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Technical Memorandum

To	Michael LeBrun, PE, General Manager, NCSD Peter Sevcik, PE, District Engineer, NCSD	Page 1
Subject	NCSD Supplemental Water Project Phasing Technical Feasibility Study	
From	Eileen Shields, PE, AECOM Jon Hanlon, PE, AECOM	
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Purpose

This technical memorandum summarizes the evaluation of phasing approaches for the Nipomo Community Services District (District) Supplemental Water Project (Waterline Intertie Project), including feasibility and construction costs that would allow the District to reduce the initial capital cost of the project. Since the failed May 2012 assessment district formation vote, the District has been developing options and evaluating the next steps to address the Nipomo Mesa's need for imported water. In several studies and efforts over the past eight years, the District has repeatedly found that the Waterline Intertie Project is the least expensive and most expedient alternative to import water onto the Nipomo Mesa. Several project constraints will need to be evaluated in addition to this technical feasibility study, including the potential for renegotiating the water delivery schedule in the current Wholesale Water Agreement with the City of Santa Maria, additional detailed technical analysis, modification of the current design and financial and legal considerations, all of which are outside the scope of this report.

Background

Currently, the Nipomo Community Services District (District) relies on groundwater as the sole source of water for approximately 12,000 customers (Urban Water Management Plan 2010 Update, Water Systems Consulting, Inc). The groundwater is 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. The parties to the lawsuit included the City of Santa Maria, landowners and other water purveyors that pump groundwater from the Santa Maria Groundwater Basin including the District, Woodlands Mutual Water Company (WMWC), Golden State Water Company (GSWC), and Rural Water Company (RWC).

After the adjudication lawsuit was filed in 1997, a number of groundwater studies were completed in the Nipomo Mesa area in order to assess the status of groundwater resources and the purpose and need for a solution. In 2004, in recognition of the findings and recommendations contained in the studies, the District entered into a Memorandum of Understanding (MOU) with the City of Santa Maria. The MOU included the purchase of

approximately 2,500 acre-feet of water per year to provide supplemental water for the exclusive use of the District.

Subsequently, many of the parties including the District, WMWC, GSWC, City of Santa Maria, and County of San Luis Obispo signed a June 30, 2005, Stipulation. The Stipulation was approved by the Court and the parties were ordered to comply with the terms of the Stipulation. Pursuant to the Stipulation, WMWC, GSWC and RWC agreed to participate in the Nipomo Waterline Intertie Project that was the subject of the 2004 MOU.

In 2006, the District commissioned the preliminary design. After the Draft Waterline Intertie Project Preliminary Engineering Memorandum (Boyle, November 2006) was submitted, the District Board of Directors requested additional studies to confirm it was the least expensive and most expedient alternative to deliver water to the Nipomo Mesa. Boyle Engineering (now AECOM) submitted the Evaluation of Supplemental Water Alternatives in June 2007 which investigated the costs and constraints associated with several alternative water supplies. The evaluation included multiple public workshops at District Board meetings and the final analysis indicated the preferred supplemental water sources were first, the Santa Maria Waterline Intertie Project (Supplemental Water Project) and second, desalination. Seawater or brackish water desalination met the criteria for reliability, quality, and availability but had not been successfully implemented in California as a primary community water supply at this scale. In fact, most projects have been stopped or indefinitely delayed during the initial permitting phase. In addition, the estimated cost of desalinated water per acre-foot was also more than for the Waterline Intertie Project. The District elected to proceed with the Waterline Intertie Project and in May 2008, Boyle/AECOM submitted the revised Waterline Intertie Project Preliminary Engineering Memorandum.

AECOM subsequently prepared the Concept Design Report (April 2009) to provide the basis for the design. The Project was designed to deliver 3,000 acre feet per year (AFY) at a maximum rate of 2,000 gallons per minute (gpm). Water delivery was to be phased based on system demands and the water delivery schedule established the Wholesale Water Agreement with the City. The water delivery rate was anticipated to be constant over a 24-hour period but could be adjusted by the District daily. District wells were to be used during peak demand periods and for emergency water if the Project is out of service. After approval of the Concept Design Report, AECOM prepared the plans and specifications for the project. The project was split into four bid packages based on geographical location and type of work as well as to promote bid competition. The components included in each package are described in the following section. The design is nearly complete, with three bid packages at a “final print check” level, and one (Bid Package 1) at 90% complete. Completion of construction documents is currently on hold, pending District direction to stop the project or continue with a revised project.

Project Components – Current Design

The current design for the Supplemental Water Project consists of 27,000 linear feet (LF) of pipeline, a 0.5 million gallon (MG) storage tank, a 2,000 gallon per minute (gpm) pump station, and chloramination systems at the pump station and at four existing wells, as well as backup power, controls, electrical instrumentation, and ancillary facilities such as a pressure reducing station and surge control.

