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Nipomo Waterline Intertie Project

Preliminary Engineering Memorandum

Volume 1 of 2

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EXECUTIVE SUMMARY

Project Need

The Nipomo Community Services District (District) currently provides water and other services to approximately 12,000 people. The current source of water is groundwater pumped from the Nipomo Mesa Management Area (NMMA) of the Santa Maria Groundwater Basin, an aquifer that has been the subject of ongoing litigation since 1997. Due to the diminishing source and competing claims, the California State Superior Court of Santa Clara County approved a Settlement Stipulation on August 3, 2005 containing a requirement that the District import a minimum of 2,500 acre-feet of supplemental water to the NMMA each year.

The District has studied several supplemental water alternatives and as a result, signed a Memorandum of Understanding (MOU) with the City of Santa Maria (the City) to pursue the Waterline Intertie Project. The 2005 MOU established a basis for purchase and delivery of water from the City to the District and through the District to neighboring water companies.

Memorandum Objectives

This report provides a preliminary engineering hydraulic analysis of both the City's and the District's distribution systems, examines water quality and disinfection alternatives, evaluates pipeline alignments, pumping, and storage options, identifies a preferred project alternative, and provides a preliminary opinion of probable construction cost. Advantages, disadvantages, constraints and requirements are identified for each project component.

Hydraulic Analysis

The hydraulic analysis for the District's water distribution system was performed using the District's water system model as updated for the 2007 Master Plan. Improvements necessary to utilize the point-of-connection (POC) at Orchard and Southland were identified. A minimum delivery pressure of 60-psi at the Santa Maria POC (Taylor and Blosser) was assumed based on analyses from Boyle and the City's Engineer (Carollo). Two supplemental water inflow rates were examined in detail: 1,860-gpm (Phase II), the maximum allowance from the City of Santa Maria per the 2005 MOU, and a mid-term flow rate of 1,300-gpm (Phase I). Results of the hydraulic modeling were evaluated by comparison to pressures in Area A, the southernmost region within the District's water system (Figure 3-3). Pressures in Area A range from 91- to 103-psi during existing demands. Supplemental inflow at the Nipomo POC (Orchard and Southland) increases these pressures. However, the modeling effort identified improvements in the NCSD system that will allow capacity for supplemental water.

NCSD Water System Upgrades

The impacts to individual users from high pressures in Area A can be mitigated with individual pressure regulators for each service connection. A pressure reducing station will also be needed for the homes in Maria Vista. The model indicated that two projects recommended in the 2007 Water Master Plan would assist in providing system capacity for the waterline intertie project: 1) Upgrade pipe along Southland St, and 2) upgrade pipe along Frontage Road to 12-inch from Southland to Tefft St. To match surrounding improvements and reduce bottlenecks, installing a 12-inch pipeline along Southland St, instead of the Master-planned 10-inch is recommended.

Two additional upgrades will be needed to allow capacity for Phase II, 1,860-gpm: 1) upgrade Orchard Rd. pipeline to 12-inch from Southland to Division St., and 2) upgrade 340-linear feet of 6-inch pipeline along Division St to 10-inch, to match the surrounding pipe system.

Pump Station No. 1

The project hydraulic profile was examined in detail (Figure 3-1). The City's hydraulic grade is higher than the anticipated tank heights for the WIP. Assuming a tank water elevation of 300-ft and the Western Alignment (Alignment 1, discussed in Section 5), a booster station on the south side of the River "Pump Station No.1 (PS#1)" will not be required for a flow rates up to 1,860-gpm, provided a minimum pressure of 60-psi at the Santa Maria POC. However, since pressure and/or flow conditions may change, provisions for PS#1 and land acquisition are recommended. Once the intertie is constructed, monitoring to assess future need for the pump station is recommended.

Pump Station No. 2

A booster station on the north (Nipomo) side of the River, "Pump Station No. 2 (PS#2)," will be required to pump water from WIP storage to the NCSD distribution system. Assuming the project configuration as shown in Figure 3-1 (with a buried storage tank and PS#2 at an elevation of 295-ft), Boyle recommends four 75-hp pumps with any three capable of pumping 1,860-gpm at 325-feet of head for Phase II. The pump station should be designed to accommodate the four pumps. However, for Phase I we recommend three 75-hp pumps with any two capable of pumping 1,300-gpm at 300-ft of head.

Storage Options

Reservoir storage may be required at the PS #2 location. The recommended size for the reservoir is 500,000 gallons (Section 3). Costs of prestressed concrete and welded steel reservoirs under various configurations (Section 7) were evaluated. In addition to various reservoir size options, three general reservoir profiles were considered: reservoirs built at grade, reservoirs half-buried, and reservoirs fully buried.

If installation of PS #1 is deferred, buried storage is recommended to lower the hydraulic pressure required to deliver water to storage. Welded steel is not recommended for buried applications. Therefore, a 500,000-gallon buried, pre-stressed concrete tank is recommended for the project. If a minimum pressure above 60-psi is guaranteed in the revised agreement between the City and District, buried storage may not be required and above-ground concrete or welded steel tanks may be acceptable.

Water Quality and Disinfection

A detailed evaluation of water quality and disinfection issues the District faces by introducing water from Santa Maria is included as Appendix V. Key issues that must be addressed include disinfectant type, water age, fluoridation, water quality, and compliance issues. Disinfection alternatives, as discussed in Section 4, consist of uncontrolled blending with NCSD water without changes in treatment process, converting City water disinfection to free chlorine residual, and converting NCSD groundwater disinfection to chloramine residual.

Alternative Alignments

The Draft EIR presented three alternative methods for traversing the Santa Maria River with the proposed NCSD Waterline Intertie. Two of these alternatives involved directional drilling. The third alternative involved attaching the pipeline to the existing 2,100-foot Highway 101 Bridge spanning the river. Four routes were considered for this study, as shown on Plate 1.

Section 5 of this report comparatively analyzes the apparent constructability, geotechnical considerations, pipe size and length, existing utilities, easements and right-of-way, and environmental considerations. An overall qualitative ranking showed three of the four alignments are equally preferred at this stage (Alignments 1, 2A, and 3). However, the geotechnical considerations ranking associated with Alignment 1 could be increased by completion of a design-level soils investigation to reduce uncertainty in the soil profile along the proposed HDD route. This would result in Alignment 1 becoming the lead ranking alternative according to this evaluation. The relative costs of each are addressed in Section 13 and summarized below.

While the HDD alignment has been concluded as feasible by Jacobs Associates (Appendix I), the specifics of the HDD should be evaluated in detail early during the design phase. It is especially important to prepare a specific evaluation of the soils and the soils suitability for HDD along the proposed alignment.

Santa Maria System Upgrades

The City has indicated it will not allow the proposed project to reduce water pressure along the northernmost City boundary. The City of Santa Maria has requested the NCSD construct a dedicated 18-inch water main along North Blosser Road between Taylor Street and Atlantic Place, approximately 5,000 linear feet. This transmission main will be an extension of the existing 24-inch water main located at Taylor and Blosser (Figures 6-1 and 6-2).

Reservoir and Pump Station Sites

Three potential sites are proposed for the reservoir and Pump Station No. 2 (PS #2) to the north of the Santa Maria River, and two potential sites for Pump Station No. 1 (PS #1), south of the River. Site details are discussed in Section 8. A visual impact study was performed by FIRMA as part of the Draft preliminary engineering effort in 2006. The report is included as Appendix VI.

Property, Permitting, and Environmental Considerations

Property issues regarding easements, right-of-way, and acquisition are discussed in Section 9. Permitting and environmental considerations are included in Section 10.

Preferred Alternatives

The preferred alternatives and cost comparison are presented in Section 13 and summarized as follows. Project components include those required for Phase II, providing capacity for up to 1,860-gpm of supplemental water.

Project Component:	Project Scenarios		
Alignment	Alignment No. 1 – Western River Crossing (HDD)	Alignment No. 2B – Eastern River Crossing along Old State HWY (open trench)	Alignment No. 3 – HWY 101 Bridge Crossing
Santa Maria Pipe Upgrades	18-inch pipeline on Blosser (5000 LF) and flow metering facility		
Pump Station No. 2	Four 75-hp Pumps		
Reservoirs	One 0.5 MG buried concrete reservoir		
Master-Planned NCSD Water system Improvements	Upgrade Southland to 10-inch Upgrade Frontage Rd to 12-inch (Southland to Tefft)		
Additional NCSD Water System Improvements	12-inch pipeline on Orchard (3,200-LF), 10-inch pipeline on Division (340-LF), upgrade Southland from MP 10-inch to 12-inch, Maria Vista PRV Station, pressure regulators on 200 homes (Area A)		
Disinfection	Chloramination booster at PS#2 and 5 Wellhead systems		

Cost Comparison

The estimated capital project costs for the three preferred project scenarios (described above) are detailed in Appendix XII. The estimated capital project costs are as follows:

- Alignment 1 (Western River Crossing, HDD): $18.2 Million
- Alignment 2B (Eastern River Crossing at Old State Hwy, open trench): $16.7 Million[1]
- Alignment 3 (Highway 101 Bridge Crossing): $21.2 Million

Master planned improvements, necessary for capacity in the Nipomo system, are an additional estimated $1.7 Million in capital costs. The incremental cost to upgrade the Southland pipeline to a 12-inch is included in the comparative project cost estimates above. The annual operation and maintenance cost is estimated to be approximately $229,000 (for any of above alternatives).

Future 6,300-afy Scenario

A future delivery scenario based on the District's Water and Sewer Master Plan predicted future demand of 6,300-afy was investigated (Section 12). Important assumptions were made regarding delivery flow rates, future demands and demand patterns, and available storage.

To utilize 6,300-afy, the distribution system must have the ability to deliver an instantaneous flow rate of 5,570-gpm. The following steps would be required:

- Replace Blosser Extension with a 24-inch main, or install a parallel 18-inch main
- Install (4) 250-hp pumps at PS#2 each rated at 2,000-gpm at 325-ft head, with any 3 to meet demand
- Install 27,000 linear feet of 24-inch dedicated main from PS#2 to the Quad Tanks.

The estimated capital cost for the improvements described above is $15.9M in addition to the cost for Phases I and II of the 3000-AFY project.

[1] Feasibility of alternative is unlikely due to environmental constraints. See Section 10 for details.

Conclusions

Based on our analysis, discussions with District staff, input from City of Santa Maria staff, and direction from the District Board of Directors, we recommend the following:

1) Request minimum delivery pressure from City of Santa Maria at the Point of Connection in order to eliminate the need for Pump Station No. 1.

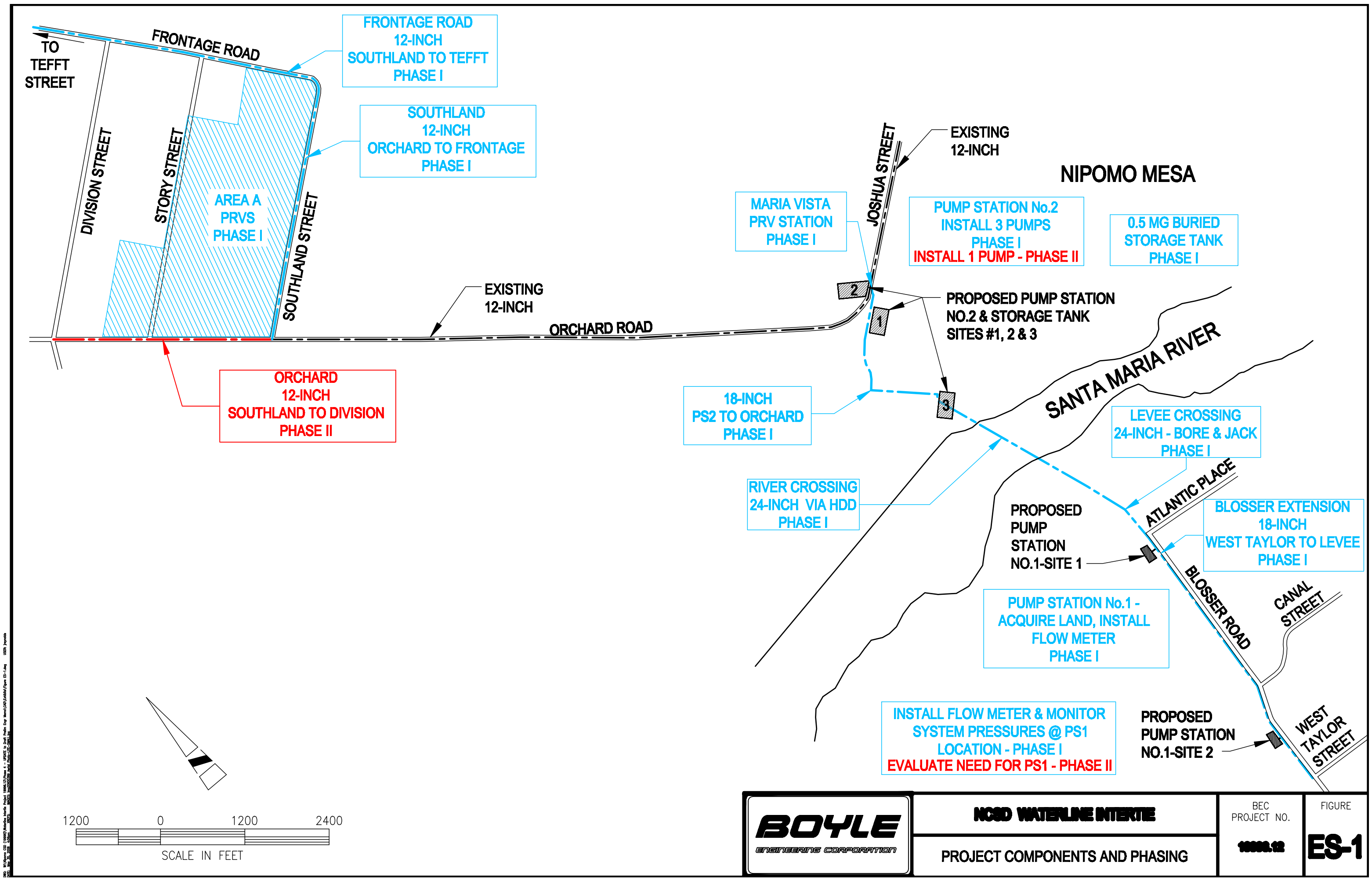
2) Evaluate design details of HDD and prepare a specific evaluation of soils and soil suitability for HDD along proposed alignment.

3) Develop the project in two phases (Figure ES-1) as follows (including Master Planned improvements):

   Phase I: Facilities and improvements recommended to provide capacity for 1,300-gpm of supplemental water.
   - NCSD System Improvements: Upgrade Southland waterline to 12-inch and Frontage Road to 12-inch from Southland to Tefft, and install pressure reducing valves on individual service connections in Area A. Convert disinfection systems at existing wells to chloramination to avoid water quality problems.
   - Waterline Intertie: Construct 18-inch Blosser Extension from Blosser and Taylor to Santa Maria River Crossing; 24-inch River Crossing via horizontal directional drilling along the Western Alignment (Alignment 1); 24-inch from River to storage tanks at Joshua and Orchard; 18-inch from tanks through PS#2, along Joshua to existing 12-inch water pipeline on Orchard.
   - Pump Station No. 1: Acquire land, install magnetic flow meter on Blosser Extension, and monitor pressures after start-up. Plan for potential future pump station.
   - Storage: Construct a 0.5-MG buried pre-stressed concrete tank at Joshua and Orchard and install a flow control valve on inflow pipeline. Acquire sufficient property to construct a second 0.5-MG reservoir for the future, if needed.
   - Pump Station No. 2: Install three pumps, any two capable of pumping 1,300-gpm in parallel operation. Install chloramine booster station.

   Phase II: Facilities and improvements recommended to provide capacity for 1,860-gpm of supplemental water.
   - NCSD Network Improvements: Upgrade Orchard waterline from Southland to Division to 12-inch, replace 6-inch section on Division Street waterline with 10-inch pipe to match adjacent pipeline (from Alegre to east of Meridian).
   - Pump Station No. 1: Monitor pressures and evaluate need for pump station.
   - Pump Station No. 2: Install an additional pump, such that any three are capable of pumping 1,860-gpm.

At this time, negotiations are underway between the City of Santa Maria and the District. The assumptions used in this analysis may change as a result of these discussions.



BOYLE ENGINEERING CORPORATION

NCSD WATERLINE INTERTIE

PROJECT COMPONENTS AND PHASING

BEC PROJECT NO. 19998.12

FIGURE ES-1

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1.0 Introduction

The Nipomo Community Services District (NCSD) serves approximately 12,000 people over an area of approximately 4,650 acres (Urban Water Management Plan 2005 Update, SAIC Engineering). The service area includes two water distribution systems (Blacklake and Main Systems) that are currently served by groundwater from the Nipomo Mesa Management Area (NMMA) of the Santa Maria Groundwater Basin. The NMMA is at the northwestern part of the basin, and encompasses approximately 27.5 square miles. The District also has supply from the Nipomo Valley subbasin, which is part of the Santa Maria basin but outside the NMMA.

The 2005 Urban Water Management Plan states that "since July 1997, the Santa Maria Groundwater Basin has been the subject of ongoing litigation between nearly 800 parties with competing claims to pump groundwater, collectively called the Santa Maria Groundwater Litigation (Santa Maria Valley Water Conservation District vs. City of Santa Maria, et al. Case No. 770214)".

The California Superior Court, County of Santa Clara, approved a Settlement Stipulation on August 3, 2005, which requires that the District import a minimum of 2,500 acre-feet of Supplemental Water to the NMMA each year. The 2005 Memorandum of Understanding (MOU) between the City of Santa Maria and the District established a basis for the District to purchase supplemental water from the City.

Acquiring water from Santa Maria presents several physical challenges for the District:

- Transmission facilities will be required to connect the systems, and must cross the Santa Maria River.
- Santa Maria currently adds chloramines and fluoride to their water. The District uses chlorine for disinfection, and blending these two disinfectants requires special consideration and may not be the best decision for the District. In addition, the District does not add fluoride to its water.
- The City of Santa Maria has not specified the flow rate and pressure available to the District. Nor has its requirements (system improvements, pump station location/aesthetic, and pipeline operational parameters) for the project been agreed upon.
- Costs and constraints for "delivered water" (including purchase cost, improvements to Santa Maria system, and improvements within the Nipomo system, as well as transmission facilities to connect the systems) were unknown.

1.1 Background and Studies – Waterline Intertie Project

The following documents and reports were published during initial development of the project and are discussed in the following sections of this Memorandum.

2005 Memorandum of Understanding

The 2005 MOU became the basis for the Waterline Intertie Project, as described in this report. According to paragraph 2.10 of the MOU, "NCSD shall be responsible for constructing and operating an interconnection with the City's retail distribution system". Location, plans, and specifications of this connection must be approved by the City. All costs for regulatory and

environmental permits, licenses, and other approvals must be paid by NCSD. The water is intended to be the City's "municipal mix", including both City groundwater and State Water Project supplies. According to City staff, the City currently delivers State Water to their customers at all times except during scheduled State Water outages in November. Other provisions of this MOU are listed below:

1. Supplemental water supply will be up to 3,000 acre-feet per year (afy). NCSD's delivery will not exceed a maximum of 250 acre-feet per month or 4.2 cubic feet per second (cfs).

2. Minimum deliveries will be 600-afy during the first year, increasing to 1,260-afy from the 11th year through 2035.

3. Payment will be either $1,250 per acre feet or an Annual Variable Rate in the amount of $895 per AF, adjusted by 3% annually through June 30, 2065.

4. NCSD can only terminate the agreement if the City is found to be in "material breach" of the Agreement, or if five years written notice is provided to the City.

Previous Studies for Waterline Intertie Project

The District has completed the following studies related to the Waterline Intertie Project:

- Draft Environmental Impact Report (EIR) by Douglas Wood & Associates, May 2006;
- Waterline Feasibility Study: Santa Maria River Crossing Alternatives (Cannon Associates, April 2005);
- Santa Maria Inter-Tie: Project Schedule and Probable Cost (Cannon Associates, June 2005); and
- Santa Maria Inter-Tie: Route and Site Alternatives (Cannon Associates, June 2005).

The studies by Cannon Associates provided the basis of the project description for the Environmental Impact Report. This description included the following components:

- Booster station and connection to Santa Maria water system at the north end of Blosser Road and/or Preisker Lane;
- Three alternatives for crossing the Santa Maria River (see Figures 4, 5, and 6 from the EIR): Horizontal Directional Drill (HDD) along the west alignment; and HDD or Highway 101 bridge crossing along the eastern alignment options. Pipe diameter would be either 12-inch or 14-inch inner diameter (ID);
- Connection to Nipomo system at existing 12-inch water main at the end of Santa Maria Vista or at a waterline extension along Orchard Avenue from Southland Street;
- Booster station and storage tank (8.4 million gallons above-ground) near connection to Nipomo system; and
- Water treatment system (either granular activated carbon or ultraviolet treatment) at the storage tank site to remove chloramines or a blending station.

Depending on the alignment, construction costs (as of June, 2005) were expected to vary from $7.4 to $9.6 million for a 12-inch pipeline, 8.4 million gallons of storage, and two booster stations. No cost opinion was provided for a 14-inch pipeline as described in the EIR.

Draft Preliminary Engineering Memorandum

In November 2006, Boyle Engineering Corporation completed a Draft Preliminary Engineering Memorandum for the Waterline Intertie Project. Two general project alignments were evaluated for crossing the Santa Maria River: one near Highway 101 and one due north from the north end of Blosser Road in Santa Maria. The report also included a preliminary hydraulic analysis, water quality analysis, disinfection study, review of reservoir storage options, siting evaluation for two pump stations, environmental and permitting considerations, and a conceptual cost comparison. The hydraulic analysis was a preliminary effort and intended to be merged with the updated water model being produced as part of the District's Water Master Plan.

After the draft Memorandum was released, Carollo Engineers completed a hydraulic analysis of the City of Santa Maria's distribution system in order to evaluate impact of various delivery rates on the City's system pressures. Two connection points were compared: at Atlantic Place and Blosser Road, existing 10-inch pipelines in a residential area, and at the end of a theoretical dedicated 18-inch pipeline from Taylor Street to the south side of the Santa Maria River. Although analyses showed that connection to the existing network did not create an unacceptable pressure drop in the residential area for a continuous supply to the NCSD, the report concluded that this connection point should not be considered because other variables, such as effects of a pump station or a flow control facility, may cause the results to change. The dedicated 18-inch pipeline was recommended for water delivery to the NCSD.

1.3 Related Water Supply Studies

The following studies provided supporting information for the analysis discussed in the Memorandum and are referenced throughout this document.

Water Master Plan Update

The Water Master Plan Update was completed in December 2007. The updated water model and distribution system improvement recommendations were utilized in this draft report to reevaluate the hydraulic analysis for the NCSD system and refine the recommended alternative for the waterline intertie. The updated analysis is included in the Hydraulic Analysis section of this report.

