CHAPTER 2
Project Description

2.1 Introduction

Recognizing the growing need for an integrated and regional approach to water management, four wastewater utilities and one water agency in the North San Pablo Bay region of California have joined forces to plan a project that would promote the expanded beneficial use of recycled water regionwide.

The proposed North Bay Water Recycling Program (NBWRP) would build on commitments to long-term inter-agency cooperation to address common needs related to reliable water supplies and enhanced environmental restoration. As implementation of the Project would likely require external funding assistance, the investigation and development of the Project is being carried out in conformance with the requirements of the U.S. Department of the Interior's Bureau of Reclamation Public Law 102-575, Title XVI, which provides a mechanism for federal participation and cost-sharing in water reuse projects.

The North Bay Water Reuse Authority (NBWRA), established under a Memorandum of Understanding (MOU) in August 2005, is comprised of four wastewater utilities: Las Gallinas Valley Sanitary District (LGVSD), Novato Sanitary District (Novato SD), Sonoma Valley County Sanitation District (SVCSD), Napa Sanitation District (Napa SD), and Sonoma County Water Agency (SCWA). Additional agencies supporting the NBWRA through contribution of funds and staff time include North Marin Water District (NMWD) and Napa County.

Under the MOU, the NBWRA is exploring "the feasibility of coordinating interagency efforts to expand the beneficial use of recycled water in the North Bay Region thereby promoting the conservation of limited surface water and groundwater resources." The NBWRP would alter the disposition of recycled water in the North Bay Region by providing increased recycled water supply to urban, agricultural and environmental uses.

2.2 Project Purpose

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. The Bureau of Reclamation's water reclamation and reuse program is authorized by the Reclamation Wastewater and Groundwater Study and Facilities Act of 1992 (Title XVI of Public Law 102-575). Also known as Title XVI, the act directs the Secretary of the Interior to undertake

a program to investigate and identify opportunities for water reclamation and reuse of municipal, industrial, domestic and agricultural wastewater, and naturally impaired ground and surface waters, and for design and construction of demonstration and permanent facilities to reclaim and reuse wastewater.

The NBWRA is a cooperative program in the San Pablo Bay region that supports sustainability and environmental enhancement by expanding the use of recycled water. The purpose of the NBWRP is to provide recycled water for agricultural, urban, and environmental uses thereby reducing reliance on local and imported surface and groundwater and reducing the amount of treated effluent releases to San Pablo Bay.

2.3 Participants

The five participating agencies have organized themselves under a Memorandum of Understanding (MOU) as the NBWRA. The following agencies would participate in the implementation of the NBWRP:

2.3.1 MOU Signatory Agencies

- **LGVSD** – The LGVSD wastewater treatment plant (WWTP) provides sanitation service to approximately 30,000 people within the area of Marinwood, Lucas Valley, Terra Linda, Santa Venetia, Los Ranchitos, and Smith Ranch Road (LGVSD, 2005).

- **Novato SD** – The Novato WWTP provides service to approximately 60,000 residents within the city of Novato, an area of 28 square miles, and surrounding areas (Novato Sanitary District, 2006).

- **SVCSD** – The SVCSD WWTP began operations in 1954 and provides service to approximately 34,000 people in the city of Sonoma, within a 7-square-mile area (SVCSD, 2006).

- **Napa SD** – The Napa SD's Soscol water recycling facility treats wastewater from the city of Napa and surrounding unincorporated communities, an area of about 23 square miles, and serves a population of approximately 80,000 (Napa SD, 2007).

- **SCWA** – SCWA, which began the Title XVI process for investigating a recycled water distribution system under a Cooperative Agreement with the Bureau of Reclamation, is a wholesale drinking water provider to over 600,000 residents and continues to be an actively participating partner.

2.3.2 Supporting Agencies

- **NMWD –** NMWD has partnered with Novato SD to implement recycled water projects in their collective service areas, including a 0.5 mgd tertiary treatment facility located at the Novato SD reclamation facility. NMWD is contributing funds and staff time to the Authority.

- **Napa County –** Napa County is cooperating with Napa SD in the development of recycled water options for the Milliken-Sarco-Tulocay (MST) Creeks areas, and is contributing funds and staff time to the Authority.

2.3.3 Other Agencies Declining to Participate

During the development of the NBWRP, several other agencies were considered for inclusion. These include the City of Vallejo, American Canyon and Solano County. However, these agencies declined to participate in the initial development phases of the NBWRA. Two agencies that were included in the Phase 1 and Phase 2 Feasibility Studies prepared by the NBWRA, but have declined to participate at this time, include the City of Petaluma and Marin Municipal Water District.

- **City of Petaluma** – The City of Petaluma is not a signatory to the MOU establishing the NBWRA. Given its location within the San Pablo Bay watershed, the City of Petaluma and surrounding unincorporated area was identified as a potential service area for recycled water at the onset of the project. Recognizing that the City had historically provided recycled water to golf course and agricultural customers within its city limits and surrounding unincorporated area, and was in the process of developing a Recycled Water Master Plan to increase service, the City was included as a potential participant in the Alternatives presented in the Phase 1 and Phase 2 Feasibility Studies. In written communication to the Authority, the City of Petaluma has declined to participate in the North San Pablo Bay Restoration and Reuse Project. Therefore, facilities previously identified in the Phase 1 and Phase 2 Feasibility Studies to serve the Petaluma area are not included in this EIR/EIS analysis.

  The City of Petaluma is moving forward with its Recycled Water Master Plan; a Draft EIR for the project was circulated in July of 2008, and was certified by the City Council in November 2008. This project is further reviewed in Section 4, Cumulative Impacts, as a cumulative project occurring within the North San Pablo Bay Watershed.

- **Marin Municipal Water District** – Marin Municipal Water District (MMWD) is not signatory to the MOU, but had been identified as a potential partner with LGVSD in the implementation of recycled water service to the Peacock Gap Golf Course Area in Marin County. MMWD has declined to participate in the North San Pablo Bay Restoration and Reuse Project. Service to the Peacock Gap area will be considered for implementation by LGVSD independent of MMWD participation.

2.3.4 Proposed Federal Action

The CEQ regulations outlined in the NEPA Handbook, require an EIS to define, in a brief statement, what Federal action is under consideration. As implementation of the NBWRP would likely require external funding assistance, the investigation and development of the NBWRP is being carried out in conformance with the requirements of the U.S. Department of the Interior's Bureau of Reclamation Public Law 102-575, Title XVI, which provides a mechanism for Federal participation and cost-sharing in approved water reuse projects. The proposed Federal Action is the provision of federal funds by the Bureau of Reclamation under the Title XVI Program to NBWRA Member and Cooperating Agencies for the implementation of water recycling projects examined in this EIR/EIS. The Bureau of Reclamation is the NEPA Lead Agency for this proposed action.

2.4 Project Area

2.4.1 NBWRA Action Area

The action area, illustrated in **Figure 2-1**, extends approximately 10 to 15 miles inland from the San Pablo Bay within Marin, Sonoma, and Napa Counties. The action area extends as far south as Point San Pedro in Marin County, and as far north as Milliken Canyon located 28 miles to the northeast in eastern Napa County, and encompasses about 318 square miles of land. Urban centers in the action area are San Rafael (county seat) and Novato in Marin County, Sonoma in Sonoma County, and Napa (county seat) in Napa County. The topography of the action area consists of gently sloping river valleys, separated by northwest trending mountain ranges with steep slopes and peaks exceeding elevations of 2,500 feet above mean sea level. Flat lying mudflats and marshland border San Pablo Bay. The majority of the action area is within Napa, Sonoma, and Novato Valleys and the foothills bounding these valleys.

The action area receives water supplies from sources both within and outside the region. Water sources within the region include the Petaluma and Napa Rivers, Sonoma Creek, and Stafford Lake on Novato Creek. Surface water sources outside the region include the Russian River Project (including Lake Mendocino, Lake Sonoma, and imports from the Eel River via Pacific Gas & Electric Company's Potter Valley Project), Dry Creek, Warm Springs Creek, Lake Hennessey, Milliken Reservoir, MMWD's six Lagunitas Creek watershed reservoirs, Soulajule Reservoir on Walker Creek, and the Sacramento-San Joaquin Delta via the State Water Project. The region relies on groundwater and recycled water as additional sources.

2.4.2 Recycled Water Service Areas

In order to form candidate recycled water projects, land use information and Member Agency recycled water planning documents were reviewed. Water and wastewater agencies in the action area have developed several existing recycled water projects and identified recycled water projects for future implementation. Additional potential recycled water project areas were identified by grouping land uses either in major agricultural or landscaping areas or in areas between existing and proposed projects. These potential recycled water use areas are summarized in **Table 2-1** and are described below. Potential recycled water use areas are shown in **Figure 2-2**.

- **Peacock Gap Golf Course** – LGVSD proposes to serve recycled water to the Peacock Gap Golf Course at the eastern end of San Rafael. In 2008, the golf course and neighboring facilities was estimated to use about 437 AFY (Nute, 2008).

- **North Marin Water District (NMWD) Urban Reuse Project** Area – Under the originally proposed NMWD Urban Reuse Project, Novato SD was estimated to provide 1,312 AFY of recycled water for urban landscaping in the City of Novato (Nute Engineering, 2004[k1]). Please see **Appendix 2** for anticipated recycled water users in the Novato SD service area.

SOURCE: CDM, 2008

NBWRA North Bay Water Recycling Program 206088.01

Figure 2-1
Action Area

TABLE 2-1
RECYCLED WATER SERVICE AREAS

LGVSD
• Peacock Gap Golf Course
Novato SD
• North Marin Water District Urban Reuse Project Area • Sears Point
SVCSD
• Sonoma Valley Recycled Water Project Area • Napa Salt Marsh Restoration Area • Southern Sonoma Valley • Central Sonoma Valley
Napa SD
• Milliken-Sarco-Tulucay Creeks Area • Carneros East

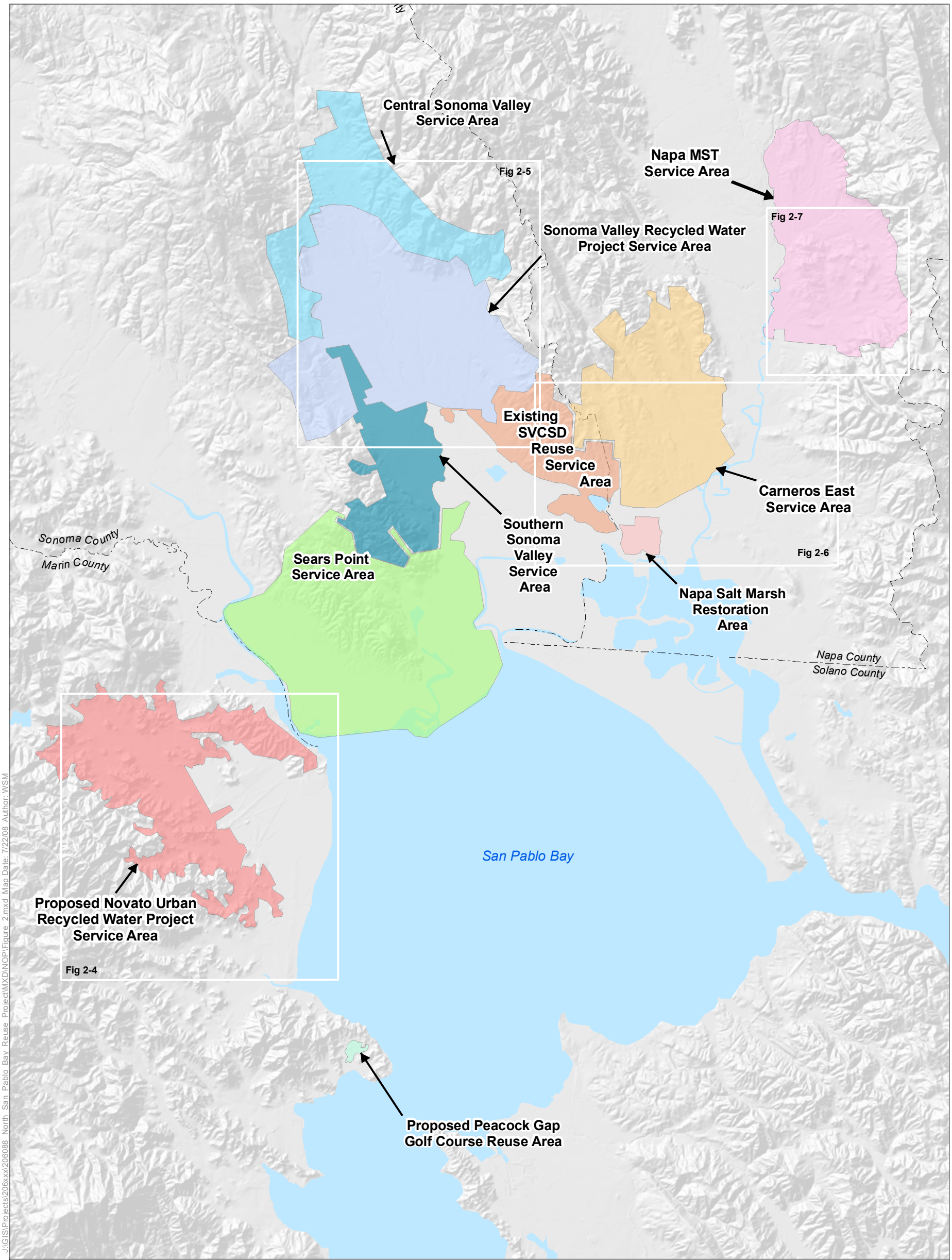
- **Sears Point** – The land in the vicinity of Sears Point lies in between SVCSD WWTP and Novato SD WWTP, but is not currently served with recycled water. This area could act as a convenient link between these treatment plants. The Sears Point reuse area encompasses 326 acres of dairy/pasture land, 76 acres of irrigated farm land, and 1,236 acres of vineyards for a total of about 1,638.

- **Sonoma Valley Recycled Water Project Area** – SVCSD is developing the Sonoma Valley Recycled Water Project, which identified about 1,015 acres of dairy/pasture land, 234 acres of urban landscaping, 2 acres of irrigated farm land, and 6,249 acres of vineyards, for a total of about 7,500 acres.

- **Southern Sonoma Valley** – The area south of the City of Sonoma is dedicated predominantly to vineyard uses and is close to the SVCSD WWTP. The Southern Sonoma Valley reuse area includes 55 acres of dairy/pasture land, 48 acres of urban landscaping, and 4,005 acres of vineyards, for a total area of 4,108 acres.

- **Central Sonoma Valley** – The Central Sonoma Valley reuse area is located north of the proposed Sonoma Valley Recycled Water Project, and includes additional vineyard areas in the valley still relatively close to the SVCSD WWTP. It encompasses 51 acres of urban landscaping, 258 acres of irrigated farm land, and 2,929 acres of vineyards, for a total area of 3,237 acres.

- **Napa Salt Marsh Restoration Project Area**– The Napa River Salt Marsh Restoration Project consists of restoration of tidal wetlands and enhancement of managed ponds in the Napa Sonoma Marsh Wildlife Area. Two water sources have been evaluated for habitat and bittern dilution operations: Napa River and slough diversions via planned levee breaches, and construction of a recycled water pipeline from the SVCSD WWTP and the Napa SD WWTP. The use of recycled water would be confined to Ponds 7 and 7A of the Napa Salt Marsh. Recycled water would be used to dilute bittern within ponds 7 and 7A and would not involve the breaching of levees.



Service Areas

- Central Sonoma Valley Service Area
- Southern Sonoma Valley Service Area
- Sears Point Service Area
- Carneros East Service Area
- Existing SVCSD Reuse Service Area
- Sonoma Valley Recycled Water Project Service Area
- Napa MST Service Area
- Napa Salt Marsh Restoration Area
- Proposed Novato Urban Recycled Water Project Area
- Proposed Peacock Gap Golf Course Reuse Area

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J:\GIS\Projects\206xxx\206088_North_San_Pablo_Bay_Reuse_Project\MXD\NOP\Figure_2.mxd Map Date: 7/22/08 Author: WSM

SOURCE: CDM, 2008; ESRI, 2006; and ESA, 2008

Note: Existing Water Distribution Facilities Not Shown

NBWRA North Bay Water Recycling Program. 206088.01

Figure 2-2

Service Areas

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- **Milliken-Sarco-Tulucay Creeks** (**MST**) **Area** – Napa SD's *Recycled Water Expansion Hydraulic and Preliminary Engineering Analysis: Phase 1 Report – Milliken-Sarco-Tulocay Area* indicates that Napa SD's MST area potentially consists of 4,335 acres (3,856 acres of vineyards, 389 acres of urban landscaping, and 90 acres of golf course/cemeteries) (Brown and Caldwell, 2007).

- **Carneros East** – Napa SD's St*rategic Plan for Recycled Water Use in the Year 2020* included the development of alternatives for a recycled water system to serve two areas of southern Napa County (LWA, 2005). According to the land use data used for the Project, Napa SD's Carneros East reuse area consists of about 6,654 acres of vineyards in the Napa County portion of the Los Carneros American Viticulture Area (AVA).