Figure 1 displays a summary of the proposed facilities. The project begins at the north end of the City of Santa Maria water distribution system at the intersection of Blosser Road and West Taylor Street with a new 18-inch waterline. The waterline runs north along Blosser Road to

Atlantic Place, transitions to a 24-inch waterline, and crosses underneath the Santa Maria River levee. The 24-inch line will be jacked and bored underneath the levee and will cross under the Santa Maria River utilizing horizontal directional drilling, ending atop the Nipomo Mesa. Since the fixed cost for any HDD project is very high relative to cost differences related to pipeline diameter, and the District may want to request higher short-term or long-term delivery rates in the future, the River and levee crossing pipelines are designed to handle up to 6,300 AFY at a flow rate of 3,900 gpm.

On the Nipomo Mesa, the 24-inch piping will connect to a 500,000-gallon, pre-stressed concrete reservoir. The reservoir will be partially buried to eliminate the need for pumping from the City distribution system. Vertical turbine pumps will draw water from the reservoir and deliver it to an existing 12-inch waterline along Santa Maria Vista Way to Joshua Street at a maximum pumping rate of 2,000 gallons per minute (gpm). Water will be pumped along Orchard Road (in the existing 12-inch waterline) and connect to the main District system at Orchard Road and Southland Street.

Dedicated 12-inch waterlines will be installed to deliver water to the system's back-bone transmission mains in order to reduce the impact on existing small diameter waterlines and customers in high pressure areas. These dedicated mains will be in five areas: 1) along Orchard Road, from Southland Street to Grande Street; 2) along Southland Street, from Orchard Road to Frontage Road; 3) along Frontage Road from Southland Street to Grande Street; 4) from Grande Street, northeast underneath Highway 101 (via jack-and-bore) to Darby Lane, continuing on Darby Lane to South Oakglen Avenue; and 5) along South Oakglen Avenue from Darby Lane to Tefft Street. The dedicated mains will connect to the existing system at Orchard Road and Grande Street, Frontage Road and Grande Street, and South Oakglen Avenue and Tefft Street.

Pressure-reducing-valve (PRV) stations will protect users in high pressure subzones from pumping pressures required for supplemental water delivery. Five PRV stations will be installed. One will be placed on Santa Maria Vista Way near the connection to the existing 12-inch waterline, lowering pressure for the Maria Vista Development. Three stations will be placed at connection points, in order to create a separate pressure zone in the southwest region of the District's system. The fifth PRV station will be installed on Southland Street between the dedicated main and an existing waterline to release water into the new pressure zone during an emergency (low pressure) situation.

The project also includes conversion of four production wells from chlorination to chloramination systems. The Preliminary Engineering Memorandum (Boyle/AECOM, May 2008) contains a detailed discussion of disinfection and water quality issues. Disinfection alternatives, as discussed in Section 4 of the Memorandum, included uncontrolled blending of City and District water without changes in treatment process, converting City water disinfection to free chlorine residual, and converting District groundwater disinfection to provide chloramine residual instead of chlorine residual. The Memorandum recommends converting the District groundwater disinfection process to chloramination at the main wellheads and including a chloramine booster at the pump station.

Project components were grouped into bid packages based on the desire to maximize bidding competition, the proximity of work items to each other, unique equipment and experience required for performance of the river crossing, the need to provide as few points of coordination and responsibility as possible for each project site, and the desire to standardize new

chloramination systems at each wellhead. Based on these criteria, the project design was divided into four bid packages as follows:

- Bid Package 1: Santa Maria River Water Main Crossing
- Bid Package 2: Nipomo Area Pipeline Improvements
- Bid Package 3: Blosser Road Water Main and Flow Meter
- Bid Package 4: Joshua Road Pump Station and Reservoir, and Wellhead Chloramination Improvements

Phasing Approaches for Project Components

AECOM worked with District staff to examine the Supplemental Water Project design for components that could initially be deferred but would still allow the District to deliver a significant quantity of imported water to the Nipomo Mesa.

Bid Package 3 consists of approximately 1 mile of 18-inch diameter pipeline along Blosser Road, a flow control valve and metering station and a 24-inch diameter pipeline crossing underneath the levee and connecting to the River crossing (Bid Package 1). The City's hydraulic analysis concluded that a dedicated 18-inch pipeline along Blosser would be required to minimize fluctuations in their system pressures. The levee crossing was designed to handle a future potential delivery of 3,900 gpm (6,300 AFY) to reduce the need to replace the pipeline to accommodate higher delivery rates in the future. While none of the components of this Bid Package can be phased, the levee crossing pipeline diameter could be reduced.

The Santa Maria River Crossing (Bid Package 1) consists of a 24-inch pipeline installed via horizontal directional drilling (HDD) to minimize potential impacts to the River. Permitting, design, and construction of the River Crossing is a significant undertaking. To minimize the need to replace the pipeline in the future, the River crossing was also designed for 3,900 gpm (6,300 AFY). While none of the components of this Bid Package can be phased, a smaller pipe diameter could be considered for the River crossing.