Evaluation of Supplemental Water Alternatives

In order to determine the cost and constraints associated with other water supply alternatives, and provide context for evaluating cost and constraints of the Waterline Intertie Project, in June of 2007 Boyle evaluated options for supplemental water supplies. The alternative sources included:

- Santa Maria Waterline Intertie
- Santa Maria groundwater
- Desalination
- Surface water from Oso Flaco Lake
- State water from a regional interconnection
- Nacimiento pipeline
- Recycled wastewater recharge and/or reuse

The evaluation indicated the preferred supplemental water sources are the Santa Maria Waterline Intertie and desalination, which meet the criteria for availability, quality, and reliability. These sources also have an added advantage of lower salts concentrations (such as sulfates, boron, chloride, and total dissolved solids) than the Nipomo groundwater. The potential to increase salt concentrations in the groundwater through disposal of treated wastewater is a current concern for the District. This has become a more pressing issue as the Southland Wastewater Treatment Facility approaches its permitted effluent limit for maximum flow. The District plans to prepare a salts management program to reduce this potential for impact. A water supply with lower salts concentration is an important component of this program, as it will help mitigate future impact to the groundwater.

The District was interested in purchasing State Water, but significant constraints were identified in the report and were further explored in meetings with staff from the District, San Luis Obispo County Public Works Department, and City of Santa Maria.

2.0 Objectives and Scope of Work

Waterline Intertie Project Objectives

As stated in the District's published Waterline Intertie Project Objectives, the "basic objective of the proposed Nipomo Community Services District (NCSD) Waterline Intertie Project is to construct a pipeline connection from the City of Santa Maria water distribution system across the Santa Maria River to the existing water distribution system within the NCSD". In so doing, the proposed project will also achieve the following objectives:

1. Slow the depletion of the above-sea-level groundwater in storage beneath the Nipomo Mesa Groundwater Management Area (NMMA) of the Santa Maria Groundwater Basin to reduce the potential for sea water intrusion by using supplemental water consistent with the settlement agreement and the judgment related to the groundwater adjudication. Since projections have shown that sea water intrusion could occur in 12-14 years with no new development, and under 8 years in a "dry years" scenario, the nearest-term project completion is essential. The conservative goal of this project is to provide at least 2,000 acre-feet per year (AFY) of supplemental water to the NMMA by 2013.

2. Comply with the 2005 groundwater adjudication settlement stipulation and judgment that dictates the need for active management of the NMMA.

3. Assist in stabilizing the groundwater levels in the NMMA by reducing pumping in the NMMA.

4. Augment current water supplies available to the Nipomo Community Services District by a phased delivery of supplemental water. Phase I will supply approximately 2,000 AFY by pipeline from Santa Maria following Phase 1 construction completion. Phase II will supply up to an additional 1,000 AFY by pipeline from Santa Maria (a cumulative total of 3,000 AFY). A third phase (Phase III), if implemented, would supply up to an additional 3,200 AFY (a cumulative total of 6,200 AFY) by pipeline from Santa Maria.

5. Augment current water supplies available to the Woodlands and other water purveyors on the Mesa by 831 acre-feet per year, as follows: Woodlands (415 AFY), Golden State Water Company (208 AFY) and Rural Water Company (208 AFY).

6. Increase the reliability of District water supply by providing a diversity of water sources. Avoid the potential use of supplemental water return flows from the District, the Woodlands and the other purveyors, being used to support the water requirements of new development.

7. Comply with Local Agency Formation Commission (LAFCO) conditions for securing supplemental water prior to annexation of lands now within the District's Sphere of Influence. This supplemental water for annexations shall be in addition to the 3,000 AFY developed by Phases I and II.

8. Avoid multiple waterline crossings of the Santa Maria River and associated environmental impacts, by constructing a single pipeline capable of transporting sufficient water for potential NMMA growth consistent with the South County Area Plan (Inland) of San Luis Obispo County's General Plan. The pipeline diameter crossing the Santa Maria River would accommodate a 6,200 AFY capacity.

9. Slow the depletion of the above-sea-level groundwater in storage beneath the NMMA by:

    a. Providing supplemental water for new development within the current service area of the District and the Mesa's other water purveyors (Golden State and Rural Water) consistent with the South County Area Plan (Inland);

    b. Facilitating supplemental water delivery for new development within the District's Sphere of Influence consistent with the South County Area Plan (Inland) and the conditions in LAFCO's 2004 Sphere of Influence Update;

    c. Providing the basis for the assessment of County Impact Fees upon development outside the District's Sphere of Influence and the service areas of the Mesa's other water purveyors (Golden State and Rural Water Companies).

Scope of Work

This report summarizes our preliminary engineering analysis of hydraulic conditions within both the Nipomo and Santa Maria systems; disinfection alternatives (the systems use different disinfectants); pipeline alignments (from the EIR); and storage options. Boyle's Scope of Work included the following tasks:

Hydraulic Analysis. Boyle reviewed historical data and performed modeling of the Nipomo and Santa Maria distribution systems in order to identify the following:

- Hydraulic "bottlenecks" in the NCSD distribution system which would restrict deliveries, to be addressed as part of this project or a future project;
- Hydraulic "bottlenecks" in the Santa Maria distribution system which would limit flow and pressure available to Nipomo;
- Opportunities for project phasing, including coordination with water projects identified in the Master Plan;
- Identification of project alternatives to reduce capital and operations/maintenance costs from those associated with the EIR project;
- Recommended delivery schedule; and
- Design criteria for booster station, pipeline, and storage facilities.

Water Quality / Disinfection Evaluation. Boyle reviewed water quality data from both agencies and developed testing protocols for the District in order to determine the following:

- Potential levels of total dissolved solids (TDS), fluoride, and disinfection byproducts in blended water supply;
- Likely levels of disinfection byproducts (THMs and HAAs) and disinfection byproduct precursors; and

- Advantages, disadvantages, and relative costs for facilities to eliminate chloramine from the Santa Maria water so that the Nipomo system can continue using only chlorine; or convert District wellheads to chloramination. This will provide a basis for determining whether there is a cost basis to continue using chlorine vs. converting to chloramine.

Pipeline Alignment Study. Boyle evaluated the three (3) basic pipeline alternatives evaluated in the May, 2006, Draft Environmental Impact Report (Directional Drilling Options A and B (Figures 4 and 5, DEIR) and Highway 101 Bridge Crossing). Boyle compared cost and feasibility of the following pipeline construction alternatives for an underground pipeline beneath the River:

- Use HDD, from the south river bank to top of the bluff
- Use open-trench construction, from the south river bank to top of the bluff

As part of this analysis, the Boyle team performed the following tasks:

- Preliminary geotechnical report (Appendix II), including site information available from previous projects in the vicinity of the proposed pipeline.
- Preliminary alignment and profile
- Recommended pipeline size
- Right-of-way or permit issues
- Utility interference risks
- Environmental considerations: The Boyle team contacted permit agencies, began conducting California Red-legged Frog surveys (as directed in the Environmental Impact Report), and identified potential environmental constraints within the proposed pipeline alignment areas defined in the EIR.
- Probable project costs

Tank Siting Study. Boyle developed conceptual site plans for three (3) tank and booster station sites, visual analysis of the proposed facilities, and a life cycle cost comparison of prestressed concrete and welded steel tanks.

3.0 Hydraulic Analysis

3.1 Summary of Previous Evaluations

Boyle Engineering Corporation performed a preliminary hydraulic analysis in the November 2006 Draft Preliminary Engineering Memorandum. A skeletonized water distribution model of the Nipomo system was developed based on the 2002 Water and Sewer Master Plan Update. Pumps, pipelines, and storage were sized for a 3,000-afy (assuming 1,860-gpm) delivery flow (per the Memorandum of Understanding between the City and Nipomo CSD). The pipeline crossing the river was evaluated for both 3,000-afy and a future flow of 6,300-afy (assuming 3,900-gpm). The modeling of the District's water distribution system was preliminary and was intended to be integrated with the completed water model being developed for the District's Water Master Plan. Further analysis based on the District's new water model is included here-in.

Analyses by Boyle and the City of Santa Maria estimated that the City's Water Distribution System has the capacity to deliver 3,000-afy at a constant rate of 1,860-gpm at a minimum delivery pressure of 60-psi at Taylor and Blosser. This conclusion was confirmed in the December 13, 2006, Carollo Engineers Report (Appendix XIII). However, while the City's analysis confirmed the system pressure would be acceptable it also indicated that connecting to the existing 10-inch mains at the north end of Blosser may cause unacceptable fluctuations in system pressures. Therefore, the City has requested construction of a dedicated 18-inch main to serve the project. The 18-inch main will connect to a 24-inch main at Taylor and Blosser.

Two project alternatives were evaluated in the 2006 Draft Memorandum. Alternative 1 was based on the District's project description for the EIR, with two booster stations and 2.5 million gallons (MG) of storage (providing 18 hours of storage) at the site of Pump Station No. 2 (PS#2). Alternative 2 considers the elimination of the storage and PS#2, relying on a larger Pump Station No. 1 (PS#1) to deliver the water to the District's existing tanks. For comparison, both alternatives assumed Alignment 1 – the western alignment. Alignment alternatives are discussed further in Chapter 5.

The preliminary analysis for Alternative 1 concluded that PS#1 would only be required to operate at point-of-connection (POC) pressures less than 60-psi since the City's hydraulic grade elevation is above the tank heights anticipated for the WIP. A 24-inch pipe was recommended for the River Crossing based on capacity to deliver 3,000-afy (at 1,860-gpm), and up to 6,300-afy (at 3,900-gpm). The difference in capital cost to install the 24-inch instead of a 14-inch pipeline (the size initially examined in the Draft EIR) would be offset by power savings within 8 years of operation at 3,900 gpm (6,300-afy), assuming PS#1 will be required in the future. The difference in capital cost to install the 24-inch instead of an 18-inch pipeline now (which would maintain system continuity between the City and Nipomo) is approximately $375,000. Power savings would not offset the cost until after 20 years of operation at 3,900 gpm. However, a peak flow rate of 5,570 gpm will be required in the future in order for NCSD to use the full 6,300 afy. At this flow, power savings would offset the capital cost within 2 years of operation. Moreover, the additional project costs for logistics and environmental impact to install a pipeline across the River twice outweighs the current capital expense.

Three pumps were recommended for PS#2, each rated at 1,000-gpm with any two capable of delivering the design flow. TDH requirements for PS#2 could not be determined with information available at the time.

Alternative 2 considers eliminating PS#2 and storage, pumping directly from Santa Maria to Nipomo's distribution system. This would require larger pumps at PS#1 and possibly a storage tank. The cost of larger pumps would be offset by the elimination of PS#2 and the storage tanks.

Since the 2006 Draft Memorandum, Nipomo's Water and Sewer Master Plan Update was completed, which included an update to the water distribution model and recommended improvements to the distribution system to meet existing near-term and future water demands. This information was utilized to reevaluate the hydraulic analysis for the WIP and refine the recommended project alternative and improvements.

3.2 New Components of Hydraulic Analysis

The analysis was expanded after completion of the December 2007 Water and Sewer Master Plan Update (2007 Master Plan) to include the following:

- Refinement of the recommended project alternative
- An evaluation and recommendation of phasing for the in-system improvements to meet the schedule of delivery of supplemental water
- A revised opinion of probable construction cost

3.3 Model of Nipomo CSD System

Hydraulic analysis for this study was performed using the District's water system model, as updated for the 2007 Master Plan.

Four potential connection points for the Nipomo distribution system were discussed in the 2006 Draft Memorandum: Orchard and Southland, Frontage and Division, Tefft and Oakglen, and directly to the Quad Tanks. A 12-inch pipeline to serve the Maria Vista development was recently accepted by the District, and was not included in the analysis at that time. The alignment of this pipeline is in Orchard with a POC at Orchard and Southland. Using the existing 12-inch main with a POC at Orchard and Southland requires the least amount of new pipe; however the high hydraulic grade line required to overcome the headloss from small diameter pipelines will result in service pressure in excess of 100-psi to homes in the vicinity. The other connection locations have less effect on pressures, because they connect to larger pipelines, but require 13,000 to 27,000 feet of new pipeline. With this consideration, the analysis first focused on water system improvements that would allow use of the Orchard and Southland POC for the Waterline Intertie Project.

Model Conditions

Each scenario was run under steady state conditions, with tanks 95% full and wells off. Varying conditions included supplemental inflows, pipeline improvements, and system demands.

Supplemental Inflows

Two supplemental water inflow rates were modeled. Baseline scenarios were run without supplemental inflow for comparison. The maximum allowance from the City of Santa Maria per the 2005 MOU,1,860-gpm, was modeled as Phase II. A mid-term flow rate of 1,300-gpm was modeled as Phase I. These flow rates and demand conditions were compared to determine the volume of water the District will be able to utilize yearly to assist with development of a phased delivery schedule. See Appendix IX. A discussion of a potential future flow rate of 5,570-gpm (for delivery of 6,300-afy) is included in Section 12.

Pipeline Improvements

The 2007 Master Plan recommended improvements to the NCSD water distribution system, categorized to meet near-term, interim, or future demands. These improvements were evaluated to isolate the projects that affect the Waterline Intertie Project. The concern is high service pressure in the southwestern part of the NCSD distribution system, bounded approximately by Southland Street to the south, homes between Division and Story to the north, Frontage Road to the East, and Orchard to the West ("Area A," see Figure 3-3). The model was utilized to identify improvements necessary to mitigate high pressures in Area A at Phase I and Phase II supplemental water inflow rates.

Network improvements were divided into four categories (Table 3-1):

- Master Plan Phase I (MP I) – Improvements recommended in the 2007 Master Plan as necessary for near-term demands which have an impact on the WIP;
- Master Plan Phase II (MP II) – Improvements recommended in the 2007 Master Plan as necessary for interim and future demands which have an impact on the WIP;
- Waterline Intertie Project Phase I (WIP I) – Improvements necessary to handle a supplemental inflow of 1,300-gpm at Orchard and Southland POC; and
- Waterline Intertie Project Phase II (WIP II) – Improvements necessary to handle a supplemental inflow of 1,860-gpm at Orchard and Southland POC.

Table 3-1. NCSD Distribution Network Pipeline Improvements

Project Phase	Description	Improvements
MP I	Master Plan Phase I Improvements recommended in 2007 Master Plan Update to meet near-term demands which impact the Waterline Intertie Project.	Willow Road (14-in) – (Future) Pomeroy west to Misty Glen Place
		Frontage (12-in) – Story to Banyon
		Frontage (12-in) – Hill to Grande
		N. Dana Foothill Road (24-in) – (Future) Quad Tanks to Mehlshau
		Mehlschau (24-in) – (Future) N. Dana Foothill Road to Thompson
		Thompson (14-in) – (Future) Mehlschau to High School
		Mehlschau (24-in) – (Future) Intersection N. Dana Foothill Road to New Tank
		Mehlschau (18-in) – Future extension – Thompson to Oak Glen
		Hwy 101 Crossing (18-in) – (Future) Oakglen & Mehlschau to N. Frontage Rd.
		N. Frontage Rd – Along Hwy 101 to Willow Road extension
		Willow Road (12) – Future Extension N. Frontage Rd to Hetrick
		Willow Road (12) – Future Extension Hetrick to Pomeroy
MP II	Master Plan Phase II Improvements recommended in 2007 Master Plan Update to meet interim and future demands which impact the Waterline Intertie Project.	S. Oakglen (14-in) – Tefft to Amado
		Amado (14-in) – S. Oakglen to Hwy 101
		Hwy 101 Crossing (14-in) – Oakglen to Frontage at Amado
		S. Frontage (12-in) – Tefft to Hill Street
		S. Frontage (12-in) – Grande to Banyon
		S. Frontage (12-in) – Story to Southland
		Southland (10-in) – Frontage to Orchard
WIP I	Waterline Intertie Project Phase I Improvements recommended to decrease pressures in Area A	Southland (12-in) – Frontage to Orchard (install 12-inch instead of MP II 10-inch improvement)
		Frontage (12-in) – Southland to Tefft (early installation of MP I & II improvements)
		PRVs in "Area A" (Figure 3-1) * *Not Modeled* *
WIP II	Waterline Intertie Project Phase II Improvements recommended to decrease pressures in Area A	Orchard (12-in) – Southland to Division
		Division (10-in) – Alegre to east of Meredith (replace 6-in section)

System Demands

Demand alternatives include existing and future average daily demands (ADD) per the 2007 Master Plan and low demand scenarios, 10% ADD, to mimic night-time demands when pressures are higher within the distribution system (Table 3-2). Peak demands were not considered for this analysis since previous analysis has confirmed that the higher demands cause lower pressures throughout the NCSD distribution system. Low pressures are not a concern for this analysis.

Table 3-2. Demand Conditions

	ADD (MGD)	10% ADD (MGD)
Existing	2.67	0.27
Future	5.57	0.56

The conditions for each model scenario are listed in Table 3-3.

Table 3-3. Model Scenarios

	Supplemental Supply (gpm)	Demand	Network + Improvements
BASE LINE	Existing	Existing ADD	Existing
	Existing	10% Existing ADD	Existing
	Existing	Future ADD	Existing + MPI + MP II
PHASE I	Existing + 1300	Existing ADD	Existing
	Existing + 1300	Existing ADD	Existing + MP I
	Existing + 1300	Existing ADD	Existing + MP I + WIP I
	Existing + 1300	10% Existing ADD	Existing
	Existing + 1300	10% Existing ADD	Existing + MP I
	Existing + 1300	10% Existing ADD	Existing + MP I + WIP I
PHASE II	Existing + 1860	Existing ADD	Existing
	Existing + 1860	Existing ADD	Existing + MP I + MP II
	Existing + 1860	Existing ADD	Existing + MP I + MP II + WIP I + WIP II
	Existing + 1860	10% Existing ADD	Existing
	Existing + 1860	10% Existing ADD	Existing + MP I + MP II
	Existing + 1860	10% Existing ADD	Existing + MP I + MP II + WIP I + WIP II
	Existing + 1860	Future ADD	Existing
	Existing + 1860	Future ADD	Existing + MP I + MP II
	Existing + 1860	Future ADD	Existing + MP I + MP II + WIP I + WIP II
	Existing + 1860	10% Future ADD	Existing + MP II + WIP I + WIP II

Model Results

Results of the hydraulic modeling were measured by comparing pressures in Area A (as shown in Figure 3-3). This area will be subject to pressure increases in excess of 100-psi which is greater than the desired residential service connection pressure of 85- to 90-psi maximum. Table 3-4 summarizes the results for each scenario. Results indicate existing pressures in Area A range from 91- to 99-psi during average day demands (ADD) and 95- to 103-psi during periods of low

demand (10% ADD). Supplemental inflow at the designated POC (Orchard and Southland) increases these pressures. However, model results show that some planned Master Plan (Phase I and II) improvements coupled with pressure-reducing valves (PRVs) on individual services in Area A will provide capacity for up to 1,300-gpm supplemental inflow. The recommended improvements for this phase are listed in Table 3-3 as WIP I and consist of upgrading two pipelines: 1) Frontage Road from Southland to Tefft to a 12-inch, and 2) Southland to a 12-inch, and installing PRVs on services in Area A.

Capacity for 1,860-gpm can be obtained by implementing WIP II: upgrading the Orchard Street pipeline to a 12-inch from Southland to Division and upgrading approximately 340-linear feet of 6-inch pipeline on Division to 10-inch to match adjacent pipe sizes.

Table 3-4. Calculated Pressures in Area A per Modeled Scenario

	Supply	Demand	Network + Improvements	Area A Pressures (psi)
BASE LINE	Existing	Existing ADD	Existing	91 - 99
	Existing	10% Existing ADD	Existing	95 - 103
	Existing	Future ADD	Existing + MPI + MP II	93 - 101
PHASE I	Existing + 1300	Existing ADD	Existing	100 - 123
	Existing + 1300	Existing ADD	Existing + MP I	100 - 124
	Existing + 1300	Existing ADD	Existing + MP I + WIP I	98 - 109
	Existing + 1300	10% Existing ADD	Existing	103 - 128
	Existing + 1300	10% Existing ADD	Existing + MP I	102 - 127
	Existing + 1300	10% Existing ADD	Existing + MP I + WIP I	99 - 110
PHASE II	Existing + 1860	Existing ADD	Existing	105 - 147
	Existing + 1860	Existing ADD	Existing + MPI + MP II	100 - 115
	Existing + 1860	Existing ADD	Existing + MP I + MP II + WIP II	98 - 107
	Existing + 1860	10% Existing ADD	Existing	109 - 153
	Existing + 1860	10% Existing ADD	Existing + MPI + MP II	102 - 117
	Existing + 1860	10% Existing ADD	Existing + MPI + MP II + WIP II	99 - 108
	Existing + 1860	Future ADD	Existing	101 - 143
	Existing + 1860	Future ADD	Existing + MPI + MP II	99 - 114
	Existing + 1860	Future ADD	Existing + MPI + MP II + WIP I + WIP II	97 - 106
	Existing + 1860	10% Future ADD	Existing + MPI + MP II + WIP I + WIP II	98 - 108

Note: Model results do not include effects of PRVs recommended for WIP I, which would decrease service side pressures in Area A. Pipeline pressures would not be affected by installation of PRVs.

3.4 Pump Stations, Storage, and Operations

Pump Stations: The 2006 Draft Memorandum indicated the potential to eliminate Pump Station No. 1 (PS#1) since the City's hydraulic grade is higher than the anticipated tank heights for the WIP. As shown in Figure 3-1, assuming a tank water elevation of 300-ft, PS#1 will not be required for a flow rate of 1,860-gpm, with a minimum pressure of 60-psi at the Santa Maria POC. The results from the 2006 Carollo report (ibid) indicate a pressure range of 63- to 89-psi for the Taylor and Blosser intersection assuming a steady flow rate of 1,860-gpm. However, since pressure and/or flow conditions may change, provisions for PS#1 and land acquisition are recommended. The minimum pressure from Santa Maria is

not contractually guaranteed in the 2005 MOU. Once the WIP is online, pressures should be monitored to assess future need for the pump station.

Pump Station No. 2 (PS#2) will be required to pump water from the WIP storage to the NCSD distribution system. The hydraulic profile (Figure 3-1) shows the difference in hydraulic grade between Santa Maria and Nipomo's distribution systems for Phase II. Assuming the project configuration as shown in Figure 3-1 (with a buried storage tank and PS#2 at an elevation of 295-ft), Boyle recommends four 75-hp pumps with any three capable of pumping 1,860-gpm at 325-feet of head for Phase II. The pump station should be designed to accommodate the four pumps. However, for Phase I we recommend three 75-hp pumps with any two capable of pumping 1,300-gpm at 300-ft of head. A schematic for the pump station is shown in Figure 3-2.

