 74 gpm, respectively. In order to help eliminate clogging in the force main and facilitate cleaning, a 4 inch force main will be installed. This size of force main will maintain a flow velocity of no less than 3.5 feet per second to help ensure that settled solids can be re-suspended at a minimum design pump flow rate of 140 gpm. Although a pump with a solids grinder option could have been selected which would have allowed for a smaller force main, they are not as efficient and require more maintenance.



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SCALE: 1"=500'±

LEGEND:

SOUTH FORK SERVICE AREA BOUNDARY

PROPERTY LINE

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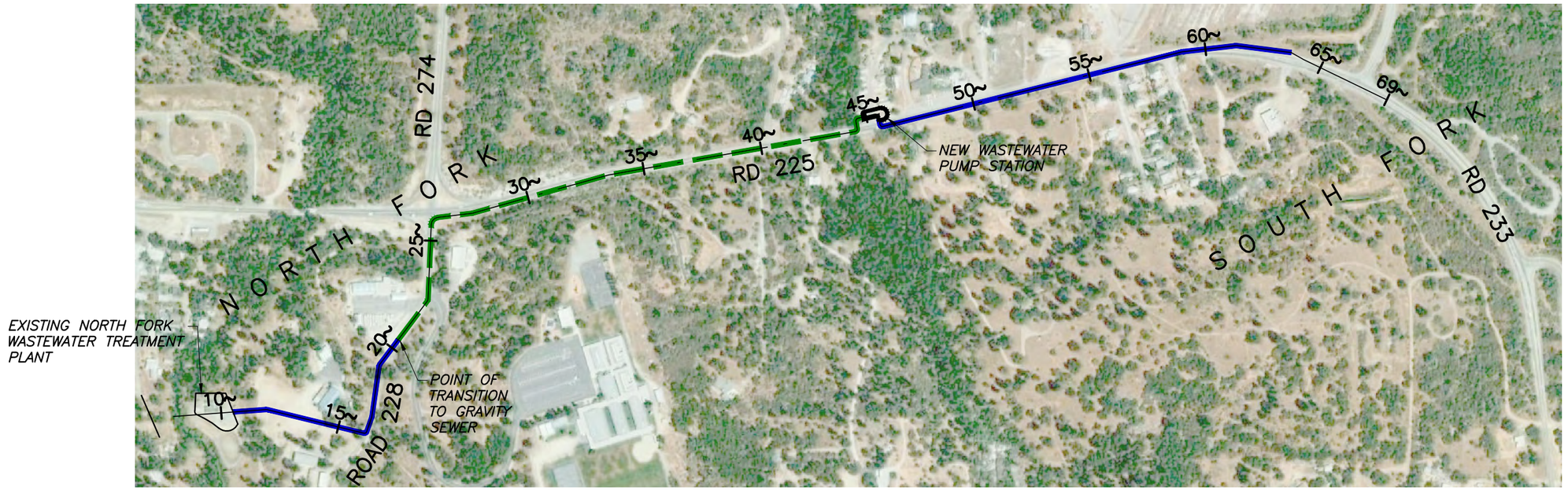
COUNTY OF MADERA

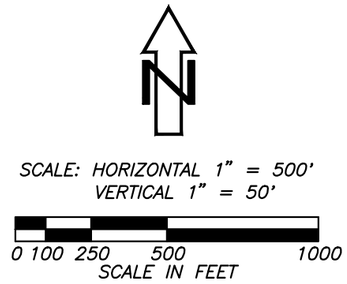
SOUTH FORK
INITIAL STUDY
FIGURE 3 – CONCEPTUAL SEWER PLAN

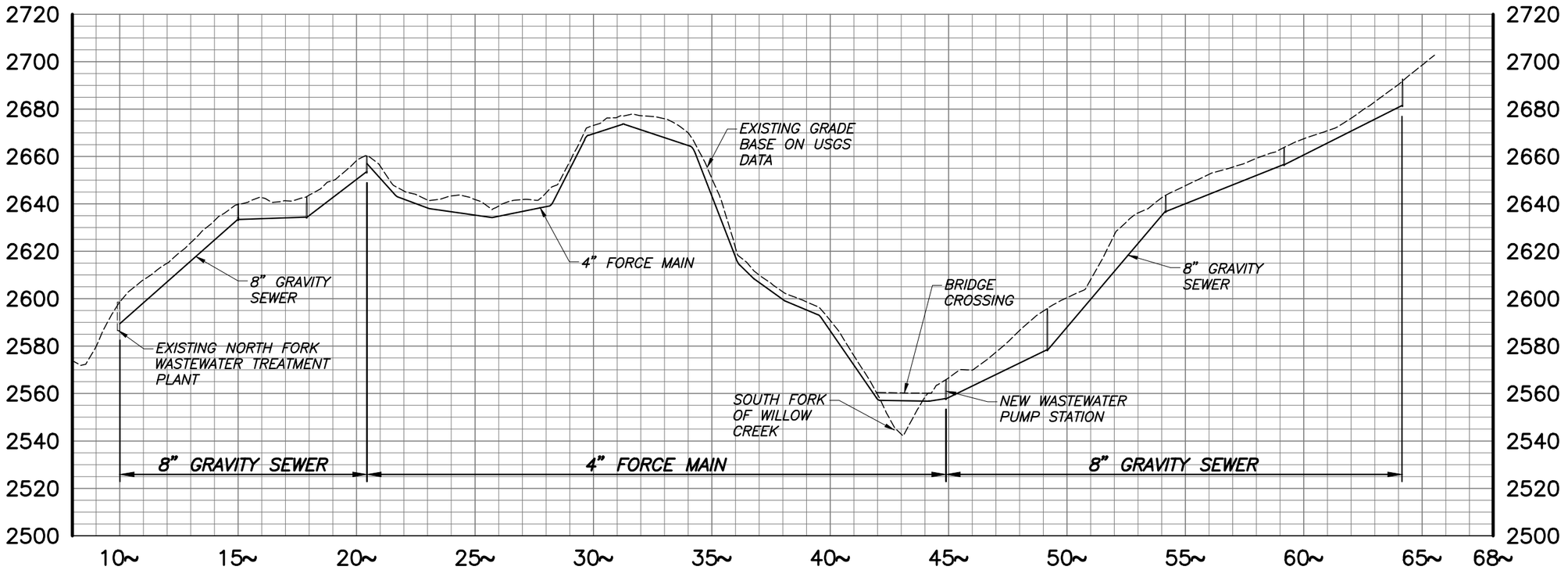
DR. BY JCA
CH. BY FVM
DATE 06-16-10
SCALE: AS NOTED

SHEET NO. 6
OF 15 SHEETS

Drawing: P:\208-0414\dwg-site\dwg\208414_FIG_3_Initial Study.dwg; Layout 1 Plot by: francisco Jun 16, 2010 - 10:39am







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COUNTY OF MADERA

SOUTH FORK
INITIAL STUDY
FIGURE 4 – CONCEPTUAL PLAN AND PROFILE

DR. BY JCA
CH. BY LMG
DATE 06-16-10
SCALE: AS NOTED

SHEET NO. 7
OF 15 SHEETS

Drawing: P:\208-0414\dwg-site\dwg\208414_FIG_4_Initial Study.dwg; Layout1 Plot by: francisco Jun 16, 2010 - 10:41am

A duplex submersible wastewater pump station will consist of two 30-horsepower submersible pumps, a concrete wet well, standard electrical and telemetry equipment, odor control equipment and provisions for connection to a portable generator. An automatic make-up water system may be added to the pump station to help flush the wet well and cycle the pumps during times of low flow

The installation of two submersible pumps provides for redundancy in the event one pump breaks down. The telemetry equipment will provide County personnel with real time information regarding the pump station. An alarm will trigger if wastewater backs up inside the wet well to a predetermined set point. The telemetry equipment would send a signal to the appropriate County employee notifying them of a problem with the system.

Construction of the pump station will generally include the excavation of a pit large enough for construction of a cast-in-place concrete wet well or installation of a pre-cast wet well. Force main installation will include the excavation of a trench to the design depth and width. Spoil piles will be placed along the trench and will be covered. Both the trench and wet well will be backfilled and moisture condition and compacted in conformance with County standards and permanent asphalt concrete resurfacing will be placed to appropriate structural thickness. Typical construction equipment will include but not limited to an excavator, loader, paver and pneumatic roller.

1.4.3 North Fork WWTP Operation

Since the County has no set policy for determining peaking factors, a design peaking factor was determined from a comparison with public works policies from other jurisdictional authorities within the Central Valley and accepted technical publications relating to the design of sewer systems.

Information contained within the City of Fresno's Memorandum for Sanitary Sewer Force Mains and Lift Stations designates the minimum peaking factor for sewer lift stations to be 2.5, or higher if determined by the Director. The Sewer System Design Standards of the County of San Benito (located to the west of Madera County) sets the peaking factor for sewer pipelines with an average daily flow less than 45 gallons per minute (gpm) at 3.3. An investigation of technical information relating to the estimation of peak sewer flows in "Wastewater Engineering", by Metcalf and Eddy, calculates a peaking factor of 5.0 for sewer pipelines with a tributary population less than 1,000. Based on the above mentioned information, a peaking factor of 4.0 was selected for design purposes.

The North Fork WWTP's current treatment capacity is 60,000 gpd. Once the South Fork wastewater collection system is fully operational, the expected average daily wastewater flows into the North Fork WWTP will be as high 33,486 gpd based on calculated average daily flow or as low as 26,472 gpd based on adjusted average daily flow. Using a peaking factor of 4.0 as mentioned above, the projected peak hour flow is estimated at 133,944 gpd based on calculated average daily flow and 105,888 gpd based on adjusted average daily flow.

2.0 ENVIRONMENTAL SETTING

2.1 Relationship to Existing Planning Documents

The North Fork/South Fork Community Center Area Plan dated November 25, 2003 as prepared by Quad Knopf is the most recent planning document available for the North Fork/South Fork area. The report includes information relative to transportation and circulation, recreation and cultural resources, agricultural and natural resources and health and safety. The proposed project will not conflict with the goals and polices outlined in the Quad Knopf report.

2.2 Local Topography

South Fork is located at an elevation of approximate 2,600 feet above mean sea level in the Sierra Nevada Foothills. Major topographical features include Mammoth Pool Reservoir to the northeast and Bass Lake to the north. The slopes throughout the project area range from zero to 13 percent. The proposed project will not affect the existing topographic features or change any of the existing slopes.

2.3 Land Use and Zoning

Residential, commercial, institutional and industrial are the main land uses throughout the project site. The project will not affect the existing land use or zoning designations.

2.4 Local Geology

The nearest seismic fault is Long Valley Caldera ring fault located approximately 37 miles to the northeast of the project site on the eastern side of the Sierra Nevada Mountain range. The potential for erosion will be minimal because the project will lie within existing right-of-way, streets, private drives, parking areas and other ruderal areas. Best management practices (BMPs) will be in place to ensure excavated material and cut sections within the project are protected from erosion potential.

2.5 Climate

The local climate is characterized by hot, dry summers and cool, wet winters. During the summer months from mid-April to mid-October, precipitation is unlikely. During the winter month, the project area averages approximately 34 inches of rainfall per year.

2.6 Air Quality

The project is located in the San Joaquin Valley Air Basin. This basin is bounded by the Sierra Nevada Mountain range on the east, the Coastal Ranges to the west, the Tehachapi mountains to the south and the northern boundary of San Joaquin County to the north. The counties of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and a portion of Kern County comprise the San Joaquin Valley Air Basin.

2.7 Major Botanical Features

A full list of vascular plants of the study area is listed in the report prepared by Live Oak Associates which is appended to this initial study.

2.8 Important Fish and Wildlife Species

A full list of important terrestrial vertebrate and special status species that could occur in the vicinity of the project are listed in the report prepared by Live Oak Associates which is appended to this initial study.

2.9 Threatened or Endangered Species

Live Oak Associates has identified the Valley Long Horned Elderberry Beetle, which is listed as an endangered species by the US Fish and Wildlife Service. A full list of threatened or endangered species is listed in the report prepared by Live Oak Associates which is appended to this initial study.

2.10 Critical Habitats as listed by the US Fish and Wildlife Service

Live Oak Associates has identified the locations of Elderberry bushes within the vicinity of the project. Refer to the report prepared by Live Oak Associates which is appended to this initial study. Elderberries are habitats for the Valley Long Horned Elderberry Beetle, which is listed as an endangered species by the US Fish and Wildlife Service.

2.11 Wetlands

There are no wetlands within the project site as designated in the National Wetlands Inventory from the US Fish and Wildlife Service.

2.12 Designated Wild and Scenic Rivers

There are no designated wild or scenic rivers as designated by the National Wild and Scenic River System in the vicinity of the project.

2.13 Water Resources

2.13.1 Surface Water Features

The only surface water feature within the project site is the South Fork of Willow Creek. No lakes, estuaries, oceans or lagoons are located in the vicinity of the project.

2.13.2 Groundwater Resources

The project area is recognized as non-groundwater basin by the State of California Department of Water Resources. Groundwater depths, quantity, and quality are not well known in the South Fork area. This is primarily due to the fact that the watershed's geological condition consists primarily of fractured rock and not alluvial deposits. The quantity and quality of the water can vary from location to location because the groundwater is found primarily in fissures in the rock that are not well connected and not in a general groundwater pool such as is found in the alluvial deposits of the valley areas. In addition, most of the wells are private wells which are not required to report use or test the quality of the groundwater. No overall programs have been developed to determine the baseline quantity or quality of the groundwater in this area. The lack of baseline information hampers the ability to track changes in the groundwater levels, quantity, and quality over time.

2.13.3 Receiving Water Quality

The south fork of Willow Creek is listed by the Regional Water Quality Control Board, Region 5 – Central Valley Region as a 303(d) water body due to temperature pollution. Evidence points to in stream temperatures that exceed 21° C, which impair the beneficial use of the stream for cold water fisheries. The stream is not listed as having other impairments, therefore, it is assumed that the water quality is otherwise acceptable.

Water quantity is regulated by the release requirements for the stream by the Federal Energy Regulation Commission for fish habitat and mitigation of temperature pollution.

This project will eliminate sewage discharges as a result of septic tank overflows to the South Fork of Willow Creek. There may be some temporary discharges of stormwater from the construction activities associated with the project. The quality of the stormwater discharges from the construction activity will be controlled by the Best Management Practices required by the General Construction Permit.

2.13.4 Water Supplies

Water supplies in eastern Madera County are mainly through private wells. Businesses and residences in the vicinity of the project rely on wells for their water supply.

2.14 Agricultural Land

There is some designated agricultural land use and zoning located in the vicinity of the project, primarily south of North Fork. No agricultural land use is located adjacent to the project.

2.15 Cultural Resources

The North Fork Mono Indian tribe historically inhabited what is now the North Fork/O'Neals area. The North Fork Rancheria was contacted to inquire about the possibility of cultural resources. A walking survey of the project site was performed by the North Fork Rancheria and they indicate that no cultural resources are in the vicinity of the project.

2.16 Coastal Zone Jurisdiction

The project site lies in the Sierra Nevada foothills and is approximately 160 miles from the Pacific Ocean. The project does not fall within the jurisdiction of the Coastal Zone Management Act.

2.17 Delineated Floodplain

The Federal Emergency Management Agency Flood Insurance Rate Map for Madera County (Map Number 06039C0750E, dated September 26, 2008) shows the project area as Special Flood Hazard Area D, areas of possible, but undetermined flood hazard. The lack of a designated floodplain for the South Fork of Willow Creek indicates that there is a high probability that flooding has not occurred in this area due to the creek. This probability is reinforced by the fact that flows in the creek are intercepted by a Browns Creek Ditch and conveyed to Bass Lake. The gradient of the existing ground and streets will adequately convey local runoff in the project area to Willow Creek, which limits any floodplains caused by local drainage.

The project will be constructed completely outside of the limits of the South Fork of Willow Creek except for that portion which will be constructed on the existing bridge for Road 225 and so will be above the creek and its flood plain.

.0 PRIMARY AND SECONDARY IMPACTS

3.1 Water Quantity

There will be no significant temporary or long term impacts on water quantity by the proposed project. A temporary increase in the quantity of water consumed will result from the construction of the project. The water consumed during the construction of the project will be used to moisture condition backfill materials and as construction water necessary for dust control. Best Management Practices (BMPs) as required by the National Pollution Discharge Elimination System General Construction permit will be adhered to in regard to construction water runoff and use of construction water. The estimated quantity of water that may be used for construction purposes is 50,000 gallons.

3.2 Water Quality

There will be no temporary significant impacts on surface water or groundwater quality by the proposed project. Discharges of stormwater from the construction site will be protected from sources of pollution as required by the General Construction Permit for Stormwater Discharges from Construction Sites by the implementation and monitoring of BMPs. Cut over from the existing septic tank and North Fork Mill Housing Facility treatment facility will not be accomplished until all of the downstream sewer mains and pump station are fully operational to ensure that effluent is directed to the treatment facility and does not spill.

There will be no long term significant negative impacts on surface water or groundwater as a result of the project. The project will eliminate the discharge of effluent from septic tanks to the groundwater and the potential spills from the North Fork Mill House Facility treatment facility.

3.3 Air Quality

There will be a less than significant impact on air quality by the proposed project. Excavation and other construction activities may result in a temporary increase in particulate matter due to the disturbance of dust and exhaust from construction equipment. Disturbed areas that are not actively being used for construction as well as excavation spoil piles will have BMPs in place to ensure proper dust control. The project specifications will require a dust control plan in conformance with the San Joaquin Valley Air Pollution Control District requirements. All construction equipment will be in good operating condition. Any piece of construction equipment not in good operating condition will be removed from the project site.

3.4 Geology

There will be no significant impact on geology by the proposed project. All work proposed by the project will take place in existing right-of-way, streets, private drives, parking areas and other ruderal areas. There will not be a significant impact on slope stability by the proposed project. The nearest seismic fault is the Long Valley Caldera ring fault located approximately 37 miles to the northeast of the project site on the eastern side of the Sierra Nevada Mountain range. The potential for seismic activity during construction is minimal and will not have a significant impact on the project.

3.5 Soils

There will be a less than significant temporary and long term impacts on the soils by the proposed project. An erosion control plan will be developed prior to and followed during construction to stabilize disturbed surface soils during and following construction. Soil compaction will be specified in the construction documents and a geotechnical engineering firm will verify soil compaction. At the completion of construction, all disturbed surface soils will either be covered with pavement or stabilized in accordance with the erosion control plan.

The potential for soil contamination will be less than significant. BMPs will be in place for storage of construction materials, liquids and wastes to ensure that leaks are detected and immediately cleaned up. The pump station wet well will be sealed to prevent leakage of effluent into the ground.

3.6 Vegetation

There will be no significant impact on existing vegetation by the proposed project. All work proposed by the project will take place in existing right-of-way, streets, private drives, parking areas and other ruderal areas except near the wastewater treatment plant. Refer to the report prepared by Live Oak Associates which is appended to this initial study. Should any vegetation be disturbed in the course of the project, the project specifications will include provisions for the restoration of vegetation.

3.7 Fish and Wildlife

There will be a less than significant impact on fish and wildlife by the proposed project. There will be an increase in noise due to construction activities but will be limited to the normal construction working hours. Construction will also be limited to the non nesting months for bats, raptors and swallows within the vicinity of the project. Refer to the report prepared by Live Oak Associates which is appended to this initial study. No loss in fish or wildlife habitat will occur because of the proposed project.

3.8 Aesthetics

There will be no significant long term impact on the local aesthetics by the proposed project. The sewer force main, gravity sewer and sewer pump station will be installed underground and will not result in adverse impacts to the scenic vista, nor will it degrade the existing character of the project site. The

portion of the sewer force main that will be attached to the South Fork Willow Creek Bridge will be painted so that it blends in with the existing color of the bridge.

3.9 Noise

There will be no significant long term impact on the noise levels by the proposed project. The work involved in the project will not generate long term noise levels in excess of the established standards. Construction activities involved in the proposed improvements may result in a temporary increase in ambient noise levels that could be audible to people living in the vicinity. Construction work will be limited to normal working hours. The proposed pumps will generate little to no audible noise above ground because the pumps will be installed below ground and be submerged.

3.10 Recreation

There will be no significant impact on recreational facilities by the proposed project. There will be no disruption or closure to any recreational facilities as part of the proposed project.

3.11 Open Space

There will be no significant impact on open space by the proposed project. There will be no loss of open space as part of the proposed project.

3.12 Cultural Resources

There will be no significant impact on cultural resources by the proposed project. The project will take place within existing right-of-way, streets, private drives, parking areas and other ruderal areas and excavations will be limited to between five and 12 feet in depth. The North Fork Rancheria was contacted to inquire about the possibility of cultural resources. A walking survey of the project site was performed by the North Fork Rancheria and they indicate that no cultural resources are in the vicinity of the project. In the event unknown cultural resources are discovered, the project specifications will require that construction be halted immediately in that area and within 100 feet of the find until a qualified archaeologist can assess the significance of the find and, if necessary, develop appropriate treatment measures in consultation with the County and other appropriate agencies. The North Fork Rancheria will provide a Cultural Monitor to observe all excavation operations and ensure that any unknown cultural resources encountered during construction are immediately identified.

3.13 Threatened or Endangered Species

There will be a less than significant impact on threatened or endangered species by the proposed project. Live Oak Associates has identified the locations of Elderberry bushes within the vicinity of the project. Refer to the report prepared by Live Oak Associates which is appended to this initial study. Elderberries are habitats for the Valley Long Horned Elderberry Beetle, which is listed as an endangered species by the US Fish and Wildlife Service. Temporary construction fencing, separation and signs will be provided around the Elderberry bushes in accordance with the 1999 *US Fish and Wildlife Service Conservation Guidelines for the Valley Elderberry Longhorn Beetle* to avoid impacting the elderberry bushes. Construction will also be limited to the non nesting months for bats, raptors and swallows within the vicinity of the project.

3.14 Environmentally Sensitive Areas

There will be no significant impact on environmentally sensitive areas by the proposed project. There are no designated environmentally sensitive areas located within the vicinity of the project. Refer to the report prepared by Live Oak Associates which is appended to this initial study.

3.15 Energy

There will be a less than significant impact on energy by the proposed project. All equipment used during construction will be self-propelled diesel or gasoline powered. Post construction energy use will be required by the sewer pump station for operation of pumps and other associated equipment and will be fed through the existing electric utility power grid.

3.16 Transportation/Circulation

There will be a less than significant impact on transportation/circulation by the proposed project. The proposed project will not result in a long term increase in the number of vehicle trips made in the area. Traffic patterns may be altered during construction to allow for installation of sewer pipelines with the use of appropriate traffic controls in conformance with the California Manual on Uniform Traffic Control Devices. Emergency access to all businesses and residences will be maintained at all times during construction. The excavated trench will be backfilled and paved and traffic will continue to flow as it did prior to construction.

3.17 Public Services

There will be no significant impact on public services by the proposed project. All utility companies with services in the area will be notified prior to construction and utilities will be marked prior to excavation by Underground Service Alert. Coordination will be provided with PG&E for connection to the power grid by the sewer pump station. Cal Fire and Madera County Sheriff will also be notified prior to construction of traffic pattern changes and will be updated throughout construction. The Madera County Maintenance District will require their staff to make period visits to the pump station and monitor the gravity sewer system.

3.18 Public Health and Safety

There will be no significant impact to public health and safety by the proposed project. The project will eliminate the public health hazards from the existing septic tanks at the North Fork Mill Housing Facility and will eliminate the need for other businesses and residences to continue using their existing septic system.

3.19 Population and Housing

There will be no significant impact to population or housing by the proposed project. The work force for construction work will be supplied by the contractor awarded the project. Growth inducement is not expected to be a factor because of the proposed project.

3.20 Land Use and Zoning

There will be no significant impact to existing land use or zoning by the proposed project. No new uses of land which may be incompatible with existing land use or zoning will occur as a result of the proposed project.

4.0 ENVIRONMENTAL CHECKLIST AND DETERMINATION

4.1 Environmental Checklist

An environmental checklist has been prepared and is included in the appendix.

4.2 Negative Declaration Determination

As described in the environmental checklist, the proposed project could not have a significant effect on the environment, and a Negative Declaration will be prepared by the County.

APPENDIX

*Appendix revised November 27, 2012 to include response to State Water Resources Control Board questions to Initial Study and Negative Declaration

LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

Biotic Evaluation
South Fork Sewer System Improvement Project

Prepared by:

Live Oak Associates, Inc.

David Hartesveldt, Principal and Senior Biologist
Austin Pearson, Director of Ecological Services
Jeff Gurule, Senior Project Manager, Staff Ecologist
Geoff Cline, Assistant Project Manager, Staff Ecologist

For:

Karl Kienow
Blair, Church & Flynn Consulting Engineers
451 Clovis Avenue, Suite 200
Clovis, CA 93612

June 10, 2010 Project No. 1434-01

EXECUTIVE SUMMARY

The County of Madera proposes to construct a wastewater collection and conveyance system for the South Fork community to allow many of the existing septic tanks and the failing North Fork Mill Housing Facility private wastewater system to be taken out of service. Live Oak Associates, Inc. completed an investigation of the biological resources of the site and evaluated likely impacts to such resources from eventual site development. Impacts from project construction will be limited to a maximum 10-foot buffer on both sides of the sewer lines and surrounding the wastewater pump site. Over the South Fork of Willow Creek the sewer line will be attached to the side of the Bridge, preventing disturbance to the bed or bank of the Creek (i.e. no equipment will enter the creek). Equipment and material staging will occur in existing parking lots and disturbed areas along the alignment including locations such as the North Fork Mill Site and North Fork Wastewater Treatment Plant.

Construction will begin after August 31 and end before January 31, thereby avoiding the raptor and migratory bird nesting seasons, the maternal bat roost season, and the valley elderberry longhorn beetle flight season. Protective measures described in the 1999 *U.S. Fish and Wildlife Service Conservation Guidelines for the Valley Elderberry Longhorn Beetle* will be implemented for the three elderberry shrubs located adjacent to the sewer alignment. An erosion control plan and storm water pollution prevention plan will be prepared by the engineer that incorporates the best management practices appropriate for the project. The plans will be implemented during construction, ensuring that there will be no foreseeable degradation of water quality in seasonal creeks, reservoirs or downstream waters.

Biotic habitats of the site are absent and one land use defined as ruderal occurs on the site. The Ruderal project site consist of roadways, driveways, shoulders of roadways and driveways, dirt parking lot, school yard, as well as a bridge across the South Fork of Willow Creek. Ruderal areas of the type observed on the project site do not provide significant habitat for most native wildlife species.

As designed, impacts from the project to special status plant species, special status wildlife species, riparian habitat and natural communities of special concern, wildlife movement corridors, wildlife nursery sites, fish and wildlife habitat, water quality, and possible Waters of the United States, would be less than significant. Mitigation measures for impacts to biotic resources are not warranted.

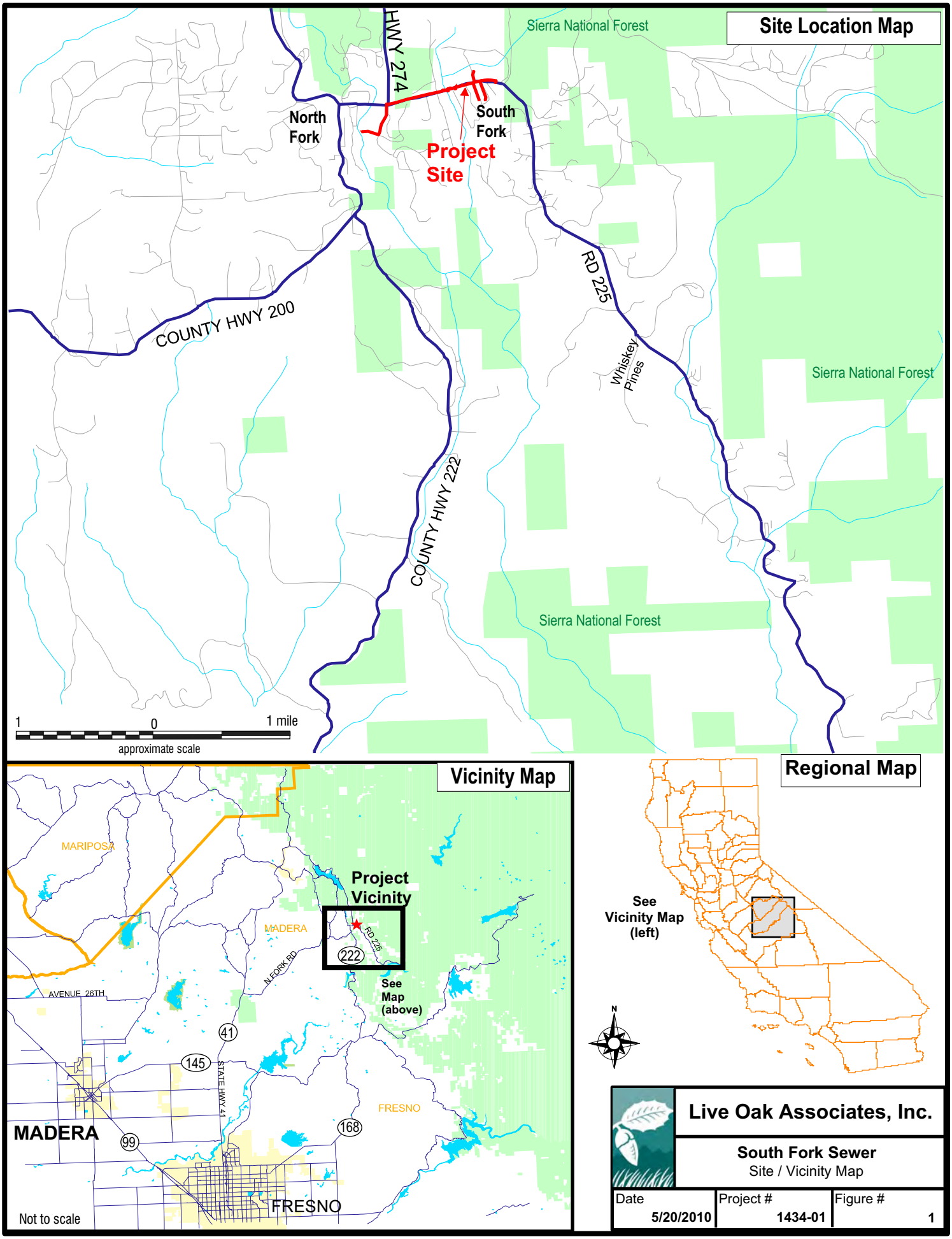
TABLE OF CONTENTS

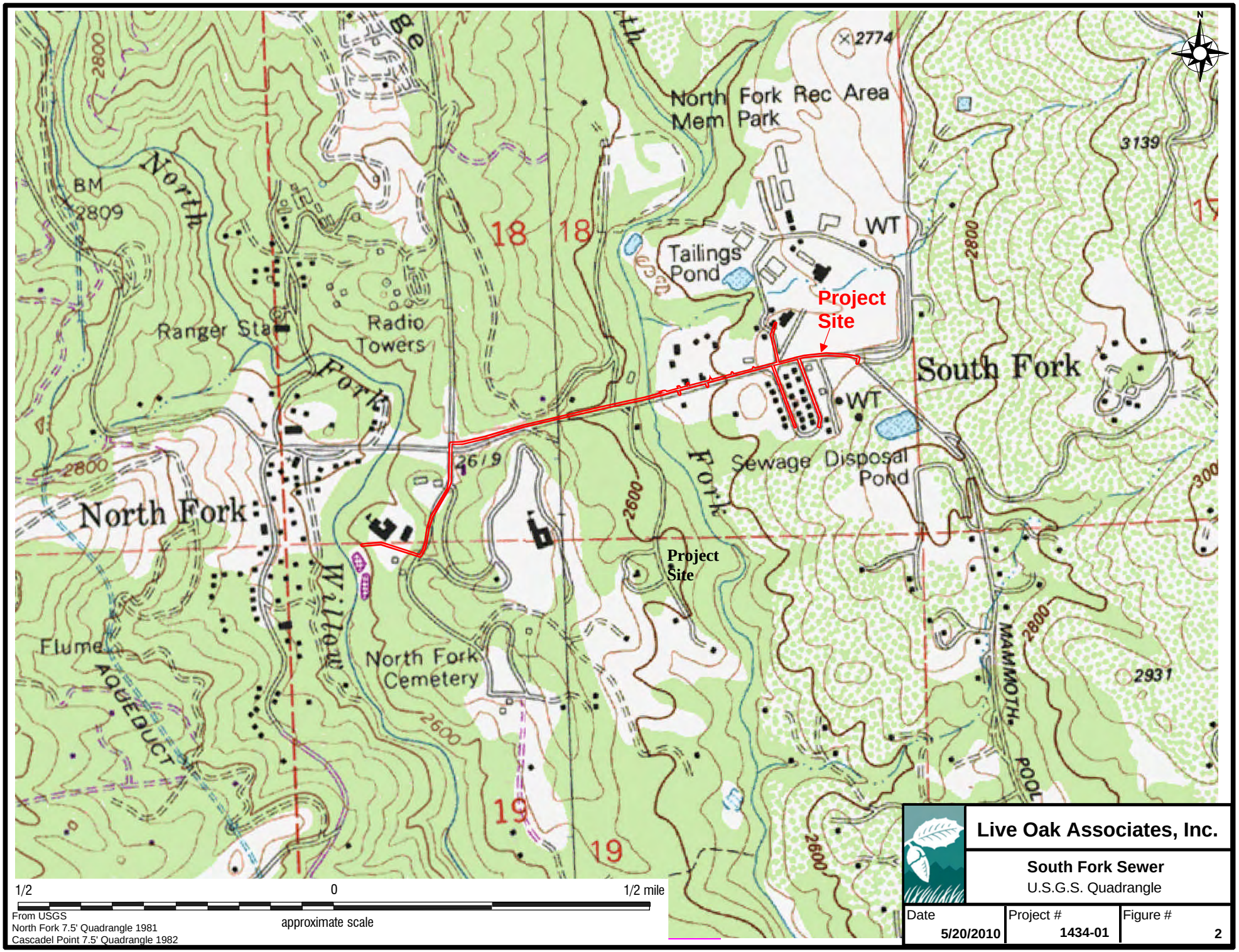
1.0 INTRODUCTION

The technical report that follows describes the biotic resources within the alignment of a proposed sewer pipeline (hereafter referred to as the "project site" or "site") to be constructed by the County of Madera. The study area is located in the unincorporated community of North Fork, California, east of the City of Madera (see Figure 1) east of Highway 41. The primary alignment runs east to west from west of the junction of Douglas Ranger Station Road and Road 225, along Road 225 across the South Fork Willow Creek Bridge, turning south at Road 228 (see Figure 2). The primary alignment then turns west just south of the North Fork Community Center, towards the North Fork Waste Water Treatment Plant. Multiple secondary lines will branch off the primary line with the three longest lines near the North Fork Mill Site, one heading north and two heading south. The site can be found on the North Fork and Cascadel Point, California U.S.G.S quadrangle within Sections 18 and 19, Township 8 South, Range 23 East (Mount Diablo Base Meridian). The site is surrounded by various scattered residences and commercial properties.

1.1 PROJECT DESCRIPTION

The County of Madera proposes to plan, design and construct a wastewater collection and conveyance system for the South Fork community to allow many of the existing septic tanks and the failing North Fork Mill Housing Facility private wastewater system to be taken out of service. The system is expected to consist of a gravity wastewater collection system, a wastewater pump station, and a sewer force main. The gravity wastewater collection system would convey wastewater from the properties served to the pump station, where it would be pumped via the force main to another gravity wastewater collection system and then discharge to the existing wastewater treatment system for the community of North Fork. Wastewater from South Fork would be treated and disposed of along with wastewater from North Fork. This will include the construction of a 4-inch sewer force main line running along the primary alignment with a pump station including submersible wastewater pumps and a 8-inch gravity sewer collection system with connection to existing South Fork users.


Site Location Map
HWY 274
North Fork
South Fork
Project Site
Sierra National Forest
COUNTY HWY 200
RD 225
Whiskey Pines
COUNTY HWY 222
Sierra National Forest
Sierra National Forest
1
0
1 mile
approximate scale
Vicinity Map
MARIPOSA
Project Vicinity
MADERA
RD 225
222
N FORK RD
See Map (above)
AVENUE 26TH
41
145
STATE HWY 41
FRESNO
168
99
MADERA
FRESNO
Not to scale
Regional Map
See Vicinity Map (left)
N
Live Oak Associates, Inc.
South Fork Sewer
Site / Vicinity Map
Date
5/20/2010
Project #
1434-01
Figure #
1



From USGS
North Fork 7.5' Quadrangle 1981
Cascadel Point 7.5' Quadrangle 1982

Live Oak Associates, Inc.

South Fork Sewer
U.S.G.S. Quadrangle

Date	Project #	Figure #
5/20/2010	1434-01	2

The sewer line will start on the east end of the project site and descend to the South Fork Willow Creek. Prior to crossing the South Fork Willow Creek wastewater pumps will force the flow across the bridge (pipeline attached to bridge) up the grade on the west side of the creek to the Chawanakee School District Bus Depot. The pipeline will then descend to the existing North Fork Wastewater Treatment Plant.

Impacts from project construction will be limited to a maximum 10-foot buffer on both sides of the sewer lines and surrounding the wastewater pump site. Because the sewer line will be attached to the side of the South Fork Willow Creek Bridge, there will be no disturbance to the bed or bank of the Creek (i.e. no equipment will enter the creek). Equipment and material staging will occur in existing parking lots and disturbed areas along the alignment including locations such as the North Fork Mill Site and North Fork Wastewater Treatment Plant.

Construction will begin after August 31 and end before January 31, thereby avoiding the raptor and migratory bird nesting seasons, the maternal bat roost season and the valley elderberry longhorn (VELB) flight season. Protective measures described in the 1999 *U.S. Fish and Wildlife Service Conservation Guidelines for the Valley Elderberry Longhorn Beetle* will be implemented for the three elderberry shrubs located adjacent to the sewer alignment. If construction does not occur by May 11, 2012 a new survey for elderberry shrubs will be conducted to ensure that no new elderberries have grown since the original survey in 2010.

An erosion control plan and storm water pollution prevention plan will be prepared by the engineer and incorporate the appropriate best management practices. The erosion control plan will be implemented during construction, ensuring that there will be no foreseeable degradation of water quality in seasonal creeks, reservoirs or downstream waters.

1.2 REPORT OBJECTIVES

Pipeline projects such as the one proposed for the South Fork Sewer System Improvement Project can potentially damage or modify biotic habitats used by sensitive plant and wildlife species. Furthermore, the pipeline project may be regulated by state and/or federal agencies,

subject to provisions of the California Environmental Quality Act (CEQA), National Environmental Protection Act (NEPA), and covered by policies of the County of Madera General Plan, or some combination of the three. This report addresses issues related to sensitive biological resources occurring, or potentially occurring, in the study area, the federal, state and local laws related to such resources, and proposed mitigation measures that would minimize potential impacts. Accordingly, Live Oak Associates, Inc. has included in this report the following:

(a) A description of existing conditions including the character, features, and resources of the project area and its surroundings; trends that are likely to continue in the absence of the project are identified.

(b) Impact assessment. All potential environmental impacts, whether beneficial or adverse, have been identified as well as the site conditions that would change as a result of the project.

(c) Assessment of significant impact. All project impacts have been assessed to determine the significance of their effects on the environment and whether the project will require further compliance under related laws and authorities.

(d) Examination of feasible ways in which the project or external factors relating to the project could be modified in order to eliminate or minimize adverse environmental impacts.

(e) Review of all environmental review requirements necessary for the project's compliance with applicable authorities.

(f) Based on steps a-e above, identify all potential significant impact to biological resources that would potentially result from the proposed project.

1.3 STUDY METHODOLOGY

The analysis of impacts, as discussed in Section 3.2 of this report, was based on the known and potential biotic resources of the project site (discussed in Section 2.0). Sources of information used in the preparation of this analysis included:

- **Literature Search.** Literature that was reviewed included some, or all, of the following*:* *California Natural Diversity Data Base* (CDFG 2010), California *Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2010), other technical studies recently completed for other projects in the area, U.S.G.S. topographic maps, and Natural Resource Conservation Service (NRCS), etc.

- **Floristic Survey.** A walking survey of the project site was conducted, during which all biotic habitats were described, and vascular plants recorded. The site was surveyed sufficiently to determine the presence/absence of all elderberry shrubs within and near the project site, and map their locations with a GPS unit. Particular attention was given to habitats of the project site, which would be suitable, or potentially suitable, for special-status plant species (i.e. federally listed species). The timing of the site visit allowed for observations of habitat suitable for special status plants occurring in the project vicinity, but did not coincide with the blooming period of any special status plants documented within the region.

- **Wildlife Survey.** A walking survey of the project site was conducted, during which all terrestrial vertebrates and their sign were recorded. Particular attention was given to habitats of the project site, which would be suitable, or potentially suitable, for special status animal species. Site specific or protocol level surveys for special-status wildlife species were not conducted for this report.

- **Survey for Jurisdictional Waters**. A preliminary walking survey of the project site was conducted, during which all wetlands and their approximate locations were recorded.

Staff Ecologist Geoff Cline and Jeff Gurule with Live Oak Associates, Inc. conducted the reconnaissance level field surveys for flora, wildlife, and jurisdictional waters on May 11, 2010. During this visit the site was assessed for special-status plant and wildlife species, habitats suitable for such species, as well as a preliminary survey for wetlands and other sensitive biotic resources.

2.0 EXISTING CONDITIONS

2.1 REGIONAL SETTING

The project site is located near the geographical center of California, in the foothills of the Sierra Nevada. Elevations of the area vary greatly, but the community of North Fork has an approximate elevation of 2,638 feet National Geodetic Vertical Datum (NGVD). North Fork and South Fork are bounded on the east by the South Fork Bluffs, with elevations of approximately 6,000 feet NGVD. To the south the foothills descend to the San Joaquin River with elevations ranging from 2,600 to 1,000 feet NGVD. To the west is Smiley Mountain with an elevation of approximately 3,600 feet NGVD. To the north is Malum Ridge, bordered by the north and south forks of Willow Creek with elevations ranging from 2,800 to 3,600 feet NGVD. Four perennial drainages occur in the North Fork area, North Fork Willow Creek, South Fork Willow Creek, Whisky Creek, and Fine Gold Creek. All four of these drainages are tributary to the San Joaquin River and support riparian vegetation.

Like most of California, North Fork (and the project site) experience a Mediterranean climate. Warm dry summers are followed by cool moist winters. Summer temperatures commonly exceed 90 degrees Fahrenheit, and the relative humidity is generally very low. Winter temperatures rarely rise much above 60 degrees Fahrenheit, and daytime high temperatures are often below 50 degrees Fahrenheit. Annual precipitation within the study area is about 34 inches, almost 85% of which falls between the months of October and March. Most precipitation falls in the form of rain, but snow occurs occasionally during most winters.

The biotic habitats of the North Fork area are largely intact, but have been fragmented by roads and subdivisions. Large patches of undeveloped lands remain on steep slopes. These include large parcels zoned for agriculture and U.S. Forest Service holdings. The common habitats of the area include oak-pine woodland, interior live oak scrub, chamise chaparral, and riparian. Despite commercial and residential development in the area, a considerable diversity of plants and animals native to the Sierra are abundant.

2.2 PROJECT SITE

The project site is located in the unincorporated communities of North Fork and South Fork, Madera County, California. Elevations range from 2,550 to 2,680 feet NGVD. The approximately 20 foot wide alignment (i.e. maximum 10 foot construction area on either side of the sewer lines and around the pump house) of the project site runs along existing road alignments and across a dirt parking lot associated with the North Fork Town Hall and Scouts building and a graded field within the Mountain Oaks school yard. The project site also includes the Road 225 bridge across the South Fork of Willow Creek. Although the project will cross the creek and run between riparian zones on either side of the bridge, the project will be confined to the bridge itself by working from the bridge to attach the sewer pipe to the north side of the bridge.

Surface drainage within the project site occurs via roadways, roadway ditches, and via the North and South Forks of Willow Creek. Rainfall on the project site quickly runs off the hardscaped surfaces and compacted dirt surfaces and collects in roadway ditches along the project alignment. These ditches then empty into the North and South Forks of Willow Creek, which flow south to the San Joaquin River.

Two soil-mapping units consisting of two families each, Holland-Chaix Families Complex, 5 to 35 percent slopes and Holland-Chaix Families Complex, 35 to 65 percent slopes was identified on the project site (USDA and SNF 1993). Soils of the Holland series consist of very deep, well drained soils that formed in material weathered from granitic rock. Soils of the Chaix series consist of moderately deep, somewhat excessively drained soils that formed in material weathered from acid intrusive igneous rock, mainly granite to granodiorite.

2.3 BIOTIC HABITATS/LAND USES

Biotic habitats of the site are absent and one land use occurs on the site which has been defined as ruderal (i.e. areas highly disturbed by human activity; See Figure 3). A list of vascular plants found on the study area and adjacent lands can be found in Appendix A. Vertebrate species

LEGEND

- Project Boundary
- Ruderal Habitat
- Elderberry Shrub

Sources:
Aerial photograph courtesy of Digital Globe

N

Road 225

South Fork
Willow Creek
Bridge

Eld 3

Road 274

Road 225

Mono Dr

Eld 2

Eld 1

500' 0 500 feet
approximate scale

Live Oak Associates, Inc.

South Fork Sewer
Biotic Habitats

Date	Project #	Figure #
5/19/2010	1434-01	3

potentially occurring in, over, or beneath (i.e. South Fork Willow Creek underneath the bridge) the project site can be found in Appendix B.

2.3.1 Ruderal

Ruderal areas of the project site consist of roadways, driveways, shoulders of roadways and driveways, dirt parking lot, school yard, as well as a bridge across the South Fork of Willow Creek. These areas are paved or generally disturbed by motor vehicle, bicycle, or foot traffic. Paved areas supported little to no vegetation. Disturbed road shoulders and disturbed dirt areas supported species specific to ongoing disturbance. Grasses and forbes common to this ruderal area included ripgut (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), Sheep's sorrel (*Rumex acetosella*), and Tricolor gilia (*Gilia tricolor*) among others. Although there are no large trees located within the site, some larger trees were located adjacent to and in some cases overhanging the site. Included in these larger tree species were black oak (*Quercus kelloggii*), valley oak (*Quercus lobata*), ponderosa pine (*Pinus ponderosa*).

Ruderal areas of the type observed on the project site do not provide significant habitat for most native wildlife species. Those species occurring in natural biotic habitats adjacent to portions the project site no doubt pass through the study area occasionally or regularly while foraging. Amphibian and reptile species potentially foraging or passing through the site include Pacific treefrog (*Pseudacris regilla*), bullfrog (*Rana catesbeiana*), Western pond turtle (*Clemmys marmorata*), and Western rattlesnake (*Crotalus viridis*). Some avian species observed foraging in the ruderal areas of the site included mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), acorn woodpecker (*Melanerpes formicivorous*) and Pacific slope flycatcher (*Empidonax difficilis*). Mammal species likely to occur in ruderal areas include California ground squirrel (*Spermophilus beecheyi*), Western gray squirrel (*Sciurus griseus*), and Botta's pocket gopher (*Thomomys bottae*). Scavenger species make the greatest use of roadways for foraging by consuming the carcasses of dead animals hit by vehicles. Species such as the common raven (*Corvus corax*) and turkey vulture (*Cathartes aura*) are observed frequently scavenging in roadways. Predators are also known to forage in ruderal areas. A red-shouldered hawk (*Buteo lineatus*) and red-tailed hawk (*Buteo jamaicensis*) were observed foraging over and near the site. Mammalian predators likely to forage on small animal species of the site include

the coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), and striped skunk (*Mephitis mephitis*).

2.4 SPECIAL-STATUS PLANTS AND ANIMALS

Several species of plants and animals within the state of California have low populations, limited distributions, or both. Such species may be considered "rare" and are vulnerable to extirpation as the state's human population grows and the habitats these species occupy are converted to agricultural and urban uses. As described more fully in Section 3.1, state and federal laws have provided the California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS) with a mechanism for conserving and protecting the diversity of plant and animal species native to the state. A sizable number of native plants and animals have been formally designated as threatened or endangered under state and federal endangered species legislation. Still others have been designated as "species of special concern" by the CDFG. The California Native Plant Society (CNPS) has developed its own lists of native plants considered rare, threatened or endangered (CNPS 2010). Collectively, these plants and animals are referred to as "special-status species".

A number of special status plants and animals are known to occur or believed to occur near the Site. These species, and their potential to occur on the Site, are listed in Table 1 on the following pages. The locations of nearby sightings of special status species have been shown in Figure 4. Ten 7.5 minute quadrangles (Ahwahnee, Bass Lake, Shuteye Peak, Mammoth Pool Dam, O'Neals, Musick Mountain, Millerton Lake West, Millerton Lake East, Auberry, and Shaver Lake) adjoining the North Fork and Cascadel Point quadrangles of the project site were used in the search for special status plants and wildlife species of the project vicinity. Sources of information for this table included the *California Natural Diversity Data Base* (CDFG 2010), *Endangered and Threatened Wildlife and Plants* (USFWS 2009), *Annual Report on the Status of California State Listed Threatened and Endangered Animals and Plants* (CDFG 2009), *The California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2010), and *California's Wildlife, Volumes I, II, and III* (Zeiner et. al. 1990).

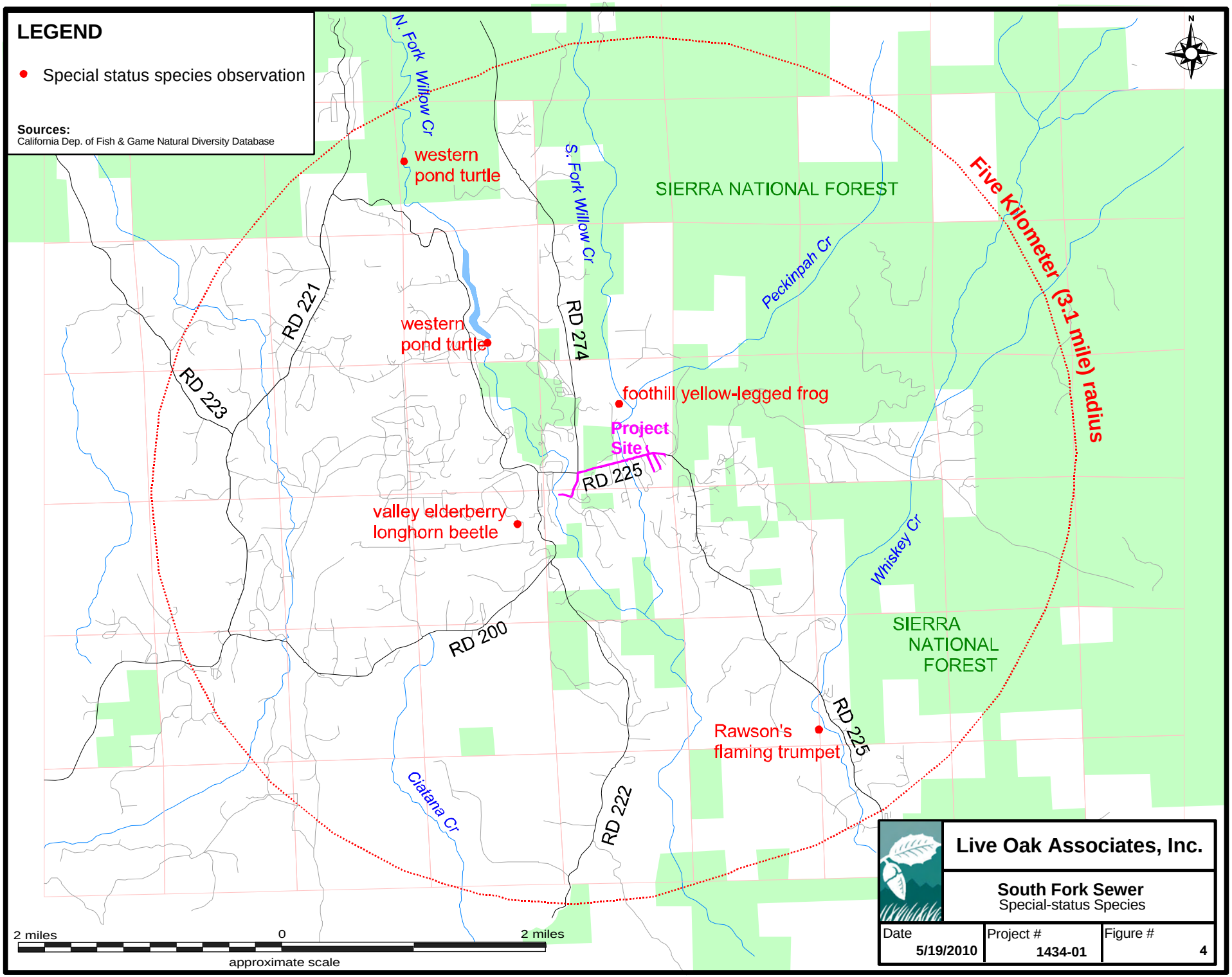

LEGEND
Special status species observation
Sources:
California Dep. of Fish & Game Natural Diversity Database
N
N. Fork Willow Cr
S. Fork Willow Cr
Peckinpah Cr
Whiskey Cr
Ciatana Cr
western pond turtle
western pond turtle
foothill yellow-legged frog
valley elderberry longhorn beetle
Rawson's flaming trumpet
Project Site
SIERRA NATIONAL FOREST
SIERRA NATIONAL FOREST
Five Kilometer (3.1 mile) radius
RD 221
RD 223
RD 274
RD 225
RD 200
RD 222
RD 225
2 miles
0
2 miles
approximate scale
Live Oak Associates, Inc.
South Fork Sewer
Special-status Species
Date 5/19/2010
Project # 1434-01
Figure # 4

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE VICINITY OF THE SOUTH FORK SEWER SYSTEM IMPROVEMENT PROJECT.

PLANTS (adapted from CNDDB [2010], CDFG [2009], and CNPS [2001])

Species Listed as Threatened or Endangered

Species	Status	Habitat	Occurrence in the Project site
Mariposa pussy-paws (*Calytridium pulchellum*)	FT CNPS 1B	Fewer than 10 populations in Mariposa, Madera and Fresno Counties; primarily in coarse granitic sands of decomposing outcrops.	**Absent.** Suitable habitat in the form of open flats of decomposed granite surrounding exposed granite bedrock was absent. The nearest known location for this species is approx. 10 miles to the northwest, near Oakhurst.
Tree anemome (*Carpenteria californica*)	CT CNPS 1B	Several occurrences are known from the Sierra foothills in Fresno Co. east and southeast of Auberry, and one occurrence in Madera Co. south of North Fork. This species is found primarily in chaparral, but it also occurs in mixed hardwoods with a shrub understory.	**Absent.** Habitat suitable for this species is absent from the site. This perennial shrub was not observed during the May 2010 survey. The nearest occurrence is approx. 4 miles south of the project site.
Succulent owl's clover (*Castilleja campestris ssp. Succulent*)	FT, CE, CNPS 1B	Occurs in vernal pools of the San Joaquin Valley and lower Sierra Nevada foothills.	**Absent.** Suitable habitat in the form of vernal pools is not present in the project site or surrounding area.