The River Crossing pipeline connects to a 500,000 gallon buried reservoir on the Mesa (Bid Package 4). This bid package also includes a pump station, piping and appurtenances, and five chloramination systems (four at existing District wells and a booster chloramination system at the pump station). Depending on the revised phasing delivery rates, the pump station construction cost could be reduced by installing fewer pumps or smaller pumps. The District may also be able to defer construction of the reservoir. The chloramination systems will still be required and the size or number of components of the chloramination systems cannot be revised. Some of the pipe diameters in Bid Package 4 could be reduced. Specifically two pipelines could have smaller diameters than currently proposed: the short length of piping between the River Crossing and the reservoir; and the pipeline designed to transmit water from the booster pump station to the existing 12-inch diameter waterline in Santa Maria Vista Way.

Bid Package 2 consists of 12-inch diameter pipelines and pressure reducing valve stations within the District's water distribution system to reduce high pressure resulting from pumping the supplemental water to the system. While the improvements are required for a delivery rate of 2,000 gpm (3,000 AFY), some may not be necessary for a smaller delivery rate, and could be deferred until future phases of the project are implemented. AECOM examined the range of

flows anticipated for the project and evaluated the potential impact on the existing system in order to identify a delivery rate that would require fewer pipelines and lessen the initial construction cost.

Analysis and Results

Levee and River Crossings (Bid Packages 3 and 1)
The City's hydraulic analysis concluded that a dedicated 18-inch pipeline would be required for the connection to minimize fluctuations in their system pressures. AECOM reviewed the hydraulic requirements for the levee and River crossings assuming a maximum future delivery of 3,000 AFY at a maximum flow rate of 2,000 gpm. The hydraulics were evaluated utilizing the following assumptions:

- Minimum hydraulic grade elevation at buried reservoir on Mesa = 310 feet (The tank roof is at an elevation of 306 feet)
- Minimum pressure from Santa Maria at point of connection at Taylor and Blosser = 60 psi
- Maximum flow rate = 2,000 gpm
- Hazen-Williams c-factor = 135

The results of the assessment indicate that an 18-inch (inner) diameter pipeline for the levee and River crossings would be sufficient to pass a flow rate of 2,000 gpm. Assuming the same thickness is required for the HDPE as currently designed (DR-9), a 24-inch OD (outer diameter) HDPE pipeline would be required for the River crossing. The current design specifies a 30-inch OD (24-inch inner diameter) DR-9 HDPE pipeline. In addition to the construction cost savings of smaller diameter pipelines, associated potential savings include one less ream hole required for installation, and reduced diameters for the steel casing barrels at the entry and exit points. We also estimate a small savings, about 1 week, in the HDD construction time. The smaller diameter carrier pipeline for the levee crossing also correlates to a smaller casing diameter.

Nipomo Area Pipeline Improvements (Bid Package 2)

Scenarios
Four main scenarios were modeled to examine phasing options for the Nipomo Area Pipeline Improvements. AECOM worked with District staff to develop the scenarios and criteria for evaluation to identify how much supplemental flow the existing system can accommodate without significantly increasing pressures. The current project improvements are designed for a flow rate of 2,000 gpm (to deliver 3,000 AFY). The evaluation was undertaken to identify if some of these improvements could be deferred if less supplemental water were delivered for the first phase of the project. "Scenario A" represents the existing Nipomo water distribution system with no Supplemental Water Project components. Several runs were performed to evaluate the impact of various supplemental inflows.

The other model scenarios investigate whether a greater delivery rate could be accommodated by incorporating select system improvements from the current design. Two different pipeline routes were modeled, each part of the current design for the 2,000 gpm delivery. "Scenario B" models the existing system, plus a 12-inch dedicated pipeline along Orchard Road, between Southland Street and Grande Avenue. "Scenario C" incorporates the Scenario B assumptions, but extends the pipeline along Orchard Road to Tefft Street, and examines the difference

between a 12-inch and a 16-inch diameter. The fourth scenario models the existing system plus a 12-inch dedicated pipeline along Southland Street, between Orchard and Frontage Road, along Frontage Road to Grande, underneath Highway 101, along Darby to South Oakglen, then along South Oakglen to connect to the 16-inch water main in Tefft Street.

Model Conditions

All scenarios were modeled with the supplemental flow introduced to the system from the Joshua Road Pump Station and no delivery to Golden State Water Company (GSWC) or other nearby purveyors. Model runs were performed under steady-state conditions with the tanks 75% full, all wells off, and a demand equivalent to 10% of the average day demand (0.27 mgd) to mimic low flow periods when system pressures are highest. No pressure reducing valve stations were included in the analysis.