DWG: \\Slofilesrv\work\Nipomo CSD (19996)\Waterline Intertie Project 19996.12\Phase 4 – UPDATE to Draft Prelim Engr Memo\Report\Editing Figure 3-1.dwg USER: eshields
DATE: May 30, 2008 11:48am XREFS: IMAGES:

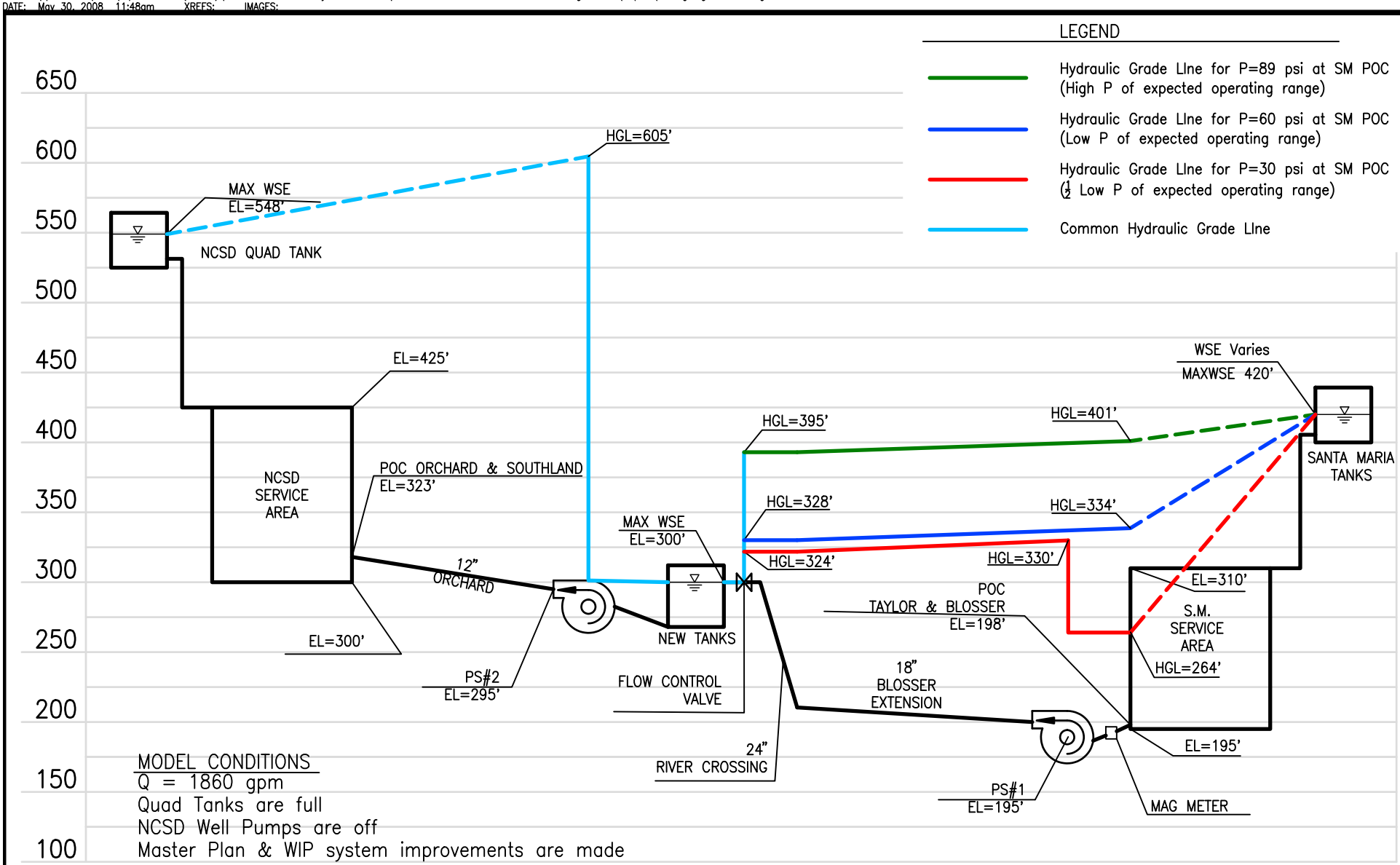

FIGURE	NCSD WATERLINE INTERTIE	BEC PROJECT NO.
3-1	HYDRAULIC PROFILE	19996.12

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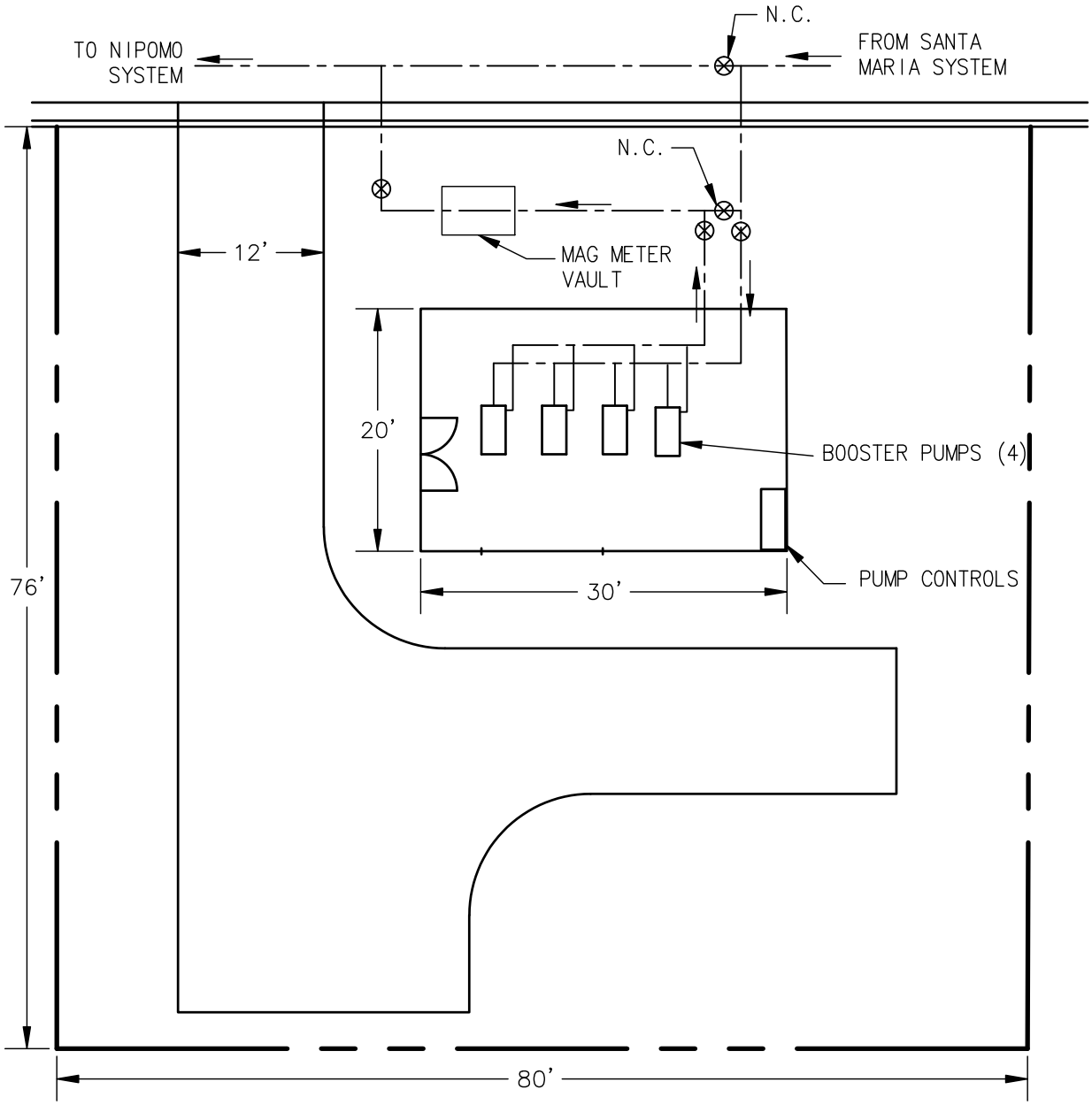

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NCSD WATERLINE INTERTIE

PROPOSED PUMP STATION SCHEMATIC

BEC PROJECT NO. 19996.12

FIGURE 3-2

DWG: \\Slofilesrv\work\Nipomo CSD (19996)\Waterline Intertie Project 19996.12\Phase 4 - UPDATE to Draft Prelim Engr Memo\CAD\Exhibits\Figure 3-2 Pump Station Schematic.dwg USER: eshields
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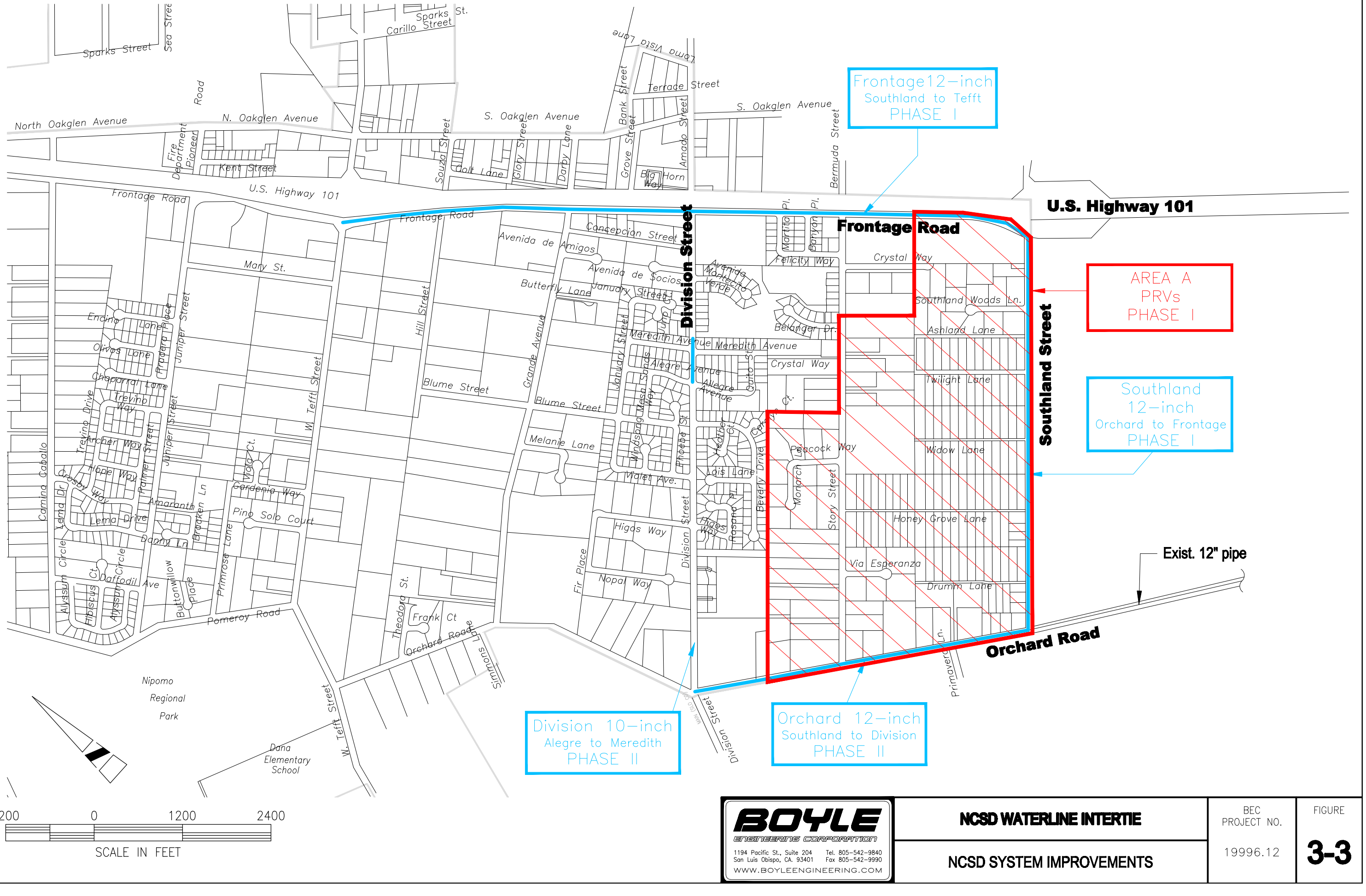

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NCSD WATERLINE INTERTIE

NCSD SYSTEM IMPROVEMENTS

BEC PROJECT NO. 19996.12

FIGURE **3-3**

Storage: Three storage options were presented in the Draft Preliminary Memorandum: 8.4-MG, 2.5-MG, and making use of the existing Quad Tanks with no new storage. The first two options would provide 3 days and 18 hours of emergency storage at 1,860-gpm, respectively.

Boyle performed an analysis of operational storage requirements for the project, and submitted the results as a memorandum dated July 27, 2007. Operational water storage needs were modeled under existing and future conditions, assuming a constant daily supplemental flow. The analysis further assumed monthly flow adjustments could be scheduled to comply with an annual delivery schedule. Flow in the distribution system from District wells was modeled using an assumed on-off operation, each well triggered by set water levels in storage. The District's diurnal demand curve was applied to vary hour-by-hour demands. Table 3-5 shows the model scenarios and results. Based on these results, the District would only need a 0.5-MG buried storage tank to provide operational storage for Phase I and Phase II (up to 1,860-gpm) of the project. This will provide just over 6 hours of storage for Phase I and 4.5 hours for Phase II.

Table 3-5: Model Results for Determination of Required Operational Storage

Condition Modeled	Average Demand over 24-hours modeled	Constant Flow from Supplemental Source	Operational Storage Required
Existing Condition - February	997 gpm (1.44 MGD)	997 gpm (1.44 MGD)	0.20 MG
Existing Condition - July	2,676 gpm (3.85 MGD)	1,860 gpm (2.68 MGD)	0.35 MG
Existing Condition - Maximum Day	3,162 gpm (4.55 MGD)	1,860 gpm (2.68 MGD)	0.30 MG
Future Condition - February	2,074 gpm (2.99 MGD)	2,073 gpm (2.99 MGD)	0.43 MG
Future Condition - July	5,566 gpm (8.02 MGD)	3,872 gpm (5.58 MGD)	0.73 MG
Future Condition - Maximum Day	6,576 gpm (9.49 MGD)	3,872 gpm (5.58 MGD)	1.03 MG

Hydraulic analysis indicated the potential to delay installation of PS#1 because of sufficient hydraulic grade from the City of Santa Maria to deliver water via gravity flow to the WIP tanks. A tank with a lower water surface would create a greater elevation difference between the systems, providing additional pressure for water delivery to the tanks. Therefore, we recommend burying or partially burying the tank. Sections 7 and 8 of this report further evaluate storage reservoir material and siting alternatives.

Another option is to design the system without storage, particularly if the District plans to construct a new storage tank (recommended in the Master Plan) at the Quad Tanks site in the next 5 to 10 years. This would allow the pumps to utilize the energy provided by the City's system. Figure 3-1 shows the hydraulic profile for the project assuming a flow rate of 1,860-gpm. Three different hydraulic grade

lines are displayed based on various delivery pressure scenarios. The anticipated delivery pressure range is 60- to 89-psi, which provides enough energy to gravity flow 1,860-gpm across the River to the WIP reservoir site. Assuming minimal loss across the flow control valve and a water surface elevation of 300-feet in the reservoir, excess energy at the reservoir ranges between 28 and 95 feet of head. This energy is lost as the water moves into the reservoir. Without the reservoir, this energy could offset the energy required to pump to the District's distribution system, potentially reducing energy costs. The resulting question is then: Is the reservoir necessary? Table 3-6 shows the advantages and disadvantages of both options.

Table 3-6. Advantages and Disadvantages of Installing a Reservoir

	Advantages	**Disadvantages**
Reservoir	Tank water surface elevation provides consistent and small range of suction-side pressures for the pumps	Reservoir breaks head coming from Santa Maria. Potential loss of 28- to 95-feet of head
	Provides short-term water supply in case of shut-down in Santa Maria	
	Pump flow rates can vary slightly, depending on water surface elevation. Variable speed is not required.	
No Reservoir	Makes use of energy from Santa Maria system	Complicates operational requirements for pump. Increases range of possible suction-side pressure scenarios.
	Eliminates cost of reservoir	
	May reduce energy cost	

Fire Flow/Emergency Operation: Impacts to the City's system in a fire flow event were not evaluated since the project will be designed to sense low pressure in the City's distribution system, and automatically shutdown the connection to allow the City maximum water pressure for fire fighting purposes. After the emergency event has ended, the City and District can re-open the pipeline.

Flow Control: A flow control valve (FCV) is proposed to control the rate of flow between the two systems. The FCV would likely be a hydraulically actuated globe type valve operated by measuring differential pressure across a calibrated orifice plate. The pressures are set to allow a constant flow through the valve independent of upstream pressures. This type of valve is manufactured by Cla-Val, Bermad, GA Industries, and others.

A FCV will greatly reduce the downstream pressure in the transmission main. Boyle recommends locating the FCV as close to the tanks or PS#2 as practical to maintain higher pressure in the transmission main. If the FCV is located in Santa Maria the pressure in the main will drop below 15-psi once it reaches the Mesa. By locating the FCV at the tank or PS#2 site, the pressure in the main will generally remain above 35-psi. The valve would be owned and operated by the District. Solenoid control of the valve can be provided to allow the valve to be opened and closed remotely using the District's SCADA system.

Operation of the shutdown feature of the FCV can be automated. However, telemetry systems for the WIP should be configured to report the shutdown to both Santa Maria and NCSD operations personnel. The reason for the closure can then be investigated. If the FCV is found to be closing too frequently, or if the valve doesn't close when it should, the set point for the system can be altered. NCSD staff should operate the FCV under coordination with the City. The status of the FCV, the flow rate through the main, and the system pressure data should be read through both agencies' SCADA systems.

If desired, pressure gauges can be placed in the Santa Maria system to monitor Santa Maria's system pressure and close the valve if pressure drops below a set point, indicating that there is a problem or emergency in the Santa Maria system.

Flow Metering: Flow metering is proposed to be performed by a magnetic flow meter located in a vault at the PS#1 site or near the POC in Santa Maria if PS#1 is not required. The meter could be read manually and/or on broadcast to the NCSD and City SCADA systems.

3.5 Relative Cost Comparison

The hydraulic modeling efforts reveal capacity for 1860-gpm in the existing system with minor pipeline upgrades, some of which are existing Master Plan recommendations, using Orchard and Southland as the point-of-connection. The Draft Preliminary Memorandum analyzed several other connection points and compared pipeline installation and electricity costs. Using Orchard and Southland as the connection point provides the advantage of utilizing an existing 12-inch pipeline. However, a larger diameter may be preferred to reduce pressure on the pumps and power costs. Table 3-7 compares relative pipeline and electricity costs over 20 years for the recommended project against those for the alternative connection points. Utilizing the existing pipeline along Orchard Road will save between $3.8 and $7.4 million in pipe installation and electricity costs. Cumulative project cost opinions are included in Section 12 and Appendix 7.

The following assumptions were used as the basis for the 20-year, relative power and capital cost comparisons described in Table 3-7:

- Pipeline installation costs
  - 12-inch diameter: $155 per linear foot
  - 16-inch diameter: $200 per linear foot
  - 18-inch diameter: $215 per linear foot
- Electricity costs $0.13 per KW-hr
- Pumps run 24-hours per day
- Three pumps in parallel, each pumping 620-gpm
- Pump motors are 98% efficient (total pump efficiency is 75%)

The relative costs presented are for comparative purposes only. A detailed analysis will be required during design phase to account for multiple variables such as the pump suction pressures, which will vary based on the storage option pursued and the pump selection.

Table 3-7 Comparison of Electricity and Pipeline Costs for 1,860-gpm

Scenario	Pipe Diameter (in)	Pump Pressure (psi)	Brake HP per pump (620-gpm)	Length (ft)	Pipeline Cost	20-yr Elec. Total	20-yr Total Elec. & Pipeline Capital Cost
Examined in Draft Preliminary Memorandum							
Pump Stations No. 1 and No. 2							
Tie-in At Tefft & Oakglen	16	122	99	17000	$ 3,400,000	$6,910,000	$10,310,000
	18	116	96	17000	$ 3,655,000	$6,710,000	$10,365,000
Tie-in at Frontage & Division	16	124	100	13000	$ 2,600,000	$6,980,000	$9,580,000
	18	119	97	13000	$ 2,795,000	$6,810,000	$9,605,000
Tie-in at Quad Tanks	16	129	102	27000	$ 5,400,000	$7,150,000	$12,550,000
	18	119	97	27000	$ 5,805,000	$6,810,000	$12,615,000
Tie-in at Frontage & Division w/PRV	18	144	110	13000	$ 2,795,000	$7,650,000	$10,445,000
Pump Stations No. 1 only							
Tie-in at Quad Tanks	16	172	83	27000	$ 5,400,000	$5,800,000	$11,200,000
	18	164	79	27000	$ 5,805,000	$5,530,000	$11,335,000
Tie-in At Tefft & Oakglen	16	166	80	17000	$ 3,400,000	$5,600,000	$9,000,000
	18	159	77	17000	$ 3,655,000	$5,370,000	$9,025,000
Tie-in at Frontage & Division w/PRV	18	189	91	13000	$ 2,795,000	$6,380,000	$9,175,000
Recommended Project Alternative							
Pump Stations No. 2 only							
Tie-in at Orchard & Southland w/PRV*	12	140	68	3200	$496,000	$4,730,000	$5,226,000

*Assumes Master Plan improvements and upgrade Orchard (Southland to Division) to 12"

3.6 Recommendations

The following project phases are recommended for the Waterline Intertie Project. Facilities and improvements are phased to provide an increasing capacity of supplemental water. Pump power recommendations are based on an assumption of 75% total pump efficiency. Refer to Figure 3-3 for the project layout and phasing. Section 8 discusses pump station and reservoir site alternatives.

Phase I: Facilities and improvements recommended to provide capacity for 1,300-gpm of supplemental water.

- NCSD System Improvements: Upgrade Southland waterline to 12-inch and Frontage Road to 12-inch from Southland to Tefft, and install pressure reducing valves on individual services in Area A.
- Waterline Intertie: Construct 18-inch Blosser Extension from Blosser and Taylor to Santa Maria River Crossing; 24-inch River Crossing via horizontal directional drilling; 24-inch from River to storage tanks at Joshua and Orchard; 18-inch from tanks through PS#2, along Joshua to existing 12-inch water pipeline on Orchard.
- Pump Station No. 1: Acquire land, install magnetic flow meter on Blosser Extension, and monitor pressures after start-up.
- Storage: Construct a 0.5-MG buried pre-stressed concrete tank at Joshua and Orchard and install a flow control valve on inflow pipeline. Acquire sufficient property to construct a second 0.5-MG reservoir for the future, if needed.
- Pump Station No. 2: Install three pumps, any two capable of pumping 1,300-gpm in parallel operation.

