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

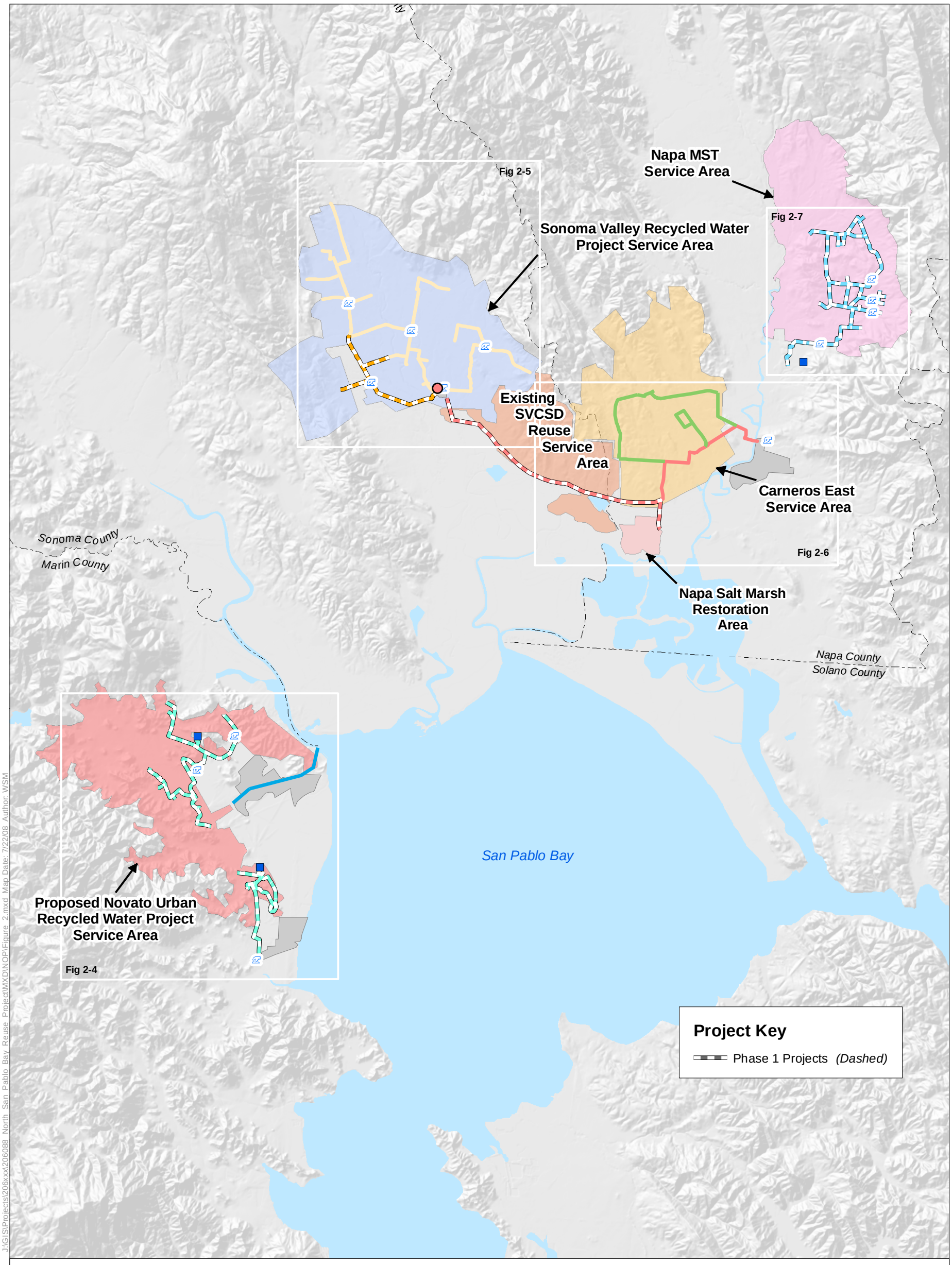
Table 2-10 summarizes the recycled water demand met in each WWTP service area and discharge to San Pablo Bay that would occur under Alternative 1. Each of the WWTPs currently serves some recycled water customers. **Table 2-10** presents this existing demand in acre feet (AF) for each service area, the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