Model Results

The modeling results are summarized in Table 1. The existing pressures under low demand conditions with no Supplemental Water Project are modeled in Scenario A1. The modeling results for Scenario A4 indicate the existing system could accommodate a Supplemental Water Project flow of approximately 400 gpm (645 AFY at a constant delivery) without increasing maximum pressures in the high pressure area more than 5% (5 psi) from the existing conditions. (The high pressure area is considered to be bounded by Southland Street on the south, Orchard Road on the west, S. Frontage Road on the east, and approximately Grande Avenue on the north). Results from Scenario B1 indicate that a supplemental flow of 1,000 gpm (1,613 AFY) could be accommodated if a 12-inch dedicated pipeline is installed along Orchard Road between Southland Street and Grande Avenue (Scenario B1), an improvement planned for the current design (3,000 AFY delivery). Although not included in Table 1, it was confirmed that a supplemental flow of 2,000 gpm would require all of the improvements currently designed.

Table 1 Results of Modeling Analysis

Scenario	System Improvements	SWP Flow (gpm)	Pressures in "High Pressure Area"				
			Min (psi)	Max (psi)	Average (psi)	# Nodes > 90 psi	# Nodes > 100 psi
A1	None	0	66	101	90	60	1
A2	None	1000	70	119	95	89	37
A3	None	600	68	109	92	74	23
A4	None	400	67	105	91	67	13
B1	12" dedicated pipeline along Orchard, Southland to Grande	1000	69	106	93	80	26
B2	12" dedicated pipeline along Orchard, Southland to Grande	500	67	103	91	67	12
C1	12" dedicated pipeline along Orchard, Southland to Tefft	1000	68	106	93	79	23
C2	16" dedicated pipeline along Orchard, Southland to Tefft	1000	66	103	91	67	11
D1	12" dedicated pipelines along Southland, Frontage, Darby, & Oakglen, to Tefft	1000	68	107	93	79	25

It may be possible to accommodate an interim delivery step between 1,000 and 2,000 gpm with the installation of PRV stations and some additional dedicated piping. However, increases in the Supplemental Water Project flows cause increased pressures both within the system and at the pump station. The proposed PRV stations are intended to protect existing system infrastructure, and the dedicated pipelines connecting to the system backbone waterlines reduce the required pressures at the pump station. Higher pressures at the pump station are a concern for two reasons: 1) increased pressures along existing 12-inch waterline along Santa Maria Vista Way and Orchard between Joshua and Southland, and 2) increased horsepower (and electricity) required at the pumps. The potential for an interim delivery between 1,000 gpm and 2,000 gpm would require additional modeling and analysis.

Joshua Road Pump Station and Reservoir (Bid Package 4)

Bid Package 4 was reviewed to determine if the reduced Supplemental Water Project flows would allow a reduction in construction cost for Bid Package 4. Three main components were identified for phasing or revisions: the pump station, the tank, and transmission piping.

Pump Station

The existing design specifies four pumps, three duty and one standby, to deliver a flow of 2,000 gpm (up to 3,000 AFY). Variable frequency drives (VFDs) provide the ability to deliver a constant flow rate against varying downstream pressures. Significantly changing the pump station building would reduce future flexibility and would not significantly reduce construction cost - therefore modifications to the building were not considered in this evaluation.

For this evaluation, we considered it optimal to construct the pump station with minimal design changes to preserve the potential for a future 3,000 AFY delivery.

A potential initial delivery rate of 400 gpm was analyzed in model Scenario A4. Based on the preliminary assessment, it appears a different pump selection will be required. We recommend two smaller pumps, one as a duty and one as a standby pump. Additional investigation is required to determine the recommended pump selection and to minimize impact to the existing design, preserving ease in phasing for future higher delivery rates.

A second potential delivery rate of 1,000 gpm was identified above with model Scenario B1. Based on the preliminary assessment, it appears possible to use three of the same pumps currently specified, with any two delivering 1,000 gpm and one as standby, all with VFDs. However, when reducing pump speeds, it is optimal to limit the minimum flow to no less than 30% of the pump's best efficiency capacity (BEC). With the current pump selection, the BEC is 840 gpm. We recommend verifying the minimum allowable flow rate with the manufacturer's representative. Individual pump manufacturers will have varying requirements for low flow limitations to prevent low flow cavitation from damaging the pump. The remaining pump station, including stubs and blind flanges for the future connection of the additional pump would remain the same.

Additional hydraulic modeling and assessment should be performed to re-evaluate the pump selection if either or both of these revised delivery options are pursued. A smaller pump will need to be selected for the 400 gpm scenario. However, it may be possible to utilize a smaller pump with the same can and connections as designed, which would allow for an easier upgrade to larger pumps in the future. A smaller pump may be more appropriate even for the 1,000 gpm delivery and could offer energy savings since the reduced flows also result in reduced losses throughout the system and therefore lower demands on the pumps.