Phase II: Facilities and improvements recommended to provide capacity for 1,860-gpm of supplemental water.

- NCSD Network Improvements: Upgrade Orchard waterline from Southland to Division to 12-inch, replace 6-inch section on Division Street waterline with 10-inch pipe to match adjacent pipeline (from Alegre to east of Meridian).
- Pump Station No. 1: Monitor pressures and evaluate need for pump station.
- Pump Station No. 2: Install an additional pump, such that any three are capable of pumping 1,860-gpm.

4.0 Water Quality and Disinfection Evaluation

In receiving Santa Maria water through the Waterline Intertie Project, the NCSD will need to address several issues:

Disinfectant Type: The Santa Maria water is treated surface water obtained from the SWP blended with the City's groundwater, and carries a chloramine residual.

Water Age: At the point of delivery (into the NCSD new storage tanks north of the Santa Maria River) the chloraminated water will have "aged" in the City's distribution system, resulting in some degradation of the chloramine residual and chlorine:ammonia ratio.

Fluoridation: The City of Santa Maria adds fluoride to their water at the blending facilities where the SWP water and groundwater mix.

Water Quality: The Santa Maria water, being a blend of groundwater and surface water, has a significantly different water quality than the NCSD groundwater. Water quality parameters of concern include TDS, chloride, hardness and corrosivity.

Compliance Issues: The District must ensure compliance with the drinking water standards for disinfection by products (DBPs), ensure maintenance of a disinfectant residual, and show no increase in lead release that may cause a lead action level exceedance.

A detailed evaluation of these issues was performed. See Appendix V.

The alternatives identified for addressing the difference in disinfectant type between the NCSD and City of Santa Maria practices include:

1. Uncontrolled blending of city and NCSD water in the NCSD distribution system (No change in treatment practices)

2. Converting City water over to free chlorine residual

3. Converting NCSD groundwater over to chloramine residual

Uncontrolled Blending/No Change in Treatment

The NCSD can choose to either allow uncontrolled blending of the chlorinated and chloraminated water in the distribution system, or blend the sources at one location prior to discharge to the system. The benefits of uncontrolled blending include no change in the current NCSD disinfection practices at the wells and no (or little) treatment of the incoming City water.

Uncontrolled blending in the system may result in loss of chlorine residual in the interface zone where the two sources meet in the distribution system. At the interface of the two sources, the blended water will have a higher chlorine to ammonia ratio as the total ammonia is diluted by the introduction of the free chlorinated groundwater. The loss of residual in this mixing zone is explained in Figure 1-1, the chlorine dose-response curve, where increasing the chlorine to ammonia ratio will result in a drop in the chlorine residual. Consider the following example:

Chloraminated City Water:	Monochloramine residual = 2.0 mg/L Total Ammonia residual = 0.4 mg/L as N Chlorine:Ammonia ratio = 5:1
Chlorinated NCSD Groundwater:	Free Chlorine residual = 1.0 mg/L Total Ammonia residual = 0.0 mg/L as N (or negligible levels)

With a 50:50 blend of these waters, the blended water would have a 1.5 mg/L chlorine residual with a total ammonia concentration of 0.2 mg/L. The chlorine:ammonia ratio become 7.5:1, which is the breakpoint on the chlorine dose-response curve, resulting in the lowest chlorine residual in the water. At this point, the NCSD would have formed the di- and tri-chloramines, resulting in taste and odor problems. With the loss of disinfectant residual, it is possible that HPC and coliform levels may increase.

Blending of chloraminated and chlorinated waters has been more effective when done in a storage reservoir, so chemical reactions take place within the tank before entering the distribution system. Controlling the blend location to a single storage tank would allow the District to control the blend ratio of NCSD groundwater and City water or to take the remaining residual to a strong free chlorine residual prior to distributing the water. Blending the groundwater and incoming City water at one location would require the District to pipe all active groundwater wells to the blend location.

Free Chlorination

The District can remove the chloramines from the incoming Santa Maria water by adding enough free chlorine to take the chlorine residual to breakpoint. At breakpoint chlorination, the ammonia is fully reduced (to nitrogen and hydrochloric acid) and the chlorine residual is at its lowest. The District can then add additional free chlorine to obtain the desired free chlorine residual throughout the distribution system. This would blend in the system with the NCSD groundwater that also contains a free chlorine residual. This alternative requires no change in treatment at the well sites.

Once the water has a free chlorine residual, it will again begin forming disinfection byproducts (DBPs), including TTHMs and HAA5s. The District will have the potential for violating the TTHM MCL, a common problem in systems using water derived from the State Water Project and using free chlorine as a primary and secondary disinfectant.

One way to control the level of DBPs formed is to maintain only that level of free chlorine needed to maintain a detectable residual at the furthest end of the system, and to reduce the age of water in the Nipomo system by cycling the tanks frequently, and flushing at deadends.

Another means to control the formation of DBPs is to pass the water through a granular activated carbon (GAC) filtration unit to remove the natural organic materials (NOM), including TOC, that react with chlorine to form the DBPs. GAC has been shown to be effective at removal of NOM. Design of GAC contactors would first require pilot testing using rapid small scale column tests (RSSCT) to determine the effectiveness of removal and ensure that the design would enable the District to comply with the DBP MCLs under all source water quality conditions.

GAC contactors have been demonstrated to remove 80% to 90% of NOM[1]. This would result in removal of most of the precursor materials forming DBPs under free chlorination. GAC will also remove DBPs already formed in the water. GAC will not remove fluoride from the water.

GAC filters can also reduce ammonia, but nitrifying bacteria must establish themselves in the GAC column before ammonia reduction can occur. Thus, freshly loaded GAC will not have established the nitrifying bacteria needed for removal of the ammonia, resulting in ammonia release into the system that will recombine with the free chlorine. Also, the reduction process for ammonia by nitrifying bacteria leads to the formation of nitrites and nitrates. These are contaminants with maximum contaminant levels for acute exposure. As such it is recommended that ammonia be reduced ahead of the GAC vessels using breakpoint chlorination, resulting in the release of the nitrogen and hydrochloric acid (in minute amounts).

Chloramination

The third alternative available to the District is to maintain a chloramine residual throughout the NCSD system by converting the free chlorination treatment process at the wells to chloramination. This change in treatment would require the addition of ammonia injection at the wells, and the redesign of the chlorine feed because of the higher total chlorine residual typically maintained. This will require larger chlorine solution tanks and chemical feed pumps with greater capacities. Each well will need online monitoring equipment to provide dosage control, as well as a building sized large enough to hold the two solution tanks and four chemical feed pumps (typically one backup pump is maintained).

The maintenance of the chloramine residual in the NCSD system will result in the least formation of DBPs as well as the fewest water quality problems in the distribution system. Figure 1-2 showed the theoretical difference in DBP formation between free chlorine and chloramines as secondary disinfectants. A simulated distribution system DBP formation evaluation has also been conducted and is summarized in Appendix V, which presents the actual rate of formation of DBPs in the chlorinated and chloraminated Santa Maria water.

In addition, the District will see a reduction in customer complaints related to taste and odor problems. Chloraminated water does not carry the chlorinous tastes and odors that are noticeable

[1] AwwaRF, "Removal of DBP Precursors by GAC Adsorption," 1998

in water containing a free chlorine residual. Customers generally find chloraminated water to be better tasting overall.

Water Quality Evaluation

The alternatives evaluation presented in Appendix V presents these approaches, including cost, regulatory, and operational issues associated with each.

5.0 Pipeline Alignments Study

The Draft Environmental Impact Report (EIR) presented three alternative methods for traversing the Santa Maria River with the proposed NCSD Waterline Intertie. Two of these alternatives involved directional drilling (Option A Route, Fig. 4 of EIR; and Option B Route, Fig. 5 of EIR). The third alternative involved attaching the pipeline to the existing 2,100-foot Highway 101 Bridge spanning the river. The EIR defined a broad area for routing these pipelines.

The objective of this Section is to comparatively analyze the constraints, advantages, and disadvantages of each alternative. The relative costs of each are addressed in Section 12 of this report. This Section considers only the proposed pipeline routes beginning at the end of the Blosser Road Extension, south of Blosser Road and Atlantic Place in Santa Maria and ending at the proposed Pump Station No. 2 / Reservoir site in Nipomo (Joshua St.). The additional required system upgrades to the NCSD and City of Santa Maria water systems are discussed in Sections 3 and 6 of this report.

As the starting point for this study, the broad Santa Maria River crossing routes presented in the EIR were refined. Boyle and Jacobs Associates performed a site review on August 3, 2006, and reviewed the identified drill/trench paths, available mapping, and existing reports/studies. The routes considered for this study are shown on Plate 1 – Alignments. Following is a brief narrative describing each of the three alignments considered in this study.

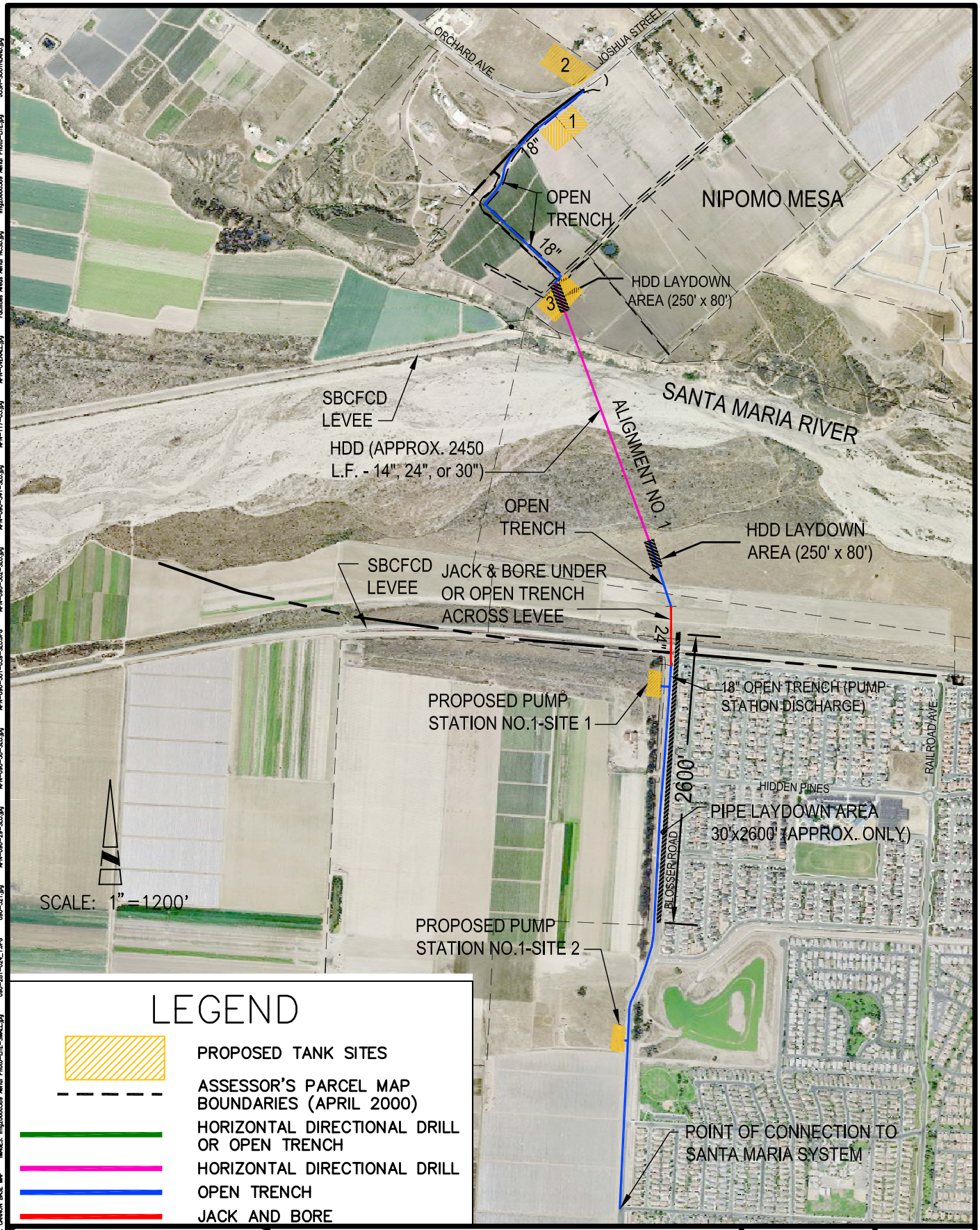
5.1 Alignment Descriptions

Alignment No. 1 (Western River Crossing): This alignment is within the Potential Drill and Trench Path Area identified on Figure 4 of the EIR (Directional Drilling – Option A Route). The refined alignment is shown on Figure No. 5-1 of this report.

The proposed pipeline alignment begins at the northeastern end of the City of Santa Maria, just south of the intersection of Blosser Road and Atlantic Place, at the connection to the Blosser Road Extension, as shown on Figure 5-1. From here, the pipeline proceeds approximately 300-lf northward along Blosser Rd. via open-trench construction. At the end of this section, approximately 300-lf of 24-inch carrier pipe will be installed inside an anticipated 36-inch diameter steel casing utilizing a perpendicular jack-and-bore installation under the river levee.

As discussed later in this Section, in lieu of this method it may be possible to trench up and over the levee as was done for the CCWA pipeline. However, Santa Barbara County Public Works (SBCPW) staff has stated they are planning to install sheet piles within the levee and construct pilot channels in order to bolster the river's capability to handle floods. SBCPW may require the District install sections of sheet piles within 10 feet of each side of the proposed pipeline crossing at the levee.

Following the levee crossing, the 24-inch pipeline proceeds northwesterly towards the active river bed for approximately 600-lf via open-trench construction. At the end of this open-trench section,



LEGEND

- PROPOSED TANK SITES
- ASSESSOR'S PARCEL MAP BOUNDARIES (APRIL 2000)
- HORIZONTAL DIRECTIONAL DRILL OR OPEN TRENCH
- HORIZONTAL DIRECTIONAL DRILL
- OPEN TRENCH
- JACK AND BORE

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NCSD WATERLINE INTERTIE

ALIGNMENT 1 - WESTERN RIVER

BEC PROJECT NO. 19996.12

FIGURE 5-1

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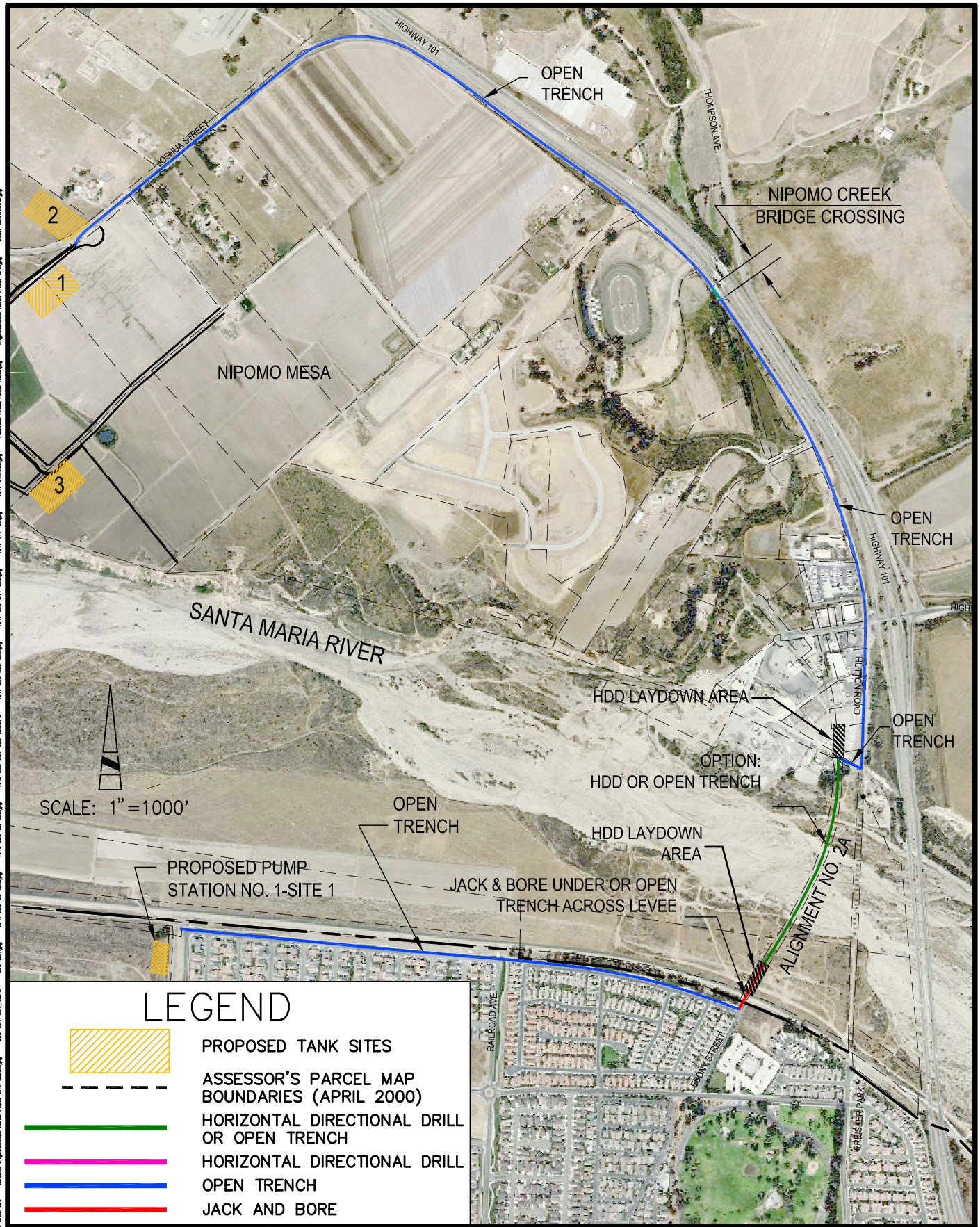
DATE: May 30, 2008 10:05am XREFS: CANNON BASE MAP IMAGES: img20600389 Aerial Photo-LITE_SMALL.jpg 090-281-024_1.JPG 090-321.jpg APN-090-29-SLO.jpg APN-090-30-SLO.jpg APN-090-301-059-SLO.JPG APN-090-302-SLO.jpg APN-090-341-SLO.jpg APN-117-03.jpg APN-OVERALL.jpg Facilities Areas Aerial NCSD.jpg img20600389 Aerial Photo-LITE.jpg JOSH-SOUTHLAND.jpg

approximately 2500-lf of 14-, 24-, or 30-inch carrier pipe will be installed along roughly the same northwesterly heading via horizontal direction drill (HDD). The HDD portion will scale the Nipomo Mesa and terminate just north of the bluffs. The pipeline continue as 24-inch inside diameter and installed via open-trench for approximately 2500-lf to the proposed Reservoir and Pump Station No. 2 Site adjacent to Joshua Street. See Figure 5-1 for details.

Alignment No. 2 (Eastern River Crossing): This proposed pipeline alignment is essentially within the Potential Drill Path Areas identified on Figure 5 of the EIR (Directional Drilling – Option B Route). Two refined options are identified for this pipeline alignment. Option 2A is a curved alignment along the abandoned railroad alignment. Option 2B is an approximately straight alignment along the abandoned 1917 State Highway alignment. The refined options for this alignment are shown on Figure No. 3 of this report.

Option 2A: The proposed pipeline alignment begins at the northeastern end of the City of Santa Maria, just south of the intersection of Blosser Road and Atlantic Place. Near this point, the proposed 18-inch inside diameter pipeline originates at its connection to the Blosser Road Extension as shown on Figure 5-2. From here, the pipeline proceeds approximately 300-lf northward along Blosser Rd. via open-trench construction. At the intersection of Blosser and Atlantic, the pipeline proceeds easterly along Atlantic Place via open-trench construction for approximately 4300-lf. Near Ebony Street, the approximate terminus of the previous pipe section, approximately 300-lf of 24-inch carrier pipe will be installed inside an anticipated 36-inch diameter steel casing utilizing a perpendicular jack-and-bore installation under the river levee. In lieu of this method, it may be possible to trench up and over the levee as was done for the CCWA pipeline. Following the levee crossing, the 24-inch pipeline proceeds northeasterly along the curved railroad alignment for approximately 1800-lf. via open-trench construction. The pipeline continues as 24-inch inside diameter northerly along Hutton Road (via open-trench) for approximately 3800-lf to the Nipomo Creek Bridge Crossing. The pipeline would cross the Nipomo Creek at this bridge by hanging underneath the structure. Following this bridge crossing, the pipeline continues northwesterly along Hutton Road, and then southwesterly along Joshua Street for approximately 6000-lf terminating at the proposed Reservoir and Pump Station No. 2 Site along Joshua Street. See Figure 5-2 for details.

Option 2B: The proposed pipeline alignment begins at the northeastern end of the City of Santa Maria, just south of the intersection of Blosser Road and Atlantic Place. Near this point, the proposed 18-inch inside diameter pipeline originates at its connection to the Blosser Road Extension as shown on Figure 5-3. From here, the pipeline proceeds approximately 300-lf northward along Blosser Rd. via open-trench construction. At the intersection of Blosser and Atlantic, the pipeline proceeds easterly along Atlantic Place via open-trench construction for approximately 5200-lf. Near the Preisker Park Lane culdesac, the approximate terminus of the previous pipe section, approximately 300-lf of 24-inch carrier pipe will be installed inside an anticipated 36-inch diameter steel casing utilizing a perpendicular jack-and-bore installation under the river levee. In lieu of this method, it may be possible to trench up and over the levee as was done for the CCWA pipeline. Following the levee crossing, the 24-inch pipeline proceeds northerly along the abandoned 1917 State Highway alignment for approximately 1800-lf via open-trench construction. The pipeline continues as 24-inch inside diameter northerly along the same route as Option 2A.