CNPS -Listed Plants

Species	Status	Habitat	Occurrence in the Project Site.
Flaming trumpet (*Collomia rawsiana*)	CNPS 1B	This species is limited to stabilized alluvium in riparian zones between 2500 and 6600 feet in Madera and Mariposa Cos. It occurs on one tributary of the Fresno River and several tributaries of the San Joaquin River, primarily in conifer forest.	**Absent.** Suitable habitat for this species is absent from the site. Numerous sightings occur to the north, east, and south of the site with the closest observation less than 2 miles south of the site. The project will not impact riparian habitat along the South Fork Willow Creek.
Madera leptosiphon (*Leptosiphon serrulatus*)	CNPS 1B	Occurs on dry slopes, often on decomposed granite in cismontane woodland, and lower montane coniferous forest.	**Unlikely.** Ruderal habitat on site is not likely to support this species. This species was not observed during the May 2010 survey, a time when this species would have been identifiable. This species has not been documented in the vicinity since a 1932 observation near Coarsegold.
Orange lupine (*Lupinus citrinus* var. *citrinus*)	CNPS 1B	Several populations are known from Madera and Fresno Counties in coarse granitic sands of decomposing outcrops.	**Absent.** Suitable habitat in the form of open flats of decomposed granite surrounding exposed granite bedrock was absent. The nearest known location for this species is in Indian Lakes Estates approx. 9 miles to the west.
Slender-stalked monkeyflower (*Mimulus gracilipes*)	CNPS 1B	Occurs in Sierra Nevada Foothills at elevations between 1640 and 4260 feet. Prefers disturbance or decomposed granite.	**Unlikely.** Habitat in the form of disturbed soils is present along the roadways of the site, although this species was not observed during the May 2010 survey, a time when this species would have been identifiable.

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE VICINITY OF THE SOUTH FORK SEWER SYSTEM IMPROVEMENT PROJECT.

ANIMALS (adapted from CNDDB [2010], CDFG [2009] and Zeiner [1988])

Species Listed as State or Federally Threatened or Endangered

Species	Status	Habitat	Occurrence in the Project Site.
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	Occurs in vernal pools of California.	**Absent.** Suitable habitat in the form of vernal pools is absent from the project site and surrounding area.
Vernal pool tadpole shrimp (*Lepidurus packardi*	FE	Occurs in vernal pools of California.	**Absent.** Suitable habitat in the form of vernal pools is absent from the project site and surrounding area.
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	FT	Lives in mature elderberry shrubs of California's Central Valley and Sierra Foothills.	**Possible.** Three elderberry shrubs, the obligate habitat of the VELB were observed adjacent to the project site. The nearest documented VELB occurrence is less than 1 mile to the southwest.
California tiger salamander (*Ambystoma californiense*)	FT, CCS	Vernal pools and stock ponds of central California.	**Absent.** The project site and surrounding area lacks suitable habitat for this species, and is outside of its known range. This species has been documented in the O'Neals area approx. 23 miles to the west.
Sierra Nevada yellow-legged frog (*Rana sierra*)	FC, CSC	Inhabits lakes, ponds, meadow streams, isolated pools, and sunny riverbanks from 980 to 12000 feet in elevation.	**Unlikely.** Habitat suitable for this species is absent from the site. The project site lies outside of the range of this species. This species occurs at much higher elevations to the north and east of the study area.
California red-legged frog (*Rana aurora draytonii*)	FT, CSC	Rivers, creeks and stock ponds of the Sierra foothills, preferring pools with overhanging vegetation.	**Absent.** This species has not been observed locally for approx. 30 years and is considered extirpated from Madera Co.
Peregrine falcon (*Falco peregrinus*)	CE	Individuals breed on cliffs in the Sierra or in coastal habitats; occurs in many habitats of CA during migration and winter.	**Unlikely.** The site provides extremely marginal foraging habitat for transients and migrating birds. Breeding habitat is absent.
Bald eagle (*Haliaeetus leucocephalus*)	CE	Prefers habitats near seacoasts, rivers, large lakes, oceans, and other large bodies of open water with an abundance of fish.	**Unlikely.** The site provides marginal foraging habitat for this seasonal species. The nearest recorded observation is at Bass Lake, 6.5 miles to the northwest.
Great gray owl (*Strix nebulosa*)	CE	Prefers pine and fir forests adjacent to montane meadows between 2400 and 7400 feet.	**Possible.** Suitable habitat exists in the vicinity of the site in the form of pine trees and meadows. Nesting habitat is absent, and foraging habitat is extremely marginal. This species would at most pass through the site while foraging. The nearest recorded observation is approx. 4 miles to the southeast.
Willow flycatcher (*Empidonax traillii*)	CE	Breeds in willow thickets found in montane meadows of the Sierra Nevada.	**Unlikely.** This species would at most pass through during migration. Breeding habitat is absent.
Pacific fisher (*Martes pennanti pacifica*)	FC, CSC	Prefers large oak and fir trees between 3000 and 7000 feet in elevation with abundant squirrel populations.	**Unlikely.** Although numerous individuals occur in the surrounding area at higher elevations, the habitat of the project site is not suitable for this species.
Sierra Nevada red fox (*Vulpes vulpes necator*)	CT	Prefers conifer and alpine habitats between 4000 and 12000 feet.	**Absent.** Higher elevation habitat required by this species is absent from the project site and surrounding area.

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE VICINITY OF THE SOUTH FORK SEWER SYSTEM IMPROVEMENT PROJECT.

ANIMALS (adapted from CNDDB [2010], CDFG [2009] and Zeiner [1988])

State and Federal Species of Special Concern

Species	Status	Habitat	Occurrence in the Project site
Foothill yellow-legged frog (*Rana boylei*)	CSC	Once widespread in fast-moving rivers and creeks of the Sierra foothills with cobble bottoms; now nearly extirpated from the Sierra.	**Absent.** Suitable habitat for this species is present in South Fork Willow Creek immediately adjacent and underneath (bridge) the site, however, suitable habitat is absent from the project site itself. The project will have no impact on the Creek. The nearest documented sighting is from 1970 along the South Fork Willow Creek less than 1 mile north of the site.
Western spadefoot (*Spea hammondii*)	CSC	Vernal pools and stock ponds of central California.	**Absent.** The study area lacks suitable habitat for this species.
Southwestern pond turtle (*Clemmys marmorata pallida*)	CSC	Open slow-moving water of rivers and creeks of central California with rocks and logs for basking.	**Possible.** The South Fork Willow Creek, adjacent and beneath the site, provides suitable habitat for this species. This species could pass through the site while moving to overwintering and/or nesting sites, however, overwintering and nesting habitat is absent from the site. The nearest recorded observation is approx. 1 mile to the north.
Western burrowing owl (*Athene cunicularia hypugaea*)	CSC	Found in open, dry grasslands, deserts and ruderal areas; requires suitable burrows. This species is often associated with California ground squirrels.	**Absent.** This species is seldom seen above the San Joaquin Valley floor. Ground squirrel burrows required by this species were absent from the project site and surrounding area.
Long-eared Owl (*Asio otus*)	CSC	Frequents riparian woodlands and forests of California.	**Possible.** Suitable nesting and roosting habitat exists in the riparian woodland of South Fork Willow Creek, adjacent to the site. This species could pass through or over the site while foraging. Nesting habitat is absent.
Northern goshawk (*Accipiter gentilis*)	CSC	Prefers dense coniferous forest of the Sierra Nevada above 5,000 feet in elevation	**Unlikely.** Wintering birds sometimes descend to the foothills, but not usually to the low elevations of the project site. This species nests at higher elevations.
Golden eagle (*Aquila chrysaetos*)	FP	Typically frequents rolling foothills, mountain areas, sage-juniper flats and desert.	**Present.** The site provides marginal foraging habitat for migrants and transients. Nesting habitat is absent. However, this species has been observed flying over the Willow Creek drainage (Jeff Gurule pers. obser.).
Black swift (*Cypseloides niger*)	CSC	Migrants and transients found throughout many habitats of state; in Sierra nests are usually associated with waterfalls.	**Possible.** Migrants and transients may forage over the site during migration. Breeding habitat is absent.

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE VICINITY OF THE SOUTH FORK SEWER SYSTEM IMPROVEMENT PROJECT.

ANIMALS (adapted from CNDDB [2010], CDFG [2009] and Zeiner [1988])

State and Federal Species of Special Concern

Species	Status	Habitat	Occurrence in the Project site
Vaux's swift (*Chaetura vauxi*)	CSC	Migrants and transients move through the foothills of the western Sierra in spring and late summer. Some individuals breed in the region in the broken tops of large snags.	**Possible.** Migrants and transients may forage over the site during migration. Breeding habitat is absent.
Olive-sided flycatcher (*Contopus cooperi*)	CSC	Prefers coniferous forests at forest edges and openings between sea level and 11000 feet in elevation.	**Possible. T**he project site provides foraging habitat and trees overhanging the site provide potential breeding habitat, although this species was not observed during the May 2010 survey.
Yellow warbler (*Dendroica petechia brewster*)	CSC	Migrants move through many habitats of Sierra and its foothills. This species breeds in riparian thickets of alder, willow and cottonwoods.	**Likely.** This species may forage within habitats of the site during migration. Breeding habitat is present adjacent to the site, in riparian vegetation along Willow Creek. This species has been observed along nearby Whiskey Creek in Cascadel Woods (Jeff Gurule pers. obser.).
Pallid bat (*Antrozous pallidus*)	CSC	Grasslands, chaparral, woodlands, and forests of California; most common in dry rocky open areas. Roost habitats include mines, caves, crevices, hollow trees, buildings and bridges.	**Possible.** The study area provides suitable foraging habitat. The bridge provides potential roosting habitat as well.
Townsends's big-eared bat (*Corynorhinus townsendii*)	CSC	Primarily a cave-dwelling bat which can roost in buildings, bridges, rock crevices and hollow trees. Occurs in a variety of habitats of the state.	**Possible.** The study area provides suitable foraging habitat. The bridge provides potential roosting habitat as well.
Spotted bat (*Euderma maculatum*)	CSC	Found in a variety of habitats from arid desert and grassland to mixed conifer forest. Roosts in rock crevices.	**Possible.** The study area provides suitable foraging habitat. No suitable roost sites are present on the site in the form of high rock crevices.
Western mastiff bat (*Eumops perotis californicus*)	CSC	Forages in broad open areas in habitats of dry desert washes chaparral, oak woodland, open ponderosa pine forest, grassland, montane meadows, and agricultural areas. Roosts in cliffs and crevices of buildings and boulders.	**Possible.** The project site provides suitable foraging habitat but no suitable roosting sites.
Southern grasshopper mouse (*Onychomys torridus Ramona*)	CSC	Sandy areas of desert regions in southern half of the state.	**Unlikely.** Although this species may occur in the Sierra foothills of Madera County, it is not common, and has not been reported in the project site and surrounding area.
American badger (*Taxidea taxus*)	CSC	Found in drier open stages of most shrub, forest and herbaceous habitats with friable soils.	**Unlikely.** The project site provides marginal foraging habitat for this species. No evidence of badger activity was observed during the site visit (i.e. burrows, claw marks, scat, etc.).

TABLE 1. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE VICINITY OF THE SOUTH FORK SEWER SYSTEM IMPROVEMENT PROJECT.

ANIMALS (adapted from CNDDB [2010], CDFG [2009] and Zeiner [1988])

State and Federal Species of Special Concern

Species	Status	Habitat	Occurrence in the Project site
Ringtail (*Bassariscus astutus*)	CSC	Riparian and heavily wooded habitats near water.	**Possible.** The project site and surrounding area provides suitable foraging habitat for this species. Nesting habitat is present in the adjacent riparian habitat along South Fork Willow Creek, but absent from the site.

OCCURRENCE EXPLANATIONS

Present: Species observed on the site at time of field surveys or during recent past.
Likely: Species not observed on the site, but it may reasonably be expected to occur there on a regular basis.
Possible: Species not observed on the site, but it could occur there from time to time.
Unlikely: Species not observed on the site, and would not be expected to occur there except, perhaps, as a transient.
Absent: Species not observed on the site, and precluded from occurring there because habitat requirements not met.

STATUS CODES

FE	Federally Endangered	CE	California Endangered
FT	Federally Threatened	CT	California Threatened
FPE	Federally Endangered (Proposed)	CR	California Rare
FC	Federal Candidate	CCS	California Candidate Species
		CFP	California Fully Protected
CNPS 1B	Plant is threatened, endangered in California and Elsewhere in California		
CSC	California Species of Special Concern		

2.5 JURISDICTIONAL WATERS

Jurisdictional waters include rivers, creeks, drainages with a defined bed and bank that may carry at most ephemeral flows, lakes, ponds, reservoirs, and wetlands. Such waters may be subject to the regulatory authority of the U. S. Army Corps of Engineers (USACE), the California Department of Fish and Game (CDFG) and the California Regional Water Quality Control Board (RWQCB) (see Section 3.2.4 of this report for additional information).

The South Fork Willow Creek flows north to south underneath (bridge) the project site. This creek is likely considered a Water of the U.S. All project related activities at the creek will remain on the bridge, outside the bed, bank, and riparian habitat of the Creek. As such, for the

purposes of this report, we have considered the South Fork Willow Creek to be outside of the project site.

2.6 WILDLIFE MOVEMENT CORRIDORS

The site does not appear to constitute a "movement corridor" for native wildlife, although several species potentially move within and through the study area. The construction of a pipeline may have a temporary adverse effect on home range and dispersal movements of native wildlife now using habitats where site development may eventually occur. Many migratory species that now pass through the study area are neo-tropical migrant birds that will continue to pass through and over the site after project construction.

2.7 NATURAL COMMUNITIES OF SPECIAL CONCERN

Natural communities of special concern are those that are of limited distribution, distinguished by significant biological diversity, home to special status plant and animal species, of importance in maintaining water quality or sustaining flows, etc. Examples of natural communities of special concern include vernal pools, emergent marsh, various types of riparian forest, etc. (Sawyer and Keeler-Wolf, 1995). One natural community of special concern can be found underneath and immediately adjacent to the site; central valley drainage rainbow trout/cyprinid stream.

The South Fork Willow Creek flows north to south underneath (bridge) the project site. All project related activities at the creek will remain on the bridge, outside the bed, bank, and riparian habitat of the Creek. As such, for the purposes of this report, we have considered the South Fork Willow Creek to be outside of the project site.

3.0 IMPACTS AND MITIGATIONS

3.1 SIGNIFICANCE CRITERIA

Approval of general plans, area plans, and specific projects is subject to the provisions of the California Environmental Quality Act (CEQA). The purpose of CEQA is to assess the impacts of proposed projects on the environment before they are carried out. CEQA is concerned with the significance of a proposed project's impacts. For example, a proposed development project may require the removal of some or all of a site's existing vegetation. Animals associated with this vegetation could be destroyed or displaced. Animals adapted to humans, roads, buildings, pets, etc., may replace those species formerly occurring on the site. Plants and animals that are state and/or federally listed as threatened or endangered may be destroyed or displaced. Sensitive habitats such as wetlands and riparian woodlands may be altered or destroyed.

Whenever possible, public agencies are required to avoid or minimize environmental impacts by implementing practical alternatives or mitigation measures. According to Section 15382 of the CEQA Guidelines, a significant effect on the environment means a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic interest."

Specific project impacts to biological resources may be considered "significant" if they would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or

- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Furthermore, CEQA Guidelines Section 15065(a) states that a project may trigger the requirement to make a "mandatory findings of significance" if the project has the potential to:

> "Substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species, or eliminate important examples of the major periods of California history or prehistory."

3.2 RELEVANT GOALS, POLICIES, AND LAWS

3.2.1 Threatened and Endangered Species

State and federal "endangered species" legislation has provided the California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS) with a mechanism for conserving and protecting plant and animal species of limited distribution and/or low or declining populations. Species listed as threatened or endangered under provisions of the state and federal endangered species acts, candidate species for such listing, state species of special concern, and some plants listed as endangered by the California Native Plant Society are collectively referred to as "species of special status." Permits may be required from both the CDFG and USFWS if activities associated with a proposed project will result in the "take" of a listed species. "Take" is defined by the state of California as "to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture or kill" (California Fish and Game Code, Section 86). "Take" is more broadly defined by the federal Endangered Species Act to include "harm" (16 USC, Section 1532(19), 50 CFR, Section 17.3). Furthermore, the CDFG and the USFWS are responding agencies under the California Environmental Quality Act (CEQA). Both

agencies review CEQA documents in order to determine the adequacy of their treatment of endangered species issues and to make project-specific recommendations for their conservation.

3.2.2 Migratory Birds

State and federal laws also protect most birds. The Federal Migratory Bird Treaty Act (16 U.S.C., scc. 703, Supp. I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs.

3.2.3 Birds of Prey

Birds of prey are also protected in California under provisions of the State Fish and Game Code, Section 3503.5, which states that it is "unlawful to take, possess, or destroy any birds in the order *Falconiformes* or *Strigiformes* (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "taking" by the CDFG.

3.2.4 Wetlands and Other Jurisdictional Waters

Natural drainage channels and adjacent wetlands may be considered "Waters of the United States" (hereafter referred to as "jurisdictional waters") subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE). The extent of jurisdiction has been defined in the Code of Federal Regulations but has also been subject to interpretation of the federal courts. Jurisdictional waters generally include:

- All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

- All interstate waters including interstate wetlands:

- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce;

- All impoundments of waters otherwise defined as waters of the United States under the definition;
- Tributaries of waters identified in paragraphs (a)(1)-(4) (i.e. the bulleted items above).

As recently determined by the United States Supreme Court in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* (the SWANCC decision), channels and wetlands isolated from other jurisdictional waters cannot be considered jurisdictional on the basis of their use, hypothetical or observed, by migratory birds.

The USACE regulates the filling or grading of such waters under the authority of Section 404 of the Clean Water Act. The extent of jurisdiction within drainage channels is defined by "ordinary high water marks" on opposing channel banks. Wetlands are habitats with soils that are intermittently or permanently saturated, or inundated. The resulting anaerobic conditions select for plant species known as hydrophytes that show a high degree of fidelity to such soils. Wetlands are identified by the presence of hydrophytic vegetation, hydric soils (soils saturated intermittently or permanently saturated by water), and wetland hydrology according to methodologies outlined in the 1987 Corps of Engineers Wetlands Delineation Manual (USACE 1987).

All activities that involve the discharge of fill into jurisdictional waters are subject to the permit requirements of the USACE (Wetland Training Institute, Inc. 1991). Such permits are typically issued on the condition that the applicant agrees to provide mitigation that result in no net loss of wetland functions or values. No permit can be issued until the Regional Water Quality Control Board (RWQCB) issues a certification (or waiver of such certification) that the proposed activity will meet state water quality standards. The filling of isolated wetlands, over which the USACE has disclaimed jurisdiction, is regulated by the RWQCB. It is unlawful to fill isolated wetlands without filing a Notice of Intent with the RWQCB. The RWQCB is also responsible for enforcing National Pollution Discharge Elimination System (NPDES) permits, including the General Construction Activity Storm Water Permit. All projects requiring federal money must also comply with Executive Order 11990 (Protection of Wetlands).

The California Department of Fish and Game has jurisdiction over the bed and bank of natural drainages and lakes according to provisions of Section 1601 and 1602 of the California Fish and Game Code (2003). Activities that would disturb these waters are regulated by the CDFG via a Streambed Alteration Agreement. Such an agreement typically stipulates that certain measures will be implemented which protect the habitat values of the drainage in question.

3.3 POTENTIALLY SIGNIFICANT PROJECT IMPACT/MITIGATION

As described in Section 1.0 the proposed action is the construction of the South Fork Sewer System Pipeline. Impact areas will include the pipeline alignment and the wastewater pump site, both with a 10-foot buffer on either side.

The project will have no potentially significant impacts to biological resources. Mitigation measures are not warranted.

3.4 LESS THAN SIGNIFICANT PROJECT IMPACTS

3.4.1 Project Impact to Valley Elderberry Longhorn Beetle (VELB)

Potential Impact. The federally threatened VELB potentially occurs in one or more of the three elderberry shrubs observed within 100 feet of the site. Shrub number 1 is approximately 40 feet from the project site, and shrubs 2 and 3 are approximately 20-25 feet from the project site (see Figure 4 for shrub locations). The shrub locations were accurately mapped with a GPS unit capable of sub-meter accuracy. These shrubs likely possess mature stems (one inch or greater in diameter), however the exact size class and stem totals were not recorded.

The USFWS considers all stems over one inch at ground level habitat for the VELB. Therefore, the removal of any stems greater than one inch is considered "take" of the VELB, requiring "take" authorization from the USFWS. The USFWS also considers construction activities including grading and the operation of vehicles and other equipment within 20 feet of the dripline of an elderberry bush to constitute "take" of the VELB. Such activities within 100 feet of an elderberry bush may constitute "take" of the VELB.

As described in the project description in section 1.1, the project will implement the protective measures described in the 1999 *U.S. Fish and Wildlife Service Conservation Guidelines for the Valley Elderberry Longhorn Beetle*. Of particular interest, these measures will include; 1) placement of orange construction fencing around each shrub at least 20 feet from the drip line with signs identifying the shrubs as endangered species habitat and 2) hiring a biologist to make a brief on-site instructional presentation to construction crews prior to the onset of construction about the VELB and the consequences of destroying its habitat without take authorization of the USFWS.

Because all project related activities will occur more than 20 feet away from the drip line of the shrubs, outside of the VELB flight season, and will implement the protective measures described in the 1999 *U.S. Fish and Wildlife Service Conservation Guidelines for the Valley Elderberry Longhorn Beetle*, the project will have a less than significant effect on the VELB and its habitat.

Although the project will have a less than significant effect on the VELB, the U.S. Fish and Wildlife Service requests they are notified any time construction occurs within 100 feet of an elderberry shrub.

Mitigation. None Warranted

3.4.2 Disturbance to Active Raptor and Other Migratory Bird Nests from Construction Activities During Project Implementation

Potential Impact. Habitats surrounding the site support a number of large trees, some of which overhang the project site, that may be used by nesting raptors. Additionally, many smaller trees and shrubs located on and adjacent to the site provide suitable nesting habitat for other migratory bird species. Removal of vegetation or nearby construction activities during the nesting period (February 1st to August 31st) could destroy nests or result in nest abandonment by adult birds, resulting in mortality of nestlings. Disturbance that causes nest abandonment and/or loss of reproductive effort would be a violation of the federal Migratory Bird Treaty Act and would constitute a potentially significant effect.

As described in section 1.1, construction will begin after August 31 and end before January 31, thereby avoiding the raptor and migratory bird nesting seasons. As a result, the project will have no effect on nesting raptors and other nesting migratory birds during construction.

Mitigation. None Warranted.

3.4.3 Disturbance to Native Wildlife Nursery Sites

Potential Impact. The South Fork Willow Creek Bridge and tree cavities in the project vicinity provide potential wildlife nursery sites. Project construction during the swallow nesting season (February 1st to August 31st) or the bat maternal roosting season (April 15th to August 31st) could destroy nests or result in nest/roost abandonment by adult birds and bats, potentially resulting in a high mortality rate of young. Significant mortality of swallow or bat young could constitute a potentially significant effect.

As described in section 1.1, construction will begin after August 31 and end before January 31, thereby avoiding the swallow nesting and maternal bat roosting seasons. As a result, the project will have no effect on native wildlife nursery sites during construction.

Mitigation. None Warranted.

3.4.4 Degradation of Water Quality in Seasonal Creeks, Reservoirs and Downstream Waters

Potential Impact. Extensive grading often leaves the soils of construction zones barren of vegetation and, therefore, vulnerable to erosion. Eroded soil can be carried as sediment in seasonal creeks to be deposited in creek beds and adjacent wetlands. The topography of the site slopes towards the North and South Forks of Willow Creek. The erosion hazard of the soil mapping units occurring on the site is considered moderate to very high (USDA 1993). All graded areas would be vulnerable to erosion during the winter rainy season. The potential for erosion and the degradation of water quality in the adjacent North and South Forks of Willow Creek is considered to be high. The possible deposition of silt in the North and South Forks of Willow Creek would constitute a potentially significant adverse effect of the project.

As part of the project, the engineers will prepare an erosion control plan and storm water pollution prevention plan, which will be implemented during construction. Theses plans will incorporate all of the appropriate Best Management Practices for this project. Preparation and implementation of the plans during construction ensure there is no foreseeable degradation of water quality in seasonal creeks, reservoirs or downstream waters.

The project will have a less than significant effect on water quality in seasonal creeks, reservoirs and downstream waters.

Mitigation. None warranted.

3.4.5. Impacts to Special Status Plant Species

Impact. Seven special status vascular plant species are known to occur in the general project vicinity (see Table 1). All seven species are either absent or unlikely to be present. The project would have no effect on regional populations of these seven special status plant species.

Mitigation. None warranted.

3.4.6 Project Impact to Special Status Animal Species

Impact. Thirty special status animal species occur regionally (see Table 2). Possible impacts to regional populations of these species from project construction are discussed below:

Species Absent From the Site, or Unlikely to Occur There. Of the 30 special status species potentially occurring in the region, 16 would not occur or would be unlikely to occur on the site due to the absence of suitable habitat. These species include among others vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamanders, western burrowing owl, etc. Eventual site development would have no effect on these 16 species, because there is little or no likelihood that they occur onsite.

Species That May Pass Through the Site During Migration. Of the 30 special status species potentially occurring in the region, 4 species would at most pass through or over the site as

migrants or transients or forage on the site from time to time. These species include golden eagle, Vaux's swift, black swift and western pond turtle. Nesting habitat is not present on or near the site, but these species would potentially pass through the site from time to time during migration. The proposed project would have no effect on regional populations of these species.

Species that May Forage. Of the 30 special status species potentially occurring in the region, 8 species could forage on the site, but breed, nest, or den in habitats off site. Breeding habitat for these species is largely absent from the study area itself, but provides marginally suitable foraging habitat. Such species include the long-eared owl, great gray owl, yellow warbler, ringtail, and four species of bats. The proposed project will temporarily reduce a small amount of marginal foraging habitat for these species. After project completion each of these species would continue utilize the site in the same capacity as they did prior to construction.

Species that May Forage, Breed, Nest, Roost, or Den on the Site. Of the 30 special status species potentially occurring in the region, only one, the olive-sided flycatcher, may forage, breed, nest, roost, or den on the site. Trees overhanging the site provide potential nesting habitat for the olive-sided flycatcher. Because construction will occur between September 1 and January 31 (outside of the nesting season) construction will not result in direct mortality or nest abandonment. The proposed project will temporarily reduce a small amount of marginal foraging habitat for this species. After project completion this species will continue utilize the site in the same capacity as it did prior to construction.

The project will result in a less than significant impact to species that may forage, breed, nest, roost, or den on the site.

Mitigation. None warranted.

3.4.7 Project Impacts to Riparian Habitat or other Natural Communities of Special Concern

Impact. Central valley drainage rainbow trout/cyprinid stream, a natural community of special concern, exists underneath and adjacent to the project site in the form of South Fork Willow

Creek, which also supports riparian habitat. The project will avoid the creek by attaching the pipeline to the existing bridge. No construction will occur within the bed, bank or riparian habitat of the creek. Therefore, the project will have no effect on these natural communities of special concern.

Mitigation. None warranted

3.4.8 Project Impacts to Wildlife Movement Corridors

Impact. As previously noted (Section 2.6), the site does not appear to function as a corridor for regular seasonal movements of wildlife species moving through the region. The project would have little effect on such regional movements. Therefore, this project will result in a less than significant effect on regional wildlife movements.

Mitigation. None warranted.

3.4.9 Project Impacts to Fish and Wildlife Habitat

Impact. While ruderal land uses of the site provide some habitat for a number of wildlife species, they are not of unique or significant value as wildlife habitat. After project completion, wildlife use of the site will be essentially the same as it is now. The project will not result in a fish or wildlife population dropping below self-sustaining levels, or threatened to eliminate an animal community. Therefore, the project construction would not constitute a significant adverse environmental impact on fish or wildlife habitat.

Mitigation. None warranted.

3.4.10 Disturbance to Waters of the United States

Potential Impacts. The South Fork Willow Creek appears to meet the jurisdictional requirements of the USACE. No development is planned to occur within the bed, bank or riparian habitat of the creek. Because the proposed projects will avoid the creek there would be no impact to Waters of the U.S.

Mitigation. Impacts to Waters of the U.S. will be avoided, no mitigation is required.

3.4.11 Local Policies or Habitat Conservation Plans

Impact. The project appears to be consistent with the County of Madera General Plan policies that are relevant to natural resource protection.

Mitigation. None warranted.

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APPENDIX A: VASCULAR PLANTS OF THE STUDY AREA

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The plants species listed below were observed on the study site during surveys conducted by Live Oak Associates, Inc. on May 11, 2010. The U.S. Fish and Wildlife Service wetland indicator status of each plant has been shown following its common name.

OBL - Obligate
FACW - Facultative Wetland
FAC - Facultative
FACU - Facultative Upland
UPL - Upland
+/- - Higher/lower end of category
NR - No review
NA - No agreement
NI - No investigation

AGAVACEAE – Agave Family		
Chlorogalum sp.	Unknown soaproot	-
ANACARDIACEAE – Sumac Family		
Rhus trilobata	Three-leaf sumac	NI
Toxicodendron diversilobum	Poison Oak	UPL
APIACEAE - Carrot Family		
Lomatium sp.	Unknown lomatium	-
Torilis arvensis	Hedge parsley	UPL
ASTERACEAE - Sunflower Family		
Artemisia douglasiana	Mugwort	FACW
Filago gallica	Filago	UPL
Hypochaeris radicata	False dandelion	UPL
Holocarpha heermannii	Heermann's tarweed	UPL
Lactuca serriola	Prickly Lettuce	FAC
Madia elegans	Common madia	UPL
Matricaria discoidea	Pineapple weed	FACU
Micropus californicus	slender cottonweed	UPL
Pseudobahia heermannii	Foothill sunburst	UPL
Senecio vulgaris	Common Groundsel	NI
Wyethia elata	Hall's mule ears	UPL
BETULACEAE – Birch Family		
Alnus sp.	Unknown alder	-
BIGNONIACEAE – Trumpet Creeper Family		
Catalpa sp.	Unknown catalpa	UPL
BORAGINACEAE - Borage Family		
Amsinckia menziesii var. menziesii	Menzies' fiddleneck	UPL
Amsinckia menziesii var. intermedia	Common fiddleneck	UPL
Nemophila menziesii	Baby blue eyes	UPL
Phacelia sp.	Unknown heliotrope	-
Plagiobothrys nothofulvus	Popcorn flower	FAC

BRASSICACEAE – Mustard Family		
Brassica sp.	Unknown mustard	UPL
Thysanocarpus curvipes	Sand fringepod	UPL
CAPRIFOLIACEAE – Honeysuckle Family		
Sambucus mexicana	Blue elderberry	FAC
Lonicera sp.	Unknown honeysuckle	-
CARYOPHYLLACEAE – Carnation Familly		
Cerastium sp.	Mouse-ear chickweed	-
Silene gallica	Windmill pink	UPL
CUPRESSACEAE – Cypress Family		
Calocedrus decurrens	Incense cedar	UPL
CYPERACEAE – Sedge Family		
Carex sp.	Unknown sedge	-
ERICACEAE – Heath Family		
Arctostaphylos viscida ssp. *mariposa*	Mariposa Manzanita	UPL
FABACEAE – Legume Family		
Cerces occidentalis	Redbud	UPL
Lupinus sp.	Unknown lupine	-
Lupinus albicaulis	Sickle-keel lupine	UPL
Lupinus bicolor	Bicolor lupine	UPL
Lupinus microcarpus	Chick lupine	UPL
Medicago lupulina	Black Medic	FAC
Trifolium albopurpureum	Indian clover	UPL
Trifolium hirtum	Rose clover	UPL
Trifolium villdenovii	Tomcat clover	UPL
Vicia villosa	Fodder vetch	UPL
Vicia sp.	Unknown vetch	-
FAGACEAE - Oak Family		
Quercus kelloggii	Black Oak	UPL
Quercus lobata	Valley Oak	FAC
Quercus wislizeni	Interior live oak	UPL
GERANIACEAE - Geranium Family		
Erodium botrys	Broad-leaf Filaree	UPL
Erodium cicutarium	Red-stemmed Filaree	UPL
Geranium dissectum	Cut-leaved cranesbill	UPL
GROSSULARIACEAE – Gooseberry Family		
Ribes sp.	Unknown gooseberry	-
JUGLANDACEAE – Walnut Family		
Juglans californica	Southern black walnut	FAC
JUNCACEAE – Rush Family		
Lazula sp.	Unknown woodrush	UPL
LILIACEAE – Lilly Family		
Calochortus albus	Globe lily	UPL
Dichelostemma capitatum	Blue dicks	UPL
Triteleia ixioides	Prettyface	UPL

OROBANCHACEAE – Broomrape Family		
Castilleja attenuata	Attenuate Indian paintbrush	UPL
OLEACEAE – Olive Family		
Fraxinus latifolia	Oregon ash	FACW
ONAGRACEAE – Evening Primrose Family		
Clarkia sp.	Unknown clarkia	UPL
PAPAVERACEAE – Poppy Family		
Eschscholzia californica	California poppy	UPL
PINACEAE – Pine Family		
Pinus ponderosa	Ponderosa Pine	UPL
Pinus sabiniana	Foothill Pine	UPL
Tsuga mertensiana	Sierra hemlock	FACU+
PLANTAGINACEAE – Plantain Family		
Plantago lanceolata	English Plantain	FAC-
POACEAE - Grass Family		
Aira caryophyllea	Silver hairgrass	UPL
Avena sp.	Unknown oat	UPL
Bromus diandrus	Ripgut	UPL
Bromus hordeaceus	Soft Chess	FACU
Bromus madritensis	Foxtail Brome	UPL
Hordeum marinum	Sea Barley	UPL
Poa bulbosa	Bulbous bluegrass	UPL
Vulpia myuros	Rattail Fescue	FACU*
POLEMONIACEAE – Jacob's Ladder Family		
Gilia capitata	Bluehead gilia	UPL
Gilia tricolor	Tricolor gilia	UPL
Leptosiphon bicolor	True babystars	UPL
Leptosiphon ciliates	Whiskerbrush	UPL
POLYGONACEAE - Buckwheat Family		
Eriogonum sp.	Unknown buckwheat	UPL
Rumex acetosella	Sheep's sorrel	FAC-
PORTULACACEAE – Primrose Family		
Claytonia parviflora	Streambank springbeauty	UPL
RANUNCULACEAE – Buttercup Family		
Delphinium sp.	Unknown larkspur	-
Ranunculus occidentalis	Western buttercup	FACW
RHAMNACEAE – Buckthorn Family		
Ceanothus cuneatus	Wedgeleaf Ceanothus	UPL
Ceonothus integerrimus	Deerbrush	UPL
Rhamnus sp.	Unknown buckthorn	-
ROSACEAE – Rose Family		
Potentilla sp.	Unknown cinquefoil	-
Prunus sp.	Unknown fruit/nut tree	-
Rubus armeniacus	Himalayan blackberry	FACW*
RUBIACEAE – Bedstraw Family		
Galium sp.	Unknown bedstraw	-

SALICEAE – Willow Family		
Salix sp.	Unknown willow	-
SANTALACEAE – Sandalwood Family		
Phoradendron sp.	Unknown mistletoe	UPL
SAPINDACEAE – Soapberry Family		
Aesculus sp.	Unknown buckeye	UPL
SAXIFRAGACEAE – Saxifrage Family		
Lithophragma sp.	Unknown woodland star	UPL
SCROPHULARIACEAE – Figwort Family		
Triphysaria erantha	Butter-and-eggs	UPL

APPENDIX B: TERRESTRIAL VERTEBRATE SPECIES THAT POTENTIALLY OCCUR ON THE STUDY AREA

APPENDIX B: TERRESTRIAL VERTEBRATE SPECIES THAT POTENTIALLY OCCUR ON THE STUDY AREA

The species listed below are those that may reasonably be expected to use the habitats of the study area routinely from time to time. The list was not intended to include birds that are vagrants or occasional transients. Terrestrial vertebrate species observed in or adjacent to the study area on May 11, 2010 have been noted with an asterisk.

CLASS: AMPHIBIA
ORDER: CAUDATA (Salamanders)
FAMILY: SALAMANDRIDAE (Newts)
California Newt (*Taricha torosa*)
FAMILY: PLETHODONTIDAE (Lungless Salamanders)
Ensatina (*Ensatina eschscholtzii*)
Black-bellied Salamander (*Batrachoseps nigriventris*)
Pacific Slender Salamander (*Batrachoseps pacificus*)
ORDER: SALIENTIA (Frogs and Toads)
FAMILY: PELOBATIDAE (Spadefoot Toads)
Western Spadefoot Toad (*Scaphiopus hammondii*)
FAMILY: BUFONIDAE (True Toads)
Western Toad (*Bufo boreas*)
FAMILY: HYLIDAE (Treefrogs and Relatives)
Pacific Treefrog (*Pseudacris regilla*)
FAMILY: RANADAE (True frogs)
California Red-legged Frog (*Rana aurora draytonii*)
Bullfrog (*Rana catesbeiana*)

CLASS: REPTILIA
ORDER: TESTUDINES (Turtles)
FAMILY: EMYDIDAE (Box and Water Turtles)
Western Pond Turtle (*Clemmys marmorata*)
ORDER: SQUAMATA (Lizards and Snakes)
SUBORDER: SAURIA (Lizards)
FAMILY: IGUANIDAE (Iguanids)
Western Fence Lizard (*Sceloporus occidentalis*)
Sagebrush Lizard (*Sceloporus graciosus*)
FAMILY: SCINCIDAE (Skinks)
Gilbert Skink (*Eumeces gilberti*)
FAMILY: ANGUIDAE (Alligator Lizards and Relatives)
Southern Alligator Lizard (*Gerrhonotus multicarinatus*)
SUBORDER: SERPENTES (Snakes)
FAMILY: BOIDAE (Boas)
Rubber Boa (*Charina bottae*)
FAMILY: COLUBRIDAE (Colubrids)

Ring-necked Snake (*Diadophis punctatus*)
Racer (*Coluber constrictor*)
Striped Racer (*Masticophis flagellum*)
Gopher Snake (*Pituophis melanoleucus*)
Common Kingsnake (*Lampropeltis getulus*)
Common Garter Snake (*Thamnophis sirtalis*)
Night Snake (*Hypsiglena torquata*)

FAMILY: VIPERIDAE

Western Rattlesnake (*Crotalus viridis*)

CLASS: AVES

ORDER: PODICIPEDIFORMES (Grebes)

FAMILY: PODICIPEDIDAE (Grebes)

Pied-billed Grebe (*Podilymbus podiceps*)

ORDER: CICONIIFORMES (Herons, Storks, Ibises, and relatives)

FAMILY: ARDEIDAE (Herons and Bitterns)

Great Blue Heron (*Ardea herodias*)
Great Egret (*Ardea alba*)
Snowy Egret (*Egretta thule*)
Green-backed Heron (*Butorides striatus*)

ORDER: ANSERIFORMES (Screamers, Ducks, and relatives)

FAMILY: ANATIDAE (Swans, Geese and Ducks)

Tundra Swan (*Cygnus columbinaus*)
Snow Goose (*Chen caerulescens*)
Canada Goose (*Branta canadensis*)
Wood Duck (*Aix sponsa*)
Green-winged Teal (*Anas crecca*)
Mallard (*Anas platyrhyncyhos*)
Northern Pintail (*Anas acuta*)
Cinnamon Teal (*Anas cyanoptera*)
Northern Shoveler (*Anas clypeata*)
Gadwall (*Anas strepera*)
American Wigeon (*Anas americana*)
Canvasback (*Aythya valisineria*)
Redhead (*Aythya americana*)
Ring-necked Duck (*Aythya collaris*)
Lesser Scaup (*Aythya affinis*)
Common Goldeneye (*Bucephala clangula*)
Bufflehead (*Bucephala albeola*)
Hooded Merganser (*Lophodytes cucullatus*)
Common Merganser (*Mergus merganser*)
Ruddy Duck (*Oxyura jamaicensis*)

ORDER: FALCONIFORMES (Vultures, Hawks, and Falcons)

FAMILY: CATHARTIDAE (American Vultures)

*Turkey Vulture (*Cathartes aura*)

FAMILY: ACCIPITRIDAE (Hawks, Old World Vultures, and Harriers)

White-tailed Kite (*Elanus caeruleus*)
Northern Harrier (*Circus cyaneus*)
Sharp-shinned Hawk (*Accipiter striatus*)
Cooper's Hawk (*Accipiter cooperi*)
Northern Goshawk (*Accipiter gentilis*)
*Red-shouldered Hawk (*Buteo lineatus*)
*Red-tailed Hawk (*Buteo jamaicensis*)
Ferruginous Hawk (*Buteo regalis*)
Rough-legged Hawk (*Buteo lagopus*)
Golden Eagle (*Aquila chrysaetos*)
Bald Eagle (*Haliaeetus leucocephalus*)

FAMILY: FALCONIDAE (Caracaras and Falcons)

American Kestrel (*Falco sparverius*)
Merlin (*Falco columbarius*)
Peregrine Falcon (*Falco peregrinus*)
Prairie Falcon (*Falco mexicanus*)

ORDER: GALLIFORMES (Megapodes, Currassows, Pheasants, and Relatives)

FAMILY: PHASIANIDAE (Quails, Pheasants, and Relatives)

California Quail (*Callipepla californica*)
Wild Turkey (*Melegris gallopavo*)

ORDER: GRUIFORMES (Cranes, Rails, and relatives)

FAMILY: RALLIDAE (Rails, Gallinules and Coots)

American Coot (*Fulica americana*)

ORDER: CHARADRIIFORMES (Shorebirds, Gulls, and relatives)

FAMILY: CHARADRIIDAE (Plovers and relatives)

Killdeer (*Charadrius vociferus*)

FAMILY: SCOLOPACIDAE (Sandpipers and relatives)

Greater Yellowlegs (*Tringa melanoleuca*)
Spotted Sandpiper (*Actitus macularia*)
Western Sandpiper (*Calidris mauri*)
Least Sandpiper (*Calidris minutilla*)
Long-billed Dowitcher (*Limnodromus scolopaceus*)
Ring-billed Gull (*Larus delawarensis*)
California Gull (*Larus californicus*)
Forster's Tern (*Sterna forsteri*)
Common Snipe (*Gallinago gallinago*)

ORDER: COLUMBIFORMES (Pigeons and Doves)

FAMILY: COLUMBIDAE (Pigeons and Doves)

Band-tailed Pigeon (*Columba fasciata*)
*Mourning Dove (*Zenaida macroura*)

ORDER: CUCULIFORMES (Cuckoos and relatives)

FAMILY: CUCULIDAE (Typical Cuckoos)

Greater Roadrunner (*Geococcyx californianus*)

ORDER: STRIGIFORMES (Owls)

FAMILY: TYTONIDAE (Barn Owls)

Barn Owl (*Tyto alba*)

FAMILY: STRIGIDAE (Typical Owls)
California Spotted Owl (*Strix occidentalis occidentalis*)
Western Screech Owl (*Otus kennicottii*)
Great Horned Owl (*Bubo virginianus*)
Northern Pygmy-Owl (*Glaucidium gnoma*)
Burrowing Owl (*Athene cunicularia*)
Long-eared Owl (*Asio otus*)
Northern Saw-whet Owl (*Aegolius acadicus*)

ORDER: CAPRIMULGIFORMES (Goatsuckers and Relatives)

FAMILY: CAPRIMULGIDAE (Goatsuckers)
Common Nighthawk (*Chordeiles minor*)
Common Poorwill (*Phalaenoptilus nuttalli*)

ORDER: APODIFORMES (Swifts and Hummingbirds)

FAMILY: APODIFORMES (Swifts)
Black Swift (*Cypseloides niger*)
Vaux's Swift (*Chaetura vauxi*)
White-throated Swift (*Aeronautes saxatalis*)

FAMILY: TROCHILIDAE (Hummingbirds)
Black-chinned Hummingbird (*Archilochus alexandri*)
*Anna's Hummingbird (*Calypte anna*)
Calliope Hummingbird (*Stellula calliope*)
Rufous Hummingbird (*Selasphorus rufus*)

ORDER: PICIFORMES (Woodpeckers and Relatives)

FAMILY: PICIDAE (Woodpeckers and Wrynecks)
Lewis's Woodpecker (*Melanerpes lewis*)
*Acorn Woodpecker (*Melanerpes formicivorous*)
Red-breasted Sapsucker (*Sphyrapicus ruber*)
Nuttall's Woodpecker (*Picoides nuttallii*)
Downy Woodpecker (*Picoides pubescens*)
Hairy Woodpecker (*Picoides villosis*)
*Northern Flicker (*Colaptes auratus*)

ORDER: PASSERIFORMES (Perching Birds)

FAMILY: TYRANNIDAE (Tyrant Flycatchers)
Olive-sided Flycatcher (*Contopus borealis*)
Western Wood-Pewee (*Contopus sordidulus*)
Willow Flycatcher (*Empidonax traillii*)
Hammond's Flycatcher (*Empidonax hammondii*)
Dusky Flycatcher (*Empidonax oberholseri*)
*Pacific Slope Flycatcher (*Empidonax difficilis*)
*Black Phoebe (*Sayornis nigricans*)
Say's Phoebe (*Sayornis saya*)
Ash-throated Flycatcher (*Myiarchus cinerascens*)
Western Kingbird (*Tyrannus verticalis*)

FAMILY: HIRUNDINIDAE (Swallows)
Tree Swallow (*Tachycineta bicolor*)
Violet-green Swallow (*Tachycineta thalassina*)

Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)
Cliff Swallow (*Hirundo pyrrhonota*)
Barn Swallow (*Hirundo rustica*)

FAMILY: CORVIDAE (Jays, Magpies, and Crows)

*Western Scrub Jay (*Aphelocoma californica*)
Steller's Jay (*Cyanocitta stelleri*)
American Crow (*Corvus brachyrhynchos*)
Common Raven (*Corvus corax*)

FAMILY: PARIDAE (Titmice)

*Oak Titmouse (*Baeolophus inornatus*)
Mountain Chickadee (*Poecile gambeli*)
Plain Titmouse (*Poecile inornatus*)

FAMILY: AEGITHALIDAE (Bushtit)

*Bushtit (*Psaltriparus minimus*)

FAMILY: SITTIDAE (Nuthatches)

Red-breasted Nuthatch (*Sitta canadensis*)
White-breasted Nuthatch (*Sitta carolinensis*)

FAMILY: CERTHIIDAE (Creepers)

Brown Creeper (*Certhia americana*)

FAMILY: TROGLODYTIDAE (Wrens)

Rock Wren (*Salpinctes obsoletus*)
Canyon Wren (*Catherpes mexicanus*)
Bewick's Wren (*Thryomanes bewickii*)
*House Wren (*Troglodytes aedon*)
Winter Wren (*Troglodytes troglodytes*)

FAMILY: CINCLIDAE (Dippers)

American Dipper (*Cinclus mexicanus*)

FAMILY: MUSCICAPIDAE (Old World Warblers, Gnatcatchers, Kinglets, Thrushes, Bluebirds, and Wrentit)

Golden-crowned Kinglet (*Regulus satrapa*)
Ruby-crowned Kinglet (*Regulus calendula*)
Blue-gray Gnatcatcher (*Polioptila caerulea*)
Western Bluebird (*Sialia mexicana*)
Mountain Bluebird (*Sialia currucoides*)
Townsend's Solitaire (*Myadestes townsendi*)
Swainson's Thrush (*Catharus ustulatus*)
Hermit Thrush (*Catharus guttatus*)
*American Robin (*Turdus migratorius*)
Varied Thrush (*Ixoreus naevius*)
*Wrentit (*Chamaea fasciata*)

FAMILY: MIMIDAE (Mockingbirds and Thrashers)

Northern Mockingbird (*Mimus polyglottos*)

FAMILY: MOTACILLIDAE (Wagtails and Pipits)

American Pipit (*Anthus rubescens*)

FAMILY: BOMBYCILLIDAE (Waxwings)

Cedar Waxwing (*Bombycilla cedrorum*)

FAMILY: PTILOGONATIDAE (Silky Flycatchers)
Phainopepla (*Phainopepla nitens*)
FAMILY: STURNIDAE (Starlings)
*European Starling (*Sturnus vulgaris*)
FAMILY: VIREONIDAE (Typical Vireos)
Solitary Vireo (*Vireo solitarius*)
Hutton's Vireo (*Vireo huttoni*)
Warbling Vireo (*Vireo gilvus*)
FAMILY: EMBERIZIDAE (Wood Warblers, Sparrows, Blackbirds, and Relatives)
Orange-crowned Warbler (*Vermivora celata*)
*Nashville Warbler (*Vermivora ruficapilla*)
California Yellow Warbler (*Dendroica petechia brewsteri*)
Yellow-rumped Warbler (*Dendroica coronata*)
Black-throated Gray Warbler (*Dendroica nigrescens*)
Townsend's Warbler (*Dendroica townsendi*)
Hermit Warbler (*Dendroica occidentalis*)
MacGillivray's Warbler (*Oporornis tolmiei*)
Wilson's Warbler (*Wilsonia pusilla*)
Western Tanager (*Piranga ludoviciana*)
*Black-headed Grosbeak (*Pheucticus melanocephalus*)
Lazuli Bunting (*Passerina amoena*)
Green-tailed Towhee (*Pipilo chlorurus*)
Spotted Towhee (*Pipilo maculatus*)
California Towhee (*Pipilo crissalis*)
Rufous-crowned Sparrow (*Aimophila ruficeps*)
Chipping Sparrow (*Spizella passerina*)
Black-chinned Sparrow (*Spizella atrogularis*)
Vesper Sparrow (*Pooecetes gramineus*)
Lark Sparrow (*Chondestes grammacus*)
Savannah Sparrow (*Passerculus sandwichensis*)
Fox Sparrow (*Passerella iliaca*)
Song Sparrow (*Melospiza melodia*)
Lincoln's Sparrow (*Melospiza lincolnii*)
Golden-crowned Sparrow (*Zonotrichia atricapilla*)
White-crowned Sparrow (*Zonotrichia leucophrys*)
Dark-eyed Junco (*Junco hyemalis*)
Red-winged Blackbird (*Agelaius phoeniceus*)
*Brewer's Blackbird (*Euphagus cyanocephalus*)
Brown-headed Cowbird (*Molothrus ater*)
Bullock’s Oriole (*Icterus bullockii*)
FAMILY: FRINGILLIDAE (Finches)
Purple Finch (*Carpodacus purpureus*)
House Finch (*Carpodacus mexicanus*)
Pine Siskin (*Carduelis pinus*)
*Lesser Goldfinch (*Carduelis psaltria*)

Evening Grosbeak (*Coccothraustes vespertinus*)
FAMILY: PASSERIDAE
*House Sparrow (*Passer domesticus*)

CLASS: MAMMALIA
ORDER: MARSUPIALIA (Opossums, Kangaroos, and Relatives)
FAMILY: DIDELPHIDAE (Opossums)
Virginia Opossum (*Didelphis virginiana*)

ORDER: INSECTIVORA (Shrews and Moles)
FAMILY: SORICIDAE (Shrews)
Ornate Shrew (*Sorex ornatus*)
Trowbridge's Shrew (*Sorex trowbridgii*)
FAMILY: TALPIDAE (Moles)
Broad-footed Mole (*Scapanus latimanus*)
ORDER: CHIROPTERA (Bats)
FAMILY: VESPERTILIONIDAE (Vespertilionid Bats)
Little Brown Myotis (*Myotis lucifugus*)
Yuma Myotis (*Myotis yumanensis*)
Long-eared Myotis, (*Myotis evotis*)
Fringed Myotis (*Myotis thysanodes*)
Long-legged Myotis (*Myotis volans*)
California Myotis (*Myotis californicus*)
Small-footed Myotis (*Myotis leibii*)
Western Pipistrelle (*Pipistrellus hesperus*)
Big Brown Bat (*Eptesicus fuscus*)
Red Bat (*Lasiurus borealis*)
Hoary Bat (*Lasiurus cinereus*)
Spotted Bat (*Euderma maculatum*)
Townsend's Big-eared Bat (*Plecotus townsendii*)
Pallid Bat (*Antrozous pallidus*)
FAMILY: MOLOSSIDAE (Free-tailed Bat)
Brazilian Free-tailed Bat (*Tadarida brasiliensis*)
Western Mastiff Bat (*Eumops perotis*)
ORDER: LAGOMORPHA (Rabbits, Hares, and Pikas)
FAMILY: LEPORIDAE (Rabbits and Hares)
Brush Rabbit (*Sylvilagus bachmani*)
Desert Cottontail (*Sylvilagus audubonii*)
Black-tailed Hare (*Lepus californicus*)
ORDER: RODENTIA (Squirrels, Rats, Mice, and Relatives)
FAMILY: APLODONTIDAE (Mountain beaver)
Sierra Nevada Mountain Beaver (*Aplodontia rufa californica*)
FAMILY: SCIURIDAE (Squirrels, Chipmunks, and Marmots)
*California Ground Squirrel (*Spermophilus beecheyi*)
Western Gray Squirrel (*Sciurus griseus*)
FAMILY: GEOMYIDAE (Pocket Gophers)

Botta's Pocket Gopher (*Thomomys bottae*)

FAMILY: CRICETIDAE (Deer Mice, Voles, and Relatives)

California Pocket Mouse (*Perognathus californicus*)
Western Harvest Mouse (*Reithrodontomys megalotis*)
California Mouse (*Peromyscus californicus*)
Deer Mouse (*Peromyscus maniculatus*)
Brush Mouse (*Peromyscus boylii*)
Dusky-footed Wood Rat (*Neotoma fuscipes*)
Meadow Vole (*Microtus californicus*)

ORDER: CARNIVORA (Carnivores)

FAMILY: CANIDAE (Foxes, Wolves, and Relatives)

Coyote (*Canis latrans*)
Red Fox (*Vulpes vulpes*)
Gray Fox (*Urocyon cinereoargenteus*)

FAMILY: PROCYONIDAE (Raccoons and Relatives)

Ringtail (*Bassariscus astutus*)
Raccoon (*Procyon lotor*)

FAMILY: MUSTELIDAE (Weasels, Badgers, and Relatives)

Long-tailed Weasel (*Mustela frenata*)
American Badger (*Taxidea taxus*)
Western Spotted Skunk (*Spilogale gracilis*)
Striped Skunk (*Mephitis mephitis*)

FAMILY: FELIDAE (Cats)

Feral Cat (*Felis cattus*)
Mountain Lion (*Felis concolor*)
Bobcat (*Lynx rufus*)

ORDER: ARTIODACTYLA

FAMILY: CERVIDAE (Deer, Elk, and Relatives)

Mule Deer (*Odocoileus hemionus*)

APPENDIX C: SELECTED PHOTOGRAPHS OF THE PROJECT SITE

Picture #1: Road 225. East end of the sewer pipeline alignment.

Picture #2: South Fork Willow Creek in background. Proposed wastewater pump site in foreground on the right side of the road.

Picture #3: Elderberry bush #2 with green flagging, next to Road 228.

CEQA APPENDIX G:
ENVIRONMENTAL CHECKLIST FORM

NOTE: The following is a sample form and may be tailored to satisfy individual agencies' needs and project circumstances. It may be used to meet the requirements for an initial study when the criteria set forth in CEQA Guidelines have been met. Substantial evidence of potential impacts that are not listed on this form must also be considered. The sample questions in this form are intended to encourage thoughtful assessment of impacts, and do not necessarily represent thresholds of significance.

1. Project title: South Fork Sewer System
2. Lead agency name and address:
   County of Madera, Department of Engineering and General Services
   2037 W. Cleveland Avenue
   Madera, CA 93637
3. Contact person and phone number: S. Greg Farley, County Engineer (559) 675-7817
4. Project location: South Fork, CA
5. Project sponsor's name and address:
   County of Madera, Department of Engineering and General Services
   2037 W. Cleveland Avenue
   Madera, CA 93637
6. General plan designation: Rural Urban 7. Zoning: Commercial, Rural SF
8. Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)
   The project will include a gravity wastewater collection system, a wastewater pump station, and a sewer force main. This will allow South Fork to eliminate many of the existing septic tanks and leach fields and the failing North Fork Mill Housing Facility wastewater system to be taken out of service.
9. Surrounding land uses and setting: Briefly describe the project's surroundings:
   The project site is located in the unincorporated community of South Fork.
   The surrounding land uses are commercial and rural residential.
10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)
    County of Madera Resources Management Agency
    State Water Resources Control Board
    US Fish and Wildlife Service

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology /Soils
☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials	☐ Hydrology / Water Quality
☐ Land Use / Planning	☐ Mineral Resources	☐ Noise
☐ Population / Housing	☐ Public Services	☐ Recreation
☐ Transportation/Traffic	☐ Utilities / Service Systems	☐ Mandatory Findings of Significance

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☒ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

_____ _____

Signature Date

_____ _____

Signature Date

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a) Earlier Analysis Used. Identify and state where they are available for review.