Tank

The need for the reservoir at the Joshua Road site was re-examined at delivery rates of 400 and 1,000 gpm. A minimum storage of 0.5 million gallons (beyond the existing Quad Tank storage capacity) was recommended in the Preliminary Engineering Memorandum (PEM) for a delivery rate of up to 2,000 gpm (Boyle/AECOM, May 2008). The advantages and disadvantages of the reservoir were also discussed in the PEM, as summarized in Table 2, on the next page.

Table 2 Advantage and Disadvantages of 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 may not be required.	
No Reservoir	Makes use of energy from Santa Maria system	Complicates operational requirements for pumps. Increases range of possible suction-side pressure scenarios.
	Eliminates cost of reservoir	No operational buffer.
	May reduce energy cost	

AECOM reviewed the operational storage requirements for the two reduced delivery rates based on the previous modeling analysis completed during the concept design phase (memorandum dated July 27, 2007). AECOM utilized the same model and adjusted the supplemental water delivery rates to provide constant daily flows at 400 and 1,000 gpm, respectively. Operational water storage needs were modeled under existing and future conditions, assuming a constant daily Supplemental Water Project flow. The analysis included the assumption that 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.

Based on a preliminary assessment, the reservoir is recommended as a storage "buffer" for a delivery of 1,000 gpm. However, the reservoir may not be necessary for a delivery rate of 400 gpm since it appears the required operational storage can be accommodated with the existing Quad Tanks. Since a tank would provide consistency in suction-side pressures for the pumps, deferring the reservoir would complicate operational requirements and may impact the pump station design. An additional assessment of the pump station operational design will be required to determine what changes are required if this option is pursued. If the District pursues this option and chooses to defer construction of the tank, we recommend performing an updated analysis with current demands to confirm the existing Quad Tanks storage capacity is adequate.

Piping Diameters

Pipe diameters in Bid Package 4 were reviewed to evaluate impacts associated with future potential deliveries of 3,000 AFY. Two main pipelines are candidates for redesign under this scenario: the short length of piping between the River Crossing and the reservoir (approximately 300 linear feet), and the pipeline designed to transmit water from the booster pump station to the existing 12-inch diameter waterline in Santa Maria Vista Way (nearly 1800 linear feet), both currently designed as 24-inch diameter to accommodate a potential future delivery of 6,300 AFY. For future potential delivery of up to 3,000 AFY, the diameter for the pipeline between the River Crossing and the reservoir could be reduced to 18-inches and the required diameter for the pipeline between the pump station and Santa Maria Vista Way would be 18-inches.

Summary of Supplemental Water Project Phasing Alternatives

Table 3 and Figure 2 summarize the project components for the potential revised phasing examined herein. The project components are split into the four bid packages. Two delivery alternatives (options) are described for each of the three delivery scenarios (400, 1,000, and 2,000 gpm). Option A shows the project components if the Levee and River Crossings and pump station piping are designed for a maximum future delivery rate of 3,000 AFY (at 2,000 gpm). Option B shows the components if the existing design for the crossings and pump station piping are preserved, allowing for a future maximum delivery through these pipelines of 6,300 AFY (at 3,900 gpm). Each Option could have three phases of project development. For each Option, Phases 1, 2, and 3 would deliver flows of 400, 1,000, and 2,000 gpm. The District could elect to implement any phase of either option and would not necessarily need to start with Phase 1 and sequentially upgrade to Phase 3 via a Phase 2 system, for example.

Table 3 Potential Delivery Alternatives and Phased Implementation Strategies

	OPTION A Max future capacity for Levee & River Crossings & pump station piping = 3,000 AFY			**OPTION B** Max future capacity for Levee & River Crossings & pump station piping = 6,300 AFY		
	Phase 1 400 gpm (645 AFY)	Phase 2 1,000 gpm (1,600 AFY)	Phase 3 2,000 gpm (3,000 AFY)	Phase 1 400 gpm (645 AFY)	Phase 2 1,000 gpm (1,600 AFY)	Phase 3 2,000 gpm (3,000 AFY)
Bid Package 1 Santa Maria River Crossing	Horizontal Directional Drill 18-inch ID HDPE Pipeline	No change to Phase 1 facilities	No change to Phase 1 facilities	Current Design: Horizontal Directional Drill 24-inch ID HDPE pipeline	No change to Phase 1 facilities	No change to Phase 1 facilities
Bid Package 2 Nipomo Area Pipeline Improvements	Defer Improvements	12-inch pipeline along Orchard (same alignment as current design) Defer other pipelines and PRV Stations	Add 12-inch pipelines along Southland, Frontage, Darby, Oakglen & 4 PRV stations	Defer Improvements	12-inch pipeline along Orchard (same alignment as current design) Defer other pipelines and PRV Stations	Add 12-inch pipelines along Southland, Frontage, Darby, Oakglen & 4 PRV stations
Bid Package 3 Blosser Road Water Main and Flow Meter	18-inch pipeline along Blosser, flow meter & control valve, 18-inch jack-&-bore under levee	No change to Phase 1 facilities	No change to Phase 1 facilities	Current Design: 18-inch pipeline along Blosser, flow meter & control valve, 24-inch jack-&-bore under levee	No change to Phase 1 facilities	No change to Phase 1 facilities
Bid Package 4 Joshua Rd Pump Station & Reservoir, Wellhead Chloramination Improvements	Construct pump station & install 2 pumps, 18-inch pipeline from HDD, 18-inch pipeline along access road, 1 PRV station, chloramination systems	Install 0.5-M Gal Reservoir, replace pumps with 3 larger pumps & VFDs	Add 1 pump & VFD	Construct pump station & install 2 pumps, 24-inch pipeline from HDD and along access road, 1 PRV station, chloramination systems	Install 0.5-M Gal Reservoir, replace pumps with 3 larger pumps & VFDs	Add 1 pump & VFD