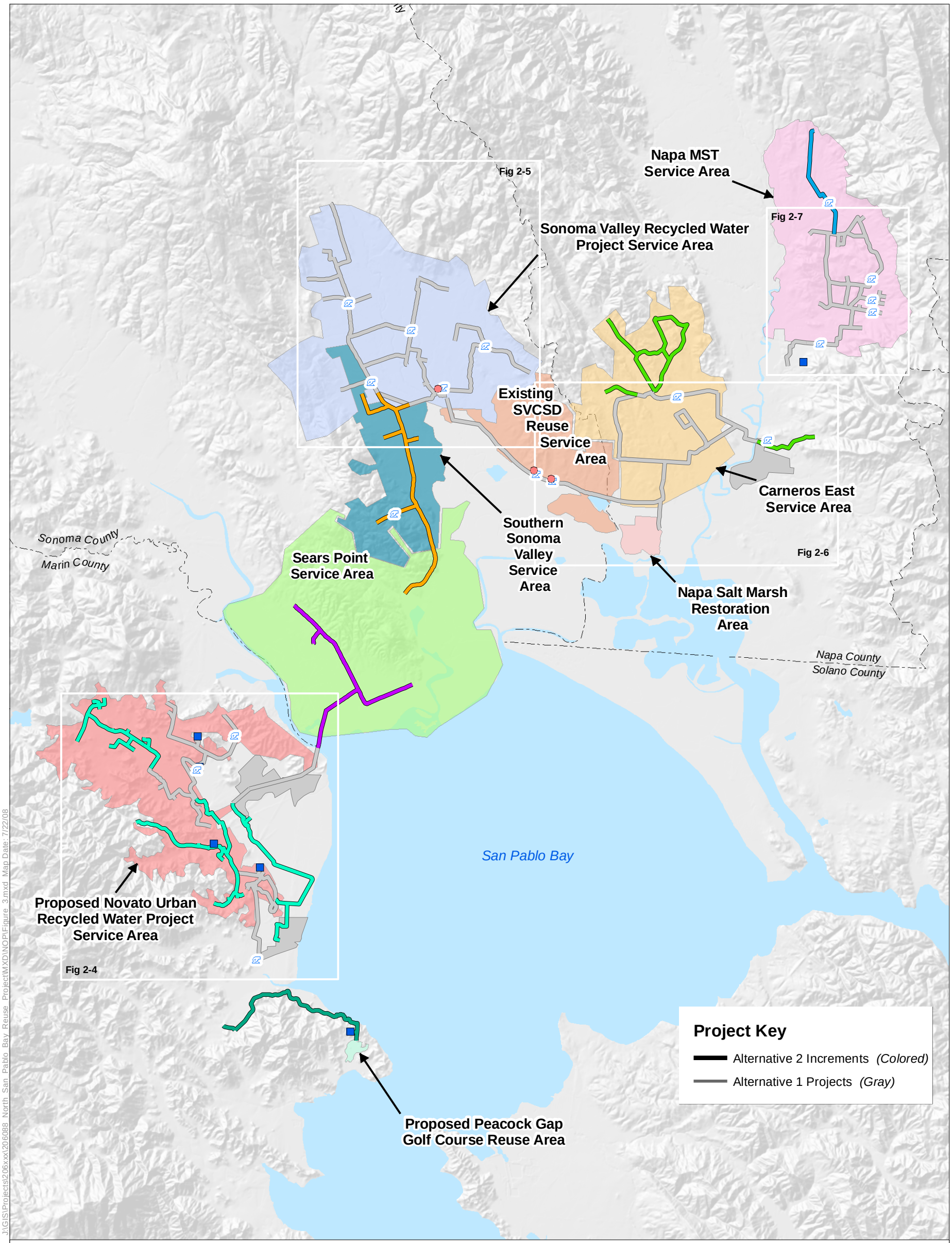
As shown in Table 2-15, assuming the provision of adequate storage, there is sufficient demand in the Sonoma areas such that those WWTPs could potentially recycled all WWTP inflow under Alternative 2.