2.5 Project Objectives

In addition to the purpose and need for the proposed Federal Action identified in Section 2.3.4, the following project objectives have been developed by the NBWRA for the NBWRP. The project is proposed to promote the expanded beneficial use of recycled water in the North Bay region to achieve the following objectives:

- Offset urban and agricultural demands on potable water supplies;
- Enhance local and regional ecosystems;
- Improve local and regional water supply reliability;
- Maintain and protect public health and safety;
- Promote sustainable practices;
- Give top priority to local needs for recycled water, and;
- Implement recycled water facilities in an economically viable manner.

All of the Member Agencies already have existing recycled water programs. The NBWRA anticipates that provision of recycled water from the Proposed Action will be made available for use to new and existing water customers on reasonable terms and conditions. As appropriate, fee structures for recycled water have been or will be developed by Member Agencies within the context of each agency's rules, regulations and financial planning.

2.6 Action Alternatives to be Considered

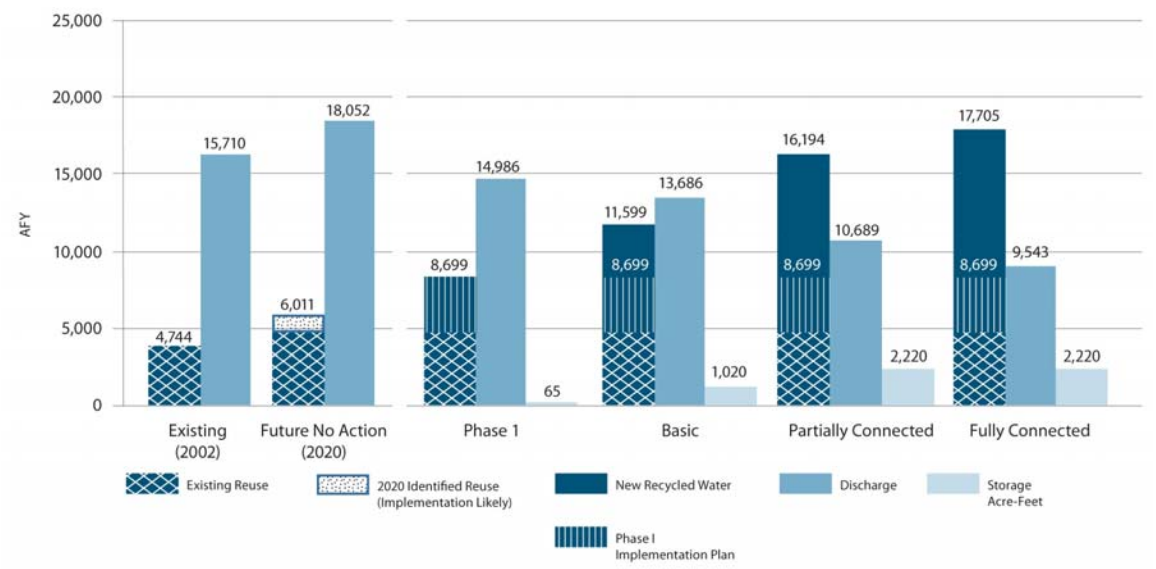
2.6.1 Action Alternatives Summary

This EIR/EIS considers the No Project Alternative, a No Action Alternative and three Action Alternatives. The Action Alternatives consist of treatment, transmission, and storage facilities necessary to meet a range of recycled water demand scenarios within the NBWRA service area through 2020. Each Action Alternative considers varying levels of recycled water use, and corresponding levels of regional facility integration. The Phase 1 Implementation Plan (discussed in Section 2.6.2 below) represents the set of projects, common to all of the NBWRP alternatives, which are defined to a level of detail that allows for project-level analysis, and would likely be

the first phase implemented under any alternative. The No Project Alternative, No Action Alternative and Action Alternatives are as follows:

- **No Project Alternative,** assumes that the proposed project is not implemented, and reviews two scenarios: 1) consideration of existing conditions without the project, a "no build scenario"; and 2) consideration of "reasonably foreseeable" future conditions without the project. This second scenario is identical to the No Action Alternative, identified below.
- **No Action Alternative,** provides a "future without the project" scenario as a baseline to compare the impacts of the proposed Action Alternatives.
- **Alternative 1, Basic System**, includes use of recycled water near each of the individual WWTPs;
- **Alternative 2, Partially Connected System**, adds additional pipelines, pump stations and storage to partially connect the existing WWTPs; and
- **Alternative 3, Fully Connected System**, provides a fully integrated recycled water distribution system connecting all four Member Agency WWTPs.

A comparison of each alternative in terms of the amount of recycled water made available, the corresponding amount of discharge to tributaries of North San Pablo Bay, and the amount of storage necessary to provide the level of recycled water use is provided in **Chart 1**, below. **Table 2-2** summarizes the existing and future recycled water supply demand and resulting discharge that would occur under Alternatives 1, 2, and 3.



SOURCE: ESA

North Bay Water Reuse Authority . 206088

Chart 1
Existing and Future Conditions (2020) vs. Proposed Project Recycled Water, Discharge, Storage (Acre-Feet Per Year)

TABLE 2-2
ALTERNATIVES SUMMARY –
RECYCLED WATER SUPPLY, DEMAND, AND RESULTING DISCHARGE (AFY)

Alternatives	WWTP Service Area	WWTP Inflow (2020)	Existing Recycled Water Demand	New Recycled Water Demand (Beneficial Reuse)	Total Recycled Water Demand	Discharge to San Pablo Bay[1]
Alternative 1: Basic System	LGVSD and Novato WWTPs	12,347	1,172	744	1,916	8,643
	SVCSD and Napa WWTPs	15,308	3,772	5,911	9,683	5,043
	Total	**27,655**	**4,944**	**6,655**	**11,599**	**13,686**
Alternative 2: Partially Connected System	LGVSD and Novato WWTPs	12,347	1,172	2,477	3,619	8,032
	SVCSD and Napa WWTPs	15,308	3,772	8,802	12,574	2,657
	Total	**27,655**	**4,944**	**11,279**	**16,193**	**10,689**
Alternative 3: Fully Connected System	LGVSD, Novato, SVCSD, and Napa WWTPs	27,655	4,944	12,761	17,705	9,543
Total		**27,655**	**4,944**	**12,761**	**17,705**	**9,543**

[1] The number does not equal supply and demand due to evaporative and other losses (e.g. spreading).

SOURCES: CDM, 2009; ESA, 2009

A full description of the facilities proposed under each Action Alternative is provided in Section 2.8.

2.6.2 Phase 1 Implementation Plan

The Member Agencies have collectively prioritized the projects within their individual service areas to establish an Implementation Plan identifying the order in which projects would be constructed. Phase 1 of the Implementation Plan includes projects that are defined to a level of detail that allows for project-level environmental review. These projects are collectively referred to as Phase 1 Projects. The Phase 1 Projects are common to Alternatives 1, 2, and 3. This EIR/EIS may be relied upon by individual member agencies for approval of these individual Phase 1 Projects. **Table 2-3** identifies projects that would be implemented as Phase 1 Projects under any of the Action Alternatives considered. These projects will be examined at a project level of detail, and are described in Section 2.7, Project Level Analysis – Phase 1 Implementation Plan. **Figure 2-3** shows proposed facilities that would be implemented under Phase 1.

2.7 Project Level Analysis

2.7.1 Phase 1 Implementation Plan

The Member Agencies have collectively prioritized the projects within their individual service areas to identify a phased Implementation Plan under any of the alternatives being considered. The first phase of the Implementation Plan includes projects that each Member Agency has defined to a level of detail that allows for project-level environmental review. These projects are collectively referred to as Phase 1 Projects. This EIR/EIS may be relied upon by individual member agencies or other cooperating agencies for approval of these individual projects.

TABLE 2-3
IMPLEMENTATION PLAN – PHASE 1

		New Pipeline (miles)	New Demand (AFY)	Capacity Increase (mgd)	New Pumps (HP)	New Storage (AF)
LGVSD	Peacock Gap	--	--	--	--	--
	NMWD URWP (South)	5.9	204	0.7	72	(3)
	Sears Point	--	--	--	--	--
Novato SD	NMWD URWP (North/Central)	9.8	542	1.2	259	(3)
	Sears Point	--	--	--	--	--
SVCSD	Southern Sonoma Valley	--	--	--	--	--
	Central Sonoma Valley	--	--	--	--	--
	Sonoma Valley (1A)[1]	5.2	874	0	662	65
	Napa Salt Marsh	7.9	(2)	0	0	0
Napa SD	Carneros East	--	--	--	--	--
	MST Area	17.5	2,137	4.5	880	0
	Napa (local)	--	--	--	--	--
	Napa Salt Marsh	--	--	--	--	--
Total		**46.3**	**3,757**	**6.4**	**1,873**	**65**

1 Sonoma Valley (1A) is a pipeline alignment originally analyzed as a part of the Sonoma Valley Recycled Water Project EIR and proposed under Phase 1 for the NBWRP. The alignment is described on page 2-18 of this document.
2 Additional 3,460 AFY release of recycled water to Napa Salt Ponds 7 and 7A, depending upon year type. Because this is a beneficial use that is not related to recycled water supply, this number is tracked separately in each of the alternatives.
3 Existing 0.5 mg reservoir would be rehabilitated to provide recycled water system storage.

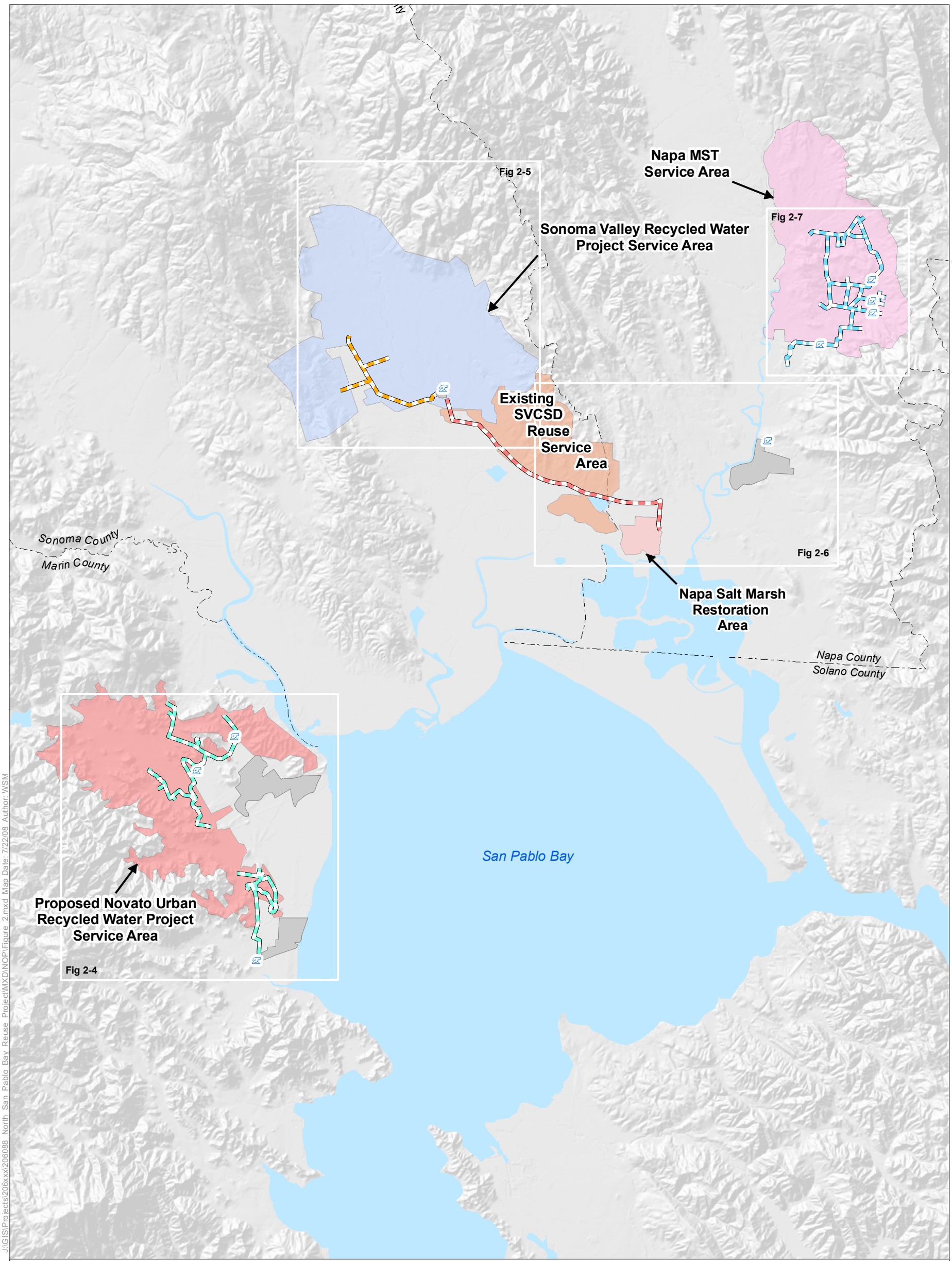
SOURCE: CDM, 2009, Napa SD, 2009.

Las Gallinas Valley Sanitary District/North Marin Water District

In 2006, the *Recycled Water Implementation Plan* (Nute Engineering, 2006) was developed to provide guidance and phasing for a recycled water system to serve the City of Novato and Hamilton Field urban areas. The intent of the implementation plan was to identify projects that could be implemented cooperatively by NMWD, Novato SD, and LGVSD in the near future in order to offset peak seasonal potable water supply demands. The *Recycled Water Implementation Plan* identified 3 service areas and facilities to most efficiently provide recycled water service: Novato South, Novato Central and Novato North. Under the Phase 1 Implementation Plan, service to the Novato South area would be provided by NMWD through construction of a pipeline distribution system. This system would be served by LGVSD through construction of a 0.7 mgd tertiary treatment facility at the existing LGVSD plant. This system would not be connected to the remainder of the NMWD recycled water system (Nute Engineering, 2006).

Novato South Service Area – Hamilton Field

Service to the Hamilton Field area would be established through implementation of a of 0.7 mgd tertiary treatment upgrade at the existing LGVSD WWTP, construction of a new booster pump station onsite, and construction by NMWD of a pipeline distribution system from the LGVSD WWTP north to serve the Hamilton Field area (**Figure 2-4**). This system would consists of a loop of 6-inch pipeline along South Oakwood Drive and Casa Grande Drive, a 12-inch pipe along



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Phase 1

Proposed Pump

Phase1

- Napa SD-MST Pipelines (Phase1)
- Napa Salt Marsh Restoration Pipelines (Phase 1)
- Novato Urban Recycled Water Pipelines (Phase 1)
- SVRW Pipelines (Phase 1)

- Existing SVCSD Reuse Service Area
- Sonoma Valley Recycled Water Project Service Area
- Napa MST Service Area
- Napa Salt Marsh Restoration Area
- Proposed Novato Urban Recycled Water Project Area
- Waste Water Treatment Plant

0 4
Miles

SOURCE: CDM, 2008; ESRI, 2006; and ESA, 2008

Note: Existing Water Distribution Facilities Not Shown

NBWRA North Bay Water Recycling Program. 206088.01

Figure 2-3

Phase 1 Implementation Plan

Service Areas and Facilities

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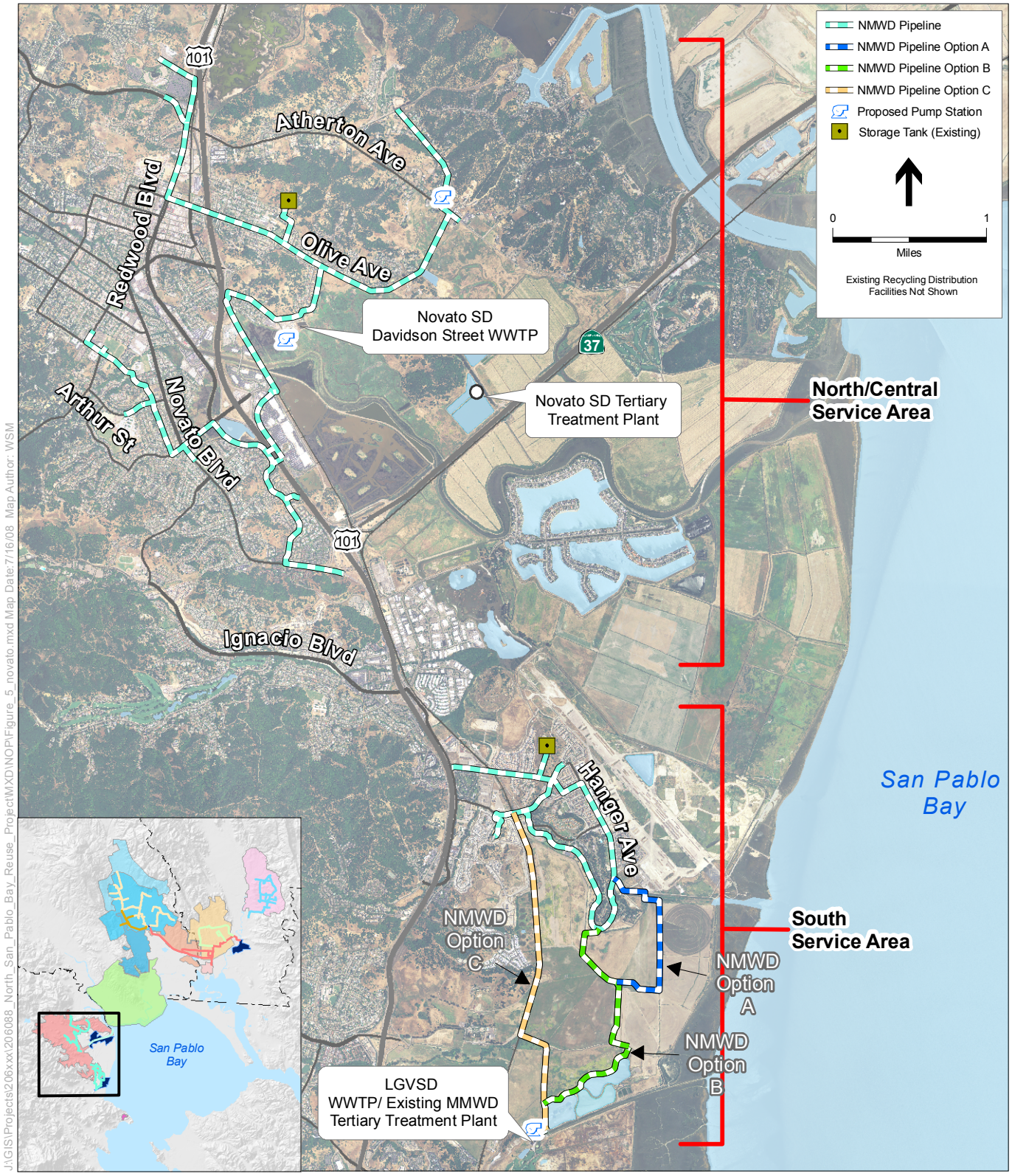


SOURCE: USDA, 2005; CDM, 2008; and ESA, 2008

Note: Existing Tank Facilities Shown

NBWRA North Bay Water Recycling Program. 206088.01

Figure 2-4

Novato Service Area:
Phase 1 Projects

Hangar Avenue to South Palm Drive, and a 10-inch pipe on Palm Drive. Recycled water storage would be provided by retrofit of the existing 0.5-million gallon (MG) Reservoir Hill Tank.