Potential Construction Cost Savings

Table 4 summarizes the opinion of probable construction costs for the phased implementation strategy described in Table 3. The construction cost opinions discussed herein are provided in 2011-2012 US dollars and do not reflect escalation for future construction. It may be assumed that construction costs will increase for deferred improvements.

Table 4 Opinion of Probable Construction Cost - Potential Phasing (2011-2012 US Dollars)

	OPTION A Max future capacity for Levee & River Crossings & pump station piping = 3,000 AFY				OPTION B Max future capacity for Levee & River Crossings & pump station piping = 6,300 AFY			
	Phase 1 - 400 gpm (645 AFY)	Phase 2 - 1,000 gpm (1,600 AFY)	Phase 3 - 2,000 gpm (3,000 AFY)	Total	Phase 1 - 400 gpm (645 AFY)	Phase 2 - 1,000 gpm (1,600 AFY)	Phase 3 - 2,000 gpm (3,000 AFY)	Total
Bid Package 1: Santa Maria River Crossing	$ 4,248,000	$ -	$ -	$ 4,248,000	$ 4,828,000	$ -	$ -	$ 4,828,000
Bid Package 2: Nipomo Area Pipeline Improvements	$ -	$ 1,246,000	$ 2,912,000	$ 4,158,000	$ -	$ 1,246,000	$ 2,912,000	$ 4,158,000
Bid Package 3: Blosser Road Water Main & Flow Meter	$ 2,148,000	$ -	$ -	$ 2,148,000	$ 2,207,000	$ -	$ -	$ 2,207,000
Bid Package 4: Joshua Rd Pump Station & Reservoir, Wellhead Chloramination Improvements	$ 2,950,000	$ 1,885,000	$ 115,000	$ 4,950,000	$ 3,029,000	$ 1,885,000	$ 115,000	$ 5,029,000
SUBTOTAL	$ 9,346,000	$ 3,131,000	$ 3,027,000	$ 15,504,000	$ 10,064,000	$ 3,131,000	$ 3,027,000	$ 16,222,000
Contingency (15%)	$ 1,401,900	$ 469,650	$ 454,050	$ 2,325,600	$ 1,509,600	$ 469,650	$ 454,050	$ 2,433,300
TOTAL	**$ 10,748,000**	**$ 3,601,000**	**$ 3,482,000**	**$ 17,830,000**	**$ 11,574,000**	**$ 3,601,000**	**$ 3,482,000**	**$ 18,656,000**

The current design construction cost opinion is $18,259,000. This provides a total single-phased project delivering 2,000 gpm with the maximum future capacity for the levee and river crossings and pump station piping equal to 6,300 AFY (Figure 1). The total for the 3-phased project under Option B reflects a higher cost estimate because the project is assumed to require two smaller pumps for Phase 1, which would be replaced with three larger pumps during Phase 2.

The total estimated potential construction cost deferment if the project is constructed in phases is described by the difference between 400-gpm delivery under Option A and the current design (a single-phase project delivering 2,000 gpm, estimated at $18,259,000). Assuming a 15% contingency, the potential deferment for this scenario equates to $7,511,000. An additional $826,000 (less than five percent of the current project construction cost) would preserve the potential 6,300 AFY future delivery for the River and Levee Crossings and piping at the pump station (difference between Options A and B).

Conclusions

The results of this study indicate that revised phasing for the Supplemental Water Project is technically feasible. The potential for three phases are described for the project to reach the existing design and delivery of 3,000 AFY (at 2,000 gpm).

The maximum supplemental delivery that the District's existing system can receive from the project without significantly increasing pressures in the system is 400 gpm, allowing the District to defer the Bid Package 2 (Nipomo Area Pipeline Improvements) until implementing higher delivery rates. At this flow rate, the reservoir may not be required and smaller pumps could be utilized at the pump station. This potential Phase 1 project is described in Table 3 and Figure 2 under Phase 1, Option B. With a construction cost opinion of $11.6M, the potential cost deferment is $6.7M. An additional construction cost reduction of $826,000 could be realized if the District decides to limit the potential future delivery through the levee and River Crossings and the pump station piping to a maximum of 3,000 AFY (Option A).