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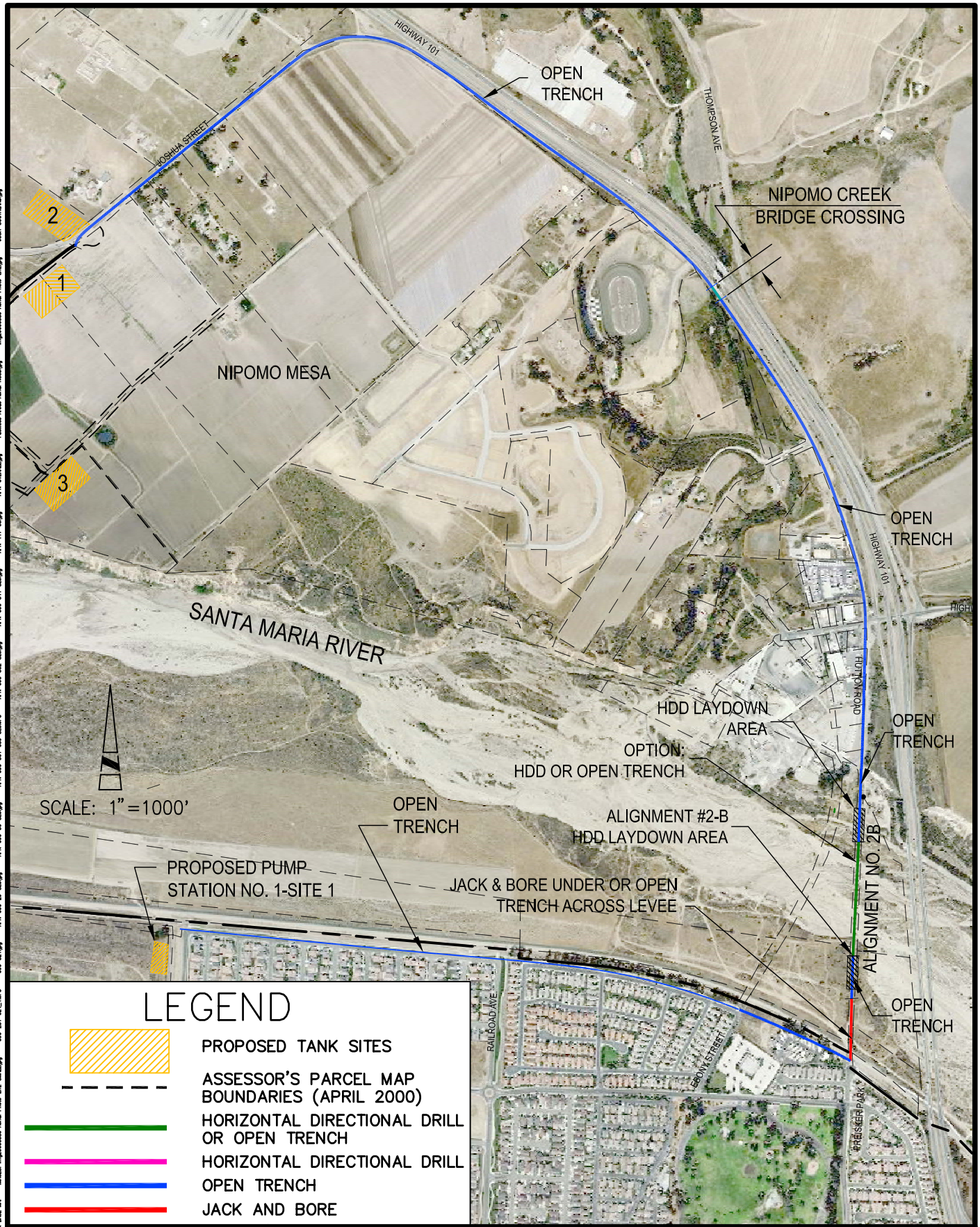
NCSD WATERLINE INTERTIE

ALIGNMENT 2A - EASTERN RIVER CROSSING

BEC PROJECT NO. 19996.12

FIGURE 5-2



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NCSD WATERLINE INTERTIE

ALIGNMENT 2B - EASTERN RIVER CROSSING

BEC PROJECT NO. 19996.12

FIGURE 5-3

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APN-OVERALL.jpg
Facilities Areas Aerial NCSD.jpg
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Alignment No. 3 (HWY-101 Bridge Crossing): This proposed pipeline alignment is essentially as identified on Figure 6 of the EIR (Highway 101 Bridge Attachment Route).

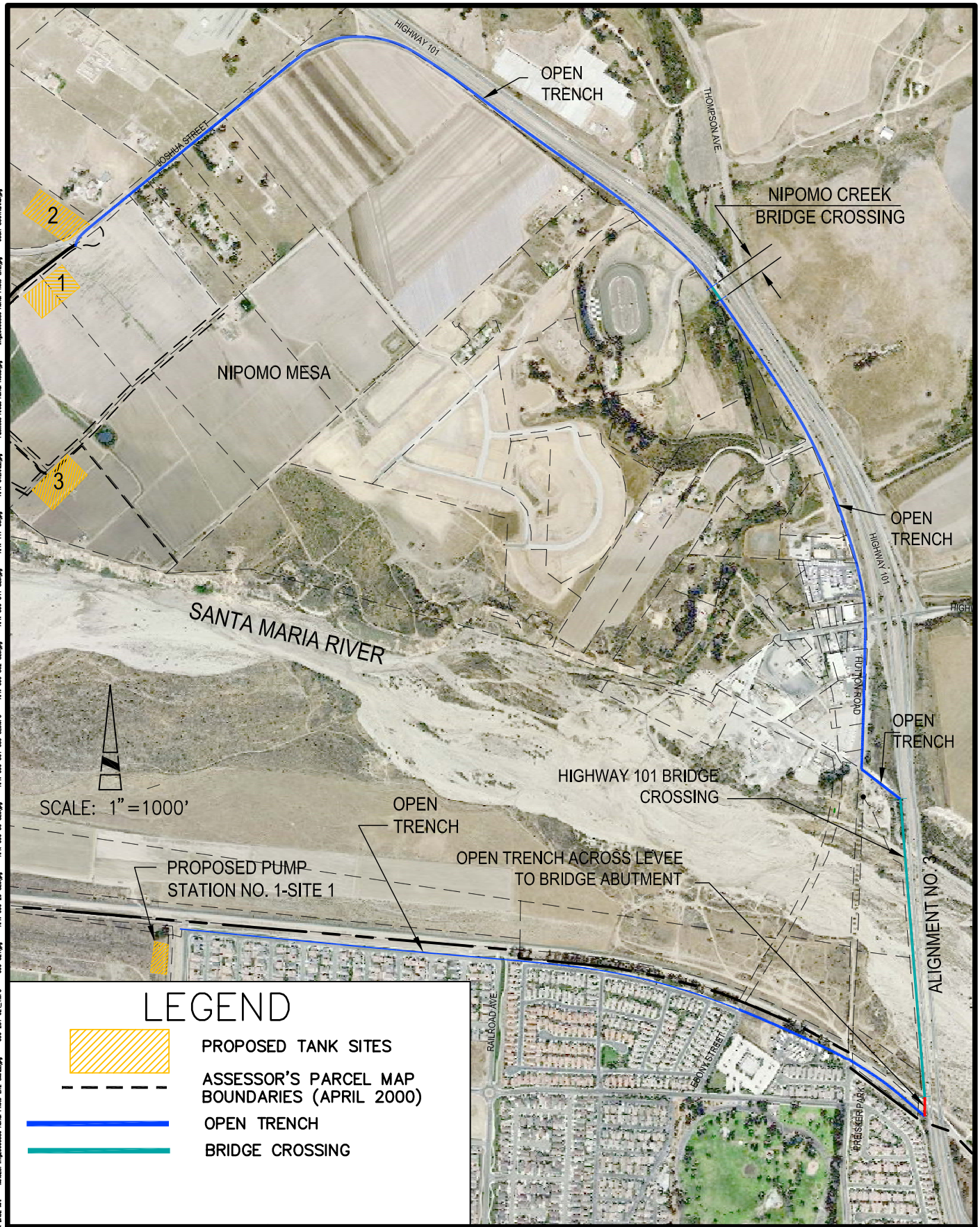
The proposed pipeline alignment begins at the northeastern end of the City of Santa Maria, just south of the intersection of Blosser Road and Atlantic Place. Near this point, the proposed 18-inch inside diameter pipeline originates at its connection to the Blosser Road Extension as shown on Figure 5-4. From here, the pipeline proceeds approximately 300-lf northward along Blosser Rd. via open-trench construction. At the intersection of Blosser and Atlantic, the pipeline proceeds easterly along Atlantic Place via open-trench construction for approximately 5900-lf towards the HWY-101 bridge southerly abutment. Near the bridge abutment, the pipeline is reduced to four (4) parallel 12.75-inch outside diameter (rationale is discussed later in this section), is attached to the existing bridge, and continues northerly for approximately 2100-lf. Following this bridge crossing, the pipeline is condensed to on 24-inch main and continues northeasterly toward Hutton Rd. for approximately 800-lf. The pipeline then continues northerly along the same route as Option 2A.

5.2 Alignment No. 1 – Western River Crossing

Alignment Refinement Details: Refinement of the preliminary alignment for the Western River Crossing, as described above, required consideration of significant physical challenges, existing site conditions and utilities, anticipated geotechnical conditions, right-of-way issues, environmental concerns, and methods of construction. Physical challenges include crossing the levee, Santa Maria River, and scaling the Nipomo bluffs at the north end of the river.

The Southernmost end of this alignment begins near the intersection of Blosser Rd. and Atlantic Place, at its connection to the Blosser Road Extension. The first physical challenge encountered by this alignment is the existing Santa Maria River Levee owned and maintained by Santa Barbara County Public Works (SBCPW). The current levee-crossing concept calls either for a bore-and-jacked steel casing installation under the levee, or scaling the levee structure via open trench construction. According to the County, open-trench installation was used for the CCWA pipeline levee crossing just downstream of the proposed crossing.

If the jacked steel casing is installed underneath the river levee, the depth of this casing must be sufficient to clear the existing rock slope protection on the levee face. It is also our understanding SBCPW is contemplating various projects to reinforce the existing levee structure. According to SBCPW staff, one such project involves driving sheet piles 40-ft deep through the top of levee to reinforce it. SBCPW will likely require the installation of short sections of sheet pile on both sides of the pipeline as a condition for approval of either crossing method.



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NCSD WATERLINE INTERTIE

ALIGNMENT 3 - BRIDGE CROSSING

BEC PROJECT NO. 19996.12

FIGURE 5-4

The final design depth, crossing technique, and final horizontal location must be coordinated with planned SBCPW projects involving the levee.

The Santa Maria River crossing poses the next challenge. As previously indicated, the first 700-lf will be installed via open-trench in order to minimize the length of directional drilling. As shown on Figure 5-1, the next 2500-lf will be installed by the Horizontal Directional Drilling (HDD) method to cross the active riverbed and scale the bluffs. The preliminary vertical and horizontal alignment for the HDD segment must consider entry/exit angles, minimum curvature radii for the drilled steel and carrier pipe, constructability issues, anticipated geologic conditions, and pipeline cover requirements to mitigate scour and provide sufficient confinement against slurry pressure to prevent "frac out".

It is our understanding the active riverbed crossing must consider tentative "pilot channels" planned by SBCPW for redirecting the river near the proposed alignment. The planned removal of surface material to construct this additional pilot channel must be considered when determining the required design depth to avoid scour for the proposed trenchless crossing. SBCPW staff indicated the pilot channel may be approximately 10-ft deep.

As indicated in the Preliminary Design Report by Jacobs Associates (see Appendix I), the vertical and horizontal components of this HDD segment are summarized as follows:

- Vertical alignment: Sweeping inverted arc in the vertical plane
- Horizontal alignment: Nipomo bluff end of alignment may require a horizontal curve to follow property lines and simplify the easement process
- HDD exit (top of bluff) approximately 100-ft higher than entrance
- Minimum depth at river = 54-ft
- Length of bore = 2,500-lf ±

The remainder of the alignment leading to the proposed reservoir site at Joshua Street is identified for open-trench construction and attempts to follow property lines to minimize the number of private properties traversed by the alignment.

Laydown Area: As shown on Figure 5-1, there is adequate area along Blosser Road Right-of-Way to accommodate pipe and HDD laydown requirements, as well as pipe jacking operations.

Geotechnical Considerations: Fugro evaluated preliminary geotechnical considerations and opinions for the pipeline portion of the project. (See Appendix II). Due to anticipated variable subsurface conditions along the western alignment, Fugro anticipates directional drilling operations will be relatively difficult. They recommend the drilling program design consider the complex soil stratigraphy and potential to encounter adverse drilling conditions. Geotechnical considerations that may affect the design and construction of the HDD alignment are discussed in detail in their report and primarily include the following:

- Widely fluctuating groundwater conditions
- Potential for running and caving of river materials at the HDD heading
- Potential for blowout of overburdened soil
- Potential for swelling and squeezing of fine grained soil materials
- Potential for encountering differing materials and conditions at various depths and locations during the drilling
- Potential for seismic settlement of pipe
- Potential for scour
- Potential for disturbance and instability of the northerly bluffs

Geotechnical considerations that may affect the design and construction of the jack and bore installation under the river levee include encountering unanticipated oversized rock that can jam boring equipment and halt operations. This method should also consider raveling, running, and swelling ground, as well as groundwater levels.

Carrier Pipe Sizing and Materials: As indicated in the hydraulic analysis, three pipe sizes were considered for the river-crossing segment of each alignment. The nominal sizes are as follows: 14-inch, 24-inch, and 30-inch inside diameter. 18-inch inside diameter pipe is required for the Nipomo and Santa Maria side pipelines.

Jacobs presented several carrier pipe material alternatives for the HDD installation in their report, including fusion-welded HDPE and welded steel pipe (WSP). It is anticipated C905 PVC transmission pipe or ductile iron will be used for all other pipe installations along this alignment.

Existing Utilities: Based on preliminary utility research and site reconnaissance, there is an existing 10-inch Conoco Phillips (CP) Oil pipeline due east of Alignment No. 1. The exact horizontal and vertical location is unknown at this time, but its approximate location is derived from utility maps provide by CP and is shown on Plate 1. It is anticipated this oil pipeline crosses the alignment between the bluffs and the proposed reservoir site.

Southern California Gas Company utility maps indicate a 12-inch high-pressure gas main along Joshua Street and Orchard Ave. Existing NCSD water and sewer lines, as well as dry utilities, also exist along these paved roads.

Existing utilities should not pose a significant challenge along the Alignment No.1 Corridor, as compared with the other alignment alternatives.

Easements, Right-of-Way, and Engineering Permits: Tarvin and Associates was retained by the District to provide an Estimate of Project Land Cost for anticipated easements and property acquisitions along

the alignments. Boyle Engineering prepared a series of Easement and Property Acquisition exhibits (See Appendix III) to serve as the basis for this appraisal analysis.

As previously stated, the refined route for Alignment No. 1 considers right-of-way and easement requirements in an effort to minimize the number of private properties traversed. As shown on Exhibits 2-4A of Appendix III, easements will be required over 8 separate properties along this alignment. It is anticipated 6 of the 8 properties along this alignment will require 30-ft wide Public Utility Easements (PUE) as well as 100-ft wide Temporary Construction Easements (TCE) to facilitate HDD and Jack and Bore operations. The other 2 properties shown on Figure 4A of the same Appendix will likely only require 30-ft PUE's due to their relatively straight alignment and proximity to the likely encumbered right-of-way delineated on the figure.

It is our understanding that Santa Barbara County Public Works will require the NCSD to execute a Secondary use Agreement for proposed work at the levee and the river crossing.

Environmental and Permits: Padre Associates evaluated environmental and permitting issues associated with each alignment (see Appendix IV). Due to the potential for frac-out to occur along the length of the HDD within the floodplain of the Santa Maria River, a 404 permit pursuant to the Clean Water Act (CWA) would be required from the United States Army Corps of Engineers (USACE). Additionally, a 401 permit per the CWA would be required from the Regional Water Quality Control board (RWQCB). Formal Section 7 consultation would be required with the United States Fisheries and Wildlife Service (USFWS) due to the presence of California Red-legged Frog (CRLF) within this alignment (Nipomo Mesa) and informal Section 7 consultation would be required with National Oceanic and Atmospheric Administration (NOAA) Fisheries for potential effects to the southern steelhead. Lastly, a Streambed Alteration Agreement (SAA) would be required from the California Department of Fish and Game (CDFG) and various other local and state agency permits. It should be noted, however, that the level of disturbance to the existing habitats of the Santa Maria floodplain, including waters of the U.S. and potential wetlands would be minimal with the HDD method. This would avoid and/or reduce the need for costly wetland mitigation and monitoring plans. Additionally, this would minimize disturbance to areas with the potential to support special-status species, such as coast horned lizard, Blochman's ragwort, and Nuttall's milk-vetch, and nesting raptors and migratory birds, which would in turn result in less short-term and long-term mitigation requirements.

Anticipated Construction Schedule for Pipeline Alignment (Blosser & Atlantic to Pump Station No. 2): The anticipated construction schedule is contingent upon many factors including, but not limited to, the final design-level study, as well as selection of contract packaging alternatives. The following summarizes the estimated construction duration for the pipeline components of this alignment. These durations are primarily "field" time and do not account for bidding, submittal review from the contractor, or overlap of construction activities:

- Santa Maria River Crossing = 4 to 5.5 months
  - Open trench and/or jack and bore pipe = 4 months
  - HDD pipe installation = 5.5 months (excluding bid, notice to proceed, submittal review)
- Nipomo-side transmission pipe to Pump Station No. 2 = 2 months

5.3 Alignment No. 2 (Option A and B) – Eastern River Crossing

Alignment Refinement Details: Refinement of the preliminary alignments for the Eastern River Crossing, as described above and shown on Figure No. 5-2, required consideration of significant physical challenges, existing site conditions and utilities, anticipated geotechnical conditions, right-of-way issues, environmental concerns, and methods of construction. Physical challenges to be dealt with include crossing the levee and Santa Maria River.

The upstream ends of these alignments begin near the intersection of Blosser Rd. and Atlantic Place, at its connection to the Blosser Road Extension. After proceeding eastward along Atlantic Place and then parallel to Poplar St., the first physical challenge is encountered by these alignments at the proposed Santa Maria River levee crossing. As previously indicated the levee is owned and maintained by Santa Barbara County Public Works (SBCPW). Crossing alternatives include jack-and-bore and open-trench construction, with installation of sheet piles required in the immediate vicinity of the pipeline crossing.

The Santa Maria River crossing poses the next challenge for both alignments – 2A and 2B. Alignment-specific details for the river crossings are summarized in the following paragraphs.

Option 2A – Alignment Along Old Railroad Route:

Once beyond the levee, the pipeline will proceed along the curved railroad alignment for approximately 1670-lf via open-trench construction as shown on Figure 5-2. HDD and open-trench construction methods were considered. Based on the preliminary analysis conducted by Boyle and Jacobs Associates, it appears this alignment may not be feasible for an HDD river crossing due to the following:

- This alignment may require drilling through a compound curve (a curve occurring simultaneously in the vertical and horizontal plane). The compound curve introduces risk and uncertainty for the bidding contractor. As stated in Jacobs Preliminary Design Report, it is difficult to control the drill tool through a compound curve. Therefore, it may be difficult to obtain competitive bids for this option.
- Pending further design-level analysis, it is anticipated the compound curve geometry will require the alignment to traverse land just west of the old curved railroad route (A.P.N. 090-341-023).
- As stated in the Jacobs report, the estimated required length of bore is 2400-lf for this option. This extends farther north into the Troesh properties than shown on Figure 5-2. The laydown area required for directional drilling (approx. 250-ft x 80-ft) as well as temporary construction and access easements will conflict with plant operations on the Troesh properties.

Therefore, it is assumed a relatively deep trench will be required to traverse the Santa Maria River bed. Based on existing hydraulic studies conducted for the Santa Maria River Bridge Expansion and the CCWA pipeline, it is anticipated that at least 25-ft of cover is required over top of pipe. The actual required pipe cover for open trench installation will need to be determined by a site-specific scour analysis.

The remainder of the alignment leading to the proposed reservoir site at Joshua Street is identified for open-trench construction and would primarily stay within public right-of-way along Hutton Rd. and Joshua St.

Option 2B – Alignment Along Abandoned 1917 State Highway Route:

Once beyond the levee, the pipeline would proceed along the relatively straight abandoned 1917 State Highway route for approximately 1800-lf via open-trench construction as shown on Figure 5-3. Based on the preliminary analysis conducted by Jacobs Associates, it appears this alignment may be feasible for an HDD river crossing. However, there is reason to believe that abandoned pile foundations for the old bridge exist and are still intact below grade. The depth of these piles is unknown, but they will likely conflict with the vertical drilling alignment for this option. Additionally, the existing utilities (described further below) along this corridor will also pose a hazard for HDD.

A relatively deep trench will be required to traverse the Santa Maria River bed along this alignment. As previously stated, the existing pile foundations may conflict with the pipeline construction. The pile foundations will need to be further explored and mapped in order to avoid conflicts with trenching operations across the riverbed. Existing piles may need to be cut and removed if conflicts with the proposed pipeline cannot be avoided.

Based on existing hydraulic studies conducted for the Santa Maria River Bridge Expansion and the CCWA pipeline, it is anticipated that at least 25-ft of cover is required over top of pipe. The actual required pipe cover for open trench installation will need to be determined by a site-specific scour analysis.

The remainder of the alignment leading to the proposed reservoir site at Joshua Street is identified for open-trench construction and attempts to stay within public right-of-way along Hutton Rd. and Joshua St

Laydown Area: Land just north of the levee (and south of the active riverbed) may be suitable for large-scale construction laydown during the dry season. Additional temporary construction easements will be required for the final laydown areas.

Geotechnical Considerations: Geotechnical considerations that may affect the design and construction of the HDD alignment are discussed in detail in their report and are summarized above under Geotechnical Considerations for Alignment No. 1.

Geotechnical considerations that may affect the design and construction of the jack and bore installation under the river levee include encountering unanticipated oversized rock that can jam boring equipment and halt operations. This method should also consider raveling, running, and swelling ground, as well as groundwater levels.

Since relatively deep open-trenches (approximately 27-ft to bottom of propose pipeline)[1] will be required for both options 2A and 2B, the following items will also need to be considered for the design-level study and Opinion of Probable Construction Cost:

- Temporary slopes and/or shoring requirements
- Site specific design parameters for shoring (to be used by contractor)

Carrier and Casing Pipe Sizing and Materials: As indicated in the hydraulic analysis, three pipe sizes are considered for the river-crossing segment of each alignment. The nominal sizes are as follows: 14-,

[1] Assumes 25-ft cover + 24-inch nominal pipeline. Required cover to be verified by site-specific scour analysis.

24-, and 30-inch inside diameter. 18-inch inside diameter pipe is required for the Santa Maria side pipelines.

Jacobs presented several carrier pipe material alternatives for the HDD installation in their report, including fusion-welded HDPE and welded steel pipe (WSP). It is anticipated C905 PVC transmission pipe or ductile iron will be used for all other pipe installations along this alignment.

Existing Utilities:

Option 2A – Alignment Along Old Railroad Route:

Based on preliminary utility research and site reconnaissance, there is an existing 8-inch Conoco Phillips (CP) Oil pipeline along this route. Southern California Gas Company utility maps also indicate both 6-inch and 12-inch high-pressure gas mains along this curved route. The exact horizontal and vertical locations are unknown at this time, but approximate locations are derived from utility maps provide by each utility. Existing utilities may pose a challenge along the Alignment No.2A corridor.