To provide the additional 0.7 mgd treatment capacity, tertiary facilities would be constructed within the fenceline of the existing LGVSD WWTP, as shown in **Figure 2-4A**. NMWD would construct a pipeline from the LGVSD WWTP to the Hamilton Field area along three route options (Figure 2-4):

- **Option A:** This option would consist of approximately 2.75 miles of pipeline that would originate at the LGVSD WWTP, extend east adjacent to the WWTP ponds and northeast through grazing land to Hangar Avenue in the where it would connect to the Coast Guard Housing Distribution Loop.

- **Option B:** This option would consist of approximately 2.1 miles of pipeline that would originate at LGVSD WWTP, extend east adjacent to the WWTP ponds and north along agricultural access roads through grazing land. Option B would connect to the Coast Guard Housing Distribution Loop at Las Lomas Drive.

- **Option C:** This option would consist of approximately 2.15 miles of pipeline that would extend north from LGVSD WWTP through grazing land. The alignment would turn west along St. Vincent's Drive then north, adjacent to the Northwest Pacific Railroad (NWPRR) right-of-way. Option C would connect to the Coast Guard Housing Loop at Palm Drive.

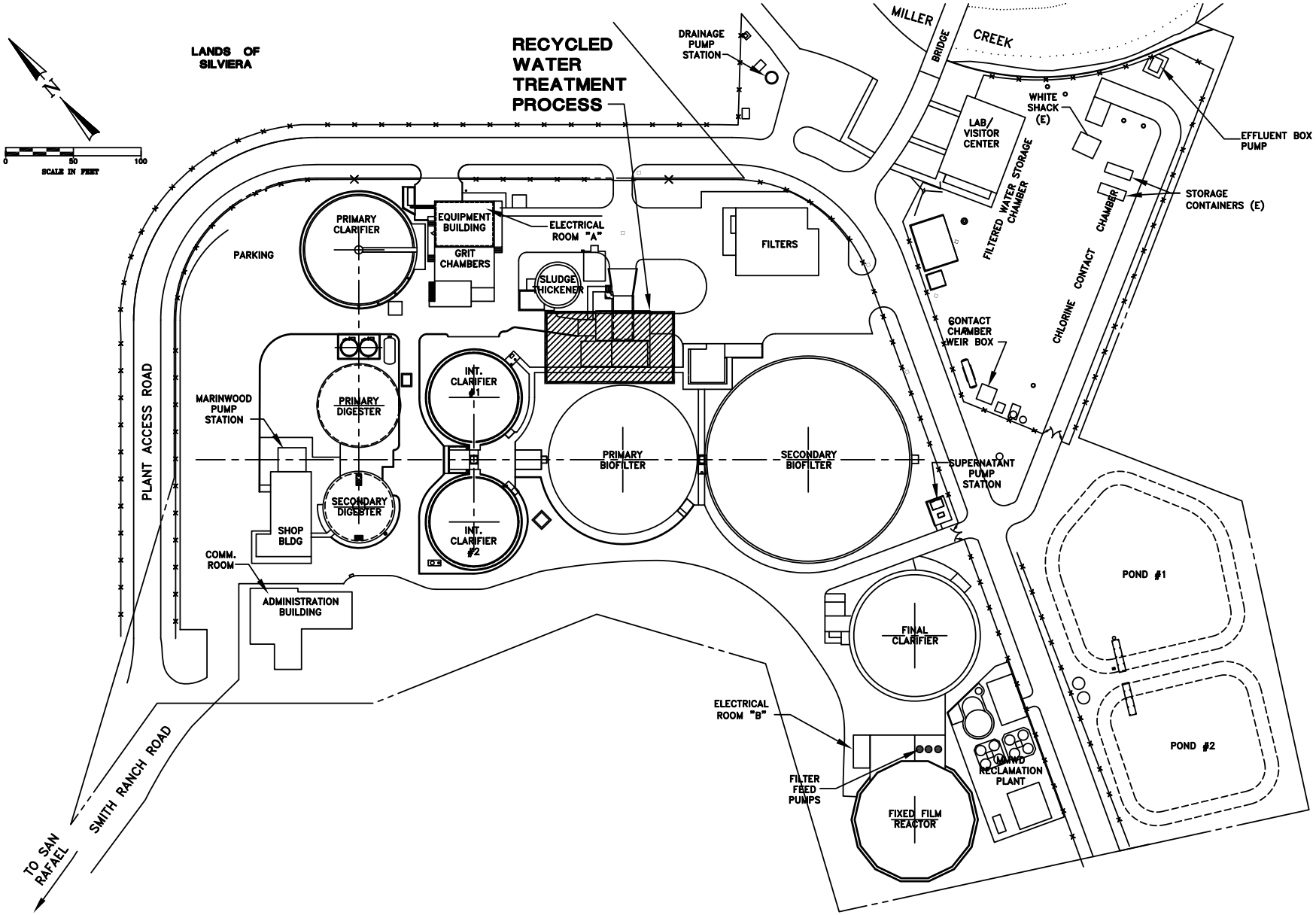
Novato Sanitary District/ North Marin Water District

Novato North Service Area

Under the *Recycled Water System Expansion Project*, NMWD and Novato SD would implement service in the Novato North Service Area by incrementally expanding tertiary capacity at the existing Novato Recycled Water Treatment Facility from 0.5 mgd to 1.2 mgd. The Recycled Water Treatment Facility 0.5 mgd upgrade would involve a new modular filter and expansion of the chlorination system. The recycled water pipeline would be routed from Atherton Avenue to Olive Avenue under Highway 101, and north on Redwood Boulevard to San Marin Drive (see Figure 2-4). A separate pipeline would be routed on H Lane to serve the Valley Memorial Park Cemetery. A booster pump would be installed at Atherton Avenue and the distribution system would be connected to the existing 0.5-MG Plum Street Tank, which would be rehabilitated to provide diurnal storage (Nute Engineering, 2006).

Novato Central Service Area

Under the *Recycled Water System Expansion Project*, Novato SD and NMWD would implement service in the Novato Central Service Area through construction of a recycled water distribution system from the Novato SD WWTP south to Rowland Boulevard and the Vintage Oaks shopping center, and across Highway 101 to serve urban users west of Highway 101. The treatment facilities at the Recycled Water Treatment Facility (see **Figure 2-4B**) would be decommissioned and relocated to the Novato SD WWTP. Tertiary treatment facilities are included in the Novato SD Master Plan for the WWTP. From the WWTP, an 18-inch pipeline would be installed along Novato SD's existing easement, with a jack and bore crossing of US 101 from Rowland



SOURCE: Nute Engineering, 2008

NBWRA North Bay Water Recycling Program. 206088

Figure 2-4A

LGVSD Tertiary Treatment Plan Upgrades

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SOURCE: GlobeXplorer, 2007

NBWRA North Bay Water Recycling Program. 206088.01

Figure 2.4B

Novato San District Recycled Water Treatment Facility

Boulevard to Redwood Boulevard. An 18-inch recycled trunk line would then extend north through Novato to deliver recycled water to Novato High School and other irrigated playing fields, with a 10-inch line extending south along Redwood Boulevard (see Figure 2-4).

A new pipeline would connect the WWTP with the North Service Area pipeline in Olive Drive via Lea Drive or McClelland Drive. This would allow continuation of recycled water service to the Stone Tree Golf Course and the other customers in the North Service Area during the course of the relocation of the recycled water facility to the WWTP. This intertie would also incorporate the Plum Street Tank into the distribution system serving both the Novato North and Central Service Areas (Nute Engineering, 2006). **Table 2-4** summarizes the roadways that would be affected under this project.

TABLE 2-4
NMWD/NOVATO SD FACILITIES – MAJOR ROADWAYS AFFECTED

• Atherton Avenue	• Redwood Boulevard	• Novato Boulevard
• Olive Avenue	• DeLong/ Diablo Avenue	• S. Novato Boulevard
• Rowland Boulevard	• Arthur Street	• Hill Road

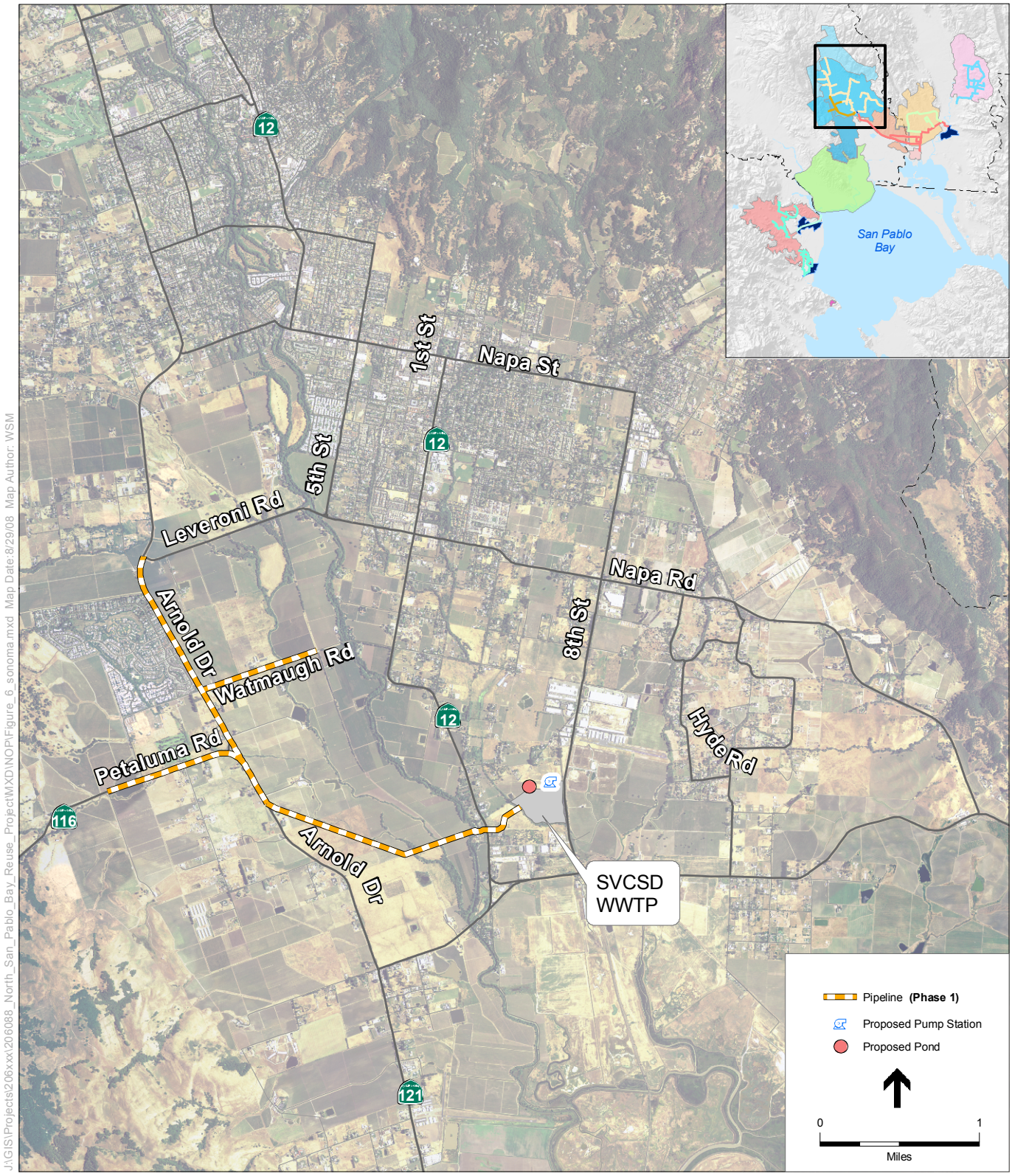
Sonoma Valley County Sanitation District

Sonoma Valley Recycled Water Project (SVRWP)

SVCSD completed an EIR in 2006 for the SVRWP, located in southern Sonoma Valley, including the City of Sonoma and unincorporated portions of the county. The SVRWP, as described in the EIR, involved extending the recycled water pipelines from the SVCSD WWTP to deliver recycled water to increased numbers of property owners. It was anticipated that if fully constructed, the SVRWP could provide up to approximately 2,750 AF per year of recycled water and expand the acreage currently irrigated with reclaimed water from 3,600 acres to approximately 9,100 acres. The SVRWP EIR included project-level analysis of 34 miles of pipeline, construction of operational and capacity storage reservoirs adjacent to the SVCSD WWTP, and construction of one booster pump station and one distribution pump station. The EIR also examined provision of additional pond storage within the Sonoma Valley at a program level. Although the SVRWP EIR was certified, SVCSD has elected to implement only one of the proposed pipeline alignments.

The Phase 1 Implementation Plan includes specific elements of the SVRWP, including construction of 5.2 miles of pipeline, additional storage at the SVCSD WWTP and construction of additional pumping capacity for distribution. These facilities are consistent with those analyzed in the SVRWP EIR. The EIR was certified in December 2006 by the SVCSD Board of Directors.

- The facilities proposed under the Phase 1 Implementation Plan are shown in **Figure 2-5**. SVRWP Alignment 1A would consist of approximately 5.2 miles of pipeline in western Sonoma Valley. The main pipeline would originate from the SVCSD WWTP, extend southwest and then northwest through a vineyard to Arnold Drive. The pipeline would continue north along Arnold Drive to Orange Avenue, and extend north on Orange Avenue



SOURCE: USDA, 2005; CDM, 2008; and ESA, 2008

Note: Existing Facilities Not Shown

NBWRA North Bay Water Recycling Program. 206088.01

Figure 2-5

Sonoma Valley Recycled Water Project Area
Phase 1 Projects

to Elm Avenue. The pipeline would then continue east on Elm Avenue, cross a field to Arnold Drive, extend north on Arnold Drive, and end just north of Leveroni Road. Secondary pipelines or segments would extend from the main pipeline on the following roadways: Highway 116, Watmaugh Road, and Leveroni Road.

Major roadways affected are identified in **Table 2-5**.