   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

a) the significance criteria or threshold, if any, used to evaluate each question; and

b) the mitigation measure identified, if any, to reduce the impact to less than significance

SAMPLE QUESTION

Issues:

	Potentially Significant Impact	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
I. AESTHETICS. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒
II. AGRICULTURE AND FORESTRY RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒
III. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☒
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒
IV. BIOLOGICAL RESOURCES: Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☒ Refer to Section 3.13 and Section 3.4 of Live Oak Associates, Inc. Report	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☒ Refer to Section 3.14 and Section 3.4 of Live Oak Associates, Inc. Report	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒
VI. GEOLOGY AND SOILS. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☒
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
VII. GREENHOUSE GAS EMISSIONS. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒ Refer to Section 3.3	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒
VIII. HAZARDS AND HAZARDOUS MATERIALS. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒
IX. HYDROLOGY AND WATER QUALITY. Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☒
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☒
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Otherwise substantially degrade water quality?	☐	☐	☐	☒
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒
X. LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒
XI. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒
XII. NOISE -- Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒ Refer to Section 3.9	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

	Potentially Significant Impact	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XIII. POPULATION AND HOUSING. Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
XIV. PUBLIC SERVICES.				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	☐	☐	☐	☐
Fire protection?	☐	☐	☒	☐
Police protection?	☐	☐	☒	☐
Schools?	☐	☐	☒	☐
Parks?	☐	☐	☒	☐
Other public facilities?	☐	☐	☒	☐
XV. RECREATION.			Refer to Section 3.17	
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒
XVI. TRANSPORTATION/TRAFFIC. Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☒
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

	Potentially Significant Impact	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XVII. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒ Refer to Section 1.4	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE.				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☐	☒
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

Note: Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; *Sundstrom v. County of Mendocino,*(1988) 202 Cal.App.3d 296; *Leonoff v. Monterey Board of Supervisors,* (1990) 222 Cal.App.3d 1337; *Eureka Citizens for Responsible Govt. v. City of Eureka* (2007) 147 Cal.App.4th 357; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th at 1109; *San Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656.

Revised 2009

Response to State Water Resources Control Board Questions (Incorporated November 27, 2012)

Comments on the IS ND

1. **Pa e 1 – second para raph – Can you clarify if there is a buildin sewer moratorium in place**

   The resolutions listed in the report and adopted by the Madera County Board of Supervisors and the Regional Water Quality Control Board prohibit new construction and use of new septic tanks within the North Fork Mill Housing Facility Health Hazard area only, which is located in the South Fork community. No building/sewer moratorium is in place for the rest of the South Fork community.

2. **What is the current avera e flow to the North For Wastewater Treatment Plant**

   See Subsection 1.3.2 on page 4. The County provided BCF with 2008 – 2009 wastewater flow data from the North Fork WWTP. The recorded wastewater flow data has an average daily flow of 16,611 gpd.

. **Pa e 9 (and throu hout the document) Best Mana ement Practices (BMPs) would be implemented to reduce potential erosion, sedimentation and water uality impacts. Please identify those BMPs, and clarify whether these BMPs are re uired as part of the Pro ect description, or are re uired under the Stormwater Dischar e permit, the Wastewater Dischar e Re uirement permit, and or construction permits**

   The BMPs mentioned in the report are those that are required by the National Pollution Discharge Elimination System Construction General Permit. A Storm Water Pollution Prevention Plan (SWPPP) would be developed as part of the project and the BMPs for reducing potential erosion, sedimentation and water quality would be included in the SWPPP. BMP fact sheets can be found at http://www.cabmphandbooks.com/.

4. **Pa e 9 – Greenhouse Gas Emissions Discussion – As re uired under the new CEQA uidelines, please provide a discussion on the Pro ects contribution to reenhouse ases, provide emissions data and discuss the Pro ect s cumulative contribution to reenhouse as impacts.**

   There will be a less than significant impact on greenhouse gas (GHG) emissions by the proposed project. The construction GHG emissions were calculated using the California Emissions Estimator Model (CalEEMod), Version 2011.1.1. This model contains the Air Resource Board's 2007 Emission Factors (EMFAC2007) and Off-Road Motor Vehicles (OFFROAD) models. The model has not been updated to use the EMFAC2011 emissions factors; however the EMFAC2007 provides more conservative estimates of emissions because it does not take into account implementation of state and federal programs to reduce GHG emissions from vehicles. Based on the emissions factors the total greenhouse gases during the temporary construction period are estimated at 56.24 metric tons of CO_2 total for the duration of construction.

   Post construction energy use will be required by the sewer pump station for operation of pumps and other associated equipment and will be fed through the existing electric utility power grid. The operational emissions were also calculated using the CalEEMod Model, Version 2011.1.1. This model calculated the operational emissions of the project to have zero greenhouse gas emissions. The operational emissions therefore do not have a "Business As Usual" model to evaluate a 29 percent reduction of GHG emissions as stated in Assembly Bill 32.

5. **Pa e 12 – Under Section .7 fish and Wildlife – Identify the non nestin months for bats, raptors and swallows.**

   Per Live Oak Associates: Swallow and raptor non-nesting season is September 1st to January 31st. Bat non-maternal roosting period is September 1st to April 14th.

. **Pa e 1 Under Section .1 Threatened or Endan ered Species and pa e 25 of the Biolo ical Report This section identifies the use of United States Fish and Wildlife Service (USFWS) conservation measures for the federally threatened Valley elderberry lon horn beetle. The Biolo ical Report identified three shrubs within the vicinity (within 100 feet) of the pipeline ali nment.**

   a. **Has the USFWS been consulted If so, please forward any correspondences.**

      Per Live Oak Associates: USFWS has not been consulted

   b. **Include in the IS ND a list of the conservation measures from the USFWS VELB uideline.**

      Per Live Oak Associates: The project will avoid impacts to the VELB by implementing the protective measures described in the 1999 *U.S. Fish and Wildlife Service Conservation Guidelines for the Valley Elderberry Longhorn Beetle.* These measures are:

      i. The placement of exclusion fencing 20 feet from the edge of each of the three elderberry shrubs identified in the study area

      ii. Posted signs every 50 feet along the edge of the exclusion fencing with the following information "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment"

      iii. A training of contractors and work crews of the laws protecting the VELB and the conservation status of the species.

   c. **Clarify if any VELB individuals were present durin the field survey**

      Per Live Oak Associates: None observed during field survey.

   d. **Will preconstruction surveys be completed to determine the presence of VELB in the Pro ect area If so, please include a measure in the IS ND indicatin so.**

      Per Live Oak Associates: No preconstruction surveys are recommended at this time, since the project will avoid all shrubs by 20 ft and construction will occur outside the VELB flight season (between March and June) when VELB would be impossible to detect, if present.

e. If the conservation measures are needed in order to reduce impacts to VELB, then the CEQA document must be up raded to an Miti ated Ne ative Declaration, and a Miti ation Monitorin and Reportin Pro ram must be developed to ensure implementation and reportin of those miti ation measures.

Proposed sewer main construction in the vicinity of identified elderberry shrubs will be confined to existing roadways that are regularly travelled by residential, commercial and school bus traffic in the North Fork and South Fork Communities. It is the County's opinion that, in comparison to typical daily activities within and along those roadways, temporary construction activities will result in a reduction in the potential for any impact to the VELB by virtue of construction zone traffic limitations. Also, construction activities will not take place during the VELB flight season, which is during the period from March through June, as a result of other considerations relative to swallow and raptor nesting periods. Nevertheless, the project will also include the implementation of protective measures established by the USFWS and presented in the 1999 USFWS VELB Guidelines, to ensure that temporary construction activities do not affect areas outside of the existing roadway and do not result in impacts to existing VELB habitat.

7. Pa e 14 – Under Section .19 Population and Housin – Provide a discussion on whether or not the Pro ect will have rowth inducin impacts, and provide substantive evidence to support the determination.

The project will not have growth inducing impacts beyond growth already contemplated in existing planning documents. The project would be an implementation of the *"North Fork/South Fork Community Center Area Plan,"* (CAP) dated November 25, 2003 and the October 1998 *"Master Plan for Site Reuse,"* (Master Plan) for the North Fork Mill site. The CAP indicated that no population inducement would result and proposed a Negative Declaration for the CAP. The Environmental Impact Report for the Master Plan defines mitigation measures for population inducement as a result of any development of the mill site.

Additionally, the project is within a defined service area and there are no proposed plans for extension beyond the service area. Sewer services to those currently using septic systems would be designed with minimum cover so that no extension beyond the current users would be feasible.

Comments on the Biolo ical Report

1. Pa e Under the Literature Search Section Literature searches were done usin databases from the California Department of Fish and Game, the California Native Plant Society, and the Natural Resource Conservation Service. However, no USFWS databases or species list was provided. Please provide a current USFWS species list for the Pro ect area. If not done so already, provide a brief discussion on the presence observation of those federally listed species (from the USFWS species list) within the pro ect area, identify any potential impacts and needed measures to reduce those impacts.

Per Live Oak Associates: See pages 5 through 7 for USFWS species list.

2. **Pa e 1 the olden ea le (A uia chrysaetos) was present in the Pro ect area durin the field survey, and it was determined that the Pro ect area provides suitable fora in habitat for this species. The olden ea le is a fully federal protected species. Note that the USFWS will not provide ta e authori ation for fully protected species. Discuss to what e tent the Pro ect impacts are, and identify conservation measures to reduce or avoid impacts to this species. Will a preconstruction survey also be completed for this species**

   Per Live Oak Associates: The site provides no nesting habitat for this species and very marginal foraging habitat. The chances of the project impacting this species are extremely low and do not warrant any specific conservation measures. Since no nesting habitat is present on the project site, preconstruction surveys are not warranted.

. **Pa e 18 Please note that the rin tail (Bassariscus astutus) is a California fully protected species, under the urisdiction of the California Department of Fish and Game (DFG). Please indicate if any individuals were present durin the field survey. Discuss if a preconstruction survey will be done to determine its presence. If individuals are present, please discuss any needed measures to reduce impacts to this species, includin consultation with the DFG.**

   Per Live Oak Associates: The project site provides no nesting habitat for this species and very marginal foraging habitat. This species was not observed during the biological field survey. The chances of the project impacting this species are extremely low. Project construction will occur during daylight hours, which will reduce the chances of project activities impacting individual ringtails, which are exclusively nocturnal. Since project activities will occur outside daytime bedding areas, impacts to this species are expected to be non-existent and preconstruction surveys not warranted.

U.S. Fish Wildlife Service

Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 121106014400

Database Last Updated: September 18, 2011

Quad Lists

Listed Species

Invertebrates

- *Branchinecta conservatio*
  Conservancy fairy shrimp (E)
- *Branchinecta lynchi*
  Critical habitat, vernal pool fairy shrimp (X)
  vernal pool fairy shrimp (T)
- *Desmocerus californicus dimorphus*
  valley elderberry longhorn beetle (T)

Fish

- *Hypomesus transpacificus*
  delta smelt (T)
- *Oncorhynchus mykiss*
  Central Valley steelhead (T) (NMFS)

Amphibians

- *Ambystoma californiense*
  California tiger salamander, central population (T)
- *Rana draytonii*
  California red-legged frog (T)

Plants

- *Calyptridium pulchellum*
  Mariposa pussy-paws (T)
- *Castilleja campestris ssp. succulenta*
  Critical habitat, succulent (=fleshy) owl's-clover (X)
- *Orcuttia inaequalis*
  Critical habitat, San Joaquin Valley Orcutt grass (X)

Candidate Species

Mammals

- *Martes pennanti*
  fisher (C)

Quads Containing Listed, Proposed or Candidate Species:

CASCADEL POINT (397B)
NORTH FORK (398A)

Animals

Species	Status	Habitat	Occurrence in the Pro ect Site.
Conservancy fairy shrimp (*Branchinecta conservatio*)	FE	Occurs in vernal pools of California.	**Absent.** Suitable habitat in the form of vernal pools is absent from the project site and surrounding area.
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	Occurs in vernal pools of California.	**Absent.** Suitable habitat in the form of vernal pools is absent from the project site and surrounding area. Critical habitat for this species is absent.
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	FT	Lives in mature elderberry shrubs of California's Central Valley and Sierra Foothills.	**Possible.** Three elderberry shrubs, the obligate habitat of the VELB were observed adjacent to the project site. The nearest documented VELB occurrence is less than 1 mile to the southwest.
Delta smelt (*Hypomesus transpacificus*)	FT, CSC	Occurs in waters of the Sacramento and San Joaquin River Delta area.	**Absent.** The project site is well outside the known range of this species.
Central Valley Steelhead (*Oncorhynchus mykiss irideus*)	FT, CSC	Winters in rivers of the Central Valley. Found in cool, clear, fast-flowing permanent streams and rivers.	**Absent.** Historically occurred in the San Joaquin River, but has since been extirpated from most of California. Furthermore, downstream dams prohibit the movement of this species into South Fork Willow Creek.
California tiger salamander (*Ambystoma californiense*)	FT, CCS	Vernal pools and stock ponds of central California.	**Absent.** The project site and surrounding area lacks suitable habitat for this species, and is outside of its known range. This species has been documented in the O'Neals area approx. 23 miles to the west.
California red-legged frog (*Rana aurora draytonii*)	FT, CSC	Rivers, creeks and stock ponds of the Sierra foothills, preferring pools with overhanging vegetation.	**Absent.** This species has not been observed locally for approx. 30 years and is considered extirpated from Madera Co.
Pacific fisher (*Martes pennanti pacifica*)	FC, CSC	Prefers large oak and fir trees between 3000 and 7000 feet in elevation with abundant squirrel populations.	**Unli ely.** Although numerous individuals occur in the surrounding area at higher elevations, the habitat of the project site is not suitable for this species.

Plants

Species	Status	Habitat	Occurrence in the Pro ect site
Mariposa pussy-paws (*Calytridium pulchellum*)	FT CNPS 1B	Fewer than 10 populations in Mariposa, Madera and Fresno Counties; primarily in coarse granitic sands of decomposing outcrops.	**Absent.** Suitable habitat in the form of open flats of decomposed granite surrounding exposed granite bedrock was absent. The nearest known location for this species is approx. 10 miles to the northwest, near Oakhurst.
Succulent owl's clover (*Castilleja campestris ssp. Succulent*)	FT, CE, CNPS 1B	Occurs in vernal pools of the San Joaquin Valley and lower Sierra Nevada foothills.	**Absent.** Suitable habitat in the form of vernal pools is not present in the project site or surrounding area. Critical habitat for this species is absent.
San Joaquin Valley orcutt grass (*Orcuttia inaequalis*)	FT, CE, CNPS 1B.1	Restricted to San Joaquin Valley and occurs in vernal pools on alluvial fans, high and low stream terraces and tabletop lava flows. Blooms May to August.	**Absent.** Habitat required by this species, in the form of vernal pools, was absent from the project site. Critical habitat for this species is absent.

OCCURRENCE E PLANATIONS

Present: Species observed on the site at time of field surveys or during recent past.
Likely: Species not observed on the site, but it may reasonably be expected to occur there on a regular basis.
Possible: Species not observed on the site, but it could occur there from time to time.
Unlikely: Species not observed on the site, and would not be expected to occur there except, perhaps, as a transient.
Absent: Species not observed on the site, and precluded from occurring there because habitat requirements not met.

STATUS CODES

FE	Federally Endangered	CE	California Endangered
FT	Federally Threatened	CT	California Threatened
FPE	Federally Endangered (Proposed)	CR	California Rare
FC	Federal Candidate	CCS	California Candidate Species
		CFP	California Fully Protected
CNPS 1B	Plant is threatened, endangered in California and Elsewhere in California		
CSC	California Species of Special Concern		

Project impacts to the above species are expected to be absent since these species are absent or unlikely to occur on the project site, with the exception of the VELB which is discussed in responses to comments above.

Part
Revenue Pro ram

TABLE OF CONTENTS

APPENDI

Revenue Program Forms

Form 1: Summary of Users and Wastewater Characteristics

Form 2: Annual OM&R and Nonoperating Costs

Form 3: Summary of Capital Replacement Fund Costs

1.0 DRAFT REVENUE PROGRAM

1.1 Draft Revenue Program Intent

The South Fork Community currently relies on individual septic tanks for wastewater disposal, with the exception of the failing private wastewater system for the North Fork Mill Housing Facility. There is currently no budgeting, capital reserve, funds, expenses, staff or treatment cost allocated for the current system. South Fork also does not currently have any customers, user accounts or other methods to bill wastewater customers.

The revenue program is intended to help develop, implement and maintain a wastewater user charge system and to provide a source of revenue for operation, maintenance, and replacement (OM&R) costs for the wastewater system.

1.2 Description of Users

The user group categories identified for South Fork include residential and commercial users. In general, residential users for South Fork include 15 mobile homes, three apartments, 12 single family dwellings and the 24 residential structures in the North Fork Mill Housing Facility for a total of 54 user accounts. The commercial customers generally include the mill site, bed and breakfast, motel, rest home and other commercial buildings in South Fork for a total of 5 user accounts.

Although residential and commercial user groups are listed separately on the revenue program forms in the appendix, the amount and quality of wastewater generated by each is not expected to be significantly different. One user group charge will be developed for both types of users as well as an individual user charge for each account.

1.3 System of Service Charges

1.3.1 Estimated Wastewater Contribution

As listed on *Form 1: Summary of Users and Wastewater Characteristics* in the appendix, the estimated annual volume of wastewater to be contributed by residential and commercial users in South Fork is 2,299,500 gallons and 949,000 gallons, respectively.

1.3.2 Annual OM&R, Non-operating and Treatment Costs

As listed on *Form 2: Annual OM&R and Nonoperating Costs* in the appendix, we anticipate that the total annual cost required to maintain the South Fork wastewater collection system and to treat the amount of wastewater generated to be approximately $64,000. This total cost includes bi-weekly inspection of the wastewater pump station, pump station electrical costs, repair and replacement of wastewater infrastructure, periodic cleaning of sewer lines, treatment of wastewater and other general maintenance.

1.3.3 User Group Cost

A unit dollar cost per gallon of wastewater has been calculated to be $0.02 as shown on *Form 3: Summary of Capital Replacement Fund Costs* in the appendix. This unit cost was then multiplied by the estimated annual wastewater volume to obtain an annual cost. Based on a 12 month billing cycle, the total user group cost for residential and commercial groups will be approximately $5,400 per month. This rate is assumed for the first full year of operation and rates in subsequent years may need to be adjusted based on actual OM&R costs and actual flow.

1.3.3 User Account Cost

A breakdown of costs by user group yields an approximate cost of $3,800 for residential and $1,600 for commercial. These user group costs can be further broken down to determine an approximate user cost for each individual user account. A total of 54 residential user accounts have been identified, therefore each residential user account can expect to pay approximately $70 as their monthly user charge. Similarly, a total of five commercial user accounts have been identified, therefore each commercial user account can expect to pay approximately $320 as their monthly user charge. As with the user group cost, this rate is assumed for the first full year of operation and rates in subsequent years may need to be adjusted based on actual OM&R costs and actual flow.

APPENDIX

FORM 1 Summary of Users and Wastewater Characteristics

Community: South Fork, CA Date: 06-16-10

(A) Number of Accounts	(B) Users (User Group)	(C) AVERAGE DAILY FLOW (gallons)	(D) AVERAGE DESIGN FLOW (gallons)	(E) ANNUAL VOLUME (C)x0.365 (1000 gallons)
54	Residential	6,300.00	25,200.00	2,299.50
5	Commercial	2,600.00	10,400.00	949.00
	SubTotals	8,900.00	35,600.00	3,248.50
	Infiltration/inflow	-	-	-
	Future Capacity	6,000.00	24,000.00	2,190.00
	Totals	14,900.00	59,600.00	5,438.50

FORM 2 Annual OM&R and Nonoperating Costs
(Instructions on back of page)

Community: South Fork, CA Date: 06-16-10

COST CATEGORY	CURRENT YEAR COSTS	FIRST YEAR OF FULL OPERATION
1. TREATMENT AND COLLECTION		
(a) Wages and Salaries	$0	$31,000
(b) Benefits	$0	$5,600
(c) Utilities	$0	$16,000
(d) Supplies	$0	$0
(e) Contract Services	$0	$1,200
(f) Repairs	$0	$4,800
(g) Equipment Replacement	$0	$1,200
(h) Insurance	$0	$0
(i) General and Administrative	$0	$3,000
(j) Subtotal Treatment Facilities	$0	$62,800
2. OPERATING INCOME:		
(a) Rent	$0	$0
(b) Sale of products	$0	$0
(c) Investment Income	$0	$0
(d) Subtotal Operating Income	$0	$0
3. MISCELLANEOUS:		
(a) Overhead/Indirect	$0	$1,200
(b) Operating Reserve Fund	$0	$0
(c) Capital Reserve Fund	$0	$0
(d) Debt Service Fund	$0	$0
(e) Subtotal miscellaneous	$0	$1,200
4. TOTAL ANNUAL COST REQUIRED	$0	$64,000

(Instructions on back of page)

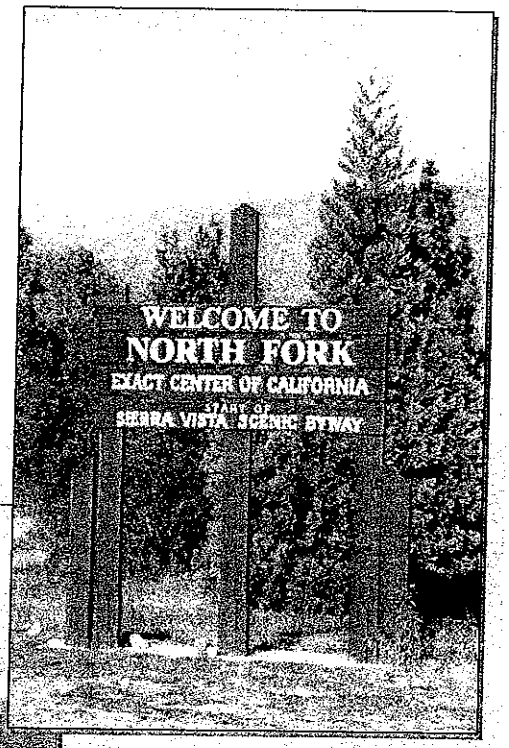
Community: South Fork, CA

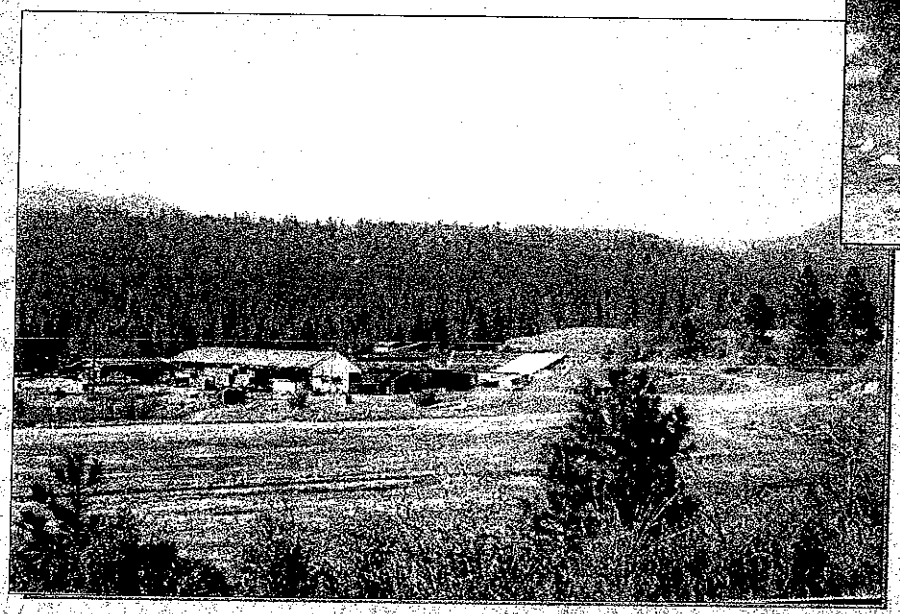
(A) Number of Accounts	(B) Users (User Group)	Annual Revenue Needed $64,000 Annual Volume in gallons 3,248,500 Unit Cost ($/gal) $0.02 (C) Annual Volume (gallons)	(D) Annual Cost (volume x unit cost)	(E) Monthly Cost (annual cost /12)*
54	Residential	2,299,500	$45,303	$3,800
5	Commercial	949,000	$18,697	$1,600
	*Rounded			
	SubTotals	3,248,500	$64,000	$5,400
	Infiltration/inflow	N/A	N/A	N/A
	Future Capacity	N/A	N/A	N/A
	TOTALS	3,248,500	$64,000	$5,400

NORTH FORK
COMMUNITY DEVELOPMENT COUNCIL, INC.
Post Office Box 1484 • North Fork, CA 93643
Tel: (559) 877-2244 • Fax: (559) 877-4267
email: nfcdc@sierratel.com

Preliminary Engineering Report
Wastewater Upgrade

December 2003





prepared for
North Fork Community Development Council, Inc.
Madera County Maintenance District 8A

Submitted by:

Wallace Swanson International
A Division of John L. Wallace & Associates

In Conjunction with:

Natural Systems International

Wallace Swanson International
A Division of John L. Wallace & Associates

December 12, 2003

Barry Vesser, Executive Director
North Fork Community Development Council
57839 Road 225
North Fork, California 93643-0426

Subject: Final Preliminary Engineering Report, North Fork Wastewater Upgrade

Dear Mr. Vesser:

We are pleased to submit to you 6 copies of the subject final report. Four additional copies have been sent directly to others as indicated in the "cc" list. We look forward to continued work with North Fork CDC and the County. We trust this report satisfies the scope and expectations outlined in our proposal and contract for engineering services.

In the meantime if you have any questions, please do not hesitate to call me at (805) 544-4011.

Yours truly,

WALLACE SWANSON INTERNATIONAL

Steven G. Tanaka, P.E.
Senior AIPS Engineer/Project Manager

SGT:
Attachment

Cc: Joe Beck/Loren Green, MCMD 8A
Bill Hussman, NFRIHA
John Mitchell, County Engineer, Madera County
Mark Richardson, RCAC

M:\577 North Fork CDC\Correspondence\Barry_Vesser4.doc

PRELIMINARY ENGINEERING REPORT

WASTEWATER UPGRADE

Prepared for

North Fork Community Development Council, Inc.

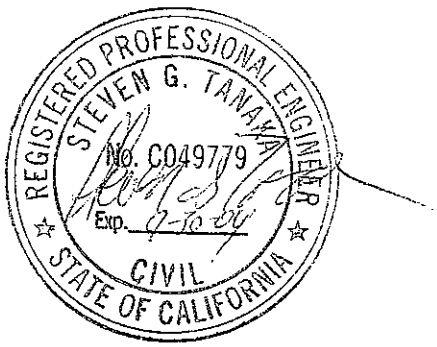
Madera County Maintenance District 8A

Prepared by:

Wallace Swanson International

In conjunction with

Natural Systems International



December 2003

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

EXECUTIVE SUMMARY

This report presents the wastewater engineering study and facility improvement recommendations to provide wastewater services to the communities of North Fork and South Fork.

The purpose of this project and wastewater study is to recommend a grant-fundable and community-affordable practical wastewater project for the communities of North Fork and South Fork, and to provide this report to funding agencies as the basis for continuing forward with available grant funds to implement the recommended project.

BACKGROUND

The North Fork CDC has qualified for rural community grant assistance for a wastewater project through the Economic Development Agency (EDA) and the United States Department of Agriculture/Rural Development Agency (USDA) by virtue of their status as a small low-income rural community. The funding agencies have indicated that decentralization, a separate project for North Fork and South Fork, may not be grant-fundable. This report will need to address this concern specifically, as to how to formulate a workable wastewater plan that serves the best interest of the community while maintaining affordability and fundability.

The North Fork CDC and the Madera County Maintenance District No. 8A (MCMD 8A) previously contracted with Provost & Pritchard Engineering Group, Inc. to prepare this wastewater plan to serve the North Fork and South Fork communities. The Provost & Pritchard study was recognized as having many technical merits; however, the recommended plan was not considered viable nor affordable to the community. This plan was further complicated by environmental constraints and issues surrounding contemplated effluent disposal lands in the North Fork area.

MCMD 8A is under an existing discharge order from the Regional Water Quality Control Board (Regional Board), Waste Discharge Requirement (WDR) Order No. 94-353, to collect, treat, and dispose of wastewater for the unincorporated area of North Fork. The South Fork area, included in this study, is not currently part of MCMD 8A. However, the South Fork area is included in MCMD 8. The South Fork area is currently served by individual septic tank/leach field systems, and one multi-unit wastewater facility for a North Fork Mill housing complex. The septic tank/leach field systems in South Fork are generally in good working condition; however, the multi-unit facility has been the subject of a number of violation notices from the Regional Board regarding the operation and maintenance of this particular facility.

EXISTING CONDITIONS

The communities of North Fork and South Fork are small, unincorporated areas in eastern Madera County. They are located about 18 miles east of Highway 41 on Road 200 approximately half way between Fresno and Yosemite National Park.

need copy of the MD 8A Map

South Fork

The South Fork area lies directly east of MCMD 8A. Population and income data for South Fork was obtained in a survey conducted in March 1999. This survey found that the population of the area proposed to be served is approximately 100 and has a median annual income of $12,000.

The South Fork area to be sewered includes approximately 55 dwelling units, including 20 rental homes, 15 mobile homes, 4 motel units, 8 bed and breakfast units, 8 rest care units, and 2 commercial properties in South Fork. Additionally, the area includes the abandoned saw mill site. This site is in the process of being renovated with the objective of being developed into a light industrial complex, mixed-use community center, and RV park.

North Fork/MCMD 8A

(Extended Aeration Plant)

All wastewater generated within MCMD 8A is presently treated in a package wastewater treatment plant that was installed in 1987 and upgraded in 1992. The North Fork treatment plant currently serves approximately 300 residents, several small businesses, the Forest Service district office, the North Fork Elementary School and the Continuation High School.

Need for Project

As described earlier, the North Fork and South Fork areas of Madera County, California, are small rural communities in the Sierra Nevada foothills, and were hard hit by the closure of the North Fork lumber mill in 1994. Unemployment in the town is estimated to be 17%. In the local area near the former mill site, household incomes average $12,000 per year[1], meeting the criteria for low income community grant assistance. Low income housing near the mill site is in short supply, and the housing that does exist is substandard.

In addition to the economic challenges that the community faces, the North Fork and South Fork communities are also experiencing deficiencies with their wastewater facilities that put these communities at risk for health and sanitation issues. The following summarizes the current status and conditions in the North and South Fork areas:

Fee title or Lease land?

North Fork. Within the MCMD 8A service area, the community is currently near capacity relative to their existing wastewater spray field disposal system. Prior attempts by the County to approve additional spray field disposal capacity with the Regional Water Quality Control Board were unsuccessful. The County at this time is discharging within 83 percent of its current rated and permitted discharge capacity.

South Fork. The community of South Fork is un-sewered at this time, and is served predominantly by individual septic tanks. There is one 20-unit housing development, served by a common wastewater facility. Each of the 20 homes has individual septic tanks, but effluent is pumped to a common sump, for disposal to ponds by evaporation/percolation. This facility is regulated by the Regional Water Quality Control Board, under Waste Discharge Requirements (WDR) Order No. 90-051. The Discharger was sent a Notice of

Who maintains the current system?

Violation in 1999 for improper maintenance of the facility, and for failing to file monthly reports as required by the Order. The Madera County Environmental Health Department indicated that the leach field system has no reserve capacity, and performance of this system is questionable. ?

EXISTING WASTEWATER FACILITIES

In North Fork, present wastewater flows to the plant average around 31,000 gallons per day (gpd), with a maximum daily flow estimated at 78,000 gpd. The existing treatment plant has an operating design rating of 57,000 gpd and a maximum treatment capacity of 60,000 gpd. Effluent is pumped to an effluent holding basin via force main to the effluent storage pond. The existing effluent storage pond and spray disposal field facilities are permitted at 38,000 gpd. A preliminary application was filed in January 1994 with the Regional Water Quality Control Board (RWQCB) to upgrade the disposal facility to 60,000 gpd. This application was denied in December 1994 and no further action has been taken by the County in this regard. ?

In South Fork, there are 20 rental homes in South Fork that are served by a substandard sewer system which discharges into sewage disposal ponds. In the past, this system has received violation notices from the RWQCB and Madera County Environmental Health Department. This system is currently under a Notice of Violation from RWQCB. A common septic tank and leach field serves the 15 mobile homes and three apartments. A new leach line was installed for this system in 1996. The rest home and bed and breakfast are each served by an individual septic tank and leach field. The remaining buildings in South Fork, consisting of single family dwellings and commercial units, are currently served by individual onsite septic systems, consisting of septic tanks and leach fields. County Environmental Health Department staff has indicated that it is unlikely that these leach fields have any reserve capacity and it is unclear how well they are performing. However, no enforcement action is pending from the County.

60,000
-45,000
15,000

Existing and Future Wastewater Flows

The existing North Fork treatment and disposal facilities currently process approximately 31,000 gpd. The South Fork area has an estimated 13,000 gpd average daily flow demand. Future projected flows for North Fork and South Fork are 45,000 and 32,000 gpd, respectively.

? by what Study

check GP

COLLECTION, TREATMENT AND DISPOSAL TECHNOLOGIES

A variety of collection, treatment and disposal technologies were considered in the formulation of alternatives for the communities of North Fork and South Fork.

Disposal alternatives considered included spray field, leach field, and subsurface irrigation (eco-chamber forest, or other landscaping). In general, leach fields were not considered desirable since their use would like trigger additional nutrient removal requirements in any proposed or existing wastewater treatment process, thus increasing overall project cost.

Septic Tank Effluent Pump or Gravity ?

New collection system components for South Fork focused on conventional gravity sewers, and low-cost collection small diameter collection system including STEP and STEG systems (refer to Chapter 4). STEG systems were considered most economical for a new collection system in North Fork. However, such a system requires maintaining existing septic systems in the community.

An array of treatment technologies were evaluated for North Fork, including mechanical treatment plants (extended aeration, sequencing batch reactor, trickling filters), and low-cost alternative technologies such as subsurface wetlands and advanced integrated pond systems (AIPS). Both AIPS and wetlands were considered well suited for a new facility in South Fork. The other treatment technologies considered were too costly and/or difficult to implement, operate and maintain. Ranking criteria included overall costs, capital costs, and operation and maintenance costs, reliability, complexity in operation, aesthetics, permittability, and others.

EVALUATION OF ALTERNATIVES

The alternatives to serve North Fork and South Fork were developed by WSI with input from North Fork CDC, Madera County, and Mr. Michael Ogden of NSI. The alternatives were formulated based on: ?

- Serving North Fork alone;
- Serving South Fork alone;
- Serving North Fork and South Fork together.

The alternatives are described as follows:

○ Reccommended By Report

Serving North Fork Alone

N1. Maintain existing WWTP, expand effluent storage, maintain existing spray field. Evaluate expansion of spray field and/or addition of leach field or eco-chamber field.

N2. Provide new AIPS plant (above effluent storage and disposal evaluated above).

N3. Same as Alternative N1 or N2 above, tertiary treatment by conventional filtration/disinfection, and stream discharge.

Serving South Fork Alone

S1. Provide conventional mechanical package WWTP, install small diameter collection system (STEP or STEG system, defined later in this report), or conventional collection system. Consider three methods of effluent disposal: 1) leach field disposal; 2) spray field disposal; and 3) eco-chamber disposal.

S2. Same as Alternative S1, but providing AIPS pond system for secondary treatment.

S3. Same as Alternative S1, but providing wetlands for secondary treatment.

S4. Same as Alternative S1, S2 or S3, but adding tertiary treatment by sand filtration/disinfection., stream disposal and reuse.

North and South Fork Combined

NS1. Maintain and expand existing WWTP, expand effluent storage and spray field, develop new spray field for future capacity. Consider combinations of effluent disposal by spray field, leach field and eco-chambers.

NS2. Same as NS1, tertiary treatment by conventional filtration/disinfection, and stream discharge.

NS3. Pump raw wastewater from North Fork to South Fork, and develop AIPS pond system in conjunction with land disposal to treat North and South Fork wastewater combined.

Based on the review of each alternative, it became apparent that combining North Fork and South Fork together is not prudent, as it increases overall costs relative to all three major components (treatment, disposal, collection). Combining the service areas necessitates a long force main and pumping station to convey sewage from one service area to another, and the combined flows necessitate large disposal areas in one location.

Cost Evaluation of Alternatives

The various alternatives were evaluated on a conceptual level cost basis. The capital costs for the various alternatives are based on a variety of sources for actual known construction costs of comparable projects where available, with costs scaled up or down appropriately based on engineering judgment. These costs are considered current Year 2003 costs, and must therefore be inflated in the future based on the Engineering News Record (ENR) index for that future year. The current ENR index is 6741 (September 2003).

Operation and maintenance costs were also estimated based on comparison of actual costs for comparable facilities, and specific budget information for the existing North Fork WWTP. The life cycle cost evaluation is based on a 20-year life of the project. For South Fork alternatives, where individual septic tanks are maintained, the operation and life cycle cost analysis accounts for periodic (3 to 5 years) pumping of septic tanks, estimated at $300/event. Life cycle costs were converted a total cost per gallon per day capacity in the treatment system. Life cycle costs for the annual O&M costs were calculated based on a 5% inflation factor, 20-year project life.

RECOMMENDED ALTERNATIVES

The recommended alternative is to decentralize, and treat North Fork and South Fork communities with separate wastewater facilities. In North Fork, it is recommended to maintain the existing WWTP to serve existing and future needs of North Fork (Alternative N1), and develop incremental storage and disposal as needed.

For South Fork, Alternative S2 is recommended, to implement an AIPS system to initially treat the community of South Fork, and to eventually serve the Mill Site. Depending on permitting constraints with the Regional Board, the AIPS system may need to be augmented with a subsurface wetlands system to offer additional nutrient removal. However, with lining of the AIPS ponds, and using subsurface disposal with nitrogen uptake, additional nutrient removal in the treatment process is not warranted. Disposal should be developed based on subsurface irrigation, possibly with some spray field disposal. This adds diversity and flexibility to the effluent disposal system, and makes use of treated secondary effluent to irrigate area landscaping. The recommended alternatives are described in Chapter 6.

North Fork: In North Fork, it is recommended to maintain the existing extended aeration WWTP, as it currently has the ability to treat up to 60,000 gpd wastewater. With projected flows of 45,000 gpd at build-out, this "already paid-for" facility should be maintained throughout the planning period. Thus, new facilities to serve build-out in North Fork focus solely on disposal capacity. The District should maintain the existing 16-acre spray field area, and provide effluent disposal (beyond the permitted 38,000 gpd) using eco-chambers/subsurface disposal systems. Details of the exact layout and locations of the disposal area are part of the detailed design effort. Future effluent disposal can be accomplished within the existing County-owned lands. The existing effluent holding pond will not require expansion to meet the future storage requirements, and criteria for holding the 100-year storm event. The Regional Board will need to approve any proposed expansion of effluent disposal per Provision E.3 of the WDRs.

South Fork: For the community of South Fork, it is recommended that a decentralized system be implemented to serve South Fork and the Mill Site. A phased implementation is recommended, with the Phase 1 project receiving grant funding to assist South Fork rate payers, with average household incomes meeting the USDA funding criteria for grant assistance.

The first phase project should consist of a 20,000 gpd AIPS pond system on the Mill Site. Since this Mill Site was essentially "free" to the community, developing a treatment system on-site will be relatively economical to the community. The major component of this implementation plan for Phase 1 is to provide a low-cost sewage collection system. It is recommended that a STEG system be employed. Further investigation is needed, however, as to existing condition of all septic tanks in the service area. Rate payers still need to pay for connection of sewer laterals to the small diameter gravity collection system, and will need to maintain on-site septic tanks for solids removal. Based on the terrain of the area, this STEG system requires a lift station to pump wastewater from the low point on the west side of South Fork, up the treatment plant site on the Mill Site. Effluent disposal for Phase 1

should focus primarily on subsurface disposal by eco-chamber or other subsurface irrigation system. The Phase 1 cost estimate is included as Table ES-1.

Table ES-1. Alternative S2 - AIPS WWTP - South Fork - Phase 1

Item	Quantity	Unit	Unit Price, $	Extended Price, $
AIPS Ponds	20,000	ga	$5	$100,000
Effluent Storage (90 day storage)	6,000	cy	$10	$60,000
Storage Pond Liner	25,000	~~ea~~ SF	$1.00	$25,000
Monitoring Well	3	ea	$15,000.00	$45,000
STEG Collection System	1	ls	$298,000.00	$298,000
Other				$0
Construction Subtotal:				**$528,000**
Disposal Sub-Options:				
Add Spray Field	4.0	ac	$40,000	$160,000
Add Leach Field	0.50	ac	$70,000	$35,000
Add Eco-Chamber	2	ac	$45,000	$90,000
Alt. S2.1 Constr. Subtotal - With Eco-Chamber Option				**$618,000**
Engineering, 10%				$61,800
Administration, 5%				$30,900
Construction Mgt., 10%				$61,800
Contingency, 20%				$123,600
Alt. S2.1 Total:				**$896,100**
Total Cost to South Fork, Based on USDA 25% Loan/75% Grant:				**$224,025**

-?

20yr

Master plan costs?

During Phase 2, the Mill Site developer will need to pay for all future improvements to serve the Mill Site. This includes collection system (likely conventional gravity), treatment (parallel AIPS ponds), and disposal (combination of subsurface disposal and spray disposal for irrigation, if feasible). Phase 2 facilities are recommended to be implemented at the time of need in the future, by the Developer(s) of the Mill Site.

Cost Impacts to Users

With any recommended utility plan, an assessment of cost impacts to each user must be made. Currently, each unit in North Fork pays approximately $35/month for sewer user fees. Based on current rates and user fees, existing rates need to be incrementally increased to balance the current operations budget. In order to fund the recommended alternative N1,

user fees need to be increased to around $64/month per EDU. However, it is noted that additional revenues will be available from the Indian Housing Authority; the timing of cash flow from these contributions is unclear at this time, but can help reduce the projected overall unit costs. This is the most cost-effective alternative to the residents. If additional grant monies can be found to cover more of the debt service, coupled with contributions from the Indian Housing Authority, user fees may be able to be reduced to levels more commensurate to existing rates. Refer to Table ES-2 for a summary of estimated costs per EDU for this alternative.

Table ES-2. User Fee Analysis - North Fork

Item	Cost, $		
USDA Loan Amount (from Table C-1)	$	56,188	
Debt Service, at 4% Interest, 20-year	$	4,134	
Annual O&M Cost	$	125,000	
Total Annual Obligation (see Note 1)	$	129,134	
Current EDUs (see Note 2)	$	155	
Total Future EDUs (see Note 2)	$	213	
Development rate@3 EDU/year=	$	10,500	annual revenue
Adjusted Annual Obligation:	$	118,634	
Annual Cost Burden Per EDU (exist)	$	765	
Annual Cost Burden Per EDU (future)	$	557	
Monthly Obligation Per EDU (exist)	$	63.78	
Monthly Obligation Per EDU (future)	$	46.41	

Note 1. Includes existing debt service obligation.

Note 2. Includes 155 existing EDUs, plus 213 future EDUs.

Note 3. Current connection Fee for North Fork MCMD 8A, $3,500/EDU.

For South Fork, with implementation of Phase 1 only, current users in South Fork would need to start out with monthly user fees of $62/month. Again, this is relatively high for the area, and means of finding additional grant monies should be considered to lessen the burden to each individual home owner. Refer to Table ES-3 for this analysis.

Table ES-3. User Fee Analysis - South Fork Phase 1

Item	Cost, $		
USDA Loan Amount (from Table 6-1)	$	224,025	
Debt Service, at 4% Interest, 20-year	$	16,484	
Phase 1 Annual O&M Cost	$	35,000	
Total Annual Obligation	$	51,484	
Current EDUs (see Note 1)	$	64	
Total Future EDUs (see Note 1)	$	88	
Development rate@1.2 EDU/year=	$	4,200	annual revenue
Adjusted Annual Obligation:	$	47,284	
Annual Cost Burden Per EDU (exist)	$	739	
Annual Cost Burden Per EDU (future)	$	537	
Monthly Obligation Per EDU (exist)	$	61.57	
Monthly Obligation Per EDU (future)	$	44.78	

Note 1. Includes 64 existing, plus 24 future EDUs.

Note 2. Current connection Fee for North Fork MCMD 8A, $3,500/EDU.

CHAPTER 1

INTRODUCTION

This report presents the wastewater engineering study and facility improvement recommendations to provide wastewater services to the communities of North Fork and South Fork.

Background

The North Fork Community Development Council (North Fork CDC) was formed in 1992. The citizens of North Fork, through their participation in community planning and training sessions decided that a nonprofit corporation should be formed to implement a Community Action Plan, and coordinate the activities of the community's existing organizations. The North Fork CDC was incorporated in 1994, and was formed to serve the following purposes:

1. *Promote economic diversification and prosperity;*
2. *Support and enhance community services and facilities that serve the citizenry;*
3. *Manage growth to preserve small town qualities;*
4. *In cooperation with the existing community organizations, serve as a liaison between North Fork and out of town businesses and county, state and federal government.*

The North Fork CDC has a twelve member Board of Directors consisting of one representative appointed by each of the following organizations: North Fork Boosters, North Fork Mono Rancheria, Sierra Vista National Scenic Byway, the Squirrel Cage Theater, the North Fork Women's Club, the Sierra Mono Indian Museum and the U.S. Forest Service. The Board also has four at-large members, who are elected by the membership of the North Fork CDC. Membership is open to any person interested in North Fork and its future.

The North Fork CDC has qualified for rural community grant assistance for a wastewater project through the Economic Development Agency (EDA) and the United States Department of Agriculture/Rural Development Agency (USDA) by virtue of their status as a small low-income rural community. The funding agencies have indicated that decentralization, a separate project for North Fork and South Fork, may not be grant-fundable. This report will need to address this concern specifically, as to how to formulate a workable wastewater plan that serves the best interest of the community while maintaining affordability and fundability.

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The North Fork CDC and the Madera County Maintenance District No. 8A (MCMD 8A) previously contracted with Provost & Pritchard Engineering Group, Inc. to prepare this wastewater plan to serve the North Fork and South Fork communities. This work and prior contract was authorized by the Madera County Board of Supervisors in February, 1999. The contract required the completion of a preliminary engineering report and submittal of the report to North Fork CDC in order to assist in the formulation of a workable wastewater plan to funding agencies. The Provost & Pritchard study was recognized as having many technical merits; however, the recommended plan was not considered viable nor affordable to the community.

MCMD 8A is under an existing discharge order from the Regional Water Quality Control Board (Regional Board), Waste Discharge Requirement (WDR) Order No. 94-353, to collect, treat, and dispose of wastewater for the unincorporated area of North Fork. The South Fork area, included in this study, is not currently part of MCMD 8A. However, the South Fork area is included in MCMD 8. The South Fork area is currently served by individual septic tank/leach field systems, and one multi-unit wastewater facility for a North Fork Mill housing complex. The septic tank/leach field systems in South Fork are generally in good working condition; however, the multi-unit facility has been the subject of a number of violation notices from the Regional Board regarding the operation and maintenance of this particular facility.

Purpose of Project

The purpose of this project and wastewater study is to recommend a grant-fundable and community-affordable practical wastewater project for the communities of North Fork and South Fork, and to provide this report to funding agencies as the basis for continuing forward with available grant funds to implement the recommended project.

Authorization and Scope of Work

On July 31, 2003, North Fork CDC and WSI entered into an Agreement for Consulting services for the MCMD 8A Wastewater Upgrade engineering study and project.

WSI, in conjunction with NSI, provided the North Fork CDC and Madera County Engineering Department with a proposal and scope of professional engineering services to develop a 20-year horizon Wastewater Plan for upgrading MCMD 8A to serve the North Fork and South Fork communities. This report will account for the future development of commercial, industrial, and residential uses, as well as accounting for the regulations set forth by the Regional Water Quality Control Board.

The proposed services include preliminary engineering analysis review, alternative analysis, public meetings, regulatory coordination, and other tasks as defined in the contract and scope of services between WSI and North Fork CDC. A summary of the specific work tasks is as follows:

- Collect and review available information from North Fork CDC. The data includes the most recent information available on demographics, population, water and wastewater demand, percolation data, soil stratospheres, water quality, maps and any other available information for the North Fork and South Fork communities that will be beneficial to completing the alternative Wastewater Plan. WSI will rely on current planning data to project wastewater flows for the 20-year planning horizon.

- Review the Provost & Pritchard Preliminary Engineering Analysis and incorporate those findings into the engineering report. WSI will present review findings of this report in

the alternative wastewater plan, and will use this report as a starting point in the development of alternative wastewater options.

- Analyze the requirements set forth by the Regional Water Quality Control Board for the preferred alternative. The analysis will include, but not be limited to regulations concerning surface and storm water discharges, erosion controls, effluent reuse, groundwater, sludge management, and wetland or waterway impacts. A discussion of these findings will be presented in this report.

- Develop cost-reducing alternatives for primary and secondary treatment, and "brainstorm" with North Fork CDC and Madera County Engineering Department to evaluate the most advantageous systems for the North Fork and South Fork communities, including:

    - Advance integrated pond systems (AIPS)
    - Constructed Wetlands
    - Facultative Lagoons
    - Trickling filters
    - Sequencing Batch Reactor (SBR) technology
    - Sub-surface discharge
    - Sand filters
    - Recycling of wastewater

- Evaluate the identified alternatives, and rank according to their advantages and disadvantages. From this evaluation, a preferred alternative will be recommended. A discussion of the evaluation methods used to determine the preferred alternative will be included in the report. A matrix table, list of criteria, and a point system will be used to numerically score and rank each secondary and tertiary alternative.

- Develop the preferred alternative. The report will include a discussion on the system's ability to meet the various objectives for a viable Wastewater Plan. This section will also address the preferred system to meet Regional Water Quality Control Boards guidelines, policies and requirements, as well as a cost estimate of the preferred system. This report will be developed in a format compliant with USDA Rural Utility Service requirements for a Preliminary Engineering Report.

- Develop an implementation program with a schedule of the capital improvements required to complete the preferred alternative wastewater treatment project. The schedule will be broken down into at least five-year increments, and will include considerations for phasing the project if needed. Given that the District has qualified for a USDA grant/loan, project phasing may be minimal.

Acknowledgments

The following people are acknowledged for their contributions to this study and report:

- Barry Vesser, Executive Director, North Fork Community Development Council
- Steve Christianson, Site Manager, North Fork Community Development Council
- John Mitchell, County Engineer, County of Madera
- Joe Beck, Utility Manager, Madera County Department of Engineering
- Loren Green, Special District Assistant Engineer, Madera County Department of Engineering

The following key team members participated in the preparation of this study and report:

- Edwin W. Lee, D.E., P.E., Technical Advisor, Wallace Swanson International
- Steve Tanaka, P.E., Project Manager, Wallace Swanson International
- Rob Miller, P.E., Division Manager/Technical Advisor, Wallace Swanson International
- Mike Shick, Associate Engineer, Wallace Swanson International
- Michael Ogden, Ph.D., P.E., Natural Systems International

CHAPTER 2

EXISTING CONDITIONS

North Fork, California, Madera County, a small town in the Sierra Nevada foothills, was hard hit by the closure of the North Fork lumber mill in 1994. Unemployment in the town is estimated to be 17%. In the local area near the former mill site, household incomes average $12,000 per year[1], meeting the criteria for low income community grant assistance. Low income housing near the mill site is in short supply, and the housing that does exist is substandard. Rather than accept these conditions, the citizens responded by organizing the North Fork CDC in order to revitalize the economy.

In a major development during 1997, the North Fork CDC pursued and received the donation of the 135-acre mill site for redevelopment. Since then, the community has developed a site plan and vision, and the North Fork CDC has worked to plan and implement this vision. Although it is a "grassroots" organization with only three full-time employees, the North Fork CDC has effectively obtained and utilized technical and grant assistance from numerous federal agencies, including HUD. A 2000 HUD RHED Innovative Activities grant allowed the organization to implement a deconstruction project, clearing the site for redevelopment while providing construction training to unemployed local residents. 2001 and 2002 RHED Capacity Building grants provided funds to complete the deconstruction program, start preliminary engineering for the site's infrastructure, strengthen the organization's fund-raising, evaluation and accounting management capacity, and attract businesses to the site. The North Fork CDC has actively and aggressively pursued development activities over the last several years. It has shown a great deal of success in those areas that were under its control, such as raising project funds, deconstruction, building collaborative relationships with local government, and pursuing on-going community planning efforts.

Unfortunately, endangered species regulations, unforeseen environmental contamination and a poor economy have presented obstacles to moving forward as planned. Such obstacles can occur in all development programs, but are especially common to rural redevelopment efforts. The two areas particularly impacted have been: 1) development of a sewer system, which is essential both for the economic development of the mill site and the low-income housing development being implemented by the local North Fork Mono Indian Tribe, and 2) attraction of businesses and developers to the mill site to create jobs, businesses and economic self-sufficiency. The North Fork CDC has been diligent and innovative in attempting to overcome these obstacles.

After much research and consideration, the North Fork CDC has taken a new direction based on a sustainable development approach. The 2002 Capacity Building grant provided funding for the CDC to host a Sustainable Rural Redevelopment Symposium. This event included top practitioners in the areas of rural economic development, alternative infrastructure, energy efficiency, green design, and innovative housing, as well as representatives from federal and state agencies, local governments, community members and other rural communities pursuing development. From this symposium, the CDC emerged with new innovative strategies to overcome obstacles to development, including new technologies for

wastewater treatment and site drainage, methods to achieve community energy efficiency, and a focus on "growing" local business and developing entrepreneurship instead of relying on attraction of businesses and developers from the outside.

Study Area

The communities of North Fork and South Fork are small, unincorporated areas in eastern Madera County. They are located about 18 miles east of Highway 41 on Road 200 approximately half way between Fresno and Yosemite National Park (refer to Figure 2-1).

South Fork. The South Fork area lies directly east of MCMD 8A, as shown on Figure 2-2. Population and income data for South Fork was obtained in a survey conducted in March 1999. This survey found that the population of the area proposed to be served is approximately 100 and has a median annual income of $12,000.

The South Fork area to be sewered includes approximately 55 dwelling units, including 20 rental homes, 15 mobile homes, 4 motel units, 8 bed and breakfast units, 8 rest care units, and 2 commercial properties in South Fork. Additionally, the area includes the abandoned saw mill site. This site is in the process of being renovated with the objective of being developed into a light industrial complex, mixed-use community center, and RV park.

North Fork/MCMD 8A. All wastewater generated within MCMD 8A is presently treated in a package wastewater treatment plant that was installed in 1987 and upgraded in 1992. The North Fork treatment plant currently serves approximately 300 residents, several small businesses, the Forest Service district office, the North Fork Elementary School and the Continuation High School. Refer to Figure 2-3 for the MCMD 8A service area.

This section presents and describes the need for this project and the health, sanitation and safety considerations with respect to the needed project.

Need for Project

As described earlier, the North Fork and South Fork areas of Madera County, California, are small rural communities in the Sierra Nevada foothills, and were hard hit by the closure of the North Fork lumber mill in 1994. Unemployment in the town is estimated to be 17%. In the local area near the former mill site, household incomes average $12,000 per year[1], meeting the criteria for low income community grant assistance. Low income housing near the mill site is in short supply, and the housing that does exist is substandard.