Option 2B – Alignment Along Abandoned 1917 State Highway Route:

Based on preliminary utility research and site reconnaissance, there is an existing 16" high-pressure gas main along this curved route. Overhead telephone and electrical lines and poles are visible along this route. The exact horizontal and vertical locations are unknown at this time, but approximate locations are derived from utility maps and field photographs.

It is understood existing NCSD water and sewer lines, as well as dry utilities, and high pressure gas mains, exist along Joshua Street and Orchard Ave.

Easements, Right-of-Way, and Engineering Permits: Tarvin and Associates was retained by the District to provide an Estimate of Project Land Cost for anticipated easements and property acquisitions along the alignments. Boyle Engineering prepared a series of Easement and Property Acquisition exhibits (See Appendix III) to serve as the basis for this appraisal analysis.

As previously stated, the refined route for Alignment No. 2A considers right-of-way and easement requirements in an effort to minimize the number of private properties traversed. As shown on Exhibit 8 of Appendix III, easements will be required over 3 separate properties along this alignment. It is anticipated all 3 properties along this alignment will require portions of 30-ft wide PUE as well as 100-ft wide TCE to facilitate pipe installation operations. Additional easements may be required once alignment is finalized.

It is our understanding that Santa Barbara County Public Works will require the NCSD to execute a Secondary use Agreement for proposed work at the levee and the river crossing.

Environmental and Permits: The permitting constraints associated with either alignment are essentially the same. The most critical issue is whether they involve HDD or open trench through the Santa Maria River floodplain. As such, the permitting requirements expected with these options within the Eastern River Crossing are discussed below in further detail:

HDD Option: Due to the potential for frac-out to occur along the length of the HDD within the floodplain of the Santa Maria River, a 404 permit pursuant to the CWA may be required from the USACE. Additionally, a 401 permit per the CWA would be required from the RWQCB. Otherwise a Frac-out Mitigation and Monitoring Plan will be required with the potential for an after-the-fact permit if a frac-out occurs. Formal Section 7 consultation would be required with the USFWS due to the potential for CRLF to occur within this alignment (Nipomo Creek and nearby areas) and informal Section 7 consultation would required with NOAA Fisheries for potential effects to the southern steelhead. Lastly, a SAA would be required from the CDFG and various other local and state agency permits. However the level of disturbance to the existing habitats of the Santa Maria floodplain, including waters of the U.S. and potential wetlands would be minimal with the HDD method. Furthermore, impacts to Nipomo Creek would be minimized by utilizing the existing bridge crossing. This would avoid and/or reduce the need for costly wetland mitigation and monitoring plans. Additionally, this would minimize disturbance to areas with the potential to support special-status species, such as coast horned lizard, Blochman's ragwort, and Nuttall's milk-vetch, and nesting raptors and migratory birds, which would in turn result in less short-term and long-term mitigation requirements.

Open Trench Option: With the implementation of this option, the pipeline would be installed within an open trench that would intersect the entire floodplain of the Santa Maria River. As such, a 404 permit would be required from the USACE and a 401 permit pursuant to the CWA would be required from the RWQCB. Formal Section 7 consultation would be required with the USFWS due to the potential for CRLF to occur within this alignment (Nipomo Creek and nearby areas) and informal Section 7 consultation would required with NOAA Fisheries for potential effects to the southern steelhead. Lastly, a SAA would be required from the CDFG and various other local and state agency permits. The level of disturbance to the existing habitats of the Santa Maria floodplain, including waters of the U.S. and potential wetlands would be substantial with the open trench method. This would result in the need for the preparation and implementation of potentially costly wetland mitigation and monitoring plans, which may involve up to 5 years of monitoring. Furthermore, the open trench method would result in disturbance to areas with the potential to support special-status species, such as coast horned lizard, Blochman's ragwort, and Nuttall's milk-vetch, and nesting raptors and migratory birds, which would in turn result in additional short-term and long-term mitigation requirements, including potential seed collection and restoration of special-status plant populations if present within the pipeline corridor.

Anticipated Construction Schedule for Pipeline Alignment (Blosser & Atlantic to Pump Station No. 2):
The anticipated construction schedule is contingent upon many factors including, but not limited to, the final design-level study, as well as selection of contract packaging alternatives. The following summarizes the estimated construction duration for the pipeline components of this alignment. These durations are primarily "field" time and do not account for bidding, submittal review from the contractor, or overlap of construction activities:

- Santa Maria River Crossing (Open trench and jack/bore pipe) = 8 months
- Nipomo-side transmission pipe to Pump Station No. 2 = 6 months

5.4 Alignment No. 3 – Highway 101 Bridge Crossing

Alignment and Concept Design Refinement: This alignment involves attaching the pipeline to one of the Santa Maria River Bridges on Highway 101. The bridges are approximately 2,100-foot long, 29-span bridges on I-girders. The bridges were seismically retrofitted in the late 1990's. Improvements included retrofits to footings and pier walls, as well as the addition of cable restrainers at the girders and abutments.

The first physical challenge encountered by this alignment is the existing Santa Maria River Levee and the Highway 101 southerly bridge abutment it ties into. Review of Santa Maria River Bridge As-Builts and site reconnaissance indicate it may be feasible to open-trench through the top of levee until the southerly abutment is met, then core through the approximately 8-inch thick concrete abutment end to gain access to the underside of bridge. Additional excavation and/or boring will likely be required to penetrate the rock facing on the abutment. Rebar locations and retrofitted seismic cable restrainers will need to be considered in selecting the core location.

Attaching the proposed pipeline to the existing bridge poses the next physical challenge. Section III-D of the project EIR identified a conceptual method for suspending the pipeline underneath the bridge deck. This method required coring through the space between girders and at the abutments. Based on our review of bridge record drawings, this method requires coring through 29 2-ft thick concrete diaphragms located between girders at each bridge pier as well as coring through 29 8-inch thick intermediate concrete diaphragms located between girders and staggered between the piers (see Figure 5-4). Preliminary discussions with Caltrans Division of Structures and consultation with coring contractors suggest this may be a feasible alternative. However, the following considerations must be taken into account prior to making a decision:

- Caltrans prefers we exhaust all other alternatives prior to pursuing this one.
- As previously indicated, cable restrainers tying diaphragms and girders to the top of piers were recently installed. These may need to be removed and reinstalled and/or avoided altogether when selecting the core drilling corridor under the bridge.
- The 2-ft thick concrete diaphragms to be cored are not perpendicular to the pipe alignment. Their skewed alignment will increase the complexity and cost of the coring operation.
- Bridge As-Built details indicate there is approximately 15 inches of separation between reinforcement steel bars in the concrete diaphragms. It is Boyle's opinion that this alternative might be suitable to accommodate at maximum a 12.75-inch outside diameter pipeline due to the reinforcement steel bar spacing; however, a smaller pipeline might be required from a construction standpoint to avoid conflicts with reinforcing steel and allow some tolerance for slight misalignment during coring operations.
- The pipe size limitation identified for this alternative will effectively be a hydraulic "bottleneck" in the NCSD intertie pipeline; unless four identical mains are installed across the bridge to create the same hydraulic conditions as are shown in the other alternatives. For consistency in the analysis of the alternatives the cost opinion is shown with the assumption that four 12.75" OD pipes can be installed on the bridge. It may not be possible to do so, further consultation with Caltrans will be required.
- As indicated in Fugro's Preliminary Geotechnical Report, a detailed structural and seismic analysis will likely be required by Caltrans to verify the suitability of the existing bridge to support the pipe, as well as the feasibility of the attachment method. Preliminary discussions with Caltrans staff indicated they saw no fatal flaws with this alternative; however, we agree

with Fugro that detailed analysis and documentation will need to be executed and provided to Caltrans to proof the design concept.

- These bridges are slated for upgrade and widening soon after the NCSD's proposed construction timeline of 2008. Discussions with Caltrans staff indicate their preference to incorporate the proposed pipeline corridor into their bridge widening design. The Caltrans bridge widening project manager indicated their timeline is as follows:
  - Begin site map and design phase: January 2007
  - If fully funded, list project for bid: 2009
  - Start construction: Winter 2010
  - Finish construction: Winter 2013

If NCSD pursues installing the pipeline on the existing bridge prior to the pending Caltrans widening project, it is likely to meet resistance from Caltrans.

Multiple other concepts for attaching the pipeline to one of the bridges were considered, including attaching the pipeline to one of the outside girders or bridge overhangs. Consideration of these concepts indicates they may not be structurally or economically feasible for the pipe sizes in consideration.

The remainder of the alignment leading to the proposed reservoir site at Joshua Street is identified for open-trench construction and attempts to stay within public right-of-way along Hutton Rd. and Joshua St.

Laydown Area: As shown on Figure 5-4, there is an approximately 60-ft wide strip of land suitable for small-scale construction laydown just east of the Preisker Lane culdesac and south of the river levee. However, this area is immediately bordered on the south by single-family homes. Assuming construction for this alternative occurs during the summer, land just north of the levee may be suitable for large-scale construction laydown.

Geotechnical Considerations: A detailed structural and seismic analysis is likely required by Caltrans to verify the suitability of the existing bridge to handle the additional loads introduced by the proposed pipeline. Specifically, the existing foundations will likely need to be evaluated.

Pipe Sizing and Materials: As previously indicated, the maximum pipe outside diameter (O.D.) permissible for the bridge crossing is restricted by the proposed core method of installation. The 14-inch O.D. pipe cited in the project EIR is not feasible due to the existing concrete reinforcement bar spacing; approximately only one-inch is left for construction error and/or misalignment along the core.

Existing Utilities: As indicated for Alignments No. 2a and 2b, the proposed alignment will parallel and likely cross an existing 10-inch CP oil pipeline along Atlantic Place. High voltage transmission lines will be traversed at Railroad and Atlantic Place. Near Ebony Street, an 8-inch CP oil pipeline followed by two high- pressure natural gas lines (6-inch and 10-inch) will be crossed. Further east along the alignment near the Preisker Park Lane culdesac, a 16-inch high-pressure natural gas line will be encountered. Overhead telephone and electrical lines are present, as well.

Easement, Right-of-Way, and Engineering Permits: The refined route for Alignment No. 3 considers right-of-way and easement requirements in an effort to minimize the number of private properties traversed. As shown on Figure 5-4, open-trench portions of this alignment along Atlantic Place, Poplar Street, Hutton Road, and Joshua Street are intended to be within public Right-of-Way.

It is our understanding Caltrans will require NCSD to secure an encroachment permit for proposed construction within their Right-of-Way, including the bridge crossing and the proposed open-trench installation to transition from the northern bridge abutment to Hutton Road.

Based on discussions with Santa Barbara County Public Works staff, the NCSD will be required to execute a Secondary use Agreement with SBCPW for proposed work at the levee and the river crossing.

Environmental and Permits:

This alternative appears to avoid discharge of any dredge and/or fill material into the Santa Maria River or Nipomo Creek, depending on the final location of the exit hole for the jack and bore operation (if pursued) near the southern end of the Highway 101 Bridge. If completed upslope of the USACE jurisdiction (i.e., above the ordinary high water mark or OHWM), then no 404 or 401 permits pursuant to the CWA would be required for this alignment. Furthermore, this alignment could avoid the need for a SAA from CDFG, if no impacts would occur to the extent of the riparian corridors within the Santa Maria River and Nipomo Creek. However, permits would be required from the various local and state agencies with jurisdiction over the bridges and roadways of remaining trenching operations to complete this proposed pipeline alignment.

Anticipated Construction Schedule for Pipeline Alignment (Blosser & Atlantic to Pump Station No. 2):
The anticipated construction schedule is contingent upon many factors including, but not limited to, the final design-level study, as well as selection of contract packaging alternatives. The following summarizes the estimated construction duration for the pipeline components of this alignment. These durations are primarily "field" time and do not account for bidding, submittal review from the contractor, or overlap of construction activities:

- Santa Maria River bridge crossing = 5 months
- Nipomo-side transmission pipe to Pump Station No. 2 = 6 months

5.5 Numerical Ranking of Alignments

The following table ranks alignments considered in this Section. Table 5-1 describes the qualitative basis for evaluation. Table 5-2 indirectly evaluates cost by comparing intertie pipe lengths for each alignment. The ranking yielded results that are very close for each alternative, due to the significant physical challenges associated with each alignment.

However, the geotechnical considerations ranking associated with Alignment 1 could be increased from a 1 to a 3 by completion of a design-level soils investigation, in order to reduce uncertainty in the soil profile along the proposed HDD route. That would result in Alignment 1 having a score of 15, and becoming the lead ranking alternative according to this evaluation.

Table 5-1 Legend for Qualitative Comparison of Alignments

Apparent Constructability	3	Straight forward construction; perceived constructible
	2	Moderately difficult construction; less constructible
	1	Difficult construction; need special equipment/experience
Geotechnical Considerations	3	Optimal conditions; no deep trench or HDD
	2	Moderate conditions; temporary slopes for deep trench
	1	Difficult conditions; varying soil profile for HDD
Pipe Size	2	Optimal case; pipe size not restricted
	1	Worst case; size restricted along alignment (bottleneck)
Existing Utilities	3	Minimal utility conflicts anticipated along corridor
	2	Moderate utility conflicts anticipated along corridor
	1	Extensive utility conflicts anticipated along corridor
Intertie Pipe Length (does not include City of Santa Maria or NCSD upgrades)	3	Optimal case: (approx. 0-9,000 lf)
	2	Moderate case: (approx. 9,001 – 18,000 lf)
	1	Worst case: (approx. 18,001 + lf)
Easement and R.O.W.	3	Easements Req'd for 0 – 3 parcels
	2	Easements Req'd for 4 – 6 parcels
	1	Easements Req'd for 7 or more parcels
Environmental	2	Low potential for biological-related mitigation
	1	High potential for biological-related mitigation

Table 5-2 Qualitative Alignment Comparison

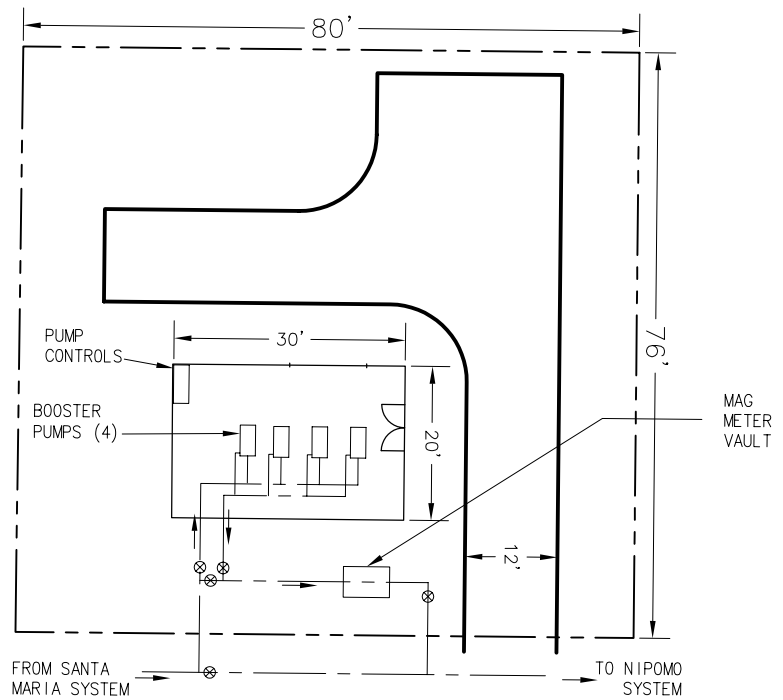
	Alignment 1 (West River,HDD)	Alignment 2a (East River, Old Railroad)	Alignment 2b (East River, Old Highway)	Alignment 3 (Hwy-101 Bridge)
Apparent Constructability	1	2	2	1
Geotechnical Considerations	1	2	2	3
Pipe Size	2	2	2	1
Existing Utilities	3	1	2	2
Pipe Length[1]	3 (6,500 lf)	1 (16,470 lf)	1 (17,600 lf)	1 (18,900 lf)
Easement and R.O.W.	1	2	3	3
Environmental[2]	2	1	1	2
Overall Ranking[3]	13	11	13	13

Note:
1. Stated lengths do not include upgrades to City of Santa Maria or NCSD existing distribution systems
2. Environmental ratings derived from Table 3 - Summary of Permitting Requirements, Permitting Analysis by Padre Associates.
3. Largest value for "Overall Ranking" indicates preferred alignment.

6.0 Santa Maria Water System Upgrades

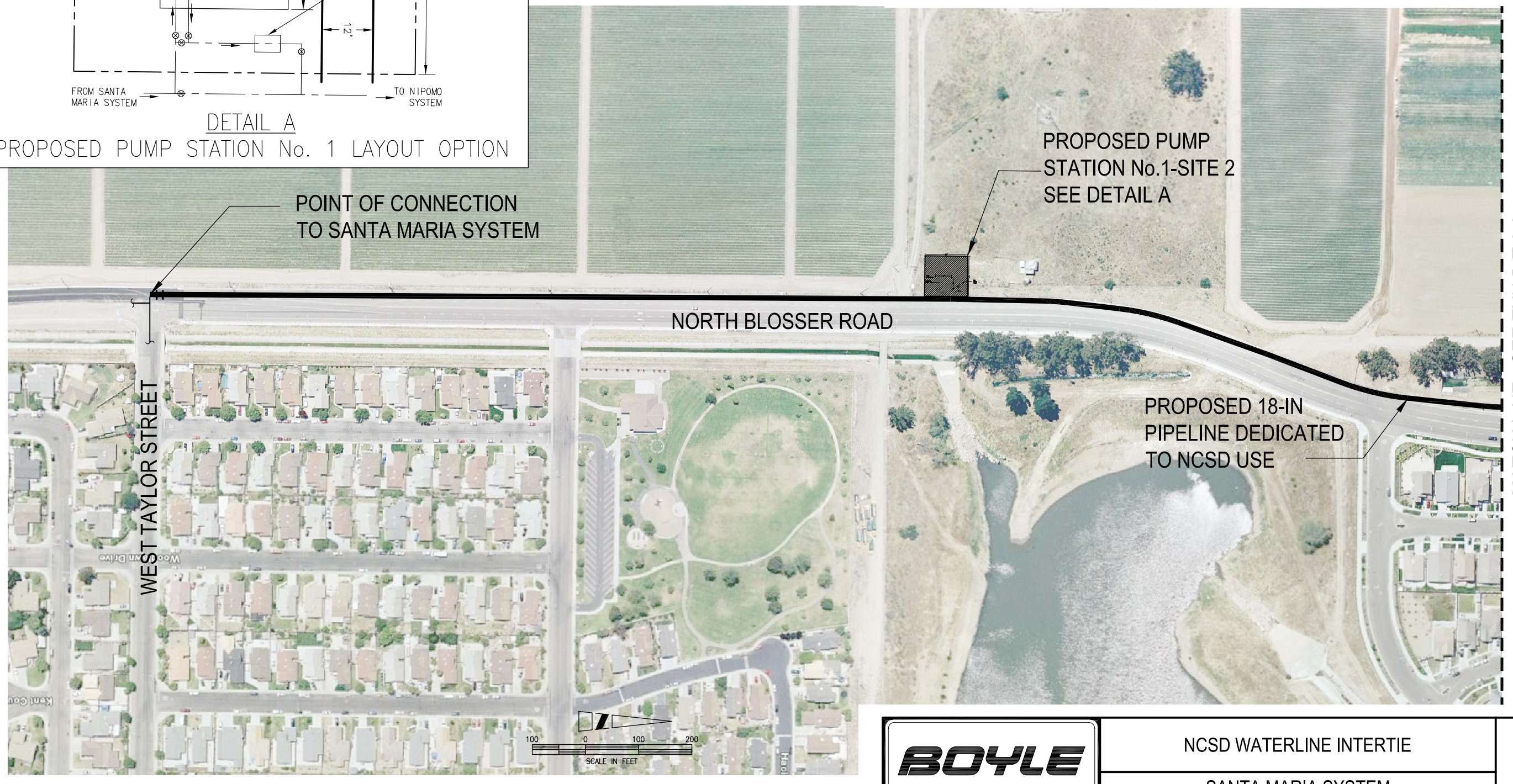
As identified above in the Alignment Descriptions of Section 5, the proposed pipeline alignments begin at the same common point – south of Blosser Road and Atlantic, near the Pump Station No. 1 site. EIR Section III.D-Connection Points indicates the proposed waterline intertie may connect to one of the City of Santa Maria's 12-inch water mains located in the northwest section of the City's potable water distribution system. Review of the City's Water Atlas indicates the existing waterlines are 10-inch at the end of Blosser Rd., 12-inch at the end of Ebony St., and 10-inch at the end of Preisker Lane.

The City has indicated it will not allow the proposed project to impact water pressure along the northernmost City boundary. In their opinion, it is not acceptable to serve the project from the existing 10-inch waterlines since connecting at this location may result in unacceptable pressure fluctuations. To resolve this, the City of Santa Maria has requested the NCSD construct a dedicated 18-inch water main along North Blosser Road between Taylor Street and Atlantic Place, approximately 5000 linear feet. This transmission main will extend the existing 24-inch water main located at Taylor and Blosser. See Figures 6-1 and 6-2 and Appendix XIII.



DETAIL A

PROPOSED PUMP STATION No. 1 LAYOUT OPTION



BOYLE ENGINEERING CORPORATION	NCSD WATERLINE INTERTIE SANTA MARIA SYSTEM IMPROVEMENTS	BEC PROJECT NO. 19996.12	FIGURE 6-1

DWG: W:\Nipomo CSD (19996)\Waterline Intertie Project 19996.12\Phase 4 – UPDATE to Draft Prelim Engr Memo\CAD\Exhibits\Figure 6-1 & 6-2.dwg USER: jfroelicher
DATE: May 30, 2008 11:58am XREFS: IMAGES: Blosser Road Aerial.jpg

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BOYLE ENGINEERING CORPORATION	NCSD WATERLINE INTERTIE	BEC PROJECT NO.	FIGURE
	SANTA MARIA SYSTEM IMPROVEMENTS	19996.12	6-2

DWG: W:\Nipomo CSD (19996)\Waterline Intertie Project 19996.12\Phase 4 – UPDATE to Draft Prelim Engr Memo\CAD\Exhibits\Figure 6-1 & 6-2.dwg USER: jfroelicher
DATE: May 30, 2008 11:57am XREFS: IMAGES: Blosser Road Aerial.jpg

7.0 Reservoir Storage Evaluation

As discussed in Section 3 of this report and the EIR, reservoir storage may be required at the Pump Station No. 2 location. Recommended size for the reservoir(s), and the cost/benefit for including them in the project, are discussed in Section 3. Boyle evaluated costs of prestressed concrete and welded steel reservoirs under various configurations in the Draft Preliminary Memorandum. Table 7-1 below summarizes various reservoir size alternatives, including reservoir configurations and relative costs for various pre-stressed concrete reservoir options. Note, costs for architectural treatment, piping/valving, fencing, roadways, etc., are in addition to this. In addition to the different reservoir size options, three general reservoir profiles are considered: reservoirs built at grade, reservoirs half-buried, and reservoirs fully buried.