TABLE 2-5
SONOMA VALLEY RECYCLED WATER PROJECT – MAJOR ROADWAYS AFFECTED

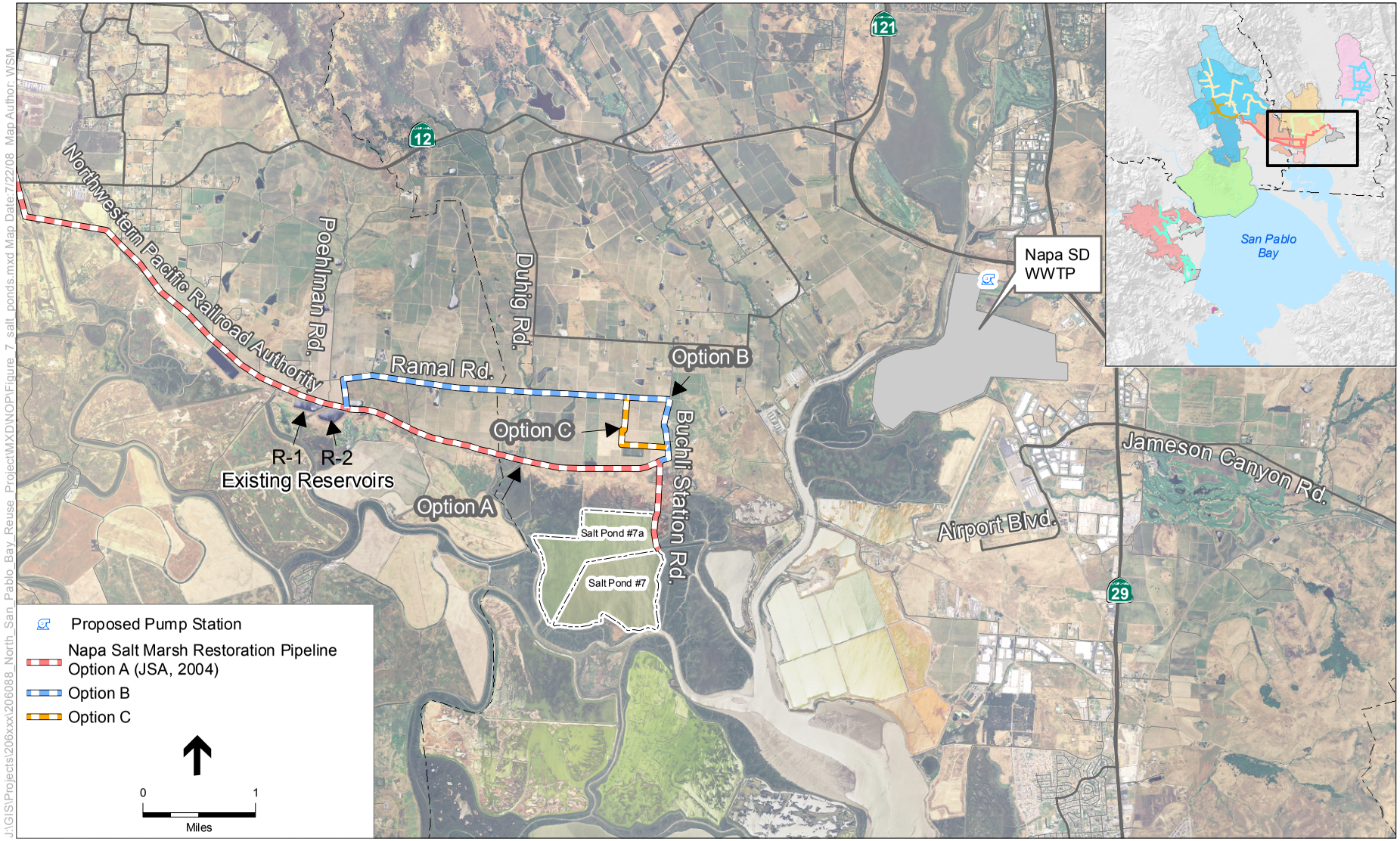
• Highway 116 (Stage Gulch Road)	• Broadway
• Arnold Drive (Orange Avenue)	• Petaluma Avenue
• Leveroni Road	• Grove Street
• W. Watmaugh Road	• Elm Avenue

SVCSD Napa Salt Pond Pipeline

The California Coastal Conservancy, U.S. Army Corps of Engineers, and California Department of Fish and Game have proposed and are implementing a salinity reduction and habitat restoration project for the 9,460-acre Napa River Unit of the Napa-Sonoma Marshes Wildlife Area. The Napa River Unit is located at the northeast edge of San Pablo Bay, adjacent to the Napa River. The purpose of the Napa River Salt Marsh Restoration Project, which was examined in an EIR/EIS that was approved in June 2004, is to restore a mosaic of habitats, including tidal habitats and managed ponds, and provide for better management of ponds in the Napa River Unit to support populations of fish and wildlife. An EIR/EIS was prepared and approved in June 2004. The Water Delivery Option examined as Phase 1 in the EIR/EIS at the project level includes the annual delivery of approximately 2,000 to 3,000 AF of tertiary recycled water from the SVCSD as an ongoing supply of non-saline water for restoration, with subsequent agricultural use.

Under Phase 1 of the NBWRP, SVCSD would construct a pipeline to provide recycled water to Pond 7 and 7A for habitat enhancement. Proposed facilities under the NBWRP's Phase 1 Implementation Plan include construction of a new pipeline from the existing SVCSD WWTP to the existing SVCSD storage reservoirs located near the intersection of the Northwestern Pacific Railroad Authority (NWPRA) and Ramal Road. Pumping would be provided by new pumps at the WWTP. The associated pipeline would include replacement of approximately 0.6 miles of aging pipe between the SVCSD WWTP and a junction structure along the NWPRA railroad line, and extending an 18-inch pipeline approximately 3.2 miles parallel to the existing 18-inch pipeline between the junction structure and the existing storage reservoirs. From the existing storage reservoirs, a new pipeline would be constructed approximately 4.0 miles (Option A) or 4.5 miles (Option B and C) to the existing salt pond mixing chamber (**Figure 2-6**). SCWA has identified three potential route options, which are described below.

- **Option A:** This option consists of installation of approximately 4.0 miles of 24-inch pipeline that would be installed from the reservoirs to Pond 7 and 7A. Approximately 1.0 mile of pipeline would extend from the reservoirs along the south side of NWPRA



SOURCE: USDA, 2005; CDM, 2008; and ESA, 2008

NBWRA North Bay Water Recycling Program. 206088.01

Figure 2-6

SVCSD Napa Salt Pond Pipeline
Phase 1 Project

railroad tracks to Skaggs Island Road, at which point the pipeline would cross to the south side of the railroad tracks and continue east along the south side of the railroad tracks for approximately 0.4 miles. At this point, the pipeline would cross to the north side of the railroad tracks and continue east along the north side of the railroad for approximately 0.9 miles, then cross to the south side of the railroad tracks. The pipeline would extend 1.7 miles until it reaches the access road for Ponds 7 and 7A, which includes pipeline installation south along the access road for approximately 4,200 feet, terminating at the mixing chamber. This option is consistent with the pipeline route reviewed in the Napa River Salt Marsh Restoration Project EIR/EIS (JSA, 2004).

- **Option B:** This option consists of installation of 4.5 miles of a 24-inch pipeline from the reservoirs to the salt ponds. Approximately 0.25 miles of pipeline would be installed north along an access road to Ramal Road. The alignment would then extend 1.75 miles east along Ramal Road. At this point, the pipeline would transverse east along an agricultural access road for approximately 1.25 miles until it reaches Buchli Station Road. The pipeline would then run south on Buchli Station Road for approximately 1.25 miles, until it reaches the Huichica Creek entrance of the Napa-Sonoma Marshes Wildlife Area (NSMWA) and the access road for Ponds 7 and 7A.

- **Option C:** This option would consist of 4.7 miles, and would follow the above Option B route for approximately 3.0 miles (from the reservoir, east along the access road to Ramal Road, and along Ramal Road). However, the pipeline would then extend south approximately 0.3 miles to access an existing reservoir. At this point it would transverse 0.4 miles east to Buchli Station Road (Figure 2-6). The pipeline would run south on Buchli Station Road for approximately 1.0 mile, until it reaches the Huichica Creek entrance of the Napa-Sonoma Marshes Wildlife Area (NSMWA) and the access road for Ponds 7 and 7A.

Proposed facilities are shown in Figure 2-6. Major roadways affected are summarized in **Table 2-6**.

TABLE 2-6
NAPA SALT POND RESTORATION PIPELINES – MAJOR ROADWAYS AFFECTED

• Green Island Road	• Las Amigas Road
• Milton Road	• Buchlis Station Road
• Ramal Road	

Phase 1 would provide 889 AF of potable surface water offset: 147 AF in the Sonoma Valley Recycled Water Project, and 542 AF in the NMWD Urban Reuse Area, and 200 AF in Napa SD. This represents drinking water that will no longer be used for non-potable uses, thus ensuring the highest quality water is reserved for potable uses.

Napa Sanitation District

The *Recycled Water Expansion, Hydraulic and Preliminary Engineering Analysis, Phase 1 Report MST Area* (Brown and Caldwell, May 2007) provides a recycled water distribution system to address groundwater overdraft in the MST area of Napa County.

MST Area Project

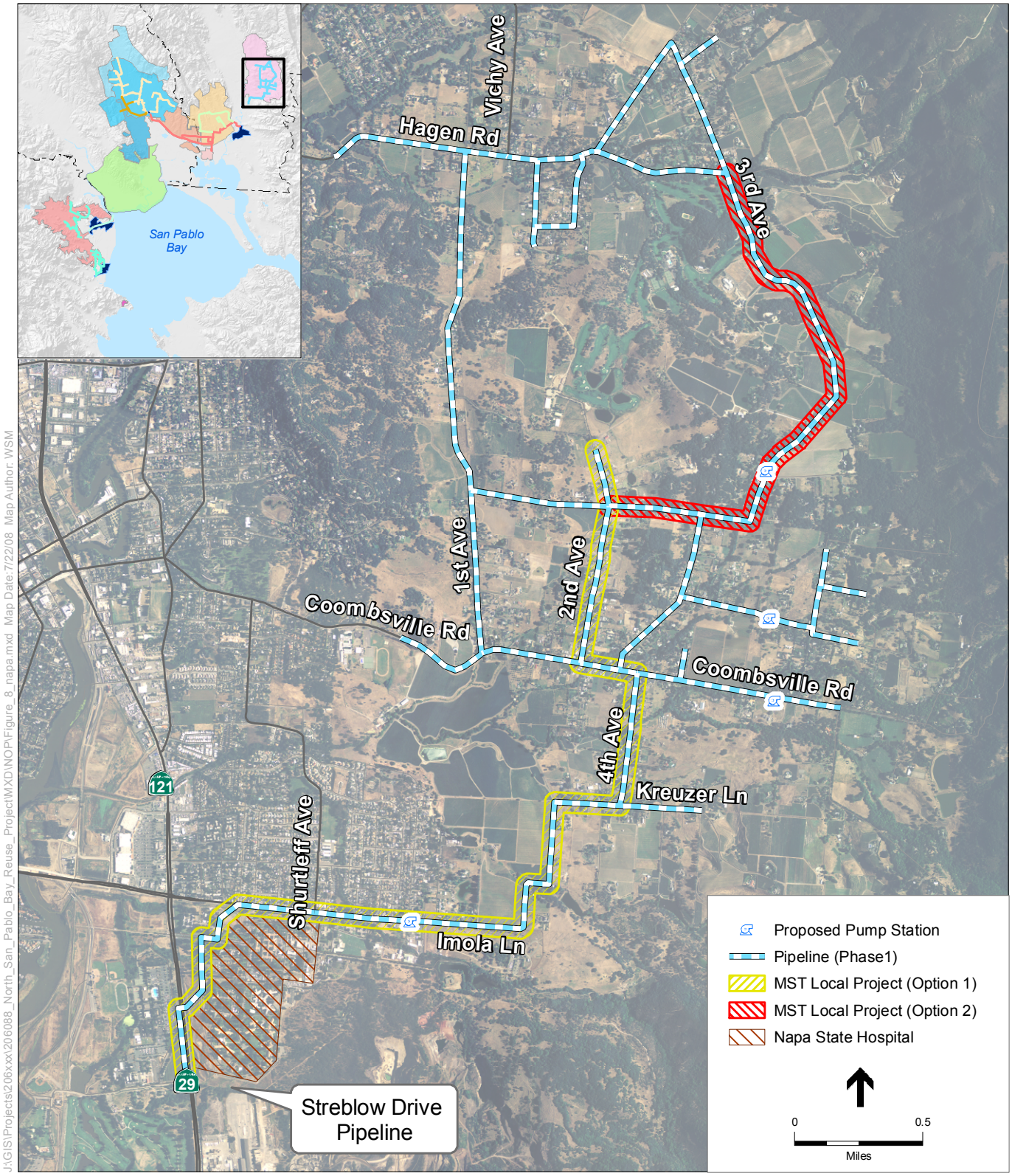
The MST Area Project would consist of 17.5 miles of new pipeline, four booster pump stations along the pipeline routes, and a new booster pump at the WWTP. The new pipeline would be installed from the end of the Streblow Drive pipeline through the Napa State Hospital grounds and north to the MST area (see **Figure 2-7**). A looped system using existing roadways would be constructed, with one segment extending west along First Avenue and the second segment extending east along Third Avenue; both segments would then merge along Hagen Road north of the Napa Valley Country Club. Four booster pump stations would be installed to maintain pressure throughout the distribution system, and an additional pump would be installed at the WWTP. Pump stations would be located on Imola, Wild Horse Valley Road, East 3rd Avenue, and 3rd Avenue. Potential recycled water users include the Napa State Hospital, the Napa Valley Country Club, and agricultural and residential parcels along the proposed pipeline route. Major roadways that would be affected by pipeline installation are listed in **Table 2-7**.

TABLE 2-7
NAPA SD MST PIPELINE SYSTEM – MAJOR ROADWAYS AFFECTED

• Imola Avenue	• Second Avenue
• 4th Avenue	• Third Avenue
• Kreuzer Lane	• East 3rd Avenue
• Coombsville Road	• North Avenue
• Wild Horse Valley Road	• Olive Hill Lane
• First Avenue	• Loma Heights Road
• North 3rd Avenue	• Hagen Road

Implementation of service to the MST area would require expansion of the Napa SD WWTP's tertiary treatment capacity by 4.5 mgd. This would include expansion of the filtration system by installing parallel filter cells adjacent to the existing filter building at the Napa SD WWTP. The location of the existing and proposed filter facilities within the fence line of the existing WWTP is shown in **Figure 2-8**. No additional storage facilities would be required.

Under the MST Local Project, a more direct pipeline system extending north from Imola Avenue along 4th Avenue, Coombsville Road, and 2nd Avenue, terminating at the Napa Valley Country Club would be implemented. The MST Local Project includes two options: Option 1 would include installation of approximately 3.5 miles of pipeline, and one pump station. Option 2 would extend the pipeline an additional 2.2 miles to provide an alternate route to the County Club. These facilities are inclusive of those identified for the larger Phase 1 MST Project; as such, analysis of these facilities is included in the discussion of impacts relative to the Phase 1 MST Project.



SOURCE: USDA, 2005; CDM, 2008; and ESA, 2008

Note: Existing Facilities Not Shown

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Figure 2-7

Napa SD MST Area: Phase 1 Projects

0 400
Feet

SOURCE: GlobeXplorer

North Bay Water Reuse Authority . 206088

Figure 2-8
Napa MST Area - Soscol WWTP Tertiary
Filtration System Upgrade - Proposed Facilities

2.8 Action Alternatives

2.8.1 No Project Alternative

The No Project Alternative assumes that the proposed project is not implemented, and reviews two scenarios: 1) consideration of existing conditions without the project, a "no build scenario"; and 2) consideration of "reasonably foreseeable" future conditions without the project. This second scenario is identical to the No Action Alternative, identified below, and will be examined under that heading.

2.8.2 No Action Alternative

Analysis of a No Action Alternative provides decision makers with a benchmark against which to compare the magnitude of environmental effects of the action alternatives. The No Action Alternative represents a "future-without-project" scenario: a continuation of existing conditions for an estimation of the most reasonable future conditions that could occur without implementation of any action alternatives.

The "No Action Alternative" assumes that there would be no joint project among the member agencies. It represents the "current status" in which additional wastewater treatment capacity and water recycling occurs strictly from the implementation of local plans for expansion, and the potential need to develop additional potable water supplies continues to be a regional challenge. In general, each Member Agency would continue to implement individual recycling projects, subject to the availability of funding and completion of the CEQA process. The No Action Alternative would likely result in a smaller increment of water recycling projects within the region. For example, it is anticipated that SVCSD would implement only one of the four pipeline systems identified in the Sonoma Valley Recycled Water Master Plan EIR, based upon the ability to fund such construction. Similarly, it is anticipated that LGVSD and Napa SD would prioritize funding toward NPDES compliance, and would not implement recycled water projects. Additionally, the lack of federal funding may delay or preclude the implementation of individual planned projects, due to the need to increase user rates in order to provide funds for implementation. Specific projects that would have the greatest potential to be implemented under the No Action Alternative are below, and are shown in Figure 2-8:

- **LGVSD.** LGVSD would prioritize expenditures on projects that meet its NPDES permit requirements. For the purpose of this EIR/EIS, it is assumed that this strategy would result in no additional recycled water projects being implemented in the LGVSD service area.

- **Novato SD.** Novato SD and NMWD would pursue implementation of recycled water distribution facilities solely within the Novato North Service Area. This includes 4.4 miles of pipeline, a 0.5 mgd upgrade at the Recycled Water Treatment Facility, and one pump station at the intersection of Atherton and Olive.