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)			Comments
	Existing Storage	Proposed New Storage	Total	
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)

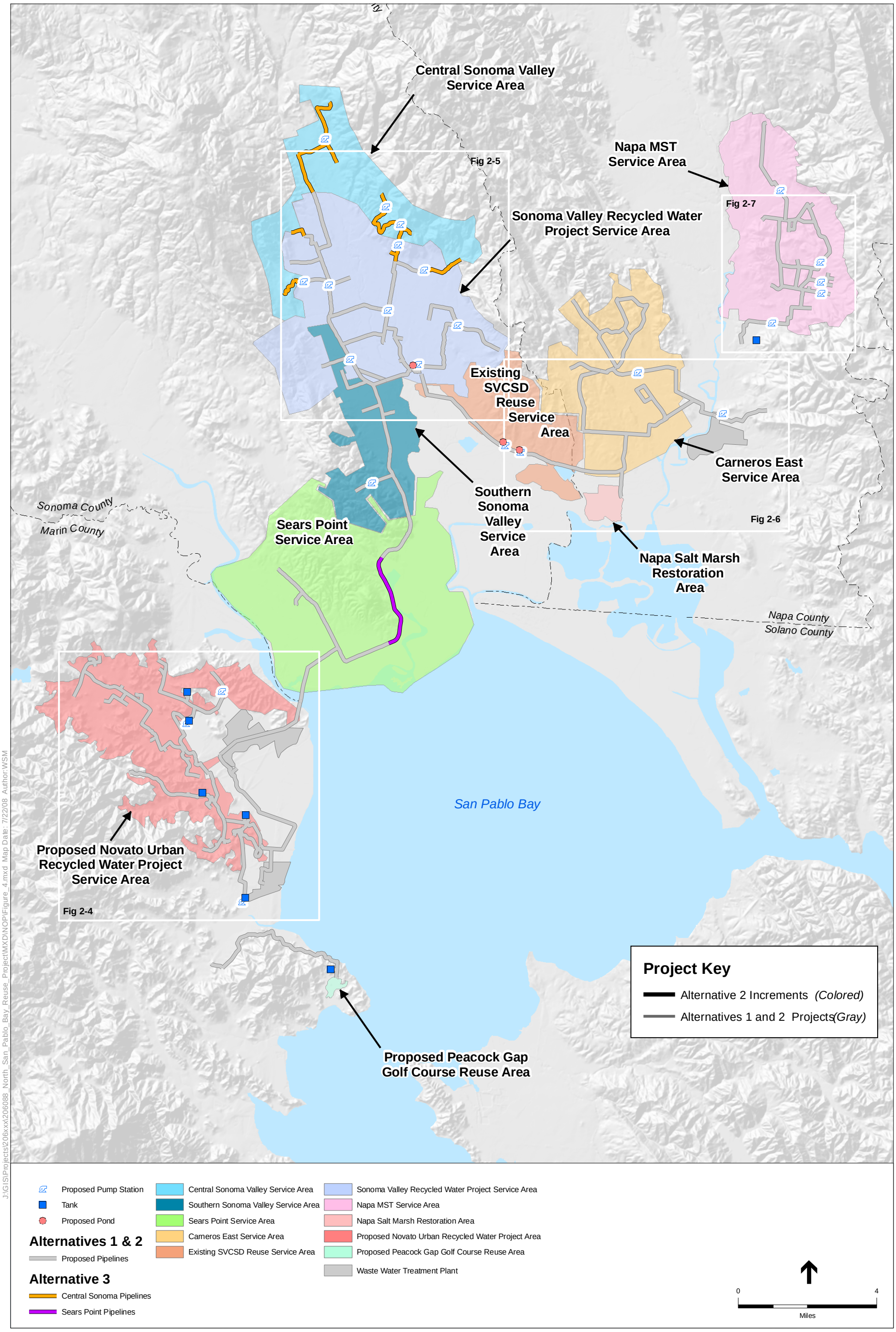
WWTP Service Area	WWTP Inflow	Existing Recycled Water Demand	New Recycled Water Demand Developed for Alternative 3	Total Recycled Water Demand	Discharge to San Pablo Bay(1)
LGVSD WWTP	3,670	902	409	1,311	2,181
Novato SD WWTP	8,677	270	3,701	3,971	4,706
SVCSD WWTP	5,508	1,174	4,230	5,404	0
Napa WWTP	9,800	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.