Table 7-1 Reservoir Storage Alternatives - Prestressed Concrete Option

Alternative		Storage Volume	Tank Dimensions[1]		Conceptual Cost (Millions of Dollars)		
			Diam.	Ht.	No Bury[2]	Half Bury[3]	Full[4] Bury
1	EIR	8.4 MG (2-4.2 MG Each)	134-ft	40-ft	$5.60	$5.77	$5.94
2	EIR (one tank)	8.4 MG (one tank)	189-ft	40-ft	$4.80	$4.97	$5.14
3	Constant delivery at design flow (3000 AFY, 1860 gpm)	2.5 MG (2-1.25 MG Each)	75-ft	38-ft	$2.60	$2.65	$2.70
4	Constant delivery at design flow (3000 AFY, 1860 gpm)	2.5 MG (one tank)	106-ft	38-ft	$2.10	$2.15	$2.20
5	Constant delivery at design flow (3000 AFY, 1860 gpm)	0.5 MG (one tank)	63-ft	22-ft	$0.85	$0.86	$0.87

Notes:
1. Tank dimensions assume adequate freeboard.
2. PSCT (prestressed concrete tank): Conceptual cost includes only the cost of tank construction and standard tank appurtenances. Costs for architectural treatment, subgrade preparation, piping/valving, fencing, roadways, etc., are in addition to this. The following unit costs were based on correspondence with DYK Tanks.
    a. $0.67/gallon for 2-4.2 MG tanks
    b. $0.57/gallon for 1-8.4 MG tank
    c. $1.04/gallon for 2-1.25 MG tanks
    d. $0.84/gallon for 1-2.5 MG tank
    e. $1.70/gallon for 1-0.5-MG tank

3. Accounts for excavation at $5/yd^3, backfill at $5/yd^3. Average additional unit cost for excavation/backfill estimated as $0.02/gallon for half-buried tanks.
4. Accounts for excavation at $5/yd^3, backfill at $5/yd^3. Average additional unit cost for excavation/backfill estimated as $0.04/gallon for fully-buried tanks.

Welded Steel Reservoir Option

Table 7-2 below summarizes the reservoir storage evaluation, including reservoir configurations and relative costs for various welded steel reservoir options. Note, costs for piping/valving, fencing, roadways, etc., are in addition to this (estimated costs for these items are accounted for in the Opinions of Probable Construction Costs presented in Section 11 of this memorandum). The cost of interior and exterior coatings are addressed separately under the "Coating/Lining" column.

Estimated life cycle costs (LCC) for reservoir linings and coatings are summarized for each configuration under the "50-yr LCC" column. The 50-yr LCC assumes recoat/reline of the reservoirs every 15 years, for a total of 3 anticipated events. The LCC assumes a 3% cost escalation per year. Due to corrosion and long-term maintenance concerns with coatings, burial of steel water storage tanks is discouraged so only above-ground steel tanks were considered.

Table 7-2 Reservoir Storage Alternatives – Welded Steel Option

Alternative		Storage Volume	Tank Dimensions[1]		Conceptual Cost (Millions of Dollars)		
			Diam.	Ht.	Tank Only[2]	Coating/ lining[3]	50-yr LCC[4]
1	EIR	8.4 MG (2-4.2 MG Each)	134-ft	40-ft	$5.20	$0.90	$7.90
2	EIR (one tank)	8.4 MG (one tank)	189-ft	40-ft	$4.90	$0.79	$7.30
3	Constant delivery at design flow (3000 AFY, 1860 gpm)	2.5 MG (2-1.25 MG Each)	75-ft	38-ft	$1.90	$0.37	$3.00
4	Constant delivery at design flow (3000 AFY, 1860 gpm)	2.5 MG (one tank)	106-ft	38-ft	$1.70	$0.31	$2.60
5	Constant delivery at design flow (3000 AFY, 1860 gpm)	0.5 MG (one tank)	63-ft	22-ft	$0.65	$0.11	$1.02

Notes:
1. Tank dimensions assume adequate freeboard.

2. WST (welded steel tank): Conceptual cost includes the cost of steel tank, standard tank appurtenances, and concrete ringwall foundation construction. The following unit costs are based upon correspondence with steel tank contractors and conceptual cost opinions:
    a. $0.62/gallon for 2-4.2 MG tanks
    b. $0.59/gallon for 1-8.4 MG tank
    c. $0.77/gallon for 2-1.25 MG tanks
    d. $0.69/gallon for 1-2.5 MG tank
    e. $1.30/gallon for 1-0.5 MG tank
3. Reservoir exterior coating and interior lining are estimated as $6/ft^2 of surface coated or lined. This assumes an epoxy-based paint system.
4. 50-yr LCC assumes recoat/reline every 15 years (3 total events).

Storage Recommendations

Section 3 of this report discusses the hydraulic analyses and recommends a volume of 500,000 gallons for the project storage. Additionally, the expected hydraulic grade from the Santa Maria system indicates that Pump Station No. 1 may not be required to deliver water to the project storage reservoir (for flows up to 1,860-gpm). The hydraulic profile shown in Figure 3-1 displays a maximum water surface elevation of 300-feet, which assumes buried tanks. Assuming a minimum pressure at the Santa Maria POC of 60-psi, theoretically water could be delivered by gravity with a storage tank water surface elevation as high as 318-feet. (This accounts for the 6-feet head loss due to friction and assumes 10-feet of loss for valves and minor losses). However, a minimum pressure is not currently guaranteed. If installation of Pump Station No. 1 is delayed, buried storage is recommended to lower the hydraulic pressure required to deliver water to storage. Welded steel is not recommended for buried applications.

Therefore, a 0.5-MG buried, pre-stressed concrete tank is recommended for the project. If a minimum pressure above 60-psi is guaranteed in the revised agreement between the City and District, storage may not be required or above-ground concrete or welded steel tanks may be acceptable.

8.0 Potential Reservoir and Pump Station Sites

This section describes the sites examined for the two pump stations and the reservoir. The reservoir site will be shared with Pump Station No. 2. Three potential sites are proposed for the reservoir and Pump Station No. 2, and two potential sites for Pump Station No. 1. The need for these facilities, and potential for eliminating one or more of them is discussed in Section 3.0.

As part of the 2006 Draft Memorandum, a visual impact analysis was prepared by FIRMA to simulate the effect of the proposed reservoirs (Sites 1 and 2 only) and Pump Station No. 1 (Site 1 only) on the visual setting. These simulations show the approximate outline of the proposed facilities from key viewpoints around the proposed sites. Simulation viewpoints were selected to show representative views for the area where the proposed facilities would be most visible. Simulations are based on preliminary site plans prepared by Boyle as presented in Appendix III, which include two 1.25-MG reservoirs built at grade. The Visual Impact Study Report is included in Appendix VI.

8.1 Site Descriptions

Pump Station No. 1, Site 1 (Durley, APN: 117-030-061)

Access: This site is currently uncultivated and is overgrown with brush. Cultivated farmland borders this site on the west, a flood control ditch borders it on the east, and the Santa Maria River levee borders it on the north. Blosser Road is adjacent to the site; however, the existing SBCPW drainage channel complicates access to the proposed pump station location. Access may be limited to existing farm access roads and/or County of Santa Barbara land just south of the levee.

Visibility: Due to the relatively short height of this structure, visual impact would not likely be significant. However, City staff has stated they would not likely support construction of Pump Station No. 1 as proposed in the EIR. Landscape screening may mitigate City concerns with locating the pump station in a residential area.

Pump Station No. 1, Site 2 (Mapleton Communications, LLC, APN: 117-030-019)

Access: This property is currently used for two radio towers. The site is accessible by Blosser Road, and potentially through a farming access road located to the south. It is not obstructed by the SBCPW drainage channel, as with proposed Pump Station No. 1, Site 1.

Visibility: As with Site 1, visual impact would not likely be significant due to the relatively short height of this structure. The property is located along Blosser Road across from a storm water detention basin and surrounded by agricultural fields. Landscaping or other screening could be utilized to lessen visual impact if desired.

Pump Station No. 2 / Reservoir, Site 1 (Linda Vista Farms, APN: 090-291-041)

Access: This site is currently used to commercially farm strawberries, and is accessible from a farm entry along Joshua Street. Due to the close proximity to the intersection of Joshua Street and Orchard Ave., as well as narrow shoulders, access to the site may be hazardous for large vehicles during construction. However, the District will routinely use small vehicles for inspection and maintenance.

Visibility: Based on the visual impact study, Reservoir Site No. 1 is only briefly and distantly visible from the Highway-101 viewpoint as shown in Appendix VI. The reservoirs are visible from viewpoints along Orchard Ave, including the 7th Day Adventist Church and buildings just west of the Orchard Ave./Joshua Street bend.

Connection to Distribution System: The reservoir site will connect to the existing NCSD water distribution system or NCSD upgrades at Joshua Street.

Pump Station No. 2 / Reservoir, Site 2 (CCC 7th Day Adventist, APN: 090-281-024)

Access: This site is currently used to commercially farm strawberries, and is accessible from a farm entry along Orchard Avenue near the entrance to the 7th Day Adventist Church. Due to the close proximity to the intersection of Joshua Street and Orchard Ave., as well as narrow shoulders, access to the farm entry may be hazardous for large vehicles during construction. However, the District will routinely use small vehicles for inspection and maintenance.

Visibility: Reservoir Site No. 2 is not visible from the Highway-101 viewpoint as shown in Appendix VI. The reservoirs are visible from viewpoints along Orchard Ave., including the 7th Day Adventist Church and building just west of the Orchard Ave/Joshua Street bend.

Connection to Distribution System: The reservoir site will connect to the existing NCSD water distribution system or NCSD upgrades at Joshua Street.

Pump Station No. 2 / Reservoir, Site 3 (Linda Vista Farms, APN # 090-291-040 & -042)

This site, located at the north end of the river crossing for Alignment No. 1, would provide the lowest practical tank elevation for this alignment alternative. For below-grade installation, the proximity to the horizontal direction drilling of the river crossing presents the potential to couple the excavation efforts, potentially reducing costs.

Access: This site is currently used for commercial farming and is accessible via farm access roads with an entrance along Joshua Street. Due to the close proximity to the intersection of Joshua Street and Orchard Ave., as well as narrow shoulders, access to the site may be hazardous for large vehicles during construction. However, the District will routinely use small vehicles for inspection and maintenance.

Visibility: A visual impact study has not been performed. However, if buried tanks are installed, potential visual impact would be minimal and limited to the pump station structure.

Connection to distribution system: The reservoir site will connect to the existing NCSD water distribution system or NCSD upgrades at Joshua Street.

8.2 Summary of Visual Impact Study

Pylons (or story-poles) were erected at or near the center of each facility for the purpose of providing a vertical reference scale in perspective. At Pump Station No. 1, the pylons were set up within Blosser Road right-of-way, approx. 50 to 60 feet east of the proposed building location. At Pump Station No. 2 / Reservoir Site 1 (Linda Vista Farms) the pylons were approximately located at tank centers. At Site 2 (CCC 7th Day Adventist) the pylons were located along an existing farm access road, approximately 50-ft east from tank centers. The farmer leasing this property specifically requested his strawberry beds not be disturbed.

Right-of-entry agreements for proposed Reservoir Site No. 3 and Pump Station No. 1 Site 2 were not available for this visual analysis.

The following criteria served as the basis for the visual simulations:

- Reservoir Sites 1 and 2
  - Two-1.25 MG Welded Steel Reservoirs (at grade), side by side
  - Each Reservoir: 76-ft diam. x 38-ft tall at sidewall
  - Reservoir foundation 1-ft tall above grade (Reservoir sidewall sits on top of this)
  - 3-ft Radius knuckle at top of sidewall
  - ¾-inch to 1-ft (Vertical:Horizontal) pitch towards center of reservoir roof
- Pump Station No. 1 and 2
  - One 30-ft x 20-ft concrete masonry unit building
  - Wall height: 12-ft
  - Peaked roof

9.0 Easements, Right-Of-Way, and Property Acquisition

Tarvin and Associates was retained by the District to provide an Estimate of Project Land Cost for anticipated easements and property acquisitions along the project alignments, from Pump Station No. 1 to Pump Station No. 2.

As part of this effort, Boyle performed the following tasks to assist Tarvin and Associates with their analysis:

- Ordered and provided Preliminary Title Reports for affected parcels
- Prepared and provided Preliminary Easement and Property Acquisition Exhibits
- Responded to inquiries for project information
- Performed additional property ownership research for select parcels

Preliminary Title Reports: Preliminary Title Reports were ordered from First American Title Company and provided to Tarvin and Associates for the following properties. It is anticipated additional title reports may be required once the project alignment is finalized and proceeds into the design phase.

- APN: 117-03-61, 83, & 84
- APN: 090-291-036 (Purdon)
- APN: 090-281-024 (CCC Assn. of 7th Day)
- APN: 090-341-033, 002, & 023 (Biorn)
- APN: 090-291-039, 040, 041, & 042 (Linda Vista Farms)
- APN: 090-341-019 (McLanahan)
- APN: 090-341-044 (Randall)
- APN: 090-341-043 (SLO County)
- APN: 090-302-016 (Troesh)

Easement and Property Acquisition Exhibits: Using the District's available property information, available aerial photography, County Assessor's Maps, and the Boyle Alignments-Base Map (See Plate 1), a series of preliminary Easement and Property Acquisition Exhibits was prepared to serve as the basis for the Estimate of Project Land Cost (Figure 9-1. See Appendix III for individual exhibits). These exhibits are not based on survey data, nor has a licensed Surveyor verified them. Property Acquisition Exhibit 1 illustrates the proposed property acquisition for Pump Station No. 1, Site 1. Easement Exhibits 2, 3, and 4A, are specific to Alignment No. 1 – Western River Crossing. Property Acquisition Exhibits 4B, 5, and 6, illustrate the proposed property acquisitions for the Reservoir/Pump Station No. 2 sites. Easement Exhibit 7 is specific to Alignment No. 3 – Highway 101 Bridge Crossing. Easement Exhibit 8 is specific to Alignment No. 2A – Old Railroad Route. Pump Station No. 1, Site 2 had not been identified at the time and is not included in Appendix III or the Tarvin and Associates study.

As indicated in the Pipeline Alignments Study of this memorandum, both Public Utility Easements (PUE) and Temporary Construction Easements (TCE) will be required for the Nipomo Intertie Pipeline Project. PUE's will be 30-ft wide as shown on Detail B of Plate No. 1. TCE's will be 100-ft wide (35-ft each side of the PUE) as shown on Detail A of that plate. The

minimum required width for TCE's is based on construction requirements for the proposed HDD pipeline installation method.

Project Coordination with Tarvin and Associates: Project and easement details were provided to Tarvin and Associates via electronic mail and telephone conversations. Items such as proposed facility footprints, proposed uses, proposed pipeline installation methods, anticipated construction durations, and miscellaneous other project details and inquiries posed by Tarvin and Associates were addressed.

Property Ownership Research: The County Assessor's Maps and Preliminary Title Reports did not provide clear property ownership/rights information for two of the parcels considered in this analysis. Additional research was performed for the following subject parcels to verify ownership and rights:

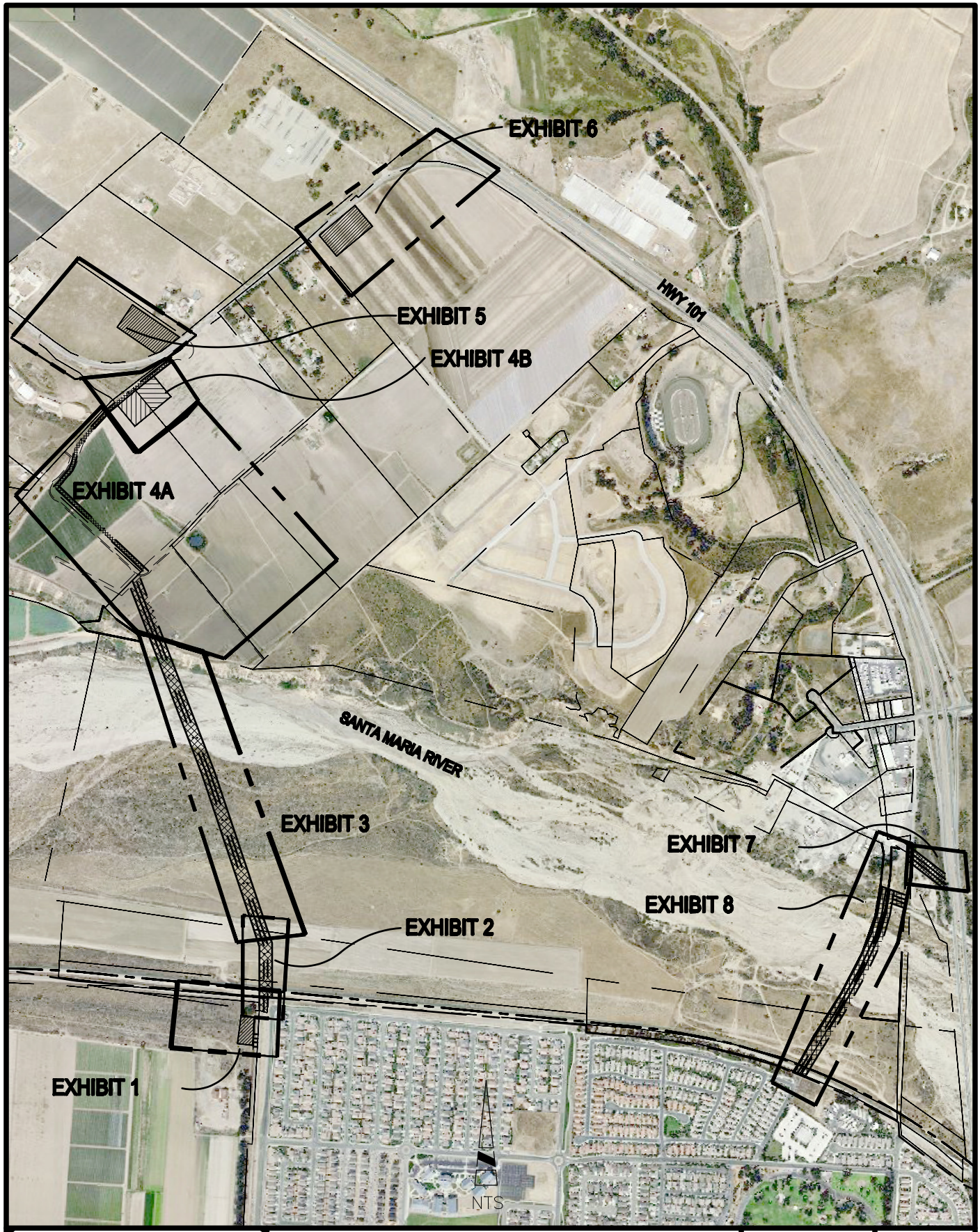
- Strip of land straddling Santa Maria-side levee at location where Alignment No. 1, Western River, crosses the levee (see Easement Exhibit 2 in Appendix III).
- Strip of land along the western shoulder of HWY-101, just north of the Santa Maria River Bridges (see Easement Exhibit 7 in Appendix III).

Strip of Land along Levee:

The Preliminary Title Report for APN: 090-341-019 indicated an Easement for Flood Control along the levee within the subject area. The Santa Barbara County Public Works Department (SBCPW) was contacted and they verified ownership as follows: SBCPW owns 130-ft north and 70-ft south of the Levee Control Line (see Easement Exhibit 2 in Appendix III) in the subject area.

Strip of Land along HWY-101:

Boyle contacted Caltrans Right-of-Way (ROW) and Relinquishment staff to verify if the subject strip of land is State Right-of-Way. Based on review of Caltrans ROW maps and discussions with Caltrans staff, it appears the land in question is State ROW. However, Caltrans has indicated the possibility of future relinquishments to San Luis Obispo County for nearby improvement to the adjacent Hutton Road. It is understood an encroachment permit will be required to traverse the State ROW as shown on Exhibit 7 of Appendix I.



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NCSD WATERLINE INTERTIE

EASEMENT /PROPERTY ACQUISITION INDEX

BEC PROJECT NO. 19996.12

FIGURE 9-1

10.0 Permitting and Environmental Considerations

The following provides a summary of the permitting issues and requirements for the Waterline Intertie Project alternatives and options, as described further in Appendix IV. A summary of the permitting requirements is presented in Table 10-1, followed by recommendations on a permitting strategy, and required plans and surveys. Plate 2 illustrates permitting constraints.

Status of ongoing biological surveys, data review efforts, and initial consultation with the agencies is summarized in Appendix IV. During the summer of 2006, and in winter of 2007, Padre Associates (Padre) performed California Red-Legged Frog protocol surveys along the proposed project routes, bounded by Blosser Road and Atlantic Place (on the south side) and Orchard Road and Joshua Street (on the north side). On February 29, 2008 an additional biological resource survey was conducted by Padre along the Blosser Extension, Alignment 1 corridor, and along Orchard Road to Southland Street to identify existing special-status species or areas containing suitable habitat for special-status species within the project impact area. This report is also included in Appendix IV, and will be included in the biological impact component of the revised draft EIR for the project.

10.1 Permitting Issues

Biological Resources: The preliminary review of the project alternatives and site survey(s) conducted to date identified potential constraints related to potential habitat for protected species within the Santa Maria floodplain and other wetland areas of the project site. The following are recommendations to minimize impacts to biological resources:

- Several CRLF protocol-level surveys have been conducted, and confirmed presence of CRLF on the mesa. Potential impacts to the CRLF and associated habitat areas can be avoided and/or minimized through additional route-deviations and/or adjustments. The March 2008 Biological Resource Survey Report by Padre (Appendix IV) recommends several mitigation measures, including a minimum buffer of 25-feet between construction activities and all known CRLF habitat.
- HDD across Santa Maria River would minimize impacts to the floodplain and existing riparian scrub habitat areas. This would minimize the potential impacts to a number of special-status species with the potential to occur in the area (e.g., coast horned lizard, nesting raptors and migratory birds, etc.).
- Rare plant species (Blochman's ragwort and Nuttall's milk-vetch) are located within the upper banks of the Santa Maria floodplain (both north and south). Blochman's ragwort was observed within the proposed project area during the February 29, 2008, field survey. A scattered population was observed in the alluvial scrub habitat south of the Santa Maria River channel. Botanical surveys will be required to determine the likelihood of impacts within the final selected pipeline alignment. The impacts to rare plants can be avoided through route-deviations and/or through seed collection and restoration, as necessary.