- **SVCSD. Sonoma Valley Recycled Water Project – Alignment 1A:** This would include construction of approximately 5.2 miles of pipeline in the Sonoma Valley, with completion of a pump station at the SVCSD WWTP.

- **SVCSD. Napa Salt Pond Pipeline:** This would include construction of approximately 3.8 miles of pipeline from the SVCSD WWTP to the SVCSD storage ponds located near the intersection of Northwestern Pacific Railroad and Ramal Road. From the ponds an additional 4.5 miles of new pipeline would be constructed to convey water to the salt pond mixing chamber. The pipeline and the pump station were discussed and analyzed under the Napa River Salt Marsh Restoration Project EIR/EIS (JSA, 2004) under the Water Delivery Project Component (Sonoma Pipeline) (see Figure 2-6). Potential route options would extend east along Ramal Road and south along Duhlig Road toward the ponds.

- **Napa SD.** Napa SD would prioritize expenditures on projects that meet its NPDES permit requirements. For the purpose of this EIR/EIS, it is assumed that this strategy would result in no additional recycled water projects being implemented in the Napa SD service area.

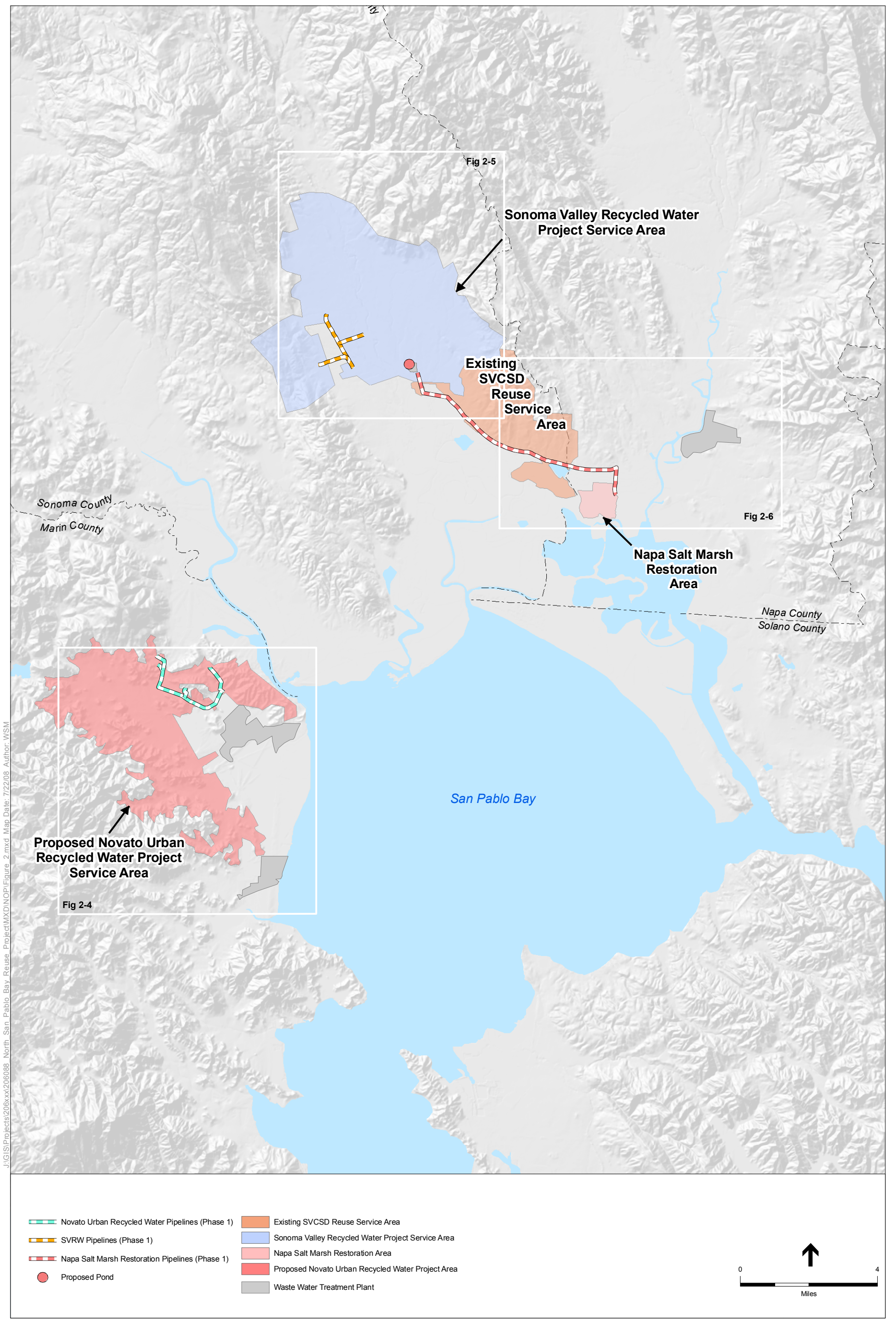
Facilities that would likely be implemented under the No Action Alternative are summarized in **Table 2-8**, and are shown in **Figure 2-9**. Planned treatment capacity levels are summarized in **Table 2-9** for each WWTP.

TABLE 2-8
NO ACTION ALTERNATIVE SUMMARY – FACILITIES BY MEMBER AGENCY

No Action		New Pipeline (miles)	New Demand (AFY)	Treatment Capacity Increase (mdg)	New Pump Station (HP)	New Storage (AF)
LGVSD	Peacock Gap	--	--	--	--	--
	NMWD URWP (South)	--	--	--	--	--
	Sears Point	--	--	--	--	--
Novato SD	NMWD URWP (North/Central)	4.4	193	0.5	250	x
	Sears Point	--	--	--	--	--
SVCSD	Southern Sonoma Valley	--	--	--	--	--
	Central Sonoma Valley	--	--	--	--	--
	Sonoma Valley (1A)	5.2	874	--	662	65
	Napa Salt Marsh[1]	7.9	--	--	--	--
Napa SD	Carneros East	--	--	--	--	--
	MST Area	--	--	--	--	--
	Napa (local)	--	--	--	--	--
	Napa Salt Marsh	--	--	--	--	--
Total		**17.5**	**1,067**	**0.5**	**912**	**65[1]**

1 Potential for 3,460 AFY release of recycled water to Napa Salt Ponds 7 and 7A, depending upon year type. Because this is a beneficial use that is not related to water supply, this number is tracked separately in each of the alternatives.
2 The total only represents new storage. The Proposed Action will rely on existing storage and retrofit existing facilities to accommodate storage needs, as identified in the Phase 3 Feasibility Report (CDM, 2008).

SOURCE: CDM, 2009.



J:\GIS\Projects\206xxx\206088_North_San_Pablo_Bay_Reuse_Project\MXD\NOP\Figure_2.mxd Map Date: 7/22/08 Author: WSM

SOURCE: CDM, 2008; ESRI, 2006; and ESA, 2008

Note: Existing Water Distribution Facilities Not Shown

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Figure 2-9

No Action Alternative

Future Without the Project

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TABLE 2-9
SUMMARY OF WWTP DISCHARGE VOLUMES UNDER THE NO ACTION ALTERNATIVE (MGD)

	Napa	Sonoma	Novato	LGVSD	Total	Salt Ponds
Projected 2020 WWTP Discharge	6,338	3,644	6,658	2,257	18,897	0
No Action Discharge	6,338	2,882	6,574	2,257	18,052	3,460
No Action Reduction	**(0)**	**(762)**	**(84)**	**0**	**(845)**	**+ 3,460**

SOURCE: CDM, 2009; ESA, 2009.

As a joint EIR/EIS, this impact analysis will consider two baselines; the CEQA Baseline standard, which requires a project to review it impacts relative to "change from existing conditions," as well as the NEPA baseline standard, which requires a comparison between an Alternative and the conditions anticipated under the No Action Alternative, i.e., construction of the facilities identified above. Typically, the CEQA impact analysis will include the NEPA increment of impact, as the CEQA analysis requires a broader comparison between existing conditions and post-project conditions. Where appropriate, the NEPA increment of impact between the No Action Alternative and the Project Alternatives will be identified, and reviewed for significance.

2.8.2 Alternative 1 – Basic System

Alternative 1 – Basic System would expand recycled water programs currently in operation within each of the Member Agency service areas (see **Figure 2-10**). It puts greatest emphasis on the service of local demands by the individual WWTPs. Alternative 1 would provide 6,655 AFY of new recycled water for irrigation use and 5,825 AFY for habitat restoration, and would include installation of 83 miles of new pipeline, construction of facilities onsite at the existing WWTPs to provide an additional 7.5 mgd of tertiary treatment capacity, and development of approximately 1,020 acre-feet of new storage, primarily at existing or planned storage ponds at the WWTPs. The defining features of Alternative 1 are as follows:

- Each agency would put first priority on the delivery of recycled water to its local projects. Local projects include the NMWD Urban Reuse Project, the Sonoma Valley Recycled Water Project, and projects in the Napa Milliken-Sarco-Tulucay (MST) Creeks area, and the Carneros East areas. All WWTP treatment and distribution systems are sized and designed to serve their respective local users.

- Interconnectivity between WWTPs would only occur between SVCSD and Napa SD to serve the Napa Salt Marsh Restoration Area during the restoration period (less than 10 years); however, the two agencies do not plan to size or coordinate their facilities to share recycled water in other areas. After the restoration period has been completed, additional recycled water will be required for pond and habitat maintenance.

- LGVSD tertiary treatment capacity would be increased by 0.7 mgd through onsite improvements at the LGVSD treatment plant. Recycled water from LGVSD would be

supplied by NMWD to users in the southern portion of the Novato Urban Recycled Water Project area, including Hamilton Field. One existing 0.5-million-gallon (MG) water reservoir, Reservoir Hill Tank, in the southern portion of the Novato Urban Recycled Water Project area would be rehabilitated for recycled water use.

- Novato SD tertiary treatment would be increased by 1.2 mgd through onsite improvements at the Novato SD WWTP and decommissioning of the Novato SD Recycled Water Treatment Facility. Novato SD and NMWD would pursue implementation of recycled water distribution facilities within the Novato North and Central Service Areas. The Plum Street Tank is an existing 0.5 MG facility that would be rehabilitated for recycled water storage. The system includes 9.8 miles of pipeline.
- SVCSD would treat wastewater at its existing treatment plant and distribute recycled water to local users within its existing SVCSD reuse area (in Carneros West) in addition to the Sonoma Valley Recycled Water Project and Napa Salt Marsh Restoration areas. This alternative would include construction of a new recycled water storage reservoir near the SVCSD WWTP. Additionally, it is assumed that potential user reservoirs would also be utilized for recycled water storage. SVCSD would also implement additional 13.1 miles of SVRWP pipelines.
- Napa SD tertiary treatment would be increased by an estimated 5.9 mgd through onsite improvements at the WWTP. Recycled water from Napa SD would be supplied to users in the Napa MST Area, Carneros East Areas and Napa Salt Marsh Restoration Area. Existing ponds at the WWTP would be reconfigured for recycled water storage. Additionally, it is assumed that potential user ponds would also be utilized for recycled water storage.

Recycled Water Supply, Demand, and Discharge

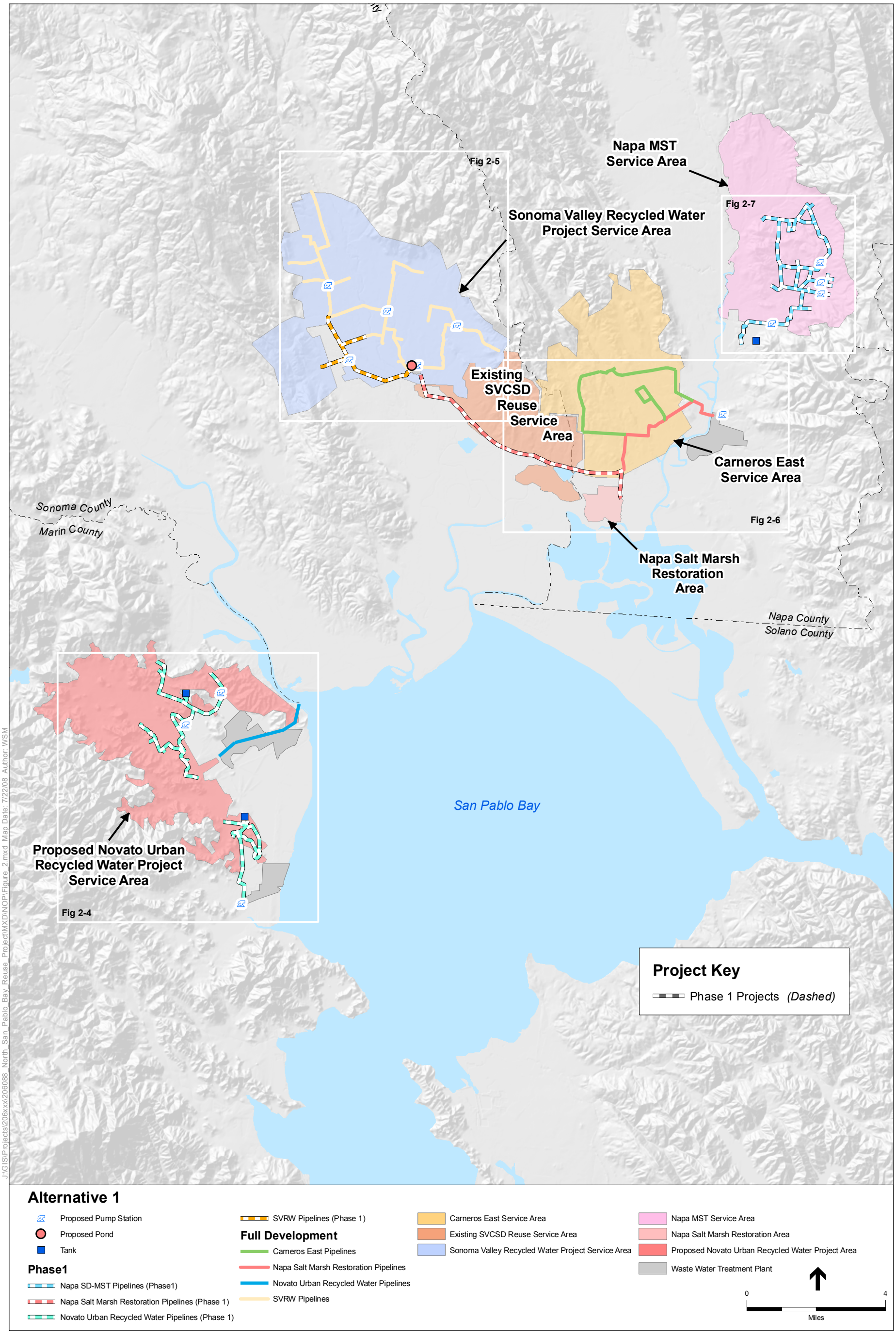
Table 2-10 summarizes the recycled water demand met in each WWTP service area and discharge to San Pablo Bay that would occur under Alternative 1. Each of the WWTPs currently serves some recycled water customers. **Table 2-10** presents this existing demand in acre feet (AF) for each service area, the additional demand that would be met under Alternative 1, and the total recycled water demand for Alternative 1.

TABLE 2-10
RECYCLED WATER SUPPLY, DEMAND, AND DISCHARGE UNDER ALTERNATIVE 1 (AFY)

WWTP Service Area	WWTP Inflow (2020)	Existing Recycled Water Demand	New Recycled Water Demand Developed for Alternative 1	Total Recycled Water Demand	Discharge to San Pablo Bay[(1)]
LGVSD WWTP	3,670	902	202	1,104	2,220
Novato SD WWTP	8,677	270	542	812	6,423
SVCSD WWTP	5,508	1,174	2,719	3,893	1,196
Napa WWTP	9,800	2,598	3,192	5,590	3,847
Total	**27,655**	**4,944**	**6,655**	**11,599**	**13,686**

1 Potential for 5,825 AFY release of recycled water to Napa Salt Ponds 7 and 7A, depending upon year type.

SOURCES: CDM, 2009; ESA, 2008



SOURCE: CDM, 2008; ESRI, 2006; and ESA, 2008

Note: Existing Water Distribution Facilities Not Shown

NBWRA North Bay Water Recycling Program. 206088.01

Figure 2-10

Alternative 1: Basic System

Service Areas and Facilities

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System Requirements

Table 2-11 summarizes the proposed pipeline sizes and lengths for Alternative 1 that are shown in Figure 2-10.

TABLE 2-11
PROPOSED PIPELINES UNDER ALTERNATIVE 1

Pipeline Diameter (Inches)	LGVSD (miles)	Novato SD (miles)	SVCSD (miles)	Napa SD (miles)
4	--	--	4.92	--
6	2.25	0.60	9.42	3.39
8	0.81	2.15	4.43	7.68
10	--	2.60	4.10	1.81
12	2.81	0.67	0.53	7.21
14	--	--	2.20	--
16	--	0.71	--	1.67
18	--	5.72	3.54	1.27
24	--	--	0.97	3.53
30	--	--	--	4.57
36	--	--	3.61	--
48	--	--	--	--
Total	**5.88**	**12.44**	**33.72**	**31.14**

SOURCES: CDM, 2009; ESA 2008.