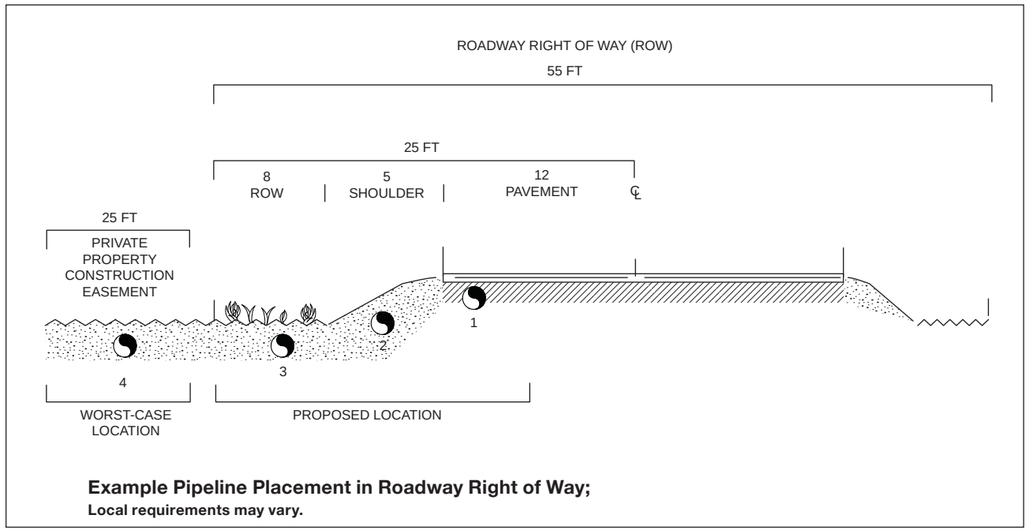
Trenching

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.

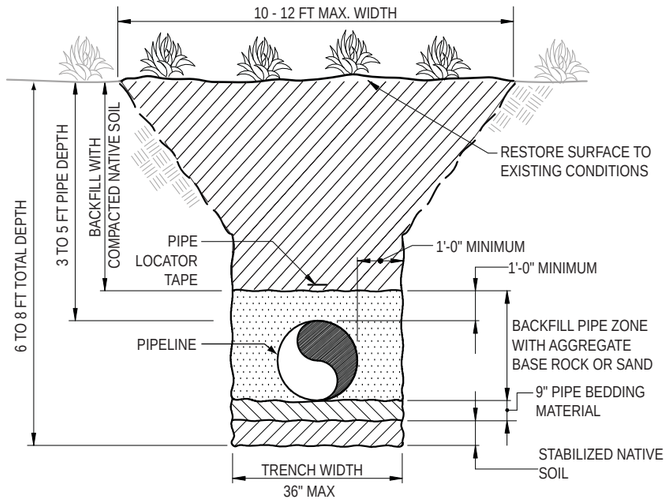
The estimated trench width for a 14-inch-diameter recycled water pipeline (average size) would be approximately 30 inches and estimated trench depth would be approximately 56 inches; however the dimensions would vary with the location along the route and the diameter of the pipeline. Recycled water pipeline 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.