In addition to the economic challenges that the community faces, the North Fork and South Fork communities are also experiencing deficiencies with their wastewater facilities that put these communities at risk for health and sanitation issues. The following summarizes the current status and conditions in the North and South Fork areas:

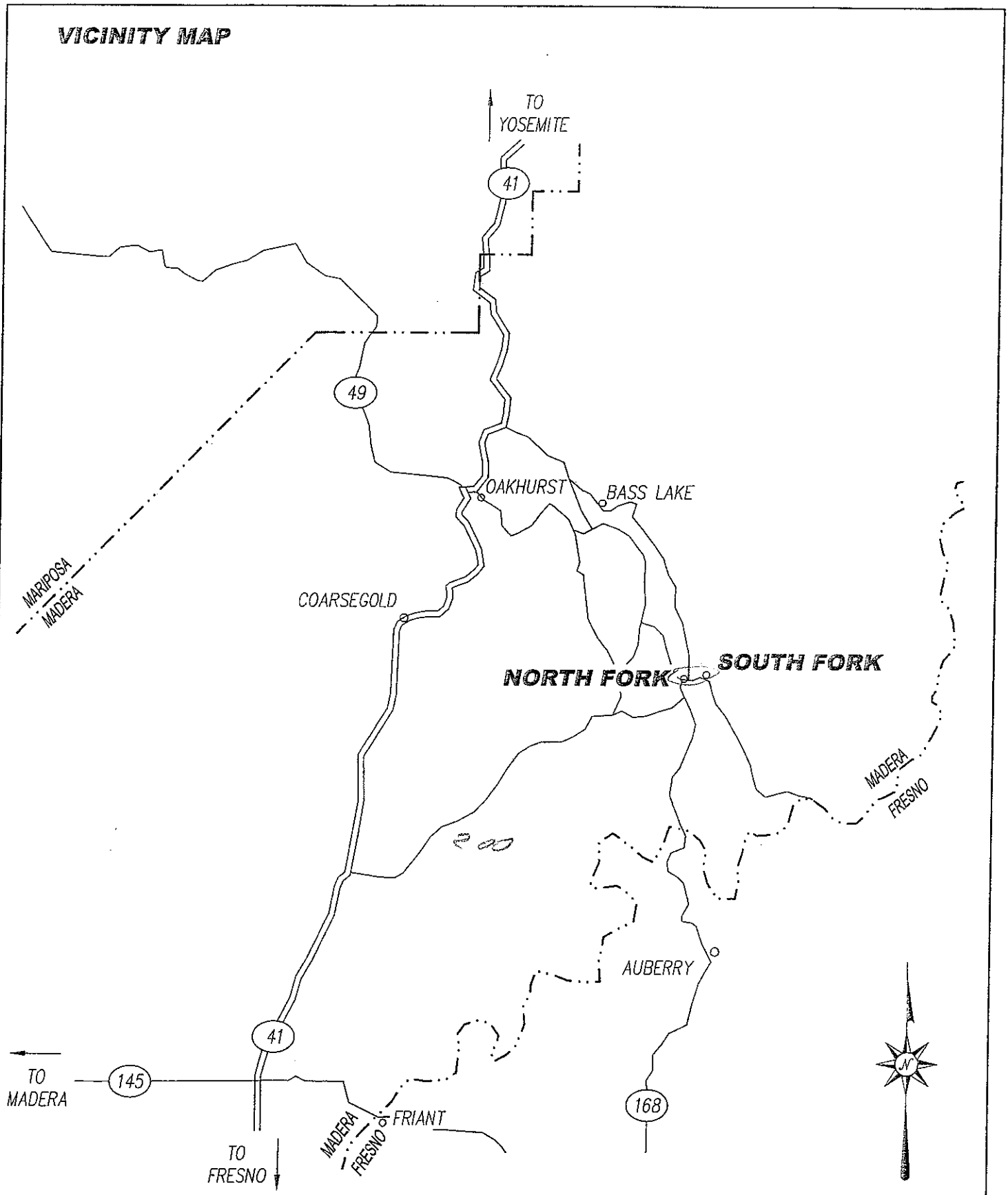

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Figure 2-1
Wastewater Upgrade
North Fork CDC/MCMD 8A

DRAWING :	Exhibits
JOB No. :	557.01.700
SCALE :	1" = 27,000'
DATE :	10-11-03

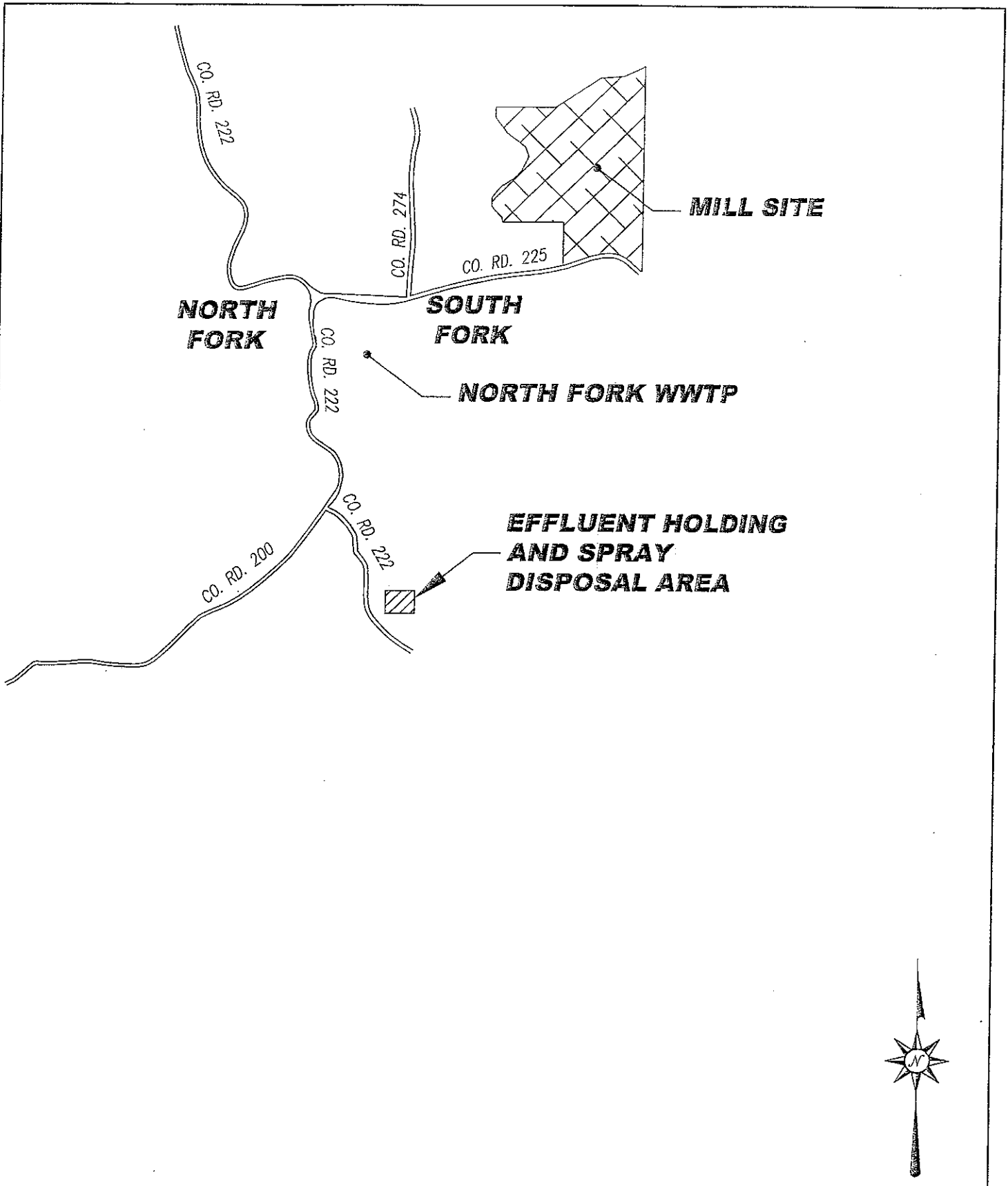

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Figure 2-2
Area Map
North Fork CDC/MCMD 8A

DRAWING :	Exhibits
JOB No. :	557.01.700
SCALE :	no scale
DATE :	10/15/03

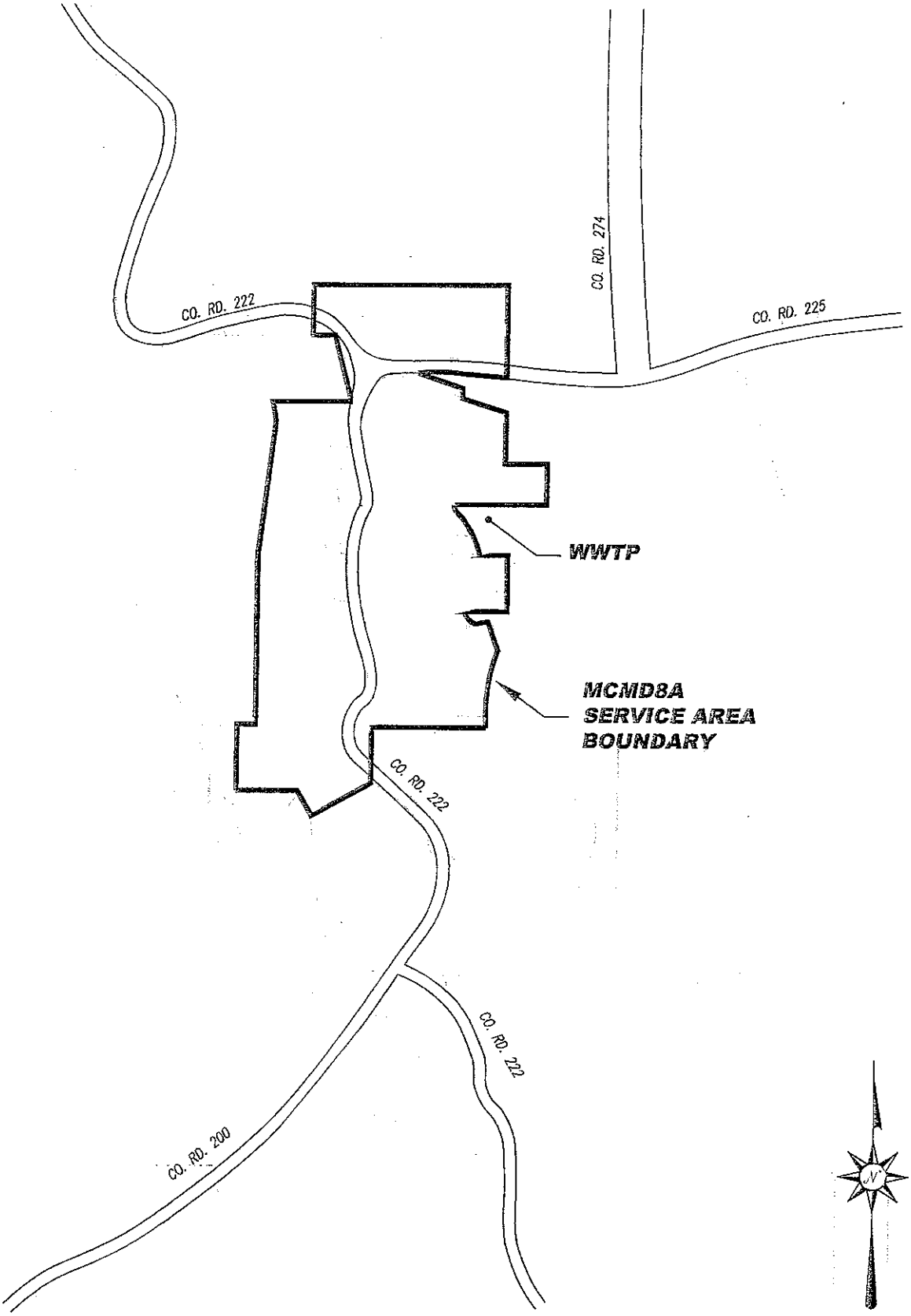

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Figure 2-3
Service Area Boundary
North Fork CDC/MCMD 8A

DRAWING :	Exhibits
JOB No. :	557.01.700
SCALE :	no scale
DATE :	10/15/03

North Fork. Within the MCMD 8A service area, the community is currently near capacity relative to their existing wastewater spray field disposal system. Prior attempts by the County to approve additional spray field disposal capacity with the Regional Water Quality Control Board were unsuccessful. The County at this time is discharging within 83 percent of its current rated and permitted discharge capacity.

South Fork. The community of South Fork is un-sewered at this time, and is served predominantly by individual septic tanks. There is one 20-unit housing development, served by a common wastewater facility. Each of the 20 homes has individual septic tanks, but effluent is pumped to a common sump, for disposal to ponds by evaporation/percolation. This facility is regulated by the Regional Water Quality Control Board, under Waste Discharge Requirements (WDR) Order No. 90-051. The Discharger was sent a Notice of Violation in 1999 for improper maintenance of the facility, and for failing to file monthly reports as required by the Order. The Madera County Environmental Health Department indicated that the leach field system has no reserve capacity, and performance of this system is questionable.

CHAPTER 3

EXISTING WASTEWATER FACILITIES

This chapter describes the existing wastewater facilities that the serve North Fork MCMD 8A, existing conditions in the South Fork community relative to septic tank service, wastewater flow projections for present-day and 20-year build-out, and a statement of the financial status of MCMD 8A.

North Fork Wastewater Facilities

Present wastewater flows to the plant average around 31,000 gallons per day (gpd), with a maximum daily flow estimated at 78,000 gpd[1]. Current Year 2003 flow data from the County indicates flows may be 25,000 to 30,000 gpd; however, some of the flow metering data may be unreliable. WSI will maintain the existing flow data very close to that provided in the Provost & Pritchard report, as the numbers are reasonably comparable. The existing treatment plant has an operating design rating of 57,000 gpd and a maximum treatment capacity of 76,000 gpd. Effluent is pumped to an effluent holding basin via force main to the effluent storage pond. The existing effluent storage pond and spray disposal field facilities are permitted at 38,000 gpd. A preliminary application was filed in January 1994 with the Regional Water Quality Control Board (RWQCB) to upgrade the disposal facility to 60,000 gpd. This application was denied in December 1994 and no further action has been taken by the County in this regard. A more detailed discussion of this issue is presented in the Evaluation of Alternatives. The existing WWTP is depicted on Figure 3-1, and the existing effluent storage pond and spray disposal area are depicted on Figure 3-2.

South Fork Wastewater Facilities

There are 20 rental homes in South Fork that are served by a substandard sewer system which discharges into sewage disposal ponds. In the past, this system has received violation notices from the RWQCB and Madera County Environmental Health Department. This system is currently under a Notice of Violation from RWQCB. A common septic tank and leach field serves the 15 mobile homes and three apartments. A new leach line was installed for this system in 1996. The rest home and bed and breakfast are each served by an individual septic tank and leach field. The remaining buildings in South Fork, consisting of single family dwellings and commercial units, are currently served by individual onsite septic systems, consisting of septic tanks and leach fields. County Environmental Health Department staff has indicated that it is unlikely that these leach fields have any reserve capacity and it is unclear how well they are performing. However, no enforcement action is pending from the County.

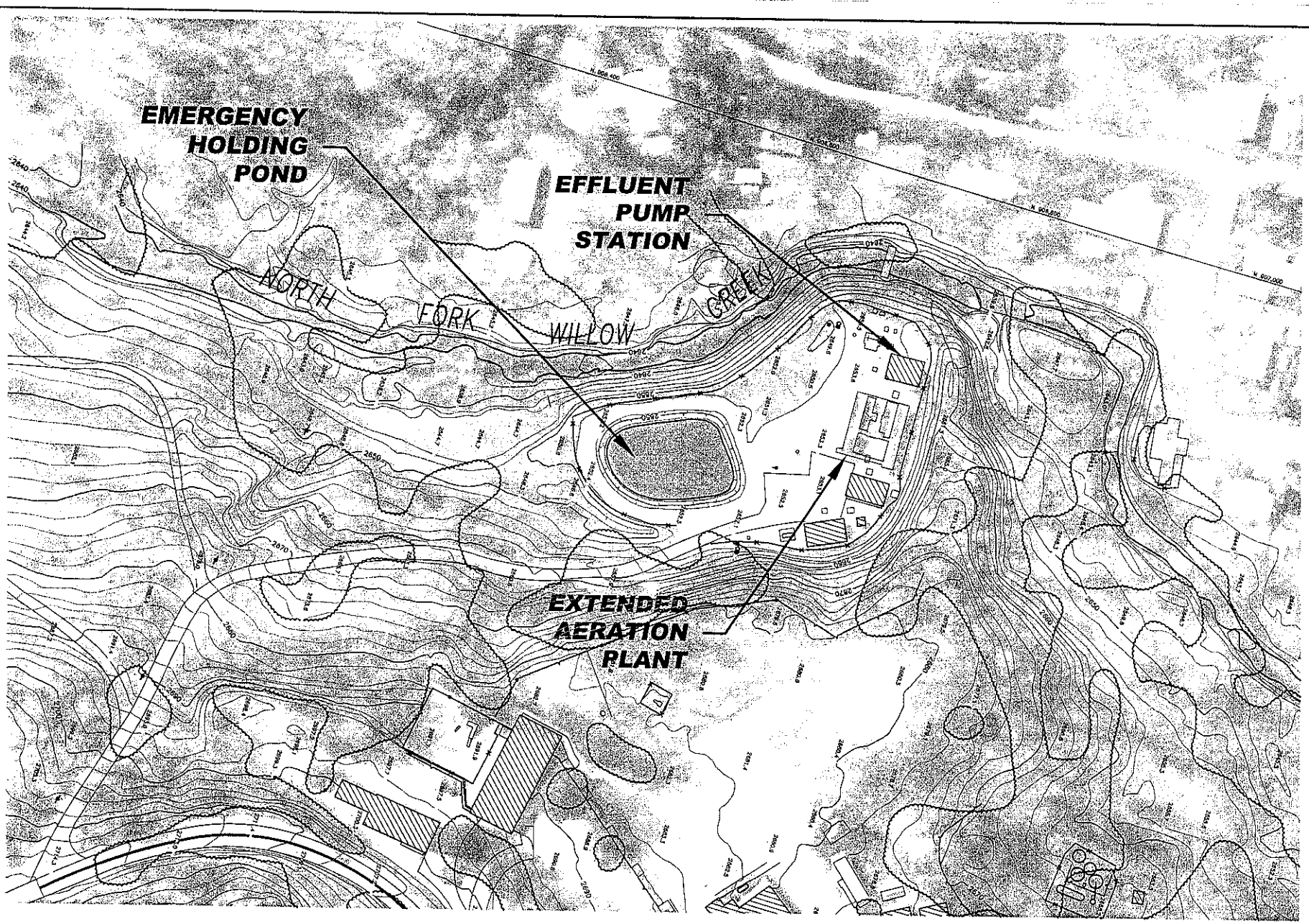

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Figure 3-1
Existing North Fork WWTP
North Fork CDC/MCMD 8A

DRAWING :	Exhibits
JOB No. :	557.01.700
SCALE :	1' ≅ 120"
DATE :	10/27/2003

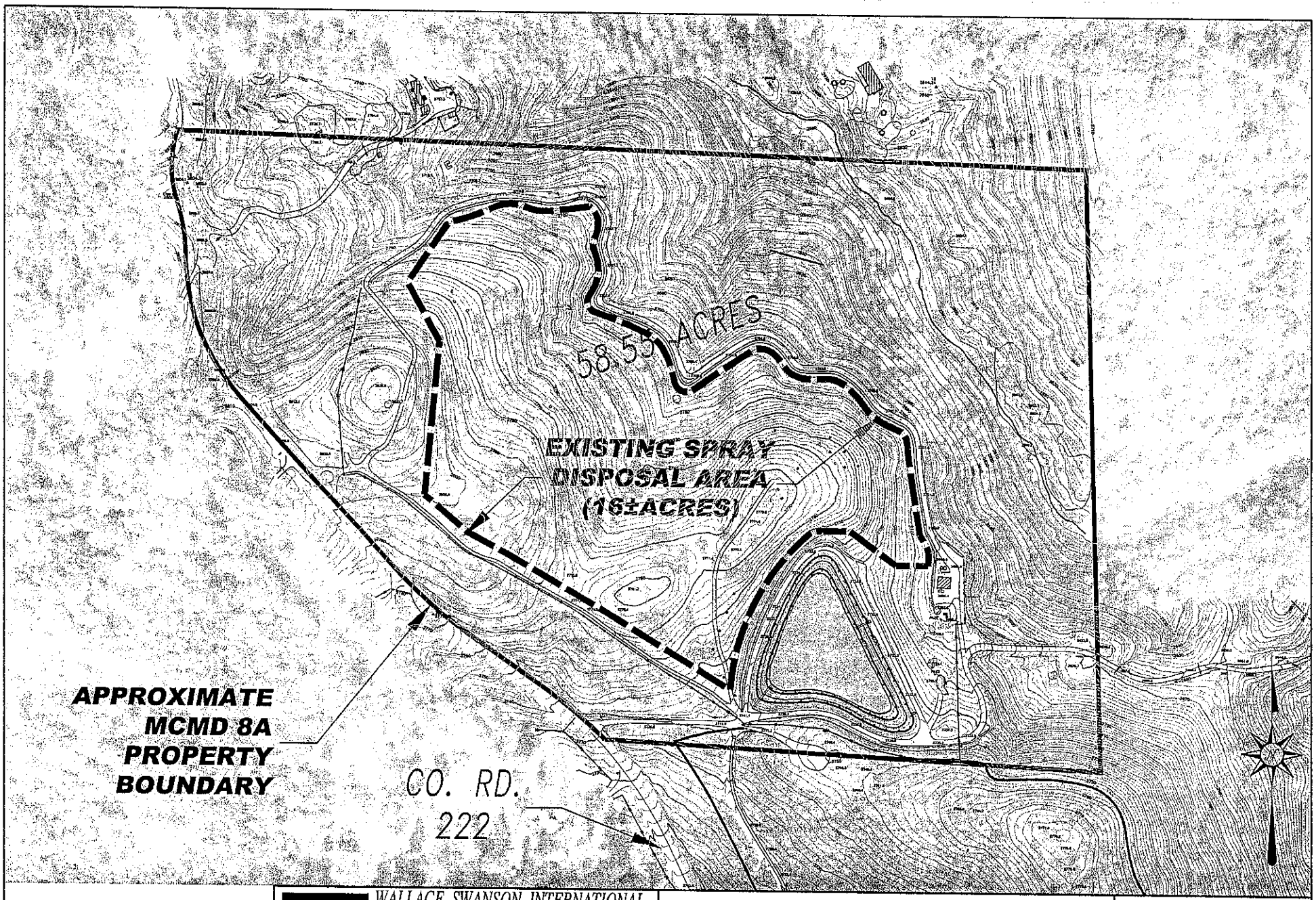

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Figure 3-2
Existing Effluent Disposal Facilities
North Fork CDC/MCMD 8A

DRAWING : Exhibits
JOB No. : 557.01.700
SCALE : 1" ≅ 300'
DATE : 10/27/2003

Existing Wastewater Flows

Madera County standards project wastewater flows based on 250 gallons per equivalent dwelling unit (EDU). The use of 250 gpd/EDU is consistent with other communities, and is a common method for projecting wastewater flows. Accessing actual data is also a good check to verify the validity of such numbers. The measured average daily flow to the North Fork plant is approximately 31,000[1]. With 155.56 EDUs currently being served, this calculates to 200 gpd/EDU. Current County records indicate 212.7 EDUs allotted for future billing purposes.

WSI recommends using 250 gpd/EDU for future flow projections: 1) to be slightly conservative from a planning perspective; and 2) the EDU flow projection is consistent with many other municipalities and small rural communities. However, other units will be projected at some fraction of an EDU, according to those presented in Table 3-1. Accounting for new construction and water efficient fixtures, it is expected that the projected wastewater flows will be within that projected in this manner.

Table 3-1. EDUs for Varying Wastewater Sources

Wastewater Source	EDU
Single Family Dwelling	1.0
Mobile Home	0.5
Commercial/Office	0.32/1000 sf
Rest Home	0.5/Bed
Motel	0.5/Room
Bed & Breakfast	0.75/Room
RV Park	0.4/Space

The existing North Fork treatment and disposal facilities currently process approximately 31,000 gpd. The South Fork area has an estimated 13,000 gpd average daily flow demand. These existing wastewater flows are shown in Table 3-2.

Future Projected Wastewater Flows

Residential growth in the South Fork area is expected to be minimal for the near future. The medium and long-term trends are less clear, but it is not unreasonable to assume a growth rate of 2% per year, as projected by the California Department of Employment Development, 1996, Annual Planning Information, Madera County[1]. The development of the Mill Site property will generate additional flow. The timing and the extent to which development at the Mill Site will occur according to the Mill Site Reuse Plan are not certain at this time. Recent plans indicate the 135-acre Mill Site will develop over time, in 6 phases. Build-out projections for the South Fork area, including the Mill Site, are shown in Table 3-3.

Table 3-2. Summary of Existing Wastewater Flows[a]

Area	Description	EDUs	Flow, gal/unit[b]	Flow, gpd	Notes
North Fork	Residential	43.1	200	8,620	
	Commercial	65.46	200	13,092	Estimate
	Forest Service	24	200	4,800	20,000 SF area
	Schools (per student)	23	10	4,500	450 students
	Subtotal:	**155.6**		**31,012**	
South Fork	Mobile Home Park	12	200	2,400	15 trailers
	Mill Site	2.5	200	500	8,000 SF
	Rental Housing	20	200	4,000	Mill compound
	Rest Home	3.8	200	760	8 unit beds
	Single Family Dwellings	10	200	2,000	
	Apartments	3	200	600	
	Bed & Breakfast	4.8	200	960	8 rooms
	Motel	2.4	200	480	4 rooms
	Commercial	5	200	1,000	Estimate
	Subtotal:	**63.5**		**12,700**	
	TOTAL:	**219**		**43,712**	

[a]Existing Data provided by 1999 Provost & Pritchard.

[b]Flow adjusted to actual flow values for North Fork, then assumed similar for South Fork.

Financial Status

The MCMD 8A currently serves 155.56 EDUs. There are also currently 4 standby units, plus 17 units reserved for the Indian Housing Authority.

Customer Rate Schedule. The current customer monthly sewer service fee schedule is as follows:

	Residential	Commercial	Standby
Sewer Service	$29.50	$29.50	$1.00
Debt service	$4.50	$9.50	$4.50
Bond reserve	$0.45	$0.95	$0.45
TOTAL:	$34.45	$39.95	$5.95

Table 3-3. Summary of Future Wastewater Flows

Area	Description	EDUs	Flow, gal/unit	Flow, gpd	Notes
North Fork	Existing Flows	155.6	---	31,012	
	Future Residential	7	250	1,750	See Note b
	Future Residential	17	250	4,250	Indian Housing Authority[c]
	Future Residential	33	250	8,250	Indian Housing Authority[d]
	Subtotal:	**212.6**	---	**45,262**	
South Fork	Existing Flows	---	---	12,700	15 trailers
	Future Residential	24	250	6,000	See Note b
	Mill Site Lt. Industrial	12	250	3,000	150 people@20 gpd/capita
	RV Park	100	100	10,000	100 spaces
	Subtotal:	---		**31,700**	
	TOTAL:	---		**76,962**	

[a]Estimated EDUs from remaining lots to be developed, provided by MCMD 8A.

[b]Based on 2% growth per annum.

Annual Operations and Maintenance Budget. The fiscal year 02/03 operating revenue is projected at $89,342, expenses at $119,130, and debt service/bond reserve at $8,600. This leaves a projected operating loss of $38,388.

Debt Service and Reserve Accounts. In March 1988, $147,100 of revenue bonds were sold to Farmers Home Administration for construction of the existing wastewater treatment plant. The interest rate is 5 percent, for a 40 year term. The final payment is due July 1, 2027. The MCMD 8A currently maintains a reserve account of $47,700.

Connection Fees. Current connection fees per EDU for North Fork MCMD 8A is $3,500 per EDU.

Waste Discharge Requirements – North Fork MCMD 8A WWTP

The North Fork WWTP is regulated by Waste Discharge Requirements (WDR), Order No. 94-353, dated December 9, 1994. WDRs are generally updated at least every 10 years, thus MCMD 8A should anticipate a permit renewal process to begin at some time in the near future.

Key aspects of the WDRs are summarized as follows:

- The permitted flow from the facility is currently 38,000 gpd, although the Order will allow up to 60,000 gpd capacity (matching the treatment plant capacity) once the District satisfies requirements to expand effluent disposal facilities.

- Finding No. 8 indicates that these adopted WDRs are consistent with the water quality objectives of the San Joaquin River Basin Plan, second amendment. Finding No. 16 further indicates that compliance with this Order will prevent any adverse impacts on water quality.

- Discharge specifications require the degree of treatment as secondary, with average total suspended solids (TSS) and 5-day biochemical oxygen demand (BOD_5) of 30 mg/L each. Total coliform levels must achieve a level of 23 most probable number (MPN) per 100 ml, with a maximum reading of 240/100 ml.

- Discharge Specification No. 10 requires the effluent storage pond to wastewater flow and precipitation based on the 100-year annual rain event year.

Waste Discharge Requirements – South Fork Multi-Unit Housing

The John Hovannisian North Fork Mill Housing Facility is regulated by WDR Order No. 90-051. This Order has no specific numeric treatment level requirements, as do the North Fork WWTP WDRs. However, the facility must be protected from the 100-year flood, must contain all wastewater within the designated ponds and storage areas, and must not create nuisance conditions. These are standard requirements and provisions of any Order issued by the Regional Board. As these requirements were adopted in 1990, it should be anticipated that these requirements will be updated at some time in the near future as well. At the time of adoption of these requirements, updated Basin Plan amendments had not been adopted; thus, these requirements indicate conformity to the Basin Plan objectives of the 1975 Water Quality Control Plan.

CHAPTER 4

COLLECTION, TREATMENT AND DISPOSAL TECHNOLOGIES

This chapter describes the collection, treatment and disposal technologies to be considered in the formulation of alternatives for the communities of North Fork and South Fork. Prior to evaluating each of the alternatives for North Fork and South Fork, it is important to understand each alternative and corresponding process. These technologies are then evaluated as to their applicability and feasibility for North Fork and South Fork. Sound technologies discussed in this chapter will then be used to formulate specific alternatives in Chapter 5 of this Report.

Disposal Technologies

Disposal systems included in this evaluation include surface disposal (spray fields) and subsurface disposal (leach fields, eco-chambers, and subsurface drip irrigation systems). All of these technologies are feasible for North Fork and South Fork, and although each technology has varying pros and cons, such attributes will be further discussed in Chapter 5 relative to each specific alternative. Eco-chambers and subsurface drip systems have essentially the same concept in regards to method of disposal.

Leach Fields. Leach fields consist of an engineered trench of permeable engineered backfill and perforated pipe, to allow effluent to leach into the subsurface soils. Leach field sizing is based on average daily flow with 100% reserve capacity. An application rate of 1.29 gal/sf is used for this study, based on prior engineering studies and existing soils data[2]. The positive aspect of leach fields is that additional effluent storage is not required, since subsurface leaching can occur during the winter/rainy season in addition to other times of the year. However, based on discussions with the Regional Board, nutrient removal capability at the treatment plant will likely be required for any leach field expansion.

Spray Fields. Spray fields use irrigation piping and spray heads to spray irrigate land surfaces for effluent disposal by evapotranspiration. Appropriate spray field application rates are generally chosen based on soil permeability data, slopes and runoff potential. Spray field sites are generally fenced or otherwise precluded from public access. As with the existing North Fork spray field site, the disposal area is equipped with perimeter swales and drains to capture any runoff that may occur during the spray application of wastewater. For the North Fork spray field site, the application rate is based on 0.055 gpd/sf. This rate of application was also used for estimating disposal area required for South Fork. Since spray disposal is not allowable during the wet and rainy season, expansion of the spray field in North Fork, or development of spray disposal in South Fork, will require expansion/addition of effluent holding capacity for a combined North Fork/South Fork option.

Eco-Chambers. Eco-chambers are evapotranspiration (ET) systems that introduce a forest ET technology for evapotranspiration disposal. ET is an alternative where groundwater protection is required or where soil conditions preclude successful percolation. Such systems appear to be desirable to the Regional Board from the standpoint of complete uptake of nitrogen by the root systems. Mound systems can provide successful ET, but these are usually for single households and are not applicable to discharge from a community. Brochures of this technology are provided in Appendix A.

An alternative to the conventional ET system (such as spray fields) is the Forest ET System. These systems were developed by E. Burton, Willets, California over 30 years ago with a local pilot plant. In 1978, Burton under the MARFOR Company installed a demonstration Forest ET system at the Mountain View Sanitary District (MVSD), Martinez, California. Subsurface Eco-chambers were installed in a young redwood grove, and the system was operated for about 15 years. Under an expansion of the MVSD Wastewater Treatment Plant, the Forest ET system was displaced. A report on this demonstration project is attached (1988). The ET rate at the MVSD project was reported to range from 27,000 gallons per day per acre during the summer months, to 7,000 gpd/acre during the wet winter months in an area with the moderate climate of Northern California.

In the late 1990s MARFOR installed a demonstration Forest ET system at Sonoma State University, Rohnert Park, California in an existing redwood grove and an adjoining newly planted site. This demonstration project was funded by the Santa Rosa and Sonoma County Water Agency. The study was completed when part of the site was displaced by a new parking lot. Part of the existing system is still intact, but the system is no longer operated as a demonstration project. The objectives of the study were met for the sponsoring agencies.

With the completion of these demonstration projects, Forest ET systems have been installed at other locations, mainly in Northern California. Systems have been installed and successfully operated at Blue Mountain, California a residential community in Marin County, Olive Press, Glen Ellen, Sonoma County, and a Barlow Apple Processor, Sebastopol, California and Occidental, California.

Subsurface Drip Irrigation Systems. Subsurface drip irrigation systems utilize a network of irrigation piping to convey wastewater to the root zones of individual plants, for disposal for evapotranspiration. As with Eco-chambers, only the amount of water that the foliage will uptake is provided, thus there is minimal percolation of effluent, and nitrogen compounds are taken up by the landscaping being irrigated. One such system, GeoFlow, Inc., claims a range of disposal capacity of 60,000 gpd/acre for coarse sands, to 3,000 gpd/acre for tight clayey soils. Wastewater is delivered to the irrigated area by pump(s) and a network of irrigation system piping. This type of irrigation system has many similarities to a home irrigation system. Burial depth of the effluent lines is 6 to 10 inches. Additional information on this system are included in Appendix A.

Collection System Technologies

Conventional wastewater collection systems utilize gravity sewers. These systems have been used for wastewater and stormwater for centuries. Modern sewer designs are based on empirical equations under uniform gradients to maintain self-cleansing velocities. In practice, urban street sewers are generally eight inches or larger in diameter, with minimum 3 feet of protective cover, and generally deeper (5 to 8 feet depth). Manholes are located no more than 400 feet apart or at changes in direction and sloped, to facilitate maintenance.

For small communities, there are proven technologies for alternative low cost collection systems. These technologies may prove economical and beneficial to smaller communities such as South Fork, and warrant evaluation. By using these alternative approaches significant savings can be gained to attain affordable systems, since collection systems frequently encompass up to 50 to 60 percent of a community's wastewater project costs.

The basic concept for alternative wastewater collection is to utilize smaller diameter pipes, with slight slopes to reduce pipe material and excavation costs. Conventional sewers are designed to maintain self-cleansing velocities of 2 feet per second. Using empirically derived gravity flow hydraulic formulae, minimum sewer sizes for conventional sewers are usually 8 inches or more in towns and cities. A minimum diameter of 8 inches is also commonly adopted by agencies to facilitate cleaning and maintenance.

Alternative sewers can be reduced to 4 or 6 inches, with minimum velocities down to 1.5 per second. Sewers are installed in unpaved areas with less than 3 feet of protected cover to reduce excavation and road repair costs. Manholes can be spaced further apart with economical cleanouts or inspection ports installed selectively to reduce costs.

With shallow installation, conventional manhole diameters can be reduced in size and still provide access for inspection and maintenance. In unpaved areas, economical lightweight manhole covers can be used. When sewers are installed in backyards, economical concrete manhole covers can be used.

These alternative approaches can gain significant cost savings for small communities. These approaches may appear innovative, but are not new since they have been used for decades in the U.S. and elsewhere, particularly in developing countries where high costs of conventional sewerage are major barriers to pollution control programs. In the following paragraphs, alternative low cost collection systems are briefly described to introduce the technology. References are listed at the end of this report to provide resources to gain full appreciation of these cost saving approaches.

The significant gain of simplified sewerage systems is the reduction of installation costs from 20 to 50 percent. In small communities, this can have a significant impact on a project, since collection systems frequently require 50-60 percent of the total project investment costs.

Small Diameter Gravity Systems. Small diameter gravity sewer systems (SDGS) have been used in developing countries for more than 25 years to overcome the high cost of

conventional sewers. In the U.S., these small bore systems have similar usage and have been recorded, mainly in small rural communities. There are several types of SDGS systems, and each should be evaluated before selecting a specific application. References on these systems are listed at the end of this report.

1. Elementary System. The elementary small diameter gravity system is composed of an interceptor tank, located at each household. Solids are removed in the interceptor tank and effluent is discharged into a small bore pipe (minimum 2 inch diameter). The hydraulic flow of the small bore is by gravity and in uneven terrain can follow ground contours, frequently with inflective gradients (dips) A group of small bore services serving a larger complex can lead to larger diameter pipes or to a conventional gravity sewer, leading to a central wastewater treatment plant. In communities with households dispersed over a wide area, in undulating terrain, these systems have gained acceptance particularly where soil systems are not amendable to on- site wastewater disposal. These systems have been used successfully in the U.S.A. for decades with success and community acceptance.

2. Septic Tank Effluent Gravity Sewers (STEG). A modification of the above elementary system involves the installation of a septic tank at each household. The effluent is discharged into a small bore/diameter gravity sewer. In some locations, an effluent filter is installed in the septic tank to improve biological and suspended solids reduction. A STEG system is installed at each household. STEG systems have been used overseas for over 40 years and in the U.S. for over 30 years.

3. Septic Tank Effluent Pump Sewers (STEP). A more complex small diameter system involves the use of pumps to lift the interceptor or septic tank effluent into a small diameter force main. The effluent pressure system can follow the terrain and can service groups of households, leading to the community wastewater treatment plant. A STEP system is required to service individual households.

4. Pressure Sewers with Effluent Pumps. The use of an interceptor tank or a septic tank at each household involves added construction of facilities, requiring monitoring and maintenance. This system can be simplified by eliminating these two tanks and installing a grinder pump to mascerate household wastewater. As solids are grounded, small pressurized collection lines can be used to convey wastewater to a centralized treatment facility.

Applicability of Collection Systems to South Fork

With the various alternative collection systems discussed, three systems warrant evaluation for a new collection system in South Fork. These there systems include: 1) Conventional gravity sewer system; 2) STEG system; and 3) STEP system.

Conventional Gravity Sewer System. Conventional gravity sewer systems are widespread and proven systems that have been around for many years. They are designed for ease of maintenance and access. This type of system would work well for any sewered community; however, for a small community with limited financial resources, conventional gravity sewer systems can be prohibitively expensive. This is the case for South Fork. A collection system of this nature for South Fork could cost well over $400,000 for the entire system.

STEG System. For South Fork, a STEG system would also work well for the community, relying on individual septic tanks to remove solids, and installing small diameter gravity sewers. The drawback to this alternative is the South Fork grade and topography, which will still require a lift station and long force main to convey wastewater to the future South Fork WWTP. This element of the collection system still makes a STEG system relatively expensive for the South Fork community. With maintaining septic systems, individual home owners still have the periodic expense of septic tank pumping. Each homeowner will also have the expense of installing a 4" lateral to the gravity sewer system, estimated at $3,000 on the average per home owner. It is also recommended that older septic tanks be replaced with new septic tanks to ensure minimal leakage.

STEP System. To implement a STEP system, individual homeowners will need to provide pumps and wetwell units. If a wetlands system is implemented, it would be recommended to still maintain individual septic tank systems at each home to remove and contain solids. This system would be the least costly of the three alternatives as far as the collection system as a whole; however, each home owner still will be responsible for individual effluent pump stations. Therefore, each individual home owner will be required to pay $3,000 to $8,000 for such a system, including the cost for their portion of individual force main to tie into the force main collection system. When factoring in this cost, a STEG system becomes more cost effective when compared to a STEP system. The main drawback to the STEP system is the initial cost of the pump system, and on-going maintenance of the equipment.

Treatment System Technologies

The following subsections describe the various treatment system technologies considered. Details of costs are included later in this chapter, and cost tables are included in Appendix C.

Sequencing Batch Reactor (SBR):

The sequencing batch reactor is a fill-and-draw activated sludge system designed to minimize treatment plant footprint by using the same basin for aerobic treatment and clarification. Typically, a system will have two SBRs that function in parallel. SBRs can achieve very good nitrogen removal when an anoxic unit process is incorporated into the treatment process train.

Grit is removed from the influent wastewater prior to entering the SBR. Once the reactor is filled, the reactor is aerated and mixed, much like the traditional activated sludge process.

When the biological reactions are complete the tank becomes quiescent, clarified water is decanted, and waste sludge is removed. After the SBR tank, wastewater generally flows into an equalization basin to provide steady flow for downstream processes, particularly tertiary treatment (filtration). The bottom of the reactor retains a portion of the sludge to inoculate future batches. A schematic of this process is included as Figure 4-1.

SBR treatment facilities have been used to treat wastewater since the 1980s. Performance of SBRs is comparable to conventional activated sludge systems. BOD removal efficiency is generally 85-95%. SBR manufacturers will typically provide a process guarantee to produce an effluent of less than 10 mg/L BOD and 10 mg/L TSS. With skilled operation, SBRs can effectively meet stringent RWQCB requirements for nutrient removal. Although SBR plants are very effective in treating wastewater, they also are more complicated to operate than most other mechanical treatment plants.

As with all activated sludge treatment systems, SBR reactors produce significant amounts of sludge. The amount of sludge produced is similar to that of conventional activated sludge. As with conventional activated sludge treatment, sludge generation would require major investment in sludge handling facilities as well as substantial annual operational costs. These costs are included in the capital, O&M, and present worth cost analysis for SBRs.

For North Fork and South Fork, a mechanical SBR plant of this magnitude of cost is not practical. Although SBR plants are a proven technology that can meet strict waste discharge requirements, the cost of such a plant is not warranted given the current discharge standards required of North Fork in the current WDRs.

Advanced Integrated Pond System (AIPS):

The Advanced Integrated Pond System offers an innovative improvement to traditional flat-bottom ponds. The AIPS design incorporates a series of specially designed multi-stage biological reactors (ponds).

Three distinct biological zones are integrated into the first pond; a deep anaerobic pit at the bottom of the reactor, a sludge blanket suspended within the deep pit, and an overlying aerobic zone comprised of aerobic bacteria and algae. The deep digester pit contains the settled bio-solids in an anaerobic fermentation zone. Due to the efficiency achieved in the deep-pit digester, organic matter is almost completely decomposed eliminating the need for routine bio-solids handling. One of the first municipal AIPS installations in California has operated continuously for over thirty-years without bio-solids removal.

The overlying aerobic zone, comprised of aerobic bacteria and algae, is supplied with oxygen from algal photosynthesis, surface re-aeration, and horizontally mounted mechanical aerators. Large savings in electricity usage and cost have been achieved due to oxygen production by algae. By maintaining an oxygenated surface overlying the anaerobic zone, the ponds do not emit any unpleasant odors.

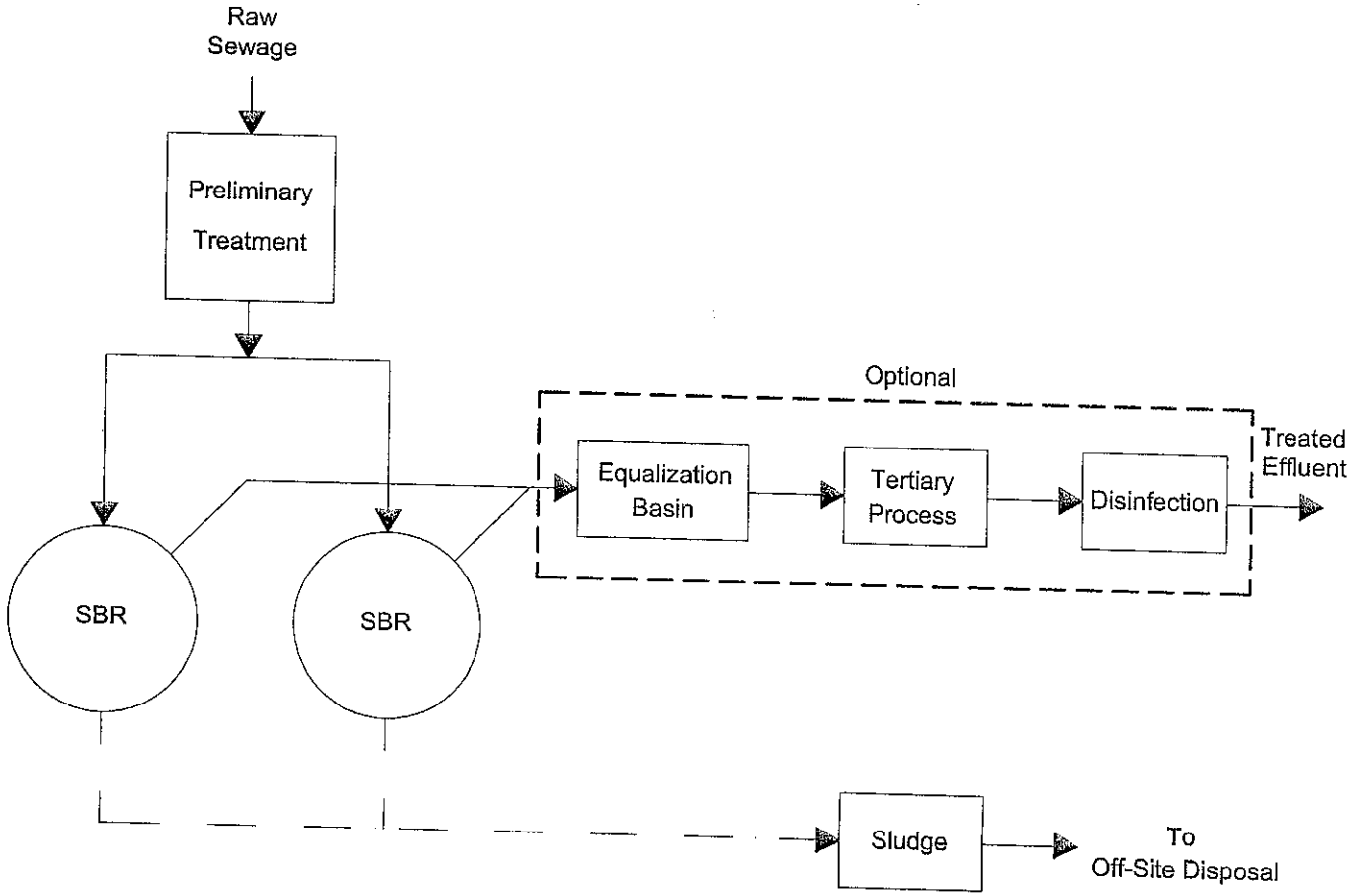

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Figure 4-1
SBR Process Schematic
North Fork CDC/MCMD 8A

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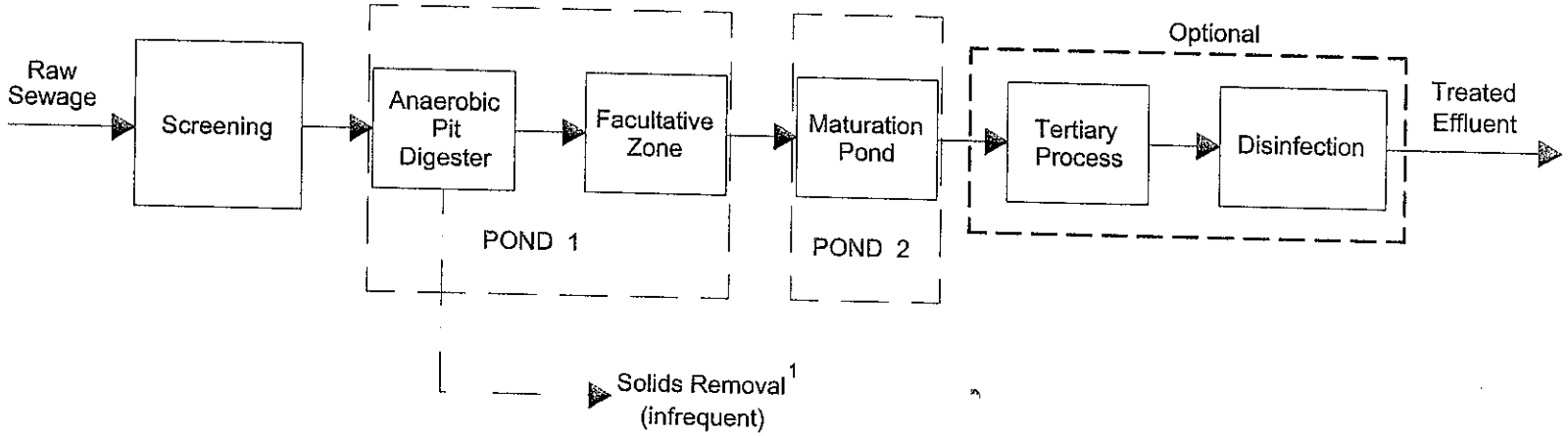
The second pond is designed much like the first with the degradation of organics continuing for a higher degree of treatment. The effluent from the second pond often meets discharge requirements for secondary treatment. The following ponds, usually between one and three, serve as maturation, polishing, and storage ponds for the effluent before re-use. In the case of North Fork or South Fork, a two-pond system would be recommended. A schematic of this process is included as Figure 4-2.

AIPS is an applied technology that has been accepted by water pollution control authorities in California and elsewhere for over 30 years. This is a proven technology that meets US EPA and California State Water Resources Control Board criteria, limits for equivalent secondary treatment for stabilization ponds of 45 mg/L for BOD_5 and TSS. An AIPS system has been operating within CRWQCB requirements in St. Helena, CA for 30 years. There are two pond systems in Santa Rosa, CA (with effluent similar to AIPS) operating with membrane processes that meet Title 22 requirements. Coupled with an appropriate tertiary treatment system, an AIPS can also meet tertiary discharge requirements. In order to be permitted in Region 5, these ponds will need to be lined. Furthermore, the AIPS will not reduce nitrogen compounds sufficiently to satisfy water quality objectives; however, coupled with an effluent disposal with nitrogen uptake (such as eco-chambers, subsurface irrigation and spray application), such a treatment system would be well suited for South Fork.

AIPS are low cost systems that rely on algae to produce oxygen and thus minimize the need for external oxygen addition from aerators, which keeps operation and maintenance costs low. Capital costs for AIPS are generally low as there are relatively few mechanical components. Despite higher land requirements relative to mechanical plants, AIPS are more cost effective than conventional treatment options.

Loading requirements for AIPS vary based on climate and waste type, but an estimated loading criteria is approximately 300 to 500 lb BOD_5/day/acre. This compares to facultative lagoons that are generally loaded at 25 to 35 lb BOD_5/day/acre[3]. AIPS can accommodate a wide range of wastewater flows, from small 10,000 gpd facilities to larger facilities over several million gallons per day. Reactor size in the field does not impact the performance and biology of these systems.

Expanding the North Fork plant using AIPS will not likely be feasible due to the amount of land required. The scope of this study did not include detailed siting studies to determine a location for AIPS ponds, but considering environmental concerns, cost of land, and existing site constraints at the existing North Fork WWTP, application of AIPS at North Fork is not considered feasible. However, AIPS are considered very suitable for the South Fork area. To address possible concerns of the Regional Board on nutrient removal (depending on proposed disposal method), a combination of AIPS in conjunction with a subsurface wetlands system, can be considered.



NOTE:

1. IF A STEG COLLECTION SYSTEM IS IMPLEMENTED, SEPTAGE PUMPING AT INDIVIDUAL HOMES IN SOUTH FORK WILL BE REQUIRED.

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Figure 4-2
AIPS Process Schematic
North Fork CDC/MCMD 8A

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Constructed Wetlands:

Subsurface flow constructed wetlands are excellent for the removal of nitrates, as well as any remaining BOD or suspended solids. Design of wetlands for removal of BOD, suspended solids and nitrogen is based on areal and temperature dependent loading formulas. Summer and winter climate conditions must be accounted for, with winter conditions prevailing for sizing such systems. For South Fork, assuming that individual septic systems are maintained at each home, a 35,000 to 40,000 gpd wetlands system would require approximately 0.5 to 0.7 acres. This is equivalent to around 90 lb/acre/day. These types of systems are also considered well suited to a community such as South Fork. Refer to Figure 4-3 for a process schematic of a constructed wetlands system. Based on feedback from the Regional Board, a wetlands system would also need to be lined. Concerns were also expressed about breeding mosquitoes; however, all flow us subsurface and there would be minimal potential for nuisance conditions. The Regional Board did not favor the idea of wetlands treatment alone; however, such a system coupled with an AIPS system may meet the Regional Board's objectives for water quality.

Ammonia, which is the primary form of nitrogen leaving the interceptor tanks is not removed in a consistent manner from constructed wetlands, and therefore will require additional treatment by a nitrification filter or by the soil. A solution to the problem of ammonia removal and nitrogen reduction is to recycle effluent from the wetlands to a gravel trickling filter placed on top of the wetlands at the front end. Nitrified water trickles down into the gravel bed of the wetlands where conditions are ideal for denitrification.

Facultative Lagoons:

Facultative lagoons maintain an oxygenated/aerobic zone above an anaerobic zone below. These lagoons are generally loaded at 25 to 35 lb BOD_5/day/acre[3], and are usually 8 to 10 feet deep. Facultative lagoons can be equipped with varying degrees of mechanical aeration, but mechanical mixing is generally low to maintain the anaerobic layer in the lower zone. These types of lagoons require large land requirements, and are not considered viable options for further consideration for North Fork or South Fork.

Trickling Filters:

Trickling filters rely on spreading wastewater over a media bed, generally plastic media, rock or other type filter media. The media bed hosts bacteria on the surface area of the media, and bacteria feed on organic material as the wastewater trickles over the media surface. Counter-current air is generally introduced to oxygenate the media bed. The oxidation process is similar to other biological treatment systems with regards to consumption of organic matter in wastewater. Trickling filters are most always circular, allowing a rotating arm to spray wastewater over the surface of the media bed.