Phase 2 of the project could receive up to 1,000 gpm of supplemental water with a dedicated 12-inch pipeline along Orchard between Southland Street and Grande Avenue, construction of the buried reservoir and three new pumps at the pump station (Table 3 and Figure 2). The estimated construction cost for these improvements is $3.6M. A preliminary review of the District's 2011 demands suggests that the District demand alone is not sufficient to utilize 1,000 gpm (1,600 AFY) during the winter months. Delivery to another water purveyor may be required to implement this delivery rate under current demand conditions. Another option would be to reduce the delivery rate according to the District's demands. Delivery to another purveyor, such as Golden State Water District, may reduce pressures in the District's system.

Phase 3 would allow supplemental delivery of up to 2,000 gpm and would require the remaining improvements for Bid Package 2 and one additional pump at the pump station (Table 3 and Figure 2). The estimated construction cost for these improvements is $3.5M.

Several additional tasks are recommended before moving forward with planning and design for a three-phased project. These tasks are summarized for each Phase below.

Phase 1 (400 gpm delivery, 645 AFY):

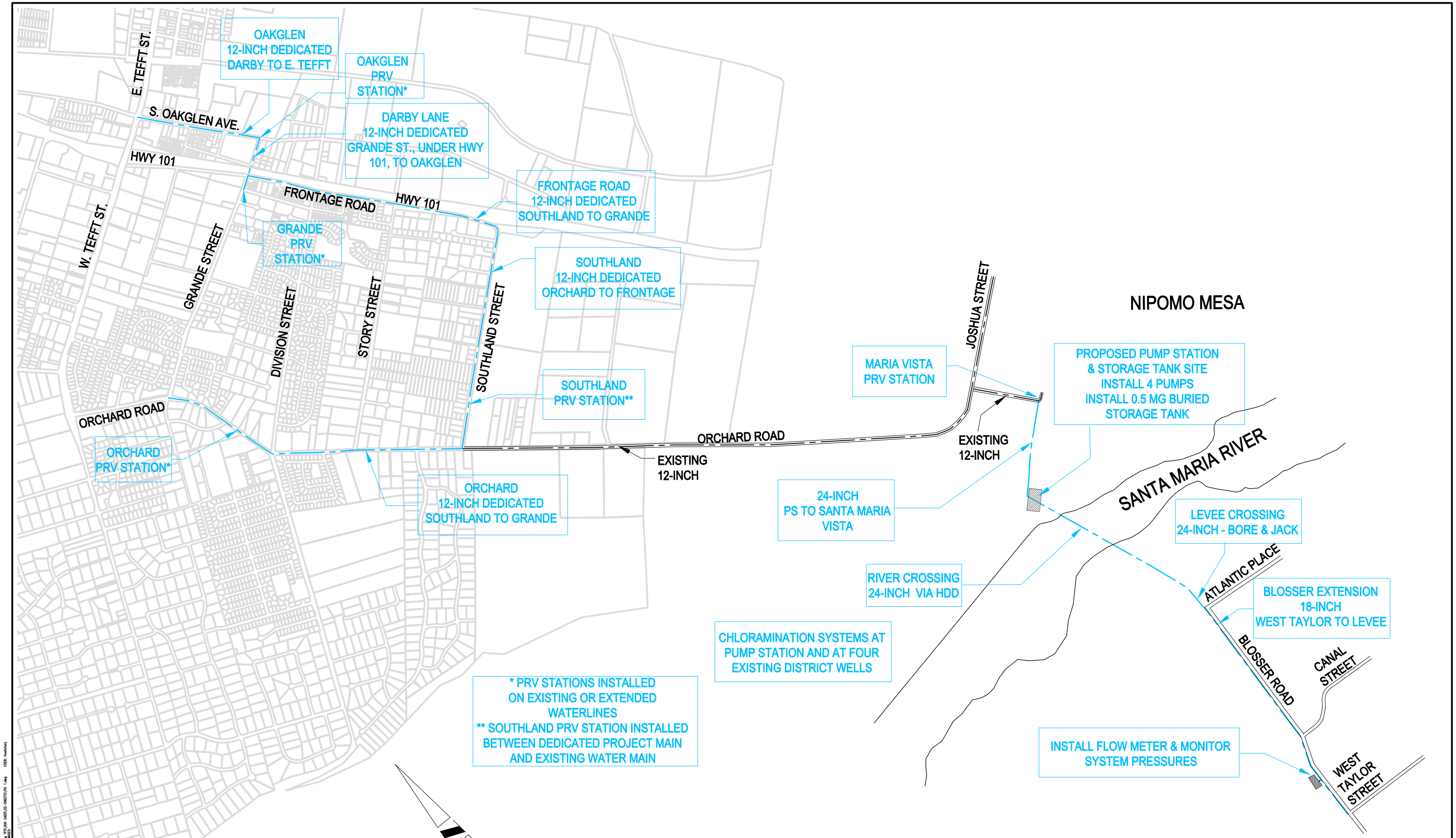
- Determine maximum potential future delivery rates for the levee and river crossings and pump station piping (3,000 or 6,300 AFY, Option A or B).
- Renegotiate water delivery schedule in existing Wholesale Water Agreement with the City of Santa Maria.
- Perform modeling with updated District demands to confirm reservoir can be deferred.
- Review pump station operations to determine changes required for Phase 1 if reservoir is deferred.
- Perform hydraulic analysis to select appropriate pumps for Phase 1, 400 gpm delivery, coordinated with future upgrades as allowed.