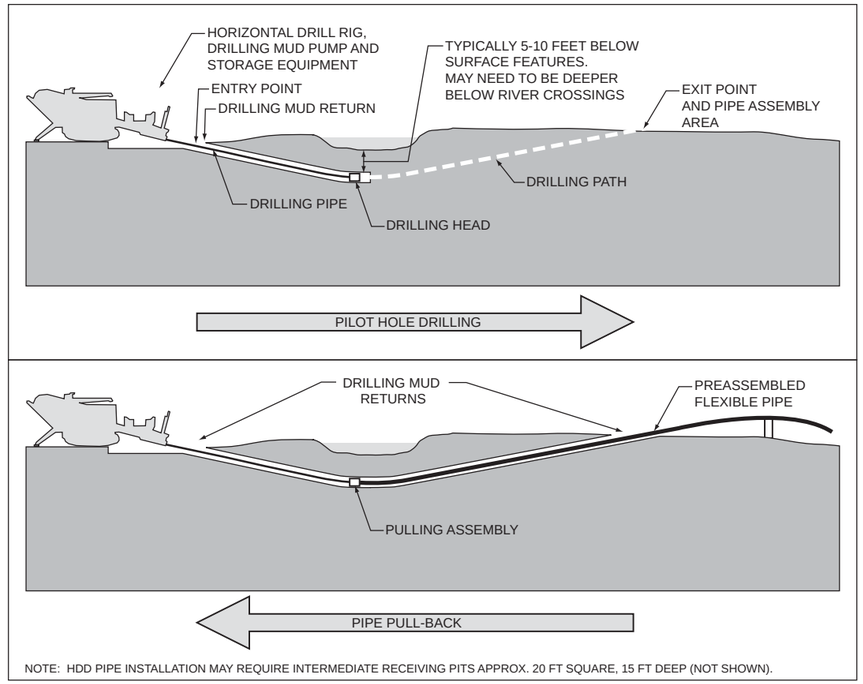


Example Pipeline Placement in Roadway Right of Way;
Local requirements may vary.



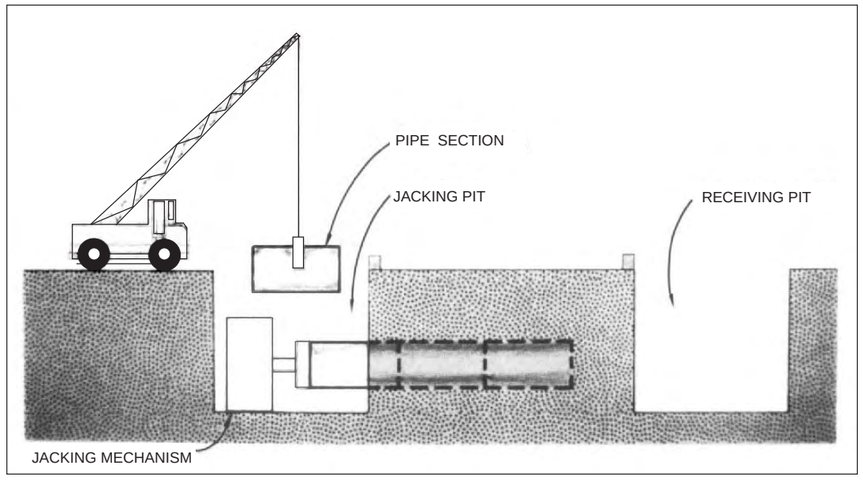
Example Open-cut Trench Section;
Local requirements may vary.

NOTE:
DEWATERING AND TRENCH SHORING NOT SHOWN



NOTE: HDD PIPE INSTALLATION MAY REQUIRE INTERMEDIATE RECEIVING PITS APPROX. 20 FT SQUARE, 15 FT DEEP (NOT SHOWN).

Typical Horizontal Directional Drill Operation



Typical Bore And Jack Pipeline Installation Special Construction Locations

SOURCE: RMC Inc.; Brown and Caldwell; Nolte

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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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