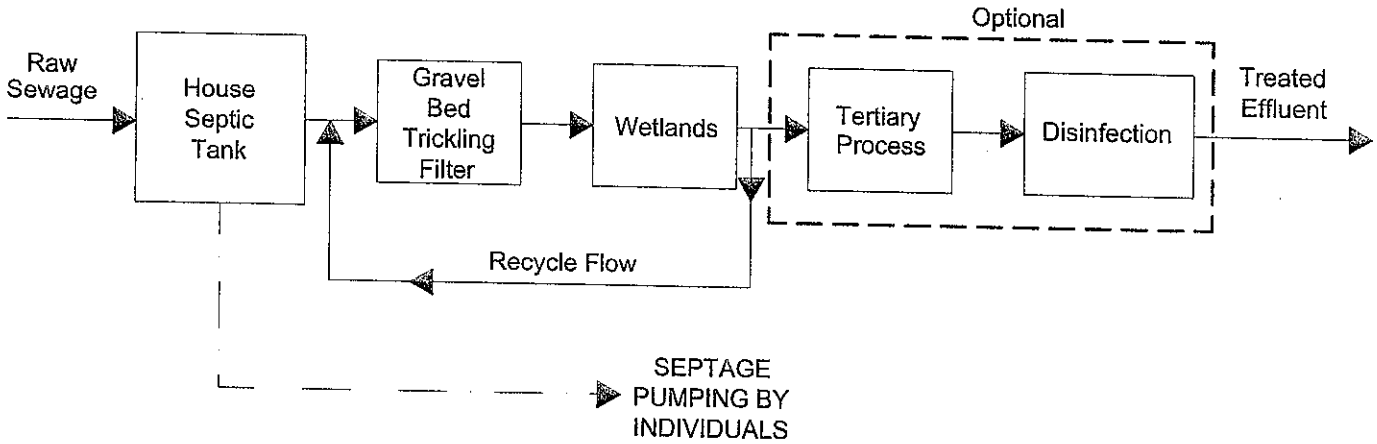

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Figure 4-3
Constructed Wetlands Process Schematic
North Fork CDC/MCMD 8A

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DATE :	10/27/2003

Effluent from trickling filters is generally recirculated at 10% to 50% to enhance treatment. Organic loading is generally 300 to 800 lb BOD_5/ac-ft-day[3]. Reactors of 50 to 100 foot diameter would be required for North Fork, and existing plant constraints would prohibit use of filters at this plant. For South Fork, 45 to 60 foot diameter reactor would be needed (with a bed depth of 10 feet). With regards to site requirements, a trickling filter plant would be feasible to install for South Fork. However, it is also noted that trickling filters are generally used for much larger flows. A derivative of the trickling filter, rotating biological contactor (RBC) units, is generally used for smaller scale projects.

Trickling filter plants require conventional headworks, including screening and grit removal, and also generally include primary clarification ahead of the filter. Some plants incorporate the design of "roughing" filter, a trickling filter loaded higher than normal, followed by a second unit loaded more lightly. Secondary sedimentation follows the trickling filter plant, to provide secondary treatment. A schematic of this process is included as Figure 4-4.

Although the trickling filter itself is a simple process, it includes mechanical equipment for distributing wastewater, pumps to recycle wastewater, and other mechanical components. Sludge handling would be similar to that of a mechanical plant such as the SBR plant.

Breeding of flies can also be a common nuisance condition with trickling filters. Based on these findings, tricking filter units are not recommended for North Fork and South Fork.

Costs for trickling filter plants are comparable to an SBR plant when considering land costs and requirements, additional process units for primary and secondary clarification and digestion.

Overall Evaluation of Treatment Technologies

As part of this presentation of technologies, screening of these technologies was provided to further refine alternatives in Chapter 5. The following Table, Table 4-1, summarizes the review of the applicability of these technologies as compared to key criteria. Based on this evaluation, both AIPS and constructed wetlands systems would be suitable for South Fork.

Criteria used to evaluate these treatment technologies include:

- Capital Cost, O&M Cost, Lift Cycle Cost
- Permittability
- Ease of Operation
- Land Requirements
- Environmental/Public Acceptance
- Sludge Management/Disposal Requirements

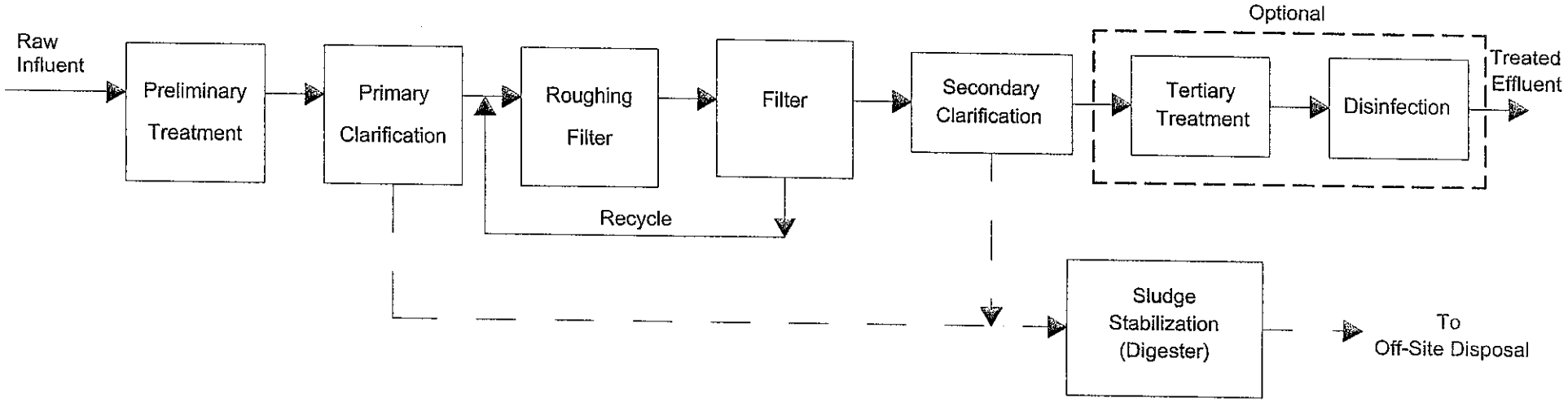

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Figure 4-4
Trickling Filter Process Schematic
North Fork CDC/MCMD 8A

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Table 4-1. Ranking and Evaluation of Treatment Technologies

Criteria	Technology				
	SBR	AIPS	Wetlands	Facultative Lagoon	Trickling Filter
Capital Cost	1	4	5	4	1
O&M Cost	2	5	4	5	2
Life Cycle Cost	1	5	4	4	1
Permittability	5	3	3	2	3
Ease of Operation	1	5	5	5	2
Land Requirements	5	2	3	1	4
Environmental/Public Acceptance	5	3	4	2	4
Sludge Management	1	5	3	3	1
SCORE:	**21**	**32**	**31**	**26**	**18**

Note: 1=least desirable; 5=most desirable

CHAPTER 5

EVALUATION OF ALTERNATIVES

This chapter presents and evaluates the alternatives for providing wastewater service to North Fork and South Fork, and also presents an overview of the alternatives evaluated by Provost & Pritchard.

Alternatives from Prior Study

The four alternatives in the Provost & Pritchard report that were originally considered and evaluated, are as follows:

- Alternative No. 1 Construction of a new collection system in South Fork and piping the wastewater to the existing treatment plant and spray field in North Fork. This would require upgrades and/or additions to existing equipment and modifications to the existing spray field disposal area.

- Alternative No. 2 Construction of a new collection system in South Fork and piping the wastewater to a new treatment plant and leach field in South Fork on the saw mill property. This includes construction of a new packaged treatment facility, rated at 50,000 gpd, without a filtration module or disinfection facilities since discharge would be to leach fields.

- Alternative No. 3 Construction of a new collection system in South Fork and piping the wastewater to a new treatment plant and spray field located on the saw mill property. This included construction of a new packaged treatment facility, rated at 50,000 gpd, including a filtration module and disinfection facilities sufficient to provide a "CT" value of 300 or greater.

- Alternative No. 4 Construction of a new collection system in South Fork and piping the wastewater to a new treatment plant located on the Mill Site and spray field located on the spray field would be located on land controlled by the Forest Service. This would allow the field to be restricted from public access and therefore require slightly lower levels of treatment than Alternative No. 3.

New Alternatives to Serve North Fork and South Fork

The alternatives to serve North Fork and South Fork were developed by WSI with input from North Fork CDC, Madera County, and Mr. Michael Ogden of NSI. The alternatives by Provost & Pritchard were used as a starting point and basis for development of these alternatives. The alternatives were formulated based on:

- Serving North Fork alone;
- Serving South Fork alone;
- Serving North Fork and South Fork together.

The alternatives are described as follows:

Serving North Fork Alone

N1. Maintain existing WWTP, expand effluent storage, maintain existing spray field. Evaluate expansion of spray field and/or addition of leach field or eco-chamber field.

N2. Provide new AIPS plant (above effluent storage and disposal evaluated above).

N3. Same as Alternative N1 or N2 above, tertiary treatment by conventional filtration/disinfection, and stream discharge.

Serving South Fork Alone

S1. Provide conventional mechanical package WWTP, install small diameter collection system (STEP or STEG system, defined later in this report), or conventional collection system. Consider three methods of effluent disposal: 1) leach field disposal; 2) spray field disposal; and 3) eco-chamber disposal.

S2. Same as Alternative S1, but providing AIPS pond system for secondary treatment.

S3. Same as Alternative S1, but providing wetlands for secondary treatment.

S4. Same as Alternative S1, S2 or S3, but adding tertiary treatment by sand filtration/disinfection., stream disposal and reuse.

North and South Fork Combined

NS1. Maintain and expand existing WWTP, expand effluent storage and spray field, develop new spray field for future capacity. Consider combinations of effluent disposal by spray field, leach field and eco-chambers.

NS2. Same as NS1, tertiary treatment by conventional filtration/disinfection, and stream discharge.

NS3. Pump raw wastewater from North Fork to South Fork, and develop AIPS pond system in conjunction with land disposal to treat North and South Fork wastewater combined.

Design Criteria

The following subsection describes the design criteria used as part of this evaluation of alternatives.

Sewer Pipes/Collection System:

Conventional gravity sewers will be based on minimum diameter of 8 inches, with flow velocities at average flows of 2 feet per second. Conventional force mains and small diameter sewer force mains will be sized based on pipe velocity of 5 feet per second or less. Small diameter sewers will be 2 and 3 inch diameter. Conventional force mains will have a minimum diameter of 4 inches.

Lift Stations:

Lift station capacities are based on maximum daily flow times (1.6 times average day). Lift stations will be duplex pump stations with standby emergency power provisions. Lift stations will be of the submersible pump type, with only electrical control panels and vents above ground.

Leach Field:

Leach field sizing is based on average daily flow with 100% reserve capacity. The soil is assumed to be silty sand, underlain by decomposed granite as is common for much of the area, and as documented in a 1990 report by John Minney, Geotechnical Report, Spray Disposal System and Holding Reservoir[2]. A typical percolation rate for this type of soil is 15 min./in, which yields an application rate of 1.29 gal/sf. Trench dimensions of 8 feet deep, 2 feet wide and 100 feet long with a 20-foot spacing mean that 1.75 aces would be required.

Spray Field:

Spray field area required is based upon the existing North Fork permit requirements: spray field application rate of 0.055 gpd/sf.

Storage Capacity:

Storage capacity of the existing pond was based on providing storage for the 100-year occurrence annual rain event, plus 2 feet freeboard (RWQCB Requirements). WSI performed a water balance, using local weather data for rainfall and evaporation, and this criterion. These water balance calculations are included in Appendix B. For North Fork alone, without any future flows from South Fork, the existing 23 acre feet of storage appears to adequate. To be conservative, no percolation was calculated through the pond bottom.

EVALUATION OF ALTERNATIVES

This section provides the evaluation of the various alternatives for wastewater facilities at North Fork and South Fork. Included at the end of this section is a discussion of the costs for all alternatives. Details of the costs are included in Appendix C.

Alternative N1. Maintain existing WWTP, expand effluent storage, maintain existing spray field. Evaluate expansion of spray field and/or addition of leach field or eco-chamber field.

This alternative maintains the existing extended aeration plant. Based on projected flows, there is sufficient treatment capacity in the plant for build-out. As with any mechanical treatment plant, there will be periodic equipment replacement and repairs as part of operating and maintaining this plant. The treated effluent will continue to be pumped to the existing effluent storage pond. As indicated earlier, the established design criteria for the effluent storage pond is the 100-year annual rainfall event per RWQCB requirements. At build-out flow, the pond would need to be expanded to 34 acre-feet (AF), well within the limitations of expansion to 46 AF described in the John Minney geotechnical report[2].

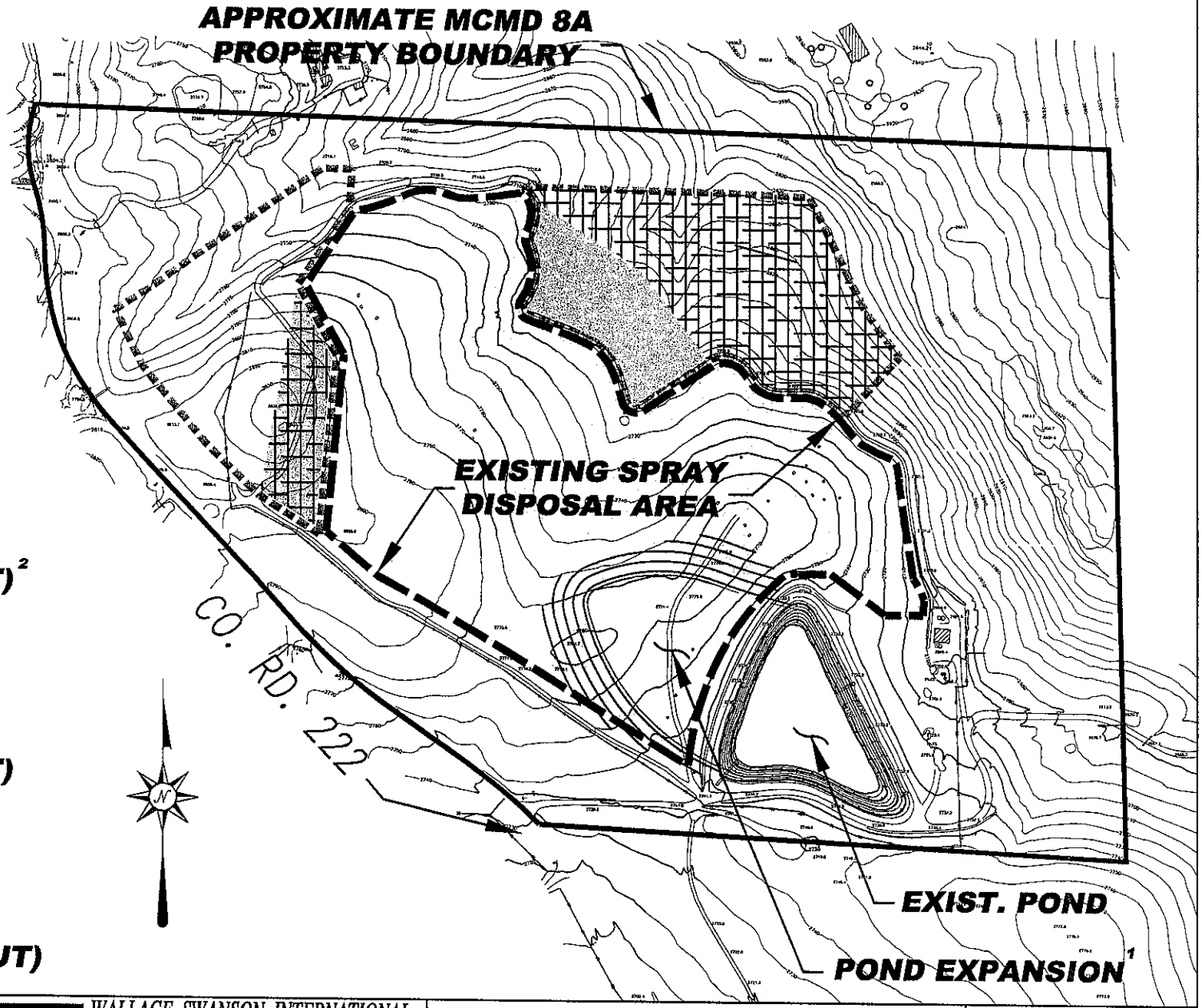
Disposal capacity must be expanded to meet build-out. With expansion of the spray field, an additional 5 acres is recommended. However, with expansion of the storage pond, the existing spray field loses 3 acres; thus, a total of 8 to 9 acres of spray field must be developed. This area appears to be developable within existing County property, while maintaining a 100-foot buffer around the property boundary. Specific constraints on terrain, drainage, and other site issues would need to be addressed as part of the detailed design effort. In regards to other options, WSI recommends that leach fields be added to meet future disposal needs, as this lessens the need for additional storage that can be costly to develop. It is recommended that the existing spray field be maintained, at least the majority of it, for disposal. In the future, it is possible that a portion of the existing spray field could be converted to leach field or subsurface irrigation disposal, to meet future needs. Figure 5-1 depicts the existing pond and spray disposal area, and the needed improvements for expansion of the spray field and expansion of the storage pond.

Pros:

- Maintains use of existing WWTP, with no further treatment cost incurred to rate payers.
- Maintains use of existing spray field, with minimal expansion within existing County-owned property.
- Least cost secondary treatment alternative to serve North Fork MCMD 8A.

Cons:

- Requires expansion of the existing storage pond to 35 AF (based on 8-month storage criteria).



NOTES:

1. 3 ACRES OF EXIST. SPRAY FIELD LOST DUE TO FUTURE POND EXPANSION
2. ACCOUNTS FOR LOST SPRAY FIELD AREA. SEE NOTE 1.

EXIST. SPRAYFIELD (16±ACRES)

SPRAY FIELD AREA (9 ACRES BUILD-OUT)[2]

ECO-CHAMBER AREA (6 ACRES BUILD-OUT)

LEACH FIELD AREA (2.5 ACRES BUILD-OUT)

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Figure 5-1
Alternative N1 Disposal Facilities
North Fork CDC/MCMD 8A

DRAWING : Exhibits
JOB No. : 557.01.700
SCALE : 1" ≅ 300'
DATE : 10/27/2003

Alternative N2. Provide new AIPS plant (effluent storage and disposal evaluated above).

This alternative considers a new AIPS plant to replace the existing extended aeration plant. The AIPS system is suitable for many applications; however, for this option, there is no room for an AIPS at the existing plant site. Siting a new location for a WWTP would be costly, and may be difficult to implement with permitting and environmental constraints.

Pros:

- Maintains use of existing spray field, with minimal expansion within existing County-owned property.
- System would yield long-term cost efficiencies with operation and maintenance.

Cons:

- Requires development of new treatment plant site, with uncertain permitting and environmental constraints, plus land acquisition for
- Mothballs an existing WWTP that is in good operating condition.

Alternative N3. Same as Alternative N1 above, tertiary treatment by conventional filtration/disinfection, and stream discharge. Refer to Figure 5-2.

This alternative considers the addition of tertiary treatment at the North Fork WWTP site. Tertiary facilities for a 60,000 gpd plant would fit on the existing plant site. This alternative assumes that the existing aeration plant will meet nutrient removal requirements, should they be included in the NPDES Permit. At full plant flow, it is not certain that the extended aeration plant could consistently meet nutrient removal requirements. The existing holding pond would be maintained as emergency backup in the event the tertiary plant does not meet discharge criteria or requires maintenance. The actual cost for construction is relatively low, as no additional construction/expansion of the effluent holding pond is required with stream discharge. However, on a life cycle cost basis, the cost of operating and maintaining a tertiary plant will be relatively expensive.

Recycling/Irrigation. Water recycling could be implemented in North Fork; however, there is very little market for tertiary recycled water in the area, and the cost of a pump station and irrigation distribution system to serve schools, parks or other uses would be prohibitive.

Pros:

- Alleviates the need to expand the existing spray field and effluent holding pond.
- Provides higher degree of treatment.
- Tertiary plant is developable on existing plant site.

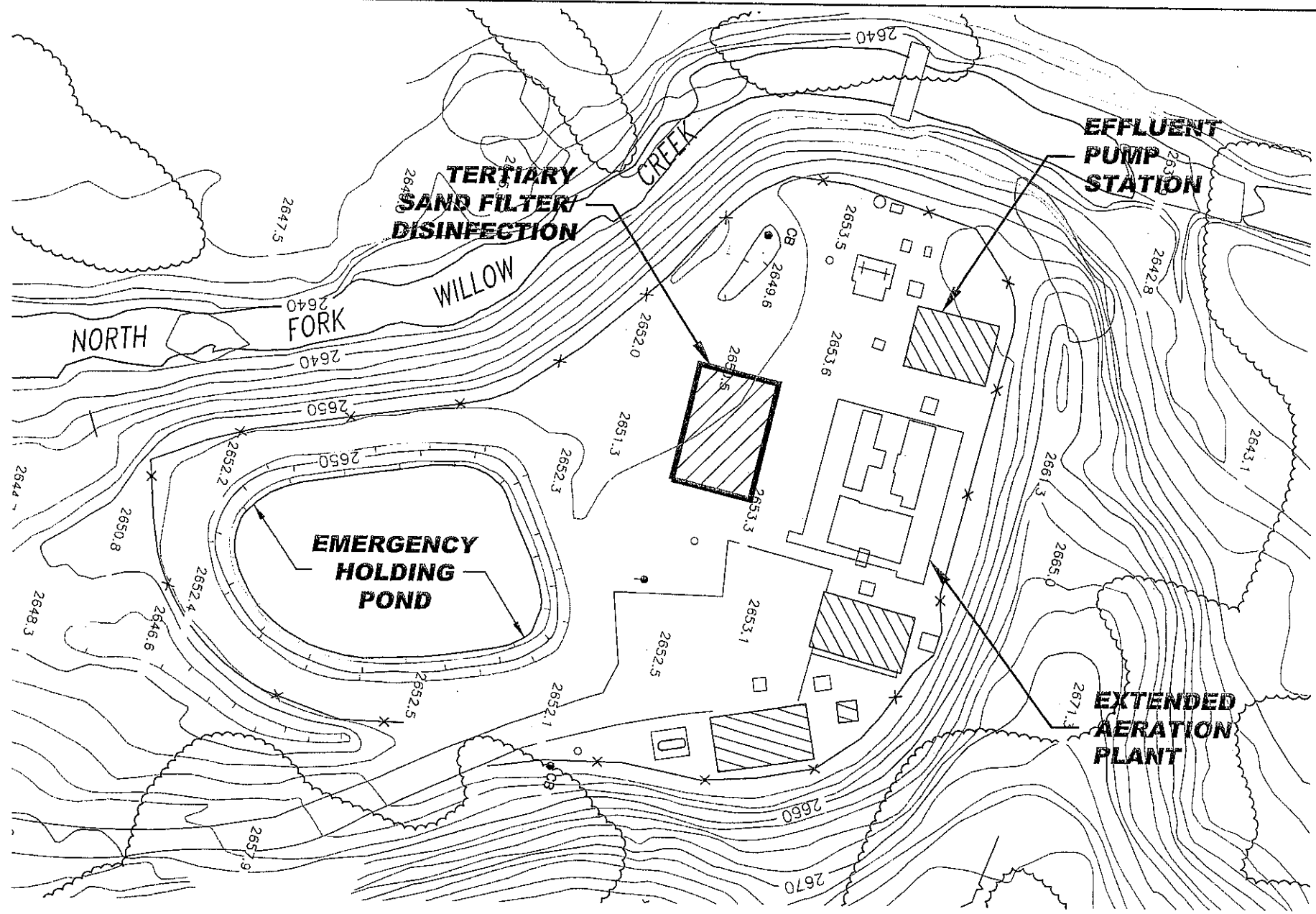

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Figure 5-2

Alternate N3 Tertiary Treatment Plant Layout

North Fork CDC/MCMD 8A

DRAWING :	Exhibits
JOB No. :	557.01.700
SCALE :	1" = 50"
DATE :	10/27/2003

Cons:

- Increases O&M costs for energy and manpower.
- Unknown discharge parameters for NPDES Permit.
- Recycled water distribution system would be cost prohibitive.

Serving South Fork Alone

Alternative S1. Provide conventional mechanical package WWTP, install small diameter collection system (STEP or STEG system, defined in Chapter 4), or conventional collection system. Consider three methods of effluent disposal: 1) leach field disposal; 2) spray field disposal; and 3) eco-chamber disposal.

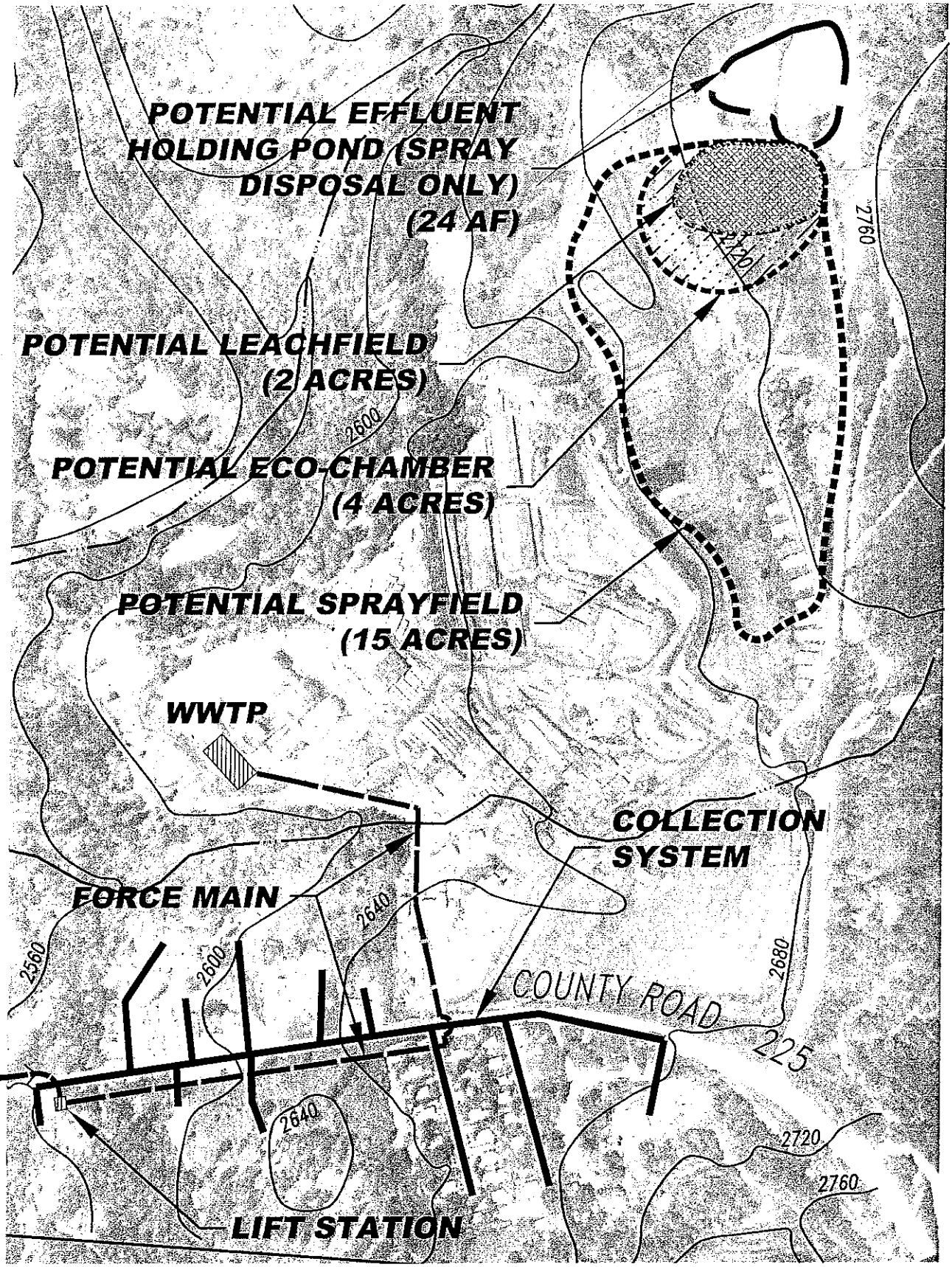
The treatment alternatives were evaluated in Chapter 4. Although mechanical plants did not rate highly in the evaluation, consideration is given to a small mechanical package WWTP to serve South Fork. For the size of facility, a mechanical plant is relatively expensive, and difficult to expand in the future to accommodate future flows. A package WWTP would have a compact footprint, however.

In Chapter 4, disposal options were evaluated. With South Fork not having existing disposal areas established, development of new spray disposal areas on the Mill Site could restrict development and access to some degree, with only secondary effluent being provided. Spray fields will take up a significant area, not only for spray irrigation, but for effluent holding also. Refer to Figure 5-3 for a depiction of this alternative. Specific areas for spray disposal on the Mill Site are difficult to ascertain, given that the development plan for the Mill Site can be somewhat flexible. WSI's general recommendation is to use a combination of subsurface disposal (eco-chambers or subsurface disposal systems), with limited spray irrigation. This combination of effluent disposal would be most desirable from the Regional Board's standpoint, to minimize percolation and maximize nitrogen uptake.

The collection system for South Fork would need to be constructed anew. From Figure 5-3, it is evident that the land falls to the west. If a conventional or small bore gravity system is constructed, a lift station is required as shown, to pump raw wastewater to the Mill Site WWTP. If a STEP system is employed, each individual pump would need to be capable of pumping to the required elevation of the WWTP. The cost estimates in Appendix C indicate a clear capital cost advantage to construct a STEP system, if you exclude the cost of individual homeowner costs for individual pumps. With that in mind, a STEG system overall has a slight economic advantage over a STEP system; also, each homeowner must maintain their individual pumps for a STEP system. For a STEG system, it should be noted that some septic tanks may need replacement as part of the improvement which will drive the cost up. A conventional gravity sewer cost is the most costly to develop, unless extensive septic tank replacement is necessary for a STEG system.

Pros:

- Treatment plant site would have a relatively small footprint.



WALLACE SWANSON INTERNATIONAL A DIVISION OF JOHN L. WALLACE & ASSOCIATES 4115 Broad Street, Suite B-5 San Luis Obispo, CA 93401 Tel (805) 544-4011 Fax (805) 544-4294	**Figure 5-3** **Alt. S1 Collection & Effluent Disposal Sys.** North Fork CDC/MCMD 8A	DRAWING : Exhibits JOB No. : 577.01.700 SCALE : 1" ≅ 400' DATE : 10/15/03

Cons:

- A new treatment plant site must be developed, including effluent storage and disposal.
- Long-term operation and maintenance of a mechanical treatment plant.

Alternative S2. Same as Alternative S1, but providing AIPS pond system for secondary treatment. Under this alternative, an AIPS system is constructed to serve South Fork and the Mill. The AIPS pond system can be constructed in phases, with Phase 1 serving the existing South Fork residents. It would be envisioned that a 20,000 gpd AIPS system would be installed initially, and a parallel 20,000 gpd AIPS system installed as part of a second phase. The second phase would be assumed to be financed by the Developer of the Mill site. Refer to Figure 5-4 for this alternative. The pond build-out would require 1 acre of land, including room for access roads, but excluding effluent storage. The AIPS ponds would require sludge management very infrequently, only once every 20 to 30 years.

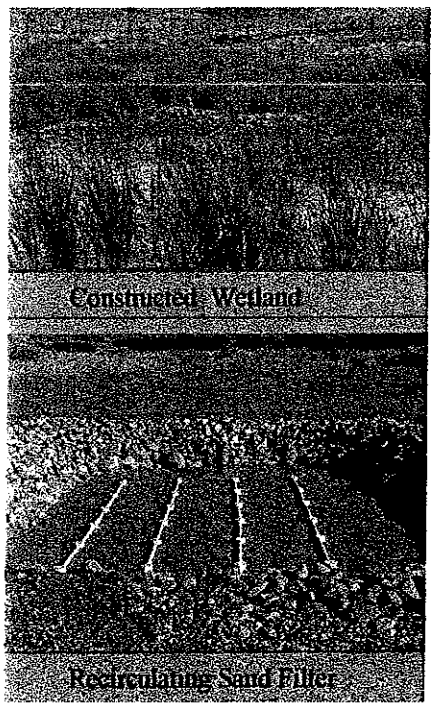
Pros:

- New WWTP system easy and economical to operate and maintain.
- No sludge disposal, except once every 20 to 30 years.
- No need to maintain individual septic tank systems.

Cons:

- A new treatment plant site must be developed, including effluent storage and disposal.

Alternative S3. Same as Alternative S1, but providing wetlands for secondary treatment. This alternative would be similar to Alternative S2, except with the use of a subsurface wetlands system in conjunction with a gravel trickling filter, as described in Chapter 4. Individual septic tanks would be maintained to remove solids as pretreatment to the wetlands system. The wetlands treatment system could be constructed on 0.5 to 0.75 acres to meet build-out demands for South Fork. The wetlands system would be aesthetically pleasing with its natural appearance, and is very easy to operate and maintain. Refer to the exhibit at right.



Pros:

- Provides low-cost, low-maintenance, aesthetically pleasing treatment system.

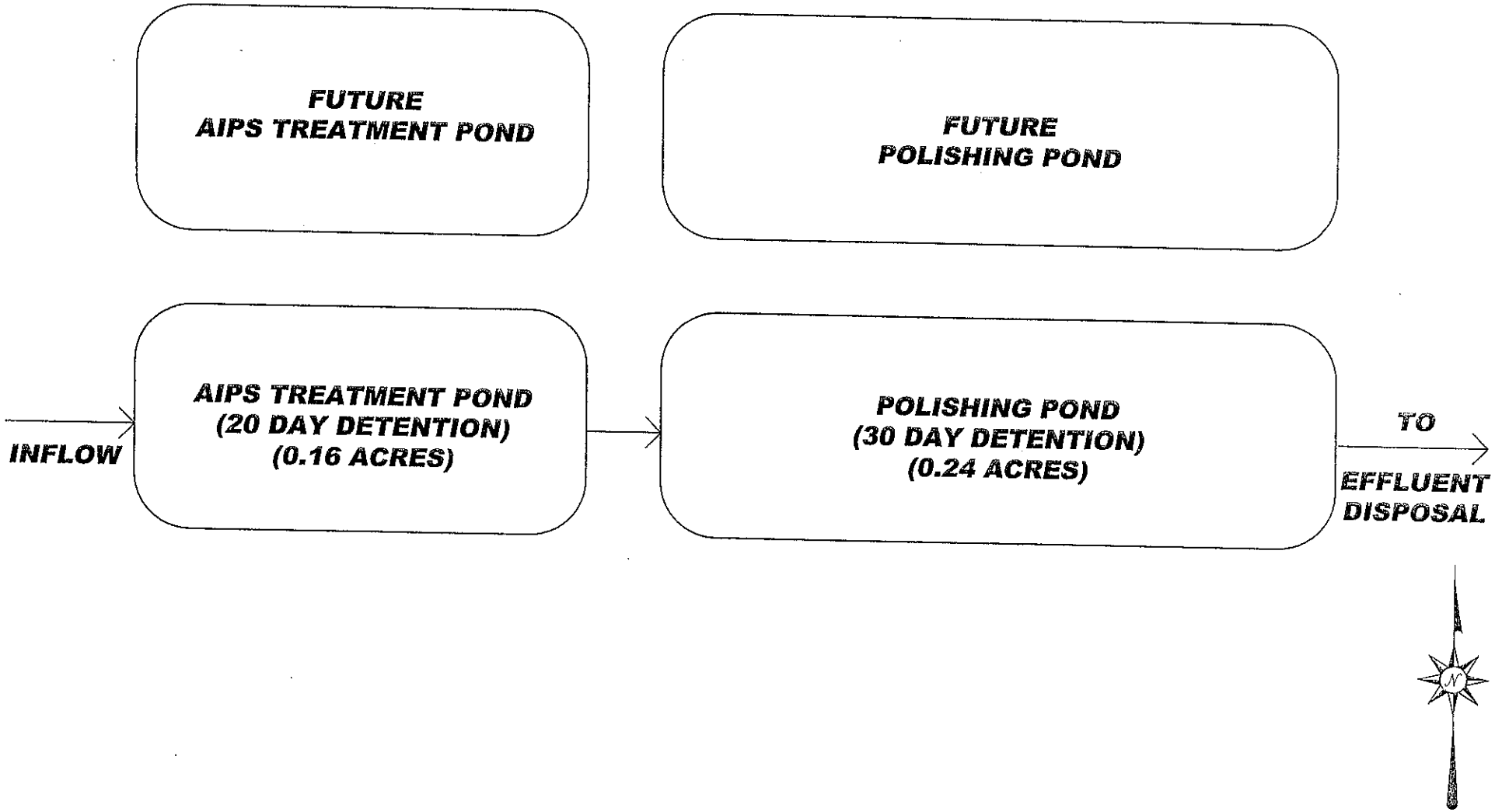


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Figure 5-4
Alternative S2 AIPS Pond Layout
North Fork CDC/MCMD 8A

DRAWING :	Exhibits
JOB No. :	557.01.700
SCALE :	1' = 40"
DATE :	10/27/2003

- Capable of meeting nutrient removal requirements of the Regional Board.

Cons:

- Individual septic tanks must be maintained for pre-treatment to the wetlands system, with continued septage hauling by individual home owners.
- Permitting may be difficult based on feedback from Regional Board.

Alternative S4. Same as Alternative S1, S2 or S3, but adding tertiary treatment by sand filtration/disinfection, stream disposal and reuse. This alternative adds a tertiary filtration and disinfection system to the wetlands treatment plant. On a life cycle cost basis, the cost of operating and maintaining a tertiary plant will be relatively expensive.

Recycling/Irrigation. Water recycling could be implemented in South Fork; however, there is very little market for tertiary recycled water in the area, and the cost of a pump station and irrigation distribution system would be prohibitive. A recycled water system may be feasible only if the developer of the Mill Site develops and pays for the entire tertiary treatment and irrigation system.

Pros:

- Provides higher degree of treatment.

Cons:

- Increases O&M costs for energy and manpower.
- Unknown discharge parameters for NPDES Permit.
- Recycled water distribution system would be cost prohibitive.

North and South Fork Combined

Alternative NS1. Maintain and expand existing WWTP, expand effluent storage and spray field, develop new spray field for future capacity. Consider combinations of effluent disposal by spray field, leach field and eco-chambers. With combining the flows from North and South Fork together, the disposal capacity on the existing County land becomes difficult should the County rely on spray disposal alone. In fact, if only spray disposal is developed, it is likely that the County would need to seek additional lands for spray irrigation. It would be recommended that, with this alternative, that a combination of the existing spray disposal field and new subsurface disposal or leach field disposal systems be implemented. More importantly, the existing effluent holding pond is insufficient and would need to expand beyond the capable 46 AF available (per the Minney Report), and thus the County would need to find additional land to develop effluent storage. Refer to Figure 5-5 for a portrayal of this disposal alternative. The treatment plant site is constrained; however the addition/expansion of the treatment plant to treat 80,000 gpd appears to be adequate, albeit tight.

NOTES:

1. 3 ACRES OF EXIST. SPRAY FIELD LOST DUE TO FUTURE POND EXPANSION
2. ACCOUNTS FOR LOST SPRAY FIELD AREA. SEE NOTE 1.
3. 20 ADDITIONAL ACRES IS REQUIRED FOR BUILD-OUT, BUT NOT AVAILABLE ON EXISTING PROPERTY.

EXIST. SPRAYFIELD (16±ACRES)

SPRAY FIELD AREA (15 ACRES BUILD-OUT)[2,3]

ECO-CHAMBER AREA (6 ACRES BUILD-OUT)

LEACH FIELD AREA (2.5 ACRES BUILD-OUT)

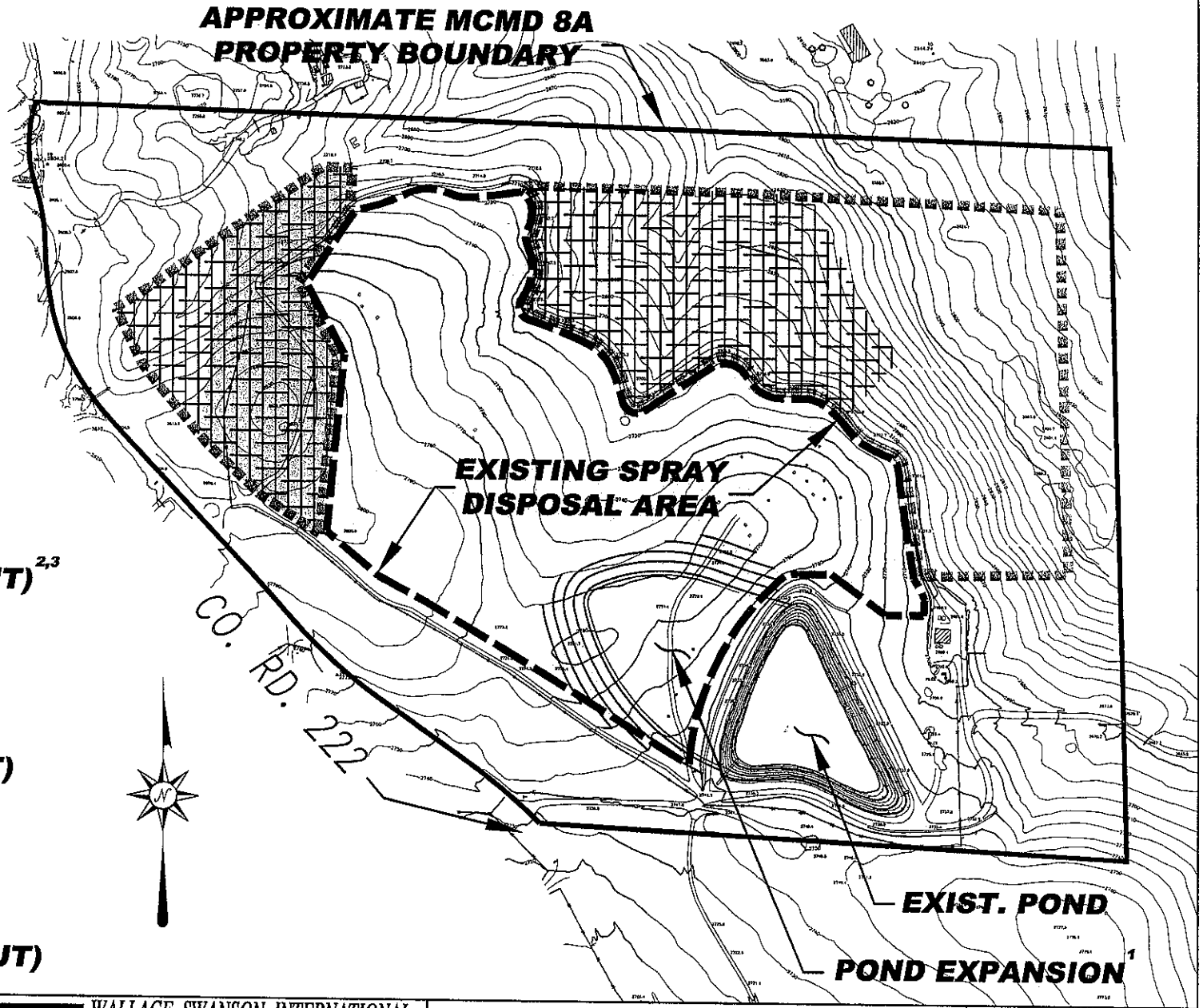

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Figure 5-5
Alternate NS4, N. & S. Fork WWTP
North Fork CDC/MCMD 8A

DRAWING : Exhibits
JOB No. : 557.01.700
SCALE : 1" ≅ 300'
DATE : 10/27/2003

Pros:

- There are no apparent significant advantages to this alternative.

Cons:

- The existing disposal field is insufficient for expansion by spray disposal.
- The effluent storage pond would need to expand beyond its physical capability, requiring additional land.
- The treatment plant can be expanded to 80,000 gpd; however, expansion of the plant will be tight. Costs to expand the WWTP, effluent disposal and storage system is expensive.
- Very costly to construct force main to convey wastewater from South Fork to North Fork.

Alternative NS2. Same as NS1, tertiary treatment by conventional filtration/disinfection, and stream discharge. Expansion of the existing WWTP, and adding tertiary treatment will not be feasible on the same site, particularly if the emergency holding pond also must be expanded. The major advantage to this alternative is that it alleviates the need for expansion of the effluent holding pond on the existing spray disposal property.

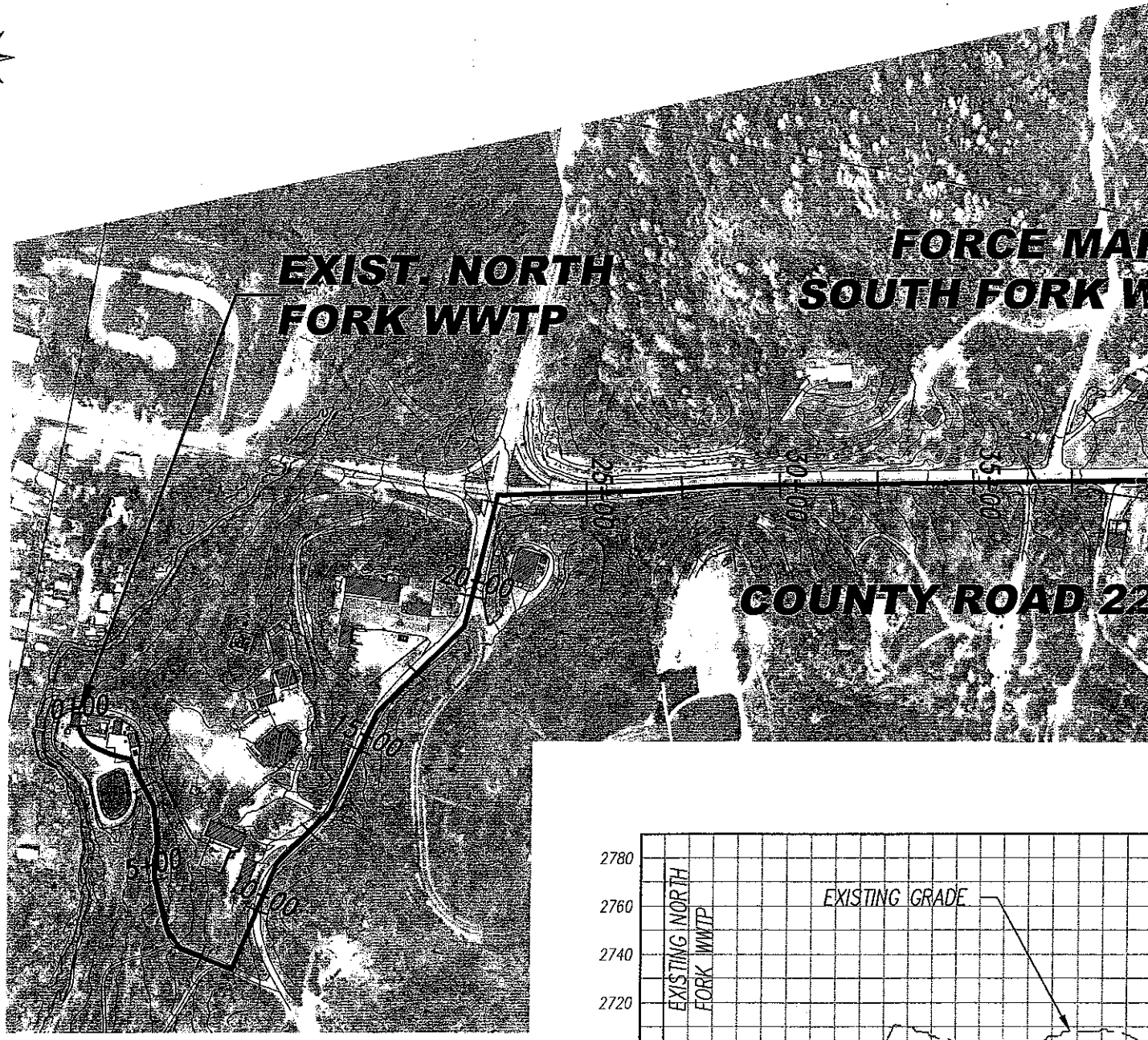
Pros:

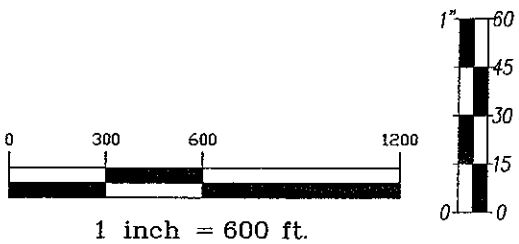
- Alleviates need to expand effluent holding pond capacity.

Cons:

- Development of 80,000 gpd tertiary treatment capability on existing plant site will be very difficult.
- Long-term costs to operate and maintain tertiary plant will be expensive.
- Very costly to construct force main to convey wastewater from South Fork to North Fork.

Alternative NS3. Pump raw wastewater from North Fork to South Fork, and develop AIPS pond system in conjunction with land disposal to treat North and South Fork wastewater combined. This alternative has one clear advantage, that being the ability to discontinue operation and maintenance of a mechanical treatment plant in North Fork. It does require the construction of a long force main (6,400 LF), and a new lift station or at least upgrade of pumps at the existing effluent pump station. Refer to Figure 5-6 for this alternative. Developing effluent disposal for North and South Fork flows, all on the Mill Site in South Fork, creates other concerns. In order to develop disposal capacity, additional land is required that may otherwise impact future planned uses of the land. Figure 5-7 shows how extensive of an area is needed for the effluent holding pond, and the various options for disposal. It is clear that spray disposal alone is not desirable, as it takes up a significant amount of land, land that is master planned for other uses. Specific siting for subsurface disposal, leach fields, and spray fields was not conducted as part of this study.





* NOTE: PROFILE ELEVATIONS ARE FOR PLANNING PURPOSES ONLY AND TO BE USED FOR DESIGN.

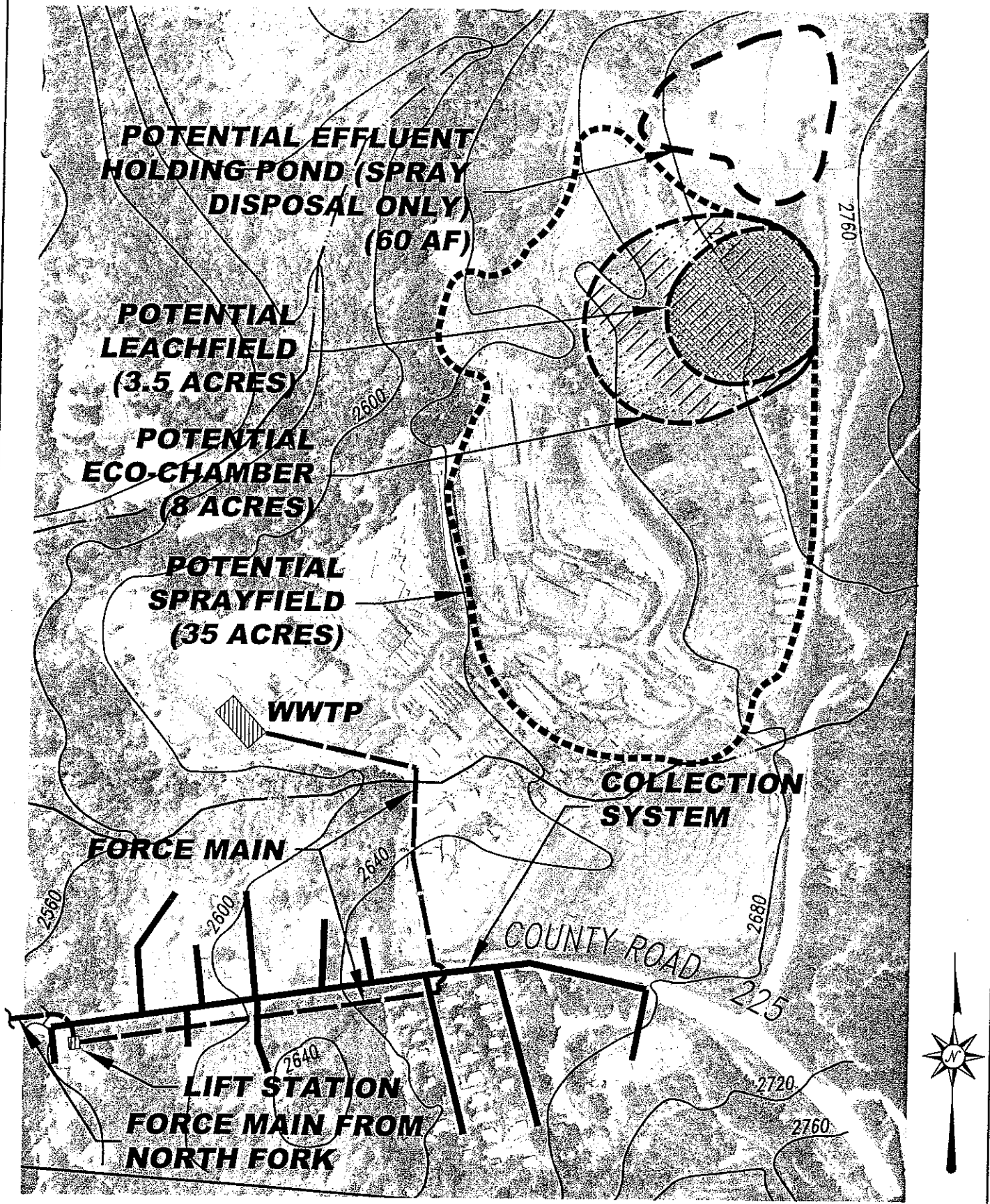


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Figure 5-7

Alt. NS3 Collection & Effluent Disposal Sys.

North Fork CDC/MCMD 8A

DRAWING :	Exhibits
JOB No. :	577.01.700
SCALE :	1" ≅ 400'
DATE :	10/15/03

Pros:

- Mothballs the existing North Fork WWTP, replacing it with an economical, low-cost and easy to maintain AIPS system.

Cons:

- Will significantly impact envisioned development at the South Fork Mill Site, to provide land for treatment and disposal of wastewater.
- Very costly to construct new force main to convey wastewater from North Fork to South Fork.

Cost Evaluation of Alternatives

The various alternatives were evaluated on a conceptual level cost basis. The capital costs for the various alternatives are based on a variety of sources for actual known construction costs of comparable projects where available, with costs scaled up or down appropriately based on engineering judgment. These costs are considered current Year 2003 costs, and must therefore be inflated in the future based on the Engineering News Record (ENR) index for that future year. The current ENR index is 6741 (September 2003).

Operation and maintenance costs were also estimated based on comparison of actual costs for comparable facilities, and specific budget information for the existing North Fork WWTP. The life cycle cost evaluation is based on a 20-year life of the project. For South Fork alternatives, where individual septic tanks are maintained, the operation and life cycle cost analysis accounts for periodic (3 to 5 years) pumping of septic tanks, estimated at $300/event. Life cycle costs were converted a total cost per gallon per day capacity in the treatment system.

Life cycle costs for the annual O&M costs were calculated based on a 5% inflation factor, 20-year project life. Refer to Table 5-1 for a summary of capital, O&M and life cycle costs for each alternative.

Recommended Alternatives

The recommended alternative is to decentralize, and treat North Fork and South Fork communities with separate wastewater facilities. In North Fork, it is recommended to maintain the existing WWTP to serve existing and future needs of North Fork (Alternative N1), and develop incremental storage and disposal as needed.

For South Fork, Alternative S2 is recommended, to implement an AIPS system to initially treat the community of South Fork, and to eventually serve the Mill Site. Depending on permitting constraints with the Regional Board, the AIPS system may need to be augmented with a subsurface wetlands system to offer additional nutrient removal. However, with lining of the AIPS ponds, and using subsurface disposal with nitrogen uptake, additional nutrient removal in the treatment process is not warranted. Disposal should be developed based on

subsurface irrigation, possibly with some spray field disposal. This adds diversity and flexibility to the effluent disposal system, and makes use of treated secondary effluent to irrigate area landscaping. The recommended alternatives are described in Chapter 6.