Table 2-12 presents the tertiary treatment capacity upgrades that would be implemented under Alternative 1. All WWTPs currently either have tertiary treatment capability or are in the process of developing tertiary treatment capability by 2010. All WWTPs except SVCSD would need greater treatment capacity (approximately 32 million gallons per day (mgd) to meet the demands under Alternative 1.

TABLE 2-12
PROPOSED TREATMENT CAPACITY UPGRADES UNDER ALTERNATIVE 1

Facility	Tertiary Treatment Capacity without the Project (mgd)	Tertiary Treatment Capacity Required for Alternative 1 (mgd)	Tertiary Treatment Capacity Increase (mgd)
LGVSD	2.0	2.3	0.7
Novato SD	0.5	1.7	1.2
SVCSD	16.0	9.9	0.0
Napa SD	8.8	14.7	5.9
Total	**27.5**	**28.6**	**7.8**

SOURCES: CDM 2009; June 2008; ESA 2008

Table 2-13 summarizes the existing and additional recycled water storage needs (i.e., the volume in excess of existing available storage), which would be required under Alternative 1. The local project areas being served separately by LGVSD and Novato SD require less water during all months than will be treated at the two WWTPs; therefore, no storage of water is required to accommodate peak month demands, only the use of existing systems reservoirs as necessary for operational interests and system pressure management. The local project areas being served by SVCSD and Napa SD require more water during the peak summer months than each of the WWTPs is treating; additional water storage at the WWTPs, as anticipated by these Agencies' local project reports, is required to accommodate peak month demands. SVCSD will require additional new storage, and Napa SD will need to modify existing water storage basins for recycled water system use. Individual landowner ponds would be utilized throughout the reuse project areas to help offset the system storage required to serve users during peak-use periods.

TABLE 2-13
PROPOSED STORAGE FACILITIES UNDER ALTERNATIVE 1

	Volume (AF)			
Location	**Existing Storage**	**Proposed New Storage**	**Total**	**Comments**
LGVSD WWTP	0.0	0.0	0.0	None required at the WWTP
NMWD (South)	1.5	0.0	1.5	Retrofit of existing Plum Street Tank
Hamilton Field	1.5	0.0	1.5	Retrofit of existing Reservoir Hill Tank
Total for LGVSD	**3.0**	**0.0**	**3.0**	
Novato SD WWTP	0.0	0.0	0.0	
Total for Novato SD	**0.0**	**0.0**	**0.0**	
SVCSD WWTP	0.0	1,020.0	1,020.0	At the WWTP; requires land purchase
Existing SVCSD Reuse Area-1	625.0	0.0	625.0	Existing storage pond
Total for SVCSD	**625.0**	**1,020.0**	**1,645.0**	
Napa SD WWTP	950.0	0.0	950.0	Existing ponds at the WWTP to be reconfigured for recycled water storage; user ponds expected for some storage
Total for Napa SD	**950.0**	**0.0**	**950.0**	
Total	**1,578.0**	**1,020.0**	**2,598.0**	

SOURCES: CDM, 2009; ESA 2008.

Additional pump stations are needed throughout the system for distribution and to boost pressures to higher pressure zones. The locations of these pump stations are summarized below in **Table 2-14**.

Alternative 1 provides 1,183 AF of potable surface water offset in the project area: 147 AF in the Sonoma Valley Recycled Water Project, 746 AF in the NMWD Urban Reuse Area, and 200 AFY for Napa State Hospital and 90 AFY for Napa SD to deliver recycled water to a portion of Los Carneros currently served by the City of Napa potable water supply. This represents drinking water that will no longer be used for nonpotable uses, thus ensuring the highest quality water is reserved for potable uses.

TABLE 2-14
PROPOSED PUMP STATIONS UNDER ALTERNATIVE 1

Location (WWTP or Reuse Area)	Horsepower (hp)	Comments
LGVSD WWTP	71	
Total for LGVSD	**71**	
Novato WWTP	258	
Total for Novato SD	**258**	
SVCSD WWTP	872	
Existing SVCSD Reuse Area (Carneros West)	218	Existing pumps
Sonoma Valley Recycled Water Project	238	
Total for SVCSD	**1,328**	
Napa WWTP	663	
Napa WWTP	1,989	Existing pumps
MST Area	244	
Total for Napa SD	**2,896**	
Total	**4,553**	

SOURCES: CDM, 2009.

2.8.3 Alternative 2 – Partially Connected System

Alternative 2 – Partially Connected System involves development of a subregional recycled water system, taking advantage of increased storage capacity and additional pipelines under Alternative 1 to distribute recycled water more extensively throughout the project area (see **Figure 2-11**). Alternative 2 would provide 11,250 acre feet of new recycled water for irrigation uses and potentially 2,933 AFY for habitat restoration, and would include: installation of 140 miles of new pipelines, construction of facilities onsite at the existing WWTPs to provide an additional 15.9 mgd of tertiary treatment capacity, and development of approximately 2,220 acre-feet of storage, primarily at existing or planned storage ponds at the WWTPs. Alternative 2 would include those facilities previously identified for Alternative 1, in addition to the following features:

- Each agency would put first priority on the delivery of recycled water to its local projects. Additional local projects include the Peacock Gap Golf Course area, further development of the NMWD Urban Reuse Project, the Sonoma Valley Recycled Water Project, and projects in Napa MST, and the Carneros East areas.

- Interconnectivity between WWTPs would occur between SVCSD and Napa SD to serve the Napa Salt Marsh Restoration Area during the restoration period (less than 10 years) and into the maintenance period, and between Novato SD and LGVSD to serve the Sears Point Area.

- LGVSD would extend service to the Peacock Gap Golf Course Area, which would include: a new pipeline; use of additional conveyance capacity in the existing MMWD recycled water distribution system; use of existing available storage at the LGVSD WWTP, and rehabilitation of an existing 0.5-MG water reservoir near the Peacock Gap Golf Course.

- NMWD would install additional pipelines to serve to the northern, central, western, and Ignacio portions of the Novato Urban Recycled Water Project Area. An added recycled water pipeline from LGVSD would extend north to join a recycled water pipeline from Novato SD; the combined flow would continue east to jointly serve the Sears Point Area, with most of this flow originating from the Novato SD WWTP. One additional existing 0.5-MG drinking water reservoir (Norman Tank) would be modified for recycled water use, in the Ignacio portion of the Novato Urban Recycled Water Project Area. One new 0.5 MG storage reservoir would be constructed in the western portion of the service area.

- SVCSD would treat wastewater at its existing plant and distribute recycled water to local uses within its existing recycled water service area (Carneros West) in addition to the Sonoma Valley Recycled Water Project, Southern Sonoma Valley Service Area, and Napa Salt Marsh Restoration Area. This would include additional system storage in the Carneros West Area. Additionally, it is assumed that potential user ponds would also be utilized for recycled water storage.

- Napa SD would supply recycled water to an expanded Napa MST Area) to further help in reducing groundwater pumping in the region, deliver recycled water to potential users in southeast Napa, deliver recycled water to the expanded Carneros East Area (compared to Alternative 1), and to the Napa Salt Marsh Restoration Area. This alternative assumes existing ponds at the WWTP would be reconfigured for recycled water storage. Additionally, it is assumed that potential user ponds would also be utilized for recycled water storage.

Recycled Water Supply, Demand, and Discharge

Table 2-15 summarizes the recycled water demand met for each WWTP service area and discharge to San Pablo Bay that would occur under Alternative 2. Each of the WWTPs currently serves some recycled water customers. Table 2-15 presents this existing demand for each service area, the additional demand that would be met under Alternative 2, and the total recycled water demand met under Alternative 2.

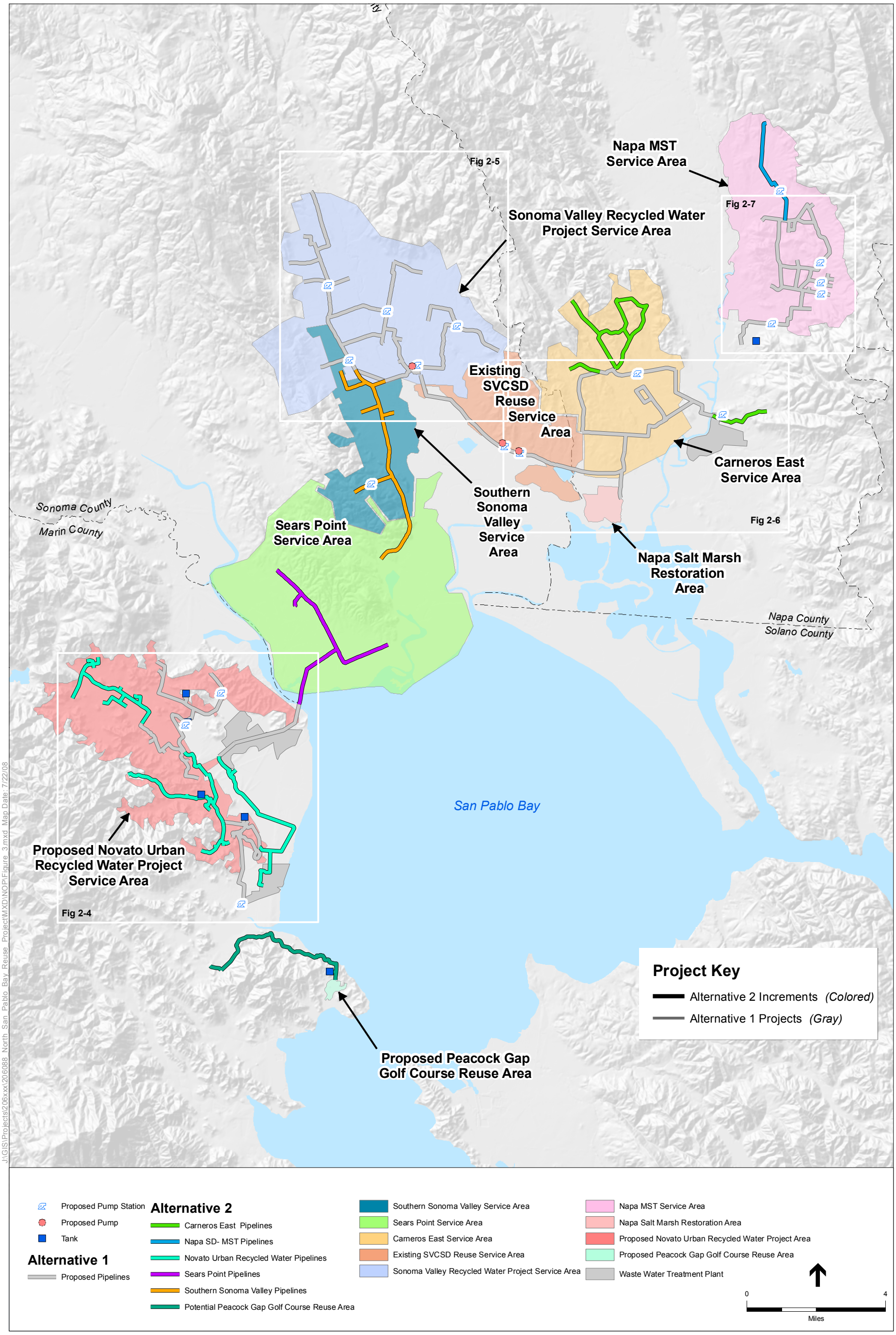
As shown in Table 2-15, assuming the provision of adequate storage, there is sufficient demand in the Sonoma areas such that those WWTPs could potentially recycled all WWTP inflow under Alternative 2.

TABLE 2-15
RECYCLED WATER SUPPLY, DEMAND, AND DISCHARGE FOR ALTERNATIVE 2 (AF)

WWTP Service Area	WWTP Inflow (2020)	Existing Recycled Water Demand	New Recycled Water Demand Developed for Alternative 2	Total Recycled Water Demand	Discharge to San Pablo Bay(1)
LGVSD WWTP	3,670	902	409	1,311	2,181
Novato SD WWTP	8,677	270	2,038	2,308	5,851
SVCSD WWTP	5,508	1,174	4,381	5,555	0
Napa SD WWTP	9,800	2,598	4,421	7,019	2,657
Total	**27,655**	**4,944**	**11,250**	**16,193**	**10,689**

1 Potential for 2,933 AFY release of recycled water to Napa Salt Ponds 7 and 7A, depending upon year type.

SOURCES: CDM, 2009; ESA 2008.



SOURCE: CDM, 2008; ESRI, 2006; and ESA, 2008

Note: Existing Recycled Water Distribution Facilities Not Shown

NBWRA North Bay Water Recycling Program. 206088.01

Figure 2-11

Alternative 2: Partially Connected System

Service Areas and Facilities

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System Requirements

Table 2-16 summarizes the proposed pipeline sizes and lengths for Alternative 2 that are shown in Figure 2-5.

TABLE 2-16
PROPOSED PIPELINES UNDER ALTERNATIVE 2

Pipeline Diameter (Inches)	LGVSD (miles)	Novato SD (miles)	SVCSD (miles)	Napa SD (miles)
4	--	--	4.92	--
6	2.25	7.37	10.93	10.04
8	0.81	6.82	6.89	11.56
10	--	5.01	4.66	3.48
12	8.67	4.31	1.21	7.94
14	--	1.92	1.27	--
16	--	2.14	2.70	1.67
18	6.20	8.39	3.54	1.27
20	--	--	1.28	--
24	--	--	4.39	3.53
30	--	--	--	4.57
36	--	--	--	--
48	--	--	--	--
Total	**17.94**	**35.96**	**41.78**	**44.08**

SOURCES: CDM, 2009; ESA 2008.

Table 2-17 presents tertiary treatment capacity upgrades that would be implemented under Alternative 2, (Table 2-5). As stated earlier, all WWTPs currently either have some tertiary treatment capability or are in the process of developing tertiary treatment capability by 2010. All WWTPs would need greater treatment capacity to meet the demands under Alternative 2.

TABLE 2-17
TREATMENT IMPROVEMENT REQUIREMENTS FOR ALTERNATIVE 2

Facility	Tertiary Treatment Capacity without the Project (mgd)	Tertiary Treatment Capacity Required for Alternative 2 (mgd)	Tertiary Treatment Capacity Increase (mgd)
LGVSD	2.0	3.3	1.2
Novato SD	0.5	5.4	5.1
SVCSD	16.0	16.2	0.0
Napa SD	8.8	18.4	9.6
Total	**27.3**	**43.2**	**15.9**

SOURCES: CDM, 2009; ESA 2009.

Table 2-18 summarizes the additional recycled water storage required under Alternative 2.

TABLE 2-18
PROPOSED STORAGE REQUIREMENTS FOR ALTERNATIVE 2

Location	Volume (AF) Existing Storage	Proposed New Storage	Total	Comments
LGVSD WWTP	200.0	0.0	200.0	Existing Site to be used
NMWD (South)	3.1	0.0	3.1	Rehabilitate existing reservoirs, Plum Street, Norman), plus new western service area 0.5 mgd tank
Hamilton Field	1.5	0.0	1.5	Rehabilitate existing Reservoir Hill Tank
Peacock Gap	1.5	0.0	1.5	Rehabilitate existing MMWD reservoir
Total for LGVSD	**206.2**	**0.0**	**206.2**	
Novato WWTP	3.1	0.0	3.1	Locate at existing WWTP
Total for Novato SD	**3.1**	**0.0**	**3.1**	
SVCSD WWTP	0.0	1,020.0	1,020.0	Requires land purchase
Existing SVCSD Reuse Area-1	00.0	1,200.0	1,200.0	New storage pond, requires land purchase
Existing SVCSD Reuse Area-1	625.0	0.0	625.0	Existing storage ponds
Total for SVCSD	**625.0**	**1,020.0**	**2,845.0**	
Napa WWTP	950.0	0.0	950.0	Existing ponds at the WWTP to be reconfigured for recycled water storage; user ponds expected for some storage.
Total for Napa SD	**950.0**	**0.0**	**950.0**	
Total	**1,784.3**	**2,220.0**	**4,004.3**	

SOURCES: CDM, 2009; ESA 2008

The addition of the Peacock Gap Golf Course to the areas served by LGVSD, compared to Alternative 1, increases the summer water demand to slightly above the flow treated at the WWTP during this season; therefore, LGVSD will need to utilize existing water storage basins at the WWTP for recycled water system use during the summer. An existing 0.5-MG reservoir near the Peacock Gap Golf Course will also be rehabilitated for recycled water storage and maintaining delivery pressure.

The local project areas being served separately by Novato SD require less water during all months than will be treated at the WWTP; therefore, no storage of water is required to accommodate peak month demands. An additional 1.0-MG reservoir is anticipated to be constructed at the WWTP; in combination with two other existing 0.5-MG system reservoirs, these tanks will be used as necessary for operational interests and system pressure management.