Phase 2 (1,000 gpm delivery, 1,600 AFY):

- Review District demands to determine whether delivery to additional water purveyors will be required to utilize 1,600 AFY, or if the District can utilize the entire amount.

Phase 3 (2,000 gpm delivery, 3,000 AFY):

- Review District demands to determine whether delivery to additional water purveyors will be required to utilize 3,000 AFY, or estimate when the District can utilize the entire amount.



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NCSD SUPPLEMENTAL WATER PROJECT
PHASING TECHNICAL FEASIBILITY STUDY

EXISTING PROJECT COMPONENTS

AECOM PROJECT NO. 60270503

FIGURE 1

OAKGLEN
12-INCH DEDICATED
DARBY TO E. TEFFT
PHASE 3

OAKGLEN
PRV
STATION*
PHASE 3

DARBY LANE
12-INCH DEDICATED
GRANDE ST., UNDER HWY
101, TO OAKGLEN
PHASE 3

FRONTAGE ROAD
12-INCH DEDICATED
SOUTHLAND TO GRANDE
PHASE 3

GRANDE
PRV
STATION*
PHASE 3

SOUTHLAND
12-INCH DEDICATED
ORCHARD TO FRONTAGE
PHASE 3

SOUTHLAND
PRV STATION**
PHASE 3

ORCHARD
PRV STATION*
PHASE 3

ORCHARD
12-INCH DEDICATED
SOUTHLAND TO GRANDE
PHASE 2

E. TEFFT ST.
S. OAKGLEN AVE.
HWY 101
FRONTAGE ROAD
HWY 101
W. TEFFT ST.
GRANDE STREET
DIVISION STREET
STORY STREET
SOUTHLAND STREET
ORCHARD ROAD
ORCHARD ROAD
EXISTING
12-INCH
EXISTING
12-INCH

POTENTIAL PHASING - NOMINAL DELIVERY RATES

PHASE 1 - 400 GPM (645 AFY)
PHASE 2 - 1,000 GPM (1600 AFY)
PHASE 3 - 2,000 GPM (3000 AFY)

OPTION A - CAPACITY FOR POTENTIAL FUTURE DELIVERY UP TO 3,000 AFY

OPTION B - CAPACITY FOR POTENTIAL FUTURE DELIVERY UP TO 6,300 AFY

Unless otherwise noted, individual project components are designed for Option A (3,000 AFY). Note that additional piping, storage, and pumps will be required for more than 3,000 AFY.

NIPOMO MESA

MARIA VISTA
PRV STATION
PHASE 1

JOSHUA STREET

PUMP STATION
& STORAGE TANK SITE
PHASE 1 - INSTALL 2 PUMPS
PHASE 2 - REPLACE 2 PUMPS WITH
3 LARGER PUMPS, INSTALL 0.5 MG
BURIED STORAGE TANK
PHASE 3 - INSTALL 4th PUMP

PIPELINE PS TO
SANTA MARIA VISTA
PHASE 1
OPTION A = 18-INCH
OPTION B = 24-INCH

SANTA MARIA RIVER

LEVEE CROSSING
BORE & JACK
PHASE 1
OPTION A = 18-INCH
OPTION B = 24-INCH

RIVER CROSSING
VIA HDD
PHASE 1
OPTION A = 18-INCH
OPTION B = 24-INCH

ATLANTIC PLACE

BLOSSER EXTENSION
18-INCH
WEST TAYLOR TO LEVEE
PHASE 1

BLOSSER ROAD

CANAL
STREET

WEST
TAYLOR
STREET

CHLORAMINATION SYSTEMS AT
PUMP STATION AND AT FOUR
EXISTING DISTRICT WELLS
PHASE 1

INSTALL FLOW METER & MONITOR
SYSTEM PRESSURES
PHASE 1

* PRV STATIONS INSTALLED
ON EXISTING OR EXTENDED
WATERLINES
** SOUTHLAND PRV STATION INSTALLED
BETWEEN DEDICATED PROJECT MAIN
AND EXISTING WATER MAIN

1500 750 0 1500 3000
SCALE IN FEET

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POTENTIAL PHASING
PROJECT COMPONENTS

AECOM PROJECT NO.
60270503

FIGURE
2