Table 5-1. Summary of Costs for Alternatives

Alternative	Alternative Description	Capital Cost, $	Annual O&M Cost, $	Life Cycle Cost of Annual O&M, $	Life Cycle Cost Total, $	Life Cycle Cost/gpd Capacity, $
N1	Maintain existing WWTP	$ 224,750	$ 125,000	$ 1,557,750	$ 1,782,500	**$ 29.71**
N2	AIPS Option	$ 877,250	$ 80,000	$ 996,960	$ 1,874,210	$ 31.24
N3	Exist. WWTP Plus Tertiary	$ 522,000	$ 200,000	$ 2,492,400	$ 3,014,400	$ 50.24
S1	Mechanical WWTP	$ 2,486,200	$ 100,000	$ 1,246,200	$ 3,732,400	$ 93.31
S2	AIPS Option	$ 1,869,950	$ 60,000	$ 747,720	$ 2,617,670	**$ 65.44**
S3	Wetlands	$ 2,138,925	$ 50,000	$ 623,100	$ 2,762,025	$ 69.05
S4	AIPS Plus Tertiary	$ 2,022,200	$ 120,000	$ 1,495,440	$ 3,517,640	$ 87.94
NS1	Expand Exist. WWTP at North Fork	$ 2,361,325	$ 250,000	$ 3,115,500	$ 5,476,825	$ 68.46
NS2	Alt. NS1 Plus Tertiary	$ 1,948,075	$ 325,000	$ 4,050,150	$ 5,998,225	$ 74.98
NS3	AIPS at South Fork	$ 3,332,825	$ 175,000	$ 2,180,850	$ 5,513,675	$ 68.92

Notes:

1. Inflation factor assumed at 5%.
2. Life cycle cost based on 20-year project life.
3. Life cycle cost, in $/gpd capacity based on treatment capacity (not actual flows).
4. Capital cost for Alternative S4 based on tertiary component with Alt. S2 (AIPS).
5. Wetlands option O&M cost includes cost of South Fork septage haul to individual home owners.
6. Wetlands option includes capital cost to home owner for individual grinder pumps@$3,500 each.
7. A STEG system for South Fork includes the continued cost of periodic septage pumping.
8. AIPS options include O&M cost for sludge removal, based on 20 year cycle.

CHAPTER 6

RECOMMENDED ALTERNATIVE

This chapter presents the recommended alternative(s) for providing wastewater service to North Fork and South Fork. Following the description of the alternatives, discussion is provided on fundability of the project, and estimated fiscal impacts to the community.

Recommended Alternative

As discussed in Chapter 5, the recommended alternative for North and South Fork communities includes decentralization and providing separate treatment and disposal facilities for each area.

North Fork: In North Fork, it is recommended to maintain the existing extended aeration WWTP, as it currently has the ability to treat up to 60,000 gpd wastewater. With projected flows of 45,000 gpd at build-out, this "already paid-for" facility should be maintained throughout the planning period. Thus, new facilities to serve build-out in North Fork focus solely on disposal capacity. The District should maintain the existing 16-acre spray field area, and provide effluent disposal (beyond the permitted 38,000 gpd) using eco-chambers/subsurface disposal systems. Details of the exact layout and locations of the disposal area are part of the detailed design effort. Future effluent disposal can be accomplished within the existing County-owned lands. The existing effluent holding pond will not require expansion to meet the future storage requirements, and criteria for holding the 100-year storm event. It is anticipated that the existing WDRs are adequate to meet Basin Plan objectives now and in the foreseeable future. The Regional Board will need to approve any proposed expansion of effluent disposal per Provision E.3 of the WDRs.

South Fork: For the community of South Fork, it is recommended that a decentralized system be implemented to serve South Fork and the Mill Site. A phased implementation is recommended, with the Phase 1 project receiving grant funding to assist South Fork rate payers, with average household incomes meeting the USDA funding criteria for grant assistance. USDA may have requirements that to serve South Fork and to be eligible for funding, the service area be defined and included into MCMD 8. Should this be the case, it is recommended that the County proceed in this regard.

The first phase project should consist of a 20,000 gpd AIPS pond system on the Mill Site. Since this Mill Site was essentially "free" to the community, developing a treatment system on-site will be relatively economical to the community. The major component of this implementation plan for Phase 1 is to provide a low-cost sewage collection system. It is recommended that a STEG system be employed. Further investigation is needed, however, as to existing condition of all septic tanks in the service area. Rate payers still need to pay for connection of sewer laterals to the small diameter gravity collection system, and will need to maintain on-site septic tanks for solids removal. Based on the terrain of the area, this STEG system requires a lift station to pump wastewater from the low point on the west side of South Fork, up the treatment plant site on the Mill Site. Effluent disposal for Phase 1

should focus primarily on subsurface disposal by eco-chamber or other subsurface irrigation system. The Phase 1 cost estimate is included as Table 6-1.

Table 6-1. Alternative S2 - AIPS WWTP - South Fork - Phase 1

Item	Quantity	Unit	Unit Price, $	Extended Price, $
AIPS Ponds	20,000	ga	$5	$100,000
Effluent Storage (90 day storage)	6,000	cy	$10	$60,000
Storage Pond Liner	25,000	ea	$1.00	$25,000
Monitoring Well	3	ea	$15,000.00	$45,000
STEG Collection System	1	ls	$298,000.00	$298,000
Other				$0
Construction Subtotal:				**$528,000**
Disposal Sub-Options:				
Add Spray Field	4.0	ac	$40,000	$160,000
Add Leach Field	0.50	ac	$70,000	$35,000
Add Eco-Chamber	2	ac	$45,000	$90,000
Alt. S2.1 Constr. Subtotal - With Eco-Chamber Option				**$618,000**
Engineering, 10%				$61,800
Administration, 5%				$30,900
Construction Mgt., 10%				$61,800
Contingency, 20%				$123,600
Alt. S2.1 Total:				**$896,100**
Total Cost to South Fork, Based on USDA 25% Loan/75% Grant:				**$224,025**

During Phase 2, the Mill Site developer will need to pay for all future improvements to serve the Mill Site. This includes collection system (likely conventional gravity), treatment (parallel AIPS ponds), and disposal (combination of subsurface disposal and spray disposal for irrigation, if feasible). Phase 2 facilities are recommended to be implemented at the time of need in the future, by the Developer(s) of the Mill Site.

Cost Impacts to Users

With any recommended utility plan, an assessment of cost impacts to each user must be made. Currently, each unit in North Fork pays approximately $35/month for sewer user fees. Based on current rates and user fees, existing rates need to be incrementally increased to

balance the current operations budget. In order to fund the recommended alternative N1, user fees need to be increased to around $64/month per EDU. However, it is noted that additional revenues will be available from the Indian Housing Authority; the timing of cash flow from these contributions is unclear at this time, but can help reduce the projected overall unit costs. This is the most cost-effective alternative to the residents. If additional grant monies can be found to cover more of the debt service, coupled with contributions from the Indian Housing Authority, user fees may be able to be reduced to levels more commensurate to existing rates. Refer to Table 6-2 for a summary of estimated costs per EDU for this alternative.

Table 6-2. User Fee Analysis - North Fork

Item	Cost, $		
USDA Loan Amount (from Table C-1)	$	56,188	
Debt Service, at 4% Interest, 20-year	$	4,134	
Annual O&M Cost	$	125,000	
Total Annual Obligation (see Note 1)	$	129,134	
Current EDUs (see Note 2)	$	155	
Total Future EDUs (see Note 2)	$	213	
Development rate@3 EDU/year=	$	10,500	annual revenue
Adjusted Annual Obligation:	$	118,634	
Annual Cost Burden Per EDU (exist)	$	765	
Annual Cost Burden Per EDU (future)	$	557	
Monthly Obligation Per EDU (exist)	$	63.78	
Monthly Obligation Per EDU (future)	$	46.41	

Note 1. Includes existing debt service obligation.
Note 2. Includes 155 existing EDUs, plus 213 future EDUs.
Note 3. Current connection Fee for North Fork MCMD 8A, $3,500/EDU.

For South Fork, with implementation of Phase 1 only, current users in South Fork would need to start out with monthly user fees of $62/month. Again, this is relatively high for the area, and means of finding additional grant monies should be considered to lessen the burden to each individual home owner. Refer to Table 6-3 for this analysis.

Table 6-3. User Fee Analysis - South Fork Phase 1

Item	Cost, $		
USDA Loan Amount (from Table 6-1)	$	224,025	
Debt Service, at 4% Interest, 20-year	$	16,484	
Phase 1 Annual O&M Cost	$	35,000	
Total Annual Obligation	$	51,484	
Current EDUs (see Note 1)	$	64	
Total Future EDUs (see Note 1)	$	88	
Development rate@1.2 EDU/year=	$	4,200	annual revenue
Adjusted Annual Obligation:	$	47,284	
Annual Cost Burden Per EDU (exist)	$	739	
Annual Cost Burden Per EDU (future)	$	537	
Monthly Obligation Per EDU (exist)	$	61.57	
Monthly Obligation Per EDU (future)	$	44.78	

Note 1. Includes 64 existing, plus 24 future EDUs.

Note 2. Current connection Fee for North Fork MCMD 8A, $3,500/EDU.

APPENDIX A

ECO-CHAMBER AND SUBSURFACE IRRIGATIONSYSTEMS – SUPPLEMENTAL INFORMATION

NEW-
GRAYWATER ALLOWED FOR IRRIGATION!

MARFOR Co.
WASTEWATER PURIFYING AND DISPOSAL SYSTEMS
Marsh-Forest

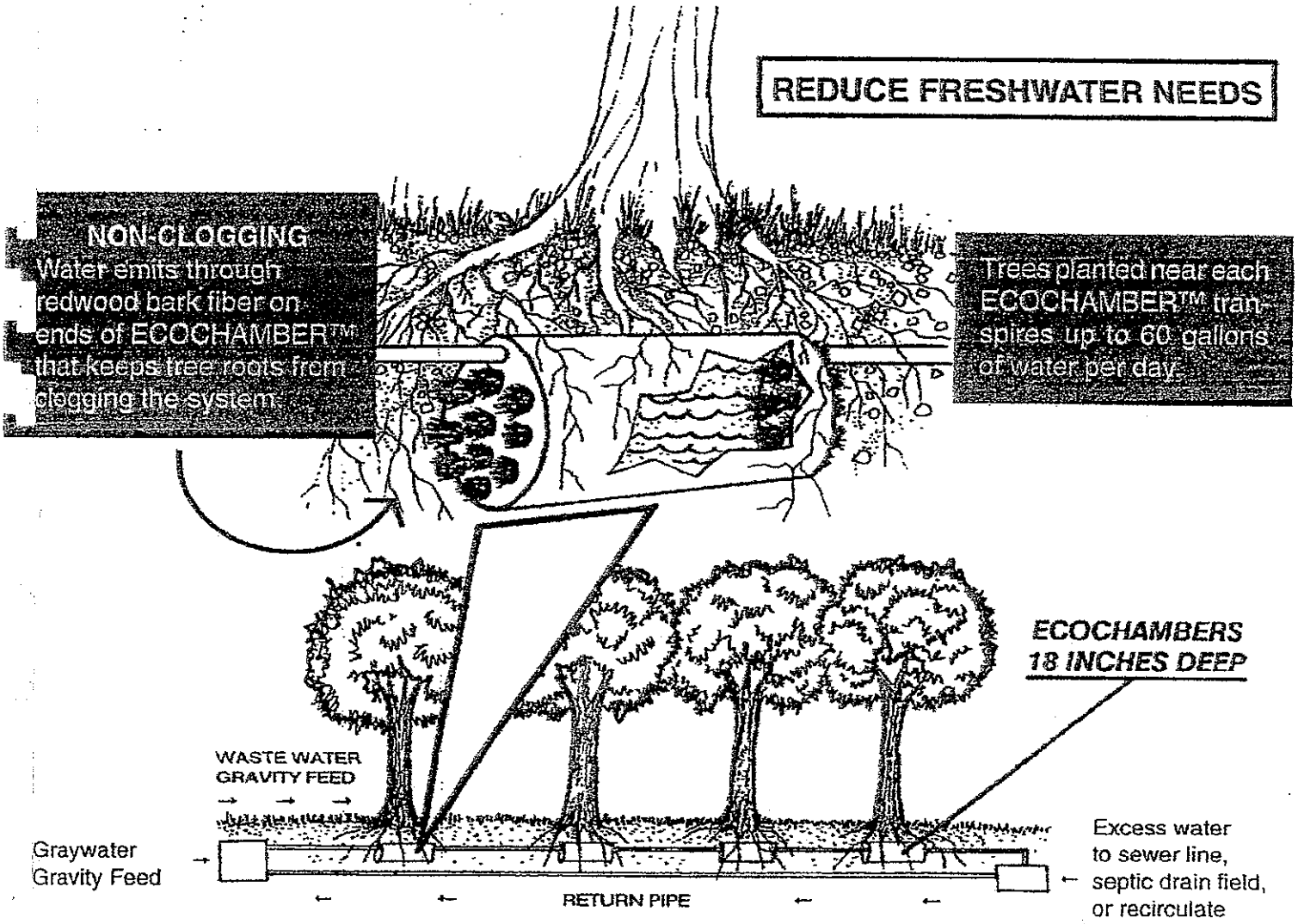
MARFOR ECOCHAMBER™ EMITTERS

MEETS STATE SYSTEMS STANDARDS
WHEN USING GRAYWATER FOR UNDERGROUND IRRIGATION.

REDUCE FRESHWATER NEEDS

NON-CLOGGING
Water emits through redwood bark fiber on ends of ECOCHAMBER™ that keeps tree roots from clogging the system.

Trees planted near each ECOCHAMBER™ transpires up to 60 gallons of water per day.



* UNDERGROUND — NO HUMAN CONTACT — LOW MAINTENANCE
* WORKS WITH GRAYWATER & RECLAIMED WATER — EASY TO INSTALL

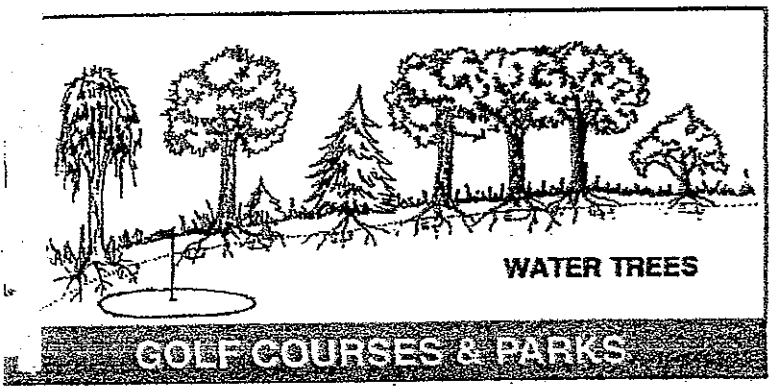
PATENTED REDWOOD BARK PRODUCTS
OVER 25 YEARS OF EXPERIENCE

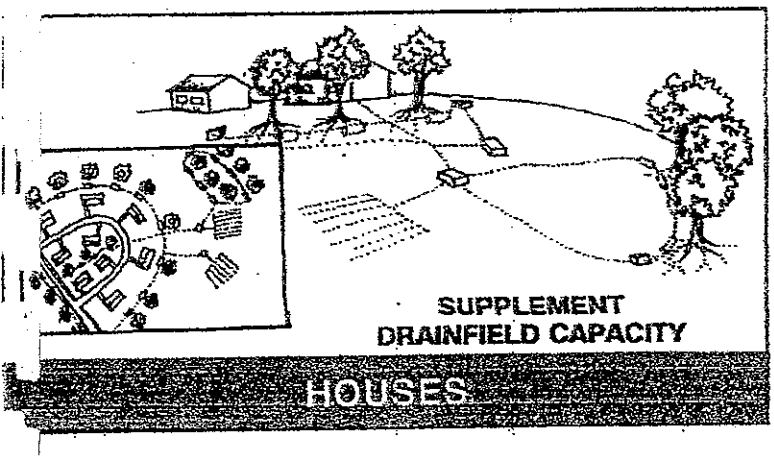
MARFOR Co., P.O. Box 2793, Dublin, CA 94568 • Tel. (510) 829-4390 • FAX (510) 838-7343

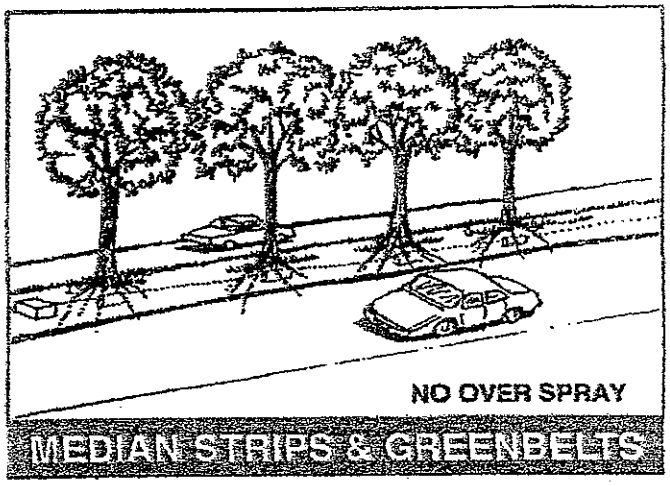
NIQUE SUB-SURFACE RRIGATION TCOCHAMBERS™

MARTOR Co.
WASTEWATER PUMPING AND DISPOSAL SYSTEMS
Marsh-Forest

* OFF-SETS NEED FOR ADDITIONAL WATER SOURCES
* SAVES COST OF ADDITIONAL TREATMENT
* NO HEALTH CONCERNS
* MEETS STATE MANDATE FOR WATER REUSE
* NON-CLOGGING FIBROUS MESH







HOW ECOCHAMBERS™ WORK:

The patented ECOCHAMBER™ has decorticated redwood bark stuffed in the ends that allow water and nutrients to feed the trees and shrubs and prevents the roots from clogging the pipes. The bark creates a "jungle habitat" for micro-organisms to thrive on organics attracted to the fibers while allowing water to pass through to the tree roots. By the action of the micro-organisms digesting the solids on the fibers, a large self-cleaning, non-clogging emitter has been created.

The ECOCHAMBERS™ can be laid out in series, parallel or series/parallel patterns for ease of installation. The transpiration of graywater is the preferred technique but it also improves our environment. No other reuse emitter has been in use for over 15 years.

WHY NOT USE A PROVEN SYSTEM!

Each ECOCHAMBER™ can dispose of up to 60 gallons of water per day.(100-300 liters), dependent on tree age and type, soil drainage and atmospheric temperature at site. Holding capacity approximately 15 gallons (57 liters).

ECOCHAMBER SPECIFICATIONS:

ngth .....33" (0.9 M)
ameter .....12" (0.3 M) Plastic Pipe
In / Out Pipe.....2" (5 mm)
Emitter area approximately 200 sq. in.

Catalog #MFS 4/96 EC

IOS Corporation

4080 Heather Lane
Sebastopol, CA 95472
(707) 874-2378 FAX 874-1713
email: ios@interx.net

April 26, 1999

Analysis of Joint Santa Rosa and Sonoma County Water Agency Subsurface Ecochamber Demonstration Project at Sonoma State University

by Daniel Wickham, Ph.D.
IOS Corporation

Introduction

The City of Santa Rosa and the Sonoma County Water Agency jointly funded the installation of a demonstration project at Sonoma State University consisting of subsurface EcoChamber emitters used to irrigate both an existing mature redwood grove and a newly planted redwood grove with reclaimed wastewater from the Santa Rosa Subregional Treatment plant at Llano Road. We were contracted by the City to analyze and retrofit this demonstration project to insure that accurate data were generated and that the system performed to specification.

The system consisted of two emitter loops each of which circulated reclaimed water through 10 EcoChamber emitters manufactured by Marfor Co. of Dublin, California. Both loops were supplied by a single dosing tank that was kept filled with a metered flow of tertiary treated wastewater. The loop in the mature forest consisted of two legs of 5 units each that were buried 24" deep in the root zones of 10 mature redwoods approximately 4' from the trunk. Flow led to a buried sump containing a pump that recirculated water back to the dosing tank. A similar system was put in place in the open field adjacent to the old grove that had 1-gallon seedling redwood trees planted over each emitter.

Meters were placed at the outflow to each loop and at the return of each loop to the dosing tank to monitor flow and release from the units to the tree root zones. The meter to the dosing tank monitored the quantity of wastewater delivered to the complete system for comparison with delivery rates in the rest of the Santa Rosa Reclamation irrigation system.

Results

The results of the first year of operation of the system showed that the City was able to irrigate the redwood trees in all months of the year at significant rates of application. Table 1 compiles the rate of delivery to the subsurface system with that of the City of Santa Rosa's surface pasture irrigation system as well as a separate surface spray system placed in a mature redwood grove adjacent to the subsurface system. Inches per month was derived from the gallons delivered over the surface area of the systems in the new grove and old grove, each of which was estimated at 1,600 ft^2.

Month/1998	Redwood Emitters	Redwood Sprinkler System	City Reclamation System Average
January	.64	0	0
February	1.10	0	0
March	4.01	0	.22
April	2.94	.72	.13
May	3.89	1.33	.57
June	5.42	1.37	3.03
July	5.90	1.41	5.04
August	3.47	1.25	5.26

Data for the latter part of the year show much higher water delivery rates but are not included here since they may have been due to plumbing problems that prevented recirculation from the collection sumps and exaggerated the amount the system could reasonably accept.

These data do not accurately reflect the potential of the delivery system for two reasons. One is that the units were plumbed in direct fashion with the inlet and outlet ports at the same height or slightly sloped downstream. The series was plumbed at a slight slope to the sump where it was collected at a depth slightly below the entire subsurface installation. This had the effect of creating an infiltration collector during the rainy season. Rainfall was therefore redistributed back to the dosing tank which replaced wastewater that might have been delivered. Two, is the two systems were combined for assessment of total delivery rate since the only meter that performed adequately was that which measured flow of reclaimed water to the dosing tank. The newly planted grove was in soils of extremely low permeability and the trees associated with the units were small so rate of delivery was largely attributable to the 10 units inside the mature grove. Flow on a per acre or per emitter basis in the mature grove is therefore underestimated in the existing grove.

In December of 1998 we modified the system by installing an adjustable standpipe inside each collection sump that allowed the head in the units to be increased and reduce or eliminate the

rainfall collection problem. This modification worked well in the existing grove but because of the topography in the new grove rainfall collection by the system still presented a problem. Perched water in the open field was within an inch or two of the soil surface for virtually the entire winter so even the sump was below water making rainfall capture inescapable.

One other problem with the system was that the water supply was controlled by a timer which only allowed flow to the dosing tank from 6:00 AM to 2:00 PM. This was also changed so flow could be *ad libidum* throughout the 24 day.

Disposal rates after the modifications are compiled in Table 2. These show that the subsurface installation inside the mature redwood grove delivers a substantial rate in all months of the year and that advent of active transpiration by the redwood trees in the early spring results in an impressive surge in delivery while the existing surface irrigation systems are non-functional.

Month/1999	Redwood Emitters	Redwood Sprinkler System	City Reclamation System Average
January	16.41	0	0
February	8.81	0	0
March	11.91	0	0
April	15.87	0	0

As can be seen by these data the rates of delivery are dramatically higher than in 1998. Elimination of rainfall capture is the predominant reason for the increases as well as the increased delivery rate with increased head pressure. Our experiments show that rate of discharge from the units in the old grove is about 3-4 times that of the system in the new grove where tree roots have not yet had time to permeate the soil. Reflecting this fact in the 1998 analysis by multiplying the average data by 1.75 to estimate the flow in the Old Grove changes the monthly figures during the post rainfall period of March - August and brings the estimates closer to that of 1999.

Month	Inches
March -	7.02
April -	5.15
May -	6.81
June -	9.49
July -	10.33
August -	6.07

The data on water delivery was supplemented with a system of irrometers installed to measure soil saturation at various locals. The instruments placed at the ecochambers both in the new and old grove provided little information beyond the fact that the delivered water always kept the soil

at that site saturated. The control irrometer in the new grove was placed incorrectly in a low lying spot that ponded all winter. The most interesting information was obtained from the control irrometer placed in the old grove away from the ecochamber system. These meters showed that while the open field became saturated as early as November it was not until late January that the soil in the old grove finally became saturated. The high rate of release in January coincides with relatively dry soil. The Old Grove Control irrometer never actually measured complete saturation in the soil at either 18" or 36" and showed saturation of approximately 92-95% only during the very heavy rain period in February and March. All other meters showed complete saturation during the period of November through April.

It is clear from this that a significant level of transpiration is occurring in the old Grove even in the winter rains.

Several trials were conducted in which one or the other system was turned off or operated in a particular fashion. These trials demonstrate that the system is highly adjustable and can be regulated according to the desires of the proprietor or in fashion responsive to the nature of the wastewater effluent.

A. Increasing head pressure - Increasing the height of the standpipe in the collection sump had an immediate effect on delivery rate. This can be illustrated in a separate system that was set up in Occidental in soils with somewhat higher permeability. A single ecochamber was buried with no associated trees and fed at varying flow rates to analyze disposal rate solely through leach/infiltration. Using this setup it was discovered that infiltration of rainwater could be eliminated by increasing the height of the outflow relative to the inflow. To do this the outfall was fitted with an elbow that allow the overflow to be rotated to increase or decrease the height.

During rainy periods up to 95.8 gpd was captured through infiltration when there was no height differential. Increasing outflow height by 1.5" resulted in equilization of outflow and inflow so no net rainfall was captured but no wastewater was disposed of. At a differential of 2.5" it was possible to deliver at a rate of 5.7 inches/month (4982 gpd/acre) on the rainiest day of January 1998. During dry periods stable delivery rates were as high as 50.5 in/mo (44,268 gpd/acre) in this system. The soil at this system had higher permeability than the SSU site, however, it should be noted that the SSU site is adobe clay with some of the lowest permeability in Sonoma County.

Incorporation of the adjustable standpipe in the SSU system gave similar results, except in the new grove which was under the perched water table. We were able to increase the rate of delivery in the old grove to as high as 22.6 inches/month (19,765 gpd/acre) during a dry period in January 1999. Delivery at this rate, however, caused the surfacing of a small amount of water in a swale near the sump. While there was no surfacing of water in the system itself this escape near it suggests that flow rate should be set using monitoring wells in strategic points in the system.

For automating larger systems incorporation of water monitoring wells with float switches is an obvious method that can easily be incorporated.

B. Dead End operation - It is clear that plumbing these systems in a recirculation loop is the root of the infiltration problem. Closing the valve which released water into the return sump and shutting off the return pump allowed dispersal to the units in the new grove and eliminated rainfall capture. Using this method it was possible to increase delivery rate dramatically. In one experiment the Old Grove system was shut down and flow was sent to the new grove without recirculation. Delivery over a 24 hour period was the equivalent of 87 in/mo (84,615 gpd/acre). This rate saturated the surface soils and demonstrated that a reasonable delivery rate is ultimately dependent on the capacity of the soil and site but it demonstrated that there is no predetermined rate limitation of the Ecochamber unit itself.

C. Ground Water mounding - Two foot deep percolation holes were installed in both the existing grove and in the adjacent field where the new grove was planted. The perk rate in the native unforested adobe soil was very low at 1.03 cm/hr. Inside the existing grove perk rate increased to 2.54 cm/hr because of the effect of the forest root system. The perk hole in the open field maintained a very high water level throughout Jan-April and did not finally dry until late April. The perk hole in the existing grove was empty by early March and was always at a lower level. Active rain was necessary for water to be present in the Old Grove perk hole.

Two monitoring wells consisting of two inch PVC pipe buried vertically to a depth of approximately 36 inches were installed in the old grove. One was placed between the two rows of emitters approximately equidistant and 4' from the outlet of two opposite emitters. The other was placed 4' from the north emitter on the outside of the loop in the root zone of the adjacent tree.

Standing water was always higher in the inside well and the differential varied with rate of flow and height of head in the sump. During April the system was operated to maintain a standing water of approximately 11" below the soil surface in the inner well. This level prevented breakout of water at the nearby swale. When the innner well was at 11" the well outside the system was 30-36" below the surface suggesting that horizontal migration was limited. Setting at this height allowed determination of the maximum subsurface delivery of that particular installation and provides a method for monitoring delivery rate.

A more precise estimate of delivery rate in the old grove was obtained by shutting off flow to the new grove for much of April. The more accurate meter to the dosing tank could then provide a better estimate of water delivery rate. This was then calibrated on the basis of gph/emitter and monitored on a frequent basis. Water delivery rate shown in Table 2 increased with the end of the rain season and the advent of windy and warm spring weather. This illustrates the transpiration enhancement of delivery rate as tree transpiration increased.

This is even more apparent when periods of the day were compared. During a period in April the average 24 hour rate was 1.36 gph/unit. During the period from approximately noon to 6:00 PM the delivery rate was 2.36 gph/unit. A night-time rate was not measured but based on the above can be estimated by assuming the 2.36 gph/unit from about 10:00 AM to 6:00 PM or 8 hours and calculating back from the average of 1.36 gph/unit over the 24 hours. At the above rates the night-time dispersal would equal 0.86 gph/unit or about 36% of the daytime transpiration-enhanced rate.

Discussion

The SSU demonstration project illustrates several aspects of Ecochamber installation and performance that lead to more effective implementation of this technology. It was first shown that substantial year round disposal rates could be obtained with this technology in an installation at Mt. View District WWTP in Martinez, California. The system there operated in trouble free fashion for over 2 decades with detailed analysis of the first five years of operation. Secondary wastewater was distributed there at rates that varied from a low of approximately 7,000 gpd/acre in winter to a high of over 30,000 gpd/acre in summer. Criticism of the analysis of this system included the fact that leach rates to the soil were underestimated or not sufficiently accounted for.

Installation at Sonoma State in soils of substantially less permeability showed reduced rates of delivery but still were well beyond rates achievable by conventional surface spray irrigation and also were functional in the wet season. In fact it should be noted that the first two seasons the SSU system functioned were among the wettest on record.

It is clear from this demonstration that the leach component of the Ecochamber system is an integral and important feature. Leach disposal is a very widespread and effective method for wastewater disposal and functions as the primary method for disposal of primary septic waste for the majority of domestic effluent in the United States. Abundant technical information exists on design and analysis of leach disposal which applies also to the Ecochamber Transpiration Enhanced leach method.

The EcoChamber type of leach system has a significant advantage over conventional leach-trench disposal because it allows incorporation of forest ecosystems into the disposal function. Our measurements of differential percolation rates inside and outside the redwood grove is consistent with a wide body of literature that show soil to be much higher in forest soils, often by a factor of three or more (Kramer, 1981. Water Relations in Plants, Academic Press, N.Y.). Another advantage is the adjustable rate of application. Increasing or modifying head in the units is easily achieved and can be regulated to stay at the optimum rate by groundwater monitoring.

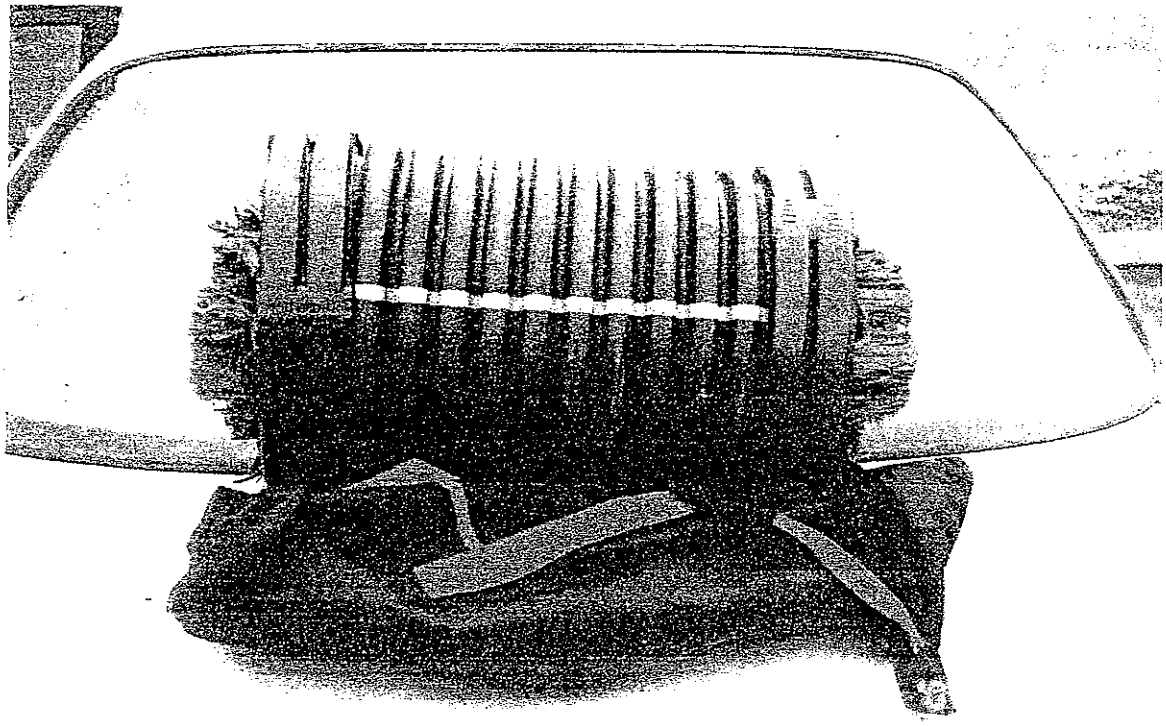
More esoteric advantages relate to the role that tree roots play in nutrient dynamics and transport. Standard leach trenches deliver organic load to the interface of the soil immediately adjacent to the leach pipe. Bacterial biomass will build up in this region and the biomass will stay in place as a film on the soil particles. This leads to creeping failure of the system as the soil is clogged. Tree roots, on the other hand, are designed specifically to move nutrients and water away from the zone of application for incorporation into storage structures that exist above the soil surface. Storage is remote from the point of application so creeping failure is minimized.

This same transport capability will allow scavenging of nitrogen, phosphorus and other nutrients of concern to regulatory agencies as the trees grow. Nitrate releases to subsurface groundwater will be greatly minimized through incorporation of a forest component.

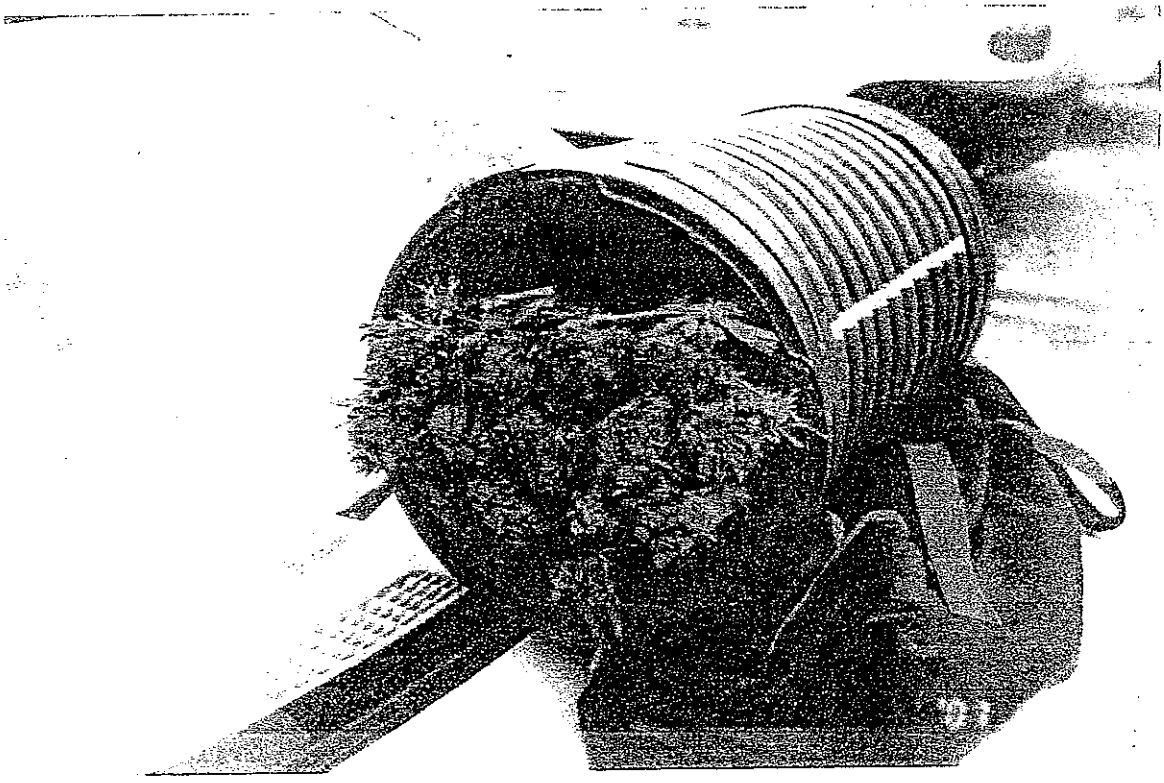
Likewise, leach systems must either be operated to allow drying, or at low rates to maintain an aerobic environment in the soils. Trees, especially redwoods or others species adapted to moist soil environments, transport oxygen to the root zone. Swamp cypress growing in high BOD anoxic swamp soils maintain root oxygenation at all times. This will enhance biological treatment of organic load.

The differential of night and day rates seen in April 1999 suggest that enhancement of leach by transpiration in the associated forest can increase disposal rates by a factor of at least three. We will be acquiring a sap flow meter to monitor direct transpiration by these trees. It is know that redwood trees will transpire at night as well as day since transpiration is associated with maintenance of turgor pressure as well as with photosynthesis and redwoods are not able to close their stomata. Rates will diminish at night, however, since air movement and temperature are less and they are the prime driving force for transpiration.

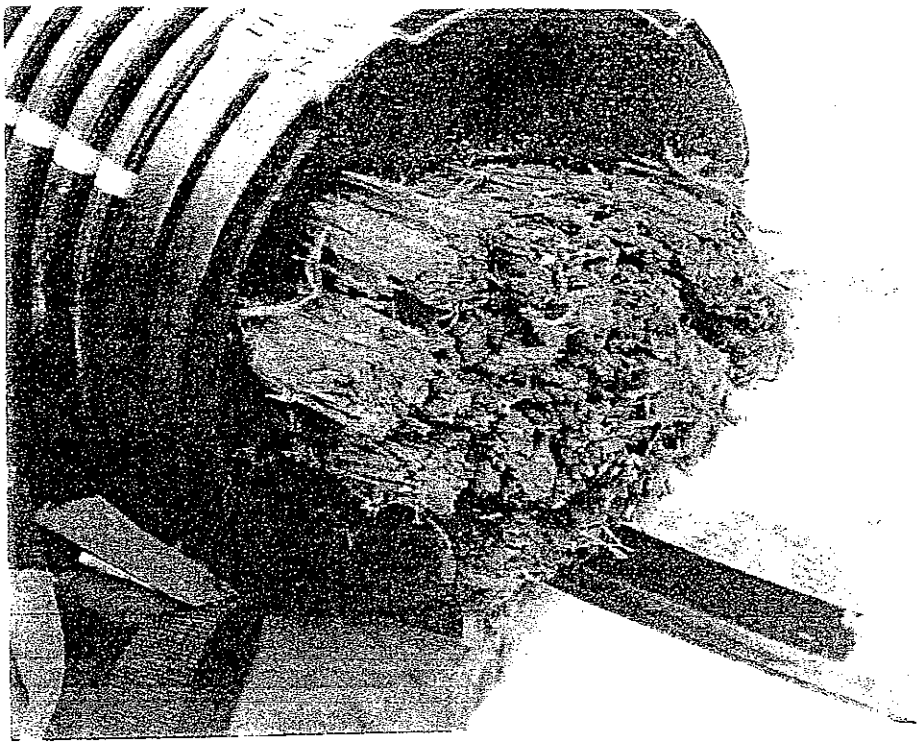
As of May 1 we will be returning the system in the new grove to operation since rainfall infiltration will no longer be an issue. The trees planted with this system have grown quite well with several individual trees increasing height by almost 100% during the first year of growth. They are still small enough, however, to exhibit a reduced transpiration rate relative to the mature trees and should show a reduced transpiration enhancement. Disposal rates in this system should be largely due to leach and accurate calculation of such disposal can be compared to the leach-only control in the Occidental installation to investigate the role of soil percolation rates on water disposal.



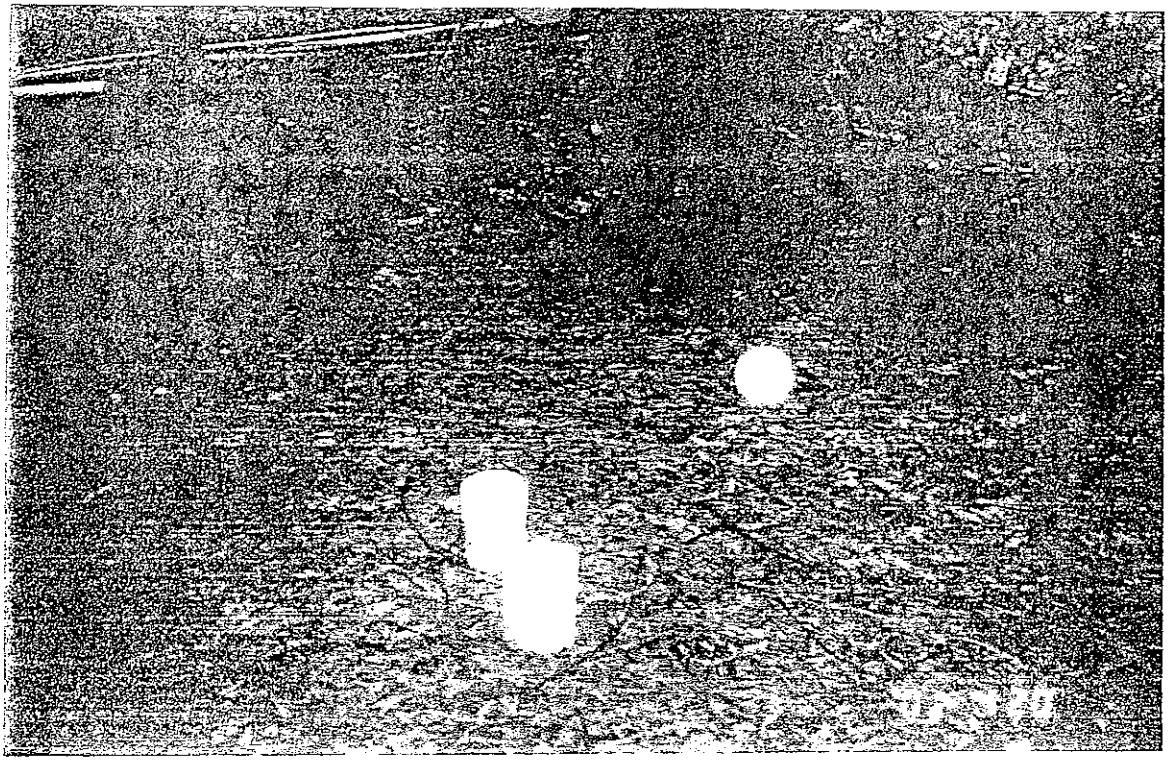
MARFOR CO. SUB-SURFACE WASTEWATER EMITTERS
SIDE VIEW



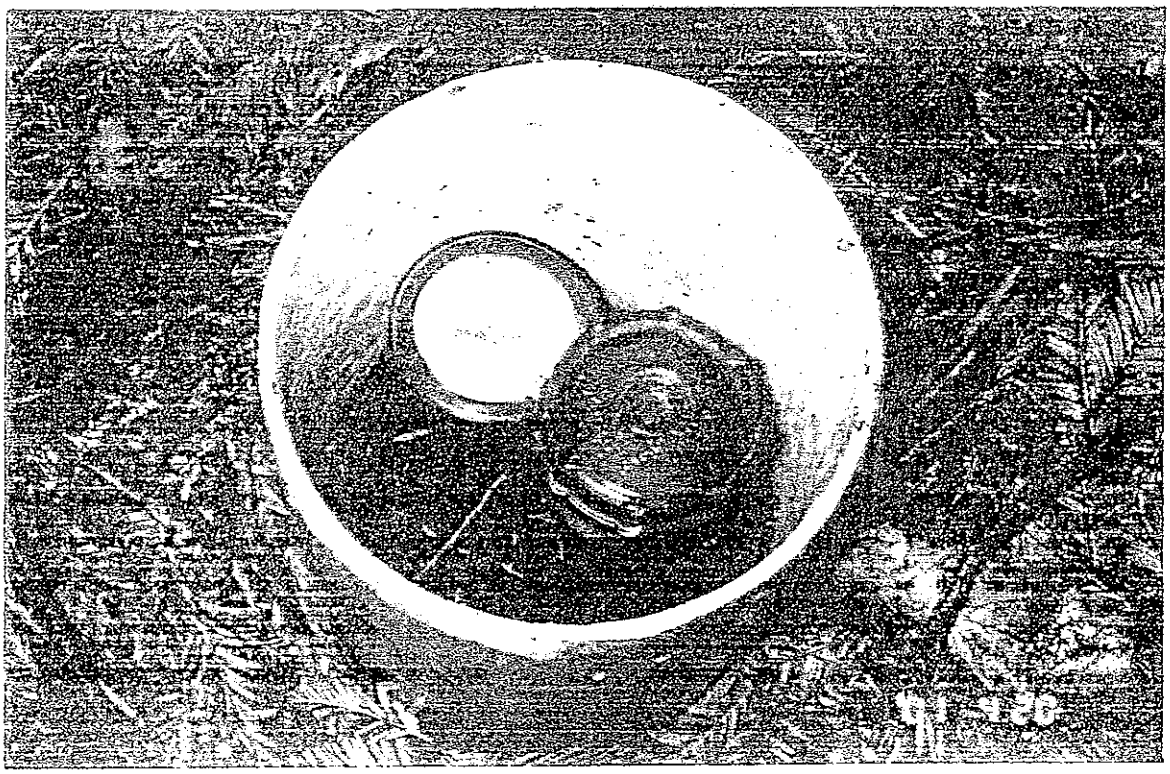
MARFOR CO. SUB-SURFACE WASTEWATER EMITTER
END VIEW



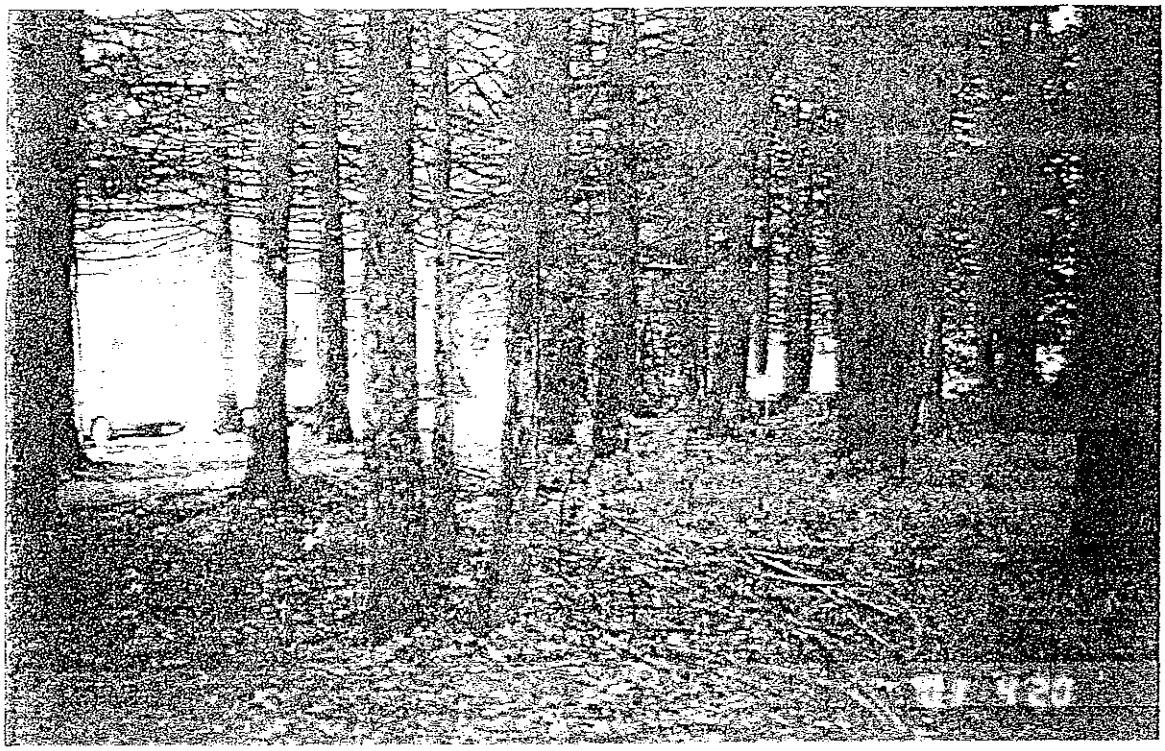
MARFOR CO. SUB-SURFACE WASTEWATER EMITTER
CLOSE-UP END VIEW SHOWING DETAIL OF REDWOOD



Redwood Tree Demonstration Irrigation Project, Cal-State University, Sonoma
View showing location of testing instruments for soil depth of water surrounding roots of trees.



Redwood Tree Demonstration Irrigation Project, Cal-State University, Sonoma.
View showing instrumentation for determining water in ground surrounding tree roots.
This equipment is still in place in original grove.



Redwood Tree Demonstration Irrigation Project. Cal. State Sonoma University.
View of main redwood grove at main entrance. Trees 40 years old. Left over plastic
Pipes removed from experimental plot. Original system still in ground of grove.

Redwood Tree Demonstration Irrigation Project, Cal State University Sonoma
View of left over piping used in new test plot. Original grove still has piping in ground.

WASTEFLOW®

DRIP SYSTEMS FOR SUBSURFACE WASTEWATER DISPOSAL

DESCRIPTION

The flexible polyethylene dripline has large turbulent flow emitters regularly spaced along the line. With the dripline hidden about six inches below ground, effluent is distributed slowly and uniformly, reducing ponding, even in difficult soils and hilly terrain.

Wasteflow is built to last. The emitters are protected against root intrusion by the ROOTGUARD® patented process, and the dripline wall is protected from organic growth with a bactericide lining.

Wasteflow is easily adaptable for projects ranging in size from single family homes to large multi-million gallon per day projects.

CHARACTERISTICS

Reliable and economic.
The low cost of the system and low cost of installation make it possible to cover large areas or have backup fields without incurring high costs.

No ponding, surfacing or deep percolation.
Effluent is uniformly distributed over the entire area using low flow rate, uniformly spaced emitters. Water is slowly applied at each individual point, enabling the water to move laterally through capillary action, reducing percolation.

Flexible and easy to install.
A small vibratory plow or trencher is all that is required to install several thousand feet of tubing.

Easy to design.
The flow characteristics of the emitters and the uniform water distribution make it very easy to design a safe and reliable system.

Resistant to plugging.
Wasteflow has the largest flow orifices on the market. The turbulent flow design keeps fine particles in suspension, and the raised entry ports into the emitter reduce the risk of solids plugging the emitter flow path.

ROOTGUARD protected.
Incorporation of Treflan guarantees protection from root intrusion and assures the system a long trouble free life.

Bactericide protected.
Incorporation of bactericide inside the tube inhibits slime formation on the walls of the tube. This does not replace effluent pre-treatment.

Purple stripes.
3 stripes identify the Wasteflow product.

Can be used for irrigation.
The uniform rate of application and its reliability make the system ideal for reuse in landscaping or irrigating agricultural crops.

Solves limited area and soil problems.
Can be used in smaller areas than conventional systems, or where soil type or steep slopes preclude conventional systems.

Freezing conditions.
Wasteflow has proven successful in freezing conditions.

GEOFLOW, INC.
307-N West Tremont Avenue
Charlotte, NC 28203
800-828-3388 / 704-347-3476
www.geoflow.com

INTRODUCTION

Geoflow's WASTEFLOW®drip system disposes of effluent below the ground surface through ½" pressurized pipes. It is designed using the grid concept with supply and flush manifolds at each end creating a closed loop system. The result of the grid design is a complete subsurface wetted area.

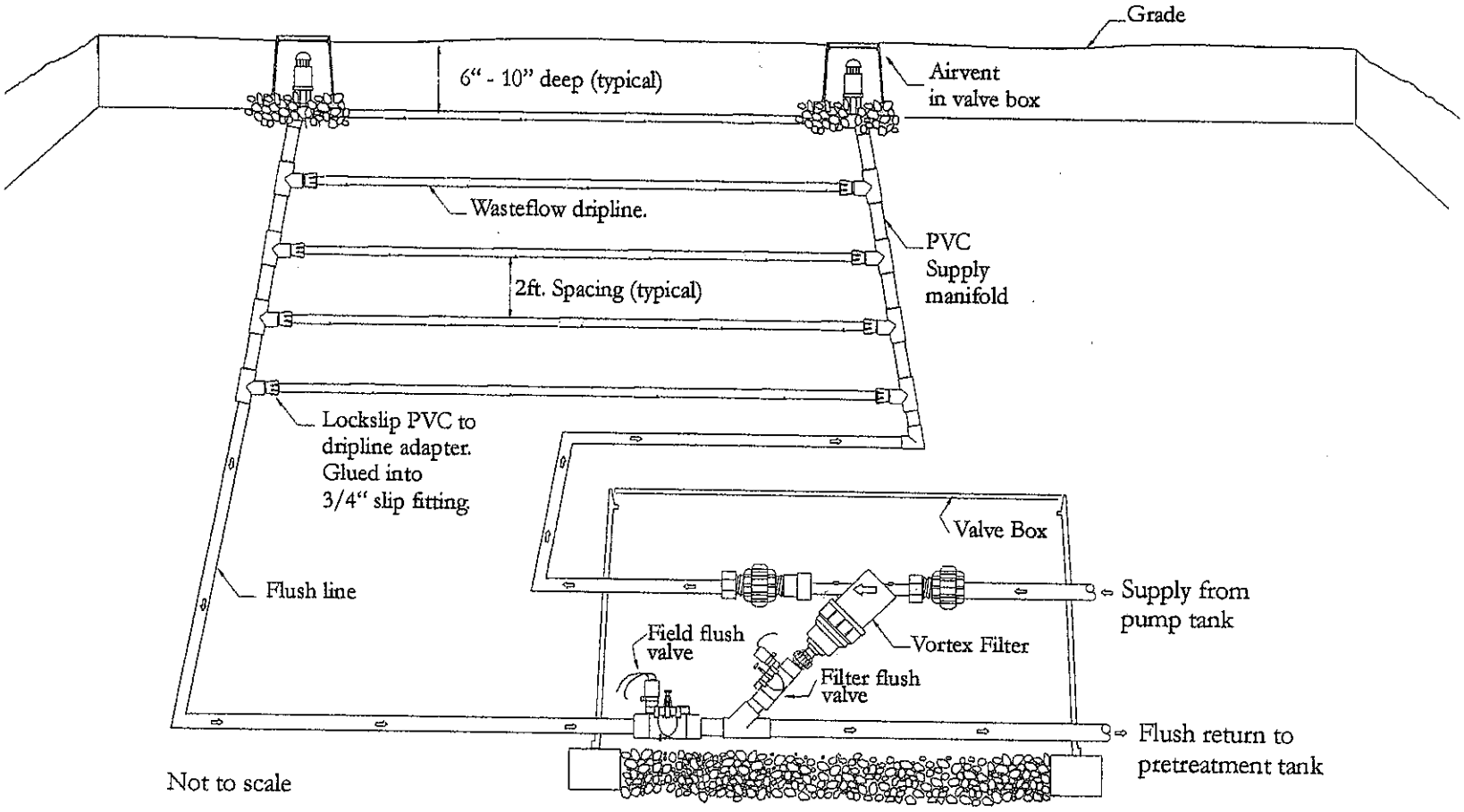
The objective with effluent disposal is usually to dispose of the effluent using the minimum area as quickly and safely as possible at an approximately uniform rate throughout the year. If the main purpose of the Geoflow system is to irrigate, then please use the standard irrigation manual for landscape available from Geoflow, Inc.

Subsurface drip is the most efficient method to dispose of effluent. Small, precise amounts of water are uniformly applied under the soil surface from multiple points.

The main advantages of Geoflow's subsurface irrigation for effluent disposal are:

- Human and animal contact with effluent is minimized, reducing health risks.
- Correctly designed systems will not cause puddling or runoff.
- It can be used under difficult circumstances of high water tables, tight soils, rocky terrain, steep slopes, around existing buildings, trees or other vegetation, and on windy sites.
- Disposal of water is maximized by means of evapotranspiration.
- The system requires no gravel. It is easy to install directly into indigenous soils and the natural landscape can be maintained.
- Minimizes deep percolation.
- Consumption of nitrates by the plant material is increased.
- Invisible and vandal proof installations.
- Ten-year warranty for root intrusion, workmanship and materials. Systems are durable with a long expected life.
- Non intrusive. It allows use of the space while operating.
- Easily automated.
- Effluent can be re-used for irrigation.