The local project areas being served by SVCSD and Napa SD require more water during the peak summer months than each of the WWTPs is treating; additional water storage at the WWTPs, as anticipated by these Agencies' local project reports, is required to accommodate peak month

demands. SVCSD will require additional new storage at the WWTP, as well as additional pond storage within the system to accommodate users added in the Southern Sonoma Valley Area. It is anticipated this additional pond storage would occur either at the WWTP or in the Carneros West area. Napa SD will need to modify existing water storage basins for recycled water system use.

Individual landowner ponds would be used throughout the reuse project areas. Figure 2-11 displays the recycled water system and locations for new storage development.

Additional pump stations are needed throughout the system for distribution and to boost pressures to higher pressure zones. The locations of these pump stations are summarized below in **Table 2-19**.

Alternative 2 provides 1,375 AF of potable surface water offset in the project area: 147 AF in the Sonoma Valley Recycled Water Project, and 938 AF in the NMWD Urban Reuse Area, 290 AFY in Napa SD. This represents drinking water that will no longer be used for nonpotable uses, thus ensuring the highest quality water is reserved for potable uses.

TABLE 2-19
PROPOSED PUMP STATIONS UNDER ALTERNATIVE 2

Location (WWTP or Reuse Area)	Horsepower (hp)	Comments
LGVSD WWTP	91	
Peacock Gap	0	Existing MMWD Pumps
Total for LGVSD	**91**	
Novato WWTP	586	
Total for Novato SD	**586**	
SVCSD WWTP	1,315	
Existing SVCSD Reuse Area (Carneros West)	52	New Pumps
Existing SVCSD Reuse Area (Carneros West)	218	Existing Pumps
Southern Sonoma Valley	260	
Sonoma Valley Recycled Water Project	192	
Total for SVCSD	**2,037**	
Napa WWTP	673	
Napa WWTP	2,020	Existing Pumps
Napa MST Area	382	
Carneros East	105	
Total for Napa SD	**3,180**	
Total	**6,115**	

SOURCES: CDM, 2009.

2.8.4 Alternative 3 – Regional System

Alternative 3 – Fully Connected System creates a regional system that connects all four WWTPs in the project area (see **Figure 2-12**). This alternative maximizes water reuse by allowing recycled water from any WWTP to be delivered to any area that needs recycled water. Since the majority of the demand for recycled water lies in the area near Sonoma and Napa, the regional interconnection achieved under Alternative 3 would allow the other WWTPs to help satisfy the

demand in this area. Alternative 3 would provide 12,761 acre feet of new recycled water for irrigation use and 3,085 AFY for habitat restoration, and would include: installation of 153 miles of new pipelines, construction of facilities onsite at the existing WWTPs to provide an additional 20.8 mgd of tertiary treatment capacity, and development of approximately 2,220 acre-feet of storage, primarily at existing or planned storage ponds at the WWTPs. Alternative 3 would consist of project elements proposed under Alternative 2 in addition to the following features:

- A series of pipelines would connect all four WWTPs to allow for potential maximum distribution and use of recycled water.
- Each agency would put first priority on the delivery of recycled water to its local projects. Local projects include the Peacock Gap Golf Course area, NMWD Urban Reuse Project, the Sonoma Valley Recycled Water Project, and projects in Napa MST and the Carneros East areas.
- Combined flow from Novato SD and LGVSD would serve the Sears Point Area and would be extended to the Southern Sonoma Valley. Most of this flow is anticipated to originate from Novato SD.
- SVCSD would extend service north of the Sonoma Valley Recycled Water Service Area to the Central Sonoma Valley Service Area.

Recycled Water Supply, Demand, and Discharge

Table 2-20 summarizes the recycled water demand that would be met in each WWTP service area and discharge to San Pablo Bay that would occur under Alternative 3. Each of the WWTPs currently serves some recycled water customers. Table 2-20 presents this existing demand for each service area, the additional demand that would be met under Alternative 3, and the total recycled water demand for Alternative 3.

TABLE 2-20
RECYCLED WATER SUPPLY, DEMAND, AND DISCHARGE FOR ALTERNATIVE 3 (AF)

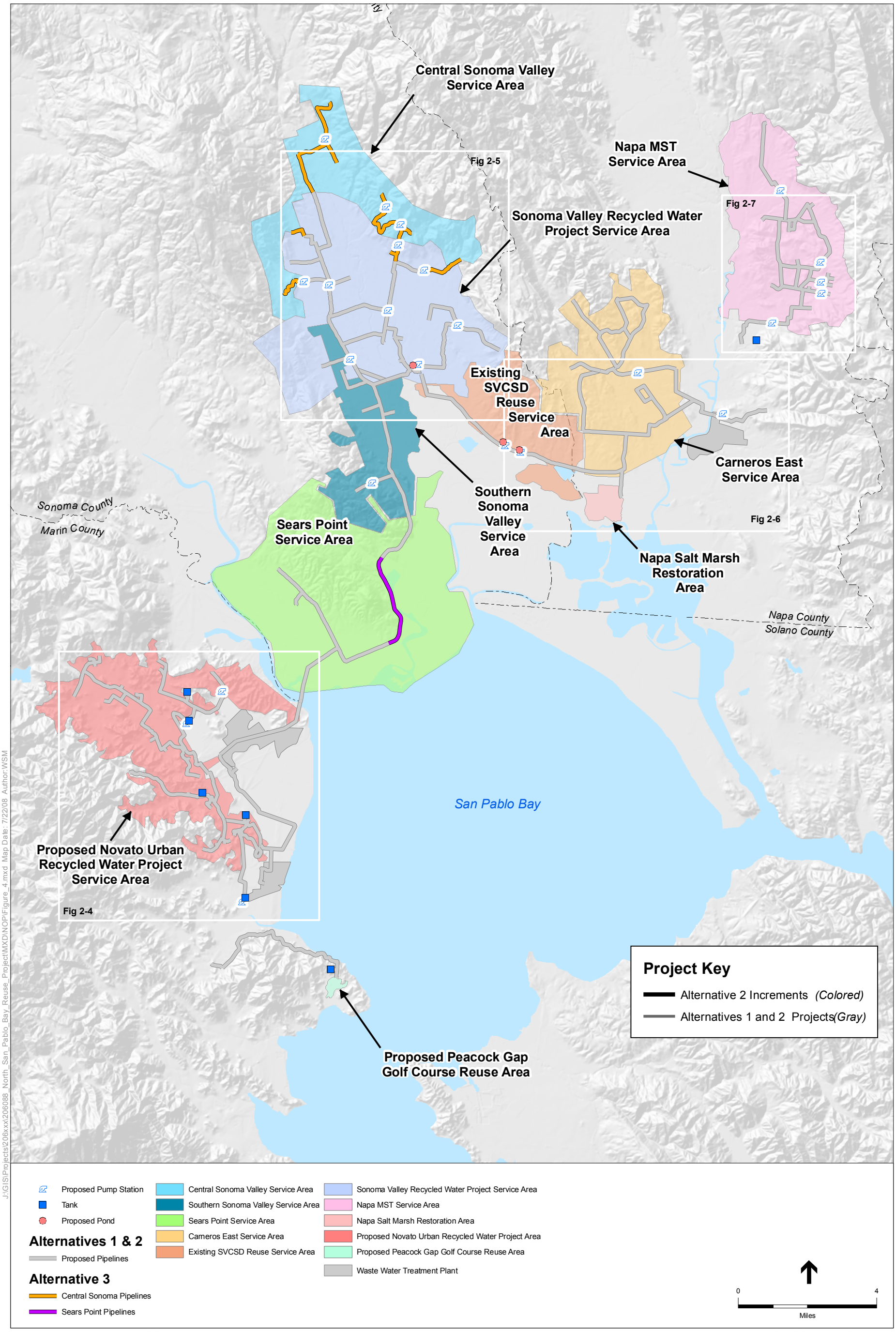
WWTP Service Area	WWTP Inflow	Existing Recycled Water Demand	New Recycled Water Demand Developed for Alternative 3	Total Recycled Water Demand	Discharge to San Pablo Bay(1)
LGVSD WWTP	3,670	902	409	1,311	2,181
Novato SD WWTP	8,677	270	3,701	3,971	4,706
SVCSD WWTP	5,508	1,174	4,230	5,404	0
Napa WWTP	9,800	2,598	4,421	6,819	2,657
Total	**27,655**	**4,944**	**12,761**	**17,705**	**9,543**

1 Potential for 3,085 AFY release of recycled water to Napa Salt Ponds 7 and 7A, depending upon year type.

SOURCES: CDM, 2009; ESA 2008.

System Requirements

Table 2-21 summarizes the proposed pipeline sizes and lengths for Alternative 3 shown in **Figure 2-12**.



J:\GIS\Projects\206xxx\206088_North_San_Pablo_Bay_Reuse_Project\MXD\NOP\Figure_4.mxd Map Date: 7/22/08 Author:WSM

SOURCE: CDM, 2008; ESRI, 2006; and ESA, 2008

Note: Existing Recycled Water Distribution Facilities Not Shown

NBWRA North Bay Water Recycling Program. 206088.01

Figure 2-12

Alternative 3: Fully Connected

Service Areas and Facilities

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TABLE 2-21
PROPOSED PIPELINES ALTERNATIVE 3

Pipeline Diameter (Inches)	LGVSD (miles)	Novato SD (miles)	SVCSD (miles)	Napa SD (miles)
4	--	--	3.51	
6	2.25	7.69	12.51	9.72
8	0.81	5.70	5.43	11.88
10	--	5.57	4.40	3.48
12	8.67	12.56	4.56	7.94
14	--	1.92	2.97	--
16	--	4.84	1.47	1.67
18	6.20	8.39	3.83	1.27
20	--	0.41	0.87	0.92
24	--	--	4.39	3.53
30	--	--	--	4.57
36	--	--	--	--
48	--	--	--	--
Total	**17.94**	**47.08**	**43.94**	**43.72**

SOURCES: CDM, 2009; ESA 2008.

Table 2-22 presents figures on treatment upgrades required to implement Alternative 3. All WWTPs currently either have some tertiary treatment capability or are in the process of developing tertiary treatment capability by 2010, and all but SVCSD will need to increase their treatment capacity to meet the demands of Alternative 3.

TABLE 2-22
TREATMENT IMPROVEMENT REQUIREMENTS FOR ALTERNATIVE 3

Facility	Tertiary Treatment Capacity without the Project (MGD)	Tertiary Treatment Capacity Required for Alternative 3 (MGD)	Tertiary Treatment Capacity Increase (MGD)
LGVSD	2.0	2.8	1.2
Novato SD	0.5	10.5	10.0
SVCSD	16.0	15.5	0.0
Napa SD	8.8	18.4	9.6
Total	**27.3**	**47.7**	**20.8**

SOURCES: CDM, 2009; ESA 2008.

The increased recycled water demands reflected in Alternative 3 requires that all WWTPs provide some amount of secondary effluent storage for treatment and use during the peak summer period. **Table 2-23** summarizes the recycled water storage needs required under Alternative 3.

TABLE 2-23
PROPOSED STORAGE FACILITIES UNDER ALTERNATIVE 3

Location	Volume (AF)			Comments
	Existing Storage	Proposed New Storage	Total	
LGVSD WWTP	200.0	0.0	200.0	Existing storage ponds to be used
NMWD (South)	3.1	0.0	3.1	Rehabilitated existing reservoirs
Hamilton Field	1.5	0.0	1.5	Rehabilitate existing reservoir
Peacock Gap	1.5	0.0	1.5	Rehabilitate existing reservoir
Total for LGVSD	**206.1**	**0.0**	**206.1**	
Novato WWTP	437.0	0.0	437.0	Existing storage ponds to be used
Novato WWTP	3.1	0.0	3.1	
Total for Novato SD	**440.1**	**0.0**	**440.1**	
SVCSD WWTP	0.0	1,020.0	1,020	Requires land purchase
SVCSD Reuse Area	625.0	0.0	625	Existing storage ponds
SVCSD Reuse Area	0.0	1,200.0	1,200	New Storage ponds; require land purchase
Total for SVCSD	**625.0**	**2,220.0**	**2845**	
Napa SD WWTP	950.0	0.0	950	Existing ponds at the WWTP to be reconfigured for recycled water storage; user ponds expected for some storage
Total for Napa SD	**950.0**	**0.0**	**950**	
Total	**2,221.3**	**2,220.0**	**4,441.2**	

SOURCES: CDM, 2009; ESA 2008

The addition of the Peacock Gap Golf Course to the areas served by LGVSD, compared to Alternative 1, increases the summer water demand to slightly above the flow treated at the WWTP during this season; therefore, LGVSD will need to utilize existing water storage basins at the WWTP for recycled water system use during the summer. An existing 0.5-MG reservoir near the Peacock Gap Golf Course will also be rehabilitated for recycled water storage.

The addition of the Sears Point and Southern Sonoma Valley Areas, compared to Alternatives 1 and 2, increases the summer water demand above the flow treated at the Novato SD WWTP during this season; therefore, Novato SD will need to utilize existing water storage basins for recycled water system use during the summer. An additional 1.0-MG reservoir is assumed to be constructed at the WWTP; in combination with the retrofit of two other existing 0.5-MG system reservoirs, these tanks will be used as necessary for operational interests and system pressure management.

The local project areas being served by SVCSD and Napa SD require more water during the peak summer months than each of the WWTPs is treating; additional water storage at the WWTPs, as anticipated by these Agencies' local project reports, is required to accommodate peak month demands. SVCSD will require additional new storage at the WWTP, as well as additional pond storage within the system to accommodate users added in the Central Sonoma Valley Service Area. It is anticipated this additional pond storage would occur either at the WWTP or in the

Carneros West area. Napa SD will need to modify existing water storage basins for recycled water system use.

Individual landowner ponds would be utilized throughout the reuse project areas. Table 2-23 displays the recycled water system and locations for new storage development.

Additional pump stations are needed throughout the recycled water system for distribution and to boost pressures to higher pressure zones. The locations of these pump stations are shown on Figure 2-12 and are summarized in **Table 2-24**.

TABLE 2-24
PROPOSED PUMP STATIONS UNDER ALTERNATIVE 3

Location (WWTP or Reuse Area)	Horsepower (hp)	Comments
LGVSD WWTP	203	
Peacock Gap	221	Existing MMWD Pumps
Total for LGVSD	**424**	
Novato WWTP	706	
Southern Sonoma Valley	260	
Total for Novato SD	**966**	
SVCSD WWTP	1,649	
Central Sonoma Valley	409	
Existing SVCSD Reuse Area (Carneros West)	61	New Pumps
Existing SVCSD Reuse Area (Carneros West)	218	Existing Pumps
Southern Sonoma Valley	0	
Sonoma Valley Recycled Water Project	575	
Total for SVCSD	**2,912**	
Napa WWTP	672	New Pumps
Napa WWTP	2,016	Existing Pumps
Napa MST Area	382	
Carneros East	105	
Total for Napa SD	**3,175**	
Total	**7,477**	

SOURCES: CDM, 2009; ESA 2008

Alternative 3 provides 1,375 AF of potable surface water offset in the project area: 147 AF in the Sonoma Valley Recycled Water Project, and 938 AF in the NMWD Urban Reuse Area, 290 AFY in Napa SD. This represents drinking water that will no longer be used for nonpotable uses, thus ensuring the highest quality water is reserved for potable uses.

2.9 Construction

For the purposes of this EIR/EIS, impact analysis assumes that pipeline installation associated with the implementation of individual projects would be within existing roadway or railroad rights-of-way. As appropriate those pipeline segments that would intersect potentially jurisdictional features and sensitive species habitat are identified in Section 3.0, Impact Analysis.

2.9.1 Recycled Water Pipelines

Construction of the proposed recycled water pipelines would involve one of the four potential methods: trenching; jack and bore tunneling; directional drilling; or suspending the pipe (such as in the presence of a bridge). These techniques are shown in **Figure 2-13**. In the first three methods, the proposed recycled water pipelines would be installed beneath the ground surface or underneath the existing roads, while in the fourth method the proposed recycled water pipeline might be attached to an existing bridge and would remain aboveground. Interruptions to existing utilities such as sewer lines or other pipelines would be minimized. In some areas, recycled water pipeline construction would require lane closures along roadways.