Wetlands / Waters of the U.S. The preliminary review of the project alternatives and site survey(s) conducted to date at the site identified potential constraints related to regulated waters of the U.S. and wetlands. Following are recommendations to minimize impacts to wetlands and Waters of the U.S.:

- HDD across Santa Maria River would minimize impacts to the floodplain and existing riparian scrub habitat areas. This would minimize the impact to waters of the U.S. and wetlands throughout this area.
- If feasible, avoid wetland and/or riparian scrub areas, particularly those that support dense stands of willows, for trenches, bore locations, and construction staging areas. This would be especially important during the selection of final HDD exit points within the floodplain of the Santa Maria River, which offers potential habitat for listed species, particularly a variety of nesting migratory birds. Whenever possible, keep construction activities within previously disturbed or developed areas to avoid impacting sensitive habitat areas. A wetland assessment will be required to determine the likelihood of impacts within the final selected pipeline alignment and impacts can be further avoided through route-deviations, as deemed necessary.
- "Frac-outs", or the loss of drilling fluids to the surrounding environment and potential release of drilling mud into sensitive aquatic areas, are considered serious offenses by regulatory agencies. The potential for "frac outs" should be minimized by incorporation of engineering and geologic information and development of a drilling and drilling fluid monitoring program that considers the existing geological conditions.
- Creek crossings and/or HDD operations will be limited by CDFG, RWQCB, and NOAA Fisheries to April 15 through October 15 to avoid impacts to water quality and associated sensitive species (i.e., southern steelhead).

Cultural Resources: There is a farm complex and barn located on the mesa, as identified in the Waterline Intertie Draft EIR. It is unknown whether this ranch/farm complex is unique or historically significant. If Alignment 1 is selected, a historical evaluation should be conducted and impacts to historical resources avoided, if possible.

Table 10-1 Summary of Permitting Requirements

Alternatives/Options	USACE – 404 Permit	USFWS – Section 7 (Formal)	NOAA Fisheries – Section 7 (Informal)	CDFG- SAA	Regional Water Quality Control Board – 401, NPDES, SWPPP	DHS – Domestic Water Supply Permit	Caltrans – Encroachment Permit	County of San Luis Obispo Permits	County of Santa Barbara Permits	City of Santa Maria Permits	SLO APCD – Authority to Construct	SB APCD – Authority to Construct	Cultural Resources Mitigation (Possibly)	Biological-related mitigation Required (H=High, L=Low)
Alternative 1 (Western River Crossing)														
HDD	☒	☒	☒	☒	☒	☒	☐	☒	☒	☒	☒	☒	☐	L
Alternative 2 (Eastern River Crossing) – Options 2A and 2B														
Method 1: HDD	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	L
Method 2: Open Trench	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	H
Alternative 3 (HWY-101 Bridge Crossing)	☐	☐	☐	☐	☒	☒	☒	☒	☒	☒	☒	☒	☒	L

10.2 Permitting Strategy

Federal agencies anticipated to be involved in the project include the USACE, USFWS, and NOAA Fisheries. The USACE will facilitate permitting with the USFWS and NOAA Fisheries, while separate permitting will be required with the CDFG, RWQCB, County of San Luis Obispo, County of Santa Barbara, City of Santa Maria, SLOAPCD, and SBAPCD.

There are three major phases in the permitting process for the project: (1) Pre-Application Phase, (2) Application Phase, and (3) Review Phase. Several activities are associated with these phases during which specific documents are produced.

Pre-Application Phase: The pre-application phase begins when the applicant has completed the conceptual and/or preliminary design work for a project and is ready to submit a project proposal. Information on the scope and location of the proposed project are minimal requirements. The primary objective of this phase is to identify appropriate permit agencies and to initiate the collection of regulatory and resource information.

Pre-Application Agency Meetings: Establishing and maintaining an open dialog with agency personnel will be a key task for completion of the permitting process. When the project description has been finalized, it is recommended that the NCSD meet with each agency (separately or collectively) to discuss the project and outline the work program. During these meetings, an informal overview of the proposed project can be provided and agency input solicited. Such a meeting will allow NCSD to provide a summary of its proposed project (needs, objectives, etc.) as well as receive initial agency guidance and input regarding permit submission requirements.

Preparation of Project Plans and Permit Applications: Based on the review of available literature data, it is recommended that the following resource surveys/project plans be completed as part of the permit application package to further evaluate the potential impacts and to formulate a comprehensive list of avoidance and minimization measures to avoid and/or reduce those identified impacts:

- Completion of CRLF protocol-level surveys
- Botanical Survey/Wetland Assessment (Final Alignment)
- Cultural Resources Assessment
- Preliminary HDD Frac-Out Monitoring and Contingency Plan

The following project-related plans/surveys likely will be required prior to construction of the proposed project:

- Landscape Plan(s) – For tank sites and pump station sites
- Site Restoration Plan
- Final HDD Frac-Out Monitoring and Contingency Plan
- Wetland Mitigation Plan (requiring compensatory mitigation for temporary and permanent wetland impacts)
- Pre-construction biological survey report
- Spring-time botanical survey report (as deemed necessary)
- Nesting bird survey report

Lastly, the Intertie Project could expose greater than 1 acre of disturbed construction area to stormwater runoff and is thus subject to the NPDES stormwater permit for general construction activity (Order No. 99-080DWQ) if stormwater would discharge to any surface water. The NPDES permit requires filing of a Notice of Intent (NOI) to discharge stormwater to the RWQCB and preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) to control contaminated runoff from temporary construction activities. The SWPPP provides the plans and specifications for erosion and sediment best management practices (BMPs), means of waste disposal, implementation of approved local plans, post-construction sediment and erosion control BMPs and maintenance responsibilities, non-stormwater management BMPs, and BMP performance inspection requirements. The NPDES regulations require the implementation of appropriate hazardous materials management practices to reduce the possibility of chemical spills or releases of contaminants, including any non-stormwater discharge to drainage channels. The NPDES regulations also require applicants to consider implementation of permanent post-construction BMPs to minimize operations-related long-term stormwater runoff effects.

Construction de-watering activities that discharge to surface waters require NPDES authorization under the RWQCB general order for dewatering and other low-threat discharges to surface waters. This permit requires submittal of an NOI before the activity that verifies the dewatering will occur in compliance with applicable water quality objectives.

Application Phase: The application phase begins with the applicant filing the necessary permit application forms. In many cases, agencies will not accept an application until certain other permit approvals have been granted. During this phase, each agency must review the application submitted to determine the completeness of the filing. If the application is determined to be incomplete, the agency must specify the deficiencies and identify the information that is needed to correct them. The applicant may then re-file the corrected application. Upon refilling, the agency has another 30 days to review for completeness. If the application is again determined to be incomplete, the agency must provide a process for an appeal of the determination and reach a decision within 60 days. Further dispute may be judicially resolved. This step is critical to the process as a permit may not be subsequently denied for failure to provide information not requested.

Padre has suggested that the Army Corps of Engineers will not likely issue a 404 Permit for the HDD River Crossing. Typically, the Corps will expect the project owner to prepare Frac-Out Mitigation and Monitoring Plans and be prepared to implement them in case a frac-out occurs, but will then require the owner to submit an “after the fact” permit application if it actually occurs.

Review Phase: Once the Final Waterline Intertie EIR is certified and the plans and permit applications have been deemed complete, the NCSD may then obtain the federal, state, and local permits required for the project, including: 404 Permit, 401 Water Quality Certification, CDFG Streambed Alteration Agreement, SLOAPCD and SBAPCD Authority to Construct permits, and County/city land use, grading, and building permits.

Final Permit Conditions: Regulatory agencies will issue conditioned permits following certification of the CEQA document. Permit conditions are designed to reduce or eliminate potential impacts and generally use the mitigations that are recommended in the CEQA document as a basis. Some of the conditions may include seasonal timing restrictions on construction activities.

11.0 EIR Project Alternatives

The primary goal of this Memorandum is identification of constraints, requirements, advantages, disadvantages, and anticipated capital costs for each project component. As indicated in Sections 3.0 and 6.0 of this Memorandum, and determined in the November 2006 draft of this Memorandum, significant water system upgrades will be required in both the City of Santa Maria and NCSD water distribution systems.

The project description to be developed for further evaluation in the CEQA process, and during design, should include the following. As discussed in preceding sections of this Memorandum, some of these components may not be required initially but should be analyzed in the event they are required in future phases. Conditions such as service pressure and hydraulic capacity could change in either system, requiring additional facilities in the future.

- City of Santa Maria water distribution system improvements
  - 18-inch Blosser Road Main as required by City
  - 18-inch lateral pipeline from Pump Station No. 1 to eastern river crossing along Atlantic Place (Alignments 2A, 2B, or 3 only)
  - Flow metering station
- Pump Station No. 1 with Flow Metering Station (various potential sites along Blosser Rd. unless directed to a different location by City)
- Santa Maria River Crossing (Alignment 1, 2A, 2B, or 3 of a 14-, 24-, or 30-inch diameter)
- Nipomo-side pipeline to proposed reservoirs or to District connection point, if reservoirs not required
- Pump Station No. 2 (Joshua St.) with Flow Control Station
- Reservoir(s) at three alternative sites (near Joshua St.) if required
- NCSD Water Master Planned improvements required for project
  - Upgrade Southland Road water main to 10-inch (12-inch is recommended)
  - Upgrade Frontage Road water main to 12-inch (Southland to Tefft)
- NCSD water distribution system upgrades
  - Pressure regulators on approximately 200 homes in Area A
  - Upgrade Master Planned improvement Southland Street from 10-inch to 12-inch
  - PRV Station at Maria Vista
  - Replace 3200-linear feet of pipeline on Orchard Rd. (Southland St. to Division St.) with 12-inch diameter
  - Replace 340-linear feet of 6-inch diameter pipeline on Division St with 10-inch diameter to match surrounding
- Disinfection improvements (free chlorine, or chloramination boosting system at Pump Station No. 2 and chloramination conversion at District wells)
- Right-of-Way, easements, and property acquisition

12.0 Future Project Improvements to Deliver 6300 AFY

Previous sections of this memorandum address Phases I and II of the Waterline Intertie Project, which would deliver 2000-afy (at 1,300-gpm) and 3000-afy (at 1,860-gpm), respectively. However, the District's Water and Sewer Master Plan (2007 Master Plan) predict future demand of 6,300-afy for the expanded service area.

In order to develop a range of costs to expand the project for delivery of 6,300-afy, the following assumptions were made:

- Future demand pattern consistent with current pattern
- Adequate storage will be available per the 2007 Master Plan
- Storage will be located at or near the current Quad Tanks site
- Master plan improvements are completed
- Waterline Intertie Alignment Alternative I was selected (Alignments II and III will require PS#1 to be installed)
- Waterline Intertie Project improvements for Phase I and II are completed
- Point of connection to Santa Maria distribution system is a Taylor and Blosser with a minimum pressure of 60-psi
- District will take as much water as the Intertie can deliver
- Intertie delivery can be adjusted daily, but remains steady during each 24-hour period

Project Components

To utilize 6,300-afy, the distribution system must have the ability to deliver an instantaneous flow rate of 5,570-gpm[1]; which is the flow required to meet the July demand at master plan buildout. The following steps would be required:

- Replace Blosser Extension with a 24-inch main, or install a parallel 18-inch main
- Install (4) 250-hp pumps at PS#2 each rated at 2,000-gpm at 325-ft head, with any 3 to meet demand
- Install 27,000 linear feet of 24-inch dedicated main from PS#2 to the Quad Tanks.

The estimated capital cost for the improvements described above is $15.9M in addition to the cost for Phases I and II of the 3000-AFY project.

The incremental cost difference between installing a 24-inch main instead of an18-inch main now is approximately $300,000. If the District expects to reach this future scenario, installing the 24-inch main along Blosser Road now, instead of installing a parallel 18-inch line in the future could save approximately $1,640,000. Details of this opinion of cost are included in Appendix VII.

[1] See Appendix IX for calculation.

13.0 Relative Cost Comparison of Preferred Project Alternatives

Section 11 of this report summarizes potential project alternatives developed for the EIR. Table 13-1 summarizes components for the preferred project alternatives. Some of these items may not be required initially (as discussed in Section 3), but were included in case they are required in the future. These descriptions were used for the conceptual-level opinions of probable construction costs, summarized in Table 13-2. Conceptual-level opinions of power and chemical costs are summarized in Table 13-3.

The purpose of this analysis is to provide a relative cost comparison between the major cost items of these alternatives. As the project proceeds into the next phase and the conceptual alternatives studied in this report are refined into a design-level project, the costs may change. Detailed Opinions of Probable Construction Costs, including estimated quantities and unit costs, for each of the following project alternatives are located in Appendix VII.

These opinions of probable construction costs prepared by Boyle represent its judgment as a design professional and are supplied for the general guidance of NCSD. Since Boyle has no control over the cost of labor and materials, over delays in project bidding or award, or over competitive bidding or market conditions, Boyle does not guarantee the accuracy of such opinions as compared to design-level cost opinions, contractor bids, or actual cost to NCSD.

Table 13-1 Preferred Project Scenarios

Project Component:	**Project Scenarios**		
Alignment	**Alignment No. 1** – Western River Crossing	**Alignment No. 2B** – Eastern River Crossing along Old State HWY	**Alignment No. 3** – HWY 101 Bridge Crossing
Santa Maria Pipe Upgrades	5000 LF of 18-inch Pipeline with Flow Metering Facility (local or remote)	5000 LF of 18-inch Pipeline with Flow Metering Facility (local or remote)	5000 LF of 18-inch Pipeline with Flow Metering Facility (local or remote)
Pump Station No. 2	Four 75-hp Pumps	Four 75-hp Pumps	Four 75-hp Pumps
Reservoirs	One 0.5 MG buried concrete reservoir	One 0.5 MG buried concrete reservoir	One 0.5 MG buried concrete reservoir
NCSD Pipe Upgrades	3,200 LF of 12-inch pipeline, 340-LF of 10-inch pipeline, Maria Vista PRV Station, pressure regulators on 200 homes (Area A)	3,200 LF of 12-inch pipeline, 340-LF of 10-inch pipeline, Maria Vista PRV Station, pressure regulators on 200 homes (Area A)	3,200 LF of 12-inch pipeline, 340-LF of 10-inch pipeline, Maria Vista PRV Station, pressure regulators on 200 homes (Area A)
Disinfection	Chloramination booster at PS#2 and 5 Wellhead systems	Chloramination booster at PS#2 and 5 Wellhead systems	Chloramination booster at PS#2 and 5 Wellhead systems

Table 13-2 Opinion of Probable Construction Costs

ALIGNMENT NO. 1 - WESTERN RIVER CROSSING
(HDD ACROSS RIVER)

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization (5% of Construction Cost)	1	LS	$575,000	$575,000
2	City of Santa Maria 18" Pipeline Upgrade	1	LS	$1,235,000	$1,235,000
3	Pump Station No. 1 - Turnout and Meter (BLOSSER ROAD)	1	LS	$60,800	$60,800
4	Nipomo Intertie Pipeline: 24" River Crossing to Bluffs	1	LS	$6,076,000	$6,076,000
5	Nipomo Intertie Pipeline: 24" to New Reservoirs	1	LS	$650,000	$650,000
6	Pump Station No. 2	1	LS	$529,000	$529,000
7	Reservoir - 0.5 MG	1	LS	$1,348,000	$1,348,000
8	Disinfection	1	LS	$700,000	$700,000
9	Phase 1 NCSD System Improvements	1	LS	$223,500	$223,500
10	Phase 2 Capacity Upgrade for Pump Station No. 2	1	LS	$68,000	$68,000
11	Phase 2 NCSD Improvements	1	LS	$556,800	$556,800
	Adjustment for Construction Cost Inflation[1]				$116,869
	Sub Total				$12,139,000
	Engineering & Construction Mngmt	20%			$2,428,000
	Contingency	30%			$3,641,700
	Total				$18,208,700

ALIGNMENT NO. 2B - EASTERN RIVER CROSSING AT OLD STATE HWY
(OPEN TRENCH ACROSS RIVER)

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization (5% of Construction Cost)	1	LS	$500,000	$500,000
2	City of Santa Maria 18" Pipeline Upgrade	1	LS	$2,392,500	$2,392,500
3	Pump Station No. 1 - Turnout and Meter (BLOSSER ROAD)	1	LS	$60,800	$60,800
4	Nipomo Intertie Pipeline: 24" River Crossing	1	LS	$1,653,250	$1,653,300
5	Nipomo Intertie Pipeline: 24" to New Reservoirs	1	LS	$3,008,600	$3,008,600
6	Pump Station No. 2	1	LS	$529,000	$529,000
7	Reservoir - 0.5 MG	1	LS	$1,348,000	$1,348,000
8	Disinfection	1	LS	$700,000	$700,000
9	NCSD System Improvements	1	LS	$223,500	$223,500
10	Phase 2 Capacity Upgrade for Pump Station No. 2	1	LS	$68,000	$68,000
11	Phase 2 NCSD Improvements	1	LS	$556,800	$556,800
	Adjustment for Construction Cost Inflation[1]				$101,257
	Sub Total				$11,142,000
	Engineering & Construction Mngmt	20%			$2,228,000
	Contingency	30%			$3,342,600
	Total				$16,712,600

ALIGNMENT NO. 3 - HWY 101 BRIDGE CROSSING
(HANG PIPE FROM BRIDGE ACROSS RIVER)

Item	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization (5% of Construction Cost)	1	LS	$560,000	$560,000
2	City of Santa Maria 18" Pipeline Upgrade	1	LS	$2,532,500	$2,532,500
3	Pump Station No. 1 - Turnout and Meter (BLOSSER ROAD)	1	LS	$60,800	$60,800
4	Nipomo Intertie Pipeline: 24" Bridge Crossing	1	LS	$4,432,100	$4,432,100
5	Nipomo Intertie Pipeline: 24" to New Reservoirs	1	LS	$3,008,600	$3,008,600
6	Pump Station No. 2	1	LS	$529,000	$529,000
7	Reservoir - 0.5 MG	1	LS	$1,348,000	$1,348,000
8	Disinfection	1	LS	$700,000	$700,000
9	NCSD System Improvements	1	LS	$223,500	$223,500
10	Phase 2 Capacity Upgrade for Pump Station No. 2	1	LS	$68,000	$68,000
11	Phase 2 NCSD Improvements	1	LS	$556,800	$556,800
	Adjustment for Construction Cost Inflation[1]				$130,217
	Sub Total				$14,150,000
	Engineering & Construction Mngmt	20%			$2,830,000
	Contingency	30%			$4,245,000
	Total				$21,225,000

Master Planned Improvement Costs					
	Southland - Frontage to Orchard - 10" pipe	3900	LF	$160	$624,000
	Frontage - 12" pipe	6470	LF	$170	$1,099,900
	Master Planned Project Total[2]				$1,723,900

Notes:

1. Inflation Adjustment. ENR CCI: October 2006 = 7883; March 2008 = 8109
2. Master Planned prices are directly from the December 2007 Water and Sewer Master Plan Update and include a 20% allowance for Engineering & Construction Management as well as a 25% contingency.

Table 13-3 Opinion of Probable Operations & Maintenance Costs

ALIGNMENT NO. 1 - WESTERN RIVER CROSSING
(HDD ACROSS RIVER)

Item	Description	Annual Cost
1	Pump Station No. 2	$174,000
2	Choramination Booster	$20,000
3	Chloramination at Wellheads	$35,000
	Total	$229,000

ALIGNMENT NO. 2B - EASTERN RIVER CROSSING AT OLD STATE HWY
(OPEN TRENCH ACROSS RIVER)

Item	Description	Annual Cost
1	Pump Station No. 2	$174,000
2	Choramination Booster	$20,000
3	Chloramination at Wellheads	$35,000
	Total	$229,000

ALIGNMENT NO. 3 - HWY 101 BRIDGE CROSSING
(HANG PIPE FROM BRIDGE ACROSS RIVER)

Item	Description	Annual Cost
1	Pump Station No. 2	$174,000
2	Choramination Booster	$20,000
3	Chloramination at Wellheads	$35,000
	Total	$229,000

Notes:
1. Costs assume 98% motor efficiency, unit power costs at $0.13/KW-hr

2. Pump Station No. 1 will be a turnout only.
3. Pump Station No. 2 would have 75-hp pumps in all scenarios
4. Only power costs and chemical costs were considered in this analysis.
5. Only delivery of 3,000-AFY is considered.

14.0 Conclusions

Based on our analysis, discussions with District staff, input from City of Santa Maria staff, and direction from the District Board of Directors, we recommend the following:

1) Request minimum delivery pressure from City of Santa Maria at the Point of Connection in order to eliminate the need for Pump Station No. 1.

2) Evaluate design details of HDD. Prepare specific evaluation of soils and soil suitability for HDD along proposed Western Alignment,

3) Develop the project in two phases as follows (including Master Planned improvements):

Phase I: Facilities and improvements recommended to provide capacity for 1,300-gpm of supplemental water.

- NCSD System Improvements: Upgrade Southland waterline to 12-inch and Frontage Road to 12-inch from Southland to Tefft (both are Water Master Plan improvements), and install pressure reducing valves on individual services in Area A. Convert disinfection systems at existing wells to chloramination to avoid water quality problems.
- Waterline Intertie: Construct 18-inch Blosser Extension from Blosser and Taylor to Santa Maria River Crossing; 24-inch River Crossing via horizontal directional drilling along the Western Alignment (Alignment 1); 24-inch from River to storage tanks at Joshua and Orchard; 18-inch from tanks through PS#2, along Joshua to existing 12-inch water pipeline on Orchard.
- Pump Station No. 1: Acquire land, install magnetic flow meter on Blosser Extension, and monitor pressures after start-up. Plan for potential future pump station.
- Storage: Construct a 0.5-MG buried pre-stressed concrete tank at Joshua and Orchard and install a flow control valve on inflow pipeline. Acquire sufficient property to construct a second 0.5-MG reservoir for the future, if needed.
- Pump Station No. 2: Install three pumps, any two capable of pumping 1,300-gpm in parallel operation. Install chloramine booster station.

Phase II: Facilities and improvements recommended to provide capacity for 1,860-gpm of supplemental water.

- NCSD Network Improvements: Upgrade Orchard waterline from Southland to Division to 12-inch, replace 6-inch sections on Division Street waterline with 10-inch pipe to match adjacent pipeline (from Alegre to east of Meridian).
- Pump Station No. 1: Monitor pressures and evaluate need for pump station.
- Pump Station No. 2: Install an additional pump, such that any three are capable of pumping 1,860-gpm.

At this time, negotiations are underway between the City of Santa Maria and the District. The assumptions used in this analysis may change as a result of these discussions. For instance, the City has suggested that they may want to share the Blosser Main Extension, instead of requiring the District to

construct a dedicated main from Taylor and Blosser to the levee. Other variables to be explored in the negotiations include delivery rates and pressures.