Diagram 1: Typical drip field layout



SYSTEM COMPONENTS:

See Diagram 1 on page 4.

A typical drip system installation will consist of the elements listed below:

1. WASTEFLOW® DRIPLINE

(See Appendix 1 on page 21 for product specification)

WASTEFLOW lines carry the water into the disposal/reuse area. WASTEFLOW lines are connected to the supply and return with Compression or Lockslip fittings. Standard spacing between lines and emitters is 24" on center. The pipe has no joints that may pull apart during installation and is ideal for tractor mounted burying machines. It is sold in 500-ft rolls. For export 400-m rolls are available. Rolls of alternative lengths may be special ordered.

WASTEFLOW dripline features:

a) ROOTGUARD®
The risk of root intrusion with an emitter slowly releasing nutrient rich effluent directly into the soil is well known to anyone who has observed a leaking sewer pipe. Geoflow has an exclusive license for ROOTGUARD, to protect emitters from root intrusion. ROOTGUARD® is warrantied for 10 years.

b) Turbulent flow path
Wasteflow drip emitters are pre-inserted in the tube 6", 12" or 24" apart with 24" being the most popular. Angles in the emitter flow path are designed to cause turbulence in order to equalize flow between emitters and keep the emitters clean. Geoflow emitters boast large flow paths, which, coupled with turbulent flow, have proven over the years to be extremely reliable and dependable.

c) Bactericide
Geoflow's WASTEFLOW has an inner lining impregnated with a bactericide, Ultra Fresh DM-50, to inhibit bacterial growth on the walls of the tube and in the emitter.

d) WASTEFLOW Classic and WASTEFLOW PC Dripline
For WASTEFLOW Classic the flow rate delivered by the emitter is a function of the pressure at the emitter. WASTEFLOW PC will have a constant flow rate at all pressures from 7 to 60 psi - to ensure a long life the recommended operating range is 10 to 45 psi.
We recommend that WASTEFLOW PC be used when the advantages are of substantial economic value.
   i) Wasteflow PC can be run longer distances than WASTEFLOW Classic.
   ii) Steep slopes. Systems should be designed for the dripline lateral to follow the contour. When this is practical, the extra cost of installing pressure regulators required for WASTEFLOW Classic would likely be less than the incremental cost of WASTEFLOW PC.
   iii) Rolling terrain. If the difference in height from trough to peak exceeds six feet then WASTEFLOW PC should be used. Vacuum relief valves must be placed at the top of each rise.

2. CONTROLLERS

(See Appendix 3 on page 27 for product specifications)

Controllers are used for time dosing and time flushing of the filter and dripfield. GEO controllers include a programmable logic control interface for field modifications. They can be used on systems ranging in size from one to four zones at the time this manual was printed. All controllers include a surge arrestor, elapsed time meter and counter. For larger systems please inquire about our Wasteflow Manager controller which has monitoring and telemetry capabilities.

3. PUMPS

WASTEFLOW dripfields depend on pumps to supply effluent and pressure to the field. These must be sized according to flow and pressure requirements. Look for submersible effluent pumps from a dependable source. Geoflow does not endorse a single manufacturer, but does advocate you use a pump that is readily serviced in your area.

4. FILTERS

(See Appendix 2 on page 24 for product specifications)

Geoflow systems use a self-cleaning Vortex Filter with a stainless screen 150 mesh / or 100 micron filter element. The self-cleaning action is efficient over a range of flow rates depending on the filter size. The clean-out port is at the base and can be opened or closed manually or automatically. If using a manual flush valve, please keep the valve cracked open slightly at all times for continuous flushing. The controller will fully open automatic flush valves.

5. SUPPLY MANIFOLD

This carries the water from the dosing tank to the disposal area. Rigid PVC is usually used and must be designed to slope back to the pump tank in freezing conditions. The velocity in the manifold should be between 2 feet per second and 5 feet per second (fps). Refer to PVC pipe sizing chart in the appendix to determine the best diameter for your application.

6. RETURN MANIFOLD

In order to help clean the system, the ends of the drip lines are connected together into a common return line, most often made of rigid PVC. This line will help equalize pressures in the system. Flushing should be done frequently during the installation period. Periodic flushing under full system pressure will guarantee a long system life. The return manifold should be installed to drain the line back to the pretreatment tank in freezing climates.

7. PRESSURE REGULATOR

(See Appendix 6 on page 32 for product specification)

Pressure regulators fix the inlet pressure at a given rate and are required with WASTEFLOW Classic. Under normal operating conditions, pressure in the drip lines should be:

10 psi to 45 psi for WASTEFLOW Classic and
7 psi to 60 psi for WASTEFLOW PC

8. AIR VACUUM BREAKER

(See Appendix 5 on page 31 for product specification)

Air vacuum breakers are installed at the high points to keep soil from being sucked into the emitters due to back siphoning or backpressure. This is an absolute necessity with underground drip systems. They are also used for proper draining of the supply and return manifolds in freezing conditions. Use one on the high end of the supply manifold and one on the high point of the return manifold. Maximum flow per vacuum breaker is 50 gpm. Freezing conditions require the air vacuum breaker be protected with insulation.

9. FILTER FLUSH VALVES

(See Appendix 4 on page 29 for product specifications)

Used to flush debris from the filter cleanout port back to the pretreatment tank, this can be an electronically activated solenoid valve or a manual ball valve. If manual, it should be opened for a full flushing at least every six months and left cracked open slightly to flush continuously. Cracking open a manual valve may be used to increase flow through the system to be within the efficient flow rate of the filter and/or pump, if necessary. Certain States may require automated electronic flushing. Please refer to your State codes.

10. FIELD FLUSH VALVES.

(See Appendix 4 on page 29 for product specifications)

Used to flush out fine particles which have passed through the filter and accumulate on the bottom of the tube at the end of each lateral. The field flush valve can be manual or electronic. If manual, it should be opened for full flushing at least every six months and left cracked open slightly to flush continuously and provide for drainage of the flush line in freezing conditions. Cracking open a manual valve can also be used to increase the flow through the system to be within the efficient flow rate of the filter and/or pump if necessary. Certain States do require automated electronic flushing. Please refer to your State codes.

11. WASTEFLOW HEADWORKS

(See Appendix 7 on page 33 for product specifications)

WASTEFLOW Headworks is a pre-assembled unit including the filter, valves and pressure gauge in a jumbo box. It is installed between the pump and the field. Be sure to insulate the box in freezing climates.

DESIGN PARAMETERS:

1. SELECT AREA

Select the area with careful consideration of the soil, the terrain and your State and County regulations. Be sure the field is not in a flood plain or bottom of a slope where excessive water may collect after rain.

2. SOIL APPLICATION DESIGN

Note: This paragraph is extracted from Subsurface Trickle Irrigation System for On-Site Wastewater Disposal And Reuse by B. L. Carlile and A. Sanjines.

The basis of the information is from the Texas Health Department regulations. The rules in your County and State may vary.

The instantaneous water application rate of the system must not exceed the water absorption capacity of the soil. A determination of the instantaneous water absorption capacity of the soil is difficult, however, since the value varies with the water content of the soil. As the soil approaches saturation with water, the absorption rate reduces to an equilibrium rate called the "saturated hydraulic conductivity." Wastewater application rates should be less than 10 percent of this saturated equilibrium.

Even though the trickle irrigation system maximizes the soil absorption rate through the low rate of application, thus keeping the soil below saturation, there will be times when the soil is at or near saturation from rainfall events. The design must account for these periods and assume the worst case condition of soil saturation. *By designing for a safety factor of 10 or 12, based on the saturated hydraulic conductivity, the system will be under-loaded most of the time but should function without surface failure during extreme wet periods.*

Using a safety factor of 12, a suitable design criterion would be to load the system at the estimated hydraulic conductivity but apply water for only a total of 2 hours per day out of the available 24 hours. By applying wastewater for a total of 2 hour per day, particularly if applied in "pulses" or short doses several times per day near the soil surface where the soil dries the quickest, this would keep the soil absorption rate at the highest value and minimize the potential of water surfacing in poor soil conditions.

As stated previously, this design criterion will under-load the system at all times except when the soil is at or near saturation from rainfall. If designing for an efficient irrigation system, the water supply may not be sufficient to meet the demands of a lawn or landscaped area during peak water demand months. This problem can be overcome by either of two solutions: add additional fresh-water make-up to the system during the growing season to supply the needed water for plants in question; or split the system into two or more fields with necessary valves and only use one of the fields during the peak water demand months and alternate the fields during winter months or extremely wet periods, or use both fields simultaneously if the pump capacity will so allow.

Table 1 shows the recommended hydraulic loading rates for various soil conditions, using a safety factor of at least 12 with regard to the equilibrium saturated hydraulic conductivity rate of the soil. These loading rates assume a treated effluent with BOD and TSS values of less than 20 mg/l is produced in the pre-treatment system.

UPDATED JULY 2000

Soil Class	Soil Type	Soil Absorption Rates		Design Hydraulic Loading Rate	Total Area Required
		Est. Soil Perc. Rate minutes/in	Hydraulic Conductivity inches/hr	gal / sq. ft. per day	sq. ft./ 100 gallons per day
I	Coarse- sand	<5	>2	1.400	71.5
I	Fine sand	5-10	1.5-2	1.200	83.3
II	Sandy loam	10-20	1.0-1.5	1.000	100.0
II	loam	20-30	0.75-1.0	0.700	143.0
III	Clay loam	30-45	0.5-0.75	0.600	200.0
III	Silt-clay loam	45-60	0.3-0.5	0.400	250.0
IV	Clay non-swell	60-90	0.2-0.3	0.200	500.0
IV	Clay - swell	90-120	0.1-0.2	0.100	800.0
IV	Poor clay	>120	<0.1	0.075	1334.0

TABLE 1. MINIMUM SURFACE AREA GUIDELINES

TO DISPOSE OF 100 GPD OF SECONDARY TREATED EFFLUENT

Disposal field area calculation:
Total square feet area of disposal field = Design flow divided by loading rate

NOTES:

1) Problems with drip disposal fields occur when soils are misinterpreted. If in doubt, choose the more restrictive soil type from the table above.
2) "Soil type" should be based on the most restrictive layer within two feet of the bottom of the dripline. In many soils 1-ft. vertical separation from the limiting layer has proven successful, and Geoflow recommends you follow State and Local guidelines.
3) The above chart is provided as a guide only. States and Counties may have regulations that are different. Check your State guidelines and consult with your local health department.

3. DEPTH AND SPACING

WASTEFLOW systems usually have emitter lines placed on 2 foot (600 mm) centers with a 2 foot emitter spacing such that each emitter supplies a 4 sq. ft (0.36 m2) area. These lines are best placed at depths of 6-10 inches (150 - 250 mm) below the surface. This is a typical design for systems on sandy and loamy soils with a cover crop of lawn grass. Closer line and/or emitter spacings of 12 inches may be used on heavy clay soils or very coarse sands where lateral movement of water is restricted. Using closer spacings should not reduce the size of the field.

4. Soil Layers and Types

The shallow depth of installation is an advantage of the subsurface dripfield since the topsoil or surface soil is generally the most biologically active and permeable soil for accepting water. The topsoil also dries the fastest after a rainfall event and will maintain the highest water absorption rate. The quality and homogeneity of the soil may present a problem. If the soil was not properly prepared and there are pieces of construction debris, rocks and non-uniform soils, it is very difficult to obtain uniform water spread. In all cases, but particularly if the soil is compacted, soil properties can be greatly improved by ripping and disking.

5. Adding Fill to the Disposal Field

Some disposal sites require additional soil be brought in for agronomic reasons or to increase separation distances from the restrictive layer. Restrictive layers stop or greatly reduce the rate of downward water movement, as a result surfacing may occur during part of the year. In soils with high water tables treatment is minimized due to a lack of oxygen.

Placing drip lines in selected fill material above the natural soil provides an aerated zone for treatment. Disposal however still occurs in the natural soil and the field size must be based on the hydraulic capability of the natural soil to prevent hydraulic overload.

Any time fill material is to be used, the area to receive the fill should have all organic material removed or it must be incorporated into the natural soil to prevent an organic layer from forming and restricting downward water movement.

The fill material should be applied in shallow layers with the first 4 to 6 inches incorporated into the natural soil to prevent an abrupt textural interface. Continue this process until all fill has been incorporated.

The fill area should be left crowned to shed surface water and may need diversion ditches or some other devices to prevent surface water from infiltrating. The entire fill area should have a vegetative cover to prevent erosion. If possible allow the fill to set at least seven to ten days before installing WASTEFLOW dripline.

6. High Points, Siphoning and Slopes

A potential problem with buried drip lines is siphoning dirt into the emitters when the pump is switched off. For this reason:

a) Drip lines should have a fairly constant slope. Run dripline along a contour.

b) At least one vacuum breaker should be installed at the highest point in each zone.

c) Avoid installing lines along rolling hills where you have high and low points along the same line. If this is the case, connect all the high points together and install a vacuum breaker on the connecting line.

d) Drip lines should be connected at the end to a common return line with a flush valve.

7. EXCESSIVE LEVEL DIFFERENCES

WASTEFLOW Classic. If the level variation within a WASTEFLOW Classic zone exceeds six feet, individual pressure regulators should be placed for each six-foot interval.

WASTEFLOW PC. WASTEFLOW PC can tolerate very large height variations provided the pressure remains within the 7 to 60 psi range, and preferably within 10 to 45 psi.

Updated

At the end of each dosing cycle water in the dripline will flow down to the bottom lines within the drip zone. This is called "lowhead drainage". On a slope site Geoflow recommends installing small manifolds with a maximum of 1500 ft of Geoflow dripline within each zone or sub-zone to offset lowhead drainage.

8. HILLY SITE

Concentrate drip lines at the top of the hill with wider spacing towards the bottom. In the case of compound slopes consult a professional irrigation designer or engineer.

Updated

9. REUSE FOR IRRIGATION

A good vegetative cover is an advantage to prevent erosion from the field and utilize water applied to the rooting zone. Sites should be planted or seeded immediately after installation. Grasses are particularly suitable for this application. Most lawn grasses will use 0.25" to 0.35" (6.3-8.9mm) of water per day during the peak-growing season. This calculates to be about 0.16 to 0.22 gal/ft2/ day, a significant part of the daily effluent loading. By overseeding lawns with winter ryegrass, this use efficiency can be continued through much of the year.
For vegetation using 0.16 to 0.22 gal/ft2/day by evapotranspiration, a sewage flow of 1000 gallons per day would supply the water needs of a landscaped area of 4600 to 6400 sq. ft. without having to add fresh water. For areas larger than this, the plants will suffer water stress during the hot months unless additional fresh water is applied.

Water Application Formula:

To determine the rate of application from various drip irrigation designs, use the following formula:

Water application (inches per hour) = (231 x (emitter flow rate gph)) / ((Emitter spacing inches) x (dripline spacing inches))

Example:

Dripline with 1.3 gph flow rate emitters spaced 24" apart and dripline spaced 24" apart.

*Water application = (231*1.3)/(24x24) = 0.52 inches of water per hour.*

APPENDIX B

WATER BALANCE CALCULATIONS

Water Balance
100-Year Storm

North Fork Spray Field - Existing

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Spray Field Area	16	acres
Design Flow (Average)	31,012	gpd

Calculated Needed Pond Volume	16.91	acre-ft
Calculated Needed Eco-Chamber Area	3.10	acres
Calculated Needed 8-Month Storage	23.28	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Spray Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)
October	2.95	3.76	3.97	5.37	0.50	0.63	-2.29	0.00
November	2.86	6.37	2.14	5.37	0.27	1.06	-1.72	0.00
December	2.95	9.13	1.28	0.00	0.16	1.52	4.31	4.31
January	2.95	10.63	1.40	0.00	0.17	1.77	4.55	8.86
February	2.67	10.48	2.33	0.00	0.29	1.75	4.12	12.98
March	2.95	8.86	3.97	0.00	0.50	1.48	3.93	16.91
April	2.86	6.04	5.54	5.37	0.69	1.01	-2.20	14.71
May	2.95	3.93	7.48	5.37	0.93	0.65	-2.70	12.01
June	2.86	1.48	8.37	5.37	1.05	0.25	-3.31	8.70
July	2.95	0.56	9.23	5.37	1.15	0.09	-3.48	5.23
August	2.95	0.35	8.18	5.37	1.02	0.06	-3.38	1.84
September	2.86	3.13	6.11	5.37	0.76	0.52	-2.75	0.00
	34.74	64.70	60.00	42.94	7.50	10.78		

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

North Fork Spray Field - Build-Out

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Spray Field Area	23	acres
Design Flow (Average)	45,262	gpd

Calculated Needed Pond Volume	22.20	acre-ft
Calculated Needed Eco-Chamber Area	4.53	acres
Calculated Needed 8-Month Storage	33.97	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Spray Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)
October	4.31	3.76	3.97	7.72	0.50	0.63	-3.28	0.00
November	4.17	6.37	2.14	7.72	0.27	1.06	-2.76	0.00
December	4.31	9.13	1.28	0.00	0.16	1.52	5.67	5.67
January	4.31	10.63	1.40	0.00	0.17	1.77	5.90	11.57
February	3.89	10.48	2.33	0.00	0.29	1.75	5.35	16.92
March	4.31	8.86	3.97	0.00	0.50	1.48	5.29	22.20
April	4.17	6.04	5.54	7.72	0.69	1.01	-3.24	18.97
May	4.31	3.93	7.48	7.72	0.93	0.65	-3.69	15.28
June	4.17	1.48	8.37	7.72	1.05	0.25	-4.35	10.93
July	4.31	0.56	9.23	7.72	1.15	0.09	-4.47	6.46
August	4.31	0.35	8.18	7.72	1.02	0.06	-4.37	2.09
September	4.17	3.13	6.11	7.72	0.76	0.52	-3.79	0.00
	50.70	64.70	60.00	61.73	7.50	10.78		

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

North Fork Leach Field - Existing

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Design Flow (Average)	31,012	gpd

Calculated Needed Pond Volume	0.00	acre-ft
Calculated Needed Leach Field Area	1.24	acres
Calculated Needed Eco-Chamber Area	3.10	acres
Calculated Needed 8-Month Storage	23.28	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Leach Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)	Leach Field Area (acres)
October	2.95	3.76	3.97	85.54	0.50	0.63	-82.46	0.00	1.24
November	2.86	6.37	2.14	82.78	0.27	1.06	-79.13	0.00	1.24
December	2.95	9.13	1.28	85.54	0.16	1.52	-81.23	0.00	1.24
January	2.95	10.63	1.40	85.54	0.17	1.77	-80.99	0.00	1.24
February	2.67	10.48	2.33	77.26	0.29	1.75	-73.14	0.00	1.24
March	2.95	8.86	3.97	85.54	0.50	1.48	-81.61	0.00	1.24
April	2.86	6.04	5.54	82.78	0.69	1.01	-79.61	0.00	1.24
May	2.95	3.93	7.48	85.54	0.93	0.65	-82.87	0.00	1.24
June	2.86	1.48	8.37	82.78	1.05	0.25	-80.72	0.00	1.24
July	2.95	0.56	9.23	85.54	1.15	0.09	-83.65	0.00	1.24
August	2.95	0.35	8.18	85.54	1.02	0.06	-83.55	0.00	1.24
September	2.86	3.13	6.11	82.78	0.76	0.52	-80.17	0.00	1.24
	34.74	64.70	60.00	1007.15	7.50	10.78			

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

North Fork Leach Field - Build-Out

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Design Flow (Average)	45,262	gpd

Calculated Needed Pond Volume	0.00	acre-ft
Calculated Needed Leach Field Area	1.81	acres
Calculated Needed Eco-Chamber Area	4.53	acres
Calculated Needed 8-Month Storage	33.97	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Leach Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)	Leach Field Area (acres)
October	4.31	3.76	3.97	85.54	0.50	0.63	-81.10	0.00	1.81
November	4.17	6.37	2.14	82.78	0.27	1.06	-77.82	0.00	1.81
December	4.31	9.13	1.28	85.54	0.16	1.52	-79.87	0.00	1.81
January	4.31	10.63	1.40	85.54	0.17	1.77	-79.64	0.00	1.81
February	3.89	10.48	2.33	77.26	0.29	1.75	-71.91	0.00	1.81
March	4.31	8.86	3.97	85.54	0.50	1.48	-80.25	0.00	1.81
April	4.17	6.04	5.54	82.78	0.69	1.01	-78.30	0.00	1.81
May	4.31	3.93	7.48	85.54	0.93	0.65	-81.51	0.00	1.81
June	4.17	1.48	8.37	82.78	1.05	0.25	-79.41	0.00	1.81
July	4.31	0.56	9.23	85.54	1.15	0.09	-82.29	0.00	1.81
August	4.31	0.35	8.18	85.54	1.02	0.06	-82.20	0.00	1.81
September	4.17	3.13	6.11	82.78	0.76	0.52	-78.85	0.00	1.81
	50.70	64.70	60.00	1007.15	7.50	10.78			

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

South Fork Spray Field - Existing

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Spray Field Area	8	acres
Design Flow (Average)	12,700	gpd

Calculated Needed Pond Volume	10.11	acre-ft
Calculated Needed Eco-Chamber Area	1.27	acres
Calculated Needed 8-Month Storage	9.53	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Spray Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)
October	1.21	3.76	3.97	2.52	0.50	0.63	-1.18	0.00
November	1.17	6.37	2.14	2.52	0.27	1.06	-0.55	0.00
December	1.21	9.13	1.28	0.00	0.16	1.52	2.57	2.57
January	1.21	10.63	1.40	0.00	0.17	1.77	2.80	5.37
February	1.09	10.48	2.33	0.00	0.29	1.75	2.55	7.92
March	1.21	8.86	3.97	0.00	0.50	1.48	2.19	10.11
April	1.17	6.04	5.54	2.52	0.69	1.01	-1.03	9.08
May	1.21	3.93	7.48	2.52	0.93	0.65	-1.59	7.49
June	1.17	1.48	8.37	2.52	1.05	0.25	-2.15	5.34
July	1.21	0.56	9.23	2.52	1.15	0.09	-2.37	2.97
August	1.21	0.35	8.18	2.52	1.02	0.06	-2.27	0.70
September	1.17	3.13	6.11	2.52	0.76	0.52	-1.59	0.00
	14.23	64.70	60.00	20.13	7.50	10.78		

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

South Fork Spray Field - Build-Out

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Spray Field Area	16	acres
Design Flow (Average)	31,700	gpd

Calculated Needed Pond Volume	17.17	acre-ft
Calculated Needed Eco-Chamber Area	3.17	acres
Calculated Needed 8-Month Storage	23.79	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Spray Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)
October	3.02	3.76	3.97	5.37	0.50	0.63	-2.22	0.00
November	2.92	6.37	2.14	5.37	0.27	1.06	-1.66	0.00
December	3.02	9.13	1.28	0.00	0.16	1.52	4.38	4.38
January	3.02	10.63	1.40	0.00	0.17	1.77	4.61	8.99
February	2.72	10.48	2.33	0.00	0.29	1.75	4.18	13.17
March	3.02	8.86	3.97	0.00	0.50	1.48	4.00	17.17
April	2.92	6.04	5.54	5.37	0.69	1.01	-2.14	15.03
May	3.02	3.93	7.48	5.37	0.93	0.65	-2.63	12.40
June	2.92	1.48	8.37	5.37	1.05	0.25	-3.25	9.15
July	3.02	0.56	9.23	5.37	1.15	0.09	-3.41	5.74
August	3.02	0.35	8.18	5.37	1.02	0.06	-3.32	2.42
September	2.92	3.13	6.11	5.37	0.76	0.52	-2.69	0.00
	35.51	64.70	60.00	42.94	7.50	10.78		

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

South Fork Leach Field - Existing

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Design Flow (Average)	12,700	gpd

Calculated Needed Pond Volume	0.00	acre-ft
Calculated Needed Leach Field Area	0.51	acres
Calculated Needed Eco-Chamber Area	1.27	acres
Calculated Needed 8-Month Storage	9.53	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Leach Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)	Leach Field Area (acres)
October	1.21	3.76	3.97	85.54	0.50	0.63	-84.20	0.00	0.51
November	1.17	6.37	2.14	82.78	0.27	1.06	-80.82	0.00	0.51
December	1.21	9.13	1.28	85.54	0.16	1.52	-82.97	0.00	0.51
January	1.21	10.63	1.40	85.54	0.17	1.77	-82.73	0.00	0.51
February	1.09	10.48	2.33	77.26	0.29	1.75	-74.71	0.00	0.51
March	1.21	8.86	3.97	85.54	0.50	1.48	-83.35	0.00	0.51
April	1.17	6.04	5.54	82.78	0.69	1.01	-81.30	0.00	0.51
May	1.21	3.93	7.48	85.54	0.93	0.65	-84.61	0.00	0.51
June	1.17	1.48	8.37	82.78	1.05	0.25	-82.41	0.00	0.51
July	1.21	0.56	9.23	85.54	1.15	0.09	-85.39	0.00	0.51
August	1.21	0.35	8.18	85.54	1.02	0.06	-85.29	0.00	0.51
September	1.17	3.13	6.11	82.78	0.76	0.52	-81.85	0.00	0.51
	14.23	64.70	60.00	1007.15	7.50	10.78			

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

South Fork Leach Field - Build-Out

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Design Flow (Average)	31,700	gpd

Calculated Needed Pond Volume	0.00	acre-ft
Calculated Needed Leach Field Area	1.27	acres
Calculated Needed Eco-Chamber Area	3.17	acres
Calculated Needed 8-Month Storage	23.79	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Leach Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)	Leach Field Area (acres)
October	3.02	3.76	3.97	85.54	0.50	0.63	-82.39	0.00	1.27
November	2.92	6.37	2.14	82.78	0.27	1.06	-79.07	0.00	1.27
December	3.02	9.13	1.28	85.54	0.16	1.52	-81.16	0.00	1.27
January	3.02	10.63	1.40	85.54	0.17	1.77	-80.93	0.00	1.27
February	2.72	10.48	2.33	77.26	0.29	1.75	-73.08	0.00	1.27
March	3.02	8.86	3.97	85.54	0.50	1.48	-81.54	0.00	1.27
April	2.92	6.04	5.54	82.78	0.69	1.01	-79.55	0.00	1.27
May	3.02	3.93	7.48	85.54	0.93	0.65	-82.80	0.00	1.27
June	2.92	1.48	8.37	82.78	1.05	0.25	-80.66	0.00	1.27
July	3.02	0.56	9.23	85.54	1.15	0.09	-83.58	0.00	1.27
August	3.02	0.35	8.18	85.54	1.02	0.06	-83.49	0.00	1.27
September	2.92	3.13	6.11	82.78	0.76	0.52	-80.10	0.00	1.27
	35.51	64.70	60.00	1007.15	7.50	10.78			

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

North Fork & South Fork Spray Field - Existing

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Spray Field Area	22	acres
Design Flow (Average)	43,712	gpd

Calculated Needed Pond Volume	21.63	acre-ft
Calculated Needed Eco-Chamber Area	4.37	acres
Calculated Needed 8-Month Storage	32.81	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Spray Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)
October	4.16	3.76	3.97	7.38	0.50	0.63	-3.09	0.00
November	4.02	6.37	2.14	7.38	0.27	1.06	-2.56	0.00
December	4.16	9.13	1.28	0.00	0.16	1.52	5.52	5.52
January	4.16	10.63	1.40	0.00	0.17	1.77	5.76	11.27
February	3.76	10.48	2.33	0.00	0.29	1.75	5.21	16.49
March	4.16	8.86	3.97	0.00	0.50	1.48	5.14	21.63
April	4.02	6.04	5.54	7.38	0.69	1.01	-3.04	18.58
May	4.16	3.93	7.48	7.38	0.93	0.65	-3.50	15.08
June	4.02	1.48	8.37	7.38	1.05	0.25	-4.15	10.93
July	4.16	0.56	9.23	7.38	1.15	0.09	-4.28	6.65
August	4.16	0.35	8.18	7.38	1.02	0.06	-4.19	2.46
September	4.02	3.13	6.11	7.38	0.76	0.52	-3.60	0.00
	48.97	64.70	60.00	59.04	7.50	10.78		

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

North Fork & South Fork Spray Field - Build-Out

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Spray Field Area	37	acres
Design Flow (Average)	76,962	gpd

Calculated Needed Pond Volume	33.97	acre-ft
Calculated Needed Eco-Chamber Area	7.70	acres
Calculated Needed 8-Month Storage	57.76	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Spray Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)
October	7.32	3.76	3.97	12.41	0.50	0.63	-4.96	0.00
November	7.09	6.37	2.14	12.41	0.27	1.06	-4.53	0.00
December	7.32	9.13	1.28	0.00	0.16	1.52	8.68	8.68
January	7.32	10.63	1.40	0.00	0.17	1.77	8.92	17.60
February	6.61	10.48	2.33	0.00	0.29	1.75	8.07	25.67
March	7.32	8.86	3.97	0.00	0.50	1.48	8.30	33.97
April	7.09	6.04	5.54	12.41	0.69	1.01	-5.01	28.96
May	7.32	3.93	7.48	12.41	0.93	0.65	-5.37	23.59
June	7.09	1.48	8.37	12.41	1.05	0.25	-6.13	17.46
July	7.32	0.56	9.23	12.41	1.15	0.09	-6.15	11.31
August	7.32	0.35	8.18	12.41	1.02	0.06	-6.05	5.26
September	7.09	3.13	6.11	12.41	0.76	0.52	-5.57	0.00
	86.21	64.70	60.00	99.30	7.50	10.78		

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

North Fork & South Fork Leach Field - Existing

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Design Flow (Average)	43,712	gpd

Calculated Needed Pond Volume	0.00	acre-ft
Calculated Needed Leach Field Area	1.75	acres
Calculated Needed Eco-Chamber Area	4.37	acres
Calculated Needed 8-Month Storage	32.81	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Leach Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)	Leach Field Area (acres)
October	4.16	3.76	3.97	85.54	0.50	0.63	-81.25	0.00	1.75
November	4.02	6.37	2.14	82.78	0.27	1.06	-77.96	0.00	1.75
December	4.16	9.13	1.28	85.54	0.16	1.52	-80.02	0.00	1.75
January	4.16	10.63	1.40	85.54	0.17	1.77	-79.78	0.00	1.75
February	3.76	10.48	2.33	77.26	0.29	1.75	-72.05	0.00	1.75
March	4.16	8.86	3.97	85.54	0.50	1.48	-80.40	0.00	1.75
April	4.02	6.04	5.54	82.78	0.69	1.01	-78.44	0.00	1.75
May	4.16	3.93	7.48	85.54	0.93	0.65	-81.66	0.00	1.75
June	4.02	1.48	8.37	82.78	1.05	0.25	-79.55	0.00	1.75
July	4.16	0.56	9.23	85.54	1.15	0.09	-82.44	0.00	1.75
August	4.16	0.35	8.18	85.54	1.02	0.06	-82.34	0.00	1.75
September	4.02	3.13	6.11	82.78	0.76	0.52	-79.00	0.00	1.75
	48.97	64.70	60.00	1007.15	7.50	10.78			

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

Water Balance
100-Year Storm

North Fork & South Fork Leach Field - Build-Out

Design Data		
Storage Pond Mid Area	1.50	acres
Storage Pond Catch Area	2.00	acres
Storage Pond Capacity	23.00	acre-ft
Leach Field Disposal Capacity	1.29	gpd/sf
Spray Field Disposal Capacity	0.055	gpd/sf
Design Flow (Average)	76,962	gpd

Calculated Needed Pond Volume	0.00	acre-ft
Calculated Needed Leach Field Area	3.08	acres
Calculated Needed Eco-Chamber Area	7.70	acres
Calculated Needed 8-Month Storage	57.76	acre-ft

Month	Flow (acre-ft)	Precipitation (inches)	Evaporation (inches)	Leach Field Application Rate (acre-ft)	Pond Evaporation (acre-ft)	Pond Catch Area (acre-ft)	Change in Storage (acre-ft)	Cumulative Storage (acre-ft)	Leach Field Area (acres)
October	7.32	3.76	3.97	85.54	0.50	0.63	-78.09	0.00	3.08
November	7.09	6.37	2.14	82.78	0.27	1.06	-74.90	0.00	3.08
December	7.32	9.13	1.28	85.54	0.16	1.52	-76.86	0.00	3.08
January	7.32	10.63	1.40	85.54	0.17	1.77	-76.62	0.00	3.08
February	6.61	10.48	2.33	77.26	0.29	1.75	-69.19	0.00	3.08
March	7.32	8.86	3.97	85.54	0.50	1.48	-77.24	0.00	3.08
April	7.09	6.04	5.54	82.78	0.69	1.01	-75.38	0.00	3.08
May	7.32	3.93	7.48	85.54	0.93	0.65	-78.50	0.00	3.08
June	7.09	1.48	8.37	82.78	1.05	0.25	-76.49	0.00	3.08
July	7.32	0.56	9.23	85.54	1.15	0.09	-79.28	0.00	3.08
August	7.32	0.35	8.18	85.54	1.02	0.06	-79.18	0.00	3.08
September	7.09	3.13	6.11	82.78	0.76	0.52	-75.94	0.00	3.08
	86.21	64.70	60.00	1007.15	7.50	10.78			

NOTES:

1. The rainfall data is from Madera County Data at the North Fork Ranger Station, 100-year storm
2. The evaporation rates are obtained from a floating pan measurement taken in Bass Lake, data from Madera County.

APPENDIX C

COST ESTIMATES

Summary of Unit Prices Used for Cost Estimating Purposes
North Fork CDC/MCMD 8A

			Unit	Unit Price
Disposal Area Unit Prices:				
	Spray Field		ac	$ 15,000.00
	Leach Field		ac	$ 45,000.00
	Eco-Chamber/subsurface		ac	$ 20,000.00
Effluent Pond Expansion:				
	pond		cy	$ 10.00
Expand Mechanical Plant			gal	$ 10.00
New Package Mechanical Plant			gal	$ 15.00
SBR Plant			gal	$ 15.00
Wetlands			gal	$ 4.00
AIPS			gal	$ 5.00
8" Gravity Sewer			lf	$ 75.00
4" to 6" Gravity Sewer (outside pvmt)			lf	$ 30.00
Lift Station			LS	$ 50,000.00
4" Force Main			lf	$ 40.00
3" Small Diameter Collection System			lf	$ 10.00
Monitoring Well			EA	$ 15,000.00
Pond Liner			sf	$ 1.00
Tertiary Filter/Disinfection			ga	$ 3.00

1000 40 40000 $250,000 pipe

547

Table C-1. Alternative N1 - Maintain Existing System - North Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
WWTP Upgrade	0	---	$0	$0
Expand Effluent Storage[1]	0	cy	$10	$0
Storage Pond Liner	80,000	sf	$1.00	$80,000
Monitoring Well	3	ea	$15,000.00	$45,000
Other	1	ls		$0
Construction Subtotal:				**$125,000**
Disposal Sub-Options[2]:				
N1.1. Expand Spray Field	5	ac	$15,000	$75,000
N1.2. Add Leach Field	0.75	ac	$45,000	$33,750
N1.3. Add Eco-Chamber	1.5	ac	$20,000	$30,000
Alt. N1.1 Constr. Subtotal				**$200,000**
Engineering, 10%				$20,000
Administration, 5%				$10,000
Construction Mgt., 10%				$20,000
Contingency, 20%				$40,000
Alt. N1.1 Total:				**$290,000**
Alt. N1.2 Constr. Subtotal				**$158,750**
Engineering, 10%				$15,875
Administration, 5%				$7,938
Construction Mgt., 10%				$15,875
Contingency, 20%				$31,750
Alt. N1.2 Total:				**$230,188**
Alt. N1.3 Constr. Subtotal				**$155,000**
Engineering, 10%				$15,500
Administration, 5%				$7,750
Construction Mgt., 10%				$15,500
Contingency, 20%				$31,000
Alt. N1.3 Total:				**$224,750**

[1]Water balance indicates no additional storage needed to meet RWQCB storage criteria.

[2]No pond expanasion required with leach field disposal or eco-chamber/subsurface irrigation addition.

Table C-2. Alternative N2 - New AIPS Plant - North Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
WWTP (AIPS)[2]	60,000	ga	$5	$300,000
WWTP Land Acquisition	1	ls	$100,000	$100,000
Expand Effluent Storage[1]	0	cy	$10	$0
Storage Pond Liner	80,000	sf	$1.00	$80,000
Monitoring Well	3	ea	$15,000.00	$45,000
Other - Site Mitigation/Permitting	1	ls	$50,000	$50,000
Construction Subtotal:				**$575,000**
Disposal Sub-Options:				
N3.1. Expand Spray Field[1]	5	ac	$15,000	$75,000
N3.2. Add Leach Field[1]	0.75	ac	$45,000	$33,750
N3.3. Add Eco-Chamber[1]	1.5	ac	$20,000	$30,000
Alt. N3.1 Constr. Subtotal				**$650,000**
Engineering, 10%				$65,000
Administration, 5%				$32,500
Construction Mgt., 10%				$65,000
Contingency, 20%				$130,000
Alt. N3.1 Total:				**$942,500**
Alt. N3.2 Constr. Subtotal				**$608,750**
Engineering, 10%				$60,875
Administration, 5%				$30,438
Construction Mgt., 10%				$60,875
Contingency, 20%				$121,750
Alt. N3.2 Total:				**$882,688**
Alt. N3.3 Constr. Subtotal				**$605,000**
Engineering, 10%				$60,500
Administration, 5%				$30,250
Construction Mgt., 10%				$60,500
Contingency, 20%				$121,000
Alt. N3.3 Total:				**$877,250**

[1]No pond expansion required with leach field disposal addition.

[2]Siting of AIPS ponds not feasible on existing WWTP site. Additional land would be required. Cost for land acquisition/siting not included.

Table C-3. Alternative N3 - Tertiary Treatment - North Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
WWTP Upgrade	0	---	$0	$0
Tertiary Filter/Disinfection	60,000	ga	$3	$180,000
Expand Effluent Storage	0	cy	$10	$0
Storage Pond Liner[1]	80,000	sf	$1.00	$80,000
Outfall to Creek	1	ls	$50,000.00	$50,000
Permitting/Environmental	1	ls	$50,000	$50,000
Construction Subtotal:				**$360,000**
Disposal Sub-Options[2]:				
N3.1. Expand Spray Field[2]	0	ac	$15,000	$0
N3.2. Add Leach Field[2]	0.00	ac	$45,000	$0
N3.3. Add Eco-Chamber[2]	0.0	ac	$20,000	$0
Alt. N3 Constr. Subtotal				**$360,000**
Engineering, 10%				$36,000
Administration, 5%				$18,000
Construction Mgt., 10%				$36,000
Contingency, 20%				$72,000
Alt. N3 Total:				**$522,000**

[1]Assumes existing storage pond to remain in service as backup emergency.

[2]Expansion of disposal field not required with stream discharge/reuse.

Table C-4. Alternative S1 - Mechanical WWTP - South Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
WWTP Extended Aeration	40,000	ga	$15	$600,000
Effluent Storage	48,400	cy	$10	$484,000
Storage Pond Liner[1]	110,000	ea	$1.00	$110,000
Monitoring Well	3	ea	$15,000.00	$45,000
Other				$0
Construction Subtotal:				**$1,239,000**
Collection System Options (see Table C-8):				
Alt. S1.1 Conventional Sewer:				$434,500
Alt. S1.2 STEG System:				$259,000
Alt. S1.3 STEP System:				$50,000
Disposal Sub-Options[2]:				
Add Spray Field	17.5	ac	$40,000	$700,000
Add Leach Field	1.75	ac	$70,000	$122,500
Add Eco-Chamber	4	ac	$45,000	$180,000
Alt. S1.1 Constr. Subtotal - With Spray Field Option				**$2,373,500**
Engineering, 10%				$237,350
Administration, 5%				$118,675
Construction Mgt., 10%				$237,350
Contingency, 20%				$474,700
Alt. S1.1 Total:				**$3,441,575**
Alt. S1.1 Constr. Subtotal - With Leach Field Option				**$1,796,000**
Engineering, 10%				$179,600
Administration, 5%				$89,800
Construction Mgt., 10%				$179,600
Contingency, 20%				$359,200
Alt. S1.2 Total:				**$2,604,200**
Alt. S1.1 Constr. Subtotal - With Eco-Chamber Option				**$1,853,500**
Engineering, 10%				$179,600
Administration, 5%				$89,800
Construction Mgt., 10%				$179,600
Contingency, 20%				$359,200
Alt. S1.2 Total:				**$2,661,700**
Alt. S1.2 Constr. Subtotal - With Spray Field Option				**$2,198,000**
Engineering, 10%				$179,600
Administration, 5%				$89,800
Construction Mgt., 10%				$179,600
Contingency, 20%				$359,200
Alt. S1.2 Total:				**$3,006,200**

Alt. S1.2 Constr. Subtotal - With Leach Field Option				**$1,678,000**
Engineering, 10%				$179,600
Administration, 5%				$89,800
Construction Mgt., 10%				$179,600
Contingency, 20%				$359,200
Alt. S1.2 Total:				**$2,486,200**
Alt. S1.2 Constr. Subtotal - With Eco-Chamber Option				**$1,678,000**
Engineering, 10%				$179,600
Administration, 5%				$89,800
Construction Mgt., 10%				$179,600
Contingency, 20%				$359,200
Alt. S1.2 Total:				**$2,486,200**
Alt. S1.3 Constr. Subtotal - With Spray Field Option				**$1,989,000**
Engineering, 10%				$179,600
Administration, 5%				$89,800
Construction Mgt., 10%				$179,600
Contingency, 20%				$359,200
Alt. S1.2 Total:				**$2,797,200**
Alt. S1.3 Constr. Subtotal - With Leach Field Option				**$1,411,500**
Engineering, 10%				$179,600
Administration, 5%				$89,800
Construction Mgt., 10%				$179,600
Contingency, 20%				$359,200
Alt. S1.2 Total:				**$2,219,700**
Alt. S1.3 Constr. Subtotal - With Eco-Chamber Option				**$1,469,000**
Engineering, 10%				$179,600
Administration, 5%				$89,800
Construction Mgt., 10%				$179,600
Contingency, 20%				$359,200
Alt. S1.2 Total:				**$2,277,200**

[1]Based on 30 acre-feet of pond volume.

[2]Includes $25,000/acre for land on Mill Site.

Table C-5. Alternative S2 - AIPS WWTP - South Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
AIPS Ponds	35,000	ga	$5	$175,000
Effluent Storage	48,400	cy	$10	$484,000
Storage Pond Liner	110,000	sf	$1.00	$110,000
Monitoring Well	3	ea	$15,000.00	$45,000
Other				$0
Construction Subtotal:				**$814,000**
Collection System Options (see Table C-8):				
Alt. S2.1 Conventional Sewer:				$434,500
Alt. S2.2 STEG System:				$259,000
Alt. S2.3 STEP System:				$50,000
Disposal Sub-Options:				
Add Spray Field	17.5	ac	$40,000	$700,000
Add Leach Field	1.75	ac	$70,000	$122,500
Add Eco-Chamber	4	ac	$45,000	$180,000
Alt. S2.1 Constr. Subtotal - With Spray Field Option				**$1,948,500**
Engineering, 10%				$194,850
Administration, 5%				$97,425
Construction Mgt., 10%				$194,850
Contingency, 20%				$389,700
Alt. S2.1 Total:				**$2,825,325**
Alt. S2.1 Constr. Subtotal - With Leach Field Option				**$1,371,000**
Engineering, 10%				$137,100
Administration, 5%				$68,550
Construction Mgt., 10%				$137,100
Contingency, 20%				$274,200
Alt. S2.1 Total:				**$1,987,950**
Alt. S2.1 Constr. Subtotal - With Eco-Chamber Option				**$1,428,500**
Engineering, 10%				$137,100
Administration, 5%				$68,550
Construction Mgt., 10%				$137,100
Contingency, 20%				$274,200
Alt. S2.1 Total:				**$2,045,450**
Alt. S2.2 Constr. Subtotal - With Spray Field Option				**$1,773,000**
Engineering, 10%				$137,100
Administration, 5%				$68,550
Construction Mgt., 10%				$137,100
Contingency, 20%				$274,200
Alt. S2.2 Total:				**$2,389,950**

Alt. S2.2 Constr. Subtotal - With Leach Field Option				**$1,253,000**
Engineering, 10%				$137,100
Administration, 5%				$68,550
Construction Mgt., 10%				$137,100
Contingency, 20%				$274,200
Alt. S2.2 Total:				**$1,869,950**
Alt. S2.2 Constr. Subtotal - With Eco-Chamber Option				**$1,253,000**
Engineering, 10%				$137,100
Administration, 5%				$68,550
Construction Mgt., 10%				$137,100
Contingency, 20%				$274,200
Alt. S2.2 Total:				**$1,869,950**
Alt. S2.3 Constr. Subtotal - With Spray Field Option				**$1,564,000**
Engineering, 10%				$137,100
Administration, 5%				$68,550
Construction Mgt., 10%				$137,100
Contingency, 20%				$274,200
Alt. S2.3 Total:				**$2,180,950**
Alt. S2.3 Constr. Subtotal - With Leach Field Option				**$986,500**
Engineering, 10%				$137,100
Administration, 5%				$68,550
Construction Mgt., 10%				$137,100
Contingency, 20%				$274,200
Alt. S2.3 Total:				**$1,603,450**
Alt. S2.3 Constr. Subtotal - With Eco-Chamber Option				**$1,044,000**
Engineering, 10%				$137,100
Administration, 5%				$68,550
Construction Mgt., 10%				$137,100
Contingency, 20%				$274,200
Alt. S2.3 Total:				**$1,660,950**

[1]Based on 30 acre-feet of pond volume.
would be required. Cost for land acquisition/siting not included.

Table C-6. Alternative S3 - Wetlands WWTP - South Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
Wetlands Treatment Plant	35,000	ga	$4	$140,000
Effluent Storage	48,400	cy	$10	$484,000
Individual Grinder Pumps	63	ea	$3,500	$220,500
Storage Pond Liner	110,000	ea	$1.00	$110,000
Monitoring Well	3	ea	$15,000.00	$45,000
Other				$0
Construction Subtotal:				**$999,500**
Collection System Options (see Table C-8):				
Alt. S2.1 Conventional Sewer:				$434,500
Alt. S2.2 STEG System:				$259,000
Alt. S2.3 STEP System:				$50,000
Disposal Sub-Options:				
Add Spray Field	17.5	ac	$40,000	$700,000
Add Leach Field	1.75	ac	$70,000	$122,500
Add Eco-Chamber	4	ac	$45,000	$180,000
Alt. S3.1 Constr. Subtotal - With Spray Field Option				**$2,134,000**
Engineering, 10%				$213,400
Administration, 5%				$106,700
Construction Mgt., 10%				$213,400
Contingency, 20%				$426,800
Alt. S3.1 Total:				**$3,094,300**
Alt. S3.1 Constr. Subtotal - With Leach Field Option				**$1,556,500**
Engineering, 10%				$155,650
Administration, 5%				$77,825
Construction Mgt., 10%				$155,650
Contingency, 20%				$311,300
Alt. S3.1 Total:				**$2,256,925**
Alt. S3.1 Constr. Subtotal - With Eco-Chamber Option				**$1,614,000**
Engineering, 10%				$155,650
Administration, 5%				$77,825
Construction Mgt., 10%				$155,650
Contingency, 20%				$311,300
Alt. S3.1 Total:				**$2,314,425**
Alt. S3.2 Constr. Subtotal - With Spray Field Option				**$1,958,500**
Engineering, 10%				$155,650
Administration, 5%				$77,825
Construction Mgt., 10%				$155,650
Contingency, 20%				$311,300
Alt. S3.2 Total:				**$2,658,925**

Alt. S3.2 Constr. Subtotal - With Leach Field Option				**$1,438,500**
Engineering, 10%				$155,650
Administration, 5%				$77,825
Construction Mgt., 10%				$155,650
Contingency, 20%				$311,300
Alt. S3.2 Total:				**$2,138,925**
Alt. S3.2 Constr. Subtotal - With Eco-Chamber Option				**$1,438,500**
Engineering, 10%				$155,650
Administration, 5%				$77,825
Construction Mgt., 10%				$155,650
Contingency, 20%				$311,300
Alt. S3.2 Total:				**$2,138,925**
Alt. S3.3 Constr. Subtotal - With Spray Field Option				**$1,749,500**
Engineering, 10%				$155,650
Administration, 5%				$77,825
Construction Mgt., 10%				$155,650
Contingency, 20%				$311,300
Alt. S3.3 Total:				**$2,449,925**
Alt. S3.3 Constr. Subtotal - With Leach Field Option				**$1,172,000**
Engineering, 10%				$155,650
Administration, 5%				$77,825
Construction Mgt., 10%				$155,650
Contingency, 20%				$311,300
Alt. S3.3 Total:				**$1,872,425**
Alt. S3.3 Constr. Subtotal - With Eco-Chamber Option				**$1,229,500**
Engineering, 10%				$155,650
Administration, 5%				$77,825
Construction Mgt., 10%				$155,650
Contingency, 20%				$311,300
Alt. S3.3 Total:				**$1,929,925**

[1]Based on 30 acre-feet of pond volume.
would be required. Cost for land acquisition/siting not included.

Table C-7. Alternative S4 - Tertiary Treatment - South Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
Tertiary Filter/Disinfection	35,000	ga	$3.00	$105,000
Construction Subtotal:				**$105,000**
Alt. S4 Constr. Subtotal				**$105,000**
Engineering, 10%				$10,500
Administration, 5%				$5,250
Construction Mgt., 10%				$10,500
Contingency, 20%				$21,000
Alt. S4 Total:				**$152,250**

Note: This Tertiary Treatment cost is to be added to S1, S2 and S3 costs.

Table C-8. Alternative Collection Systems - South Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
Conventional Collection System:				
8" Gravity Sewer	3,900	lf	$75	$292,500
Lift Station	1	ea	$50,000	$50,000
4" Force Main	2,300	lf	$40	$92,000
Subtotal[1]:				**$434,500**
Small Dia. Gravity Collection System (STEG):				
4" to 6" Gravity Sewer[3]	3,900	lf	$30	$117,000
Lift Station	1	ea	$50,000	$50,000
4" Force Main	2,300	lf	$40	$92,000
Subtotal[1]:				**$259,000**
Small Dia. Collection System (STEP)[2]:				
3" Plastic/HDPE Force Main[3]	5,000	lf	$10	$50,000
Lift Station	0	ea	$15,000	$0
4" Force Main	0	lf	$1	$0
Subtotal[1]:				**$50,000**
Notes:				
[1]Excludes cost of individual home lateral hookup cost, estimated at $3,000/home.				
[2]Excludes cost of individual grinder pumps and septic tanks for each home owner, estimated at $5,000 per home.				
[3]Constructed shallow and outside of paved roadways.				
[4]Costs to replace 63 exist. Septic tanks for STEG alternative estimated at $220,000, borne by each individual home owner.				
[5]For STEP system, estimated cost of 63 individual pumps at $5,000/home, or $315,000.				

Table C-9. Alternative NS1 - Expand Exist. WWTP - North/South Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
WWTP Upgrade to 90,000 gpd	30,000	ga	$10	$300,000
Expand Effluent Storage[1]	35,000	cy	$10	$350,000
Storage Pond Liner	150,000	ea	$1.00	$150,000
Monitoring Well	6	ea	$15,000.00	$90,000
South Fork Collection System[4]				$342,500
New Lift Station	1	ea	$50,000	$50,000
4" FM South Fork to North Fork	6,400	lf	$40.00	$256,000
Other				$0
Construction Subtotal:				**$1,538,500**
Disposal Sub-Options:				
NS1.1. Add Spray Field[2]	20	ac	$15,000	$300,000
NS1.2. Add Leach Field[3]	2	ac	$45,000	$90,000
NS1.3. Add Eco-Chamber[4]	4	ac	$20,000	$80,000
Alt. NS1.1 Constr. Subtotal				**$1,838,500**
Engineering, 10%				$183,850
Administration, 5%				$91,925
Construction Mgt., 10%				$183,850
Contingency, 20%				$367,700
Alt. NS1.1 Total:				**$2,665,825**
Alt. NS1.2 Constr. Subtotal				**$1,628,500**
Engineering, 10%				$162,850
Administration, 5%				$81,425
Construction Mgt., 10%				$162,850
Contingency, 20%				$325,700
Alt. NS1.2 Total:				**$2,361,325**
Alt. NS1.3 Constr. Subtotal				**$1,618,500**
Engineering, 10%				$161,850
Administration, 5%				$80,925
Construction Mgt., 10%				$161,850
Contingency, 20%				$323,700
Alt. NS1.3 Total:				**$2,346,825**

[1]Cost to expand exist. Pond to 34 AF, plus develop new storage site.

[2]Based on adding 20 additional acres of spray field to existing 16 acre site.

[3]Based on adding 2 acres of leach field to existing 16 acre site.

[4]Cost from Table C-8 for conventional collection system, excluding force main to South Fork WWTP.

Table C-10. Alternative NS2 - WWTP and add Tertiary Treatment - North/South Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
WWTP Upgrade to 90,000 gpd	30,000	ga	$10	$300,000
Expand Effluent Storage[1]	0	cy	$10	$0
Storage Pond Liner	80,000	sf	$1.00	$80,000
Monitoring Well	3	ea	$15,000.00	$45,000
Tertiary Filter/Disinfection	90,000	ga	$3.00	$270,000
South Fork Collection System[3]				$342,500
New Lift Station	1	ea	$50,000	$50,000
4" FM South Fork to North Fork	6,400	lf	$40.00	$256,000
Other				$0
Construction Subtotal:				**$1,343,500**
Disposal Sub-Options:				
NS1.1. Add Spray Field[2]	0	ac	$15,000	$0
NS1.2. Add Leach Field[2]	0	ac	$45,000	$0
NS1.3. Add Eco-Chamber[2]	0	ac	$20,000	$0
Alt. NS2 Constr. Subtotal				**$1,343,500**
Engineering, 10%				$134,350
Administration, 5%				$67,175
Construction Mgt., 10%				$134,350
Contingency, 20%				$268,700
Alt. NS2 Total:				**$1,948,075**

[1]No cost to expand pond since stream discharge will be permitted.

[2]No cost to expand disposal area since stream discharge will be permitted.

[3]See Table C-8.

Table C-11. Alternative NS3 - AIPS At South Fork/Abandon North Fork WWTP - North Fork/South Fork

Item	Quantity	Unit	Unit Price, $	Extended Price, $
Abandon North Fork WWTP	1	ls	$25,000	$25,000
WWTP (AIPS)	80,000	ga	$5	$400,000
New Lift Station	1	ea	$50,000	$50,000
New 4" Force Main	6,400	lf	$40	$256,000
Effluent Storage	65,000	cy	$10	$650,000
Storage Pond Liner	250,000	ea	$1.00	$250,000
South Fork Collection System[1]				$342,500
Monitoring Well	3	ea	$15,000.00	$45,000
Other	0	ea	$0.00	$0
Construction Subtotal:				**$2,018,500**
Disposal Sub-Options[2]:				
NS3.1. Add Spray Field	35	ac	$40,000	$1,400,000
NS3.2. Add Leach Field	4	ac	$70,000	$280,000
NS3.3. Add Eco-Chamber	10	ac	$45,000	$450,000
Alt. NS3.1 Constr. Subtotal				**$3,418,500**
Engineering, 10%				$341,850
Administration, 5%				$170,925
Construction Mgt., 10%				$341,850
Contingency, 20%				$683,700
Alt. NS3.1 Total:				**$4,956,825**
Alt. NS3.2 Constr. Subtotal				**$2,298,500**
Engineering, 10%				$229,850
Administration, 5%				$114,925
Construction Mgt., 10%				$229,850
Contingency, 20%				$459,700
Alt. NS3.2 Total:				**$3,332,825**
Alt. NS3.3 Constr. Subtotal				**$2,468,500**
Engineering, 10%				$246,850
Administration, 5%				$123,425
Construction Mgt., 10%				$246,850
Contingency, 20%				$493,700
Alt. NS3.3 Total:				**$3,579,325**

[1]See Table C-8.