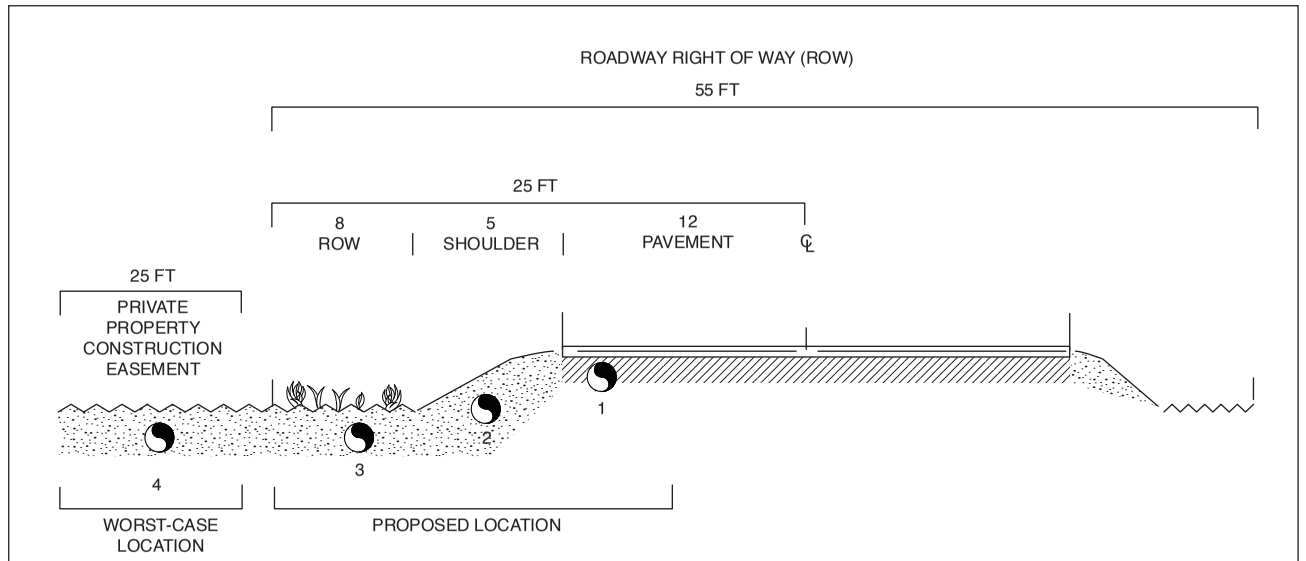
Trenching

Trenching is a conventional cut-and-cover construction technique. At sites with non-native species or no sensitive biological resources present, the recycled water pipelines would be installed using open-cut trenching. The trenching technique includes clearing of the construction site, saw cutting of the pavement where applicable, trench excavation, pipe installation, backfill operations, and re-paving where applicable. In undeveloped areas, an approximately 50-foot wide corridor for construction would be utilized to maximize construction efficiency. Sufficient space would be available to allow the contractor to store the excavated soil to the side of the trench, install the pipe, and backfill the trench reusing the soil. Pipes would be staged along the alignment in advance of the recycled water pipeline installation. In areas encumbered by existing improvements, high-volume roadways, or environmentally sensitive areas, a narrower construction corridor of approximately 25 feet would be used.

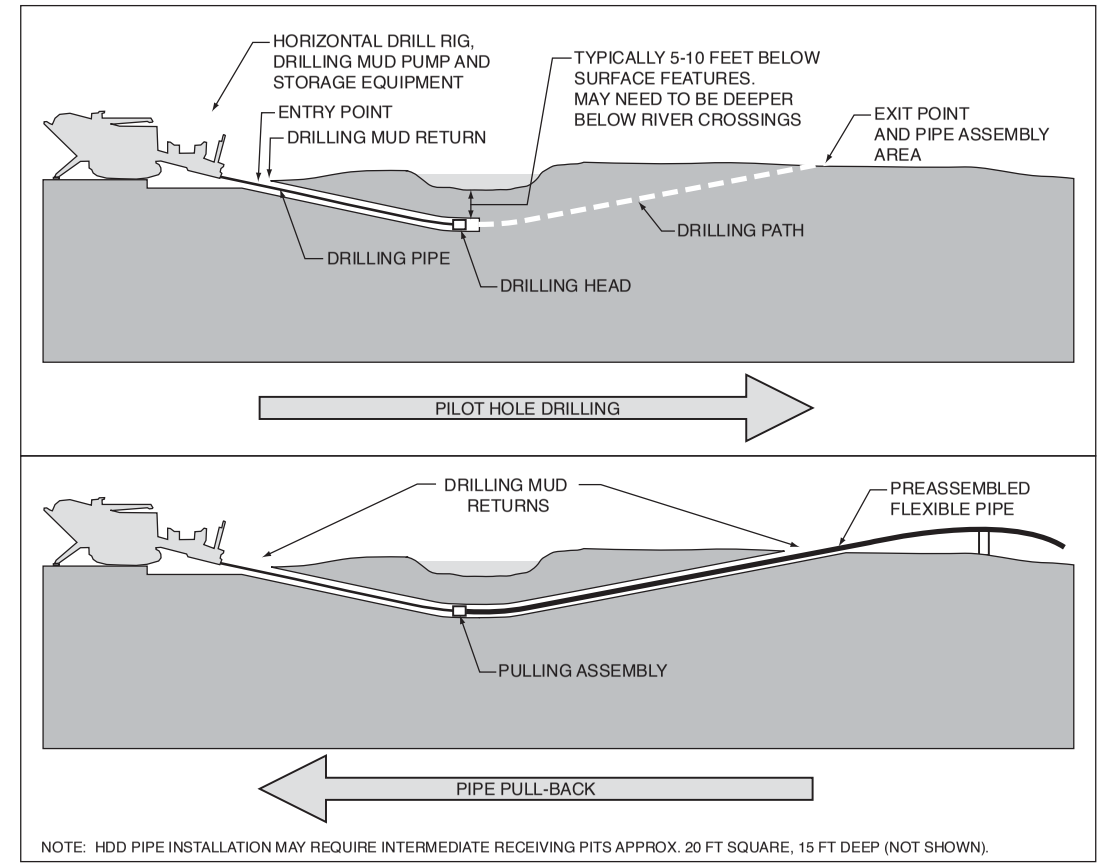
The estimated trench width for a 14-inch-diameter recycled water pipeline (average size) would be approximately 30 inches and estimated trench depth would be approximately 56 inches; however the dimensions would vary with the location along the route and the diameter of the pipeline. Recycled water pipeline construction would occur at a rate of approximately 300–400 feet per day where the pipelines would cross open land or low-use sections of roadways. In more developed areas, where there are narrow construction corridors, higher traffic volumes, and more utilities, the construction rate is expected to average approximately 100–200 feet per day.

Spoils, excluding asphalt and concrete, will be retained for replacement to avoid soil importation and reduce truck trips. Only contaminated spoils will be excavated along roadways and be hauled off site to appropriate disposal facilities. Backfill material would be imported if necessary. In open space areas, native excavated soils would be retained for backfill.

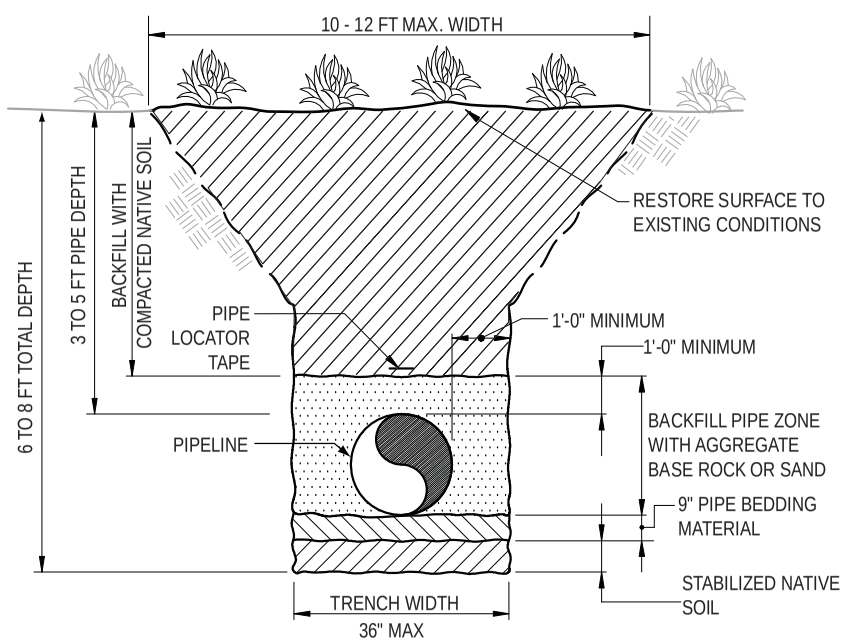
During construction, vertical wall trenches would be temporarily closed at the end of each work day, either by covering with steel trench plates, backfill material, or installing barricades to restrict access depending on physical conditions and conditions of the encroachment permit (along roadways). If the area is paved prior to construction, a temporary patch or covering would be used until final repaving of the affected area occurs. Final paving would occur approximately two to six weeks after recycled water pipeline construction is complete within a given road segment.



Example Pipeline Placement in Roadway Right of Way;
Local requirements may vary.

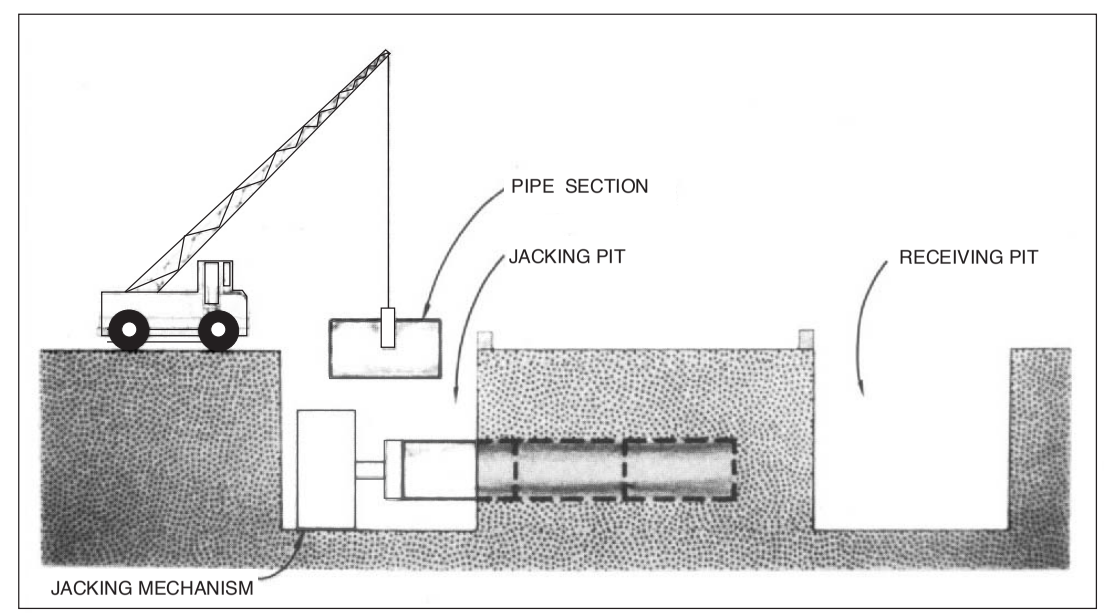


Typical Horizontal Directional Drill Operation



Example Open-cut Trench Section;
Local requirements may vary.

NOTE:
DEWATERING AND TRENCH SHORING NOT SHOWN



Typical Bore And Jack Pipeline Installation Special Construction Locations

SOURCE: RMC Inc.; Brown and Caldwell; Nolte

Figure 2-13
Construction Techniques

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Jack and Bore Tunneling

Jack and bore tunneling could be employed in areas where open cut trenching is not feasible due to limited construction area, geotechnical conditions, railroad crossings, major road crossings, or presence of sensitive biological resources such as wetlands or riparian habitat. Jack and bore tunneling is a trenchless construction method that would be utilized for installing underground pipelines for short distances without disturbing the ground surface. This method employs a horizontal boring machine or an auger that is advanced in a tunnel bore to remove material ahead of the pipe. Powerful hydraulic jacks are used to push pipe from a launch (jacking) pit to a receiving pit. As the tunneling auger is driven forward, a jacking pipe is added into the pipe string. Each bore and jack undercrossing would require a jacking pit measuring approximately 30 feet by 10 feet. The temporary pits typically would be excavated to a maximum depth of 20 feet. Recycled water pipeline installation by this method would require approximately one to two weeks per waterway crossing; excavated soils would be retained for backfill.

Directional Drilling

Horizontal directional drilling is another trenchless construction method that could be used for installing underground pipelines without disturbing the ground surface. Using a horizontal drill rig, the pipeline is installed in two stages: (1) a small diameter pilot hole is directionally drilled along a designed directional path, and (2) the pilot hole is then enlarged to a diameter that would accommodate the pipeline and the pipeline would be pulled back through the enlarged hole. Slurry, typically bentonite (an inert clay), is used as a drilling lubricant and processed by separating solids from the slurry and discharging the clear liquid to waterways or storm drains.

Recycled water pipeline installation by this method would require approximately one to two weeks per waterway crossing. Any unused excavated soils would be hauled off site.

Recycled Water Pipeline Suspension

Pipeline suspension is a fourth construction alternative for recycled water pipeline installation and could occur at locations with bridges that cross streams. Pipeline construction at these crossings could occur by installing the pipeline in the structural supports underneath or on the sides of the bridges. Design of a bridge crossing (e.g., pipe material and placement) would be determined during the design phase, once the engineers consult with the bridge’s proprietor and review the design specifications of the bridge.

Pipeline installation by this method would require approximately one to two weeks per bridge crossing. No excavation would be required.

Surface Restoration

The final phase of pipeline construction would be surface restoration. In areas where pipe is installed along roadways, repaving would be the final step. Where temporary patching was performed, permanent repaving would be the final step. Final repaving would be performed either after the entire pipe construction is complete or after segments of pipe construction are complete.

Unpaved surfaces would be restored by replanting native grasses. A permanent right-of-way of approximately 20-30 feet would be needed for the pipelines in areas outside of the roadways.

2.9.2 Storage Facilities

Construction of the new open storage reservoirs would include site preparation and clearing, excavation, earth movement, liner placement, embankment construction, and hydro-seeding. Assuming a surface storage facility of approximately 50 acre-feet, approximately 100,000 cubic yards of material would be excavated to a depth of approximately six feet. Approximately 20,000 cubic yards would be used to build embankments; the remaining 80,000 cubic yards would be balanced on-site. Approximately 10-15 crew members would be needed for construction. Construction of each storage reservoir is estimated to take approximately eight months..

2.9.3 Booster Pump Station and Distribution Pump Station

Survey staking would be used to define the limits of the construction for proposed booster pump stations. Following rough grading, additional excavation or filling would bring the site to final grade and prepare the soil for underground piping and structural slabs. Site work would involve installing manholes, valve pits, structural foundations, curbs, site drainage, fencing, and sidewalks. After the structure has been erected and roofed, electrical equipment (e.g., machinery control consoles, panels, switchboards, lighting, etc.) would be installed. Site work such as installing pull boxes, conduits, and cables would continue. Pumps would be installed and piped through the process facilities. Approximately five crew members would be needed for construction. Construction of each booster pump station is estimated to take approximately six months.

2.9.4 Staging Areas

At various locations within the construction zones, staging areas would be required to store pipe, construction equipment, and other construction related items. Staging areas would be established in areas near construction zones that are open and easily accessed (e.g., vacant lots). In some cases, staging areas may be used for the duration of the NBWRP. In other cases, as pipeline construction moves along the route, the staging area may also be moved along and within the route to minimize hauling distances and avoid disrupting any one area for extended periods of time. Contractors are expected to negotiate short-term temporary easements for staging areas. The location of the staging areas would be determined by the contractor and would typically be located every three miles along the pipeline alignment. Generally the staging areas would be located in previously disturbed or non-vegetated areas with protection barriers to adjacent sensitive areas. The maximum size of these staging areas would be approximately one acre. Additional staging areas could be located within the 25-foot construction corridor along the pipeline alignment. Staging areas would avoid wetlands and riparian areas, using them only as a last resort and fully restoring them after use.

2.9.5 Construction Equipment

Construction would involve grading, excavation, structural erection, and backfilling at the NBWRP sites. Energy efficient equipment would be used wherever feasible. Heavy construction could include the following equipment:

- Tunnel boring machine
- Pavement saw
- Jack hammers
- Back hoe
- Front-end loaders
- 10-wheel dump trucks
- Flat-back delivery truck
- Sweepers
- Crane
- Compactor
- Water truck
- Trench shields
- Air compressors
- Concrete trucks
- Concrete pumper trucks
- Welding trucks
- Side boom pipe handler tractor
- Earth movers
- Bulldozers
- Excavators
- Road grader (for widening at detours along shoulders
- Paving equipment: back hoe, asphalt hauling trucks, compactors, paving machine, rollers

2.10 Operation and Maintenance

Operation of the NBWRP would involve operation and maintenance of the proposed facilities in addition to the existing WWTPs.

2.10.1 Recycled Water Pipelines

The proposed recycled water pipelines would be primarily operated from May through October; in times of drought the pipelines may be in operation on a year-round basis. The recycled water would be provided from the WWTPs. In the event the existing recycled water users' demand is greater than the supply, additional recycled water would be supplied from the existing and proposed storage reservoirs.

2.10.2 Storage Reservoirs

Typically, the proposed reservoirs would store recycled water from the WWTPs in spring. The stored water would be delivered to users during summer and fall.

2.10.3 Pump Stations

The pump stations would generally operate from May through October; in times of drought, these facilities may operate on a year-round basis.

2.10.4 Maintenance

Currently the member agencies' staff performs daily inspections of the water recycling facilities including pump stations; electrical control equipment; tide and slide gates; motor control center; valves and appurtenances; and pond floats and cell sites. Through preventative maintenance, the inspections are conducted either annually, semi-annually, monthly, and/or weekly. The staff at the WWTPs would perform similar preventative maintenance of the proposed recycled water pipelines, storage reservoirs, and pump stations.

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