[2]Based on $25,000/acre land cost at Mill site.

№ 4963

CERTIFICATION OF PAYMENT OF DEVELOPER FEES FOR SCHOOL FACILITIES

THIS IS TO CERTIFY THAT THE MADERA UNIFIED SCHOOL DISTRICT HAS RECEIVED PAYMENT FOR THE CONSTRUCTION INDICATED BELOW:

PERMIT # 40601

1. ( ) **RESIDENTIAL:**
   (a) Name of Developer/Builder: Alejandro Ochoa
   Address: 28101 Ave 13 1/2
   Madera
   Phone Number: 661-0393
   Contractor's License No: [redacted]
   (b) Location: Subdivision:
   Block # ____ Lot # ____
   APN # 034-140-020
   Address: 28693 Ave 13½
   (c) Sq. Footage (habitable): 1344 sq. ft.
   X $ 1.93 per sq. ft. = $ 2593.92

2. ( ) **COMMERCIAL/INDUSTRIAL:**
   (a) Name of Developer/Builder:
   Address:
   Phone Number:
   Contractor's License No:
   (b) Location: Subdivision:
   Block # ____ Lot # ____
   Address:
   (c) Sq. Footage: sq. ft.
   X $____ per sq. ft. = $

3. **CALCULATION OF PAYMENT DUE:**
   (a) Amount in 1(c) $ 2593.92
   (b) Amount in 2(c) $
   (c) Total, 3(a) & 3(b) $ 2593.92

4. **METHOD OF PAYMENT:**
   (a) (✓) [redacted] $ 2593.92
   (b) ( ) Certified Check No.
   (c) ( ) Cashier's Check No.
   (d) ( ) Money Order No.

Dated: 11/2/98

MUSD Business Official

Original - MUSD Business Office
Yellow - MUSD Business Office
Pink - Permit Office(City/County)
Goldenrod- Builder/Developer

FaCm #84
1/[illegible]97

MADERA COUNTY
DEPARTMENT OF ENGINEERING AND GENERAL SERVICES
DIVISION OF BUILDING AND SAFETY

PERMIT TO ACTIVATE TEMPORARY POWER

58-02

Alejandro Ochoa
Name of Party to Refund To

MINIMUM DEPOSIT REQUIRED $500.00

28671 Ave 13 1/2 - Madera, 93638
Mailing Address, City & Zip

The deposit shall be refunded at the time a final inspection has been made and a certificate of occupancy issued for the building provided all conditions of approval for temporary power have been complied with.

[redacted] Ave 13 1/2
Building Address

Receipt Number: 247332

[redacted]
Permit Number

#11289

[V] OK TO REFUND DEPOSIT By: DD

[ ] FORFEIT DEPOSIT By: _____

Occupancy of the building is not permitted until a certificate of occupancy has been issued. If the building is occupied prior to issuance of a certificate of occupancy, or if the building permit becomes void, the deposit is forfeited. Anyone selling, leasing, or transferring a residential dwelling before a certificate of occupancy is issued and who represents that said dwelling is ready for occupancy shall be deemed in violation of the Madera County Code and subject to the penalties therein.

ALEJANDRO OCHOA | Alejandro Ochoa | K Lund | 9-12-01
Print Applicant's Name | Applicants Signature | Issued By | Date

1/99

#C-11225

REQUEST FOR AUDITOR'S WARRANT
COUNTY OF MADERA, STATE OF CALIFORNIA

ENGINEERING AND GENERAL SERVICES TO 20280 WARRANT NO. _____

THE AUDITOR OF MADERA COUNTY
IS HEREBY DIRECTED TO DRAW A WARRANT FOR: 58210-701000

FIVE HUNDRED TWELVE DOLLARS AND FORTY CENTS ---------- $512.40

TO THE ORDER OF Alejandro Ochoa

ADDRESS: 28671 Ave 13½, Madera, Ca 93638

FOR REFUND OF CASH XX RELOCATION CASH BOND _____ FORFEIT _____ PRINCIPLE: 500.00
INTEREST: 12.40
512.40

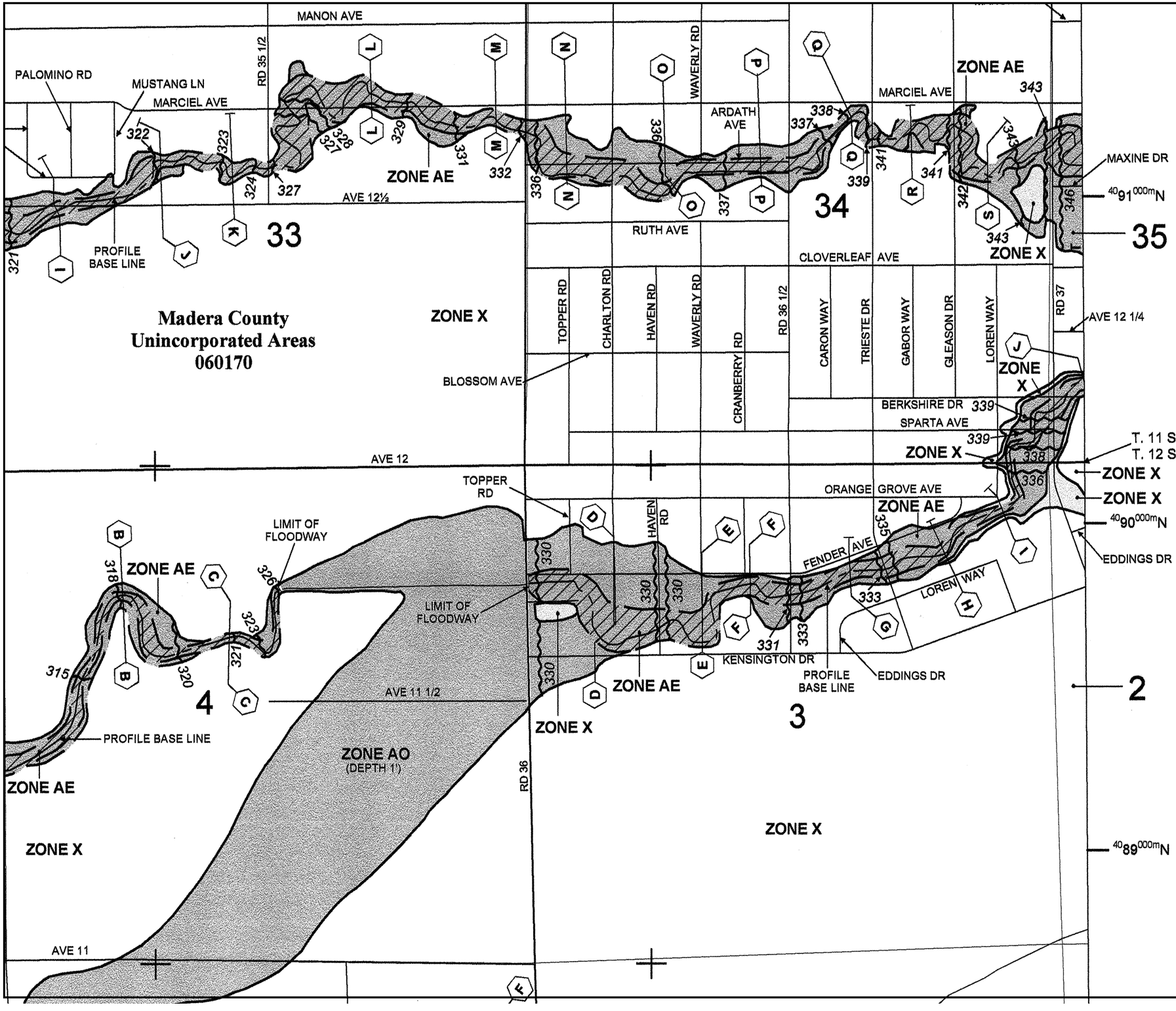
DEPOSIT RECEIPT NO 11289 DATED 9-12-01

OFFICIAL RECEIPT NO 247332 DATED 9-12-01

JOB ADDRESS: 28693 Ave 13½

BUILDING PERMIT NO 40601

Lori Lyman
AUTHORIZED SIGNATURE



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

0 300 600 METE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1195E

FIRM

FLOOD INSURANCE RATE MAP

MADERA COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1195 OF 1385

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

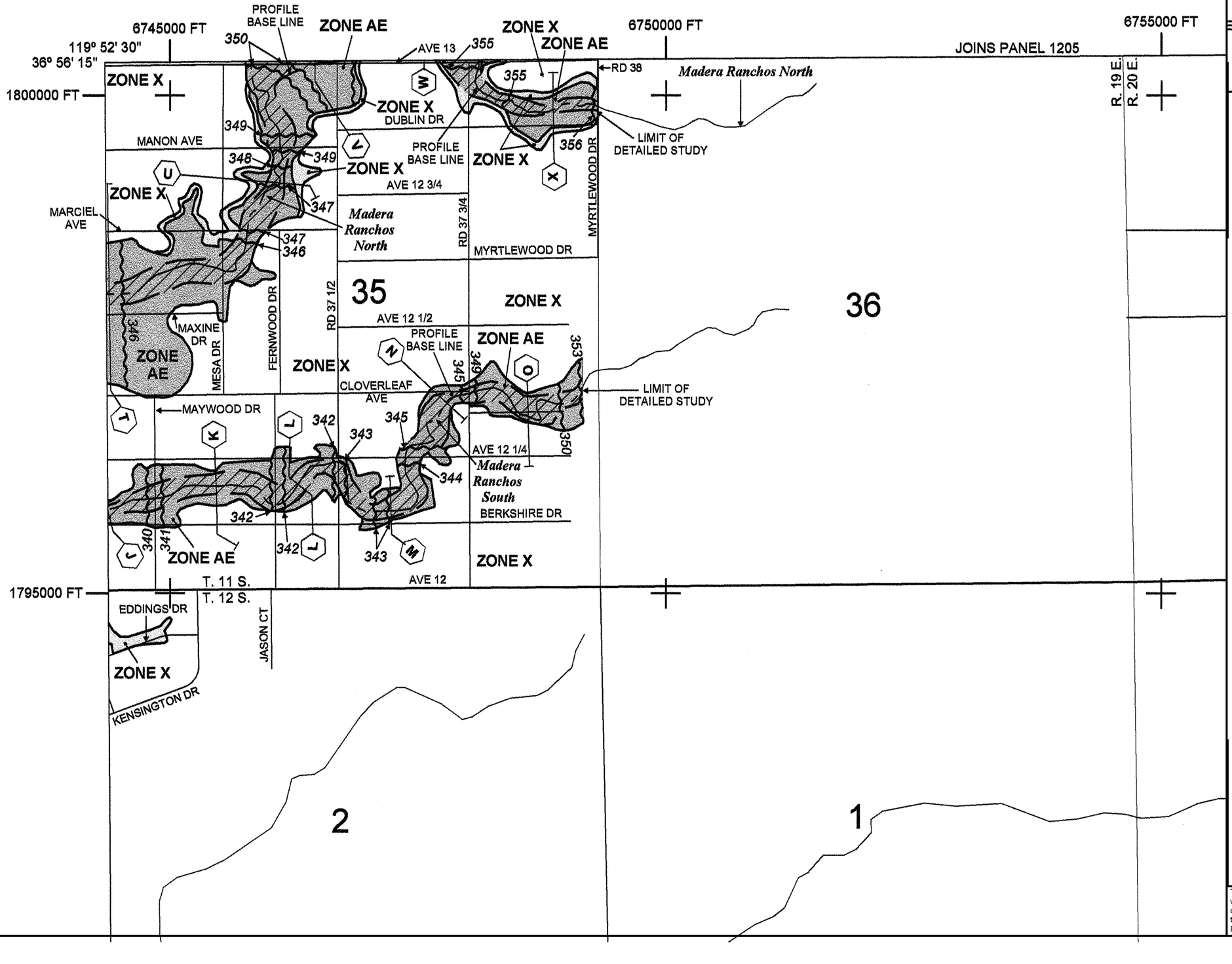
COMMUNITY	NUMBER	PANEL	SUFFIX
MADERA COUNTY	060170	1195	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
06039C1195E

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

0 300 600 METE

NFIP

PANEL 1215E

FIRM

FLOOD INSURANCE RATE MAP

MADERA COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1215 OF 1385

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MADERA COUNTY	060170	1215	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06039C1215E

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE STUDY

MADERA COUNTY, CALIFORNIA,
AND INCORPORATED AREAS

Community Name	Community Number
CHOWCHILLA, CITY OF	060171
MADERA, CITY OF	060172
MADERA COUNTY (UNINCORPORATED AREAS)	060170

Proof Copy

SEPTEMBER 26, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
06039CV000A

TABLE OF CONTENTS (Continued)

Page

TABLES

EXHIBITS

For the fourth revision local officials and the affected communities were informed of the restudy during discussions regarding the previous study conducted from Friant Dam to California State Highway 99 (Reference 4). Public notices were published in the Fresno Bee on December 10, 1999 (Reference 7).

For this countywide revision, an initial CCO meeting took place on May 5, 2006. A final CCO meeting was held on September 20, 2007, and was attended by representatives of the community and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Madera County, California.

All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Published Separately).

Table 2 – Flooding Sources Studied by Detailed Methods

China Creek	Oak Creek
Cottonwood Creek	Oak Creek Tributary
Dry Creek	Root Creek
Fresno River (Upstream of State Highway 99)	San Joaquin River
Fresno River (Upstream of State Highway 41)	San Joaquin River (Upstream of State Highway 145)
	San Joaquin River (Upstream of State Highway 99)
Madera Ranchos North	Schmidt Creek
Madera Ranchos South	Schmidt Creek Tributary

The western portions of Cottonwood Creek, Dry Creek, and Schmidt Creek were studied using the procedure for shallow flooding.

Approximate methods were used to study the flood hazard that would result from the failure of the levees on Chowchilla Canal/East Side Bypass, Fresno and San Joaquin Rivers, Ash and Berenda Sloughs, Buttonwillow Drain, and Columbia

Table 4 – Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
CHINA CREEK					
At confluence with Fresno River	10.50	N/A	N/A	1,870	N/A
At confluence with a tributary approximately 420 ft upstream of Road 425B	9.60	N/A	N/A	1,680	N/A
COTTONWOOD CREEK					
Approximately 1,000 feet downstream of AT&SF Railroad	85.16	1,880	3,850	4,810	6,670
Approximately 2,000 feet upstream of County Road 28	[1]	2,020	3,100	3,100	3,100
DRY CREEK					
At a point upstream of AT&SF Railroad	42.70	1,090	2,260	2,830	3,950
FRESNO RIVER					
Approximately 10,000 feet downstream of Highway 99	290.90	5,400	5,800	5,900	11,500
Southern Pacific Railroad	290.60	5,400	5,700	5,800	12,500[2]
Main Canal Diversion Weir	287.90	5,400	5,700	5,800	29,000
Madera Canal Crossing	271.30	5,000	5,000	5,000	35,000
At Highway 41	49.90	N/A	N/A	9,630	N/A
Upstream of confluence with China Creek	39.65	N/A	N/A	7,850	N/A
MADERA RANCHOS NORTH					
At AT&SF Railroad	5.60	390	790	940	1,250
At County Road 33.5	4.48	360	710	850	1,130
At County Road 35	1.36	140	260	310	470
MADERA RANCHOS SOUTH					
At railroad	7.54	300	630	770	1,020
At County Road 36	4.93	250	440	520	700
At confluence with a tributary approximately 1,400 feet downstream of Road 428	3.00	N/A	N/A	660	N/A

[1]Data not available

[2]Flood flow discharge in Fresno River reduced due to overland flow occurring above Tozer Street as shown on the FIRM

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Madera Ranchos South								
A	15,930	142	363	2.1	310.5	310.5	311.2	0.7
B	18,430	40	130	5.9	318.1	318.1	318.8	0.7
C	19,930	42	108	7.1	320.9	320.9	321.7	0.8
D	24,880	449	2,025	0.3	330.0	330.0	331.0	1.0
E	26,130	367	1,419	0.4	330.1	330.1	331.0	0.9
F	27,130	205	521	1.0	330.4	330.4	331.2	0.8
G	28,230	195	610	0.9	332.7	332.7	333.5	0.8
H	29,230	149	821	0.6	335.5	335.5	336.3	0.8
I	30,030	120	447	1.2	335.5	335.5	336.3	0.8
J	31,980	145	530	1.0	339.7	339.7	340.5	0.8
K	33,130	180	933	0.6	341.4	341.4	342.2	0.8
L	34,080	210	876	0.6	342.3	342.3	343.1	0.8
M	35,630	205	435	1.2	343.2	343.2	344.1	0.9
N	37,330	220	529	1.0	345.0	345.0	345.7	0.7
O	38,350	238	713	0.7	349.3	349.3	350.3	1.0

[1]Feet upstream of Atchison, Topeka, and Santa Fe Railway

TABLE 7

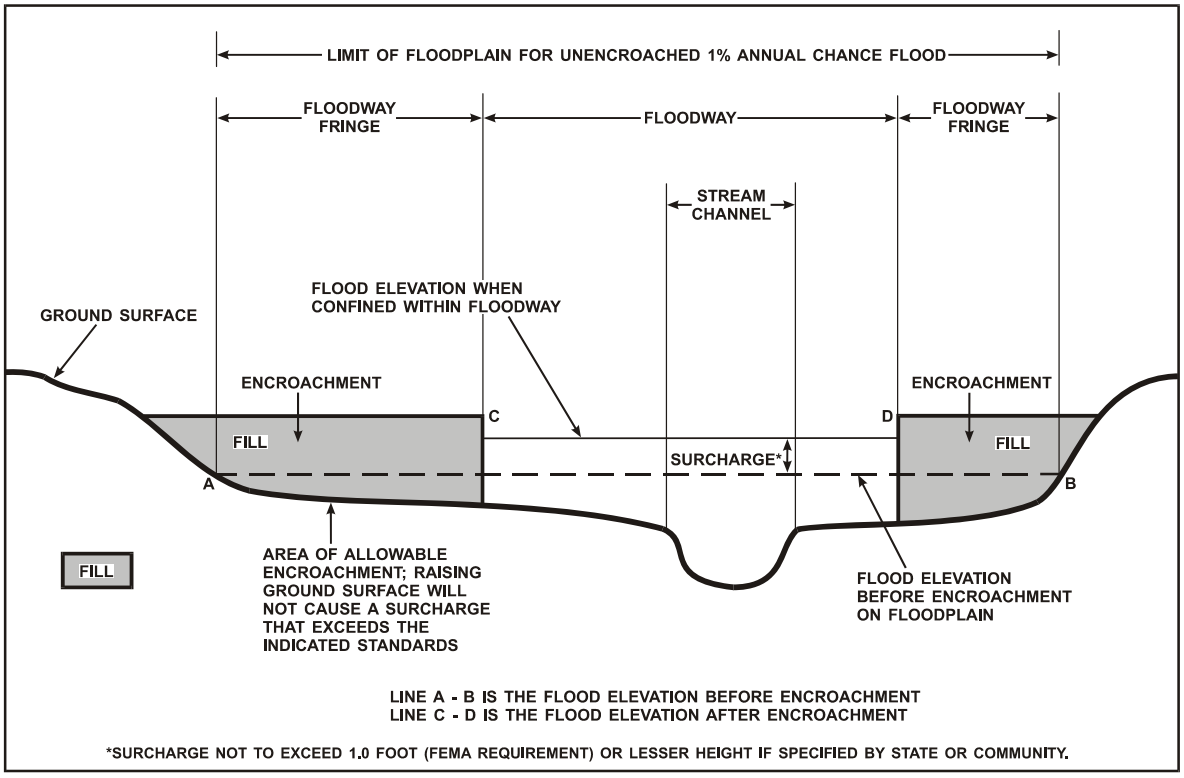
FEDERAL EMERGENCY MANAGEMENT AGENCY

MADERA COUNTY, CA AND INCORPORATED AREAS

FLOODWAY DATA

MADERA RANCHOS SOUTH

Figure 1 – Floodway Schematic



5.0 INSURANCE APPLICATIONS

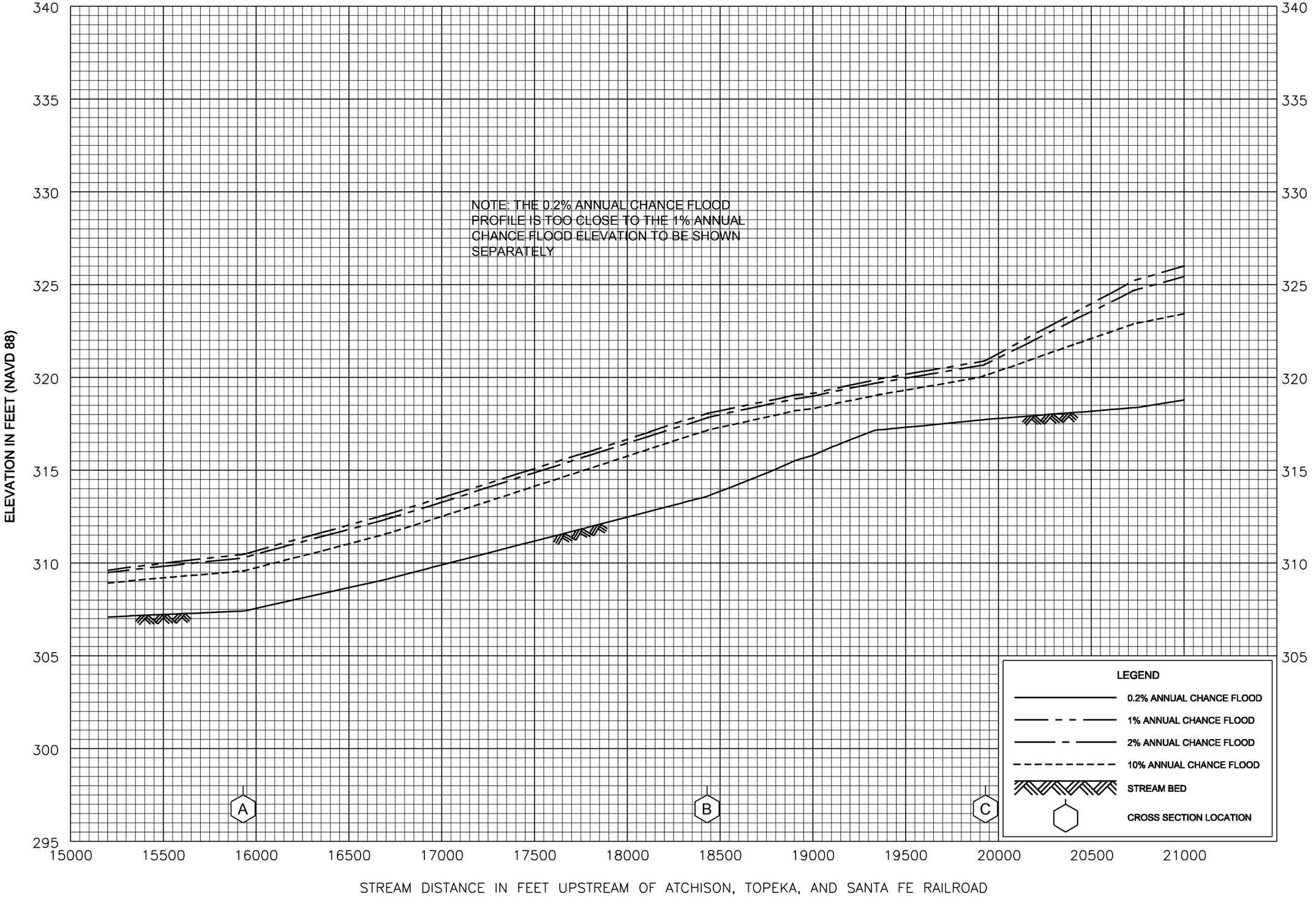
For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent annual-chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent annual-chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

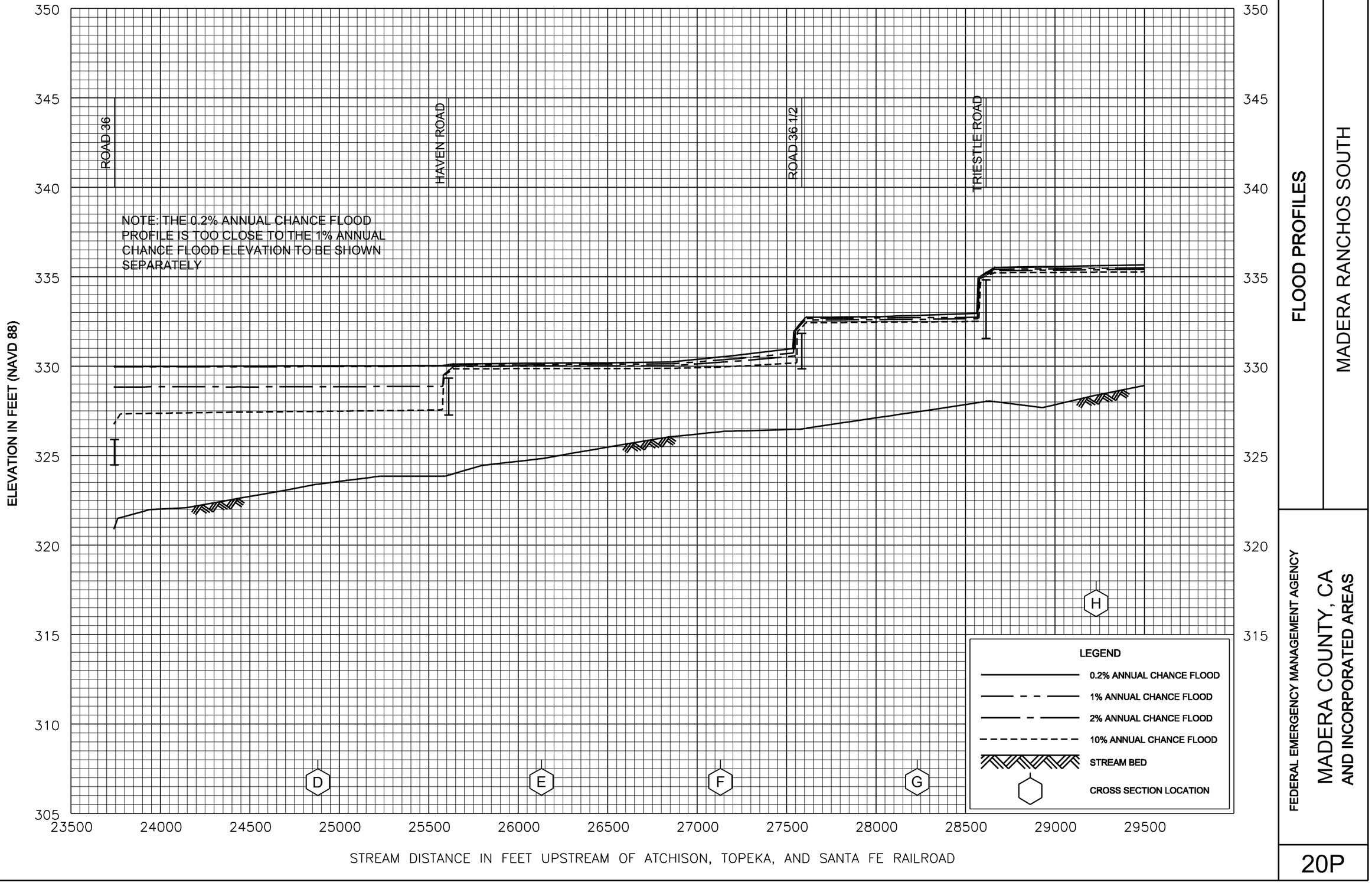


FLOOD PROFILES

MADERA RANCHOS SOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MADERA COUNTY, CA
AND INCORPORATED AREAS

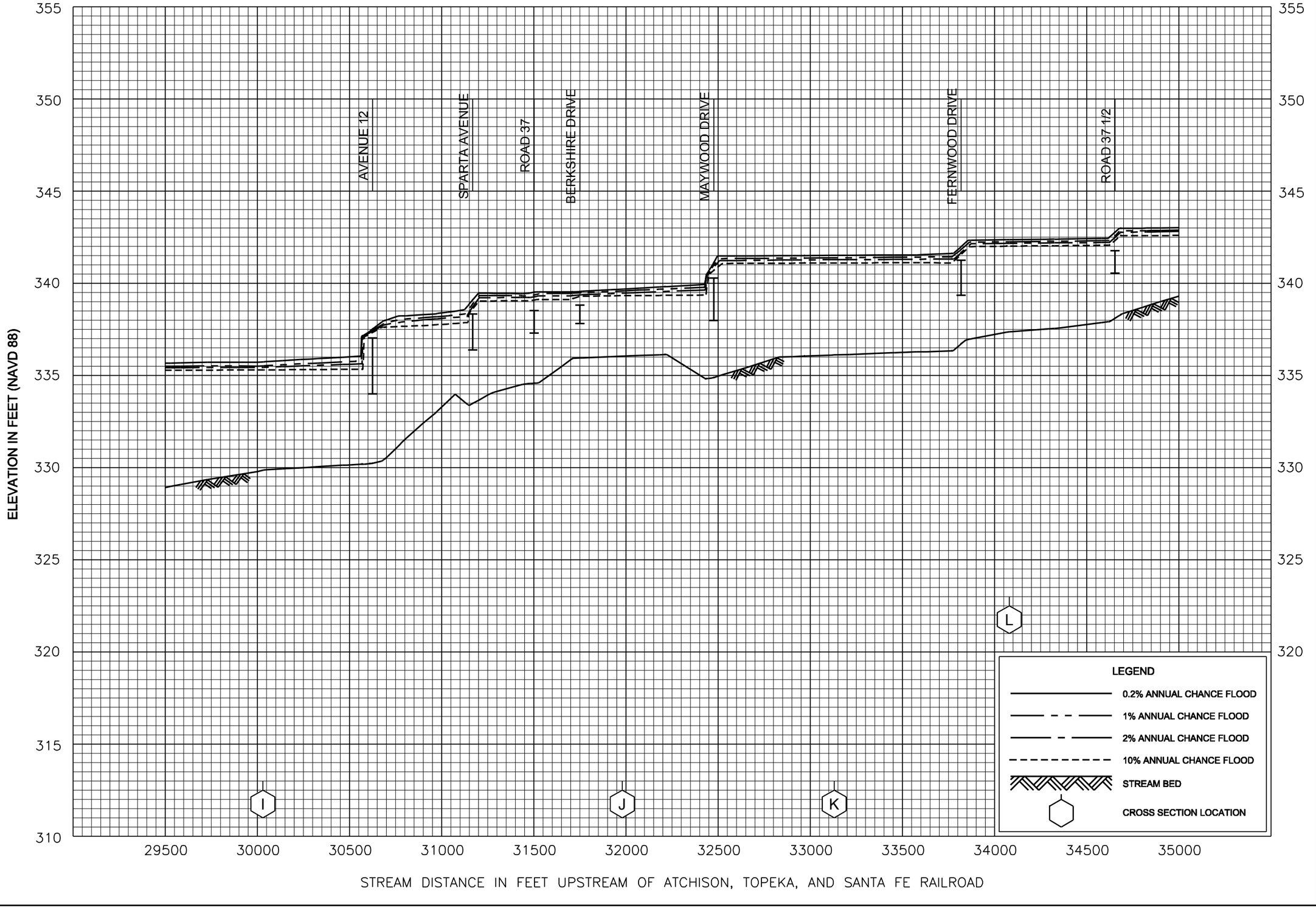


FLOOD PROFILES

MADERA RANCHOS SOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MADERA COUNTY, CA
AND INCORPORATED AREAS



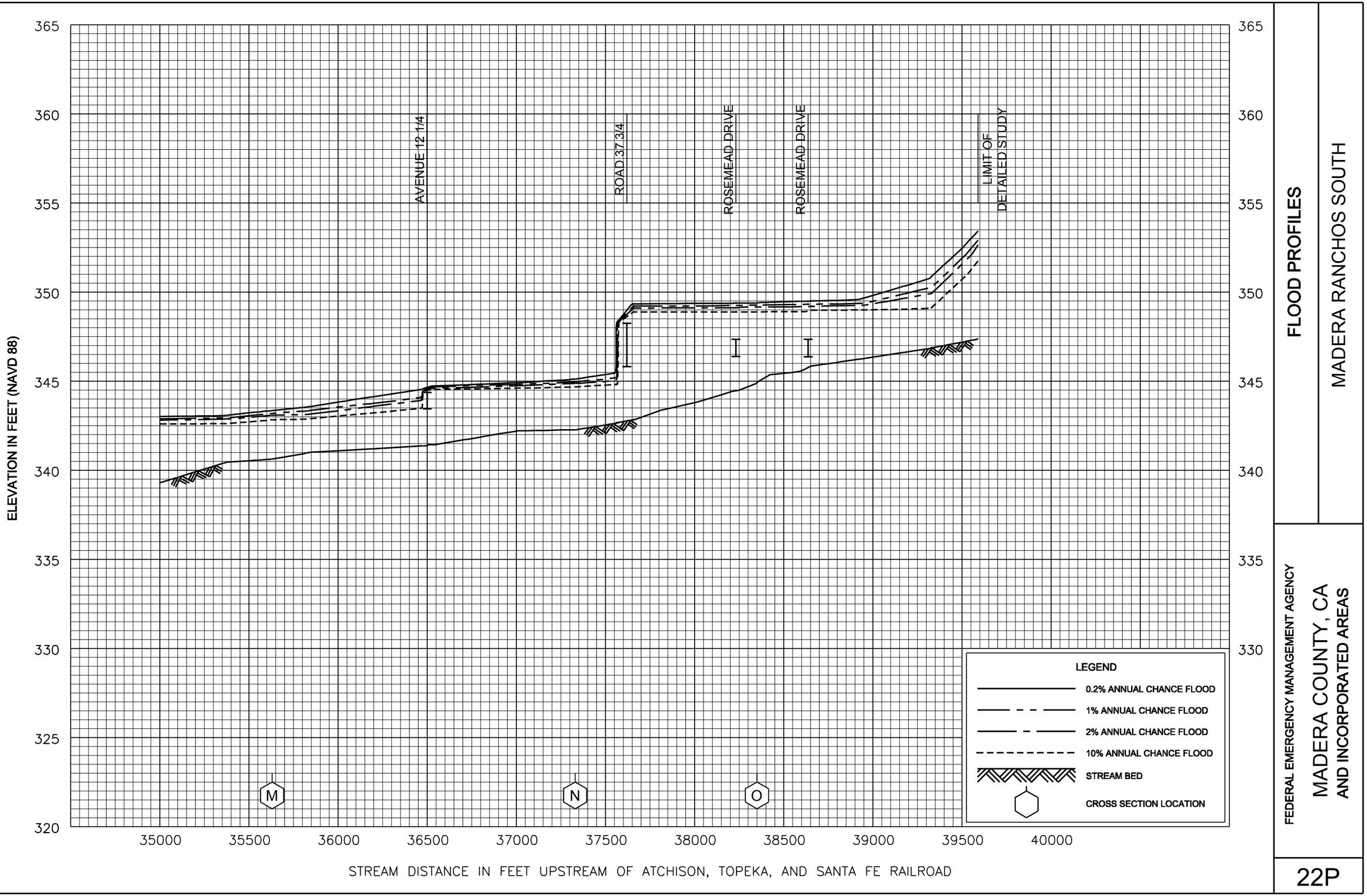
FLOOD PROFILES

MADERA RANCHOS SOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MADERA COUNTY, CA
AND INCORPORATED AREAS

21P



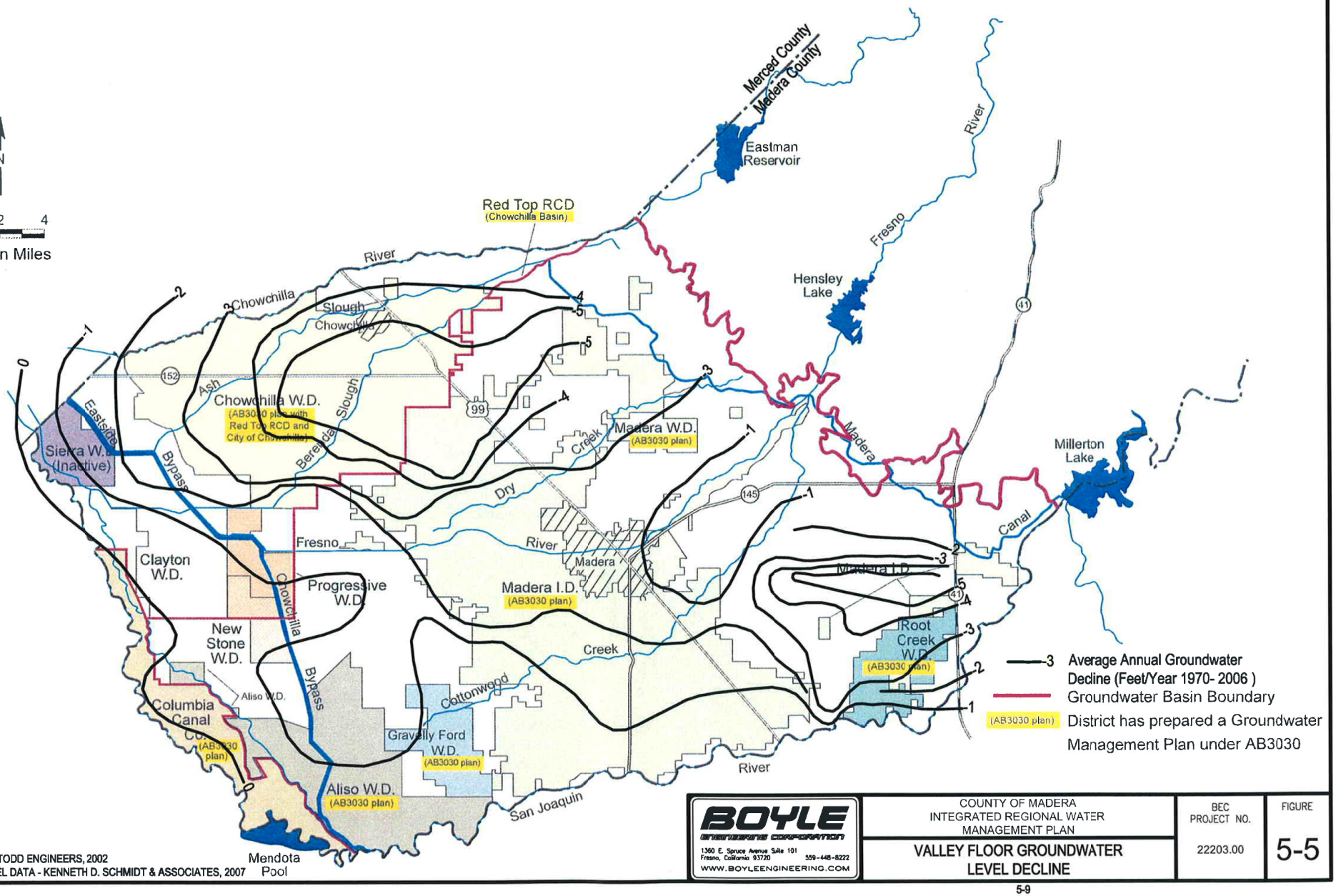
FLOOD PROFILES

MADERA RANCHOS SOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MADERA COUNTY, CA
AND INCORPORATED AREAS

22P



SOURCE:
BASE MAP - TODD ENGINEERS, 2002
WATER LEVEL DATA - KENNETH D. SCHMIDT & ASSOCIATES, 2007

BOYLE ENGINEERING CORPORATION
1360 E. Spruce Avenue Suite 101
Fresno, California 93720 559-448-8222
WWW.BOYLEENGINEERING.COM

COUNTY OF MADERA
INTEGRATED REGIONAL WATER MANAGEMENT PLAN

VALLEY FLOOR GROUNDWATER LEVEL DECLINE

BEC PROJECT NO. 22203.00

FIGURE 5-5

DWG: V:\Madera, County of\22203.00 IRWMP\CAD\FIGURES\Chapter 5\FIG 5-5.dwg USER: drodriguez
DATE: Apr 02, 2008 11:07am XREFS: G-BD11x17h IMAGES: Mad-Co.jpg
BECtogerFR

BOARD OF SUPERVISORS
COUNTY OF MADERA

MADERA COUNTY GOVERNMENT CENTER
200 WEST FOURTH STREET / MADERA, CALIFORNIA 93637
(559) 675-7700 / FAX (559) 673-3302 / TDD (559) 675-8970
agendas available: www.madera-county.com/supervisors

TANNA G. BOYD, Chief Clerk of the Board

File No: 10249

Agreement No. 9105-C-2010

Date: April 27, 2010

In the Matter of CONSIDERATION OF ENTERING INTO MEMORANDUM OF UNDERSTANDING WITH LYNN BROCKMAN REVOCABLE TRUST, TO ACCEPT THE DONATION OF PROPERTY, ASSESSOR PARCEL NUMBER 049-650-017-000, TO DEVELOP A NEIGHBORHOOD RECREATIONAL AREA IN MADERA RANCHOS, RESOURCE MANAGEMENT AGENCY/ADMINISTRATION DEPARTMENT.

Upon motion of Supervisor Bigelow, seconded by Supervisor Dominici, it is ordered that the attached be and it is hereby adopted as shown, and the Chairman is authorized to execute said agreements. It is further ordered to name the park Brockman Park.

I hereby certify that the above order was adopted by the following vote, to wit:

AYES:	Supervisors Bigelow, Moss, Dominici, Rodriguez and Wheeler.
NOES:	None.
ABSTAIN:	None.
ABSENT:	None.

Distribution:

Lynn Brockman Revocable Living Trust
Granicus

ATTEST: TANNA G. BOYD, CLERK
BOARD OF SUPERVISORS

By Sarah R. Anderson
Deputy Clerk

SA

RESOURCE MANAGEMENT AGENCY
ADMINISTRATION

Ray Beach, Director

2037 W. Cleveland Avenue
Madera, CA 93637-8720
(559) 661-6333
FAX (559) 675-5203
rbeach@madera-county.com

DATE: April 27, 2010

TO: Board of Supervisors

FROM: Ray Beach
RMA Director

SUBJECT: **Approve the Memorandum of Understanding to accept the donation of property from the Lynn Brockman Revocable Trust – APN # 049-650-017-000 to develop a neighborhood recreational area in Madera Ranchos.**

RECOMMENDATION

It is recommended that the Board of Supervisors;

1. Approve the Memorandum of Understanding to accept the donation of property from the Lynn Brockman Revocable Trust – APN # 049-650-017-000 to develop a neighborhood recreational area in Madera Ranchos.
2. Authorize the Chairman of the Board to execute the Memorandum of Understanding to accept the donation of property from the Lynn Brockman Revocable Trust – APN # 049-650-017-000 to develop a neighborhood recreational area in Madera Ranchos.

SUMMARY

In 2004, Madera County was awarded funds through Proposition 40 to develop recreational venues throughout the County. Each district was provided funding to use in their area as they saw fit. To date projects using Prop 40 funding include Ahwahnee Hills Regional Park, the Fairmead Tot Lot, Fossil Discovery Center, and Rotary Park in the City of Madera.

In January 2010 the County was approached by Brock Moore of the Lynn Brockman Revocable trust to inquire about donating land to develop a recreational area on Avenue 12 and Road 38 in the Madera Ranchos neighborhood. Staff has worked with the family to develop a memorandum of understanding to establish terms for development of the donated area. Planned amenities include a ponding basin to address flooding issues during winter rains. The ponding basin will double as a soccer and baseball field during spring, summer, and fall months when the ponding basin is not needed. Restroom facilities will also be included in the initial design of the facility. The long term vision of the area includes recreational trails, a play area for children ages 3 – 12, and picnic areas.

The initial plan meets two key needs; that of recreational opportunities and flood control.

Staff is requesting that the Board of Supervisors approve the memorandum of understanding and allow the chairman of the board to execute the document to memorialize the terms of the donation.

FISCAL IMPACT

There is no fiscal impact associated with this request.

Attachments
Memorandum of Understanding
Alternative Park Plan One
Alternative Park Plan Two

MADERA COUNTY CONTRACT NO. 9105-C-2010
(Memorandum of Understanding – Development of Neighborhood Park)

THIS MEMORANDUM OF UNDERSTANDING is entered into this 27TH day of APRIL, 2010, by and between the COUNTY OF MADERA, a political subdivision of the State of California (hereinafter "COUNTY"), and the LYNN BROCKMAN REVOCABLE LIVING TRUST DATED JANUARY 6, 1995 (hereinafter "OWNER").

RECITALS

A. COUNTY desires to acquire real property to develop a neighborhood park and incidental storm water recharge area (PARK) in the general vicinity of Road 38 and Avenue 12 within Madera County.

B. OWNER owns certain real property located at the northeast corner of Road 38 and Avenue 12 within Madera County.

C. OWNER desires to conditionally grant to COUNTY at no cost to OWNER approximately five (5) acres of property to accommodate the COUNTY'S desire to build a park.

AGREEMENT

1. As a condition of the granting, OWNER requires that the PARK be designed, operated and maintained in a manner that does not degrade the value of OWNER's adjacent and surrounding properties. OWNER envisions that, among other things, the PARK have the following attributes:

1.01 be turfed with a row of perimeter trees along the eastern and Southern sides of the facility;

1.02 accommodate public passive and active recreation activities;

1.03 adequate permanent and securable lavatories;

1.04 adequate security lighting; and

1.05 be named the Ranchos Brockman Park or other name as may be mutually acceptable to the COUNTY and OWNER.

2. OWNER acknowledges funding for design, construction, and maintenance could be from various sources. Regardless of funding sources, COUNTY acknowledges and accepts all responsibility for PARK design, maintenance and operational matters.

3. OWNER acknowledges COUNTY intends to design and install PARK improvements in phases. COUNTY will reasonably pursue design and construction of said improvements as will be further refined based on the conceptual park plan prepared by Dirk Poeschel Land Development Services Inc. which is enclosed hereto.

4. COUNTY will pay for all title, recordation, fees, surveys, studies, permits, applications of any kind for the PROPERTY and the PARK. Any such studies and/or evaluations shall be provided OWNER at no expense to OWNER.

5. OWNER grants to COUNTY the PROPERTY in an "AS IS" condition subject to the terms set forth in this Agreement. COUNTY intends to accept the PROPERTY subject to appropriate disclosure, investigations, and a reasonable time to assure the PROPERTY will meet COUNTY purposes.

6. COUNTY will indemnify, hold harmless and defend OWNER from all liabilities and claims associated with the activities to acquire, design, permit, maintain and/or provide security to the PROPERTY and PARK.

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IN WITNESS WHEREOF, the foregoing MOU is executed on the day and year first written above.

COUNTY OF MADERA

Chairman, Board of Supervisors

ATTEST:

Clerk, Board of Supervisors

LYNN BROCKMAN REVOCABLE LIVING TRUST DATED JANUARY 6, 1995

LYNN BROCKMAN REVOCABLE LIVING TRUST DATED JAN 6, 1995

By: _____

Title: TRUSTEE

_____ _____

Taxpayer Identification Number

Approved as to Legal Form:
COUNTY COUNSEL

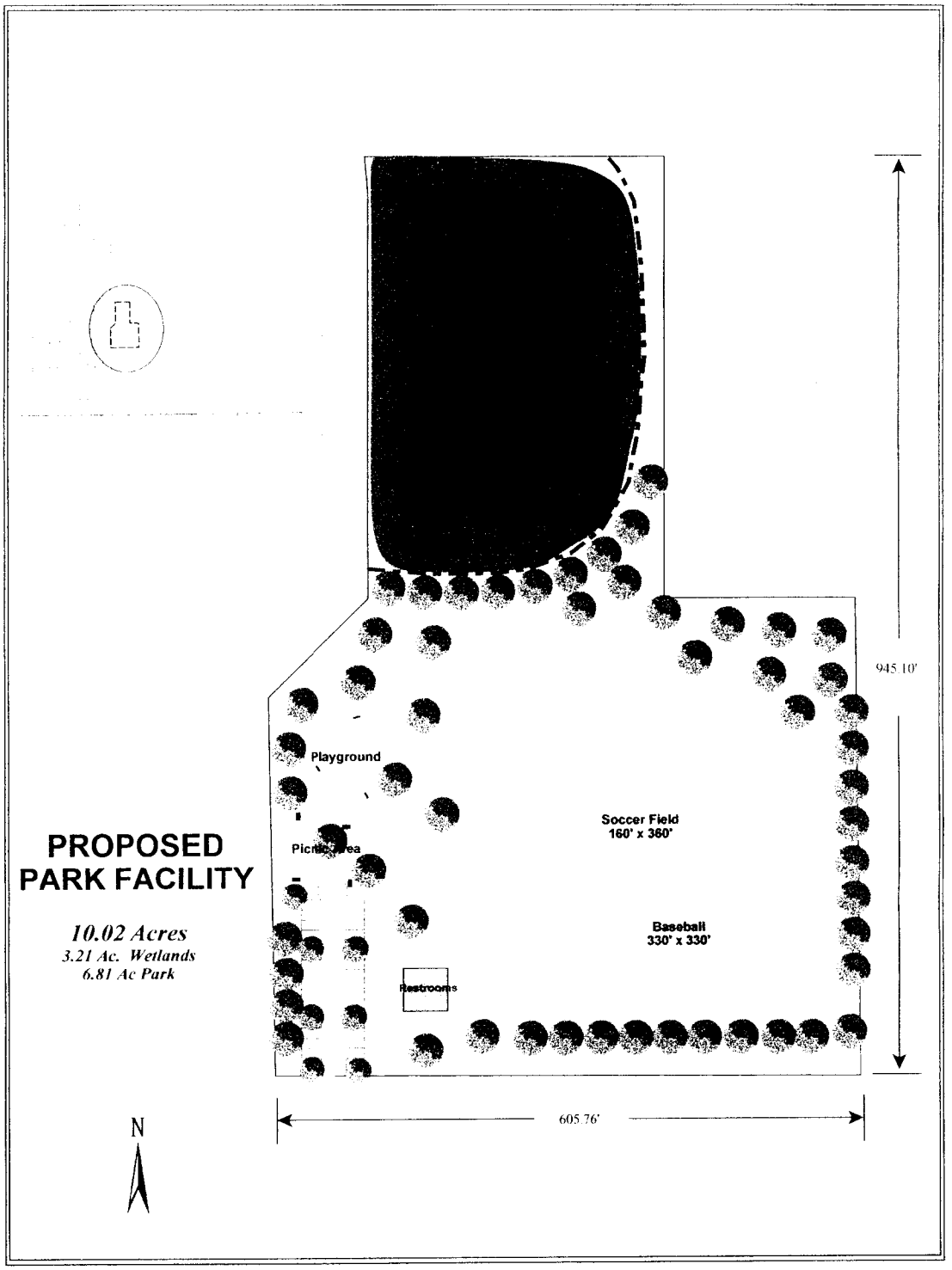
By: _____

ACCOUNT NUMBER(S):

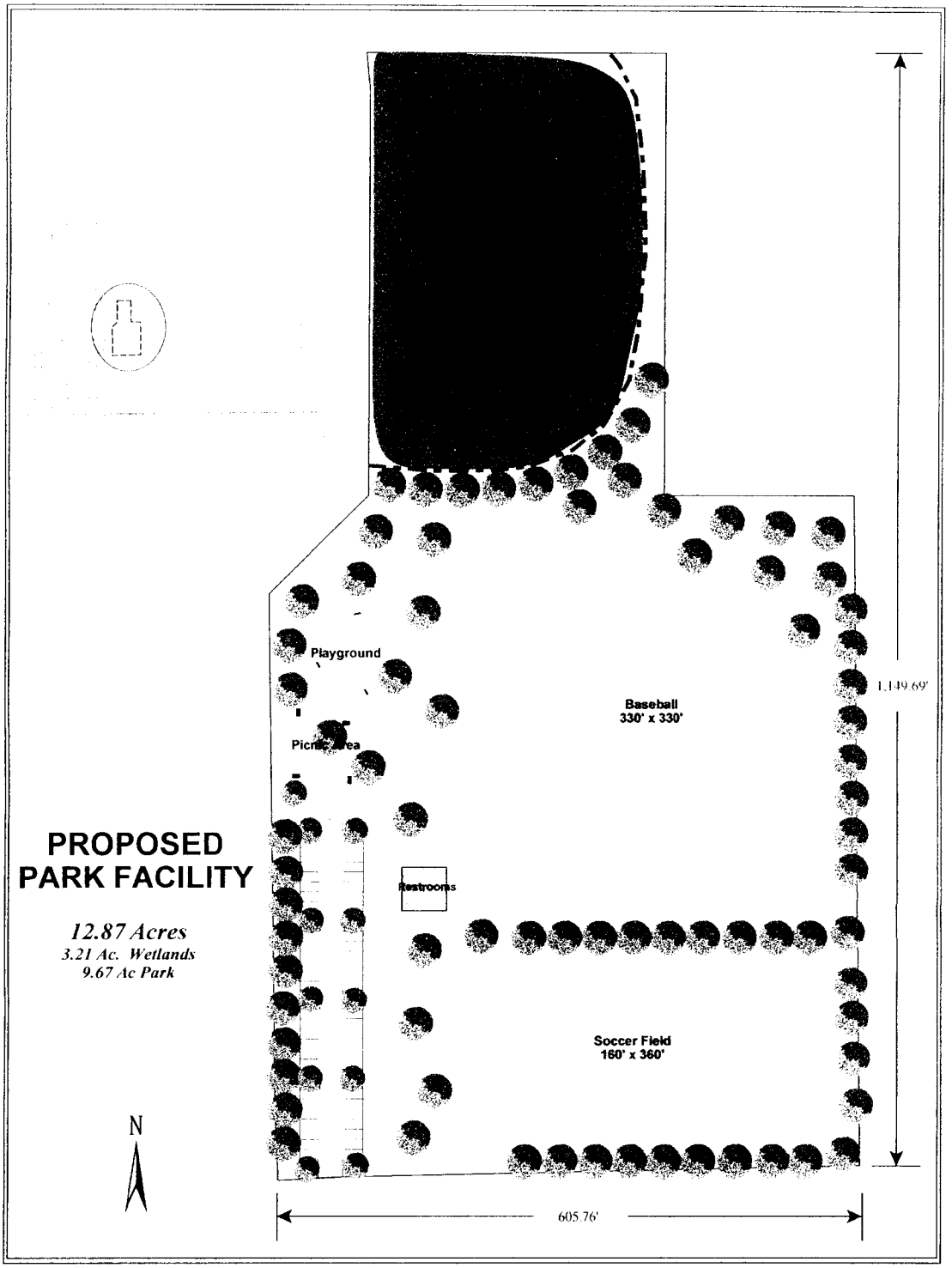
N/A

_____

_____



Alternative One
10.02 Acres



Alternative Two
12.87 Acres

MADERA IRRIGATION DISTRICT
12152 ROAD 28¼ ▪ MADERA ▪ CA 93637-9199
(559) 673-3514 ▪ FAX (559) 673-0564

March 27, 2013

Via Email & US Mail

Kheng Vang
Madera County Engineer
2037 W Cleveland
Madera Ca. 93637

RE: Brockman Flood Control Basin

Dear Mr. Vang:

Madera Irrigation District (MID) is in support of the Brockman Flood Basin project. This project is adjacent to the 6.2 Canal used and maintained by MID to convey water from the Friant Dam to MID's water users. The canal has an existing 24-inch diameter inlet that allows flood waters to be diverted to the canal and over the years has alleviated some localized flooding problems. This proposed project would allow MID and the County to further expand their partnership though the use of the facility by storing more flood waters and controlling the release, as well as diverting waters to the basin for beneficial use. Both years of drought and years of excess flooding have been difficult for Madera County property owners. Anything that can be done to buffer the two extremes and conserve our resources, which are benefits that this project will provide, is a high priority for MID.

Regards,

Thomas Greci, P.E.
General Manager